1.2.1(5)

Certified List of Courses for 2018-19

NRIINSTITUTEOFTECHNOLOGY

Pothavarappadu(v),Agiripalli(M)VijayawadaRural-521212

1.2.1(5)-Certified List of New Courses along with the Highlighted Course Structure for the A.Y. 2018-19

NRI INSTITUTE OF TECHNOLOGY

(An Autonomous Institution Permanently Affiliated to JNTUK, Kakinada)
(Accredited with NAAC "A" Grade and ISO 9001:2015 Certified Institution)
POTHAVARAPPADU (V), (VIA) NUNNA, AGIRIPALLI (M), PIN – 521 212

DEPARTMENT OF CIVIL ENGINEERING

NRIA 18

STRUCTURE FOR FIRST YEAR B.TECH PROGRAMME

I YEAR I SEMESTER

Sl. No	Course Code	Title of the Course	Scheme of Instruction (Periods Per Week)				Scheme of Examination (Maximum Marks)			No. of Credits
			L	T	P	Total	CIA	SEA	Total	
1	18A1100101	Professional English – I	2	1	-	3	40	60	100	3
2	18A1100201	Engineering Mathematics – I	2	1	-	3	40	60	100	3
3	18A1100204	Engineering Chemistry	2	1	-	3	40	60	100	3
4	18A1101401	Engineering Mechanics	3	1	-	4	40	60	100	4
5	18A1100801	Environmental Studies	2	1	-	3	40	60	100	0
6	18A1100191	English Communication Skills lab – I	-	-	4	4	40	60	100	2
7	18A1100293	Engineering Chemistry lab	-	-	3	3	40	60	100	1.5
8	18A1100391	Basic Engineering & IT Workshop	-	-	3	3	40	60	100	1.5
		Total	**11**	**5**	**10**	**26**	**320**	**480**	**800**	**18**

I YEAR II SEMESTER

Sl. No	Course Code	Title of the Course	Scheme of Instruction (Periods Per Week)				Scheme of Examination (Maximum Marks)			No. of Credits
			L	T	P	Total	CIA	SEA	Total	
1	18A1200101	Professional English – II	2	1	-	3	40	60	100	3
2	18A1200201	Engineering Mathematics – II	3	1	-	4	40	60	100	4
3	18A1200202	Engineering Physics	2	1	-	3	40	60	100	3
4	18A1205301	Programming and Problem solving with C	3	1	-	4	40	60	100	4
5	18A1201401	Engineering Drawing	2	-	3	5	40	60	100	3.5
6	18A1200191	English Communication Skills lab – II	-	-	3	3	40	60	100	1.5
7	18A1200291	Engineering Physics lab	-	-	3	3	40	60	100	1.5
8	18A1205392	Programming and Problem solving with C Lab	-	-	3	3	40	60	100	1.5
		Total	**12**	**4**	**12**	**28**	**320**	**480**	**800**	**22**

L - LECTURE T – TUTORIAL P - PRACTICAL
CIA – Continuous Internal Assessment SEA – Semester End Assessment

Head of The Department
CIVIL ENGINEERING
NRI Institute of Technol-
POTHAVARAPPADU

PROFESSIONAL ENGLISH-I
(Common to CE,EEE,ME,ECE,CSE and IT)

Lecture – Tutorial:	2-1 Hours	**Internal Marks:**	40
Credits:	3	**External Marks:**	60

Prerequisites:
None

Course Objectives:
1. To strengthen the lexical ability of the students in different contexts.
2. To expose the students to various sub-skills and strategies of reading and writing – summarizing and paraphrasing.
3. To help the students develop effective writing skills through paragraph writing.
4. To train the students in fundamentals of grammar required to equip them with fluent English.
5. To enable the students to think critically by exposing them to different socio-cultural contexts through various literary texts.

Course Outcomes:
Upon successful completion of the course, the student will be able to:

CO1	Use grammar accurately in various formal and functional contexts.
CO2	Build good vocabulary and develop the ability to use in various contexts.
CO3	Comprehend, analyze and evaluate texts critically.
CO4	Develop effective reading and writing skills to enhance communicative competence.
CO5	Help the students to inculcate and apply human values and professional ethics in their academic, professional and social lives.

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1										3		2
CO2										3		2
CO3						1	1					2
CO4										3		2
CO5						1	1	3				2

UNIT I

1. **Reading:** Introduction to Integrated Communication with emphasis on Reading Skills, Scanning an article from *The Economic Times* – **"Why India celebrates Engineers Day on the birth anniversary of M. Visvesvaraya"**
2. **Text: "I have a dream..."** - Martin Luther King
3. **Vocabulary Building:** Synonyms and Antonyms from the Text , Word Formations: Root Words, Prefixes and Suffixes
4. **Writing:** Styles of Sentence Structure for Effective Writing, Textual Exercises, Scrambled Sentences
5. **Remedial Grammar:** Parts of Speech, Effective Sentence Constructions Using Connectives

UNIT II

1. **Reading:** Skimming: **"Oh Father, Dear Father"** – Raj Kinger
2. **Text: "On Shaking Hands"** – A.G. Gardiner
3. **Vocabulary Building:** Synonyms and Antonyms from the Text
4. **Writing:** Paragraph Scramble
5. **Remedial Grammar:** Framing Questions and Question Tags, Punctuation Rules, Usage of Articles

UNIT III

1. **Reading:** Critical Reading: **"Dial 000"** - Barry Rosenberg
2. **Text: "Seeing People Off"** – Max Beerbohm
3. **Vocabulary Building:** Synonyms and Antonyms from the Text, Acronyms
4. **Writing:** Principles of a Good Paragraph
5. **Remedial Grammar:** Verbs and Types, Present Tense

UNIT IV

1. **Reading:** Note Making: **"Icons: The Lotus Temple"** – Anamika Bhutalia
2. **Text: "The Lost Child"** – Mulk Raj Anand
3. **Vocabulary Building:** Synonyms and Antonyms from the Text, One Word Substitutes
4. **Writing:** Summarising and Writing Anecdotes
5. **Remedial Grammar:** Past Tense and Future Tense, Correction of Sentences

REFERENCE BOOKS:

1. **The Blue Book of Grammar and Punctuation,** 10th Edition, Jane Straus, Josey-Bass, A Wiley Imprint.
2. **Oxford Practice Grammar,** John Eastwood, Oxford University Press.
3. **The Most Common Mistakes in English Usage** – Thomas Elliott Berry
4. **Essential Communication Skills** – Shalini Agarwal, Ane Books Pvt Ltd.
5. **Dictionary of Synonyms and Antonyms,** Oxford & IBH, III Ed
6. **A Practical English Grammar,** Agnes V. Martinet and Audrey Jean Thomson, Oxford University Press.

E-RESOURCES:

1. http://grammar.ccc.commnet.edu/grammar/index.htm
2. https://owl.english.purdue.edu/
3. https://www.britishcouncil.in/

ENGINEERING MATHEMATICS-1
((Common to CE,EEE,ME,ECE,CSE and IT)

Lecture – Tutorial:	2 – 1	**Internal Marks:**	40
Credits:	3	**External Marks:**	60

Prerequisites:
Fundamentals of Matrices, Fundamentals of Trigonometry and Calculus

Course Objectives:

- The course is designed to equip the students with the necessary skills and techniques that are essential for Engineering course.
- The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.

COURSE OUTCOMES:
Upon successful completion of the course, the student will be able to:

CO1 To solve simultaneous linear equations, determine eigen values, eigen vectors of a matrix and determine the nature of a Quadratic forms.

CO2 To calculate a root of algebraic and transcendental equations. Explain relation between the finite difference operators and compute the interpolating polynomial for the given data. Solve Ordinary differential equations numerically using Taylor series method, Euler's and RK method of second and fourth order.

CO3 To determine the Maxima and Minima of functions of Two variables without constraints and with constraints and form the Partial Differential equations by elimination of arbitrary constants and arbitrary functions.

CO4 To solve the ordinary linear differential equations by using Laplace Transforms.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2		1	2						1	1
CO2	3	2		1	1						1	1
CO3	3	2		1	2						1	1
CO4	3	2		1	1						1	1

UNIT I:

Matrices

Rank – Echelon form – Normal form – PAQ form – Inverse of 4x4 matrix by Gauss-Jordan - Solution of Homogeneous linear systems – solution of Non-homogeneous linear systems – Gauss Elimination – Gauss Seidel methods.

Eigenvalues – Eigen vectors – Properties – Cayley Hamilton theorem (without proof) – Inverse Powers of Matrices by Caley Hamilton theorem – Quadratic forms – Reduction of quadratic forms to Canonical form (Congruent transformation method, Orthogonal transformation) – Rank, Index, Signature of a Quadratic form.

UNIT II

Numerical Methods

Solutions of Algebraic and Transcendental Equations: Bisection method – Iteration method – Newton Raphson method (one variable). Interpolation: Finite differences –Operators Δ, ∇, E and relations between them - Forward differences – Backward differences – Missing terms - Newton's forward and backward formulae for interpolation – Lagrange's interpolation formula.

Trapezoidal rule – Simpson's $1/3^{rd}$ and $3/8^{th}$ rules – Numerical solution of Ordinary differential equation by Taylor series method – Euler's method – Modified Euler's method – Rungekutta method of second and fourth order.

UNIT III

Partial Differentiation

Homogeneous function – Euler's theorem – Total derivative – Chain rule – Generalized mean value theorem for single variable (without proof) – Taylor's and Maclaurin's series – Expansion of Two variable functions – functional dependence – Jacobian – Maxima and Minima of functions of two variables without constraints and Lagrange's method of multipliers.

UNIT IV

Laplace Transforms

Laplace transforms of standard functions – shifting theorems – transforms of derivative's and integrals – Unit step function – Dirac's delta function.

Inverse laplace transforms - convolution theorem (without proof) – solving ordinary differential equations (Initial value problems) using Laplace transforms.

TEXT BOOKS:

1.B.S.Grewal, "Higher Engineering Mathematics, Khanna Publishers", 43rd Edition, 2014.

2.V.Ravindranath and P.Vijayalakshmi, Mathematical Methods, Himalaya Publishing House.

REFERENCE BOOKS:

1. **N.P.Bali**, Engineering Mathematics, Lakshmi Publications.
2. **Erwin Kreyszig,** Advanced Engineering Mathematics, 10th Edition, Wiley-India.

E-RESOURCES:

1.www.nptel**videos.com/mathematics/ (Math Lectures from MIT,Stanford,IIT'S)**

2.nptel.ac.in/courses/122104017

3.nptel.ac.in/courses/111105035

ENGINEERING CHEMISTRY

Lecture – Tutorial: 2-1 **Internal Marks:** 40

Credits: 3 **External Marks:** 60

Prerequisites:

Course Objectives:

Knowledge of basic concepts of Chemistry for Engineering students will help them as professional engineers later in design and material selection, as well as utilizing the available resources.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1 Plastics have become part and parcel of everyday life. Hence their preparation, fabrication and study of properties are essential to engineering students.

CO2 Study of electrochemistry helps in developing efficient cells and batteries and thorough understanding of corrosion and its prevention.

CO3 Knowledge of water technology helps in understanding various methods to produce suitable water for drinking as well as industrial purpose.

CO4 Fuels as a source of energy for automobiles and all industries and they are introduced. Fuels which are used in general and their economics, advantages and limitations are discussed.

Contribution of Course Outcomes towards achievement of Program Outcomes

(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	2	1	3									
CO2	3	1	2									
CO3	1		3									
CO4	2		1									

UNIT I

POLYMERS

Introduction-methods of polymerization-(emulsion and suspension)-physical and mechanical properties.

Plastics– Introduction-Thermoplastics and Thermosetting plastics – Compounding and fabrication (compression, injection, transfer & extrusion)- Preparation, properties and applications of polythene, PVC, Bakelite and Teflon

Elastomers: - Natural rubber- compounding and vulcanization – Synthetic rubbers: Buna S, Buna N and Thiokol– Applications of elastomers.

Fiber reinforced plastics – Biodegradable polymers – Conducting polymers.

UNIT II

ELECTROCHEMISTRY AND CORROSION

Galvanic cells - Reversible and irreversible cells – Single electrode potential – Electrochemical series and uses of this series- Standard Hydrogen electrode and Calomel electrode - Concentration Cells

Batteries: Dry Cell – Li- cells (Liquid cathode and solid cathode Li cells).

Fuel cells-Hydrogen-oxygen and methyl alcohol-oxygen fuel cells

Corrosion :- Definition – Theories of Corrosion (chemical & electrochemical) – Formation of galvanic cells by different metals, by concentration cells, by differential aeration and waterline corrosion – Passivity of metals – Pitting corrosion - Galvanic series – Factors which influence the rate of corrosion - Protection from corrosion – Cathodic protection – Protective coatings: Galvanizing, Tinning, Electroplating, Electro less plating.

UNIT III

WATER TECHNOLOGY

Hard water:- Reasons for hardness – units of hardness –numerical problems-determination of hardness by EDTA method -alkalinity

Boiler troubles – Priming and Foaming, Scale formation, Boiler corrosion, Caustic embrittlement - Internal treatments –external treatments- Softening of Hard water: Lime – Soda process-numerical problems- Zeolite process and Ion Exchange process.

Water for drinking purposes- Purification – disinfection- Chlorination, Break point chlorination-Reverse Osmosis and Electro Dialysis.

UNIT IV

Fuels:- Introduction – Classification – Calorific value - HCV and LCV – Dulong's formula –Bomb calorimeter – Numerical problems – Coal — Proximate and ultimate analysis –Significance of the analyses – Liquid fuels – Petroleum-Refining – Cracking – Synthetic petrol(Fisher tropsch method)–Petrol knocking – Diesel knocking-Octane and Cetane ratings – Anti-knock agents-Flue gas analysis by orsat apparatus.

Nanomaterials- Introduction, sol-gel method & chemical reduction methods of preparation- carbon nano tubes and fullerenes: preparation and properties and applications.

Cement: - Constituents, manufacturing, hardening and setting, deterioration of cement

TEXT BOOKS:

1. Engineering Chemistry by Jain and Jain; Dhanpati Rai Publication
2. Engineering Chemistry by Shikha Agarwal; Cambridge University Press,2015 edition.

REFERENCE BOOKS:

1. Engineering Chemistry of Wiley India Pvt. Ltd., Vairam and others, 2014 2nd edition.
2. Engineering Chemistry by Prasanth Rath, Cengage Learning, 2015 edition.
3. A text book of engineering Chemistry by S. S. Dara; S. Chand & Co Ltd., Latest Edition
4. Applied Chemistry by H.D. Gesser, Springer Publishers
5. Text book of Nano-science and nanotechnology by B.S. Murthy, P. Shankar and others, University Press, IIM

E-RESOURCES:

1. www.nptel.ac.in
2. www.swayam.gov.in

ENGINEERING MECHANICS

Lecture – Tutorial: 3 – 1 **Internal Marks:** 40

Credits: 4 **External Marks:** 60

Prerequisites:

- Engineering Physics.
- Engineering Mathematics.

Course Objectives:

- To develop an understanding of the principles of statics and the ability to analyze problems using static equilibrium equations.
- To develop the fundamentals of engineering mechanics and problem solving skills essential for an engineer.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1 Construct free body diagrams and develop appropriate equilibrium equations.

CO2 Analyze system with concepts of friction & Determine the position of centroid.

CO3 Determine moment of inertia for Composite Sections.

CO4 Apply D-Alembert's principle, work-energy method and Impulse Momentum principle to solve dynamics problems.

Contribution of Course Outcomes towards achievement of Program Outcomes
(1– Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	1	-	2	-	-	-	-	-	-	-	-
CO2	3	1	-	2	-	-	-	1	-	-	-	-
CO3	3	2	-	3	-	-	-	1	-	-	1	-
CO4	3	1	-	2	-	-	-	-	-	-	-	-

UNIT I

Systems of Forces:
Classification, Coplanar Concurrent Forces – Components of force– Resultant- Triangle law of Forces-Polygon law of Forces- Parallelogram Law of Forces- Resolution and composition of Forces, Moment of Force and its Application – Varignon's theorem.

Equilibrium of Systems of Forces:

Free Body Diagrams, Types of Supports and their reactions, Internal and External Forces – Types of Equilibrium, Equations of Equilibrium, Conditions of Equilibrium, Equilibrium of bodies under Coplanar concurrent system of forces – Lami's Theorem

UNIT II

FRICTION:
Introduction, limiting friction and impending motion, coulomb's laws of dry friction, coefficient of friction, cone of friction, wedge friction, Ladder friction.

Centroid:
Centroids of simple figures (from basic principles) – Centroids of Composite Figures

Centre of Gravity: Centre of gravity of simple body (from basic principles), centre of gravity of composite bodies, Pappus and Guldinus theorem.

UNIT III

Area moment of Inertia:
Definition –Moment of Inertia of plane areas, Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures and Product of Inertia.

Mass Moment of Inertia:
Moment of Inertia of Simple solids, Transfer Formula for Mass Moments of Inertia, Mass Moment of Inertia of composite bodies.

UNIT IV

Kinematics & Kinetics:
Rectilinear motion – Motion of Rigid Body under uniform and variable accelerations – motion under gravity-curvilinear motion -Projectiles-rotary motion. Analysis as a Particle and Analysis as a Rigid Body in Translation – D'Alemberts Principle – Connected bodies.

Work, Power and Energy: Work-energy equation for translation-connected bodies on horizontal and inclined planes-pulleys. Impulse momentum method.

TEXT BOOKS:

1. **S.Timoshenko, DH Young**, *JV Rao, Sukumar Pati, —Engineering* Mechanics", McGraw Hill Education Publisher,5th Edition(Special Indian Edition), 2013.

2.**Hibbeller,R.C and Ashok Gupta**, Engineering Mechanics:Statics and Dynamics, 11 Edition, Pearson Education 2010.

REFERENCE BOOKS:

1.Engineering Mechanics: R.K.Bansal, Laxmi publications.
2.Engineering Mechanics: S.S.Bavakatti, New age International.
3.Engineering Mechanics:Bhattacharyya,Oxford publications.
4. Engineering Mechanics: Pakirappa, Durga publishing House

E-RESOURCES:

1. http://nptel.ac.in/courses/122104015/
2. https://ocw.mit.edu/courses/mechanical-engineering/

ENVIRONMENTAL STUDIES
(Common to CE,EEE,ME,CSE and IT)

Lecture – Tutorial: 2-1 **Internal Marks:** 40
Credits: -- **External Marks:** 60

Prerequisites:

Course Objectives:

- Basic understanding of ecosystem and to know the importance of biodiversity.
- Understanding of natural resources.
- To understand different types of pollutants effecting the environment.
- To know global environmental problems, problems associated with over population and burden on environment.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1	Realize the importance of ecosystem and biodiversity for maintaining ecological balance.
CO2	Understand the role of natural resources for the sustenance of life on earth and recognize the need to conserve them.
CO3	Identify the environmental pollutants and abatement devices.
CO4	Gain the importance of sustainability.

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	2		3			2	3	2			2	1
CO2	2		3			2	3	2			2	1
CO3	2		3			2	3	2			2	1
CO4	2		3			2	3	2			2	1

UNIT I

Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Ecological succession. – Food chains, food webs and ecological pyramids, flow of energy, biogeochemical cycles.

Biodiversity and its conservation: Definition: genetic, species and ecosystem diversity- classification - Value of biodiversity, India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts - Endangered and endemic species of India – Conservation of biodiversity.

UNIT II

Natural Resources: Natural resources and associated problems

Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people.

Water resources – Use and over utilization of surface and ground water –

Floods, drought, conflicts over water, dams – benefits and problems.
Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources. Case studies.
Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources Vs Oil and Natural Gas Extraction.
Land resources: land as a resource, land degradation, wasteland reclamation, man induced landslides, soil erosion and desertification.
Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

UNIT III

Environmental Pollution: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards, Technological solutions for pollution control, Role of an individual in prevention of pollution with case studies.
Solid Waste Management: Sources, Classification, effects and control measures of urban andindustrial solid wastes. Biomedical, Hazardous and E-waste management, carbon credits.
Disaster management: floods, droughts, earthquakes, cyclones.

UNIT IV

Social issues and the environment: Global environmental challenges- global warming and climate change, acid rains, ozone layer depletion.
Towards sustainable future: From unsustainable to sustainable development, population and its explosion, urban problems related to energy, rain water harvesting, consumerism and waste products, role of IT in environment and human health, HIV/ AIDS, environmental ethics.
Environmental management and acts: Impact assessment and significance, various stages of EIA, environmental management plan (EMP), green belt development. Environmental Law (Air, Water, Wildlife, Forest, Environment protection act).
The student should visit an industry/ Ecosystem and submit a report individually on any issues related to environmental studies course and make a power point presentation.

TEXT BOOKS:

1. Environment Studies, Anubha Kaushik, C P Kaushik, New Age International Publishers, 2018
2. Environmental Studies, R. Rajagopalan, 2nd Edition, 2011, Oxford University Press.
3. Environmental Studies, P. N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai

REFERENCE BOOKS:

1. Text Book of Environmental Studies, Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.
2. Environmental Studies, K. V. S. G. Murali Krishna, VGS Publishers, Vijayawada.
3. Erach Bharucha, 2010 " Text Book of Environmental Studies" , University Grants Commission, University Press (India) Pvt. Ltd., Hyderabad.
4. Text book of Environmental Science and Engineering by G. Tyler Miller Jr, 2006 Cengage learning.

E-RESOURCES:

1. http://nptel.ac.in/courses.php.
2. http://jntuk-coeerd.in/

ENGLISH COMMUNICATION SKILLS LAB-I

Practice:	4 Hours	**Internal Marks:**	40
Credits:	2	**External Marks:**	60

Prerequisites:

None

Course Objectives:

To enable the students to learn through practice the four communication skills: Listening, Speaking, Reading and Writing.

Understand the nuances of language usage for better presentation in all the walks of life promoting life-long learning.

Course Outcomes:

Upon successful completion of the course, the student will be able to:

CO1 Understand the importance of communication skills and instill the need for life-long learning.

CO2 Express themselves fluently and appropriately in social and professional contexts.

CO3 Make sense of both verbal and non-verbal messages through selected listening activities.

CO4 Aware of the need of pronunciation and intonation in improving their speaking skills.

Contribution of Course Outcomes towards achievement of Program Outcomes

(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1						1			1	3		2
CO2						1			1	3		2
CO3									1	3		2
CO4											1	2

List of Experiments:

UNIT 1:

1. Why study Spoken English?
2. Making Inquiries on the phone, thanking and responding to Thanks
3. Responding to Requests and asking for Directions

Practice work.

UNIT 2:

1. Asking for Clarifications, Inviting, Expressing Sympathy, Congratulating
2. Apologising, Advising, Suggesting, Agreeing and Disagreeing

Practice work.

UNIT 3:

1. Letters and Sounds
2. The Sounds of English

Practice work.

UNIT 4:

1. Pronunciation
2. Stress and Intonation

Practice work.

Equipment Required:

Computer Assisted Language Laboratory with computers equipped with software that help the students in developing four skills – Listening, Speaking, Reading and Writing.

Reference Books:

1. INTERACT: English Lab Manual for Undergraduate Students' Published by Orient Blackswan Pvt Ltd.
2. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna Lakshmi, Maruti Publications.
3. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
4. Unlock, Listening and speaking skills 2, Cambridge University Press
5. Spring Board to Success, Orient BlackSwan
6. A Practical Course in effective english speaking skills, PHI
7. Word power made handy, Dr shalini verma, Schand Company
8. Let us hear them speak, Jayashree Mohanraj, Sage texts
9. Professional Communication, Aruna Koneru, Mc Grawhill Education Cornerstone, Developing soft skills, Pearson Education

E-Resources:

1. https://www.britishcouncil.in/
2. http://www.talkenglish.com/

ENGINEERING CHEMISTRY LAB

Practice:	3	**Internal Marks:**	40
Credits:	1.5	**External Marks:**	60

Prerequisites:

Course Objectives:

To provide knowledge of chemistry practical's. It enables the students to analyze the different parameters of water sample like hardness and alkalinity and different volumetric titrations. It makes the students to obtain basic knowledge of instrumentation based on different Engineering applications.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1 Perform different volumetric titrations listed in syllabus.

CO2 To analyze various parameters of water sample.

CO3 Instrumental methods of chemical analysis exhibit the skill of the students

CO4 Preparation of different compounds provides knowledge to the students.

Contribution of Course Outcomes towards achievement of Program Outcomes

(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1	2										
CO2	1	2										
CO3	1											
CO4	1											

List of Experiments:

1.Determination of HCl by Na_2CO_3 solution

2.Determination of alkalinity of sample containing Na_2CO_3 and NaOH

3.Determination of $KMnO_4$ using standard oxalic acid solution

4.Determination of total hardness of water by EDTA solution

5.Determination of copper using standard EDTA solution

6.Determination of Zinc using standard EDTA solution

7.Determination of Iron by a calorimetric method

8.Conductometric titration between strong acid and strong base

9.Potentiometric titration between strong acid and strong base

10.Potentiometric titration between Iron and dichromate

Additional Experiments to be performed

1.Preparation of urea-formaldehyde resin

2.Determination of P^H of water sample

3. Preparation of phenol-formaldehyde resin

EQUIPMENT REQUIRED:

PH meters, Potentiometers, Conductometers, colorimeters.

APPARATUS

Burettes, Pipettes, Conical flask, Beakers.

REFERENCE BOOKS:

1. A Textbook of Quantitative Analysis, Arthur J. Vogel.
2. Dr. Jyotsna Cherukuris (2012) *Laboratory Manual of engineering chemistry-II,* VGS Techno Series
3. Chemistry Practical Manual, Lorven Publications
4. K. Mukkanti (2009) *Practical Engineering Chemistry,* B.S. Publication

BASIC ENGINEERING & IT WORKSHOP

Practice:	3	**Internal Marks:**	40
Credits:	1.5	**External Marks:**	60

Prerequisites:

- Knowledge of Engineering Drawing.

Course Objectives:

1. To impart hands-on training on basic engineering in various trades such as Carpentry, Fitting, Tin-Smithy, Black smithy and House wiring.
2. Imparting skills to Preparation of various basic joints, objects and shapes by using Carpentry, Fitting ,Tin smithy and Black smithy.
3. Imparting skills to Know various basic house wiring connections
4. Understand the basic components and peripherals and assembly, Disassembling of a computer.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1 Using of various tools to get different applications by using basic Trades of Carpentry, Fitting, Tin-Smithy, Black smithy and House wiring.

CO2 Preparation of various basic joints, objects and shapes by using Carpentry, Fitting ,Tin smithy and Black smithy

CO3 Make basic house wiring connections

CO4 Configure the components and peripherals and assembly, Disassembling of a computer

Contribution of Course Outcomes towards achievement of Program Outcomes

(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	1	3	-	3	2	1	-	2	1	2	2
CO2	3	1	3	-	3	2	1	-	2	1	2	2
CO3	3	1	3	-	3	2	1	-	2	1	2	2
CO4	3	2	3	2	2	2	1	2	3	1	3	2

List of Experiments:

Practice any Two experiments from each trade of Engineering workshop and all Experiments for IT

TRADE NO	NAME OF THE TRADE	EXPERIMENTS
1	CARPENTRY	1.T-Lap Joint
		2.Cross Lap joint

		3. Dovetail Joint
2	FITTING	1. V - Fit
		2. Square Fit
		3. Half Round Fit
3	TIN SMITHY	1. Square Box without lid
		2.Open Scoop
		3.Funnel
4	BLACK SMITHY	1.Round rod to Square rod
		2.S-Hook
		3.Round Rod to Flat Ring
5	HOUSE WIRING	1.Parallel and Series Connections
		2.Stair Case wiring
		3.Fluorescent Lamp Fitting
6	INFORMATION TECHNOLOGY	1.Identification of the peripherals of a computer
		2.System Assembling and Disassembling
7	INFORMATION TECHNOLOGY	1.Operating System Installation

REFERENCE BOOKS:

1. Elements of Workshop Technology vol.-1 & vol.-2 by A. K. Hajra Choudhury, S. K. Hajra Choudhury, Nirjhar Roy
2. Workshop Manual , P.Kannaih,K.L. Narayana , Scitech Publishers
3. Workshop Manual prepared by Dept. of Mechanical Engg., NRIIT
4. Computer Hardware, Installation, Interfacing, Troubleshooting and Maintenance, K.L. James, Eastern Economy Edition.
5. Microsoft Office 2007: Introductory Concepts and Techniques, Windows XP Edition by Gary

E-RESOURCES:

1.http://nptel.iitm.ac.in
2.JNTUK-COERD

VIRTUAL LAB:

1.http://vlab.amrita.edu/?sub=1&brch=201&sim=366&cnt=1
2. http://vlab.amrita.edu/?sub=1&brch=195&sim=840&cnt=1

PROFESSIONAL ENGLISH-II
(Common to CE,EEE,ME,ECE,CSE and IT)

Lecture – Tutorial: 2-1 **Internal Marks:** 40
Credits: 3 **External Marks:** 60

Prerequisites:

Course Objectives:

1. To expose the students to components of grammar required in effective sentence constructions.
2. To help the students to develop effective writing skills using phrasal verbs, connectives, collocations, idioms etc.
3. To enable the students to learn the format, style and types of letters, reports and emails.
4. To expose the students to various sub skills and strategies of reading and writing.
5. To enable the students to analyse and evaluate various texts that lead to global comprehension.

Course Outcomes:

Upon successful completion of the course, the student will be able to:

CO1	Recognize the importance of the role of communication in the competitive world.
CO2	Acquire the competence to write effectively in various formal and academic contexts.
CO3	Acquire the jargon used in business communication and technical communication.
CO4	Develop the ability to evaluate texts by inferring the implied sense of such texts and apply such knowledge globally.
CO5	Gain knowledge about the significance of the universal human values through expression of human feelings of compassion and right understanding.

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1									2	3		2
CO2										2		2
CO3										3		2
CO4												2
CO5								2				2

UNIT I

1. **Text:** A. **"The Struggle for an Education"** – Booker T. Washington
   B. **"Good Manners"** – J.C. Hill
2. **Writing:** Formal Communication VS Informal Communication -Writing
3. **Vocabulary:** Business and Technical Terminology
4. **Remedial Grammar:** Change of Voice

UNIT II

1. **Text: "A Letter to Indu"** – Jawaharlal Nehru
2. **Writing:** Letter Writing – Types of Letters – Different Styles of Letter Writing
3. **Vocabulary:** Phrasal Verbs – Use of Connectives in Sentence Constructions
4. **Remedial Grammar:** Reported Speech

UNIT III

1. **Text**: A. **"The Power of a Plate of Rice"** – Ifeoma Okoye
   B. **"Email to Employees"** – Satya Nadella
2. **Writing**: Email Writing, Report Writing (Significance, Format and style of writing Technical Reports)
3. **Vocabulary**: Collocations
4. **Remedial Grammar**: Subject-Verb Agreement

UNIT IV

1. **Text**: **"Stench of Kerosene"** – Amrita Pritam
2. **Writing**: Essay Writing –Types of Essays
3. **Vocabulary**: Use of Idiomatic Expressions (in different contexts)
4. **Remedial Grammar**: Common Errors

TEXT BOOKS:

REFERENCE BOOKS:

1. Advanced Grammar in Use. Martin Hewings. Cambridge University Press. 2013
2. Effective Technical Communication Rizvi, Ashraf. M.. Tata McGraw – Hill, New Delhi. 2005
3. Word Power Made Easy. Norman Lewis
4. Michael Swan. Basic English Usage
5. A New Approach to Objective English. Dhillon Group of Publications
6. English and Soft Skills. Dhanavel S. P. Orient Black Swan, Hyderabad, 2010
7. Professional Communication. Baradwaj Kumkum. I.K. International Publishing House Pvt. Ltd, New Delhi .2008
8. Intermediate English Grammar, Raymond Murphy, Cambridge University Press.

E-RESOURCES:

1. http://grammar.ccc.commnet.edu/grammar/index.htm
2. https://owl.english.purdue.edu/
3. https://learnenglish.britishcouncil.org/en

ENGINEERING MATHEMATICS-II
(Common to CE,EEE,ME,ECE,CSE and IT)

Lecture – Tutorial:	3 – 1	**Internal Marks:**	40
Credits:	4	**External Marks:**	60

Prerequisites:
Student has a knowledge about Trigonometric functions and its related formulae, Differentiation , Integration and vector algebra.

Course Objectives:

- The course is designed to equip the students with the necessary skills and techniques that are essential for Engineering course.
- The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1	Finding the General solution of first order ordinary differential equation and its applications.
CO2	Finding the General solution of second and higher order ordinary differential equations with constant and variable coefficients.
CO3	Determine double integral over a region and triple integral over a volume.
CO4	Determine the Gradient, Diveregence and Curl of a vector and vector identities.

Contribution of Course Outcomes towards achievement of Program Outcomes
(1– Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2		1	2						1	1
CO2	3	2		1	2						1	1
CO3	3	2		1	1						1	1
CO4	3	2		1	1						1	1

UNIT I
Ordinary differential equations of first order and applications

Linear – Bernoulli – Exact – Reducible to exact differential equations – Ort trajectories –
Newton's law of cooling – Law of exponential growth and decay .

UNIT II
Ordinary differential equations of 2nd and higher order

Non homogeneous equations of higher order with constant coefficients with Right hand side terms of the type $e^{ax}, \sin ax, \cos ax, x^k (k > 0), e^{ax}V, x^m V$ - Variation of parameters – Differential equations with variable coefficients (Legendre and Cauchy)

UNIT III

Multiple Integrals

Multiple Integrals – Double and Triple Integrals – Change of variables – Change of integration.

Applications: Finding Areas, Surfaces and Volumes.

UNIT IV

Vector Calculus

Vector differentiation – Gradient – Divergence – Curl – Vector identies.

Vector Integration – Line integral – work done – Potential function – area – surface and volume integrals – Vector integral theorems (without proof) viz. Greens, stokes and Gauss divergence and related problems.

TEXT BOOKS:

1.B.S.Grewal, "Higher Engineering Mathematics, Khanna Publishers", 43rd Edition, 2014.

REFERENCE BOOKS:

1. **N.P.Bali**, Engineering Mathematics, Lakshmi Publications.
2. **Erwin Kreyszig**, Advanced Engineering Mathematics, 10th Edition, Wiley-India

E-RESOURCES:

1.www.nptel**videos.com/mathematics/ (Math Lectures from MIT,Stanford,IIT'S)**

2.nptel.ac.in/courses/122104017

3.nptel.ac.in/courses/111105035

ENGINEERING PHYSICS

Lecture – Tutorial: 2-1 **Internal Marks:** 40
Credits: 3 **External Marks:** 60

Prerequisites: Knowledge of Basic Properties of Light, Sound & Solids
Course Objectives: 1. To provide a bridge between Basic Physics and Engineering Physics.

2.To Create the awareness of various phenomena of physics which in turn help the students in future engineering applications

COURSE OUTCOMES:
Upon successful completion of the course, the student will be able to:

CO1 Impart Knowledge of Physical Optics phenomena like Interference, Diffraction and Polarization involving required to design instruments with higher resolution.

CO2 Teach Concepts of coherent sources, its realization and utility optical instrumentation. Study the Structure-property relationship exhibited by solid crystal materials for their utility.

CO3 Know the generation and propagation of sound in architectural design and understand about the production and detection of ultrasonic waves and its application in various fields.

CO4 To impart the knowledge of materials with characteristic utility in appliances.

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3				3					3		
CO2	3											
CO3	3	3	3		3							
CO4	3				2							

UNIT I

Interference: Introduction - Interference in thin films (reflection geometry) – Newton's rings – construction and basic principle of Interferometers.

Diffraction: Introduction – Rayleigh Criterion - Resolving power of a grating, Telescope and Microscopes.

Polarization: Introduction - Types of Polarization –Double Refraction - Nicol Prism -Quarter wave plate and Half Wave plate.

UNIT II

Lasers: Characteristics of Laser, Absorption, spontaneous emission,

Stimulated emission Lasing action, Relation between Einstein Coefficients, Population Inversion, Pumping Schemes: 3- level&4- level lasers, Pumping methods. Components of laser devices, Ruby Laser, He-Ne Laser, Applications.
Crystal Structure: Introduction - Space lattice - Basis - Unit cell - Lattice parameters - Bravais lattices- Crystal systems - Structure and packing fractions of simple cubic, Body centered cubic, Face centered cubic crystals.
X-ray Diffraction: Directions and planes in crystals - Miller indices - Separation between successive [h k 1] planes - Diffraction of X - rays by crystal planes - Bragg's law.

UNIT III

Acoustics: Factors affecting Acoustics of Buildings and their Remedies - Sabine's formula for Reverberation Time – sound absorption coefficient & its determination.
Non-Destructive Testing using ultrasonics: Production and detection of Ultrasonics - Ultrasonic Testing - Basic Principle -Transducers - Inspection Methods - Pulse Echo Testing Technique –Flaw Detector - Applications

UNIT IV

Magnetism: Classification based on Field, Temperature and order/disorder – atomic origin – Dia, Para & Ferromagnetism- Hysteresis- applications of magnetic materials (Para &Ferro).

Dielectrics: Introduction – Types of Polarization – Dielectrics in AC fields – Internal field – Clausius Mossoti Equation – Dielectric Loss, Breakdown and strength of dielectric materials.

TEXT BOOKS:

1. A text book of Engineering physics by Dr.M.N.Avadhanulu And Dr. P.G Kshir sagar,Schand &Company Ltd (2017)
2. P.K.Palanisamy, Engineering Physics, Sci Tech Publications.
3. Engineering Physics, 2nd Edition, H.K.Malik & A.K.Singh, Mc Graw Hill Education, Chennai

REFERENCE BOOKS:

1. Solid State Physics by A.J.Dekkar, Mac Millan Publishers
2. Ajoy Ghatak, Optics, 2nd Ed., Tata McGraw Hill, 1994

E-RESOURCES:

1.NPTEL
2.www.doitpoms.ac.uk

PROGRAMMING AND PROBLEM SOLVING WITH C
(Common to CIVIL,EEE,MECH,ECE)

Lecture – Tutorial:	3-1	**Internal Marks:**	40
Credits:	4	**External Marks:**	60

Prerequisites:

. Basic Knowledge on computer usage
.Basic knowledge on Mathematics

Course Objectives:

Formulating algorithmic solutions to problems and implementing algorithms in C.

- Notion of Operation of a CPU, Notion of an algorithm and computational procedure, editing and executing programs in Linux.
- Understanding branching, iteration and data representation using arrays.
- Modular programming and recursive solution formulation.
- Understanding pointers and dynamic memory allocation.
- Understanding miscellaneous aspects of C.
- Comprehension of file operations.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1 Understanding basic terminologies, basic idea on writing, executing programs, understanding decision structures.
CO2 Design programs involving Arrays, modular programming concepts
CO3 Understand the use of Pointers and Strings
CO4 Use different data structures and create/update basic data files.

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	2	2	2	1	1	1	2					
CO2	3	3	3	3	1	3	1					1
CO3	3	3	3	3	1	3	2					2
CO4	3	3	3	3	1	3	2					2

UNIT I

Introduction to Programming: Computer - Components, Types of Languages, Compiler, Algorithms and their representations: Flowcharts, Pseudo Code.
Introduction to C: "Hello World" in C – Editor, Compiler, Execution Environment. C as a Middle Level Language. Basic Structure of C program, Standard Library and Header Files, Tokens in C - Variable, Constant (literal and named), Data types, Keywords, Variable Declaration and Assignment. Operators - Precedence & Associativity. Type conversion, Input and Output statements.
Selection and Looping Statements: If statement, If-Else Statement, Nested If, Examples, Multi-way selection: Switch, Else-If, examples, While Statement, For Statement, Nested Loops, do-while Statement, Break and Continue statements, Example programs

UNIT II

Arrays: Concept, Declaration and Initialization of Arrays, Accessing Individual Elements of Array. Use of Arrays in Sorting, Searching. Concept of 2-D array (Matrix), Passing arrays to functions, Examples.
Functions: Need of Functions, Function Declaration, Definition and Call. Inbuilt functions and User Defined Functions. Passing arguments to a function, Returning values from a function. Scope of variable, local and global variable. Storage classes.
Recursive Functions: Need of Recursion, Direct Recursion, Indirect Recursion, Examples of Recursive Programs – Factorial, Fibonacci series. Recursive Vs Iterative solutions,Disadvantages of Recursion.

UNIT III

Pointers: Concept of Pointers, Relevance of Data type in Pointer Variable, Pointer arithmetic. Pointer to pointer. Pointers and Functions (passing pointers to functions, returning pointers from functions). Pointers and Arrays. Pointers and Strings. Array of Pointers, Pointer to Array. Various alternatives of accessing arrays (1-D and 2-D) using pointers, Dynamic Memory Allocation ,Command Line Arguments
Strings: Strings as Arrays, Character Array versus Strings, Reading Strings, Writing Strings, User Defined Functions for String Operations – Copy, Concatenate, Length, Reverse, Converting case, Appending, Comparing two strings, Extracting a substring. Array of strings.

UNIT IV

Structures & Unions: Notion, Declaration and Initialization, Structure Variables, Accessing and Assigning values of the fields, Functions and Structures, Arrays of Structures, nested structures, Pointers and Structures, Passing Structure to a Function and Returning Structure from Function. Introduction to self referential structures , Union, Nesting of Structure and Union. Enumerated data types.
Data Files: Declaring, Opening and Closing File Streams, Reading From and Writing to Text Files, Random File Access

TEXT BOOKS:

1. C Programming-A Problem Solving Approach, Forouzan, Gilberg, Cengage

REFERENCE BOOKS:

1.Programming in ANSIC 7th Edition by E.Balaguruswamy
2.Let us C by Yaswanth Kanetkar
3. The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education.
4. Programming with C, Bichkar, Universities Press.
5. Programming in C, ReemaThareja, OXFORD.
6. C by Example, Noel Kalicharan, Cambridge.
7. ANSI C Programming, Gary J. Bronson, Cengage Learning.

E-RESOURCES:

1. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-087-practical-programming-in-c-january-iap-2010/lecture-notes/
2. http://cslibrary.stanford.edu/101/EssentialC.pdf
3. http://nptel.ac.in/courses/106104128/
4. http://www.vssut.ac.in/lecture_notes/lecture1424354156.pdf

ENGINEERING DRAWING

Lecture – Practice: 2 – 3 **Internal Marks:** 40
Credits: 3.5 **External Marks:** 60

Prerequisites:

- Knowledge of basic mathematical concepts (Geometry)
- Drawing skills

Course Objectives:

- To introduce the students to use drawing instruments and to draw polygons, Engineering Curves and scales.
- To introduce the students to use of orthographic projections, projections of points, lines &
 Lines inclined to both the planes.
- To make the students draw the projections of the planes and solids at various positions with reference planes.
- The student will be able to represent and convert the isometric view to orthographic views and vice versa.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1	Understand simple geometric construction like polygons, engineering curves and scales.
CO2	Understand orthographic projection of points, straight lines- inclined to one plane and inclined to both the planes.
CO3	Understand orthographic projection of planes and solids at various positions with different reference planes.
CO4	Understand The transformation of orthographic views into isometric views and vice versa.

Contribution of Course Outcomes towards achievement of Program Outcomes
(1– Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2	1	2	2	2	1	-	-	3	-	1
CO2	3	2	1	2	2	2	1	-	-	3	-	1
CO3	3	2	1	2	2	2	1	-	-	3	-	1
CO4	3	2	1	2	2	2	1	-	-	3	-	1

UNIT I

Introduction to engineering drawing: Types of lines, lettering, dimensioning and simple geometrical constructions .

Polygons: Construction of regular polygons by general methods, inscribing and describing polygons with circles.
Conics: Construction of Parabola, Ellipse and Hyperbola by using general methods and also draw tangents & normals for the curves.
Scales: Plain scales, diagonal scales and vernier scales

UNIT II

Introduction to orthographic projections:
Projections of points and lines: Horizontal plane, vertical plane, profile plane, importance of reference planes, projections of points in various quadrants. Projections of straight lines- perpendicular lines, inclined lines and parallel to either of the reference planes (HP,VP or PP).
Projections of lines inclined to both the planes:
Projections of straight lines inclined to the planes, determination of true lengths, and angle of inclination.

UNIT III

Projections of planes: regular planes perpendicular/parallel to one plane and inclined to the other reference plane and inclined to both the planes.
Projections of Solids: projections of Prisms, Pyramids, Cones and Cylinders with the axis parallel/perpendicular/ inclined to one of the planes and vice versa.

UNIT IV

Transformation of Projections:
Conversion of isometric views to orthographic views and
Conversion of orthographic views to isometric views.

TEXT BOOKS:

1. Engineering Drawing by N.D. Butt, Chariot Publications
2. Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill Publishers

REFERENCE BOOKS:

1. Engineering Drawing by K.L.Narayana & P. Kannaiah, Scitech Publishers
2. Engineering Graphics for Degree by K.C. John, PHI Publishers
3. Engineering Graphics by PI Varghese, McGrawHill Publishers
4. Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, New Age Publishers

E-RESOURCES:

1. http://nptel.iitm.ac.in/

ELECTRICAL CIRCUIT ANALYSIS - I

ENGLISH COMMUNICATION SKILLS LAB-II

Practice: 3 **Internal Marks:** 40
Credits: 1.5 **External Marks:** 60

Prerequisites:

Course Objectives:
To enable the students to learn through practice the four communication skills: Listening, Speaking, Reading and Writing.
Understand the nuances of language usage for better presentation in all the walks of life promoting life-long learning.

Course Outcomes:
Upon successful completion of the course, the student will be able to:

CO1	Attain better understanding of the nuances of English language to put into use in various situation and events.
CO2	Acquire speaking skills with clarity and confidence which in turn enhances their employability skills.
CO3	Communicate and present their ideas and sources accurately and effectively.
CO4	Enhance their employability skills and critical thinking skills with participation in mock interviews and group discussions.

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1									1	3		2
CO2										3		2
CO3									1	3		2
CO4									1			2

List of Experiments:

UNIT 1:
1. Debating
Practice work

UNIT 2:
1. Group Discussions
Practice work

UNIT 3:
1. Presentation Skills
Practice work

UNIT 4:
1. Interview Skills
2. Curriculum Vitae
Practice work

EQUIPMENT REQUIRED:
Computer Assisted Language Laboratory with computers equipped with software that help the students in developing four skills – Listening, Speaking, Reading and Writing.

REFERENCE BOOKS:

1. INTERACT: English Lab Manual for Undergraduate Students' Published by Orient Blackswan Pvt Ltd.
2. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna Lakshmi, Maruti Publications.
3. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
4. Unlock, Listening and speaking skills 2, Cambridge University Press
5. Spring Board to Success, Orient BlackSwan
6. A Practical Course in effective english speaking skills, PHI
7. Word power made handy, Dr shalini verma, Schand Company
8. Let us hear them speak, Jayashree Mohanraj, Sage texts
9. Professional Communication, Aruna Koneru, Mc Grawhill Education
10. Cornerstone, Developing soft skills, Pearson Education

E-RESOURCES:

1. 1. https://www.britishcouncil.in/
2. http://www.talkenglish.com/

ENGINEERING PHYSICS LAB

Practice: 3 **Internal Marks:** 40
Credits: 1.5 **External Marks:** 60

Prerequisites:
Knowledge of Vernier Calipers, Screw Gauge
Course Objectives: Training field oriented Engineering graduates to handle instruments and their design methods to improve the accuracy of measurements.

COURSE OUTCOMES:
Upon successful completion of the course, the student will be able to:

- CO1 : Calculate wavelengths of various light sources, thickness of the given object and radius of curvature of lens.
- CO2 Determine Numerical Aperture & bending losses of Optical Fibre
- CO3 Analyze the characteristics and energy band gaps of semi-conductor and zener diodes
- CO4 Estimate the frequency of tuning fork and Magnetic field strength.

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	3							3			
CO2	3	3			2				3			
CO3	3	3							3			
CO4	3	3							3			

List of Experiments:

1. Determination of wavelength of a source-Diffraction Grating-Normal incidence
2. Newton's rings – Radius of Curvature of Plano - Convex Lens
3. Determination of thickness of a spacer using wedge film and parallel interference fringes. .
4. Determination of wavelength of laser source using diffraction grating.
5. Determination of Numerical Aperture of an Optical Fibre.
6. Study of I/V Characteristics of Semiconductor diode.
7. I/V characteristics of Zener diode.
8. Energy Band gap of a Semiconductor p - n junction
9. Meldi's experiment – Transverse and Longitudinal modes.
10. Magnetic field along the axis of a current carrying coil – Stewart and

Gee's apparatus

11. Verification of laws of vibrations in stretched strings – Sonometer

12. L- C- R Series Resonance Circuit.

EQUIPMENT REQUIRED:

1. Spectrometer
2. Travelling Microscope
3. Regulated Power Supply
4. Function Generators
5. Energy Band Gap Kit
6. Digital Mutlimetres
7. Tuning Forks
8. Electrically driven Tuning Forks
9. Tangent Galvanometer

REFERENCE BOOKS:

1. Lab Manual of Engineering Physics by Dr.Y.Aparna & Dr.K.Venkateswara Rao (VGS Books Links, Vijayawada)

E-RESOURCES:

1.www.vlab.co.in

PROGRAMMING AND PROBLEM SOLVING WITH C LAB

Practice: 3 **Internal Marks:** 40
Credits: 1.5 **External Marks:** 60

Prerequisites:

Course Objectives:

- Understand the basic concept of C Programming, and its different modules that includes conditional and looping expressions, Arrays, Strings, Functions, Pointers, Structures and File programming.
- Acquire knowledge about the basic concept of writing a program.
- Role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language.
- Use of conditional expressions and looping statements to solve problems associated withconditions and repetitions.
- Role of Functions involving the idea of modularity.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1 Understand C programming development environment, compiling, debugging, and linking and executing a program using the development environment

CO2 To solve the problems using selection and iterative statements

CO3 Analyzing the complexity of problems, Modularize the problems into small modules and then convert them into programs, Understand and apply the in-built functions and customized functions for solving the problems.

CO4 To solve the various problems using arrays, structures, pointers and files

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	2	3	1	2	3	1	2					1
CO2	2	1	2	2	1	2	2					2
CO3	2	3	3	2	3	3	2					3
CO4	3	3	3	3	3	3	3					3

List of Experiments:

Exercise - 1 Basics

a) What is an OS Command, Familiarization of Editors - vi, Emacs

b) Using commands like mkdir, ls, cp, mv, cat, pwd, and man

c) C Program to Perform Adding, Subtraction, Multiplication and Division of two numbers From
Command line

Exercise - 2 Basic Math

a) Write a C Program to Simulate 3 Laws at Motion

b) Write a C Program to convert Celsius to Fahrenheit and vice versa

Exercise - 3 Control Flow - I

a)Write a C Program to Find Whether the Given Year is a Leap Year or not.

b)Write a C Program to Add Digits & Multiplication of a number

Exercise – 4 Control Flow - II
a)Write a C Program to Find Whether the Given Number is
i) Prime Number
ii) Armstrong Number
b) Write a C program to print Floyd Triangle
c) Write a C Program to print Pascal Triangle
Exercise – 5 Functions
a) Write a C Program demonstrating of parameter passing in Functions and returning values.
b) Write a C Program illustrating Fibonacci, Factorial with Recursion without Recursion
Exercise – 6 Control Flow - III
a) Write a C Program to make a simple Calculator to Add, Subtract, Multiply or Divide Using
switch...case
b) Write a C Program to convert decimal to binary and hex (using switch call function the
function)
Exercise – 7 Functions - Continued
Write a C Program to compute the values ofsin x and cos x and e^x values using Series
expansion. (use factorial function)
Exercise – 8 Arrays
Demonstration of arrays
a) Search-Linear.
b) Sorting-Bubble, Selection.
c) Operations on Matrix.
Exercises - 9 Structures
a)Write a C Program to Store Information of a Movie Using Structure
b)Write a C Program to Store Information Using Structures with Dynamically Memory
Allocation
c) Write a C Program to Add Two Complex Numbers by Passing Structure to a Function
Exercise - 10 Arrays and Pointers
a)Write a C Program to Access Elements of an Array Using Pointer
b) Write a C Program to find the sum of numbers with arrays and pointers.
Exercise – 11 Dynamic Memory Allocations
a) Write a C program to find sum of n elements entered by user. To perform this program,
allocate memory dynamically using malloc () function.
b) Write a C program to find sum of n elements entered by user. To perform this program,
allocate memory dynamically using calloc () function. Understand the difference between the
above two programs
Exercise – 12 Strings
a) Implementation of string manipulation operations with library function.
i) copy
ii) concatenate
iii) length
iv) compare

b) Implementation of string manipulation operations without library function.
i) copy
ii) concatenate
iii) length
iv) compare
Exercise -13 Files
a)Write a C programming code to open a file and to print it contents on screen.
b)Write a C program to copy files
Exercise - 14 Files Continued
a) Write a C program merges two files and stores their contents in another file.
b) Write a C program to delete a file.

EQUIPMENT REQUIRED:

1.Computer Systems with UNIX OS,GCC Compiler,VI Editor

REFERENCE BOOKS:

1. 1.Programming in ANSIC 7th Edition by E.Balaguruswamy
2.Let us C by Yaswanth Kanetkar
3. The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education.

E-RESOURCES:

1. http://www.skiet.org/downloads/cprogrammingquestion.pdf
2. http://www.c4learn.com/c-programs/
3. https://www.programiz.com/c-programming/examples
4. https://www.sanfoundry.com/c-programming-examples/

NRI INSTITUTE OF TECHNOLOGY

POTHAVARAPPADU (V), (VIA) NUNNA, AGIRIPALLI (M), PIN – 521 212

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

STRUCTURE FOR FIRST YEAR UG PROGRAMME

I YEAR I SEMESTER

Sl. No	Course Code	Title of the Course	Scheme of Instruction (Periods Per Week)					Scheme of Examination (Maximum Marks)			No. of Credits
			L	T	P	S	Total	Internal	External	Total	
1	18LS101	Professional communication – I.	3	1	-	-	4	40	60	100	3
2	18CH101	Applied Chemistry.	3	1	-	-	4	40	60	100	3
3	18MA101	Linear algebra & Differential Calculus.	4	1	-	-	5	40	60	100	4
4	18ED151	Engineering Drawing.	2	-	3	S	5	100	-	100	3
5	18EE101	Fundamentals of Electrical Engineering.	3	1	-	-	4	40	60	100	3
6	18LS161	Professional communication lab – I.	-	-	3	-	3	40	60	100	1
7	18CH161	Applied chemistry lab.	-	-	3	-	3	40	60	100	1
8	18MC101	Environmental Studies. (Non - Credit)	2	1	-	S	3	100	-	100	0
		Total	17	5	9	0	31	440	360	800	18

I YEAR II SEMESTER

Sl. No	Course Code	Title of the Course	Scheme of Instruction (Periods Per Week)					Scheme of Examination (Maximum Marks)			No. of Credits
			L	T	P	S	Total	Internal	External	Total	
1	18LS202	Professional communication – II.	3	1	-	-	4	40	60	100	3
2	18PY201	Applied Physics.	3	1	-	-	4	40	60	100	3
3	18MA202	Vector Calculus & Transformation Techniques	4	1	-	-	5	40	60	100	4
4	18EE202	Electrical Circuit Analysis -I.	3	1	-	-	4	40	60	100	3
5	18CP201	C – Programming.	2	2	-	-	4	40	60	100	3
6	18LS262	Professional communication lab – II.	-	-	3	-	3	40	60	100	1
7	18PY261	Applied physics lab.	-	-	3	-	3	40	60	100	1
8	18CP261	C - Programming Lab.	-	-	3	-	3	40	60	100	2
9	18WS161	Engineering Workshop / IT Workshop.	-	-	3	-	3	40	60	100	2
		Total	15	6	12	0	33	360	540	900	22

L - LECTURE T – TUTORIAL P - PRACTICAL S - SELF STUDY

Dr. N. SAMBASIVA RAO
B.Tech, M.Tech, Ph.D, MISTE
Head of the Department & Professor of EEE
NRI INSTITUTE OF TECHNOLOGY (KN)

PROFESSIONAL ENGLISH-I
(Common to CE,EEE,ME,ECE,CSE and IT)

Lecture – Tutorial: 2-1 Hours **Internal Marks:** 40
Credits: 3 **External Marks:** 60

Prerequisites:
None

Course Objectives:
1. To strengthen the lexical ability of the students in different contexts.
2. To expose the students to various sub-skills and strategies of reading and writing – summarizing and paraphrasing.
3. To help the students develop effective writing skills through paragraph writing.
4. To train the students in fundamentals of grammar required to equip them with fluent English.
5. To enable the students to think critically by exposing them to different socio-cultural contexts through various literary texts.

Course Outcomes:
Upon successful completion of the course, the student will be able to:

CO1	Use grammar accurately in various formal and functional contexts.
CO2	Build good vocabulary and develop the ability to use in various contexts.
CO3	Comprehend, analyze and evaluate texts critically.
CO4	Develop effective reading and writing skills to enhance communicative competence.
CO5	Help the students to inculcate and apply human values and professional ethics in their academic, professional and social lives.

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1										3		2
CO2										3		2
CO3						1	1					2
CO4										3		2
CO5						1	1	3				2

UNIT I

1. **Reading:** Introduction to Integrated Communication with emphasis on Reading Skills, Scanning an article from *The Economic Times* – **"Why India celebrates Engineers Day on the birth anniversary of M. Visvesvaraya"**
2. **Text: "I have a dream..."** - Martin Luther King
3. **Vocabulary Building:** Synonyms and Antonyms from the Text , Word Formations: Root Words, Prefixes and Suffixes
4. **Writing:** Styles of Sentence Structure for Effective Writing, Textual Exercises, Scrambled Sentences
5. **Remedial Grammar:** Parts of Speech, Effective Sentence Constructions Using Connectives

UNIT II

1. **Reading**: Skimming: **"Oh Father, Dear Father"** – Raj Kinger
2. **Text**: **"On Shaking Hands"** – A.G. Gardiner
3. **Vocabulary Building:** Synonyms and Antonyms from the Text
4. **Writing:** Paragraph Scramble
5. **Remedial Grammar:** Framing Questions and Question Tags, Punctuation Rules, Usage of Articles

UNIT III

1. **Reading**: Critical Reading: **"Dial 000"** - Barry Rosenberg
2. **Text**: **"Seeing People Off"** – Max Beerbohm
3. **Vocabulary Building**: Synonyms and Antonyms from the Text, Acronyms
4. **Writing**: Principles of a Good Paragraph
5. **Remedial Grammar**: Verbs and Types, Present Tense

UNIT IV

1. **Reading:** Note Making: **"Icons: The Lotus Temple"** – Anamika Bhutalia
2. **Text**: **"The Lost Child"** – Mulk Raj Anand
3. **Vocabulary Building:** Synonyms and Antonyms from the Text, One Word Substitutes
4. **Writing:** Summarising and Writing Anecdotes
5. **Remedial Grammar**: Past Tense and Future Tense, Correction of Sentences

REFERENCE BOOKS:

1. **The Blue Book of Grammar and Punctuation**, 10th Edition, Jane Straus, Josey-Bass, A Wiley Imprint.
2. **Oxford Practice Grammar,** John Eastwood, Oxford University Press.
3. **The Most Common Mistakes in English Usage** – Thomas Elliott Berry
4. **Essential Communication Skills** – Shalini Agarwal, Ane Books Pvt Ltd.
5. **Dictionary of Synonyms and Antonyms**, Oxford & IBH, III Ed
6. **A Practical English Grammar**, Agnes V. Martinet and Audrey Jean Thomson, Oxford University Press.

E-RESOURCES:

1. http://grammar.ccc.commnet.edu/grammar/index.htm
2. https://owl.english.purdue.edu/
3. https://www.britishcouncil.in/

APPLIED CHEMISTRY
(Common to CSE,IT,ECE,EEE)

Lecture – Tutorial:	2-1	**Internal Marks:**	40
Credits:	3	**External Marks:**	60

Prerequisites:

Course Objectives:
Knowledge of basic concepts of Chemistry for Engineering students will help them as professional engineers later in design and material selection, as well as utilizing the available resources.

COURSE OUTCOMES:
Upon successful completion of the course, the student will be able to:

CO1	Plastics have become part of our life. Hence their preparation, fabrication and study of properties are essential to engineering students.
CO2	Study of electrochemistry helps in developing efficient cells and batteries and thorough understanding of corrosion and its prevention.
CO3	With the increase in demand for power and also with depleting sources of fossil fuels, the demand for alternative sources of fuels is increasing. Some of the prospective fuel sources are introduced
CO4	Nano materials, superconductors and liquid crystals are advanced engineering materials with exceptional properties can be exploited by engineering students. The green synthesis must be understood to keep the planet earth safe.

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	2	1	3									
CO2	3	1	2									
CO3	2	1										
CO4	1				2							

UNIT I

POLYMERS
Introduction-methods of polymerization-(emulsion and suspension)-physical and mechanical properties.
Plastics– Introduction-Thermoplastics and Thermosetting plastics – Compounding and fabrication (compression, injection, transfer & extrusion)-Preparation, properties and applications of polythene, PVC, Bakelite and Teflon
Elastomers: - Natural rubber- compounding and vulcanization – Synthetic rubbers: Buna S, Buna N and Thiokol– Applications of elastomers.
Fiber reinforced plastics – Biodegradable polymers – Conducting polymers.

UNIT II

ELECTROCHEMISTRY AND CORROSION
Galvanic cells - Reversible and irreversible cells – Single electrode potential – Electrochemical series and uses of this series- Standard Hydrogen electrode and Calomel electrode - Concentration Cells

Batteries: Dry Cell – Li- cells (Liquid cathode and solid cathode Li cells).
Fuel cells-Hydrogen-oxygen and methyl alcohol-oxygen fuel cells
Corrosion **:-** Definition – Theories of Corrosion (chemical & electrochemical) – Formation of galvanic cells by different metals, by concentration cells, by differential aeration and waterline corrosion – Passivity of metals – Pitting corrosion - Galvanic series – Factors which influence the rate of corrosion - Protection from corrosion – Cathodic protection – Protective coatings: Galvanizing, Tinning, Electroplating, Electro less plating.

UNIT III

NON CONVENTIONAL ENERGY SOURCES

Solar energy: Introduction, application of solar energy, conversion of solar energy(thermal and photo conversion)-photovoltaic cell: design, working
Hydro power include setup a hydropower plant (diagram)-Geothermal energy: introduction-design geothermal power plant-Tidal and wave power: Introduction-design and working-movement of tides and their effect on sea level-Ocean thermal energy: Introduction, closed cycle, open cycle, hybrid OTEC, diagram and explanation-.Biomass and bio fuels

UNIT IV

Chemistry of Advanced materials

Nano materials: Introduction –Sol- gel method &chemical reduction method of preparation-characterization by BET methods-carbon nano tubes and fullerenes: Types, preparation and properties and applications.
Liquid crystals: Introduction-Types-Applications.
Super conductors: definition-types-properties-application.
Semi conductors: Preparation of Semiconductors Si and Ge(two methods)
Green chemistry: principles-phase transfer catalyst method-supercritical fluid extraction methods

TEXT BOOKS:

1. Engineering Chemistry by Jain and Jain; Dhanpati Rai Publications
2. Engineering Chemistry by Shikha Agarwal; Cambridge University Press, 2015 edition.

REFERENCE BOOKS:

1. Engineering Chemistry of Wiley India Pvt. Ltd., Vairam and others, 2014 edition (second).
2. Engineering Chemistry by Prasanth Rath, Cengage Learning, 2015 edition.
3. A text book of engineering Chemistry by S. S. Dara; S. Chand & Co Ltd., Latest Edition
4. Applied Chemistry by H.D. Gesser, Springer Publishers
5. Text book of Nano-science and nanotechnology by B.S. Murthy, P. Shankar and others, University Press, IIM

E-RESOURCES:

1. www.nptel.ac.in
2. www.swayam.gov.in

ENGINEERING MECHANICS

ENGINEERING MATHEMATICS-1
((Common to CE,EEE,ME,ECE,CSE and IT)

Lecture – Tutorial: 2 – 1 **Internal Marks:** 40
Credits: 3 **External Marks:** 60

Prerequisites:
Fundamentals of Matrices, Fundamentals of Trigonometry and Calculus

Course Objectives:

- The course is designed to equip the students with the necessary skills and techniques that are essential for Engineering course.
- The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.

COURSE OUTCOMES:
Upon successful completion of the course, the student will be able to:

CO1 To solve simultaneous linear equations, determine eigen values, eigen vectors of a matrix and determine the nature of a Quadratic forms.

CO2 To calculate a root of algebraic and transcendental equations. Explain relation between the finite difference operators and compute the interpolating polynomial for the given data. Solve Ordinary differential equations numerically using Taylor series method, Euler's and RK method of second and fourth order.

CO3 To determine the Maxima and Minima of functions of Two variables without constraints and with constraints and form the Partial Differential equations by elimination of arbitrary constants and arbitrary functions.

CO4 To solve the ordinary linear differential equations by using Laplace Transforms.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2		1	2						1	1
CO2	3	2		1	1						1	1
CO3	3	2		1	2						1	1
CO4	3	2		1	1						1	1

UNIT I:

Matrices

Rank – Echelon form – Normal form – PAQ form – Inverse of 4x4 matrix by Gauss-Jordan - Solution of Homogeneous linear systems – solution of Non-homogeneous linear systems – Gauss Elimination – Gauss Seidel methods.

Eigenvalues – Eigen vectors – Properties – Cayley Hamilton theorem (without proof) – Inverse Powers of Matrices by Caley Hamilton theorem – Quadratic forms – Reduction of quadratic forms to Canonical form (Congruent transformation method, Orthogonal transformation) – Rank, Index, Signature of a Quadratic form.

UNIT II

Numerical Methods

Solutions of Algebraic and Transcendental Equations: Bisection method – Iteration method – Newton Raphson method (one variable). Interpolation: Finite differences –Operators Δ, ∇, E and relations between them - Forward differences – Backward differences – Missing terms - Newton's forward and backward formulae for interpolation – Lagrange's interpolation formula.

Trapezoidal rule – Simpson's $1/3^{rd}$ and $3/8^{th}$ rules – Numerical solution of Ordinary differential equation by Taylor series method – Euler's method – Modified Euler's method – Rungekutta method of second and fourth order.

UNIT III

Partial Differentiation

Homogeneous function – Euler's theorem – Total derivative – Chain rule – Generalized mean value theorem for single variable (without proof) – Taylor's and Maclaurin's series – Expansion of Two variable functions – functional dependence – Jacobian – Maxima and Minima of functions of two variables without constraints and Lagrange's method of multipliers.

UNIT IV

Laplace Transforms

Laplace transforms of standard functions – shifting theorems – transforms of derivative's and integrals – Unit step function – Dirac's delta function.
Inverse laplace transforms - convolution theorem (without proof) – solving ordinary differential equations (Initial value problems) using Laplace transforms.

TEXT BOOKS:

1.B.S.Grewal, "Higher Engineering Mathematics, Khanna Publishers", 43rd Edition, 2014.

2.V.Ravindranath and P.Vijayalakshmi, Mathematical Methods, Himalaya Publishing House.

REFERENCE BOOKS:

1. **N.P.Bali**, Engineering Mathematics, Lakshmi Publications.
2. **Erwin Kreyszig,** Advanced Engineering Mathematics, 10th Edition, Wiley-India.

E-RESOURCES:

1.www.nptel**videos.com/mathematics/ (Math Lectures from MIT,Stanford,IIT'S)**

2.**nptel.ac.in/courses/122104017**

3.**nptel.ac.in/courses/111105035**

ENGINEERING GRAPHICS
(Common to EEE, ECE, CSE& IT)

Lecture – Practice:	1 – 3	**Internal Marks:**	40
Credits:	2.5	**Semester end assessment: (Internal Only)**	60

Prerequisites:

- Knowledge of basic mathematical concepts (Geometry)
- Drawing skills

Course Objectives:

- To introduce the students to use drawing instruments and to draw polygons, Engineering Curves.
- To introduce the students to use of orthographic projections, projections of points, lines & Lines inclined to both the planes.
- To make the students draw the projections of the planes and solids at various positions with reference planes.
- The student will be able to represent and convert the pictorial views to orthographic views and vice versa by using AutoCAD as well as conventional.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1	Understand simple geometric construction like polygons, engineering curves and scales.
CO2	Understand orthographic projection of points, straight lines- inclined to one plane and inclined to both the planes.
CO3	Understand orthographic projection of planes and solids at various positions with different reference planes.
CO4	Understand The transformation of orthographic views into pictorial views and vice versa through AutoCAD as well as conventional drawing.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2	1	2	2	2	1	-	-	3	-	1
CO2	3	2	1	2	2	2	1	-	-	3	-	1
CO3	3	2	1	2	2	2	1	-	-	3	-	1
CO4	3	2	1	2	2	2	1	-	-	3	-	1

UNIT I

Introduction to engineering drawing:

Polygons: Construction of regular polygons by general methods, inscribing and

describing polygons with circles.
Conics: Construction of Parabola, Ellipse and Hyperbola by using general methods and also draw tangents & normals for the curves.

UNIT II

Introduction to orthographic projections:
Projections of points and lines: Horizontal plane, vertical plane, profile plane, importance of reference planes, projections of points in various quadrants. Projections of straight lines- perpendicular lines, inclined lines and parallel to either of the reference planes(HP,VP or PP).
Projections of lines inclined to both the planes:
Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclination .

UNIT III

Projections of planes: regular planes perpendicular/parallel to one plane and inclined to the other reference plane.
Projections of Solids: projections of Prisms, Pyramids, Cones and Cylinders with the axis parallel/perpendicular/ inclined to one of the planes and vice versa.

UNIT IV

Transformation of Projections: AutoCAD Fundamentals.
Conversion of Pictorial views to orthographic views Using AutoCAD and conventional.
Conversion of orthographic views to isometric views. Isometric drawing of simple objects through AutoCAD.

TEXT BOOKS:

1. Engineering Drawing by N.D. Butt, Chariot Publications
2. Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill Publishers

REFERENCE BOOKS:

1. Engineering Drawing by K.L.Narayana & P. Kannaiah, Scitech Publishers
2. Engineering Graphics for Degree by K.C. John, PHI Publishers
3. Engineering Graphics by PI Varghese, McGrawHill Publishers
4. Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, New Age Publishers

E-RESOURCES:

2. http://nptel.iitm.ac.in/

FUNDAMENTALS OF ELECTRICAL ENGINEERING
(Common to EEE,ECE)

Lecture – Tutorial:	3 – 1	**Internal Marks:**	40
Credits:	3	**External Marks:**	60

Course Objectives:

- To inculcate the understanding about the electrical fundamentals
- To impart the basic knowledge about the Magnetic circuits
- Identification of various components and Understanding the operation of CRO.
- Understanding the importance of various sources and their Conversion.

Course Outcomes:

Upon successful completion of the course, the student will be able to:

CO1	Understand the importance of Electric circuits & Elements.
CO2	Understanding about the Magnetic Circuits.
CO3	Identification of various components and Understanding the operation of CRO.
CO4	Understanding the importance of various sources and their Conversion.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	3	1	2								
CO2	3	2		2								
CO3	2	1										
CO4	3	3		2								

UNIT I

Fundamentals of Electricity :

Introduction to circuit elements (R,L & C) – Electric current – Electric Potential difference – Ohm's law -Factors upon which Resistance depends – Specific Resistance – Effect of Temperature on Resistance – Temperature coefficient of Resistance – Series & parallel connection of Resistances , Inductances & Capacitances - Kirchhoff's laws (KCL & KVL)– Basic types of Sources (Independent Sources).

UNIT II

Protective Devices :

Types of Fuses, Characteristics , Materials Used, Fuse Rating – Types of Switches , Materials used, Symbols – Types of Circuit breakers - Types of Resistors , Rating – Colour coding of R,L & C

UNIT III

Earthing :
Need and Necessity of Earthing – Types of Earthing – Simple Earthing circuits for domestic appliances – Procedure of Earthing – Earthing of Generators, Motors, Transformers, Transmission Lines – Calculation earth resistance – Perfect Earthing - Importance of Neutral
Electrical Safety :
Electrical Shock – Types of First aids – Safety Norms – Human Body response for various electric voltages

UNIT IV

Measuring Instruments :
Types of Measuring Instruments – Principle of operation - Measurement of current, voltage, power, energy, Resistance, Inductance & capacitance – Earth Resistance – Principle of operation of CRO.

TEXT BOOKS:

1. Principles of Electrical Engineering by V.K Mehta, S.Chand Publications.
2. Elec., Technology by Edward Hughes
3. Electronic Principles by Sanjay Sharma , S.K.Katraia and Sons publications, 2nd edition
4. Electronics Devices and Circuits , S.Salivahanan ,N.Suresh Kumar,A.Vallava Raj, TMH publications , 4th edition

REFERENCE BOOKS:

1. Theory and Problems of Basic Electrical Engineering by D.P.Kothari & I.J. Nagrath PHI.
2. Basic Electrical Engineering by Fitzgerald and Higginbotham
3. Electrical Engineering fundamentals by Vincent Del Toro – PHI, New Delhi

E-RESOURCES:

1. http://nptel.ac.in/courses.php
2. http://jntuk-coeerd.in/
3. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/

ENGLISH COMMUNICATION SKILLS LAB-I

Practice: 4 Hours **Internal Marks:** 40

Credits: 2 **External Marks:** 60

Prerequisites:

None

Course Objectives:

To enable the students to learn through practice the four communication skills: Listening, Speaking, Reading and Writing.

Understand the nuances of language usage for better presentation in all the walks of life promoting life-long learning.

Course Outcomes:

Upon successful completion of the course, the student will be able to:

CO1	Understand the importance of communication skills and instill the need for life-long learning.
CO2	Express themselves fluently and appropriately in social and professional contexts.
CO3	Make sense of both verbal and non-verbal messages through selected listening activities.
CO4	Aware of the need of pronunciation and intonation in improving their speaking skills.

Contribution of Course Outcomes towards achievement of Program Outcomes

(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1						1			1	3		2
CO2						1			1	3		2
CO3									1	3		2
CO4											1	2

List of Experiments:

UNIT 1:

1. Why study Spoken English?
2. Making Inquiries on the phone, thanking and responding to Thanks
3. Responding to Requests and asking for Directions

Practice work.

UNIT 2:

1. Asking for Clarifications, Inviting, Expressing Sympathy, Congratulating
2. Apologising, Advising, Suggesting, Agreeing and Disagreeing

Practice work.

UNIT 3:

1. Letters and Sounds
2. The Sounds of English

Practice work.

UNIT 4:

1. Pronunciation
2. Stress and Intonation

Practice work.

Equipment Required:

Computer Assisted Language Laboratory with computers equipped with software that help the students in developing four skills – Listening, Speaking, Reading and Writing.

Reference Books:

1. INTERACT: English Lab Manual for Undergraduate Students' Published by Orient Blackswan Pvt Ltd.
2. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna Lakshmi, Maruti Publications.
3. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
4. Unlock, Listening and speaking skills 2, Cambridge University Press
5. Spring Board to Success, Orient BlackSwan
6. A Practical Course in effective english speaking skills, PHI
7. Word power made handy, Dr shalini verma, Schand Company
8. Let us hear them speak, Jayashree Mohanraj, Sage texts
9. Professional Communication, Aruna Koneru, Mc Grawhill Education Cornerstone, Developing soft skills, Pearson Education

E-Resources:

1. https://www.britishcouncil.in/
2. http://www.talkenglish.com/

APPLIED CHEMISTRY LAB

Practice: 3 **Internal Marks:** 40

Credits: 1.5 **External Marks:** 60

Prerequisites:

Course Objectives:

To provide knowledge of chemistry practical's. It enables the students to analyze the different parameters of water sample like hardness and alkalinity and different volumetric titrations. It makes the students to obtain basic knowledge of instrumentation based on different Engineering applications.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1 Perform different volumetric titrations listed in syllabus.

CO2 To analyze various parameters of water sample.

CO3 Instrumental methods of chemical analysis exhibit the skill of the students.

CO4 Preparation of different compounds provides knowledge to the students.

Contribution of Course Outcomes towards achievement of Program Outcomes

(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1	2										
CO2	1	2										
CO3	1											
CO4	1											

List of Experiments:

1.Determination of HCl by Na_2CO_3 solution

2.Determination of alkalinity of sample containing Na_2CO_3 and NaOH

3.Determination of $KMnO_4$ using standard oxalic acid solution

4.Determination of total hardness of water by EDTA solution

5.Determination of copper using standard EDTA solution

6.Determination of Zinc using standard EDTA solution

7.Determination of Iron by a calorimetric method

8.Conductometric titration between strong acid and strong base

9.Potentiometric titration between strong acid and strong base

10.Potentiometric titration between Iron and dichromate

Additional Experiments to be performed

1.Preparation of urea-formaldehyde resin

2.Determination of P^H of water sample

3. Preparation of phenol-formaldehyde resin

EQUIPMENT REQUIRED:

PH meters, Potentiometers, Conductometers, colorimeters.

APPARATUS

Burettes, Pipettes, Conical flask, Beakers.

REFERENCE BOOKS:

1 . A Textbook of Quantitative Analysis, Arthur J. Vogel.

2. Dr. Jyotsna Cherukuri (2012) *Laboratory Manual of engineering chemistry-II,* VGS Techno Series

3. Chemistry Practical Manual, Lorven Publications

4. K. Mukkanti (2009) *Practical Engineering Chemistry,* B.S. Publication

ENVIRONMENTAL STUDIES
(Common to CE,EEE,ME,CSE and IT)

Lecture – Tutorial:	2-1	**Internal Marks:**	40
Credits:	--	**External Marks:**	60

Prerequisites:

Course Objectives:

- Basic understanding of ecosystem and to know the importance of biodiversity.
- Understanding of natural resources.
- To understand different types of pollutants effecting the environment.
- To know global environmental problems, problems associated with over population and burden on environment.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1	Realize the importance of ecosystem and biodiversity for maintaining ecological balance.
CO2	Understand the role of natural resources for the sustenance of life on earth and recognize the need to conserve them.
CO3	Identify the environmental pollutants and abatement devices.
CO4	Gain the importance of sustainability.

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	2		3			2	3	2			2	1
CO2	2		3			2	3	2			2	1
CO3	2		3			2	3	2			2	1
CO4	2		3			2	3	2			2	1

UNIT I

Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Ecological succession. – Food chains, food webs and ecological pyramids, flow of energy, biogeochemical cycles.

Biodiversity and its conservation: Definition: genetic, species and ecosystem diversity- classification - Value of biodiversity, India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts - Endangered and endemic species of India – Conservation of biodiversity.

UNIT II

Natural Resources: Natural resources and associated problems

Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people.

Water resources – Use and over utilization of surface and ground water –

Floods, drought, conflicts over water, dams – benefits and problems.
Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources. Case studies.
Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources Vs Oil and Natural Gas Extraction.
Land resources: land as a resource, land degradation, wasteland reclamation, man induced landslides, soil erosion and desertification.
Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

UNIT III

Environmental Pollution: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards, Technological solutions for pollution control, Role of an individual in prevention of pollution with case studies.
Solid Waste Management: Sources, Classification, effects and control measures of urban andindustrial solid wastes. Biomedical, Hazardous and **E-waste** management, carbon credits.
Disaster management: floods, droughts, earthquakes, cyclones.

UNIT IV

Social issues and the environment: Global environmental challenges- global warming and climate change, acid rains, ozone layer depletion.
Towards sustainable future: From unsustainable to sustainable development, population and its explosion, urban problems related to energy, rain water harvesting, consumerism and waste products, role of IT in environment and human health, HIV/ AIDS, environmental ethics.
Environmental management and acts: Impact assessment and significance, various stages of EIA, environmental management plan (EMP), green belt development. Environmental Law (Air, Water, Wildlife, Forest, Environment protection act).
The student should visit an industry/ Ecosystem and submit a report individually on any issues related to environmental studies course and make a power point presentation.

TEXT BOOKS:

1. Environment Studies, Anubha Kaushik, C P Kaushik, New Age International Publishers, 2018
2. Environmental Studies, R. Rajagopalan, 2nd Edition, 2011, Oxford University Press.
3. Environmental Studies, P. N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai

REFERENCE BOOKS:

1. Text Book of Environmental Studies, Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.
2. Environmental Studies, K. V. S. G. Murali Krishna, VGS Publishers, Vijayawada.
3. Erach Bharucha, 2010 " Text Book of Environmental Studies" , University Grants Commission, University Press (India) Pvt. Ltd., Hyderabad.
4. Text book of Environmental Science and Engineering by G. Tyler Miller Jr, 2006 Cengage learning.

E-RESOURCES:

1. http://nptel.ac.in/courses.php.
2. http://jntuk-coeerd.in/

PROFESSIONAL ENGLISH-II
(Common to CE,EEE,ME,ECE,CSE and IT)

Lecture – Tutorial:	2-1	**Internal Marks:**	40
Credits:	3	**External Marks:**	60

Prerequisites:

Course Objectives:
1. To expose the students to components of grammar required in effective sentence constructions.
2. To help the students to develop effective writing skills using phrasal verbs, connectives, collocations, idioms etc.
3. To enable the students to learn the format, style and types of letters, reports and emails.
4. To expose the students to various sub skills and strategies of reading and writing.
5. To enable the students to analyse and evaluate various texts that lead to global comprehension.

Course Outcomes:

Upon successful completion of the course, the student will be able to:

CO1	Recognize the importance of the role of communication in the competitive world.
CO2	Acquire the competence to write effectively in various formal and academic contexts.
CO3	Acquire the jargon used in business communication and technical communication.
CO4	Develop the ability to evaluate texts by inferring the implied sense of such texts and apply such knowledge globally.
CO5	Gain knowledge about the significance of the universal human values through expression of human feelings of compassion and right understanding.

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1									2	3		2
CO2										2		2
CO3										3		2
CO4												2
CO5								2				2

UNIT I
1. **Text:** A. **"The Struggle for an Education"** – Booker T. Washington
   B. **"Good Manners"** – J.C. Hill
2. **Writing**: Formal Communication VS Informal Communication -Writing
3. **Vocabulary**: Business and Technical Terminology
4. **Remedial Grammar**: Change of Voice

UNIT II
1. **Text: "A Letter to Indu"** – Jawaharlal Nehru
2. **Writing**: Letter Writing – Types of Letters – Different Styles of Letter Writing
3. **Vocabulary**: Phrasal Verbs – Use of Connectives in Sentence Constructions
4. **Remedial Grammar**: Reported Speech

UNIT III

1. **Text:** A. **"The Power of a Plate of Rice"** – Ifeoma Okoye
   B. **"Email to Employees"** – Satya Nadella
2. **Writing**: Email Writing, Report Writing (Significance, Format and style of writing Technical Reports)
3. **Vocabulary**: Collocations
4. **Remedial Grammar:** Subject-Verb Agreement

UNIT IV

1. **Text: "Stench of Kerosene"** – Amrita Pritam
2. **Writing**: Essay Writing –Types of Essays
3. **Vocabulary**: Use of Idiomatic Expressions (in different contexts)
4. **Remedial Grammar**: Common Errors

TEXT BOOKS:

REFERENCE BOOKS:

1. Advanced Grammar in Use. Martin Hewings. Cambridge University Press. 2013
2. Effective Technical Communication Rizvi, Ashraf. M.. Tata McGraw – Hill, New Delhi. 2005
3. Word Power Made Easy. Norman Lewis
4. Michael Swan. Basic English Usage
5. A New Approach to Objective English. Dhillon Group of Publications
6. English and Soft Skills. Dhanavel S. P. Orient Black Swan, Hyderabad, 2010
7. Professional Communication. Baradwaj Kumkum. I.K. International Publishing House Pvt. Ltd, New Delhi .2008
8. Intermediate English Grammar, Raymond Murphy, Cambridge University Press.

E-RESOURCES:

1. http://grammar.ccc.commnet.edu/grammar/index.htm
2. https://owl.english.purdue.edu/
3. https://learnenglish.britishcouncil.org/en

APPLIED PHYSICS

(Common to ECE, CSE, EEE & IT)

Lecture – Tutorial:	2-1	**Internal Marks:**	40
Credits:	3	**External Marks:**	60

Prerequisites: Knowledge of Optics & Electromagnetism

Course Objectives: 1. To provide a bridge between Basic Physics and Engineering Physics.

2.To Create the awareness of various phenomena of physics which in turn help the students in future engineering applications

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1	Impart Knowledge of Physical Optics phenomena like Interference, Diffraction and Polarization involving required to design instruments with higher resolution.
CO2	Teach Concepts of coherent sources, its realization and utility optical instrumentation. Apply the concepts of light in optical fibers, light wave communication systems, and for sensing physical parameters
CO3	Study the concepts regarding the bulk response of materials to the EM fields and their analytically study in the back-drop of basic quantum mechanics.
CO4	Understand the physics of Semiconductors and their working mechanism for their utility in sensors

Contribution of Course Outcomes towards achievement of Program Outcomes

(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3				3					3		
CO2	3	3		2	2					3		
CO3	3	3								1		
CO4	3		2		2							

UNIT I

Interference: Introduction - Interference in thin films (reflection geometry) – Newton's rings – construction and basic principle of Interferometers.

Diffraction: Introduction – Rayleigh Criterion - Resolving power of a grating, Telescope and Microscopes.

Polarization: Introduction - Types of Polarization –Double Refraction - Nicol Prism -Quarter wave plate and Half Wave plate.

UNIT-II

Lasers: Introduction - Characteristics of Laser, Absorption, spontaneous emission, Stimulated emission Lasing action, Relation between Einstein Coefficients, Population Inversion, Pumping Schemes: 3- level&4- level lasers, Pumping methods. Components of laser devices, Ruby Laser, He-Ne Laser, Applications.

Fibre Optics: Principle of optical fibre, Structure – Numerical aperture and acceptance angle, Types of optical fibers – based on Material, refractive index profile, Modes of propagation (Single & Multimode Fibres), Propagation of signal through optical fibre, Applications.

UNIT III

EM fields: Basic laws of electro magnetism, Maxwell's equations (Differential form only) - propagation of EM wave in dielectric medium – Poynting Vector.
Quantum Mechanics: Introduction - Matter waves – Schrŏedinger Time Independent and Time Dependent wave equations – Particle in a box.
Free Electron Theory: Introduction - Defects of Classical free electron theory – Quantum Free electron theory - concept of Fermi Energy – Density of States

UNIT IV

Band Theory of Solids: Bloch's theorem – Kronig – Penney model (qualitative) – energy bands in crystalline solids – classification of crystalline solids– effective mass of electron & concept of hole.
Semi-Conductor Physics: Conduction – Density of carriers in Intrinsic and Extrinsic semiconductors – Drift & Diffusion – relevance of Einstein's equation- Hall effect.

TEXT BOOKS:

4. A text book of Engineering physics by Dr.M.N.Avadhanulu And Dr. P.G Kshir sagar,Schand &Company Ltd (2017)
5. P.K.Palanisamy, Engineering Physics, Sci Tech, Chennai
6. Engineering Physics, 2nd Edition, H.K.Malik & A.K.Singh, Mc Graw Hill Education, Chennai

REFERENCE BOOKS:

3. Solid State Physics by A.J.Dekkar, Mac Millan Publishers
4. Ajoy Ghatak, Optics, 2nd Ed., Tata McGraw Hill, 1994

E-RESOURCES:

1.NPTEL
2.www.doitpoms.ac.uk

ENGINEERING MATHEMATICS-II
(Common to CE,EEE,ME,ECE,CSE and IT)

Lecture – Tutorial:	3 – 1	**Internal Marks:**	40
Credits:	4	**External Marks:**	60

Prerequisites:
Student has a knowledge about Trigonometric functions and its related formulae, Differentiation , Integration and vector algebra.

Course Objectives:

- The course is designed to equip the students with the necessary skills and techniques that are essential for Engineering course.
- The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1	Finding the General solution of first order ordinary differential equation and its applications.
CO2	Finding the General solution of second and higher order ordinary differential equations with constant and variable coefficients.
CO3	Determine double integral over a region and triple integral over a volume.
CO4	Determine the Gradient, Diveregence and Curl of a vector and vector identities.

Contribution of Course Outcomes towards achievement of Program Outcomes
(1– Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2		1	2						1	1
CO2	3	2		1	2						1	1
CO3	3	2		1	1						1	1
CO4	3	2		1	1						1	1

UNIT I
Ordinary differential equations of first order and applications

Linear – Bernoulli – Exact – Reducible to exact differential equations – Ort trajectories –
Newton's law of cooling – Law of exponential growth and decay .

UNIT II
Ordinary differential equations of 2nd and higher order

Non homogeneous equations of higher order with constant coefficients with Right hand side terms of the type $e^{ax}, \sin ax, \cos ax, x^k (k>0), e^{ax}V, x^m V$ - Variation of parameters – Differential equations with variable coefficients (Legendre and Cauchy)

UNIT III

Multiple Integrals

Multiple Integrals – Double and Triple Integrals – Change of variables – Change of integration.

Applications: Finding Areas, Surfaces and Volumes.

UNIT IV

Vector Calculus

Vector differentiation – Gradient – Divergence – Curl – Vector identies.

Vector Integration – Line integral – work done – Potential function – area – surface and volume integrals – Vector integral theorems (without proof) viz. Greens, stokes and Gauss divergence and related problems.

TEXT BOOKS:

1.B.S.Grewal, "Higher Engineering Mathematics, Khanna Publishers", 43rd Edition, 2014.

REFERENCE BOOKS:

1. **N.P.Bali**, Engineering Mathematics, Lakshmi Publications.

2. **Erwin Kreyszig,** Advanced Engineering Mathematics, 10th Edition, Wiley-India

E-RESOURCES:

1.www.nptel**videos.com/mathematics/ (Math Lectures from MIT,Stanford,IIT'S)**

2.**nptel.ac.in/courses/122104017**

3.**nptel.ac.in/courses/111105035**

ELECTRICAL CIRCUIT ANALYSIS - I

Lecture – Tutorial:	3 – 1	**Internal Marks:**	40
Credits:	4	**External Marks:**	60

Course Objectives:

- To study the concepts of passive elements, types of sources and various network reduction techniques
- To understand the behavior of RLC networks for sinusoidal excitations and the performance of R-L, R-C and R-L-C circuits with variation of one of the parameters and to understand the concept of resonance.
- Use different circuit analysis techniques: Nodal analysis- mesh analysis to find branch currents and node voltages
- To study the concepts of balanced and unbalanced three-phase circuits.

Course Outcomes:

Upon successful completion of the course, the student will be able to:

CO1	Understand the basic concepts of electrical circuits and also basic laws of electrical circuits and their application to electrical circuits.
CO2	Apply knowledge of mathematics, science, and engineering to the analysis and design of DC and single phase ac electrical circuits.
CO3	Solve Various Conventional circuit analysis Techniques.
CO4	Understand the basic concepts of three phase electrical circuits and measure the power in both balanced and unbalanced three phase circuits.

Contribution of Course Outcomes towards achievement of Program Outcomes
(1- Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2	1									
CO2	2	2										
CO3	3	3	1									
CO4	2	3										

UNIT I

Fundamentals of Electrical Circuits :

Classification of Network Elements – Network reduction techniques – Star-delta/delta-Star transformation – Source transformation technique – Mesh Analysis – Nodal Analysis – Super Mesh Analysis – Super Node Analysis

Network topology

Definitions – Graph – node – branch – links – twigs - Tree, co-tree Basic Cut-set and Basic Tie-set matrices for planar networks – Duality & Dual networks.

UNIT II

Single Phase A.C Circuits

Generation of Sinusoidal alternating quantities – Phase and Phase difference – Complex and polar forms of representations, J-notation, Average value, R.M.S value, Peak Factor and Form factor for different periodic wave forms - Concept of Reactance, Impedance, Susceptance and Admittance-Power Factor and significance - Real and Reactive power, Complex Power – Coupled circuits – Dot Convention – Coefficient of coupling.

UNIT III

Locus diagrams & Resonance

Locus diagrams - series R-L, R-C, R-L-C and parallel combination with variation of various parameters - Resonance-series, parallel circuits, concept of band width and Q factor.

UNIT IV

Network Theorems (Application to d.c & a.c analysis): Mesh analysis, Node analysis, Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum power transfer Theorem, Reciprocity Theorem, Millman's Theorem, Tellegen's Theorem, Substitution Theorem and Compensation Theorem.

TEXT BOOKS:

1. Network Analysis: Van Valkenburg; Prentice-Hall of India Private Ltd.
2. Engineering Circuit Analysis by William Hayt and Jack E.Kemmerley,Mc Graw Hill Company,6 th edition
3. "Fundamentals of Electric Circuits "Charles K.Alexander, Mathew N.O.Sadiku, Tata nMcGraw-Hill.
4. Circuits & Networks Analysis & Synthesis by A. Sudhakar and Shyammohan S Palli, Tata McGraw- Hill.

REFERENCE BOOKS:

1. Circuit Theory by A.Chakrabarti Danapat Rai & Co publisher.
2. Network Analysis by N.C.Jagan, C.Lakshmi Narayana BS publications 2nd edition
3. 3000 Solved Problems in Electrical Circuit by Schaum's solved problem series Tata McGraw- Hill.

E-RESOURCES:

1. http://nptel.ac.in/courses.php
2. http://jntuk-coeerd.in/
3. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/

PROGRAMMING AND PROBLEM SOLVING WITH C
(Common to CIVIL,EEE,MECH,ECE)

Lecture – Tutorial: 3-1 **Internal Marks:** 40
Credits: 4 **External Marks:** 60

Prerequisites:
. Basic Knowledge on computer usage
.Basic knowledge on Mathematics

Course Objectives:
Formulating algorithmic solutions to problems and implementing algorithms in C.
- Notion of Operation of a CPU, Notion of an algorithm and computational procedure,
  editing and executing programs in Linux.
- Understanding branching, iteration and data representation using arrays.
- Modular programming and recursive solution formulation.
- Understanding pointers and dynamic memory allocation.
- Understanding miscellaneous aspects of C.
- Comprehension of file operations.

COURSE OUTCOMES:
Upon successful completion of the course, the student will be able to:

CO1 Understanding basic terminologies, basic idea on writing, executing programs, understanding decision structures.
CO2 Design programs involving Arrays, modular programming concepts
CO3 Understand the use of Pointers and Strings
CO4 Use different data structures and create/update basic data files.

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	2	2	2	1	1	1	2					
CO2	3	3	3	3	1	3	1					1
CO3	3	3	3	3	1	3	2					2
CO4	3	3	3	3	1	3	2					2

UNIT I

Introduction to Programming: Computer - Components, Types of Languages, Compiler, Algorithms and their representations: Flowcharts, Pseudo Code.
Introduction to C: "Hello World" in C – Editor, Compiler, Execution Environment. C as a Middle Level Language. Basic Structure of C program, Standard Library and Header Files, Tokens in C - Variable, Constant (literal and named), Data types, Keywords, Variable Declaration and Assignment. Operators - Precedence & Associativity. Type conversion, Input and Output statements.
Selection and Looping Statements: If statement, If-Else Statement, Nested If, Examples, Multi-way selection: Switch, Else-If, examples, While Statement, For Statement, Nested Loops, do-while Statement, Break and Continue statements, Example programs

UNIT II

Arrays: Concept, Declaration and Initialization of Arrays, Accessing Individual Elements of Array. Use of Arrays in Sorting, Searching. Concept of 2-D array (Matrix), Passing arrays to functions, Examples.
Functions: Need of Functions, Function Declaration, Definition and Call. Inbuilt functions and User Defined Functions. Passing arguments to a function, Returning values from a function. Scope of variable, local and global variable. Storage classes.
Recursive Functions: Need of Recursion, Direct Recursion, Indirect Recursion, Examples of Recursive Programs – Factorial, Fibonacci series. Recursive Vs Iterative solutions,Disadvantages of Recursion.

UNIT III

Pointers: Concept of Pointers, Relevance of Data type in Pointer Variable, Pointer arithmetic. Pointer to pointer. Pointers and Functions (passing pointers to functions, returning pointers from functions). Pointers and Arrays. Pointers and Strings. Array of Pointers, Pointer to Array. Various alternatives of accessing arrays (1-D and 2-D) using pointers, Dynamic Memory Allocation ,Command Line Arguments
Strings: Strings as Arrays, Character Array versus Strings, Reading Strings, Writing Strings, User Defined Functions for String Operations – Copy, Concatenate, Length, Reverse, Converting case, Appending, Comparing two strings, Extracting a substring. Array of strings.

UNIT IV

Structures & Unions: Notion, Declaration and Initialization, Structure Variables, Accessing and Assigning values of the fields, Functions and Structures, Arrays of Structures, nested structures, Pointers and Structures, Passing Structure to a Function and Returning Structure from Function. Introduction to self referential structures , Union, Nesting of Structure and Union. Enumerated data types.
Data Files: Declaring, Opening and Closing File Streams, Reading From and Writing to Text Files, Random File Access

TEXT BOOKS:

1. C Programming-A Problem Solving Approach, Forouzan, Gilberg, Cengage

REFERENCE BOOKS:

1.Programming in ANSIC 7th Edition by E.Balaguruswamy
2.Let us C by Yaswanth Kanetkar
3. The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education.
4. Programming with C, Bichkar, Universities Press.
5. Programming in C, ReemaThareja, OXFORD.
6. C by Example, Noel Kalicharan, Cambridge.
7. ANSI C Programming, Gary J. Bronson, Cengage Learning.

E-RESOURCES:

1. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-087-practical-programming-in-c-january-iap-2010/lecture-notes/
2. http://cslibrary.stanford.edu/101/EssentialC.pdf
3. http://nptel.ac.in/courses/106104128/
4. http://www.vssut.ac.in/lecture_notes/lecture1424354156.pdf

ENGLISH COMMUNICATION SKILLS LAB-II

Practice:	3	**Internal Marks:**	40
Credits:	1.5	**External Marks:**	60

Prerequisites:

Course Objectives:

To enable the students to learn through practice the four communication skills: Listening, Speaking, Reading and Writing.

Understand the nuances of language usage for better presentation in all the walks of life promoting life-long learning.

Course Outcomes:

Upon successful completion of the course, the student will be able to:

CO1	Attain better understanding of the nuances of English language to put into use in various situation and events.
CO2	Acquire speaking skills with clarity and confidence which in turn enhances their employability skills.
CO3	Communicate and present their ideas and sources accurately and effectively.
CO4	Enhance their employability skills and critical thinking skills with participation in mock interviews and group discussions.

Contribution of Course Outcomes towards achievement of Program Outcomes

(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1									1	3		2
CO2										3		2
CO3									1	3		2
CO4									1			2

List of Experiments:

UNIT 1:

1. Debating

Practice work

UNIT 2:

1. Group Discussions

Practice work

UNIT 3:

1. Presentation Skills

Practice work

UNIT 4:

1. Interview Skills
2. Curriculum Vitae

Practice work

EQUIPMENT REQUIRED:

Computer Assisted Language Laboratory with computers equipped with software that help the students in developing four skills – Listening, Speaking, Reading and Writing.

REFERENCE BOOKS:

1. INTERACT: English Lab Manual for Undergraduate Students' Published by Orient Blackswan Pvt Ltd.
2. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna Lakshmi, Maruti Publications.
3. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
4. Unlock, Listening and speaking skills 2, Cambridge University Press
5. Spring Board to Success, Orient BlackSwan
6. A Practical Course in effective english speaking skills, PHI
7. Word power made handy, Dr shalini verma, Schand Company
8. Let us hear them speak, Jayashree Mohanraj, Sage texts
9. Professional Communication, Aruna Koneru, Mc Grawhill Education
10. Cornerstone, Developing soft skills, Pearson Education

E-RESOURCES:

1. 1. https://www.britishcouncil.in/
2. http://www.talkenglish.com/

APPLIED PHYSICS LAB

Practice:	2	**Internal Marks:**	40
Credits:	1	**External Marks:**	60

Prerequisites: Knowledge of Vernier Calipers, Screw Gauge

Course Objectives: Training field oriented Engineering graduates to handle instruments and their design methods to improve the accuracy of measurements.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1	Calculate wavelengths of various light sources, thickness of the given object and radius of curvature of lens.
CO2	Determine Numerical Aperture & bending losses of Optical Fibre
CO3	Analyze the characteristics and energy band gaps of semi-conductor and zener diodes
CO4	Estimate the frequency of tuning fork and Magnetic field strength.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	3							3			
CO2	3	3			2				3			
CO3	3	3							3			
CO4	3	3							3			

List of Experiments:

13. Determination of wavelength of a source-Diffraction Grating-Normal incidence
14. Newton's rings – Radius of Curvature of Plano - Convex Lens
15. Determination of thickness of a spacer using wedge film and parallel interference fringes. .
16. Determination of wavelength of laser source using diffraction grating.
17. Determination of Numerical Aperture of an Optical Fibre.
18. Study of I/V Characteristics of Semiconductor diode.
19. I/V characteristics of Zener diode.
20. Energy Band gap of a Semiconductor p - n junction
21. Meldi's experiment – Transverse and Longitudinal modes.
22. Magnetic field along the axis of a current carrying coil – Stewart and

Gee's apparatus

23. Verification of laws of vibrations in stretched strings – Sonometer

24. L- C- R Series Resonance Circuit.

EQUIPMENT REQUIRED:

10. Spectrometer
11. Travelling Microscope
12. Regulated Power Supply
13. Function Generators
14. Energy Band Gap Kit
15. Digital Mutlimetres
16. Tuning Forks
17. Electrically driven Tuning Forks
18. Tangent Galvanometer

REFERENCE BOOKS:

1. Lab Manual of Engineering Physics by Dr.Y.Aparna & Dr.K.Venkateswara Rao (VGS Books Links, Vijayawada)

E-RESOURCES:

1.www.vlab.co.in

PROGRAMMING AND PROBLEM SOLVING WITH C LAB

Practice: 3 **Internal Marks:** 40

Credits: 1.5 **External Marks:** 60

Prerequisites:

Course Objectives:

- Understand the basic concept of C Programming, and its different modules that includes conditional and looping expressions, Arrays, Strings, Functions, Pointers, Structures and File programming.
- Acquire knowledge about the basic concept of writing a program.
- Role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language.
- Use of conditional expressions and looping statements to solve problems associated withconditions and repetitions.
- Role of Functions involving the idea of modularity.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1 Understand C programming development environment, compiling, debugging, and linking and executing a program using the development environment

CO2 To solve the problems using selection and iterative statements

CO3 Analyzing the complexity of problems, Modularize the problems into small modules and then convert them into programs, Understand and apply the in-built functions and customized functions for solving the problems.

CO4 To solve the various problems using arrays, structures, pointers and files

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	2	3	1	2	3	1	2					1
CO2	2	1	2	2	1	2	2					2
CO3	2	3	3	2	3	3	2					3
CO4	3	3	3	3	3	3	3					3

List of Experiments:

Exercise - 1 Basics

a) What is an OS Command, Familiarization of Editors - vi, Emacs

b) Using commands like mkdir, ls, cp, mv, cat, pwd, and man

c) C Program to Perform Adding, Subtraction, Multiplication and Division of two numbers From
Command line

Exercise - 2 Basic Math

a) Write a C Program to Simulate 3 Laws at Motion

b) Write a C Program to convert Celsius to Fahrenheit and vice versa

Exercise - 3 Control Flow - I

a)Write a C Program to Find Whether the Given Year is a Leap Year or not.

b)Write a C Program to Add Digits & Multiplication of a number

Exercise – 4 Control Flow - II
a)Write a C Program to Find Whether the Given Number is
i) Prime Number
ii) Armstrong Number
b) Write a C program to print Floyd Triangle
c) Write a C Program to print Pascal Triangle
Exercise – 5 Functions
a) Write a C Program demonstrating of parameter passing in Functions and returning values.
b) Write a C Program illustrating Fibonacci, Factorial with Recursion without Recursion
Exercise – 6 Control Flow - III
a) Write a C Program to make a simple Calculator to Add, Subtract, Multiply or Divide Using
switch...case
b) Write a C Program to convert decimal to binary and hex (using switch call function the
function)
Exercise – 7 Functions - Continued
Write a C Program to compute the values ofsin x and cos x and e^x values using Series
expansion. (use factorial function)
Exercise – 8 Arrays
Demonstration of arrays
a) Search-Linear.
b) Sorting-Bubble, Selection.
c) Operations on Matrix.
Exercises - 9 Structures
a)Write a C Program to Store Information of a Movie Using Structure
b)Write a C Program to Store Information Using Structures with Dynamically Memory
Allocation
c) Write a C Program to Add Two Complex Numbers by Passing Structure to a Function
Exercise - 10 Arrays and Pointers
a)Write a C Program to Access Elements of an Array Using Pointer
b) Write a C Program to find the sum of numbers with arrays and pointers.
Exercise – 11 Dynamic Memory Allocations
a) Write a C program to find sum of n elements entered by user. To perform this program,
allocate memory dynamically using malloc () function.
b) Write a C program to find sum of n elements entered by user. To perform this program,
allocate memory dynamically using calloc () function. Understand the difference between the
above two programs
Exercise – 12 Strings
a) Implementation of string manipulation operations with library function.
i) copy
ii) concatenate
iii) length
iv) compare

b) Implementation of string manipulation operations without library function.
i) copy
ii) concatenate
iii) length
iv) compare

Exercise -13 Files

a)Write a C programming code to open a file and to print it contents on screen.
b)Write a C program to copy files

Exercise - 14 Files Continued

a) Write a C program merges two files and stores their contents in another file.
b) Write a C program to delete a file.

EQUIPMENT REQUIRED:

1.Computer Systems with UNIX OS,GCC Compiler,VI Editor

REFERENCE BOOKS:

1. 1.Programming in ANSIC 7th Edition by E.Balaguruswamy
2.Let us C by Yaswanth Kanetkar
3. The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education.

E-RESOURCES:

1. http://www.skiet.org/downloads/cprogrammingquestion.pdf
2. http://www.c4learn.com/c-programs/
3. https://www.programiz.com/c-programming/examples
4. https://www.sanfoundry.com/c-programming-examples/

BASIC ENGINEERING & IT WORKSHOP

Practice:	3	**Internal Marks:**	40
Credits:	1.5	**External Marks:**	60

Prerequisites:

- Knowledge of Engineering Drawing.

Course Objectives:

1. To impart hands-on training on basic engineering in various trades such as Carpentry, Fitting, Tin-Smithy, Black smithy and House wiring.
2. Imparting skills to Preparation of various basic joints, objects and shapes by using Carpentry, Fitting ,Tin smithy and Black smithy.
3. Imparting skills to Know various basic house wiring connections
4. Understand the basic components and peripherals and assembly, Disassembling of a computer.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1	Using of various tools to get different applications by using basic Trades of Carpentry, Fitting, Tin-Smithy, Black smithy and House wiring.
CO2	Preparation of various basic joints, objects and shapes by using Carpentry, Fitting ,Tin smithy and Black smithy
CO3	Make basic house wiring connections
CO4	Configure the components and peripherals and assembly, Disassembling of a computer

Contribution of Course Outcomes towards achievement of Program Outcomes

(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	1	3	-	3	2	1	-	2	1	2	2
CO2	3	1	3	-	3	2	1	-	2	1	2	2
CO3	3	1	3	-	3	2	1	-	2	1	2	2
CO4	3	2	3	2	2	2	1	2	3	1	3	2

List of Experiments:

Practice any Two experiments from each trade of Engineering workshop and all Experiments for IT

TRADE NO	NAME OF THE TRADE	EXPERIMENTS
1	CARPENTRY	1.T-Lap Joint
		2.Cross Lap joint

		3. Dovetail Joint
2	FITTING	1. V - Fit
		2. Square Fit
		3. Half Round Fit
3	TIN SMITHY	1. Square Box without lid
		2.Open Scoop
		3.Funnel
4	BLACK SMITHY	1.Round rod to Square rod
		2.S-Hook
		3.Round Rod to Flat Ring
5	HOUSE WIRING	1.Parallel and Series Connections
		2.Stair Case wiring
		3.Fluorescent Lamp Fitting
6	INFORMATION TECHNOLOGY	1.Identification of the peripherals of a computer
		2.System Assembling and Disassembling
7	INFORMATION TECHNOLOGY	1.Operating System Installation

REFERENCE BOOKS:

1. Elements of Workshop Technology vol.-1 & vol.-2 by A. K. Hajra Choudhury, S. K. Hajra Choudhury, Nirjhar Roy
2. Workshop Manual , P.Kannaih,K.L. Narayana , Scitech Publishers
3. Workshop Manual prepared by Dept. of Mechanical Engg., NRIIT
4. Computer Hardware, Installation, Interfacing, Troubleshooting and Maintenance, K.L. James, Eastern Economy Edition.
5. Microsoft Office 2007: Introductory Concepts and Techniques, Windows XP Edition by Gary

E-RESOURCES:

1.http://nptel.iitm.ac.in
2.JNTUK-COERD

VIRTUAL LAB:

1.http://vlab.amrita.edu/?sub=1&brch=201&sim=366&cnt=1
2. http://vlab.amrita.edu/?sub=1&brch=195&sim=840&cnt=1

NRI INSTITUTE OF TECHNOLOGY

(An Autonomous Institution Permanently Affiliated to JNTUK, Kakinada)
(Accredited with NAAC "A" Grade and ISO 9001:2015 Certified Institution)
POTHAVARAPPADU (V), (VIA) NUNNA, AGIRIPALLI (M), PIN – 521 212

DEPARTMENT OF MECHANICAL ENGINEERING

NRIA18

New Courses

STRUCTURE FOR FIRST YEAR B.TECH PROGRAMME

I YEAR I SEMESTER

Sl. No	Course Code	Title of the Course	Scheme of Instruction (Periods Per Week)				Scheme of Examination (Maximum Marks)			No. of Credits
			L	T	P	Total	CIA	SEA	Total	
1	18A1100101	Professional English – I	2	1	-	3	40	60	100	3
2	18A1100201	Engineering Mathematics – I	3	1	-	4	40	60	100	4
3	18A1100202	Engineering Physics	2	1	-	3	40	60	100	3
4	18A1103401	Engineering Drawing	2	-	3	5	40	60	100	3.5
5	18A1100801	Environmental Studies	2	1	-	3	40	60	100	0
6	18A1100191	English Communication Skills lab – I	-	-	4	4	40	60	100	2
7	18A1100291	Engineering Physics lab	-	-	3	3	40	60	100	1.5
8	18A1100391	Basic Engineering & IT Workshop	-	-	2	2	40	60	100	1
		Total	11	4	12	27	320	480	800	18

I YEAR II SEMESTER

Sl. No	Course Code	Title of the Course	Scheme of Instruction (Periods Per Week)				Scheme of Examination (Maximum Marks)			No. of Credits
			L	T	P	Total	CIA	SEA	Total	
1	18A1200101	Professional English – II	2	1	-	3	40	60	100	3
2	18A1200201	Engineering Mathematics – II	3	1	-	4	40	60	100	4
3	18A1200204	Engineering Chemistry	2	1	-	3	40	60	100	3
4	18A1205301	Programming and Problem solving with C	3	1	-	4	40	60	100	4
5	18A1201401	Engineering Mechanics	3	1	-	4	40	60	100	4
6	18A1200191	English Communication Skills lab – II	-	-	3	3	40	60	100	1.5
7	18A1200293	Engineering Chemistry lab	-	-	2	2	40	60	100	1
8	18A1205392	Programming and Problem solving with C Lab	-	-	3	3	40	60	100	1.5
		Total	13	5	8	26	320	480	800	22

L - LECTURE T – TUTORIAL P - PRACTICAL

CIA – Continuous Internal Assessment SEA – Semester End Assessment

..., Mechanical Department
NRI Institute of Technology
POTHAVARAPPADU (Vill)
Agiripalli (Mdl), Krishna Dist.

PROFESSIONAL ENGLISH-I
(Common to CE,EEE,ME,ECE,CSE and IT)

Lecture – Tutorial: 2-1 Hours **Internal Marks:** 40
Credits: 3 **External Marks:** 60

Prerequisites:
None

Course Objectives:
1. To strengthen the lexical ability of the students in different contexts.
2. To expose the students to various sub-skills and strategies of reading and writing – summarizing and paraphrasing.
3. To help the students develop effective writing skills through paragraph writing.
4. To train the students in fundamentals of grammar required to equip them with fluent English.
5. To enable the students to think critically by exposing them to different socio-cultural contexts through various literary texts.

Course Outcomes:
Upon successful completion of the course, the student will be able to:

CO1	Use grammar accurately in various formal and functional contexts.
CO2	Build good vocabulary and develop the ability to use in various contexts.
CO3	Comprehend, analyze and evaluate texts critically.
CO4	Develop effective reading and writing skills to enhance communicative competence.
CO5	Help the students to inculcate and apply human values and professional ethics in their academic, professional and social lives.

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1										3		2
CO2										3		2
CO3						1	1					2
CO4										3		2
CO5						1	1	3				2

UNIT I

1. **Reading:** Introduction to Integrated Communication with emphasis on Reading Skills, Scanning an article from *The Economic Times* – **"Why India celebrates Engineers Day on the birth anniversary of M. Visvesvaraya"**
2. **Text: "I have a dream…"** - Martin Luther King
3. **Vocabulary Building:** Synonyms and Antonyms from the Text , Word Formations: Root Words, Prefixes and Suffixes
4. **Writing:** Styles of Sentence Structure for Effective Writing, Textual Exercises, Scrambled Sentences
5. **Remedial Grammar:** Parts of Speech, Effective Sentence Constructions Using Connectives

UNIT II

1. **Reading**: Skimming: **"Oh Father, Dear Father"** – Raj Kinger
2. **Text**: **"On Shaking Hands"** – A.G. Gardiner
3. **Vocabulary Building:** Synonyms and Antonyms from the Text
4. **Writing**: Paragraph Scramble
5. **Remedial Grammar:** Framing Questions and Question Tags, Punctuation Rules, Usage of Articles

UNIT III

1. **Reading**: Critical Reading: **"Dial 000"** - Barry Rosenberg
2. **Text**: **"Seeing People Off"** – Max Beerbohm
3. **Vocabulary Building**: Synonyms and Antonyms from the Text, Acronyms
4. **Writing**: Principles of a Good Paragraph
5. **Remedial Grammar**: Verbs and Types, Present Tense

UNIT IV

1. **Reading:** Note Making: **"Icons: The Lotus Temple"** – Anamika Bhutalia
2. **Text**: **"The Lost Child"** – Mulk Raj Anand
3. **Vocabulary Building:** Synonyms and Antonyms from the Text, One Word Substitutes
4. **Writing:** Summarising and Writing Anecdotes
5. **Remedial Grammar**: Past Tense and Future Tense, Correction of Sentences

REFERENCE BOOKS:

1. **The Blue Book of Grammar and Punctuation**, 10th Edition, Jane Straus, Josey-Bass, A Wiley Imprint.
2. **Oxford Practice Grammar,** John Eastwood, Oxford University Press.
3. **The Most Common Mistakes in English Usage** – Thomas Elliott Berry
4. **Essential Communication Skills** – Shalini Agarwal, Ane Books Pvt Ltd.
5. **Dictionary of Synonyms and Antonyms**, Oxford & IBH, III Ed
6. **A Practical English Grammar**, Agnes V. Martinet and Audrey Jean Thomson, Oxford University Press.

E-RESOURCES:

1. http://grammar.ccc.commnet.edu/grammar/index.htm
2. https://owl.english.purdue.edu/
3. https://www.britishcouncil.in/

ENGINEERING MATHEMATICS-1

((Common to CE,EEE,ME,ECE,CSE and IT)

Lecture – Tutorial: 3 – 1 **Internal Marks:** 40
Credits: 4 **External Marks:** 60

Prerequisites:
Fundamentals of Matrices, Fundamentals of Trigonometry and Calculus

Course Objectives:

- The course is designed to equip the students with the necessary skills and techniques that are essential for Engineering course.
- The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1 To solve simultaneous linear equations, determine eigen values, eigen vectors of a matrix and determine the nature of a Quadratic forms.

CO2 To calculate a root of algebraic and transcendental equations. Explain relation between the finite difference operators and compute the interpolating polynomial for the given data. Solve Ordinary differential equations numerically using Taylor series method, Euler's and RK method of second and fourth order.

CO3 To determine the Maxima and Minima of functions of Two variables without constraints and with constraints and form the Partial Differential equations by elimination of arbitrary constants and arbitrary functions.

CO4 To solve the ordinary linear differential equations by using Laplace Transforms.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2		1	2						1	1
CO2	3	2		1	1						1	1
CO3	3	2		1	2						1	1
CO4	3	2		1	1						1	1

UNIT I:

Matrices

Rank – Echelon form – Normal form – PAQ form – Inverse of 4x4 matrix by Gauss-Jordan - Solution of Homogeneous linear systems – solution of Non-homogeneous linear systems – Gauss Elimination – Gauss Seidel methods.

Eigenvalues – Eigen vectors – Properties – Cayley Hamilton theorem (without proof) – Inverse Powers of Matrices by Caley Hamilton theorem – Quadratic forms – Reduction of quadratic forms to Canonical form (Congruent transformation method, Orthogonal transformation) – Rank, Index, Signature of a Quadratic form.

UNIT II

Numerical Methods

Solutions of Algebraic and Transcendental Equations: Bisection method – Iteration method – Newton Raphson method (one variable). Interpolation: Finite differences –Operators Δ, ∇, E and relations between them - Forward differences – Backward differences – Missing terms - Newton's forward and backward formulae for interpolation – Lagrange's interpolation formula.

Trapezoidal rule – Simpson's $1/3^{rd}$ and $3/8^{th}$ rules – Numerical solution of Ordinary differential equation by Taylor series method – Euler's method – Modified Euler's method – Rungekutta method of second and fourth order.

UNIT III

Partial Differentiation

Homogeneous function – Euler's theorem – Total derivative – Chain rule – Generalized mean value theorem for single variable (without proof) – Taylor's and Maclaurin's series – Expansion of Two variable functions – functional dependence – Jacobian – Maxima and Minima of functions of two variables without constraints and Lagrange's method of multipliers.

UNIT IV

Laplace Transforms

Laplace transforms of standard functions – shifting theorems – transforms of derivative's and integrals – Unit step function – Dirac's delta function.
Inverse laplace transforms - convolution theorem (without proof) – solving ordinary differential equations (Initial value problems) using Laplace transforms.

TEXT BOOKS:

1.**B.S.Grewal, "Higher Engineering Mathematics, Khanna Publishers", 43rd Edition, 2014.**

2.**V.Ravindranath and P.Vijayalakshmi,** Mathematical Methods, Himalaya Publishing House.

REFERENCE BOOKS:

1. **N.P.Bali**, Engineering Mathematics, Lakshmi Publications.

2. **Erwin Kreyszig,** Advanced Engineering Mathematics, 10th Edition, Wiley-India.

E-RESOURCES:

1.www.nptel**videos.com/mathematics/ (Math Lectures from MIT,Stanford,IIT'S)**

2.**nptel.ac.in/courses/122104017**

3.**nptel.ac.in/courses/111105035**

ENGINEERING PHYSICS

Lecture – Tutorial:	2-1	**Internal Marks:**	40
Credits:	3	**External Marks:**	60

Prerequisites: Knowledge of Basic Properties of Light, Sound & Solids
Course Objectives:
1. To provide a bridge between Basic Physics and Engineering Physics.
2.To Create the awareness of various phenomena of physics which in turn help the students in future engineering applications

COURSE OUTCOMES:
Upon successful completion of the course, the student will be able to:

CO1 Impart Knowledge of Physical Optics phenomena like Interference, Diffraction and Polarization involving required to design instruments with higher resolution.

CO2 Teach Concepts of coherent sources, its realization and utility optical instrumentation. Study the Structure-property relationship exhibited by solid crystal materials for their utility.

CO3 Know the generation and propagation of sound in architectural design and understand about the production and detection of ultrasonic waves and its application in various fields.

CO4 To impart the knowledge of materials with characteristic utility in appliances.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3				3					3		
CO2	3											
CO3	3	3	3		3							
CO4	3				2							

UNIT I

Interference: Introduction - Interference in thin films (reflection geometry) – Newton's rings – construction and basic principle of Interferometers.

Diffraction: Introduction – Rayleigh Criterion - Resolving power of a grating, Telescope and Microscopes.

Polarization: Introduction - Types of Polarization –Double Refraction - Nicol Prism -Quarter wave plate and Half Wave plate.

UNIT II

Lasers: Characteristics of Laser, Absorption, spontaneous emission, Stimulated emission Lasing action, Relation between Einstein Coefficients, Population Inversion, Pumping Schemes: 3- level&4- level lasers, Pumping methods. Components of laser devices, Ruby Laser, He-Ne Laser, Applications.
Crystal Structure: Introduction - Space lattice - Basis - Unit cell - Lattice parameters - Bravais lattices- Crystal systems - Structure and packing fractions of simple cubic, Body centered cubic, Face centered cubic crystals.
X-ray Diffraction: Directions and planes in crystals - Miller indices - Separation between successive [h k 1] planes - Diffraction of X - rays by crystal planes - Bragg's law.

UNIT III

Acoustics: Factors affecting Acoustics of Buildings and their Remedies - Sabine's formula for Reverberation Time – sound absorption coefficient & its determination.
Non-Destructive Testing using ultrasonics: Production and detection of Ultrasonics - Ultrasonic Testing - Basic Principle -Transducers - Inspection Methods - Pulse Echo Testing Technique –Flaw Detector - Applications

UNIT IV

Magnetism: Classification based on Field, Temperature and order/disorder – atomic origin – Dia, Para & Ferromagnetism- Hysteresis- applications of magnetic materials (Para &Ferro).

Dielectrics: Introduction – Types of Polarization – Dielectrics in AC fields – Internal field – Clausius Mossoti Equation – Dielectric Loss, Breakdown and strength of dielectric materials.

TEXT BOOKS:

1. A text book of Engineering physics by Dr.M.N.Avadhanulu And Dr. P.G Kshir sagar,Schand &Company Ltd (2017)
2. P.K.Palanisamy, Engineering Physics, Sci Tech Publications.
3. Engineering Physics, 2nd Edition, H.K.Malik & A.K.Singh, Mc Graw Hill Education, Chennai

REFERENCE BOOKS:

1. Solid State Physics by A.J.Dekkar, Mac Millan Publishers
2. Ajoy Ghatak, Optics, 2nd Ed., Tata McGraw Hill, 1994

E-RESOURCES:

1 NPTEL
2 www.doitpoms.ac.uk

ENGINEERING DRAWING

Lecture – Practice:	2 - 3	**Internal Marks:**	40
Credits:	3.5	**External Marks:**	60

Prerequisites:

- Knowledge of basic mathematical concepts (Geometry)
- Drawing skills

Course Objectives:

- To introduce the students to use drawing instruments and to draw polygons, Engineering Curves and scales.
- To introduce the students to use of orthographic projections, projections of points, lines & Lines inclined to both the planes.
- To make the students draw the projections of the planes and solids at various positions with reference planes.
- The student will be able to represent and convert the isometric view to orthographic views and vice versa.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO 1	Understand simple geometric construction like polygons, engineering curves and scales.
CO 2	Understand orthographic projection of points, straight lines- inclined to one plane and inclined to both the planes.
CO 3	Understand orthographic projection of planes and solids at various positions with different reference planes.
CO 4	Understand The transformation of orthographic views into isometric views and vice versa

Contribution of Course Outcomes towards achievement of Program Outcomes

(1– Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2	1	2	2	2	1	-	-	3	-	1
CO 2	3	2	1	2	2	2	1	-	-	3	-	1
CO 3	3	2	1	2	2	2	1	-	-	3	-	1
CO 4	3	2	1	2	2	2	1	-	-	3	-	1

UNIT I

Introduction to engineering drawing: Types of lines, lettering, dimensioning and simple geometrical constructions .

Polygons: Construction of regular polygons by general methods, inscribing and describing polygons with circles.

Conics: Construction of Parabola, Ellipse and Hyperbola by using general methods and also draw tangents & normals for the curves.

Scales: Plain scales, diagonal scales and vernier scales

UNIT II

Introduction to orthographic projections:

Projections of points and lines: Horizontal plane, vertical plane, profile plane, importance of reference planes, projections of points in various quadrants. Projections of straight lines- perpendicular lines, inclined lines and parallel to either of the reference planes (HP,VP or PP).

Projections of lines inclined to both the planes:

Projections of straight lines inclined to the planes, determination of true lengths, and angle of inclination.

UNIT III

Projections of planes: regular planes perpendicular/parallel to one plane and inclined to the other reference plane and inclined to both the planes.

Projections of Solids: projections of Prisms, Pyramids, Cones and Cylinders with the axis parallel/perpendicular/ inclined to one of the planes and vice versa.

UNIT IV

Transformation of Projections:

Conversion of isometric views to orthographic views and
Conversion of orthographic views to isometric views.

TEXT BOOKS:

1. Engineering Drawing by N.D. Butt, Chariot Publications
2. Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill Publishers

REFERENCE BOOKS:

1. Engineering Drawing by K.L.Narayana & P. Kannaiah, Scitech Publishers
2. Engineering Graphics for Degree by K.C. John, PHI Publishers
3. Engineering Graphics by PI Varghese, McGrawHill Publishers
4. Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, New Age Publishers

E-RESOURCES:

1. http://nptel.iitm.ac.in/

ENVIRONMENTAL STUDIES

(Common to CE,EEE,ME,CSE and IT)

Lecture – Tutorial: 2-1 **Internal Marks:** 40

Credits: -- **External Marks:** 60

Prerequisites:

Course Objectives:

- Basic understanding of ecosystem and to know the importance of biodiversity.
- Understanding of natural resources.
- To understand different types of pollutants effecting the environment.
- To know global environmental problems, problems associated with over population and burden on environment.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1	Realize the importance of ecosystem and biodiversity for maintaining ecological balance.
CO2	Understand the role of natural resources for the sustenance of life on earth and recognize the need to conserve them.
CO3	Identify the environmental pollutants and abatement devices.
CO4	Gain the importance of sustainability.

Contribution of Course Outcomes towards achievement of Program Outcomes

(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	2		3			2	3	2			2	1
CO2	2		3			2	3	2			2	1
CO3	2		3			2	3	2			2	1
CO4	2		3			2	3	2			2	1

UNIT I

Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Ecological succession. – Food chains, food webs and ecological pyramids, flow of energy, biogeochemical cycles.

Biodiversity and its conservation: Definition: genetic, species and ecosystem diversity- classification - Value of biodiversity, India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts - Endangered and endemic species of India – Conservation of biodiversity.

UNIT II

Natural Resources: Natural resources and associated problems

Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people.

Water resources – Use and over utilization of surface and ground water –

Floods, drought, conflicts over water, dams – benefits and problems.
Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources. Case studies.
Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources Vs Oil and Natural Gas Extraction.
Land resources: land as a resource, land degradation, wasteland reclamation, man induced landslides, soil erosion and desertification.
Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

UNIT III

Environmental Pollution: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards, Technological solutions for pollution control, Role of an individual in prevention of pollution with case studies.
Solid Waste Management: Sources, Classification, effects and control measures of urban andindustrial solid wastes. Biomedical, Hazardous and **E-waste** management, carbon credits.
Disaster management: floods, droughts, earthquakes, cyclones.

UNIT IV

Social issues and the environment: Global environmental challenges- global warming and climate change, acid rains, ozone layer depletion.
Towards sustainable future: From unsustainable to sustainable development, population and its explosion, urban problems related to energy, rain water harvesting, consumerism and waste products, role of IT in environment and human health, HIV/ AIDS, environmental ethics.
Environmental management and acts: Impact assessment and significance, various stages of EIA, environmental management plan (EMP), green belt development. Environmental Law (Air, Water, Wildlife, Forest, Environment protection act).
The student should visit an industry/ Ecosystem and submit a report individually on any issues related to environmental studies course and make a power point presentation.

TEXT BOOKS:

1. Environment Studies, Anubha Kaushik, C P Kaushik, New Age International Publishers, 2018
2. Environmental Studies, R. Rajagopalan, 2nd Edition, 2011, Oxford University Press.
3. Environmental Studies, P. N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai

REFERENCE BOOKS:

1. Text Book of Environmental Studies, Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.
2. Environmental Studies, K. V. S. G. Murali Krishna, VGS Publishers, Vijayawada.
3. Erach Bharucha, 2010 " Text Book of Environmental Studies" , University Grants Commission, University Press (India) Pvt. Ltd., Hyderabad.
4. Text book of Environmental Science and Engineering by G. Tyler Miller Jr, 2006 Cengage learning.

E-RESOURCES:

1. http://nptel.ac.in/courses.php.
2. http://jntuk-coeerd.in/

ENGLISH COMMUNICATION SKILLS LAB-I

Practice:	4 Hours	**Internal Marks:**	40
Credits:	2	**External Marks:**	60

Prerequisites:

None

Course Objectives:

To enable the students to learn through practice the four communication skills: Listening, Speaking, Reading and Writing.

Understand the nuances of language usage for better presentation in all the walks of life promoting life-long learning.

Course Outcomes:

Upon successful completion of the course, the student will be able to:

CO1 Understand the importance of communication skills and instill the need for life-long learning.

CO2 Express themselves fluently and appropriately in social and professional contexts.

CO3 Make sense of both verbal and non-verbal messages through selected listening activities.

CO4 Aware of the need of pronunciation and intonation in improving their speaking skills.

Contribution of Course Outcomes towards achievement of Program Outcomes

(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1						1			1	3		2
CO2						1			1	3		2
CO3									1	3		2
CO4											1	2

List of Experiments:

UNIT 1:

1. Why study Spoken English?
2. Making Inquiries on the phone, thanking and responding to Thanks
3. Responding to Requests and asking for Directions

Practice work.

UNIT 2:

1. Asking for Clarifications, Inviting, Expressing Sympathy, Congratulating
2. Apologising, Advising, Suggesting, Agreeing and Disagreeing

Practice work.

UNIT 3:

1. Letters and Sounds
2. The Sounds of English

Practice work.

UNIT 4:

1. Pronunciation
2. Stress and Intonation

Practice work.

Equipment Required:

Computer Assisted Language Laboratory with computers equipped with software that help the students in developing four skills – Listening, Speaking, Reading and Writing.

Reference Books:

1. INTERACT: English Lab Manual for Undergraduate Students' Published by Orient Blackswan Pvt Ltd.
2. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna Lakshmi, Maruti Publications.
3. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
4. Unlock, Listening and speaking skills 2, Cambridge University Press
5. Spring Board to Success, Orient BlackSwan
6. A Practical Course in effective english speaking skills, PHI
7. Word power made handy, Dr shalini verma, Schand Company
8. Let us hear them speak, Jayashree Mohanraj, Sage texts
9. Professional Communication, Aruna Koneru, Mc Grawhill Education Cornerstone, Developing soft skills, Pearson Education

E-Resources:

1. https://www.britishcouncil.in/
2. http://www.talkenglish.com/

ENGINEERING PHYSICS LAB

Practice: 3 **Internal Marks:** 40
Credits: 1.5 **External Marks:** 60

Prerequisites:
Knowledge of Vernier Calipers, Screw Gauge
Course Objectives: Training field oriented Engineering graduates to handle instruments and their design methods to improve the accuracy of measurements.

COURSE OUTCOMES:
Upon successful completion of the course, the student will be able to:

CO1 Calculate wavelengths of various light sources, thickness of the given object and radius of curvature of lens.
CO2 Determine Numerical Aperture & bending losses of Optical Fibre
CO3 Analyze the characteristics and energy band gaps of semi-conductor and zener diodes
CO4 Estimate the frequency of tuning fork and Magnetic field strength.

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	3							3			
CO2	3	3			2				3			
CO3	3	3							3			
CO4	3	3							3			

List of Experiments:

1. Determination of wavelength of a source-Diffraction Grating-Normal incidence
2. Newton's rings – Radius of Curvature of Plano - Convex Lens
3. Determination of thickness of a spacer using wedge film and parallel interference fringes. .
4. Determination of wavelength of laser source using diffraction grating.
5. Determination of Numerical Aperture of an Optical Fibre.
6. Study of I/V Characteristics of Semiconductor diode.
7. I/V characteristics of Zener diode.
8. Energy Band gap of a Semiconductor p - n junction
9. Meldi's experiment – Transverse and Longitudinal modes.
10. Magnetic field along the axis of a current carrying coil – Stewart and

Gee's apparatus

11. Verification of laws of vibrations in stretched strings – Sonometer

12. L- C- R Series Resonance Circuit.

EQUIPMENT REQUIRED:

1. Spectrometer
2. Travelling Microscope
3. Regulated Power Supply
4. Function Generators
5. Energy Band Gap Kit
6. Digital Mutlimetres
7. Tuning Forks
8. Electrically driven Tuning Forks
9. Tangent Galvanometer

REFERENCE BOOKS:

1. Lab Manual of Engineering Physics by Dr.Y.Aparna & Dr.K.Venkateswara Rao (VGS Books Links, Vijayawada)

E-RESOURCES:

1.www.vlab.co.in

BASIC ENGINEERING & IT WORKSHOP

Practice: 2 **Internal Marks:** 40

Credits: 1 **External Marks:** 60

Prerequisites:

- Knowledge of Engineering Drawing.

Course Objectives:

5. To impart hands-on training on basic engineering in various trades such as Carpentry, Fitting, Tin-Smithy, Black smithy and House wiring.
6. Imparting skills to Preparation of various basic joints, objects and shapes by using Carpentry, Fitting ,Tin smithy and Black smithy.
7. Imparting skills to Know various basic house wiring connections
8. Understand the basic components and peripherals and assembly, Disassembling of a computer.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1 Using of various tools to get different applications by using basic Trades of Carpentry, Fitting, Tin-Smithy, Black smithy and House wiring.

CO2 Preparation of various basic joints, objects and shapes by using Carpentry, Fitting ,Tin smithy and Black smithy

CO3 Make basic house wiring connections

CO4 Configure the components and peripherals and assembly, Disassembling of a computer

Contribution of Course Outcomes towards achievement of Program Outcomes

(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	1	3	-	3	2	1	-	2	1	2	2
CO2	3	1	3	-	3	2	1	-	2	1	2	2
CO3	3	1	3	-	3	2	1	-	2	1	2	2
CO4	3	2	3	2	2	2	1	2	3	1	3	2

List of Experiments:

Practice any Two experiments from each trade of Engineering workshop and all Experiments for IT

TRADE NO	NAME OF THE TRADE	EXPERIMENTS
		1.T-Lap Joint

1	CARPENTRY	2.Cross Lap joint
		3. Dovetail Joint
2	FITTING	1. V - Fit
		2. Square Fit
		3. Half Round Fit
3	TIN SMITHY	1. Square Box without lid
		2.Open Scoop
		3.Funnel
4	BLACK SMITHY	1.Round rod to Square rod
		2.S-Hook
		3.Round Rod to Flat Ring
5	HOUSE WIRING	1.Parallel and Series Connections
		2.Stair Case wiring
		3.Fluorescent Lamp Fitting
6	INFORMATION TECHNOLOGY	1.Identification of the peripherals of a computer
		2.System Assembling and
7	INFORMATION	1.Operating System Installation

REFERENCE BOOKS:

1. Elements of Workshop Technology vol.-1 & vol.-2 by A. K. Hajra Choudhury, S. K. Hajra Choudhury, Nirjhar Roy
2. Workshop Manual , P.Kannaih,K.L. Narayana , Scitech Publishers
3. Workshop Manual prepared by Dept. of Mechanical Engg., NRIIT
4. Computer Hardware, Installation, Interfacing, Troubleshooting and Maintenance, K.L. James, Eastern Economy Edition.
5. Microsoft Office 2007: Introductory Concepts and Techniques, Windows XP Edition by Gary

E-RESOURCES:

1.http://nptel.iitm.ac.in

2.JNTUK-COERD

VIRTUAL LAB:

1.http://vlab.amrita.edu/?sub=1&brch=201&sim=366&cnt=1

2. http://vlab.amrita.edu/?sub=1&brch=195&sim=840&cnt=1

PROFESSIONAL ENGLISH-II
(Common to CE,EEE,ME,ECE,CSE and IT)

Lecture – Tutorial:	2-1	**Internal Marks:**	40
Credits:	3	**External Marks:**	60

Prerequisites:

Course Objectives:
1. To expose the students to components of grammar required in effective sentence constructions.
2. To help the students to develop effective writing skills using phrasal verbs, connectives, collocations, idioms etc.
3. To enable the students to learn the format, style and types of letters, reports and emails.
4. To expose the students to various sub skills and strategies of reading and writing.
5. To enable the students to analyse and evaluate various texts that lead to global comprehension.

Course Outcomes:

Upon successful completion of the course, the student will be able to:

CO1	Recognize the importance of the role of communication in the competitive world.
CO2	Acquire the competence to write effectively in various formal and academic contexts.
CO3	Acquire the jargon used in business communication and technical communication.
CO4	Develop the ability to evaluate texts by inferring the implied sense of such texts and apply such knowledge globally.
CO5	Gain knowledge about the significance of the universal human values through expression of human feelings of compassion and right understanding.

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1									2	3		2
CO2										2		2
CO3										3		2
CO4												2
CO5								2				2

UNIT I
1. **Text**: A. **"The Struggle for an Education"** – Booker T. Washington
   B. **"Good Manners"** – J.C. Hill
2. **Writing**: Formal Communication VS Informal Communication -Writing
3. **Vocabulary**: Business and Technical Terminology
4. **Remedial Grammar**: Change of Voice

UNIT II
1. **Text**: **"A Letter to Indu"** – Jawaharlal Nehru
2. **Writing**: Letter Writing – Types of Letters – Different Styles of Letter Writing
3. **Vocabulary**: Phrasal Verbs – Use of Connectives in Sentence Constructions
4. **Remedial Grammar**: Reported Speech

UNIT III

1. **Text**: A. **"The Power of a Plate of Rice"** – Ifeoma Okoye
   B. **"Email to Employees"** – Satya Nadella
2. **Writing**: Email Writing, Report Writing (Significance, Format and style of writing Technical Reports)
3. **Vocabulary**: Collocations
4. **Remedial Grammar:** Subject-Verb Agreement

UNIT IV

1. **Text**: **"Stench of Kerosene"** – Amrita Pritam
2. **Writing**: Essay Writing –Types of Essays
3. **Vocabulary**: Use of Idiomatic Expressions (in different contexts)
4. **Remedial Grammar**: Common Errors

TEXT BOOKS:

REFERENCE BOOKS:

1. Advanced Grammar in Use. Martin Hewings. Cambridge University Press. 2013
2. Effective Technical Communication Rizvi, Ashraf. M.. Tata McGraw – Hill, New Delhi. 2005
3. Word Power Made Easy. Norman Lewis
4. Michael Swan. Basic English Usage
5. A New Approach to Objective English. Dhillon Group of Publications
6. English and Soft Skills. Dhanavel S. P. Orient Black Swan, Hyderabad, 2010
7. Professional Communication. Baradwaj Kumkum. I.K. International Publishing House Pvt. Ltd, New Delhi .2008
8. Intermediate English Grammar, Raymond Murphy, Cambridge University Press.

E-RESOURCES:

1. http://grammar.ccc.commnet.edu/grammar/index.htm
2. https://owl.english.purdue.edu/
3. https://learnenglish.britishcouncil.org/en

ENGINEERING MATHEMATICS-II
(Common to CE,EEE,ME,ECE,CSE and IT)

Lecture – Tutorial:	3 – 1	**Internal Marks:**	40
Credits:	4	**External Marks:**	60

Prerequisites:
Student has a knowledge about Trigonometric functions and its related formulae, Differentiation , Integration and vector algebra.

Course Objectives:

- The course is designed to equip the students with the necessary skills and techniques that are essential for Engineering course.
- The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1	Finding the General solution of first order ordinary differential equation and its applications.
CO2	Finding the General solution of second and higher order ordinary differential equations with constant and variable coefficients.
CO3	Determine double integral over a region and triple integral over a volume.
CO4	Determine the Gradient, Diveregence and Curl of a vector and vector identities.

Contribution of Course Outcomes towards achievement of Program Outcomes
(1– Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2		1	2						1	1
CO2	3	2		1	2						1	1
CO3	3	2		1	1						1	1
CO4	3	2		1	1						1	1

UNIT I
Ordinary differential equations of first order and applications

Linear – Bernoulli – Exact – Reducible to exact differential equations – Ort trajectories –
Newton's law of cooling – Law of exponential growth and decay .

UNIT II
Ordinary differential equations of 2nd and higher order

Non homogeneous equations of higher order with constant coefficients with Right hand side terms of the type $e^{ax}, \sin ax, \cos ax, x^k (k > 0), e^{ax}V, x^mV$ - Variation of parameters – Differential equations with variable coefficients (Legendre and Cauchy)

UNIT III

Multiple Integrals

Multiple Integrals – Double and Triple Integrals – Change of variables – Change of integration.

Applications: Finding Areas, Surfaces and Volumes.

UNIT IV

Vector Calculus

Vector differentiation – Gradient – Divergence – Curl – Vector identies.

Vector Integration – Line integral – work done – Potential function – area – surface and volume integrals – Vector integral theorems (without proof) viz. Greens, stokes and Gauss divergence and related problems.

TEXT BOOKS:

1.B.S.Grewal, "Higher Engineering Mathematics, Khanna Publishers", 43rd Edition, 2014.

REFERENCE BOOKS:

1. **N.P.Bali**, Engineering Mathematics, Lakshmi Publications.
2. **Erwin Kreyszig**, Advanced Engineering Mathematics, 10th Edition, Wiley-India

E-RESOURCES:

1.www.nptel**videos.com/mathematics/ (Math Lectures from MIT,Stanford,IIT'S)**

2.**nptel.ac.in/courses/122104017**

3.**nptel.ac.in/courses/111105035**

ENGINEERING CHEMISTRY

Lecture – Tutorial:	2-1	**Internal Marks:**	40
Credits:	3	**External Marks:**	60

Prerequisites:

Course Objectives:
Knowledge of basic concepts of Chemistry for Engineering students will help them as professional engineers later in design and material selection, as well as utilizing the available resources.

COURSE OUTCOMES:
Upon successful completion of the course, the student will be able to:

CO1 Plastics have become part and parcel of everyday life. Hence their preparation, fabrication and study of properties are essential to engineering students.

CO2 Study of electrochemistry helps in developing efficient cells and batteries and thorough understanding of corrosion and its prevention.

CO3 Knowledge of water technology helps in understanding various methods to produce suitable water for drinking as well as industrial purpose.

CO4 Fuels as a source of energy for automobiles and all industries and they are introduced. Fuels which are used in general and their economics, advantages and limitations are discussed.

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	2	1	3									
CO2	3	1	2									
CO3	1		3									
CO4	2		1									

UNIT I

POLYMERS

Introduction-methods of polymerization-(emulsion and suspension)-physical and mechanical properties.

Plastics– Introduction-Thermoplastics and Thermosetting plastics – Compounding and fabrication (compression, injection, transfer & extrusion)- Preparation, properties and applications of polythene, PVC, Bakelite and Teflon

Elastomers: - Natural rubber- compounding and vulcanization – Synthetic rubbers: Buna S, Buna N and Thiokol– Applications of elastomers.

Fiber reinforced plastics – Biodegradable polymers – Conducting polymers.

UNIT II

ELECTROCHEMISTRY AND CORROSION

Galvanic cells - Reversible and irreversible cells – Single electrode potential – Electrochemical series and uses of this series- Standard Hydrogen electrode and Calomel electrode - Concentration Cells

Batteries: Dry Cell – Li- cells (Liquid cathode and solid cathode Li cells).
Fuel cells-Hydrogen-oxygen and methyl alcohol-oxygen fuel cells
Corrosion **:-** Definition – Theories of Corrosion (chemical & electrochemical) – Formation of galvanic cells by different metals, by concentration cells, by differential aeration and waterline corrosion – Passivity of metals – Pitting corrosion - Galvanic series – Factors which influence the rate of corrosion - Protection from corrosion – Cathodic protection – Protective coatings: Galvanizing, Tinning, Electroplating, Electro less plating.

UNIT III

WATER TECHNOLOGY

Hard water:- Reasons for hardness – units of hardness –numerical problems-determination of hardness by EDTA method -alkalinity
Boiler troubles – Priming and Foaming, Scale formation, Boiler corrosion, Caustic embrittlement - Internal treatments –external treatments- Softening of Hard water: Lime – Soda process-numerical problems- Zeolite process and Ion Exchange process.
Water for drinking purposes- Purification – disinfection- Chlorination, Break point chlorination-Reverse Osmosis and Electro Dialysis.

UNIT IV

Fuels:- Introduction – Classification – Calorific value - HCV and LCV – Dulong's formula –Bomb calorimeter – Numerical problems – Coal — Proximate and ultimate analysis –Significance of the analyses – Liquid fuels – Petroleum-Refining – Cracking – Synthetic petrol(Fisher tropsch method)–Petrol knocking – Diesel knocking-Octane and Cetane ratings – Anti-knock agents-Flue gas analysis by orsat apparatus.
Nanomaterials- Introduction, sol-gel method & chemical reduction methods of preparation- carbon nano tubes and fullerenes: preparation and properties and applications.
Cement: - Constituents, manufacturing, hardening and setting, deterioration of cement

TEXT BOOKS:

1. Engineering Chemistry by Jain and Jain; Dhanpati Rai Publication
2. Engineering Chemistry by Shikha Agarwal; Cambridge University Press,2015 edition.

REFERENCE BOOKS:

1. Engineering Chemistry of Wiley India Pvt. Ltd., Vairam and others, 2014 2nd edition.
2. Engineering Chemistry by Prasanth Rath, Cengage Learning, 2015 edition.
3. A text book of engineering Chemistry by S. S. Dara; S. Chand & Co Ltd., Latest Edition
4. Applied Chemistry by H.D. Gesser, Springer Publishers
5. Text book of Nano-science and nanotechnology by B.S. Murthy, P. Shankar and others, University Press, IIM

E-RESOURCES:

1.www.nptel.ac.in
2.www.swayam.gov.in

PROGRAMMING AND PROBLEM SOLVING WITH C
(Common to CIVIL,EEE,MECH,ECE)

Lecture – Tutorial: 3-1 **Internal Marks:** 40
Credits: 4 **External Marks:** 60

Prerequisites:
. Basic Knowledge on computer usage
.Basic knowledge on Mathematics

Course Objectives:
Formulating algorithmic solutions to problems and implementing algorithms in C.
• Notion of Operation of a CPU, Notion of an algorithm and computational procedure,
editing and executing programs in Linux.
• Understanding branching, iteration and data representation using arrays.
• Modular programming and recursive solution formulation.
• Understanding pointers and dynamic memory allocation.
• Understanding miscellaneous aspects of C.
• Comprehension of file operations.

COURSE OUTCOMES:
Upon successful completion of the course, the student will be able to:
CO1 Understanding basic terminologies, basic idea on writing, executing programs, understanding decision structures.
CO2 Design programs involving Arrays, modular programming concepts
CO3 Understand the use of Pointers and Strings
CO4 Use different data structures and create/update basic data files.

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	2	2	2	1	1	1	2					
CO2	3	3	3	3	1	3	1					1
CO3	3	3	3	3	1	3	2					2
CO4	3	3	3	3	1	3	2					2

UNIT I

Introduction to Programming: Computer - Components, Types of Languages, Compiler, Algorithms and their representations: Flowcharts, Pseudo Code.
Introduction to C: "Hello World" in C – Editor, Compiler, Execution Environment. C as a Middle Level Language. Basic Structure of C program, Standard Library and Header Files, Tokens in C - Variable, Constant (literal and named), Data types, Keywords, Variable Declaration and Assignment. Operators - Precedence & Associativity. Type conversion, Input and Output statements.
Selection and Looping Statements: If statement, If-Else Statement, Nested If, Examples, Multi-way selection: Switch, Else-If, examples, While Statement, For Statement, Nested Loops, do-while Statement, Break and Continue statements, Example programs

UNIT II

Arrays: Concept, Declaration and Initialization of Arrays, Accessing Individual Elements of Array. Use of Arrays in Sorting, Searching. Concept of 2-D array (Matrix), Passing arrays to functions, Examples.

Functions: Need of Functions, Function Declaration, Definition and Call. Inbuilt functions and User Defined Functions. Passing arguments to a function, Returning values from a function. Scope of variable, local and global variable. Storage classes.

Recursive Functions: Need of Recursion, Direct Recursion, Indirect Recursion, Examples of Recursive Programs – Factorial, Fibonacci series. Recursive Vs Iterative solutions,Disadvantages of Recursion.

UNIT III

Pointers: Concept of Pointers, Relevance of Data type in Pointer Variable, Pointer arithmetic. Pointer to pointer. Pointers and Functions (passing pointers to functions, returning pointers from functions). Pointers and Arrays. Pointers and Strings. Array of Pointers, Pointer to Array. Various alternatives of accessing arrays (1-D and 2-D) using pointers, Dynamic Memory Allocation ,Command Line Arguments

Strings: Strings as Arrays, Character Array versus Strings, Reading Strings, Writing Strings, User Defined Functions for String Operations – Copy, Concatenate, Length, Reverse, Converting case, Appending, Comparing two strings, Extracting a substring. Array of strings.

UNIT IV

Structures & Unions: Notion, Declaration and Initialization, Structure Variables, Accessing and Assigning values of the fields, Functions and Structures, Arrays of Structures, nested structures, Pointers and Structures, Passing Structure to a Function and Returning Structure from Function. Introduction to self referential structures , Union, Nesting of Structure and Union. Enumerated data types.

Data Files: Declaring, Opening and Closing File Streams, Reading From and Writing to Text Files, Random File Access

TEXT BOOKS:

1. C Programming-A Problem Solving Approach, Forouzan, Gilberg, Cengage

REFERENCE BOOKS:

1.Programming in ANSIC 7th Edition by E.Balaguruswamy
2.Let us C by Yaswanth Kanetkar
3. The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education.
4. Programming with C, Bichkar, Universities Press.
5. Programming in C, ReemaThareja, OXFORD.
6. C by Example, Noel Kalicharan, Cambridge.
7. ANSI C Programming, Gary J. Bronson, Cengage Learning.

E-RESOURCES:

1. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-087-practical-programming-in-c-january-iap-2010/lecture-notes/
2. http://cslibrary.stanford.edu/101/EssentialC.pdf
3. http://nptel.ac.in/courses/106104128/
4. http://www.vssut.ac.in/lecture_notes/lecture1424354156.pdf

ENGINEERING MECHANICS

Lecture – Tutorial: 3 – 1 **Internal Marks:** 40
Credits: 4 **External Marks:** 60

Prerequisites:
- Engineering Physics.
- Engineering Mathematics.

Course Objectives:
- To develop an understanding of the principles of statics and the ability to analyze problems using static equilibrium equations.
- To develop the fundamentals of engineering mechanics and problem solving skills essential for an engineer.

COURSE OUTCOMES:
Upon successful completion of the course, the student will be able to:

CO1 Construct free body diagrams and develop appropriate equilibrium equations.
CO2 Analyze system with concepts of friction & Determine the position of centroid.
CO3 Determine moment of inertia for Composite Sections.
CO4 Apply D-Alembert's principle, work-energy method and Impulse Momentum principle to solve dynamics problems.

Contribution of Course Outcomes towards achievement of Program Outcomes
(1– Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	1	-	2	-	-	-	-	-	-	-	-
CO2	3	1	-	2	-	-	-	1	-	-	-	-
CO3	3	2	-	3	-	-	-	1	-	-	1	-
CO4	3	1	-	2	-	-	-	-	-	-	-	-

UNIT I

Systems of Forces:
Classification, Coplanar Concurrent Forces – Components of force– Resultant-Triangle law of Forces-Polygon law of Forces- Parallelogram Law of Forces-Resolution and composition of Forces, Moment of Force and its Application – Varignon's theorem.

Equilibrium of Systems of Forces:
Free Body Diagrams, Types of Supports and their reactions, Internal and External Forces – Types of Equilibrium, Equations of Equilibrium, Conditions of Equilibrium, Equilibrium of bodies under Coplanar concurrent system of forces – Lami's Theorem

UNIT II

FRICTION:
Introduction, limiting friction and impending motion, coulomb's laws of dry friction, coefficient of friction, cone of friction, wedge friction, Ladder friction.
Centroid:
Centroids of simple figures (from basic principles) – Centroids of Composite Figures
Centre of Gravity: Centre of gravity of simple body (from basic principles), centre of gravity of composite bodies, Pappus and Guldinus theorem.

UNIT III

Area moment of Inertia:
Definition –Moment of Inertia of plane areas, Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures and Product of Inertia.
Mass Moment of Inertia:
Moment of Inertia of Simple solids, Transfer Formula for Mass Moments of Inertia, Mass Moment of Inertia of composite bodies.

UNIT IV

Kinematics & Kinetics:
Rectilinear motion – Motion of Rigid Body under uniform and variable accelerations – motion under gravity-curvilinear motion -Projectiles-rotary motion. Analysis as a Particle and Analysis as a Rigid Body in Translation – D'Alemberts Principle – Connected bodies.
Work, Power and Energy: Work-energy equation for translation-connected bodies on horizontal and inclined planes-pulleys. Impulse momentum method.

TEXT BOOKS:

1. **S.Timoshenko, DH Young**, *JV Rao, Sukumar Pati*, ―Engineering Mechanics", McGraw Hill Education Publisher,5th Edition(Special Indian Edition), 2013.
2.**Hibbeller,R.C and Ashok Gupta**, Engineering Mechanics:Statics and Dynamics, 11 Edition, Pearson Education 2010.

REFERENCE BOOKS:

1.Engineering Mechanics: R.K.Bansal, Laxmi publications.
2.Engineering Mechanics: S.S.Bavakatti, New age International.
3.Engineering Mechanics:Bhattacharyya,Oxford publications.
4. Engineering Mechanics: Pakirappa, Durga publishing House

E-RESOURCES:

2. http://nptel.ac.in/courses/122104015/
3. https://ocw.mit.edu/courses/mechanical-engineering/

ENGLISH COMMUNICATION SKILLS LAB-II

Practice: 3 **Internal Marks:** 40
Credits: 1.5 **External Marks:** 60

Prerequisites:

Course Objectives:
To enable the students to learn through practice the four communication skills: Listening, Speaking, Reading and Writing.
Understand the nuances of language usage for better presentation in all the walks of life promoting life-long learning.

Course Outcomes:
Upon successful completion of the course, the student will be able to:

CO1	Attain better understanding of the nuances of English language to put into use in various situation and events.
CO2	Acquire speaking skills with clarity and confidence which in turn enhances their employability skills.
CO3	Communicate and present their ideas and sources accurately and effectively.
CO4	Enhance their employability skills and critical thinking skills with participation in mock interviews and group discussions.

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1									1	3		2
CO2										3		2
CO3									1	3		2
CO4									1			2

List of Experiments:

UNIT 1:
1. Debating
Practice work

UNIT 2:
1. Group Discussions
Practice work

UNIT 3:
1. Presentation Skills
Practice work

UNIT 4:
1. Interview Skills
2. Curriculum Vitae
Practice work

EQUIPMENT REQUIRED:
Computer Assisted Language Laboratory with computers equipped with software that help the students in developing four skills – Listening, Speaking, Reading and Writing.

REFERENCE BOOKS:

1. INTERACT: English Lab Manual for Undergraduate Students' Published by Orient Blackswan Pvt Ltd.
2. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna Lakshmi, Maruti Publications.
3. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
4. Unlock, Listening and speaking skills 2, Cambridge University Press
5. Spring Board to Success, Orient BlackSwan
6. A Practical Course in effective english speaking skills, PHI
7. Word power made handy, Dr shalini verma, Schand Company
8. Let us hear them speak, Jayashree Mohanraj, Sage texts
9. Professional Communication, Aruna Koneru, Mc Grawhill Education
10. Cornerstone, Developing soft skills, Pearson Education

E-RESOURCES:

1. 1. https://www.britishcouncil.in/
2. http://www.talkenglish.com/

ENGINEERING CHEMISTRY LAB

Practice:	2	**Internal Marks:**	40
Credits:	1	**External Marks:**	60

Prerequisites:

Course Objectives:

To provide knowledge of chemistry practical's. It enables the students to analyze the different parameters of water sample like hardness and alkalinity and different volumetric titrations. It makes the students to obtain basic knowledge of instrumentation based on different Engineering applications.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1 Perform different volumetric titrations listed in syllabus.

CO2 To analyze various parameters of water sample.

CO3 Instrumental methods of chemical analysis exhibit the skill of the students

CO4 Preparation of different compounds provides knowledge to the students.

Contribution of Course Outcomes towards achievement of Program Outcomes

(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1	2										
CO2	1	2										
CO3	1											
CO4	1											

List of Experiments:

1.Determination of HCl by Na_2CO_3 solution

2.Determination of alkalinity of sample containing Na_2CO_3 and NaOH

3.Determination of $KMnO_4$ using standard oxalic acid solution

4.Determination of total hardness of water by EDTA solution

5.Determination of copper using standard EDTA solution

6.Determination of Zinc using standard EDTA solution

7.Determination of Iron by a calorimetric method

8.Conductometric titration between strong acid and strong base

9.Potentiometric titration between strong acid and strong base

10.Potentiometric titration between Iron and dichromate

Additional Experiments to be performed

1.Preparation of urea-formaldehyde resin

2.Determination of P^H of water sample

3. Preparation of phenol-formaldehyde resin

EQUIPMENT REQUIRED:

PH meters, Potentiometers, Conductometers, colorimeters.

APPARATUS

Burettes, Pipettes, Conical flask, Beakers.

REFERENCE BOOKS:

1. A Textbook of Quantitative Analysis, Arthur J. Vogel.
2. Dr. Jyotsna Cherukuris (2012) *Laboratory Manual of engineering chemistry-II,* VGS Techno Series
3. Chemistry Practical Manual, Lorven Publications
4. K. Mukkanti (2009) *Practical Engineering Chemistry,* B.S. Publication

PROGRAMMING AND PROBLEM SOLVING WITH C LAB

Practice: 3 **Internal Marks:** 40
Credits: 1.5 **External Marks:** 60

Prerequisites:

Course Objectives:

- Understand the basic concept of C Programming, and its different modules that includes conditional and looping expressions, Arrays, Strings, Functions, Pointers, Structures and File programming.
- Acquire knowledge about the basic concept of writing a program.
- Role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language.
- Use of conditional expressions and looping statements to solve problems associated withconditions and repetitions.
- Role of Functions involving the idea of modularity.

COURSE OUTCOMES:
Upon successful completion of the course, the student will be able to:

CO1 Understand C programming development environment, compiling, debugging, and linking and executing a program using the development environment
CO2 To solve the problems using selection and iterative statements
CO3 Analyzing the complexity of problems, Modularize the problems into small modules and then convert them into programs, Understand and apply the in-built functions and customized functions for solving the problems.
CO4 To solve the various problems using arrays, structures, pointers and files

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	2	3	1	2	3	1	2					1
CO2	2	1	2	2	1	2	2					2
CO3	2	3	3	2	3	3	2					3
CO4	3	3	3	3	3	3	3					3

List of Experiments:

Exercise - 1 Basics
a) What is an OS Command, Familiarization of Editors - vi, Emacs
b) Using commands like mkdir, ls, cp, mv, cat, pwd, and man
c) C Program to Perform Adding, Subtraction, Multiplication and Division of two numbers From
Command line

Exercise - 2 Basic Math
a) Write a C Program to Simulate 3 Laws at Motion
b) Write a C Program to convert Celsius to Fahrenheit and vice versa

Exercise - 3 Control Flow - I
a)Write a C Program to Find Whether the Given Year is a Leap Year or not.
b)Write a C Program to Add Digits & Multiplication of a number

Exercise – 4 Control Flow - II
a)Write a C Program to Find Whether the Given Number is
i) Prime Number
ii) Armstrong Number
b) Write a C program to print Floyd Triangle
c) Write a C Program to print Pascal Triangle
Exercise – 5 Functions
a) Write a C Program demonstrating of parameter passing in Functions and returning values.
b) Write a C Program illustrating Fibonacci, Factorial with Recursion without Recursion
Exercise – 6 Control Flow - III
a) Write a C Program to make a simple Calculator to Add, Subtract, Multiply or Divide Using
switch...case
b) Write a C Program to convert decimal to binary and hex (using switch call function the
function)
Exercise – 7 Functions - Continued
Write a C Program to compute the values ofsin x and cos x and e^x values using Series
expansion. (use factorial function)
Exercise – 8 Arrays
Demonstration of arrays
a) Search-Linear.
b) Sorting-Bubble, Selection.
c) Operations on Matrix.
Exercises - 9 Structures
a)Write a C Program to Store Information of a Movie Using Structure
b)Write a C Program to Store Information Using Structures with Dynamically Memory
Allocation
c) Write a C Program to Add Two Complex Numbers by Passing Structure to a Function
Exercise - 10 Arrays and Pointers
a)Write a C Program to Access Elements of an Array Using Pointer
b) Write a C Program to find the sum of numbers with arrays and pointers.
Exercise – 11 Dynamic Memory Allocations
a) Write a C program to find sum of n elements entered by user. To perform this program,
allocate memory dynamically using malloc () function.
b) Write a C program to find sum of n elements entered by user. To perform this program,
allocate memory dynamically using calloc () function. Understand the difference between the
above two programs
Exercise – 12 Strings
a) Implementation of string manipulation operations with library function.
i) copy
ii) concatenate
iii) length
iv) compare

b) Implementation of string manipulation operations without library function.
i) copy
ii) concatenate
iii) length
iv) compare

Exercise -13 Files

a)Write a C programming code to open a file and to print it contents on screen.
b)Write a C program to copy files

Exercise - 14 Files Continued

a) Write a C program merges two files and stores their contents in another file.
b) Write a C program to delete a file.

EQUIPMENT REQUIRED:

1.Computer Systems with UNIX OS,GCC Compiler,VI Editor

REFERENCE BOOKS:

1. 1.Programming in ANSIC 7th Edition by E.Balaguruswamy
2.Let us C by Yaswanth Kanetkar
3. The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education.

E-RESOURCES:

1. http://www.skiet.org/downloads/cprogrammingquestion.pdf
2. http://www.c4learn.com/c-programs/
3. https://www.programiz.com/c-programming/examples
4. https://www.sanfoundry.com/c-programming-examples/

NRI INSTITUTE OF TECHNOLOGY

(An Autonomous Institution Permanently Affiliated to JNTUK, Kakinada)
(Accredited by NAAC with "A" Grade and ISO 9001:2015 Certified Institution)
POTHAVARAPPADU (V), (VIA) NUNNA, AGIRIPALLI (M), PIN – 521 212

2018-2019

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
COURSE STRUCTURE FOR FIRST YEAR B.TECH PROGRAMME
I YEAR I SEMESTER

Sl. No	Course Code	Title of the Course	Scheme of Instruction (Periods Per Week)				Scheme of Examination (Maximum Marks)			No. of Credits
			L	T	P	Total	CIA	SEA	Total	
1	18A1100101	Professional English – I	2	1	-	3	40	60	100	3
2	18A1100201	Engineering Mathematics – I	2	1	-	3	40	60	100	3
3	18A1100205	Applied Chemistry	2	1	-	3	40	60	100	3
4	18A1102301	Fundamentals of Electrical Engineering.	2	1	-	3	40	60	100	3
5	18A1103301	Engineering Graphics	1	-	2	3	40	60	100	2
6	18A1100191	English Communication Skills lab – I	-	-	4	4	40	60	100	2
7	18A1100294	Applied Chemistry lab	-	-	2	2	40	60	100	1
8	18A1105391	Automation tools & Professional Workshop	-	-	2	2	40	60	100	1
		Total	9	4	10	23	320	480	800	18

I YEAR II SEMESTER

Sl. No	Course Code	Title of the Course	Scheme of Instruction (Periods Per Week)				Scheme of Examination (Max Marks)			No. of Credits
			L	T	P	Total	CIA	SEA	Total	
1	18A1200101	**Professional English – II**	2	1	-	3	40	60	100	3
2	18A1200201	Engineering Mathematics – II	3	1	-	4	40	60	100	4
3	18A1200203	Applied Physics	2	1	-	3	40	60	100	3
4	18A1205301	Programming and Problem solving with C	3	1	-	4	40	60	100	4
5	18A1204401	Electronics Devices and Circuits	3	1	-	4	40	60	100	4
6	18A1200801	Environmental Studies	2	1	-	3	40	60	100	0
7	18A1200191	English Communication Skills lab – II	-	-	3	3	40	60	100	1.5
8	18A1200292	Applied Physics lab	-	-	2	2	40	60	100	1
9	18A1205392	Programming and Problem solving with C Lab	-	-	3	3	40	60	100	1.5
		Total	15	6	8	29	360	540	900	22

L - LECTURE T – TUTORIAL P - PRACTICAL
CIA – Continuous Internal Assessment SEA – Semester End Assessment

Head, ECE Department
NRI Institute of Technology
POTHAVARAPPADU (V)
Agiripalli (Mdl); Krishna Dist.

PROFESSIONAL ENGLISH-I
(Common to CE,EEE,ME,ECE,CSE and IT)

Lecture – Tutorial:	2-1 Hours	**Internal Marks:**	40
Credits:	3	**External Marks:**	60

Prerequisites:
None

Course Objectives:

1. To strengthen the lexical ability of the students in different contexts.
2. To expose the students to various sub-skills and strategies of reading and writing – summarizing and paraphrasing.
3. To help the students develop effective writing skills through paragraph writing.
4. To train the students in fundamentals of grammar required to equip them with fluent English.
5. To enable the students to think critically by exposing them to different socio-cultural contexts through various literary texts.

Course Outcomes:

Upon successful completion of the course, the student will be able to:

CO1	Use grammar accurately in various formal and functional contexts.
CO2	Build good vocabulary and develop the ability to use in various contexts.
CO3	Comprehend, analyze and evaluate texts critically.
CO4	Develop effective reading and writing skills to enhance communicative competence.
CO5	Help the students to inculcate and apply human values and professional ethics in their academic, professional and social lives.

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1										3		2
CO2										3		2
CO3						1	1					2
CO4										3		2
CO5						1	1	3				2

UNIT I

1. **Reading:** Introduction to Integrated Communication with emphasis on Reading Skills, Scanning an article from *The Economic Times* – **"Why India celebrates Engineers Day on the birth anniversary of M. Visvesvaraya"**
2. **Text: "I have a dream..."** – Martin Luther King
3. **Vocabulary Building:** Synonyms and Antonyms from the Text , Word Formations: Root Words, Prefixes and Suffixes
4. **Writing:** Styles of Sentence Structure for Effective Writing, Textual Exercises, Scrambled Sentences
5. **Remedial Grammar:** Parts of Speech, Effective Sentence Constructions Using Connectives

ENGINEERING MATHEMATICS-1

((Common to CE,EEE,ME,ECE,CSE and IT)

Lecture – Tutorial: 2 – 1 **Internal Marks:** 40

Credits: 3 **External Marks:** 60

Prerequisites:

Fundamentals of Matrices, Fundamentals of Trigonometry and Calculus

Course Objectives:

- The course is designed to equip the students with the necessary skills and techniques that are essential for Engineering course.
- The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1 To solve simultaneous linear equations, determine eigen values, eigen vectors of a matrix and determine the nature of a Quadratic forms.

CO2 To calculate a root of algebraic and transcendental equations. Explain relation between the finite difference operators and compute the interpolating polynomial for the given data. Solve Ordinary differential equations numerically using Taylor series method, Euler's and RK method of second and fourth order.

CO3 To determine the Maxima and Minima of functions of Two variables without constraints and with constraints and form the Partial Differential equations by elimination of arbitrary constants and arbitrary functions.

CO4 To solve the ordinary linear differential equations by using Laplace Transforms.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2		1	2						1	1
CO2	3	2		1	1						1	1
CO3	3	2		1	2						1	1
CO4	3	2		1	1						1	1

UNIT I:

Matrices

Rank – Echelon form – Normal form – PAQ form – Inverse of 4x4 matrix by Gauss-Jordan - Solution of Homogeneous linear systems – solution of Non-homogeneous linear systems – Gauss Elimination – Gauss Seidel methods.

Eigenvalues – Eigen vectors – Properties – Cayley Hamilton theorem (without proof) – Inverse Powers of Matrices by Caley Hamilton theorem – Quadratic forms – Reduction of quadratic forms to Canonical form (Congruent transformation method, Orthogonal transformation) – Rank, Index, Signature of a Quadratic form.

UNIT II

1. **Reading**: Skimming: **"Oh Father, Dear Father"** – Raj Kinger
2. **Text: "On Shaking Hands"** – A.G. Gardiner
3. **Vocabulary Building:** Synonyms and Antonyms from the Text
4. **Writing**: Paragraph Scramble
5. **Remedial Grammar:** Framing Questions and Question Tags, Punctuation Rules, Usage of Articles

UNIT III

1. **Reading**: Critical Reading: **"Dial 000"** - Barry Rosenberg
2. **Text**: **"Seeing People Off"** – Max Beerbohm
3. **Vocabulary Building**: Synonyms and Antonyms from the Text, Acronyms
4. **Writing**: Principles of a Good Paragraph
5. **Remedial Grammar**: Verbs and Types, Present Tense

UNIT IV

1. **Reading:** Note Making: **"Icons: The Lotus Temple"** – Anamika Bhutalia
2. **Text**: **"The Lost Child"** – Mulk Raj Anand
3. **Vocabulary Building:** Synonyms and Antonyms from the Text, One Word Substitutes
4. **Writing:** Summarising and Writing Anecdotes
5. **Remedial Grammar**: Past Tense and Future Tense, Correction of Sentences

REFERENCE BOOKS:

1. **The Blue Book of Grammar and Punctuation**, 10th Edition, Jane Straus, Josey-Bass, A Wiley Imprint.
2. **Oxford Practice Grammar,** John Eastwood, Oxford University Press.
3. **The Most Common Mistakes in English Usage** – Thomas Elliott Berry
4. **Essential Communication Skills** – Shalini Agarwal, Ane Books Pvt Ltd.
5. **Dictionary of Synonyms and Antonyms**, Oxford & IBH, III Ed
6. **A Practical English Grammar**, Agnes V. Martinet and Audrey Jean Thomson, Oxford University Press.

E-RESOURCES:

1. http://grammar.ccc.commnet.edu/grammar/index.htm
2. https://owl.english.purdue.edu/
3. https://www.britishcouncil.in/

APPLIED CHEMISTRY

(Common to CSE,IT,ECE,EEE)

Lecture – Tutorial: 2-1 **Internal Marks:** 40
Credits: 3 **External Marks:** 60

Prerequisites:

Course Objectives:
Knowledge of basic concepts of Chemistry for Engineering students will help them as professional engineers later in design and material selection, as well as utilizing the available resources.

COURSE OUTCOMES:
Upon successful completion of the course, the student will be able to:

CO1	Plastics have become part of our life. Hence their preparation, fabrication and study of properties are essential to engineering students.
CO2	Study of electrochemistry helps in developing efficient cells and batteries and thorough understanding of corrosion and its prevention.
CO3	With the increase in demand for power and also with depleting sources of fossil fuels, the demand for alternative sources of fuels is increasing. Some of the prospective fuel sources are introduced
CO4	Nano materials, superconductors and liquid crystals are advanced engineering materials with exceptional properties can be exploited by engineering students.
	The green synthesis must be understood to keep the planet earth safe.

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	2	1	3									
CO2	3	1	2									
CO3	2	1										
CO4	1				2							

UNIT I

POLYMERS
Introduction-methods of polymerization-(emulsion and suspension)-physical and mechanical properties.
Plastics– Introduction-Thermoplastics and Thermosetting plastics – Compounding and fabrication (compression, injection, transfer & extrusion)-Preparation, properties and applications of polythene, PVC, Bakelite and Teflon
Elastomers: - Natural rubber- compounding and vulcanization – Synthetic rubbers: Buna S, Buna N and Thiokol– Applications of elastomers.
Fiber reinforced plastics – Biodegradable polymers – Conducting polymers.

UNIT II

ELECTROCHEMISTRY AND CORROSION
Galvanic cells - Reversible and irreversible cells – Single electrode potential – Electrochemical series and uses of this series- Standard Hydrogen electrode and Calomel electrode – Concentration Cells

UNIT II

Numerical Methods

Solutions of Algebraic and Transcendental Equations: Bisection method – Iteration method – Newton Raphson method (one variable). Interpolation: Finite differences –Operators Δ, ∇, E and relations between them - Forward differences – Backward differences – Missing terms - Newton's forward and backward formulae for interpolation – Lagrange's interpolation formula.

Trapezoidal rule – Simpson's $1/3^{rd}$ and $3/8^{th}$ rules – Numerical solution of Ordinary differential equation by Taylor series method – Euler's method – Modified Euler's method – Rungekutta method of second and fourth order.

UNIT III

Partial Differentiation

Homogeneous function – Euler's theorem – Total derivative – Chain rule – Generalized mean value theorem for single variable (without proof) – Taylor's and Maclaurin's series – Expansion of Two variable functions – functional dependence – Jacobian – Maxima and Minima of functions of two variables without constraints and Lagrange's method of multipliers.

UNIT IV

Laplace Transforms

Laplace transforms of standard functions – shifting theorems – transforms of derivative's and integrals – Unit step function – Dirac's delta function.
Inverse laplace transforms - convolution theorem (without proof) – solving ordinary differential equations (Initial value problems) using Laplace transforms.

TEXT BOOKS:

1. **B.S.Grewal, "Higher Engineering Mathematics, Khanna Publishers", 43rd Edition, 2014.**
2. **V.Ravindranath and P.Vijayalakshmi,** Mathematical Methods, Himalaya Publishing House.

REFERENCE BOOKS:

1. **N.P.Bali**, Engineering Mathematics, Lakshmi Publications.
2. **Erwin Kreyszig,** Advanced Engineering Mathematics, 10th Edition, Wiley-India.

E-RESOURCES:

1. www.nptel**videos.com/mathematics/ (Math Lectures from MIT,Stanford,IIT'S)**
2. **nptel.ac.in/courses/122104017**
3. **nptel.ac.in/courses/111105035**

FUNDAMENTALS OF ELECTRICAL ENGINEERING
(Common to EEE,ECE)

Lecture – Tutorial:	3 – 1	**Internal Marks:**	40
Credits:	3	**External Marks:**	60

Course Objectives:

- To inculcate the understanding about the electrical fundamentals
- To impart the basic knowledge about the Magnetic circuits
- Identification of various components and Understanding the operation of CRO.
- Understanding the importance of various sources and their Conversion.

Course Outcomes:

Upon successful completion of the course, the student will be able to:

CO1	Understand the importance of Electric circuits & Elements.
CO2	Understanding about the Magnetic Circuits.
CO3	Identification of various components and Understanding the operation of CRO.
CO4	Understanding the importance of various sources and their Conversion.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	3	1	2								
CO2	3	2		2								
CO3	2	1										
CO4	3	3		2								

UNIT I

Fundamentals of Electricity :

Introduction to circuit elements (R,L & C) – Electric current – Electric Potential difference – Ohm's law -Factors upon which Resistance depends – Specific Resistance – Effect of Temperature on Resistance – Temperature coefficient of Resistance – Series & parallel connection of Resistances , Inductances & Capacitances - Kirchhoff's laws (KCL & KVL)– Basic types of Sources (Independent Sources).

UNIT II

Protective Devices :

Types of Fuses, Characteristics , Materials Used, Fuse Rating – Types of Switches , Materials used, Symbols – Types of Circuit breakers - Types of Resistors , Rating – Colour coding of R,L & C

UNIT III

Batteries: Dry Cell – Li- cells (Liquid cathode and solid cathode Li cells).
Fuel cells-Hydrogen-oxygen and methyl alcohol-oxygen fuel cells
Corrosion :- Definition – Theories of Corrosion (chemical & electrochemical) – Formation of galvanic cells by different metals, by concentration cells, by differential aeration and waterline corrosion – Passivity of metals – Pitting corrosion - Galvanic series – Factors which influence the rate of corrosion - Protection from corrosion – Cathodic protection – Protective coatings: Galvanizing, Tinning, Electroplating, Electro less plating.

UNIT III

NON CONVENTIONAL ENERGY SOURCES

Solar energy: Introduction, application of solar energy, conversion of solar energy(thermal and photo conversion)-photovoltaic cell: design, working
Hydro power include setup a hydropower plant (diagram)-Geothermal energy: introduction-design geothermal power plant-Tidal and wave power: Introduction-design and working-movement of tides and their effect on sea level-Ocean thermal energy: Introduction, closed cycle, open cycle, hybrid OTEC, diagram and explanation-.Biomass and bio fuels

UNIT IV

Chemistry of Advanced materials

Nano materials: Introduction –Sol- gel method &chemical reduction method of preparation-characterization by BET methods-carbon nano tubes and fullerenes: Types, preparation and properties and applications.
Liquid crystals: Introduction-Types-Applications.
Super conductors: definition-types-properties-application.
Semi conductors: Preparation of Semiconductors Si and Ge(two methods)
Green chemistry: principles-phase transfer catalyst method-supercritical fluid extraction methods

TEXT BOOKS:

1. Engineering Chemistry by Jain and Jain; Dhanpati Rai Publications
2. Engineering Chemistry by Shikha Agarwal; Cambridge University Press, 2015 edition.

REFERENCE BOOKS:

1. Engineering Chemistry of Wiley India Pvt. Ltd., Vairam and others, 2014 edition (second).
2. Engineering Chemistry by Prasanth Rath, Cengage Learning, 2015 edition.
3. A text book of engineering Chemistry by S. S. Dara; S. Chand & Co Ltd., Latest Edition
4. Applied Chemistry by H.D. Gesser, Springer Publishers
5. Text book of Nano-science and nanotechnology by B.S. Murthy, P. Shankar and others, University Press, IIM

E-RESOURCES:

1.www.nptel.ac.in
2.www.swayam.gov.in

ENGINEERING MECHANICS

ENGINEERING GRAPHICS
(Common to EEE, ECE, CSE& IT)

Lecture – Practice:	1 – 2	**Internal Marks:**	40
Credits:	2	**Semester end assessment:**	60
		(Internal Only)	

Prerequisites:

- Knowledge of basic mathematical concepts (Geometry)
- Drawing skills

Course Objectives:

- To introduce the students to use drawing instruments and to draw polygons, Engineering Curves.
- To introduce the students to use of orthographic projections, projections of points, lines & Lines inclined to both the planes.
- To make the students draw the projections of the planes and solids at various positions with reference planes.
- The student will be able to represent and convert the pictorial views to orthographic views and vice versa by using AutoCAD as well as conventional.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1	Understand simple geometric construction like polygons, engineering curves and scales.
CO2	Understand orthographic projection of points, straight lines- inclined to one plane and inclined to both the planes.
CO3	Understand orthographic projection of planes and solids at various positions with different reference planes.
CO4	Understand The transformation of orthographic views into pictorial views and vice versa through AutoCAD as well as conventional drawing.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2	1	2	2	2	1	-	-	3	-	1
CO2	3	2	1	2	2	2	1	-	-	3	-	1
CO3	3	2	1	2	2	2	1	-	-	3	-	1
CO4	3	2	1	2	2	2	1	-	-	3	-	1

UNIT I

Introduction to engineering drawing:

Polygons: Construction of regular polygons by general methods, inscribing and

Earthing :

Need and Necessity of Earthing – Types of Earthing – Simple Earthing circuits for domestic appliances – Procedure of Earthing – Earthing of Generators, Motors, Transformers, Transmission Lines – Calculation earth resistance – Perfect Earthing - Importance of Neutral

Electrical Safety :

Electrical Shock – Types of First aids – Safety Norms – Human Body response for various electric voltages

UNIT IV

Measuring Instruments :

Types of Measuring Instruments – Principle of operation - Measurement of current, voltage, power, energy, Resistance, Inductance & capacitance – Earth Resistance – Principle of operation of CRO.

TEXT BOOKS:

1. Principles of Electrical Engineering by V.K Mehta, S.Chand Publications.

2. Elec., Technology by Edward Hughes

3. Electronic Principles by Sanjay Sharma , S.K.Katraia and Sons publications, 2nd edition

4. Electronics Devices and Circuits , S.Salivahanan ,N.Suresh Kumar,A.Vallava Raj, TMH publications , 4th edition

REFERENCE BOOKS:

1. Theory and Problems of Basic Electrical Engineering by D.P.Kothari & I.J. Nagrath PHI.

2. Basic Electrical Engineering by Fitzgerald and Higginbotham

3. Electrical Engineering fundamentals by Vincent Del Toro – PHI, New Delhi

E-RESOURCES:

1. http://nptel.ac.in/courses.php
2. http://jntuk-coeerd.in/
3. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/

ENGLISH COMMUNICATION SKILLS LAB-I

Practice: 4 Hours **Internal Marks:** 40

Credits: 2 **External Marks:** 60

Prerequisites:

None

Course Objectives:

To enable the students to learn through practice the four communication skills: Listening, Speaking, Reading and Writing.

Understand the nuances of language usage for better presentation in all the walks of life promoting life-long learning.

Course Outcomes:

Upon successful completion of the course, the student will be able to:

CO1 Understand the importance of communication skills and instill the need for life-long learning.

CO2 Express themselves fluently and appropriately in social and professional contexts.

CO3 Make sense of both verbal and non-verbal messages through selected listening activities.

CO4 Aware of the need of pronunciation and intonation in improving their speaking skills.

Contribution of Course Outcomes towards achievement of Program Outcomes

(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1						1			1	3		2
CO2						1			1	3		2
CO3									1	3		2
CO4											1	2

describing polygons with circles.
Conics: Construction of Parabola, Ellipse and Hyperbola by using general methods and also draw tangents & normals for the curves.

UNIT II

Introduction to orthographic projections:
Projections of points and lines: Horizontal plane, vertical plane, profile plane, importance of reference planes, projections of points in various quadrants. Projections of straight lines- perpendicular lines, inclined lines and parallel to either of the reference planes(HP,VP or PP).
Projections of lines inclined to both the planes:
Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclination .

UNIT III

Projections of planes: regular planes perpendicular/parallel to one plane and inclined to the other reference plane.
Projections of Solids: projections of Prisms, Pyramids, Cones and Cylinders with the axis parallel/perpendicular/ inclined to one of the planes and vice versa.

UNIT IV

Transformation of Projections: AutoCAD Fundamentals.
Conversion of Pictorial views to orthographic views Using AutoCAD and conventional.
Conversion of orthographic views to isometric views. Isometric drawing of simple objects through AutoCAD.

TEXT BOOKS:

1. Engineering Drawing by N.D. Butt, Chariot Publications
2. Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill Publishers

REFERENCE BOOKS:

1. Engineering Drawing by K.L.Narayana & P. Kannaiah, Scitech Publishers
2. Engineering Graphics for Degree by K.C. John, PHI Publishers
3. Engineering Graphics by PI Varghese, McGrawHill Publishers
4. Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, New Age Publishers

E-RESOURCES:

2. http://nptel.iitm.ac.in/

APPLIED CHEMISTRY LAB

Practice:	2	**Internal Marks:**	40
Credits:	1	**External Marks:**	60

Prerequisites:

Course Objectives:

To provide knowledge of chemistry practical's. It enables the students to analyze the different parameters of water sample like hardness and alkalinity and different volumetric titrations. It makes the students to obtain basic knowledge of instrumentation based on different Engineering applications.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1 Perform different volumetric titrations listed in syllabus.

CO2 To analyze various parameters of water sample.

CO3 Instrumental methods of chemical analysis exhibit the skill of the students.

CO4 : Preparation of different compounds provides knowledge to the students.

Contribution of Course Outcomes towards achievement of Program Outcomes

(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1	2										
CO2	1	2										
CO3	1											
CO4	1											

List of Experiments:

1.Determination of HCl by Na_2CO_3 solution

2.Determination of alkalinity of sample containing Na_2CO_3 and NaOH

3.Determination of $KMnO_4$ using standard oxalic acid solution

List of Experiments:

UNIT 1:

1. Why study Spoken English?
2. Making Inquiries on the phone, thanking and responding to Thanks
3. Responding to Requests and asking for Directions

Practice work.

UNIT 2:

1. Asking for Clarifications, Inviting, Expressing Sympathy, Congratulating
2. Apologising, Advising, Suggesting, Agreeing and Disagreeing

Practice work.

UNIT 3:

1. Letters and Sounds
2. The Sounds of English

Practice work.

UNIT 4:

1. Pronunciation
2. Stress and Intonation

Practice work.

Equipment Required:

Computer Assisted Language Laboratory with computers equipped with software that help the students in developing four skills – Listening, Speaking, Reading and Writing.

Reference Books:

1. INTERACT: English Lab Manual for Undergraduate Students' Published by Orient Blackswan Pvt Ltd.
2. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna Lakshmi, Maruti Publications.
3. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
4. Unlock, Listening and speaking skills 2, Cambridge University Press
5. Spring Board to Success, Orient BlackSwan
6. A Practical Course in effective english speaking skills, PHI
7. Word power made handy, Dr shalini verma, Schand Company
8. Let us hear them speak, Jayashree Mohanraj, Sage texts
9. Professional Communication, Aruna Koneru, Mc Grawhill Education Cornerstone, Developing soft skills, Pearson Education

E-Resources:

1. https://www.britishcouncil.in/
2. http://www.talkenglish.com/

AUTOMATION TOOLS & PROFESSIONAL WORKSHOP

Practice:	2	**Internal Marks:**	40
Credits:	1	**External Marks:**	60

Prerequisites: Knowledge of information technology workshop

Course Objectives:

1. Understand the basic components and peripherals of a computer.
2. To become familiar in configuring a system.
3. Learn the usage of productivity tools
4. Acquire knowledge about the netiquette and cyber hygiene
5. Get hands on experience in trouble shooting a system

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1	Understand and Apply MS Office tools
CO2	Configure the components on the motherboard and install different operating systems
CO3	Understand and configure different storage media
CO4	Identified strategies for overcoming constraints to effective decentralization and sustainable management at different levels

Contribution of Course Outcomes towards achievement of Program Outcomes

(1 – Low, 2 - Medium, 3– High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2	3	2	2	2	1	2	3	1	3	2
CO2	3	1	3	-	2	1	1	-	1	1	3	2
CO3	3	1	2	-	2	2	1	-	1	1	2	2
CO4	3	2	2	1	-	2	1	1	1	1	2	2

List of Experiments: 10

1.Identification of the peripherals of a computer: To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions. Description of various I/O Devices

2.System Assembling, Disassembling: A practice on disassembling the components of a PC and assembling them to back to working condition.

3.Operating System Installation-Install Operating Systems like Windows, Linux along with necessary Device Drivers.

4.MS-Office / Open Office

a. Word - Formatting, Page Borders, Reviewing, Equations, symbols.
b. Spread Sheet - organize data, usage of formula, graphs, charts.
c. Power point - features of power point, guidelines for preparing an effective presentation.
d. Access- creation of database, validate data

5. Network Configuration & Software Installation-Configuring TCP/IP, proxy and firewall settings. Installing application software, system software & tools.

6. Internet and World Wide Web-

Cyber Hygiene (Demonstration): Awareness of various threats on the internet. Importance of security patch updates and anti-virus solutions. Ethical Hacking, Firewalls, Multi-factor authentication techniques including

4.Determination of total hardness of water by EDTA solution

5.Determination of copper using standard EDTA solution

6.Determination of Zinc using standard EDTA solution

7.Determination of Iron by a calorimetric method

8.Conductometric titration between strong acid and strong base

9.Potentiometric titration between strong acid and strong base

10.Potentiometric titration between Iron and dichromate

Additional Experiments to be performed

1.Preparation of urea-formaldehyde resin

2.Determination of P^H of water sample

3. Preparation of phenol-formaldehyde resin

EQUIPMENT REQUIRED:

PH meters, Potentiometers, Conductometers, colorimeters.

APPARATUS

Burettes, Pipettes, Conical flask, Beakers.

REFERENCE BOOKS:

1 . A Textbook of Quantitative Analysis, Arthur J. Vogel.

2. Dr. Jyotsna Cherukuri (2012) *Laboratory Manual of engineering chemistry-II,* VGS Techno Series

3. Chemistry Practical Manual, Lorven Publications

4. K. Mukkanti (2009) *Practical Engineering Chemistry,* B.S. Publication

PROFESSIONAL ENGLISH-II
(Common to CE,EEE,ME,ECE,CSE and IT)

Lecture – Tutorial: 2-1 **Internal Marks:** 40
Credits: 3 **External Marks:** 60
Prerequisites:

Course Objectives:
1. To expose the students to components of grammar required in effective sentence constructions.
2. To help the students to develop effective writing skills using phrasal verbs, connectives, collocations, idioms etc.
3. To enable the students to learn the format, style and types of letters, reports and emails.
4. To expose the students to various sub skills and strategies of reading and writing.
5. To enable the students to analyse and evaluate various texts that lead to global comprehension.

Course Outcomes:
Upon successful completion of the course, the student will be able to:

CO1	Recognize the importance of the role of communication in the competitive world.
CO2	Acquire the competence to write effectively in various formal and academic contexts.
CO3	Acquire the jargon used in business communication and technical communication.
CO4	Develop the ability to evaluate texts by inferring the implied sense of such texts and apply such knowledge globally.
CO5	Gain knowledge about the significance of the universal human values through expression of human feelings of compassion and right understanding.

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1									2	3		2
CO2										2		2
CO3										3		2
CO4												2
CO5								2				2

UNIT I
1. **Text**: A. **"The Struggle for an Education"** – Booker T. Washington
   B. **"Good Manners"** – J.C. Hill
2. **Writing**: Formal Communication VS Informal Communication -Writing
3. **Vocabulary**: Business and Technical Terminology
4. **Remedial Grammar**: Change of Voice

UNIT II
1. **Text: "A Letter to Indu"** – Jawaharlal Nehru
2. **Writing**: Letter Writing – Types of Letters – Different Styles of Letter Writing
3. **Vocabulary**: Phrasal Verbs – Use of Connectives in Sentence Constructions
4. **Remedial Grammar**: Reported Speech

Smartcard, Biometrics are also practiced

7.Search Engines & Netiquette:

Students are enabled to use search engines for simple search, academic search and any other context based search (Bing, Google etc). Students are acquainted to the principles of micro-blogging, wiki, collaboration using social networks, participating in online technology forums

8. Trouble Shooting-Hardware trouble shooting, Software trouble shooting.

Hardware Troubleshooting (Demonstration): Identification of a problem and fixing a defective PC(improper assembly or defective peripherals).

Software Troubleshooting (Demonstration):. Identification of a problem and fixing the PC for any software issues

9. MATLAB- basic commands, subroutines, graph plotting.

10. LATEX-basic formatting, handling equations and images.

EQUIPMENT REQUIRED:

1. Physical components of computer

REFERENCE BOOKS:

1. Computer Hardware, Installation, Interfacing, Troubleshooting and Maintenance, K.L. James, Eastern Economy Edition.

2. Microsoft Office 2007: Introductory Concepts and Techniques, Windows XP Edition by Gary B. Shelly, Misty E. Vermaat and Thomas J. Cashman (2007, Paperback).

3. LATEX- User's Guide and Reference manual, Leslie Lamport, Pearson, LPE, 2/e.

4. Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers, Rudraprathap, Oxford University Press, 2002.

5. Workshop Manual prepared by NRIIT staff

E-RESOURCES:

1.http://nptel.iitm.ac.in

2.JNTUK-COERD

VIRTUAL LAB:

1. http://vlab.amrita.edu/?sub=1&brch=201&sim=366&cnt=1
2. http://vlab.amrita.edu/?sub=1&brch=195&sim=840&cnt=1
3. http://vlab.amrita.edu/?sub=1&brch=282&sim=879&cnt=1

ENGINEERING MATHEMATICS-II
(Common to CE,EEE,ME,ECE,CSE and IT)

Lecture – Tutorial:	3 – 1	**Internal Marks:**	40
Credits:	4	**External Marks:**	60

Prerequisites:
Student has a knowledge about Trigonometric functions and its related formulae, Differentiation , Integration and vector algebra.

Course Objectives:

- The course is designed to equip the students with the necessary skills and techniques that are essential for Engineering course.
- The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:	
CO1	Finding the General solution of first order ordinary differential equation and its applications.
CO2	Finding the General solution of second and higher order ordinary differential equations with constant and variable coefficients.
CO3	Determine double integral over a region and triple integral over a volume.
CO4	Determine the Gradient, Diveregence and Curl of a vector and vector identities.

Contribution of Course Outcomes towards achievement of Program Outcomes
(1– Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2		1	2						1	1
CO2	3	2		1	2						1	1
CO3	3	2		1	1						1	1
CO4	3	2		1	1						1	1

UNIT I
Ordinary differential equations of first order and applications

Linear – Bernoulli – Exact – Reducible to exact differential equations – Ort trajectories –
Newton's law of cooling – Law of exponential growth and decay .

UNIT II
Ordinary differential equations of 2^{nd} and higher order

Non homogeneous equations of higher order with constant coefficients with Right hand side terms of the type $e^{ax}, \sin ax, \cos ax, x^k (k>0), e^{ax}V, x^m V$ - Variation of parameters – Differential equations with variable coefficients (Legendre and Cauchy)

UNIT III

1. **Text**: A. **"The Power of a Plate of Rice"** – Ifeoma Okoye
   B. **"Email to Employees"** – Satya Nadella
2. **Writing**: Email Writing, Report Writing (Significance, Format and style of writing Technical Reports)
3. **Vocabulary**: Collocations
4. **Remedial Grammar:** Subject-Verb Agreement

UNIT IV

1. **Text**: **"Stench of Kerosene"** – Amrita Pritam
2. **Writing**: Essay Writing –Types of Essays
3. **Vocabulary**: Use of Idiomatic Expressions (in different contexts)
4. **Remedial Grammar**: Common Errors

TEXT BOOKS:

REFERENCE BOOKS:

1. Advanced Grammar in Use. Martin Hewings. Cambridge University Press. 2013
2. Effective Technical Communication Rizvi, Ashraf. M.. Tata McGraw – Hill, New Delhi. 2005
3. Word Power Made Easy. Norman Lewis
4. Michael Swan. Basic English Usage
5. A New Approach to Objective English. Dhillon Group of Publications
6. English and Soft Skills. Dhanavel S. P. Orient Black Swan, Hyderabad, 2010
7. Professional Communication. Baradwaj Kumkum. I.K. International Publishing House Pvt. Ltd, New Delhi .2008
8. Intermediate English Grammar, Raymond Murphy, Cambridge University Press.

E-RESOURCES:

1. http://grammar.ccc.commnet.edu/grammar/index.htm
2. https://owl.english.purdue.edu/
3. https://learnenglish.britishcouncil.org/en

APPLIED PHYSICS

(Common to ECE, CSE, EEE & IT)

Lecture – Tutorial:	2-1	**Internal Marks:**	40
Credits:	3	**External Marks:**	60

Prerequisites: Knowledge of Optics & Electromagnetism

Course Objectives: 1. To provide a bridge between Basic Physics and Engineering Physics.

2.To Create the awareness of various phenomena of physics which in turn help the students in future engineering applications

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1	Impart Knowledge of Physical Optics phenomena like Interference, Diffraction and Polarization involving required to design instruments with higher resolution.
CO2	Teach Concepts of coherent sources, its realization and utility optical instrumentation. Apply the concepts of light in optical fibers, light wave communication systems, and for sensing physical parameters
CO3	Study the concepts regarding the bulk response of materials to the EM fields and their analytically study in the back-drop of basic quantum mechanics.
CO4	Understand the physics of Semiconductors and their working mechanism for their utility in sensors

Contribution of Course Outcomes towards achievement of Program Outcomes

(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3				3					3		
CO2	3	3		2	2					3		
CO3	3	3								1		
CO4	3		2		2							

UNIT I

Interference: Introduction - Interference in thin films (reflection geometry) – Newton's rings – construction and basic principle of Interferometers.

Diffraction: Introduction – Rayleigh Criterion – Resolving power of a grating, Telescope and Microscopes.

Polarization: Introduction - Types of Polarization – Double Refraction - Nicol Prism -Quarter wave plate and Half Wave plate.

UNIT-II

Lasers: Introduction - Characteristics of Laser, Absorption, spontaneous emission, Stimulated emission Lasing action, Relation between Einstein Coefficients, Population Inversion, Pumping Schemes: 3- level&4- level lasers, Pumping methods. Components of laser devices, Ruby Laser, He-Ne Laser, Applications.

Fibre Optics: Principle of optical fibre, Structure – Numerical aperture and acceptance angle,

UNIT III

Multiple Integrals

Multiple Integrals – Double and Triple Integrals – Change of variables – Change of integration.

Applications: Finding Areas, Surfaces and Volumes.

UNIT IV

Vector Calculus

Vector differentiation – Gradient – Divergence – Curl – Vector identies.

Vector Integration – Line integral – work done – Potential function – area – surface and volume integrals – Vector integral theorems (without proof) viz. Greens, stokes and Gauss divergence and related problems.

TEXT BOOKS:

1.B.S.Grewal, "Higher Engineering Mathematics, Khanna Publishers", 43rd Edition, 2014.

REFERENCE BOOKS:

1. **N.P.Bali**, Engineering Mathematics, Lakshmi Publications.
2. **Erwin Kreyszig,** Advanced Engineering Mathematics, 10th Edition, Wiley-India

E-RESOURCES:

1.www.nptel**videos.com/mathematics/ (Math Lectures from MIT,Stanford,IIT'S)**

2.**nptel.ac.in/courses/122104017**

3.**nptel.ac.in/courses/111105035**

PROGRAMMING AND PROBLEM SOLVING WITH C
(Common to CIVIL,EEE,MECH,ECE)

Lecture – Tutorial:	3-1	**Internal Marks:**	40
Credits:	4	**External Marks:**	60

Prerequisites:
. Basic Knowledge on computer usage
.Basic knowledge on Mathematics

Course Objectives:
Formulating algorithmic solutions to problems and implementing algorithms in C.
• Notion of Operation of a CPU, Notion of an algorithm and computational procedure,
editing and executing programs in Linux.
• Understanding branching, iteration and data representation using arrays.
• Modular programming and recursive solution formulation.
• Understanding pointers and dynamic memory allocation.
• Understanding miscellaneous aspects of C.
• Comprehension of file operations.

COURSE OUTCOMES:
Upon successful completion of the course, the student will be able to:

CO1	Understanding basic terminologies, basic idea on writing, executing programs, understanding decision structures.
CO2	Design programs involving Arrays, modular programming concepts
CO3	Understand the use of Pointers and Strings
CO4	Use different data structures and create/update basic data files.

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	2	2	2	1	1	1	2					
CO2	3	3	3	3	1	3	1					1
CO3	3	3	3	3	1	3	2					2
CO4	3	3	3	3	1	3	2					2

UNIT I

Introduction to Programming: Computer - Components, Types of Languages, Compiler, Algorithms and their representations: Flowcharts, Pseudo Code.
Introduction to C: "Hello World" in C – Editor, Compiler, Execution Environment. C as a Middle Level Language. Basic Structure of C program, Standard Library and Header Files, Tokens in C - Variable, Constant (literal and named), Data types, Keywords, Variable Declaration and Assignment. Operators - Precedence & Associativity. Type conversion, Input and Output statements.
Selection and Looping Statements: If statement, If-Else Statement, Nested If, Examples, Multi-way selection: Switch, Else-If, examples, While Statement, For Statement, Nested Loops, do-while Statement, Break and Continue statements, Example programs

UNIT II

Types of optical fibers – based on Material, refractive index profile, Modes of propagation (Single & Multimode Fibres), Propagation of signal through optical fibre, Applications.

UNIT III

EM fields: Basic laws of electro magnetism, Maxwell's equations (Differential form only) - propagation of EM wave in dielectric medium – Poynting Vector.

Quantum Mechanics: Introduction - Matter waves – Schröedinger Time Independent and Time Dependent wave equations – Particle in a box.

Free Electron Theory: Introduction - Defects of Classical free electron theory – Quantum Free electron theory - concept of Fermi Energy – Density of States

UNIT IV

Band Theory of Solids: Bloch's theorem – Kronig – Penney model (qualitative) – energy bands in crystalline solids – classification of crystalline solids– effective mass of electron & concept of hole.

Semi-Conductor Physics: Conduction – Density of carriers in Intrinsic and Extrinsic semiconductors – Drift & Diffusion – relevance of Einstein's equation- Hall effect.

TEXT BOOKS:

4. A text book of Engineering physics by Dr.M.N.Avadhanulu And Dr. P.G Kshir sagar,Schand &Company Ltd (2017)
5. P.K.Palanisamy, Engineering Physics, Sci Tech, Chennai
6. Engineering Physics, 2nd Edition, H.K.Malik & A.K.Singh, Mc Graw Hill Education, Chennai

REFERENCE BOOKS:

3. Solid State Physics by A.J.Dekkar, Mac Millan Publishers
4. Ajoy Ghatak, Optics, 2nd Ed., Tata McGraw Hill, 1994

E-RESOURCES:

1.NPTEL

2.www.doitpoms.ac.uk

ELECTRONIC DEVICES & CIRCUITS

Lecture – Tutorial: 3-1 **Internal Marks:** 25

Credits: 4 **External Marks:** 75

Prerequisites:

- Basic Knowledge in Semiconductors.
- Knowledge about Circuits Construction.
- Knowledge on Networks and Current components

Course Objectives:

- The concept of Semiconductor Diodes are to be reviewed and to study transport mechanism.
- Application of diodes as rectifies with their operation with and without filters to be designed.
- Principal of Transistor working and its biasing methods are to study.
- Construction working and operation of FET's with MOSFET's to be studied.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1	Understand Semiconductor Technology and gain knowledge about various diodes.
CO2	Have knowledge about diode applications , rectifiers and filter design.
CO3	Have sound knowledge about transistor and its biasing design.
CO4	Gains knowledge about FET's and MOSFET operations.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	1	1		2							
CO2	2		2	3	2	1						1
CO3	1	2	3		1	1	1					1
CO4	1		3	2	2		1					

UNIT I

SEMICONDUCTOR DIODE CHARACTERISTICS IN SPECIAL DEVICES:

Qualitative Theory of P-N Junction, P-N Junction as Diode, Current Components in a Diode, Quantitative theory of diode equation ,Volt-Ampere Characteristics, Diode Resistance, Quantitative theory of Transition and Diffusion Capacitance ,Break down in a diode , Problems.

Arrays: Concept, Declaration and Initialization of Arrays, Accessing Individual Elements of Array. Use of Arrays in Sorting, Searching. Concept of 2-D array (Matrix), Passing arrays to functions, Examples.
Functions: Need of Functions, Function Declaration, Definition and Call. Inbuilt functions and User Defined Functions. Passing arguments to a function, Returning values from a function. Scope of variable, local and global variable. Storage classes.
Recursive Functions: Need of Recursion, Direct Recursion, Indirect Recursion, Examples of Recursive Programs – Factorial, Fibonacci series. Recursive Vs Iterative solutions,Disadvantages of Recursion.

UNIT III

Pointers: Concept of Pointers, Relevance of Data type in Pointer Variable, Pointer arithmetic. Pointer to pointer. Pointers and Functions (passing pointers to functions, returning pointers from functions). Pointers and Arrays. Pointers and Strings. Array of Pointers, Pointer to Array. Various alternatives of accessing arrays (1-D and 2-D) using pointers, Dynamic Memory Allocation ,Command Line Arguments
Strings: Strings as Arrays, Character Array versus Strings, Reading Strings, Writing Strings, User Defined Functions for String Operations – Copy, Concatenate, Length, Reverse, Converting case, Appending, Comparing two strings, Extracting a substring. Array of strings.

UNIT IV

Structures & Unions: Notion, Declaration and Initialization, Structure Variables, Accessing and Assigning values of the fields, Functions and Structures, Arrays of Structures, nested structures, Pointers and Structures, Passing Structure to a Function and Returning Structure from Function. Introduction to self referential structures , Union, Nesting of Structure and Union. Enumerated data types.
Data Files: Declaring, Opening and Closing File Streams, Reading From and Writing to Text Files, Random File Access

TEXT BOOKS:

1. C Programming-A Problem Solving Approach, Forouzan, Gilberg, Cengage

REFERENCE BOOKS:

1.Programming in ANSIC 7th Edition by E.Balaguruswamy
2.Let us C by Yaswanth Kanetkar
3. The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education.
4. Programming with C, Bichkar, Universities Press.
5. Programming in C, ReemaThareja, OXFORD.
6. C by Example, Noel Kalicharan, Cambridge.
7. ANSI C Programming, Gary J. Bronson, Cengage Learning.

E-RESOURCES:

1. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-087-practical-programming-in-c-january-iap-2010/lecture-notes/
2. http://cslibrary.stanford.edu/101/EssentialC.pdf
3. http://nptel.ac.in/courses/106104128/
4. http://www.vssut.ac.in/lecture_notes/lecture1424354156.pdf

ENVIRONMENTAL STUDIES
(Common to CE,EEE,ME,CSE and IT)

Lecture – Tutorial:	2-1	**Internal Marks:**	40
Credits:	--	**External Marks:**	60

Prerequisites:

Course Objectives:

- Basic understanding of ecosystem and to know the importance of biodiversity.
- Understanding of natural resources.
- To understand different types of pollutants effecting the environment.
- To know global environmental problems, problems associated with over population and burden on environment.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1	Realize the importance of ecosystem and biodiversity for maintaining ecological balance.
CO2	Understand the role of natural resources for the sustenance of life on earth and recognize the need to conserve them.
CO3	Identify the environmental pollutants and abatement devices.
CO4	Gain the importance of sustainability.

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	2		3			2	3	2			2	1
CO2	2		3			2	3	2			2	1
CO3	2		3			2	3	2			2	1
CO4	2		3			2	3	2			2	1

UNIT I

Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem - Producers, consumers and decomposers. - Ecological succession. – Food chains, food webs and ecological pyramids, flow of energy, biogeochemical cycles.

Biodiversity and its conservation: Definition: genetic, species and ecosystem diversity- classification - Value of biodiversity, India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts - Endangered and endemic species of India – Conservation of biodiversity.

UNIT II

Natural Resources: Natural resources and associated problems

Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people.

Water resources – Use and over utilization of surface and ground water –

SPECIAL DEVICES:

Operation and Characteristics of Zener Diode, Tunnel Diode, Varactor Diode, Photo Diode, PIN Diode, LED and SCR

UNIT II

UNIT-II

RECTIFIERS AND FILTERS:

Introduction to Power supplies, Rectifiers – Qualitative treatment of Half Wave rectifier, Qualitative treatment of Full Wave rectifier, Quantitative treatment Bridge rectifier and related problems.

FILTERS AND REGULATORS:

Introduction to Filters, types of filters and their significance, Qualitative treatment of - Capacitive Filter, Inductor Filter, L-*Section*, *Π*-Section single and multiple, Voltage Regulator using Zener Diode, Related Problems.

UNIT III

BIPOLAR JUNCTION TRANSISTOR, BIASING AND STABILIZATION:

Introduction To Bipolar Transistor, Construction Operation of BJT, Working Of P-N-P and N-P-N Transistors, BJT as Amplifier and Switch, Transistor Current Components- Input-Output Characteristics of BJT in *CE,CB,CC Configurations, Relation Between* α, β, γ.

STABILIZATION & BIASING:

BJT Biasing Techniques, Need for Biasing, Operating Point, DC & AC Load Line Analysis, Types of Biasing, Stability Factors of Biasing, Thermal Runaway, Heat Sinks, Thermal Stabilizations, Diode Compensation Techniques

UNIT IV

JUNCTION FIELD EFFECT TRANSISTOR & MOSFET's:

Introduction to J-FET, Types of J-FET, V-I Characteristics of J-FET in CS Configuration, FET as an Amplifier, J-FET Biasing.

MOSFET's:

MOSFET's Construction, Operation & Characteristics, Enhancement & Depletion Mode MOSFET, UJT Construction, working and its characteristics, UJT as Relaxation Oscillator

TEXT BOOKS:

1) **Jacob Millman, Christos C.Halkias And Satyabrata Jit, Electronic Devices And Circuits, Mc Graw Hill, 3rd Edition , 2010.**
2) **S. Salivahanan, N. Kumar And A. Vallavaraj, Electronic Devices And Circuits, Mc Graw Hill, 2rd Edition , 2007**

REFERENCE BOOKS:

1) **1. R.L.Boylestad And Louis Nashelsky, Electronic Devices And Circuits, Pearson/Prentice Hall Publishers.**
2) **David A.Bell, Electronic Devices And Circuits, Oxford University Press, 5th Edition, 2008.**
3) **Micro Electronic Circuits, Sedra Smith, Oxford Press, India(5/E), Oxford, 2004**
4) **Electronic Devices And Circuits- K.Satya Prasad , Vgs Booklinks**

E-RESOURCES:

1.Moocks
2.NPTEL
3. Course era

ENGLISH COMMUNICATION SKILLS LAB-II

Practice: 3 **Internal Marks:** 40
Credits: 1.5 **External Marks:** 60

Prerequisites:

Course Objectives:
To enable the students to learn through practice the four communication skills: Listening, Speaking, Reading and Writing.
Understand the nuances of language usage for better presentation in all the walks of life promoting life-long learning.

Course Outcomes:
Upon successful completion of the course, the student will be able to:

CO1 Attain better understanding of the nuances of English language to put into use in various situation and events.
CO2 Acquire speaking skills with clarity and confidence which in turn enhances their employability skills.
CO3 Communicate and present their ideas and sources accurately and effectively.
CO4 Enhance their employability skills and critical thinking skills with participation in mock interviews and group discussions.

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1									1	3		2
CO2										3		2
CO3									1	3		2
CO4									1			2

List of Experiments:

UNIT 1:
1. Debating
Practice work

UNIT 2:
1. Group Discussions
Practice work

UNIT 3:
1. Presentation Skills
Practice work

UNIT 4:
1. Interview Skills
2. Curriculum Vitae
Practice work

EQUIPMENT REQUIRED:
Computer Assisted Language Laboratory with computers equipped with software that help the students in developing four skills – Listening, Speaking, Reading and Writing.

Floods, drought, conflicts over water, dams – benefits and problems.
Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources. Case studies.
Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources Vs Oil and Natural Gas Extraction.
Land resources: land as a resource, land degradation, wasteland reclamation, man induced landslides, soil erosion and desertification.
Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

UNIT III

Environmental Pollution: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards, Technological solutions for pollution control, Role of an individual in prevention of pollution with case studies.
Solid Waste Management: Sources, Classification, effects and control measures of urban andindustrial solid wastes. Biomedical, Hazardous and **E-waste** management, carbon credits.
Disaster management: floods, droughts, earthquakes, cyclones.

UNIT IV

Social issues and the environment: Global environmental challenges- global warming and climate change, acid rains, ozone layer depletion.
Towards sustainable future: From unsustainable to sustainable development, population and its explosion, urban problems related to energy, rain water harvesting, consumerism and waste products, role of IT in environment and human health, HIV/ AIDS, environmental ethics.
Environmental management and acts: Impact assessment and significance, various stages of EIA, environmental management plan (EMP), green belt development. Environmental Law (Air, Water, Wildlife, Forest, Environment protection act).
The student should visit an industry/ Ecosystem and submit a report individually on any issues related to environmental studies course and make a power point presentation.

TEXT BOOKS:

1. Environment Studies, Anubha Kaushik, C P Kaushik, New Age International Publishers, 2018
2. Environmental Studies, R. Rajagopalan, 2nd Edition, 2011, Oxford University Press.
3. Environmental Studies, P. N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai

REFERENCE BOOKS:

1. Text Book of Environmental Studies, Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.
2. Environmental Studies, K. V. S. G. Murali Krishna, VGS Publishers, Vijayawada.
3. Erach Bharucha, 2010 " Text Book of Environmental Studies" , University Grants Commission, University Press (India) Pvt. Ltd., Hyderabad.
4. Text book of Environmental Science and Engineering by G. Tyler Miller Jr, 2006 Cengage learning.

E-RESOURCES:

1. http://nptel.ac.in/courses.php
2.http://jntuk-coeerd.in/

APPLIED PHYSICS LAB

Practice:	2	**Internal Marks:**	40
Credits:	1	**External Marks:**	60

Prerequisites: Knowledge of Vernier Calipers, Screw Gauge

Course Objectives: Training field oriented Engineering graduates to handle instruments and their design methods to improve the accuracy of measurements.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1	Calculate wavelengths of various light sources, thickness of the given object and radius of curvature of lens.
CO2	Determine Numerical Aperture & bending losses of Optical Fibre
CO3	Analyze the characteristics and energy band gaps of semi-conductor and zener diodes
CO4	Estimate the frequency of tuning fork and Magnetic field strength.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	3							3			
CO2	3	3			2				3			
CO3	3	3							3			
CO4	3	3							3			

List of Experiments:

13. Determination of wavelength of a source-Diffraction Grating-Normal incidence
14. Newton's rings – Radius of Curvature of Plano - Convex Lens
15. Determination of thickness of a spacer using wedge film and parallel interference fringes. .
16. Determination of wavelength of laser source using diffraction grating.
17. Determination of Numerical Aperture of an Optical Fibre.
18. Study of I/V Characteristics of Semiconductor diode.
19. I/V characteristics of Zener diode.
20. Energy Band gap of a Semiconductor p – n junction
21. Meldi's experiment – Transverse and Longitudinal modes.
22. Magnetic field along the axis of a current carrying coil – Stewart and

REFERENCE BOOKS:

1. INTERACT: English Lab Manual for Undergraduate Students' Published by Orient Blackswan Pvt Ltd.
2. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna Lakshmi, Maruti Publications.
3. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
4. Unlock, Listening and speaking skills 2, Cambridge University Press
5. Spring Board to Success, Orient BlackSwan
6. A Practical Course in effective english speaking skills, PHI
7. Word power made handy, Dr shalini verma, Schand Company
8. Let us hear them speak, Jayashree Mohanraj, Sage texts
9. Professional Communication, Aruna Koneru, Mc Grawhill Education
10. Cornerstone, Developing soft skills, Pearson Education

E-RESOURCES:

1. 1. https://www.britishcouncil.in/
2. http://www.talkenglish.com/

PROGRAMMING AND PROBLEM SOLVING WITH C LAB

Practice:	3	**Internal Marks:**	40
Credits:	1.5	**External Marks:**	60

Prerequisites:

Course Objectives:

- Understand the basic concept of C Programming, and its different modules that includes conditional and looping expressions, Arrays, Strings, Functions, Pointers, Structures and File programming.
- Acquire knowledge about the basic concept of writing a program.
- Role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language.
- Use of conditional expressions and looping statements to solve problems associated withconditions and repetitions.
- Role of Functions involving the idea of modularity.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1	Understand C programming development environment, compiling, debugging, and linking and executing a program using the development environment
CO2	To solve the problems using selection and iterative statements
CO3	Analyzing the complexity of problems, Modularize the problems into small modules and then convert them into programs, Understand and apply the in-built functions and customized functions for solving the problems.
CO4	To solve the various problems using arrays, structures, pointers and files

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	2	3	1	2	3	1	2					1
CO2	2	1	2	2	1	2	2					2
CO3	2	3	3	2	3	3	2					3
CO4	3	3	3	3	3	3	3					3

List of Experiments:

Exercise - 1 Basics

a) What is an OS Command, Familiarization of Editors - vi, Emacs

b) Using commands like mkdir, ls, cp, mv, cat, pwd, and man

c) C Program to Perform Adding, Subtraction, Multiplication and Division of two numbers From Command line

Exercise – 2 Basic Math

a) Write a C Program to Simulate 3 Laws at Motion

b) Write a C Program to convert Celsius to Fahrenheit and vice versa

Exercise – 3 Control Flow - I

a)Write a C Program to Find Whether the Given Year is a Leap Year or not.

b)Write a C Program to Add Digits & Multiplication of a number

Gee's apparatus

23. Verification of laws of vibrations in stretched strings – Sonometer

24. L- C- R Series Resonance Circuit.

EQUIPMENT REQUIRED:

10. Spectrometer
11. Travelling Microscope
12. Regulated Power Supply
13. Function Generators
14. Energy Band Gap Kit
15. Digital Mutlimetres
16. Tuning Forks
17. Electrically driven Tuning Forks
18. Tangent Galvanometer

REFERENCE BOOKS:

1. Lab Manual of Engineering Physics by Dr.Y.Aparna & Dr.K.Venkateswara Rao (VGS Books Links, Vijayawada)

E-RESOURCES:

1.www.vlab.co.in

A.Y - 18-19

NRI INSTITUTE OF TECHNOLOGY

AUTONOMOUS

Accredited : NAAC with "A", NBA (CSE, ECE & EEE)
Approved by AICTE, New Delhi & Permanently affiliated to JNTUK, Kakinada
Pothavarappadu, Agiripalli Mandalam, Krishna Dt., Andhra Pradesh - 521212
URL : www.nrigroupofcolleges.ac.in, Ph : 0866 2469666, Email : principal@nriit.edu.in

DEPARTMENT OF COMUTER SCIENCE AND ENGINEERING

COURSE STRUCTURE FOR FIRST YEAR (NRIA18)

NRI INSTITUTE OF TECHNOLOGY

(An Autonomous Institution Permanently Affiliated to JNTUK, Kakinada)
(Accredited with NAAC "A" Grade and ISO 9001:2015 Certified Institution)
POTHAVARAPPADU (V), (VIA) NUNNA, AGIRIPALLI (M), PIN – 521 212

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

STRUCTURE FOR FIRST YEAR B.TECH PROGRAMME

I YEAR I SEMESTER

Sl. No	Course Code	Title of the Course	Scheme of Instruction (Periods Per Week) L	T	P	Total	Scheme of Examination (Maximum Marks) CIA	SEA	Total	No. of Credits
1	18A1100101	Professional English – I	2	1	-	3	40	60	100	3
2	18A1100201	Engineering Mathematics – I	2	1		3	40	60	100	3
3	18A1100203	Applied Physics	2	1	-	3	40	60	100	3
4	18A1105301	Programming and Problem solving with C	2	1		3	40	60	100	3
5	18A1103301	Engineering Graphics	1		2	3	40	60	100	2
6	18A1100801	Environmental Studies	2	1	-	3	40	60	100	0
7	18A1100191	English Communication Skills lab – I		-	3	3	40	60	100	1.5
8	18A1100292	Applied Physics lab			2	2	40	60	100	1
9	18A1105391	Programming and Problem solving with C Lab			3	3	40	60	100	1.5
	Total		11	5	10	26	360	540	900	18

I YEAR II SEMESTER

Sl. No	Course Code	Title of the Course	Scheme of Instruction (Periods Per Week) L	T	P	Total	Scheme of Examination (Maximum Marks) CIA	SEA	Total	No. of Credits
1	18A1200101	Professional English – II	2	1	-	3	40	60	100	3
2	18A1200201	Engineering Mathematics II	3	1	-	4	40	60	100	4
3	18A1200205	Applied Chemistry	2	1		3	40	60	100	3
4	18A1202301	Fundamentals of Electrical Engineering	3			3	40	60	100	3
5	18A1205401	OPPS Through JAVA	2	1		3	40	60	100	3
6	18A1200191	English Communication Skills lab – II	-		3	3	40	60	100	1.5
7	18A1200294	Applied Chemistry lab.			2	2	40	60	100	1
8	18A1205391	Automation tools & Professional Workshop	-		3	3	40	60	100	1.5
9	18A1205491	OPPS Through JAVA Lab			4	4	40	60	100	2
	Total		12	4	12	28	360	540	900	22

L - LECTURE T – TUTORIAL P - PRACTICAL

CIA – Continuous Internal Assessment SEA – Semester End Assessment

H.O.D

Head, CSE Department
NRI Institute of Technology
POTHAVARAPPADU (Vill)
Agiripalli (Mdl.), Krishna Dist.

PROFESSIONAL ENGLISH-I
(Common to CE,EEE,ME,ECE,CSE and IT)

Lecture – Tutorial:	2-1 Hours	**Internal Marks:**	40
Credits:	3	**External Marks:**	60

Prerequisites:
None

Course Objectives:
1. To strengthen the lexical ability of the students in different contexts.
2. To expose the students to various sub-skills and strategies of reading and writing – summarizing and paraphrasing.
3. To help the students develop effective writing skills through paragraph writing.
4. To train the students in fundamentals of grammar required to equip them with fluent English.
5. To enable the students to think critically by exposing them to different socio-cultural contexts through various literary texts.

Course Outcomes:
Upon successful completion of the course, the student will be able to:

CO1	Use grammar accurately in various formal and functional contexts.
CO2	Build good vocabulary and develop the ability to use in various contexts.
CO3	Comprehend, analyze and evaluate texts critically.
CO4	Develop effective reading and writing skills to enhance communicative competence.
CO5	Help the students to inculcate and apply human values and professional ethics in their academic, professional and social lives.

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1										3		2
CO2										3		2
CO3						1	1					2
CO4										3		2
CO5						1	1	3				2

UNIT I

1. **Reading:** Introduction to Integrated Communication with emphasis on Reading Skills, Scanning an article from *The Economic Times* – **"Why India celebrates Engineers Day on the birth anniversary of M. Visvesvaraya"**
2. **Text: "I have a dream…"** - Martin Luther King
3. **Vocabulary Building:** Synonyms and Antonyms from the Text , Word Formations: Root Words, Prefixes and Suffixes
4. **Writing:** Styles of Sentence Structure for Effective Writing, Textual Exercises, Scrambled Sentences
5. **Remedial Grammar:** Parts of Speech, Effective Sentence Constructions Using Connectives

UNIT II

1. **Reading**: Skimming: **"Oh Father, Dear Father"** – Raj Kinger
2. **Text: "On Shaking Hands"** – A.G. Gardiner
3. **Vocabulary Building:** Synonyms and Antonyms from the Text
4. **Writing**: Paragraph Scramble
5. **Remedial Grammar:** Framing Questions and Question Tags, Punctuation Rules, Usage of Articles

UNIT III

1. **Reading**: Critical Reading: **"Dial 000"** - Barry Rosenberg
2. **Text**: **"Seeing People Off"** – Max Beerbohm
3. **Vocabulary Building**: Synonyms and Antonyms from the Text, Acronyms
4. **Writing**: Principles of a Good Paragraph
5. **Remedial Grammar**: Verbs and Types, Present Tense

UNIT IV

1. **Reading:** Note Making: **"Icons: The Lotus Temple"** – Anamika Bhutalia
2. **Text: "The Lost Child"** – Mulk Raj Anand
3. **Vocabulary Building:** Synonyms and Antonyms from the Text, One Word Substitutes
4. **Writing:** Summarising and Writing Anecdotes
5. **Remedial Grammar**: Past Tense and Future Tense, Correction of Sentences

REFERENCE BOOKS:

1. **The Blue Book of Grammar and Punctuation,** 10th Edition, Jane Straus, Josey-Bass, A Wiley Imprint.
2. **Oxford Practice Grammar,** John Eastwood, Oxford University Press.
3. **The Most Common Mistakes in English Usage** – Thomas Elliott Berry
4. **Essential Communication Skills** – Shalini Agarwal, Ane Books Pvt Ltd.
5. **Dictionary of Synonyms and Antonyms,** Oxford & IBH, III Ed
6. **A Practical English Grammar**, Agnes V. Martinet and Audrey Jean Thomson, Oxford University Press.

E-RESOURCES:

1. http://grammar.ccc.commnet.edu/grammar/index.htm
2. https://owl.english.purdue.edu/
3. https://www.britishcouncil.in/

ENGINEERING MATHEMATICS-1

((Common to CE,EEE,ME,ECE,CSE and IT)

Lecture – Tutorial: 2 – 1 **Internal Marks:** 40

Credits: 3 **External Marks:** 60

Prerequisites:

Fundamentals of Matrices, Fundamentals of Trigonometry and Calculus

Course Objectives:

- The course is designed to equip the students with the necessary skills and techniques that are essential for Engineering course.
- The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1 To solve simultaneous linear equations, determine eigen values, eigen vectors of a matrix and determine the nature of a Quadratic forms.

CO2 To calculate a root of algebraic and transcendental equations. Explain relation between the finite difference operators and compute the interpolating polynomial for the given data. Solve Ordinary differential equations numerically using Taylor series method, Euler's and RK method of second and fourth order.

CO3 To determine the Maxima and Minima of functions of Two variables without constraints and with constraints and form the Partial Differential equations by elimination of arbitrary constants and arbitrary functions.

CO4 To solve the ordinary linear differential equations by using Laplace Transforms.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2		1	2						1	1
CO2	3	2		1	1						1	1
CO3	3	2		1	2						1	1
CO4	3	2		1	1						1	1

UNIT I:

Matrices

Rank – Echelon form – Normal form – PAQ form – Inverse of 4x4 matrix by Gauss-Jordan - Solution of Homogeneous linear systems – solution of Non-homogeneous linear systems – Gauss Elimination – Gauss Seidel methods.

Eigenvalues – Eigen vectors – Properties – Cayley Hamilton theorem (without proof) – Inverse Powers of Matrices by Caley Hamilton theorem – Quadratic forms – Reduction of quadratic forms to Canonical form (Congruent transformation method, Orthogonal transformation) – Rank, Index, Signature of a Quadratic form.

UNIT II

Numerical Methods
Solutions of Algebraic and Transcendental Equations: Bisection method – Iteration method – Newton Raphson method (one variable). Interpolation: Finite differences –Operators Δ, ∇, E and relations between them - Forward differences – Backward differences – Missing terms - Newton's forward and backward formulae for interpolation – Lagrange's interpolation formula.

Trapezoidal rule – Simpson's $1/3^{rd}$ and $3/8^{th}$ rules – Numerical solution of Ordinary differential equation by Taylor series method – Euler's method – Modified Euler's method – Rungekutta method of second and fourth order.

UNIT III

Partial Differentiation
Homogeneous function – Euler's theorem – Total derivative – Chain rule – Generalized mean value theorem for single variable (without proof) – Taylor's and Maclaurin's series – Expansion of Two variable functions – functional dependence – Jacobian – Maxima and Minima of functions of two variables without constraints and Lagrange's method of multipliers.

UNIT IV

Laplace Transforms
Laplace transforms of standard functions – shifting theorems – transforms of derivative's and integrals – Unit step function – Dirac's delta function. Inverse laplace transforms - convolution theorem (without proof) – solving ordinary differential equations (Initial value problems) using Laplace transforms.

TEXT BOOKS:

1. **B.S.Grewal, "Higher Engineering Mathematics, Khanna Publishers", 43rd Edition, 2014.**
2. **V.Ravindranath and P.Vijayalakshmi,** Mathematical Methods, Himalaya Publishing House.

REFERENCE BOOKS:

1. **N.P.Bali,** Engineering Mathematics, Lakshmi Publications.
2. **Erwin Kreyszig,** Advanced Engineering Mathematics, 10th Edition, Wiley-India.

E-RESOURCES:

1. www.nptel**videos.com/mathematics/ (Math Lectures from MIT,Stanford,IIT'S)**
2. **nptel.ac.in/courses/122104017**
3. **nptel.ac.in/courses/111105035**

APPLIED PHYSICS

(Common to CSE & IT)

Lecture – Tutorial: 2-1
Credits: 3

Internal Marks: 40
External Marks: 60

Prerequisites: Knowledge of Optics & Electromagnetism

Course Objectives:

1. To provide a bridge between Basic Physics and Engineering Physics.
2. To Create the awareness of various phenomena of physics which in turn help the students in future engineering applications

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1 Impart Knowledge of Physical Optics phenomena like Interference, Diffraction and Polarization involving required to design instruments with higher resolution.

CO2 Teach Concepts of coherent sources, its realization and utility optical instrumentation. Apply the concepts of light in optical fibers, light wave communication systems, and for sensing physical parameters

CO3 Study the concepts regarding the bulk response of materials to the EM fields and their analytically study in the back-drop of basic quantum mechanics.

CO4 Understand the physics of Semiconductors and their working mechanism for their utility in sensors

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3				3					3		
CO2	3	3		2	2					3		
CO3	3	3								1		
CO4	3		2		2							

UNIT I

Interference: Introduction - Interference in thin films (reflection geometry) – Newton's rings – construction and basic principle of Interferometers.

Diffraction: Introduction – Rayleigh Criterion - Resolving power of a grating, Telescope and Microscopes.

Polarization: Introduction - Types of Polarization –Double Refraction - Nicol Prism -Quarter wave plate and Half Wave plate.

UNIT-II

Lasers: Introduction - Characteristics of Laser, Absorption, spontaneous emission, Stimulated emission Lasing action, Relation between Einstein Coefficients, Population Inversion, Pumping Schemes: 3- level&4- level lasers, Pumping methods. Components of laser devices, Ruby Laser, He-Ne Laser, Applications.

Fibre Optics: Principle of optical fibre, Structure – Numerical aperture and acceptance angle,

Types of optical fibers – based on Material, refractive index profile, Modes of

propagation (Single & Multimode Fibres), Propagation of signal through optical fibre, Applications.

UNIT III

EM fields: Basic laws of electro magnetism, Maxwell's equations (Differential form only) - propagation of EM wave in dielectric medium – Poynting Vector.
Quantum Mechanics: Introduction - Matter waves – Schröedinger Time Independent and Time Dependent wave equations – Particle in a box.
Free Electron Theory: Introduction - Defects of Classical free electron theory – Quantum Free electron theory - concept of Fermi Energy – Density of States

UNIT IV

Band Theory of Solids: Bloch's theorem – Kronig – Penney model (qualitative) – energy bands in crystalline solids – classification of crystalline solids– effective mass of electron & concept of hole.

Semi-Conductor Physics: Conduction – Density of carriers in Intrinsic and Extrinsic semiconductors – Drift & Diffusion – relevance of Einstein's equation- Hall effect.

TEXT BOOKS:

4. A text book of Engineering physics by Dr.M.N.Avadhanulu And Dr. P.G Kshir sagar,Schand &Company Ltd (2017)
5. P.K.Palanisamy, Engineering Physics, Sci Tech, Chennai
6. Engineering Physics, 2nd Edition, H.K.Malik & A.K.Singh, Mc Graw Hill Education, Chennai

REFERENCE BOOKS:

3. Solid State Physics by A.J.Dekkar, Mac Millan Publishers
4. Ajoy Ghatak, Optics, 2nd Ed., Tata McGraw Hill, 1994

E-RESOURCES:

1.NPTEL
2.www.doitpoms.ac.uk

PROGRAMMING AND PROBLEM SOLVING WITH C
(Common to CSE, IT)

Lecture – Tutorial: 2-1
Credits: 3

Internal Marks: 40
External Marks: 60

Prerequisites:
. Basic Knowledge on computer usage
.Basic knowledge on Mathematics

Course Objectives:
Formulating algorithmic solutions to problems and implementing algorithms in C.
- Notion of Operation of a CPU, Notion of an algorithm and computational procedure, editing and executing programs in Linux.
- Understanding branching, iteration and data representation using arrays.
- Modular programming and recursive solution formulation.
- Understanding pointers and dynamic memory allocation.
- Understanding miscellaneous aspects of C.
- Comprehension of file operations.

COURSE OUTCOMES:
Upon successful completion of the course, the student will be able to:

CO1	Understanding basic terminologies, basic idea on writing, executing programs, understanding decision structures.
CO2	Design programs involving Arrays, modular programming concepts
CO3	Understand the use of Pointers and Strings
CO4	Use different data structures and create/update basic data files.

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	2	2	2	1	1	1	2					
CO2	3	3	3	3	1	3	1					1
CO3	3	3	3	3	1	3	2					2
CO4	3	3	3	3	1	3	2					2

UNIT I

Introduction to Programming: Computer - Components, Types of Languages, Compiler, Algorithms and their representations: Flowcharts, Pseudo Code.
Introduction to C: "Hello World" in C – Editor, Compiler, Execution Environment. C as a Middle Level Language. Basic Structure of C program, Standard Library and Header Files, Tokens in C - Variable, Constant (literal and named), Data types, Keywords, Variable Declaration and Assignment. Operators - Precedence & Associativity. Type conversion, Input and Output statements.
Selection and Looping Statements: If statement, If-Else Statement, Nested If, Examples, Multi-way selection: Switch, Else-If, examples, While Statement, For Statement, Nested Loops, do-while Statement, Break and Continue statements, Example programs

UNIT II

Arrays: Concept, Declaration and Initialization of Arrays, Accessing Individual Elements of Array. Use of Arrays in Sorting, Searching. Concept of 2-D array (Matrix), Passing arrays to functions, Examples.
Functions: Need of Functions, Function Declaration, Definition and Call. Inbuilt functions and User Defined Functions. Passing arguments to a function, Returning values from a function. Scope of variable, local and global variable. Storage classes.
Recursive Functions: Need of Recursion, Direct Recursion, Indirect Recursion, Examples of Recursive Programs – Factorial, Fibonacci series. Recursive Vs Iterative solutions,Disadvantages of Recursion.

UNIT III

Pointers: Concept of Pointers, Relevance of Data type in Pointer Variable, Pointer arithmetic. Pointer to pointer. Pointers and Functions (passing pointers to functions, returning pointers from functions). Pointers and Arrays. Pointers and Strings. Array of Pointers, Pointer to Array. Various alternatives of accessing arrays (1-D and 2-D) using pointers, Dynamic Memory Allocation ,Command Line Arguments
Strings: Strings as Arrays, Character Array versus Strings, Reading Strings, Writing Strings, User Defined Functions for String Operations – Copy, Concatenate, Length, Reverse, Converting case, Appending, Comparing two strings, Extracting a substring. Array of strings.

UNIT IV

Structures & Unions: Notion, Declaration and Initialization, Structure Variables, Accessing and Assigning values of the fields, Functions and Structures, Arrays of Structures, nested structures, Pointers and Structures, Passing Structure to a Function and Returning Structure from Function. Introduction to self referential structures , Union, Nesting of Structure and Union. Enumerated data types.
Data Files: Declaring, Opening and Closing File Streams, Reading From and Writing to Text Files, Random File Access

TEXT BOOKS:
1. C Programming-A Problem Solving Approach, Forouzan, Gilberg, Cengage

REFERENCE BOOKS:
1.Programming in ANSIC 7th Edition by E.Balaguruswamy
2.Let us C by Yaswanth Kanetkar
3. The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education.
4. Programming with C, Bichkar, Universities Press.
5. Programming in C, ReemaThareja, OXFORD.
6. C by Example, Noel Kalicharan, Cambridge.
7. ANSI C Programming, Gary J. Bronson, Cengage Learning.

E-RESOURCES:
1. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-087-practical-programming-in-c-january-iap-2010/lecture-notes/
2. http://cslibrary.stanford.edu/101/EssentialC.pdf
3. http://nptel.ac.in/courses/106104128/
4. http://www.vssut.ac.in/lecture_notes/lecture1424354156.pdf

ENGINEERING GRAPHICS
(Common to EEE, ECE, CSE& IT)

Lecture – Practice: 1 – 2
Credits: 2

Internal Marks: 40
Semester end assessment: 60
(Internal Only)

Prerequisites:

- Knowledge of basic mathematical concepts (Geometry)
- Drawing skills

Course Objectives:

- To introduce the students to use drawing instruments and to draw polygons, Engineering Curves.
- To introduce the students to use of orthographic projections, projections of points, lines & Lines inclined to both the planes.
- To make the students draw the projections of the planes and solids at various positions with reference planes.
- The student will be able to represent and convert the pictorial views to orthographic views and vice versa by using AutoCAD as well as conventional.

COURSE OUTCOMES:
Upon successful completion of the course, the student will be able to:

CO1	Understand simple geometric construction like polygons, engineering curves and scales.
CO2	Understand orthographic projection of points, straight lines- inclined to one plane and inclined to both the planes.
CO3	Understand orthographic projection of planes and solids at various positions with different reference planes.
CO4	Understand The transformation of orthographic views into pictorial views and vice versa through AutoCAD as well as conventional drawing.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2	1	2	2	2	1	-	-	3	-	1
CO2	3	2	1	2	2	2	1	-	-	3	-	1
CO3	3	2	1	2	2	2	1	-	-	3	-	1
CO4	3	2	1	2	2	2	1	-	-	3	-	1

UNIT I

Introduction to engineering drawing:
Polygons: Construction of regular polygons by general methods, inscribing and

describing polygons with circles.
Conics: Construction of Parabola, Ellipse and Hyperbola by using general methods and also draw tangents & normals for the curves.

UNIT II

Introduction to orthographic projections:
Projections of points and lines: Horizontal plane, vertical plane, profile plane, importance of reference planes, projections of points in various quadrants. Projections of straight lines- perpendicular lines, inclined lines and parallel to either of the reference planes(HP,VP or PP).
Projections of lines inclined to both the planes:
Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclination .

UNIT III

Projections of planes: regular planes perpendicular/parallel to one plane and inclined to the other reference plane.
Projections of Solids: projections of Prisms, Pyramids, Cones and Cylinders with the axis parallel/perpendicular/ inclined to one of the planes and vice versa.

UNIT IV

Transformation of Projections: AutoCAD Fundamentals.
Conversion of Pictorial views to orthographic views Using AutoCAD and conventional.
Conversion of orthographic views to isometric views. Isometric drawing of simple objects through AutoCAD.

TEXT BOOKS:
1. Engineering Drawing by N.D. Butt, Chariot Publications
2. Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill Publishers

REFERENCE BOOKS:
1. Engineering Drawing by K.L.Narayana & P. Kannaiah, Scitech Publishers
2. Engineering Graphics for Degree by K.C. John, PHI Publishers
3. Engineering Graphics by PI Varghese, McGrawHill Publishers
4. Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, New Age Publishers

E-RESOURCES:

2. http://nptel.iitm.ac.in/

ENVIRONMENTAL STUDIES
(Common to CE,EEE,ME,CSE and IT)

Lecture – Tutorial: 2-1 **Internal Marks:** 40
Credits: -- **External Marks:** 60

Prerequisites:

Course Objectives:
- Basic understanding of ecosystem and to know the importance of biodiversity.
- Understanding of natural resources.
- To understand different types of pollutants effecting the environment.
- To know global environmental problems, problems associated with over population and burden on environment.

COURSE OUTCOMES:
Upon successful completion of the course, the student will be able to:

CO1 Realize the importance of ecosystem and biodiversity for maintaining ecological balance.
CO2 Understand the role of natural resources for the sustenance of life on earth and recognize the need to conserve them.
CO3 Identify the environmental pollutants and abatement devices.
CO4 Gain the importance of sustainability.

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	2		3			2	3	2			2	1
CO2	2		3			2	3	2			2	1
CO3	2		3			2	3	2			2	1
CO4	2		3			2	3	2			2	1

UNIT I

Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Ecological succession. – Food chains, food webs and ecological pyramids, flow of energy; biogeochemical cycles.
Biodiversity and its conservation: Definition: genetic, species and ecosystem diversity- classification - Value of biodiversity, India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts - Endangered and endemic species of India – Conservation of biodiversity.

UNIT II

Natural Resources: Natural resources and associated problems
Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people.
Water resources – Use and over utilization of surface and ground water –

Floods, drought, conflicts over water, dams – benefits and problems.
Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources. Case studies.
Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources Vs Oil and Natural Gas Extraction.
Land resources: land as a resource, land degradation, wasteland reclamation, man induced landslides, soil erosion and desertification.
Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

UNIT III

Environmental Pollution: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards, Technological solutions for pollution control, Role of an individual in prevention of pollution with case studies.
Solid Waste Management: Sources, Classification, effects and control measures of urban andindustrial solid wastes. Biomedical, Hazardous and **E-waste** management, carbon credits.
Disaster management: floods, droughts, earthquakes, cyclones.

UNIT IV

Social issues and the environment: Global environmental challenges- global warming and climate change, acid rains, ozone layer depletion.
Towards sustainable future: From unsustainable to sustainable development, population and its explosion, urban problems related to energy, rain water harvesting, consumerism and waste products, role of IT in environment and human health, HIV/ AIDS, environmental ethics.
Environmental management and acts: Impact assessment and significance, various stages of EIA, environmental management plan (EMP), green belt development. Environmental Law (Air, Water, Wildlife, Forest, Environment protection act).
The student should visit an industry/ Ecosystem and submit a report individually on any issues related to environmental studies course and make a power point presentation.

TEXT BOOKS:

1. Environment Studies, Anubha Kaushik, C P Kaushik, New Age International Publishers, 2018
2. Environmental Studies, R. Rajagopalan, 2nd Edition, 2011, Oxford University Press.
3. Environmental Studies, P. N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai

REFERENCE BOOKS:

1. Text Book of Environmental Studies, Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.
2. Environmental Studies, K. V. S. G. Murali Krishna, VGS Publishers, Vijayawada.
3. Erach Bharucha, 2010 " Text Book of Environmental Studies" , University Grants Commission, University Press (India) Pvt. Ltd., Hyderabad.
4. Text book of Environmental Science and Engineering by G. Tyler Miller Jr, 2006 Cengage learning.

E-RESOURCES:

1. http://nptel.ac.in/courses.php
2. http://jntuk-coeerd.in/

ENGLISH COMMUNICATION SKILLS LAB-I

Practice: 3 Hours **Internal Marks:** 40

Credits: 1.5 **External Marks:** 60

Prerequisites:

None

Course Objectives:

To enable the students to learn through practice the four communication skills: Listening, Speaking, Reading and Writing.

Understand the nuances of language usage for better presentation in all the walks of life promoting life-long learning.

Course Outcomes:

Upon successful completion of the course, the student will be able to:

CO1 Understand the importance of communication skills and instill the need for life-long learning.

CO2 Express themselves fluently and appropriately in social and professional contexts.

CO3 Make sense of both verbal and non-verbal messages through selected listening activities.

CO4 Aware of the need of pronunciation and intonation in improving their speaking skills.

Contribution of Course Outcomes towards achievement of Program Outcomes

(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1						1			1	3		2
CO2						1			1	3		2
CO3									1	3		2
CO4											1	2

List of Experiments:

UNIT 1:

1. Why study Spoken English?
2. Making Inquiries on the phone, thanking and responding to Thanks
3. Responding to Requests and asking for Directions

Practice work.

UNIT 2:

1. Asking for Clarifications, Inviting, Expressing Sympathy, Congratulating
2. Apologising, Advising, Suggesting, Agreeing and Disagreeing

Practice work.

UNIT 3:

1. Letters and Sounds
2. The Sounds of English

Practice work.

UNIT 4:

1. Pronunciation
2. Stress and Intonation

Practice work.

Equipment Required:

Computer Assisted Language Laboratory with computers equipped with software that help the students in developing four skills – Listening, Speaking, Reading and Writing.

Reference Books:

10. INTERACT: English Lab Manual for Undergraduate Students' Published by Orient Blackswan Pvt Ltd.
11. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna Lakshmi, Maruti Publications.
12. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
13. Unlock, Listening and speaking skills 2, Cambridge University Press
14. Spring Board to Success, Orient BlackSwan
15. A Practical Course in effective english speaking skills, PHI
16. Word power made handy, Dr shalini verma, Schand Company
17. Let us hear them speak, Jayashree Mohanraj, Sage texts
18. Professional Communication, Aruna Koneru, Mc Grawhill Education Cornerstone, Developing soft skills, Pearson Education

E-Resources:

1. https://www.britishcouncil.in/
2. http://www.talkenglish.com/

APPLIED PHYSICS LAB

Practice:	2	**Internal Marks:**	40
Credits:	1	**External Marks:**	60

Prerequisites: Knowledge of Vernier Calipers, Screw Gauge

Course Objectives: Training field oriented Engineering graduates to handle instruments and their design methods to improve the accuracy of measurements.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1	Calculate wavelengths of various light sources, thickness of the given object and radius of curvature of lens.
CO2	Determine Numerical Aperture & bending losses of Optical Fibre
CO3	Analyze the characteristics and energy band gaps of semi-conductor and zener diodes
CO4	Estimate the frequency of tuning fork and Magnetic field strength.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	3							3			
CO2	3	3			2				3			
CO3	3	3							3			
CO4	3	3							3			

List of Experiments:

13. Determination of wavelength of a source-Diffraction Grating-Normal incidence
14. Newton's rings – Radius of Curvature of Plano - Convex Lens
15. Determination of thickness of a spacer using wedge film and parallel interference fringes. .
16. Determination of wavelength of laser source using diffraction grating.
17. Determination of Numerical Aperture of an Optical Fibre.
18. Study of I/V Characteristics of Semiconductor diode.
19. I/V characteristics of Zener diode.
20. Energy Band gap of a Semiconductor p - n junction
21. Meldi's experiment – Transverse and Longitudinal modes.
22. Magnetic field along the axis of a current carrying coil – Stewart and

Gee's apparatus

23. Verification of laws of vibrations in stretched strings – Sonometer

24. L- C- R Series Resonance Circuit.

EQUIPMENT REQUIRED:

10. Spectrometer
11. Travelling Microscope
12. Regulated Power Supply
13. Function Generators
14. Energy Band Gap Kit
15. Digital Mutlimetres
16. Tuning Forks
17. Electrically driven Tuning Forks
18. Tangent Galvanometer

REFERENCE BOOKS:

1. Lab Manual of Engineering Physics by Dr.Y.Aparna & Dr.K.Venkateswara Rao (VGS Books Links, Vijayawada)

E-RESOURCES:

1.www.vlab.co.in

PROGRAMMING AND PROBLEM SOLVING WITH C LAB

Practice: 3 **Internal Marks:** 40
Credits: 1.5 **External Marks:** 60

Prerequisites:

Course Objectives:

- Understand the basic concept of C Programming, and its different modules that includes conditional and looping expressions, Arrays, Strings, Functions, Pointers, Structures and File programming.
- Acquire knowledge about the basic concept of writing a program.
- Role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language.
- Use of conditional expressions and looping statements to solve problems associated withconditions and repetitions.
- Role of Functions involving the idea of modularity.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1	Understand C programming development environment, compiling, debugging, and linking and executing a program using the development environment
CO2	To solve the problems using selection and iterative statements
CO3	Analyzing the complexity of problems, Modularize the problems into small modules and then convert them into programs, Understand and apply the in-built functions and customized functions for solving the problems.
CO4	To solve the various problems using arrays, structures, pointers and files

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	2	3	1	2	3	1	2					1
CO2	2	1	2	2	1	2	2					2
CO3	2	3	3	2	3	3	2					3
CO4	3	3	3	3	3	3	3					3

List of Experiments:

Exercise - 1 Basics
a) What is an OS Command, Familiarization of Editors - vi, Emacs
b) Using commands like mkdir, ls, cp, mv, cat, pwd, and man
c) C Program to Perform Adding, Subtraction, Multiplication and Division of two numbers From
Command line
Exercise - 2 Basic Math
a) Write a C Program to Simulate 3 Laws at Motion
b) Write a C Program to convert Celsius to Fahrenheit and vice versa
Exercise - 3 Control Flow - I
a)Write a C Program to Find Whether the Given Year is a Leap Year or not.
b)Write a C Program to Add Digits & Multiplication of a number

Exercise – 4 Control Flow - II
a)Write a C Program to Find Whether the Given Number is
i) Prime Number
ii) Armstrong Number
b) Write a C program to print Floyd Triangle
c) Write a C Program to print Pascal Triangle
Exercise – 5 Functions
a) Write a C Program demonstrating of parameter passing in Functions and returning values.
b) Write a C Program illustrating Fibonacci, Factorial with Recursion without Recursion
Exercise – 6 Control Flow - III
a) Write a C Program to make a simple Calculator to Add, Subtract, Multiply or Divide Using
switch...case
b) Write a C Program to convert decimal to binary and hex (using switch call function the
function)
Exercise – 7 Functions - Continued
Write a C Program to compute the values ofsin x and cos x and e^x values using Series
expansion. (use factorial function)
Exercise – 8 Arrays
Demonstration of arrays
a) Search-Linear.
b) Sorting-Bubble, Selection.
c) Operations on Matrix.
Exercises - 9 Structures
a)Write a C Program to Store Information of a Movie Using Structure
b)Write a C Program to Store Information Using Structures with Dynamically Memory
Allocation
c) Write a C Program to Add Two Complex Numbers by Passing Structure to a Function
Exercise - 10 Arrays and Pointers
a)Write a C Program to Access Elements of an Array Using Pointer
b) Write a C Program to find the sum of numbers with arrays and pointers.
Exercise – 11 Dynamic Memory Allocations
a) Write a C program to find sum of n elements entered by user. To perform this program,
allocate memory dynamically using malloc () function.
b) Write a C program to find sum of n elements entered by user. To perform this program,
allocate memory dynamically using calloc () function. Understand the difference between the
above two programs
Exercise – 12 Strings
a) Implementation of string manipulation operations with library function.
i) copy
ii) concatenate
iii) length
iv) compare

b) Implementation of string manipulation operations without library function.
i) copy
ii) concatenate
iii) length
iv) compare

Exercise -13 Files

a)Write a C programming code to open a file and to print it contents on screen.
b)Write a C program to copy files

Exercise - 14 Files Continued

a) Write a C program merges two files and stores their contents in another file.
b) Write a C program to delete a file.

EQUIPMENT REQUIRED:

1.Computer Systems with UNIX OS,GCC Compiler,VI Editor

REFERENCE BOOKS:

1. 1.Programming in ANSIC 7th Edition by E.Balaguruswamy
2.Let us C by Yaswanth Kanetkar
3. The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education.

E-RESOURCES:

1. http://www.skiet.org/downloads/cprogrammingquestion.pdf
2. http://www.c4learn.com/c-programs/
3. https://www.programiz.com/c-programming/examples
4. https://www.sanfoundry.com/c-programming-examples/

PROFESSIONAL ENGLISH-II

(Common to CE,EEE,ME,ECE,CSE and IT)

Lecture – Tutorial: 2-1

Credits: 3

Prerequisites:

Internal Marks: 40

External Marks: 60

Course Objectives:

1. To expose the students to components of grammar required in effective sentence constructions.
2. To help the students to develop effective writing skills using phrasal verbs, connectives, collocations, idioms etc.
3. To enable the students to learn the format, style and types of letters, reports and emails.
4. To expose the students to various sub skills and strategies of reading and writing.
5. To enable the students to analyse and evaluate various texts that lead to global comprehension.

Course Outcomes:

Upon successful completion of the course, the student will be able to:

CO1	Recognize the importance of the role of communication in the competitive world.
CO2	Acquire the competence to write effectively in various formal and academic contexts.
CO3	Acquire the jargon used in business communication and technical communication.
CO4	Develop the ability to evaluate texts by inferring the implied sense of such texts and apply such knowledge globally.
CO5	Gain knowledge about the significance of the universal human values through expression of human feelings of compassion and right understanding.

Contribution of Course Outcomes towards achievement of Program Outcomes

(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1									2	3		2
CO2										2		2
CO3										3		2
CO4												2
CO5								2				2

UNIT I

1. **Text**: A. **"The Struggle for an Education"** – Booker T. Washington
   B. **"Good Manners"** – J.C. Hill
2. **Writing**: Formal Communication VS Informal Communication -Writing
3. **Vocabulary**: Business and Technical Terminology
4. **Remedial Grammar**: Change of Voice

UNIT II

1. **Text: "A Letter to Indu"** – Jawaharlal Nehru
2. **Writing**: Letter Writing – Types of Letters – Different Styles of Letter Writing
3. **Vocabulary**: Phrasal Verbs – Use of Connectives in Sentence Constructions
4. **Remedial Grammar**: Reported Speech

UNIT III

1. **Text**: A. **"The Power of a Plate of Rice"** – Ifeoma Okoye
   B. **"Email to Employees"** – Satya Nadella
2. **Writing**: Email Writing, Report Writing (Significance, Format and style of writing Technical Reports)
3. **Vocabulary**: Collocations
4. **Remedial Grammar:** Subject-Verb Agreement

UNIT IV

1. **Text: "Stench of Kerosene"** – Amrita Pritam
2. **Writing**: Essay Writing –Types of Essays
3. **Vocabulary**: Use of Idiomatic Expressions (in different contexts)
4. **Remedial Grammar**: Common Errors

TEXT BOOKS:

REFERENCE BOOKS:

1. Advanced Grammar in Use. Martin Hewings. Cambridge University Press. 2013
2. Effective Technical Communication Rizvi, Ashraf. M.. Tata McGraw – Hill, New Delhi. 2005
3. Word Power Made Easy. Norman Lewis
4. Michael Swan. Basic English Usage
5. A New Approach to Objective English. Dhillon Group of Publications
6. English and Soft Skills. Dhanavel S. P. Orient Black Swan, Hyderabad, 2010
7. Professional Communication. Baradwaj Kumkum. I.K. International Publishing House Pvt. Ltd, New Delhi .2008
8. Intermediate English Grammar, Raymond Murphy, Cambridge University Press.

E-RESOURCES:

1. http://grammar.ccc.commnet.edu/grammar/index.htm
2. https://owl.english.purdue.edu/
3. https://learnenglish.britishcouncil.org/en

ENGINEERING MATHEMATICS-II
(Common to CE,EEE,ME,ECE,CSE and IT)

Lecture – Tutorial:	3 – 1	**Internal Marks:**	40
Credits:	4	**External Marks:**	60

Prerequisites:
Student has a knowledge about Trigonometric functions and its related formulae, Differentiation , Integration and vector algebra.

Course Objectives:

- The course is designed to equip the students with the necessary skills and techniques that are essential for Engineering course.
- The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1	Finding the General solution of first order ordinary differential equation and its applications.
CO2	Finding the General solution of second and higher order ordinary differential equations with constant and variable coefficients.
CO3	Determine double integral over a region and triple integral over a volume.
CO4	Determine the Gradient, Diveregence and Curl of a vector and vector identities.

Contribution of Course Outcomes towards achievement of Program Outcomes
(1– Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2		1	2						1	1
CO2	3	2		1	2						1	1
CO3	3	2		1	1						1	1
CO4	3	2		1	1						1	1

UNIT I
Ordinary differential equations of first order and applications

Linear – Bernoulli – Exact – Reducible to exact differential equations – Ort trajectories –
Newton's law of cooling – Law of exponential growth and decay .

UNIT II
Ordinary differential equations of 2nd and higher order

Non homogeneous equations of higher order with constant coefficients with Right hand side terms of the type $e^{ax}, \sin ax, \cos ax, x^k\ (k > 0), e^{ax}V, x^mV$ - Variation of parameters – Differential equations with variable coefficients (Legendre and Cauchy)

UNIT III

Multiple Integrals
Multiple Integrals – Double and Triple Integrals – Change of variables – Change of integration.
Applications: Finding Areas, Surfaces and Volumes.

UNIT IV

Vector Calculus
Vector differentiation – Gradient – Divergence – Curl – Vector identies.
Vector Integration – Line integral – work done – Potential function – area – surface and volume integrals – Vector integral theorems (without proof) viz. Greens, stokes and Gauss divergence and related problems.

TEXT BOOKS:
1.B.S.Grewal, "Higher Engineering Mathematics, Khanna Publishers", 43rd Edition, 2014.

REFERENCE BOOKS:
1. **N.P.Bali**, Engineering Mathematics, Lakshmi Publications.
2. **Erwin Kreyszig,** Advanced Engineering Mathematics, 10th Edition, Wiley-India

E-RESOURCES:
1.www.nptel**videos.com/mathematics/ (Math Lectures from MIT,Stanford,IIT'S)**
2.**nptel.ac.in/courses/122104017**
3.**nptel.ac.in/courses/111105035**

APPLIED CHEMISTRY

(Common to CSE,IT,ECE,EEE)

Lecture – Tutorial: 2-1 **Internal Marks:** 40

Credits: 3 **External Marks:** 60

Prerequisites:

Course Objectives:

Knowledge of basic concepts of Chemistry for Engineering students will help them as professional engineers later in design and material selection, as well as utilizing the available resources.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1 Plastics have become part of our life. Hence their preparation, fabrication and study of properties are essential to engineering students.

CO2 Study of electrochemistry helps in developing efficient cells and batteries and thorough understanding of corrosion and its prevention.

CO3 With the increase in demand for power and also with depleting sources of fossil fuels, the demand for alternative sources of fuels is increasing. Some of the prospective fuel sources are introduced

CO4 Nano materials, superconductors and liquid crystals are advanced engineering materials with exceptional properties can be exploited by engineering students.
The green synthesis must be understood to keep the planet earth safe.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	2	1	3									
CO2	3	1	2									
CO3	2	1										
CO4	1				2							

UNIT I

POLYMERS

Introduction-methods of polymerization-(emulsion and suspension)-physical and mechanical properties.

Plastics– Introduction-Thermoplastics and Thermosetting plastics – Compounding and fabrication (compression, injection, transfer & extrusion)-Preparation, properties and applications of polythene, PVC, Bakelite and Teflon

Elastomers: - Natural rubber- compounding and vulcanization – Synthetic rubbers: Buna S, Buna N and Thiokol– Applications of elastomers.

Fiber reinforced plastics – Biodegradable polymers – Conducting polymers.

UNIT II

ELECTROCHEMISTRY AND CORROSION

Galvanic cells - Reversible and irreversible cells – Single electrode potential – Electrochemical series and uses of this series- Standard Hydrogen electrode and Calomel electrode - Concentration Cells
Batteries: Dry Cell – Li- cells (Liquid cathode and solid cathode Li cells).
Fuel cells-Hydrogen-oxygen and methyl alcohol-oxygen fuel cells
Corrosion :- Definition – Theories of Corrosion (chemical & electrochemical) – Formation of galvanic cells by different metals, by concentration cells, by differential aeration and waterline corrosion – Passivity of metals – Pitting corrosion - Galvanic series – Factors which influence the rate of corrosion - Protection from corrosion – Cathodic protection – Protective coatings: Galvanizing, Tinning, Electroplating, Electro less plating.

UNIT III

NON CONVENTIONAL ENERGY SOURCES
Solar energy: Introduction, application of solar energy, conversion of solar energy(thermal and photo conversion)-photovoltaic cell: design, working

Hydro power include setup a hydropower plant (diagram)-Geothermal energy: introduction-design geothermal power plant-Tidal and wave power: Introduction-design and working-movement of tides and their effect on sea level-Ocean thermal energy: Introduction, closed cycle, open cycle, hybrid OTEC, diagram and explanation-.Biomass and bio fuels

UNIT IV

Chemistry of Advanced materials
Nano materials: Introduction –Sol- gel method &chemical reduction method of preparation-characterization by BET methods-carbon nano tubes and fullerenes: Types, preparation and properties and applications.
Liquid crystals: Introduction-Types-Applications.
Super conductors: definition-types-properties-application.
Semi conductors: Preparation of Semiconductors Si and Ge(two methods)
Green chemistry: principles-phase transfer catalyst method-supercritical fluid extraction methods

TEXT BOOKS:

1. Engineering Chemistry by Jain and Jain; Dhanpati Rai Publications
2. Engineering Chemistry by Shikha Agarwal; Cambridge University Press, 2015 edition.

REFERENCE BOOKS:

1. Engineering Chemistry of Wiley India Pvt. Ltd., Vairam and others, 2014 edition (second).
2. Engineering Chemistry by Prasanth Rath, Cengage Learning, 2015 edition.
3. A text book of engineering Chemistry by S. S. Dara; S. Chand & Co Ltd., Latest Edition
4. Applied Chemistry by H.D. Gesser, Springer Publishers
5. Text book of Nano-science and nanotechnology by B.S. Murthy, P. Shankar and others, University Press, IIM

E-RESOURCES:

1.www.nptel.ac.in
2.www.swayam.gov.in

FUNDAMENTALS OF ELECTRICAL ENGINEERING
(Common to CSE,IT)

Lecture – Tutorial:	3 – 1	**Internal Marks:**	40
Credits:	3	**External Marks:**	60

Course Objectives:

- To inculcate the understanding about the electrical fundamentals
- To impart the basic knowledge about the Magnetic circuits
- Identification of various components and Understanding the operation of CRO.
- Understanding the importance of various sources and their Conversion.

Course Outcomes:

Upon successful completion of the course, the student will be able to:

CO1	Understand the importance of Electric circuits & Elements.
CO2	Understanding about the Magnetic Circuits.
CO3	Identification of various components and Understanding the operation of CRO.
CO4	Understanding the importance of various sources and their Conversion.

Contribution of Course Outcomes towards achievement of Program Outcomes (1- Low, 2- Medium, 3 – High)

	PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l
CO1	3	3	1	2								
CO2	3	2		2								
CO3	2	1										
CO4	3	3		2								

UNIT I

Fundamentals of Electricity :

Introduction to circuit elements (R,L & C) – Electric current – Electric Potential difference – Ohm's law -Factors upon which Resistance depends – Specific Resistance – Effect of Temperature on Resistance – Temperature coefficient of Resistance – Series & parallel connection of Resistances , Inductances & Capacitances - Kirchhoff's laws (KCL & KVL)– Basic types of Sources (Independent Sources).

UNIT II

Protective Devices :

Types of Fuses, Characteristics , Materials Used, Fuse Rating – Types of Switches , Materials used, Symbols – Types of Circuit breakers - Types of Resistors , Rating – Colour coding of R,L & C

UNIT III

Earthing :

Need and Necessity of Earthing – Types of Earthing – Simple Earthing circuits for

domestic appliances – Procedure of Earthing – Earthing of Generators, Motors, Transformers, Transmission Lines – Calculation earth resistance – Perfect Earthing - Importance of Neutral

Electrical Safety :

Electrical Shock – Types of First aids – Safety Norms – Human Body response for various electric voltages

UNIT IV

Measuring Instruments :

Types of Measuring Instruments – Principle of operation - Measurement of current, voltage, power, energy, Resistance, Inductance & capacitance – Earth Resistance – Principle of operation of CRO.

TEXT BOOKS:

1. Principles of Electrical Engineering by V.K Mehta, S.Chand Publications.
2. Elec., Technology by Edward Hughes
3. Electronic Principles by Sanjay Sharma , S.K.Katraia and Sons publications, 2nd edition
4. Electronics Devices and Circuits , S.Salivahanan ,N.Suresh Kumar,A.Vallava Raj, TMH publications , 4th edition

REFERENCE BOOKS:

1. Theory and Problems of Basic Electrical Engineering by D.P.Kothari & I.J. Nagrath PHI.
2. Basic Electrical Engineering by Fitzgerald and Higginbotham
3. Electrical Engineering fundamentals by Vincent Del Toro – PHI, New Delhi

E-RESOURCES:

1. http://nptel.ac.in/courses.php
2. http://jntuk-coeerd.in/
3. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/

OOPS THRUGH JAVA
(Common to CSE,IT)

Lecture – Tutorial:	2-1	**Internal Marks:**	40
Credits:	3	**External Marks:**	60

Prerequisites:

Course Objectives:

- To introduce the object oriented programming concepts.
- To understand object oriented programming concepts, and apply them in solving problems.
- To introduce the principles of inheritance and polymorphism; and demonstrate how they relate to the design of abstract classes
- To introduce the implementation of packages and interfaces
- To introduce the concepts of exception handling and multithreading.
- To introduce the design of Graphical User Interface using applets.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1	Able to solve real world problems using OOP techniques
CO2	Able to understand the use of Inheritance, Abstract Classes and Packages
CO3	Able to develop multithreaded applications with synchronization and Exception Handling.
CO4	Able to develop applets for web applications

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	2	3	1	2	3	1	2	--	1	--	2	1
CO2	2	1	2	2	1	2	2	--	2	--	2	2
CO3	2	3	3	2	3	3	2	--	3	--	2	3
CO4	3	3	3	3	3	3	3	--	3	--	3	3

UNIT I

UNIT-I:

Introduction to OOP, Procedural Programming Language and Object Oriented Language, Principles of OOP, Applications of OOP, History of JAVA, JAVA features, JVM, Program Structure. Variables, Primitive Data Types, Identifiers, Literals, Operators, Expressions, Precedence Rules and Associativity, Primitive Type Conversion and Casting, Flow of Control. Classes and Objects, Class declaration, Creating Objects, Methods, Method Overloading

UNIT II

Constructor, Overloading, Garbage Collector, Importance of Static Keyword and this keywords, Examples, Arrays, Command Line Arguments, Nested Classes.
Inheritance & Polymorphism: Basic concepts of Inheritance, Member access, forms of inheritance- specialization, specification, construction, extension, limitation, combination, benefits of inheritance, Relationships, Creating Multilevel Hierarchy, super uses, using final with Inheritance, Polymorphism, Runtime polymorphism, pure polymorphism, method overriding, abstract classes & Methods, Object class
Packages: Defining a Package, PATH, CLASSPATH, Difference between PATH

and CLASS PATH, Access protection, importing packages.

UNIT III

Interfaces: Defining an interface, implementing interfaces, Nested interfaces, variables in interfaces and extending interfaces, Multiple inheritances of interfaces, Difference between Abstract class & Interfaces.

Exception handling : Fundamentals of exception handling, Exception types, Termination or resumptive models, Uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws and finally, built-in exceptions, creating own exception sub classes.

Multithreading: Thread Introduction, Differences between thread-based multitasking and process-based multitasking, Thread life cycle , creating threads using Thread class and Runnable Interface, Thread Priorities, synchronizing threads, inter thread communication.

UNIT IV

Files: Reading data from files and writing data to files, Random Access File,

Applet: Applet class, Applet structure, Applet life cycle, sample Applet programs. Event handling: event delegation model, sources of event, Event Listeners, adapter classes, inner classes.

TEXT BOOKS:

1. Java The complete reference, 9th edition, Herbert Schildt, McGraw Hill Education (India) Pvt. Ltd.
2. Understanding Object-Oriented Programming with Java, updated edition, T. Budd, Pearson Education.

REFERENCE BOOKS:

1. An Introduction to programming and OO design using Java, J. Nino and F.A. Hosch, John Wiley & sons.
2. Introduction to Java programming, Y. Daniel Liang, Pearson Education.
3. Object Oriented Programming through Java, P. Radha Krishna, Universities Press.
4. Programming in Java, S. Malhotra, S. Chudhary, 2nd edition, Oxford Univ. Press.
5. Java Programming and Object oriented Application Development, R. A. Johnson, Cengage Learning.

E-RESOURCES:

1. http://programmingbydoing.com
2. www.learnjavaonline.org
3. https://www.tutorialspoint.com/java
4. http://www.mindfiresolutions.com/blog/2017/12/best-resources-learn-java/
5. https://www.javatpoint.com
6. https://nptel.ac.in/courses

ENGLISH COMMUNICATION SKILLS LAB-II

Practice: 3 **Internal Marks:** 40
Credits: 1.5 **External Marks:** 60

Prerequisites:

Course Objectives:
To enable the students to learn through practice the four communication skills: Listening, Speaking, Reading and Writing.
Understand the nuances of language usage for better presentation in all the walks of life promoting life-long learning.

Course Outcomes:
Upon successful completion of the course, the student will be able to:

CO1	Attain better understanding of the nuances of English language to put into use in various situation and events.
CO2	Acquire speaking skills with clarity and confidence which in turn enhances their employability skills.
CO3	Communicate and present their ideas and sources accurately and effectively.
CO4	Enhance their employability skills and critical thinking skills with participation in mock interviews and group discussions.

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1									1	3		2
CO2										3		2
CO3									1	3		2
CO4									1			2

List of Experiments:

UNIT 1:
1. Debating
Practice work

UNIT 2:
1. Group Discussions
Practice work

UNIT 3:
1. Presentation Skills
Practice work

UNIT 4:
1. Interview Skills
2. Curriculum Vitae
Practice work

EQUIPMENT REQUIRED:
Computer Assisted Language Laboratory with computers equipped with software that help the students in developing four skills – Listening, Speaking, Reading and Writing.

REFERENCE BOOKS:

1. INTERACT: English Lab Manual for Undergraduate Students' Published by Orient Blackswan Pvt Ltd.
2. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna Lakshmi, Maruti Publications.
3. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
4. Unlock, Listening and speaking skills 2, Cambridge University Press
5. Spring Board to Success, Orient BlackSwan
6. A Practical Course in effective english speaking skills, PHI
7. Word power made handy, Dr shalini verma, Schand Company
8. Let us hear them speak, Jayashree Mohanraj, Sage texts
9. Professional Communication, Aruna Koneru, Mc Grawhill Education
10. Cornerstone, Developing soft skills, Pearson Education

E-RESOURCES:

1. 1. https://www.britishcouncil.in/
2. http://www.talkenglish.com/

APPLIED CHEMISTRY LAB

Practice: 2 **Internal Marks:** 40

Credits: 1 **External Marks:** 60

Prerequisites:

--

Course Objectives:

To provide knowledge of chemistry practical's. It enables the students to analyze the different parameters of water sample like hardness and alkalinity and different volumetric titrations. It makes the students to obtain basic knowledge of instrumentation based on different Engineering applications.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1	Perform different volumetric titrations listed in syllabus.
CO2	To analyze various parameters of water sample.
CO3	Instrumental methods of chemical analysis exhibit the skill of the students.
CO4	Preparation of different compounds provides knowledge to the students.

Contribution of Course Outcomes towards achievement of Program Outcomes

(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1	2										
CO2	1	2										
CO3	1											
CO4	1											

List of Experiments:

1.Determination of HCl by Na_2CO_3 solution

2.Determination of alkalinity of sample containing Na_2CO_3 and NaOH

3.Determination of $KMnO_4$ using standard oxalic acid solution

4.Determination of total hardness of water by EDTA solution

5.Determination of copper using standard EDTA solution

6.Determination of Zinc using standard EDTA solution

7.Determination of Iron by a calorimetric method

8.Conductometric titration between strong acid and strong base

9.Potentiometric titration between strong acid and strong base

10.Potentiometric titration between Iron and dichromate

Additional Experiments to be performed

1.Preparation of urea-formaldehyde resin

2.Determination of P^H of water sample

3. Preparation of phenol-formaldehyde resin

EQUIPMENT REQUIRED:

PH meters, Potentiometers, Conductometers, colorimeters.

APPARATUS

Burettes, Pipettes, Conical flask, Beakers.

REFERENCE BOOKS:

1 . A Textbook of Quantitative Analysis, Arthur J. Vogel.

2. Dr. Jyotsna Cherukuri (2012) *Laboratory Manual of engineering chemistry-II,* VGS Techno Series

3. Chemistry Practical Manual, Lorven Publications

4. K. Mukkanti (2009) *Practical Engineering Chemistry,* B.S. Publication

AUTOMATION TOOLS & PROFESSIONAL WORKSHOP

Practice: 2 **Internal Marks:** 40
Credits: 1.5 **External Marks:** 60

Prerequisites: Knowledge of information technology workshop

Course Objectives:

1. Understand the basic components and peripherals of a computer.
2. To become familiar in configuring a system.
3. Learn the usage of productivity tools
4. Acquire knowledge about the netiquette and cyber hygiene
5. Get hands on experience in trouble shooting a system

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1 Understand and Apply MS Office tools
CO2 Configure the components on the motherboard and install different operating systems
CO3 Understand and configure different storage media
CO4 Identified strategies for overcoming constraints to effective decentralization and sustainable management at different levels

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2 - Medium, 3– High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2	3	2	2	2	1	2	3	1	3	2
CO2	3	1	3	-	2	1	1	-	1	1	3	2
CO3	3	1	2	-	2	2	1	-	1	1	2	2
CO4	3	2	2	1	-	2	1	1	1	1	2	2

List of Experiments: 10

1.Identification of the peripherals of a computer: To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions. Description of various I/O Devices

2.System Assembling, Disassembling: A practice on disassembling the components of a PC and assembling them to back to working condition.

3.Operating System Installation-Install Operating Systems like Windows, Linux along with necessary Device Drivers.

4.MS-Office / Open Office

a. Word - Formatting, Page Borders, Reviewing, Equations, symbols.
b. Spread Sheet - organize data, usage of formula, graphs, charts.
c. Power point - features of power point, guidelines for preparing an effective presentation.
d. Access- creation of database, validate data

5. Network Configuration & Software Installation-Configuring TCP/IP, proxy and firewall settings. Installing application software, system software & tools.

6. Internet and World Wide Web-

Cyber Hygiene (Demonstration): Awareness of various threats on the internet. Importance of security patch updates and anti-virus solutions. Ethical

Hacking, Firewalls, Multi-factor authentication techniques including Smartcard, Biometrics are also practiced

7.Search Engines & Netiquette:

Students are enabled to use search engines for simple search, academic search and any other context based search (Bing, Google etc). Students are acquainted to the principles of micro-blogging, wiki, collaboration using social networks, participating in online technology forums

8. Trouble Shooting-Hardware trouble shooting, Software trouble shooting.

Hardware Troubleshooting (Demonstration): Identification of a problem and fixing a defective PC(improper assembly or defective peripherals).

Software Troubleshooting (Demonstration):. Identification of a problem and fixing the PC for any software issues

9. MATLAB- basic commands, subroutines, graph plotting.

10. LATEX-basic formatting, handling equations and images.

EQUIPMENT REQUIRED:

1. Physical components of computer

REFERENCE BOOKS:

1. Computer Hardware, Installation, Interfacing, Troubleshooting and Maintenance, K.L. James, Eastern Economy Edition.
2. Microsoft Office 2007: Introductory Concepts and Techniques, Windows XP Edition by Gary B. Shelly, Misty E. Vermaat and Thomas J. Cashman (2007, Paperback).
3. LATEX- User's Guide and Reference manual, Leslie Lamport, Pearson, LPE, 2/e.
4. Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers, Rudraprathap, Oxford University Press, 2002.
5. Workshop Manual prepared by NRIIT staff

E-RESOURCES:

1.http://nptel.iitm.ac.in
2.JNTUK-COERD

VIRTUAL LAB:

1. http://vlab.amrita.edu/?sub=1&brch=201&sim=366&cnt=1
2. http://vlab.amrita.edu/?sub=1&brch=195&sim=840&cnt=1
3. http://vlab.amrita.edu/?sub=1&brch=282&sim=879&cnt=1

OOPS THROUGH JAVA LAB

Practice: 4 **Internal Marks:** 40

Credits: 2 **External Marks:** 60

Prerequisites:

Course Objectives:

- To introduce java compiler and eclipse platform.
- To impart hands on experience with java programming
- To write programs using abstract classes, inheritance, polymorphism, exception handling and multithreading.
- To write programs for solving real world problems

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1	***Able to write programs for solving real world problems using basic concepts of java***
CO2	***Able to write programs using abstract classes, interfaces and exception handling.***
CO3	***Able to write programs using inheritance, multithreaded programs.***
CO4	***Able to write code snippets for applet programming***

Contribution of Course Outcomes towards achievement of Program Outcomes

(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	2	3	1	2	3	1	2	--	1	--	2	1
CO2	3	1	2	2	1	2	2	--	2	--	2	2
CO3	1	3	2	2	3	3	2	--	3	--	2	3
CO4	3	3	3	2	2	3	3	--	1	--	3	3

List of Experiments:

Exercise - 1 (Basics)

a). Write a JAVA program to display default value of all primitive data type of JAVA

b). Write a java program that display the roots of a quadratic equation ax2+bx=0. Calculate the discriminate D and basing on value of D, describe the nature of root.

c). Five Bikers Compete in a race such that they drive at a constant speed which may or may not be the same as the other. To qualify the race, the speed of a racer must be more than the average speed of all 5 racers. Take as input the speed of each racer and print back the speed of qualifying racers.

Exercise - 2 (Operations, Expressions, Control-flow, Strings)

a). Write a JAVA program to search for an element in a given list of elements using binary search mechanism.

b). Write a JAVA program to sort for an element in a given list of elements

using bubble sort
(c). Write a JAVA program to sort for an element in a given list of elements using merge sort.
(d) Write a JAVA program using StringBufferto delete, remove character.

Exercise - 3 (Class, Objects)

a). Write a JAVA program to implement class mechanism. – Create a class, methods and
invoke them inside main method.
b). Write a JAVA program to implement constructor.

Exercise - 4 (Methods)

a). Write a JAVA program to implement constructor overloading.
b). Write a JAVA program implement method overloading.

Exercise - 5 (Inheritance)

a). Write a JAVA program to implement Single Inheritance
b). Write a JAVA program to implement multi level Inheritance
c). Write a java program for abstract class to find areas of different shapes

Exercise - 6 (Inheritance - Continued)

a). Write a JAVA program give example for "super" keyword.
b). Write a JAVA program to implement Interface. What kind of Inheritance can be achieved?

Exercise - 7 (Exception)

a).Write a JAVA program that describes exception handling mechanism
b).Write a JAVA program Illustrating Multiple catch clauses

Exercise – 8 (Runtime Polymorphism)

a). Write a JAVA program that implements Runtime polymorphism
b). Write a Case study on run time polymorphism, inheritance that implements in above
problem

Exercise – 9 (User defined Exception)

a). Write a JAVA program for creation of Illustrating throw
b). Write a JAVA program for creation of Illustrating finally
c). Write a JAVA program for creation of Java Built-in Exceptions
d).Write a JAVA program for creation of User Defined Exception

Exercise – 10 (Threads)

a). Write a JAVA program that creates threads by extending Thread class .First thread display
"Good Morning "every 1 sec, the second thread displays "Hello "every 2 seconds and the
third display "Welcome" every 3 seconds ,(Repeat the same by implementing Runnable)
b). Write a program illustrating isAlive and join ()
c). Write a Program illustrating Daemon Threads.

Exercise - 11 (Threads continuity)

a).Write a JAVA program Producer Consumer Problem
b).Write a case study on thread Synchronization after solving the above producer consumer
problem

Exercise – 12 (Packages)

a). Write a JAVA program illustrate class path
b). Write a case study on including in class path in your os environment of your package.
c). Write a JAVA program that import and use the defined your package in the

previous
Problem

Exercise - 13 (Applet)

a).Write a JAVA program to paint like paint brush in applet.

b) Write a JAVA program to display analog clock using Applet.

c). Write a JAVA program to create different shapes and fill colors using Applet.

EQUIPMENT REQUIRED:

REFERENCE BOOKS:

1. Java The complete reference, 9th edition, Herbert Schildt, McGraw Hill Education (India) Pvt. Ltd.
2. Understanding Object-Oriented Programming with Java, updated edition, T. Budd, Pearson Education.
3. An Introduction to programming and OO design using Java, J. Nino and F.A. Hosch, John Wiley & sons.
4. Introduction to Java programming, Y. Daniel Liang, Pearson Education.
5. Object Oriented Programming through Java, P. Radha Krishna, Universities Press.
6. Programming in Java, S. Malhotra, S. Chudhary, 2nd edition, Oxford Univ. Press.
7. Java Programming and Object oriented Application Development, R. A. Johnson, Cengage Learning.

E-RESOURCES:

1. https://www.javacodegeeks.com
2. http://programmingbydoing.com
3. https://www.oracle.com/technetwork/java
4. https://www.computerscienceonline.org/cutting-edge/java

NRIA18 : ACADEMI CURRICULUM FOR B.TECH (INFORMATION TECHNOLOGY)

I YEAR - I SEMESTER

L - LECTURE T – TUTORIAL P – PRACTICAL CIA – Continuous Internal Assessment SEA – Semester End Assessment

Sl. No	Course Code	Title of the Course	Scheme of Instruction (Periods Per Week)				Scheme of Examination (Maximum Marks)			No. of Credits
			L	T	P/D	Total	CIA	SEA	Total	
1	18A1100101	Professional English-1	2	1	0	3	40	60	100	3
2	18A1100201	Engineering Mathematics-1	2	1	0	3	40	60	100	3
3	18A1100203	Applied Physics	2	1	0	3	40	60	100	3
4	18A1105301	Programming and Problem Solving with C	2	1	0	3	40	60	100	3
5	18A1103302	Engineering Graphics	1	0	2	3	40	60	100	2
6	18A1100191	English Communication Skills Lab-1	0	0	3	3	40	60	100	1.5
7	18A1100292	Applied Physics lab	0	0	2	2	40	60	100	1
8	18A1105392	Programming and Problem Solving with C Lab	0	0	3	3	40	60	100	1.5
9	18A1100801	Environmental Studies	2	1	0	3	40	60*	100	0
Total			**11**	**5**	**10**	**26**	**360**	**540**	**900**	**18**

I YEAR - II SEMESTER

L - LECTURE T – TUTORIAL P – PRACTICAL CIA – Continuous Internal Assessment SEA – Semester End Assessment

Sl. No	Course Code	Title of the Course	Scheme of Instruction (Periods Per Week)				Scheme of Examination (Maximum Marks)			No. of Credits
			L	T	P/D	Total	CIA	SEA	Total	
1	18A1200101	Professional English-II	2	1	0	3	40	60	100	3
2	18A1200201	Engineering Mathematics-II	3	1	0	4	40	60	100	4
3	18A1200205	Applied Chemistry	2	1	0	3	40	60	100	3
4	18A1205401	OOPS through Java	2	1	0	3	40	60	100	3
5	18A1202301	Fundamentals of Electrical Engineering	3	0	0	3	40	60	100	3
6	18A1200191	English Communication Skills Lab-II	0	0	3	3	40	60	100	1.5
7	18A1200294	Applied Chemistry lab	0	0	2	2	40	60	100	1
8	18A1205391	Automation Tools and Professional Workshop	0	0	3	3	40	60	100	1.5
9	18A1205491	OOPS through Java Lab	0	0	4	4	40	60	100	2
Total			**12**	**4**	**12**	**28**	**360**	**540**	**900**	**22**

Head, IT Dep[illegible]
NRI Institute of [illegible]hnology
POTHAVARAP[illegible]DU (V)
Agiripalli (M), [illegible] Dist

PROFESSIONAL ENGLISH-I
(Common to CE,EEE,ME,ECE,CSE and IT)

Lecture – Tutorial:	2-1 Hours	**Internal Marks:**	40
Credits:	3	**External Marks:**	60

Prerequisites:
None

Course Objectives:
1. To strengthen the lexical ability of the students in different contexts.
2. To expose the students to various sub-skills and strategies of reading and writing – summarizing and paraphrasing.
3. To help the students develop effective writing skills through paragraph writing.
4. To train the students in fundamentals of grammar required to equip them with fluent English.
5. To enable the students to think critically by exposing them to different socio-cultural contexts through various literary texts.

Course Outcomes:
Upon successful completion of the course, the student will be able to:

CO1	Use grammar accurately in various formal and functional contexts.
CO2	Build good vocabulary and develop the ability to use in various contexts.
CO3	Comprehend, analyze and evaluate texts critically.
CO4	Develop effective reading and writing skills to enhance communicative competence.
CO5	Help the students to inculcate and apply human values and professional ethics in their academic, professional and social lives.

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1										3		2
CO2										3		2
CO3						1	1					2
CO4										3		2
CO5						1	1	3				2

UNIT I

1. **Reading:** Introduction to Integrated Communication with emphasis on Reading Skills, Scanning an article from *The Economic Times* – **"Why India celebrates Engineers Day on the birth anniversary of M. Visvesvaraya"**
2. **Text: "I have a dream..."** - Martin Luther King
3. **Vocabulary Building:** Synonyms and Antonyms from the Text , Word Formations: Root Words, Prefixes and Suffixes
4. **Writing:** Styles of Sentence Structure for Effective Writing, Textual Exercises, Scrambled Sentences
5. **Remedial Grammar:** Parts of Speech, Effective Sentence Constructions Using Connectives

UNIT II

1. **Reading:** Skimming: **"Oh Father, Dear Father"** – Raj Kinger
2. **Text: "On Shaking Hands"** – A.G. Gardiner
3. **Vocabulary Building:** Synonyms and Antonyms from the Text
4. **Writing:** Paragraph Scramble
5. **Remedial Grammar:** Framing Questions and Question Tags, Punctuation Rules, Usage of Articles

UNIT III

1. **Reading:** Critical Reading: **"Dial 000"** - Barry Rosenberg
2. **Text: "Seeing People Off"** – Max Beerbohm
3. **Vocabulary Building:** Synonyms and Antonyms from the Text, Acronyms
4. **Writing:** Principles of a Good Paragraph
5. **Remedial Grammar:** Verbs and Types, Present Tense

UNIT IV

1. **Reading:** Note Making: **"Icons: The Lotus Temple"** – Anamika Bhutalia
2. **Text: "The Lost Child"** – Mulk Raj Anand
3. **Vocabulary Building:** Synonyms and Antonyms from the Text, One Word Substitutes
4. **Writing:** Summarising and Writing Anecdotes
5. **Remedial Grammar:** Past Tense and Future Tense, Correction of Sentences

REFERENCE BOOKS:

1. **The Blue Book of Grammar and Punctuation**, 10th Edition, Jane Straus, Josey-Bass, A Wiley Imprint.
2. **Oxford Practice Grammar**, John Eastwood, Oxford University Press.
3. **The Most Common Mistakes in English Usage** – Thomas Elliott Berry
4. **Essential Communication Skills** – Shalini Agarwal, Ane Books Pvt Ltd.
5. **Dictionary of Synonyms and Antonyms**, Oxford & IBH, III Ed
6. **A Practical English Grammar**, Agnes V. Martinet and Audrey Jean Thomson, Oxford University Press.

E-RESOURCES:

1. http://grammar.ccc.commnet.edu/grammar/index.htm
2. https://owl.english.purdue.edu/
3. https://www.britishcouncil.in/

ENGINEERING MATHEMATICS-1
((Common to CE,EEE,ME,ECE,CSE and IT)

Lecture – Tutorial: 2 – 1 **Internal Marks:** 40
Credits: 3 **External Marks:** 60

Prerequisites:
Fundamentals of Matrices, Fundamentals of Trigonometry and Calculus
Course Objectives:
- The course is designed to equip the students with the necessary skills and techniques that are essential for Engineering course.
- The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.

COURSE OUTCOMES:
Upon successful completion of the course, the student will be able to:

CO1 To solve simultaneous linear equations, determine eigen values, eigen vectors of a matrix and determine the nature of a Quadratic forms.

CO2 To calculate a root of algebraic and transcendental equations. Explain relation between the finite difference operators and compute the interpolating polynomial for the given data. Solve Ordinary differential equations numerically using Taylor series method, Euler's and RK method of second and fourth order.

CO3 To determine the Maxima and Minima of functions of Two variables without constraints and with constraints and form the Partial Differential equations by elimination of arbitrary constants and arbitrary functions.

CO4 To solve the ordinary linear differential equations by using Laplace Transforms.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2		1	2						1	1
CO2	3	2		1	1						1	1
CO3	3	2		1	2						1	1
CO4	3	2		1	1						1	1

UNIT I:

Matrices
Rank – Echelon form – Normal form – PAQ form – Inverse of 4x4 matrix by Gauss-Jordan - Solution of Homogeneous linear systems – solution of Non-homogeneous linear systems – Gauss Elimination – Gauss Seidel methods.

Eigenvalues – Eigen vectors – Properties – Cayley Hamilton theorem (without proof) – Inverse Powers of Matrices by Caley Hamilton theorem – Quadratic forms – Reduction of quadratic forms to Canonical form (Congruent transformation method, Orthogonal transformation) – Rank, Index, Signature of a Quadratic form.

UNIT II

1. **Reading**: Skimming: **"Oh Father, Dear Father"** – Raj Kinger
2. **Text**: **"On Shaking Hands"** – A.G. Gardiner
3. **Vocabulary Building:** Synonyms and Antonyms from the Text
4. **Writing**: Paragraph Scramble
5. **Remedial Grammar:** Framing Questions and Question Tags, Punctuation Rules, Usage of Articles

UNIT III

1. **Reading**: Critical Reading: **"Dial 000"** - Barry Rosenberg
2. **Text**: **"Seeing People Off"** – Max Beerbohm
3. **Vocabulary Building**: Synonyms and Antonyms from the Text, Acronyms
4. **Writing**: Principles of a Good Paragraph
5. **Remedial Grammar**: Verbs and Types, Present Tense

UNIT IV

1. **Reading:** Note Making: **"Icons: The Lotus Temple"** – Anamika Bhutalia
2. **Text: "The Lost Child"** – Mulk Raj Anand
3. **Vocabulary Building:** Synonyms and Antonyms from the Text, One Word Substitutes
4. **Writing:** Summarising and Writing Anecdotes
5. **Remedial Grammar**: Past Tense and Future Tense, Correction of Sentences

REFERENCE BOOKS:

1. **The Blue Book of Grammar and Punctuation**, 10th Edition, Jane Straus, Josey-Bass, A Wiley Imprint.
2. **Oxford Practice Grammar,** John Eastwood, Oxford University Press.
3. **The Most Common Mistakes in English Usage** – Thomas Elliott Berry
4. **Essential Communication Skills** – Shalini Agarwal, Ane Books Pvt Ltd.
5. **Dictionary of Synonyms and Antonyms**, Oxford & IBH, III Ed
6. **A Practical English Grammar**, Agnes V. Martinet and Audrey Jean Thomson, Oxford University Press.

E-RESOURCES:

1. http://grammar.ccc.commnet.edu/grammar/index.htm
2. https://owl.english.purdue.edu/
3. https://www.britishcouncil.in/

APPLIED PHYSICS

(Common to CSE & IT)

Lecture – Tutorial: 2-1 **Internal Marks:** 40

Credits: 3 **External Marks:** 60

Prerequisites: Knowledge of Optics & Electromagnetism

Course Objectives:

1. To provide a bridge between Basic Physics and Engineering Physics.
2. To Create the awareness of various phenomena of physics which in turn help the students in future engineering applications

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1 Impart Knowledge of Physical Optics phenomena like Interference, Diffraction and Polarization involving required to design instruments with higher resolution.

CO2 Teach Concepts of coherent sources, its realization and utility optical instrumentation. Apply the concepts of light in optical fibers, light wave communication systems, and for sensing physical parameters

CO3 Study the concepts regarding the bulk response of materials to the EM fields and their analytically study in the back-drop of basic quantum mechanics.

CO4 Understand the physics of Semiconductors and their working mechanism for their utility in sensors

Contribution of Course Outcomes towards achievement of Program Outcomes

(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3				3					3		
CO2	3	3		2	2					3		
CO3	3	3								1		
CO4	3		2		2							

UNIT I

Interference: Introduction - Interference in thin films (reflection geometry) – Newton's rings – construction and basic principle of Interferometers.

Diffraction: Introduction – Rayleigh Criterion - Resolving power of a grating, Telescope and Microscopes.

Polarization: Introduction - Types of Polarization –Double Refraction - Nicol Prism -Quarter wave plate and Half Wave plate.

UNIT-II

Lasers: Introduction - Characteristics of Laser, Absorption, spontaneous emission, Stimulated emission Lasing action, Relation between Einstein Coefficients, Population Inversion, Pumping Schemes: 3- level&4- level lasers, Pumping methods. Components of laser devices, Ruby Laser, He-Ne Laser, Applications.

Fibre Optics: Principle of optical fibre, Structure – Numerical aperture and acceptance angle,

Types of optical fibers – based on Material, refractive index profile, Modes of

UNIT II

Numerical Methods

Solutions of Algebraic and Transcendental Equations: Bisection method – Iteration method – Newton Raphson method (one variable). Interpolation: Finite differences –Operators Δ, ∇, E and relations between them - Forward differences – Backward differences – Missing terms - Newton's forward and backward formulae for interpolation – Lagrange's interpolation formula.

Trapezoidal rule – Simpson's $1/3^{rd}$ and $3/8^{th}$ rules – Numerical solution of Ordinary differential equation by Taylor series method – Euler's method – Modified Euler's method – Rungekutta method of second and fourth order.

UNIT III

Partial Differentiation

Homogeneous function – Euler's theorem – Total derivative – Chain rule – Generalized mean value theorem for single variable (without proof) – Taylor's and Maclaurin's series – Expansion of Two variable functions – functional dependence – Jacobian – Maxima and Minima of functions of two variables without constraints and Lagrange's method of multipliers.

UNIT IV

Laplace Transforms

Laplace transforms of standard functions – shifting theorems – transforms of derivative's and integrals – Unit step function – Dirac's delta function.
Inverse laplace transforms - convolution theorem (without proof) – solving ordinary differential equations (Initial value problems) using Laplace transforms.

TEXT BOOKS:

1.B.S.Grewal, "Higher Engineering Mathematics, Khanna Publishers", 43rd Edition, 2014.

2.V.Ravindranath and P.Vijayalakshmi, Mathematical Methods, Himalaya Publishing House.

REFERENCE BOOKS:

1. **N.P.Bali**, Engineering Mathematics, Lakshmi Publications.
2. **Erwin Kreyszig,** Advanced Engineering Mathematics, 10th Edition, Wiley-India.

E-RESOURCES:

1.www.nptel**videos.com/mathematics/ (Math Lectures from MIT,Stanford,IIT'S)**

2.**nptel.ac.in/courses/122104017**

3.**nptel.ac.in/courses/111105035**

ENGINEERING GRAPHICS
(Common to EEE, ECE, CSE& IT)

Lecture – Practice:	1 – 2	**Internal Marks:**	40
Credits:	2	**Semester end assessment: (Internal Only)**	60

Prerequisites:

- Knowledge of basic mathematical concepts (Geometry)
- Drawing skills

Course Objectives:

- To introduce the students to use drawing instruments and to draw polygons, Engineering Curves.
- To introduce the students to use of orthographic projections, projections of points, lines & Lines inclined to both the planes.
- To make the students draw the projections of the planes and solids at various positions with reference planes.
- The student will be able to represent and convert the pictorial views to orthographic views and vice versa by using AutoCAD as well as conventional.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1	Understand simple geometric construction like polygons, engineering curves and scales.
CO2	Understand orthographic projection of points, straight lines- inclined to one plane and inclined to both the planes.
CO3	Understand orthographic projection of planes and solids at various positions with different reference planes.
CO4	Understand The transformation of orthographic views into pictorial views and vice versa through AutoCAD as well as conventional drawing.

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2	1	2	2	2	1	-	-	3	-	1
CO2	3	2	1	2	2	2	1	-	-	3	-	1
CO3	3	2	1	2	2	2	1	-	-	3	-	1
CO4	3	2	1	2	2	2	1	-	-	3	-	1

UNIT I

Introduction to engineering drawing:

Polygons: Construction of regular polygons by general methods, inscribing and

Arrays: Concept, Declaration and Initialization of Arrays, Accessing Individual Elements of Array. Use of Arrays in Sorting, Searching. Concept of 2-D array (Matrix), Passing arrays to functions, Examples.
Functions: Need of Functions, Function Declaration, Definition and Call. Inbuilt functions and User Defined Functions. Passing arguments to a function, Returning values from a function. Scope of variable, local and global variable. Storage classes.
Recursive Functions: Need of Recursion, Direct Recursion, Indirect Recursion, Examples of Recursive Programs – Factorial, Fibonacci series. Recursive Vs Iterative solutions,Disadvantages of Recursion.

UNIT III

Pointers: Concept of Pointers, Relevance of Data type in Pointer Variable, Pointer arithmetic. Pointer to pointer. Pointers and Functions (passing pointers to functions, returning pointers from functions). Pointers and Arrays. Pointers and Strings. Array of Pointers, Pointer to Array. Various alternatives of accessing arrays (1-D and 2-D) using pointers, Dynamic Memory Allocation ,Command Line Arguments
Strings: Strings as Arrays, Character Array versus Strings, Reading Strings, Writing Strings, User Defined Functions for String Operations – Copy, Concatenate, Length, Reverse, Converting case, Appending, Comparing two strings, Extracting a substring. Array of strings.

UNIT IV

Structures & Unions: Notion, Declaration and Initialization, Structure Variables, Accessing and Assigning values of the fields, Functions and Structures, Arrays of Structures, nested structures, Pointers and Structures, Passing Structure to a Function and Returning Structure from Function. Introduction to self referential structures , Union, Nesting of Structure and Union. Enumerated data types.
Data Files: Declaring, Opening and Closing File Streams, Reading From and Writing to Text Files, Random File Access

TEXT BOOKS:

1. C Programming-A Problem Solving Approach, Forouzan, Gilberg, Cengage

REFERENCE BOOKS:

1.Programming in ANSIC 7th Edition by E.Balaguruswamy
2.Let us C by Yaswanth Kanetkar
3. The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education.
4. Programming with C, Bichkar, Universities Press.
5. Programming in C, ReemaThareja, OXFORD.
6. C by Example, Noel Kalicharan, Cambridge.
7. ANSI C Programming, Gary J. Bronson, Cengage Learning.

E-RESOURCES:

1. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-087-practical-programming-in-c-january-iap-2010/lecture-notes/

2. http://cslibrary.stanford.edu/101/EssentialC.pdf

3. http://nptel.ac.in/courses/106104128/

4. http://www.vssut.ac.in/lecture_notes/lecture1424354156.pdf

ENGLISH COMMUNICATION SKILLS LAB-I

Practice:	3 Hours	**Internal Marks:**	40
Credits:	1.5	**External Marks:**	60

Prerequisites:

None

Course Objectives:

To enable the students to learn through practice the four communication skills: Listening, Speaking, Reading and Writing.

Understand the nuances of language usage for better presentation in all the walks of life promoting life-long learning.

Course Outcomes:

Upon successful completion of the course, the student will be able to:

CO1 Understand the importance of communication skills and instill the need for life-long learning.

CO2 Express themselves fluently and appropriately in social and professional contexts.

CO3 Make sense of both verbal and non-verbal messages through selected listening activities.

CO4 Aware of the need of pronunciation and intonation in improving their speaking skills.

Contribution of Course Outcomes towards achievement of Program Outcomes

(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1						1			1	3		2
CO2						1			1	3		2
CO3									1	3		2
CO4											1	2

Floods, drought, conflicts over water, dams – benefits and problems.
Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources. Case studies.
Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources Vs Oil and Natural Gas Extraction.
Land resources: land as a resource, land degradation, wasteland reclamation, man induced landslides, soil erosion and desertification.
Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

UNIT III

Environmental Pollution: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards, Technological solutions for pollution control, Role of an individual in prevention of pollution with case studies.
Solid Waste Management: Sources, Classification, effects and control measures of urban andindustrial solid wastes. Biomedical, Hazardous and **E-waste** management, carbon credits.
Disaster management: floods, droughts, earthquakes, cyclones.

UNIT IV

Social issues and the environment: Global environmental challenges- global warming and climate change, acid rains, ozone layer depletion.
Towards sustainable future: From unsustainable to sustainable development, population and its explosion, urban problems related to energy, rain water harvesting, consumerism and waste products, role of IT in environment and human health, HIV/ AIDS, environmental ethics.
Environmental management and acts: Impact assessment and significance, various stages of EIA, environmental management plan (EMP), green belt development. Environmental Law (Air, Water, Wildlife, Forest, Environment protection act).
The student should visit an industry/ Ecosystem and submit a report individually on any issues related to environmental studies course and make a power point presentation.

TEXT BOOKS:

1. Environment Studies, Anubha Kaushik, C P Kaushik, New Age International Publishers, 2018
2. Environmental Studies, R. Rajagopalan, 2nd Edition, 2011, Oxford University Press.
3. Environmental Studies, P. N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai

REFERENCE BOOKS:

1. Text Book of Environmental Studies, Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.
2. Environmental Studies, K. V. S. G. Murali Krishna, VGS Publishers, Vijayawada.
3. Erach Bharucha, 2010 " Text Book of Environmental Studies" , University Grants Commission, University Press (India) Pvt. Ltd., Hyderabad.
4. Text book of Environmental Science and Engineering by G. Tyler Miller Jr, 2006 Cengage learning.

E-RESOURCES:

1. http://nptel.ac.in/courses.php.
2. http://jntuk-coeerd.in/

APPLIED PHYSICS LAB

Practice: 2 **Internal Marks:** 40
Credits: 1 **External Marks:** 60

Prerequisites: Knowledge of Vernier Calipers, Screw Gauge

Course Objectives: Training field oriented Engineering graduates to handle instruments and their design methods to improve the accuracy of measurements.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1	Calculate wavelengths of various light sources, thickness of the given object and radius of curvature of lens.
CO2	Determine Numerical Aperture & bending losses of Optical Fibre
CO3	Analyze the characteristics and energy band gaps of semi-conductor and zener diodes
CO4	Estimate the frequency of tuning fork and Magnetic field strength.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	3							3			
CO2	3	3			2				3			
CO3	3	3							3			
CO4	3	3							3			

List of Experiments:

13. Determination of wavelength of a source-Diffraction Grating-Normal incidence
14. Newton's rings – Radius of Curvature of Plano - Convex Lens
15. Determination of thickness of a spacer using wedge film and parallel interference fringes.
16. Determination of wavelength of laser source using diffraction grating.
17. Determination of Numerical Aperture of an Optical Fibre.
18. Study of I/V Characteristics of Semiconductor diode.
19. I/V characteristics of Zener diode.
20. Energy Band gap of a Semiconductor p - n junction
21. Meldi's experiment – Transverse and Longitudinal modes.
22. Magnetic field along the axis of a current carrying coil – Stewart and

List of Experiments:

UNIT 1:

1. Why study Spoken English?
2. Making Inquiries on the phone, thanking and responding to Thanks
3. Responding to Requests and asking for Directions

Practice work.

UNIT 2:

1. Asking for Clarifications, Inviting, Expressing Sympathy, Congratulating
2. Apologising, Advising, Suggesting, Agreeing and Disagreeing

Practice work.

UNIT 3:

1. Letters and Sounds
2. The Sounds of English

Practice work.

UNIT 4:

1. Pronunciation
2. Stress and Intonation

Practice work.

Equipment Required:

Computer Assisted Language Laboratory with computers equipped with software that help the students in developing four skills – Listening, Speaking, Reading and Writing.

Reference Books:

10. INTERACT: English Lab Manual for Undergraduate Students' Published by Orient Blackswan Pvt Ltd.
11. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna Lakshmi, Maruti Publications.
12. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
13. Unlock, Listening and speaking skills 2, Cambridge University Press
14. Spring Board to Success, Orient BlackSwan
15. A Practical Course in effective english speaking skills, PHI
16. Word power made handy, Dr shalini verma, Schand Company
17. Let us hear them speak, Jayashree Mohanraj, Sage texts
18. Professional Communication, Aruna Koneru, Mc Grawhill Education Cornerstone, Developing soft skills, Pearson Education

E-Resources:

1. https://www.britishcouncil.in/
2. http://www.talkenglish.com/

PROGRAMMING AND PROBLEM SOLVING WITH C
(Common to CSE, IT)

Lecture – Tutorial:	2-1	**Internal Marks:**	40
Credits:	3	**External Marks:**	60

Prerequisites:
. Basic Knowledge on computer usage
.Basic knowledge on Mathematics

Course Objectives:
Formulating algorithmic solutions to problems and implementing algorithms in C.

- Notion of Operation of a CPU, Notion of an algorithm and computational procedure, editing and executing programs in Linux.
- Understanding branching, iteration and data representation using arrays.
- Modular programming and recursive solution formulation.
- Understanding pointers and dynamic memory allocation.
- Understanding miscellaneous aspects of C.
- Comprehension of file operations.

COURSE OUTCOMES:
Upon successful completion of the course, the student will be able to:

CO1	Understanding basic terminologies, basic idea on writing, executing programs, understanding decision structures.
CO2	Design programs involving Arrays, modular programming concepts
CO3	Understand the use of Pointers and Strings
CO4	Use different data structures and create/update basic data files.

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	2	2	2	1	1	1	2					
CO2	3	3	3	3	1	3	1					1
CO3	3	3	3	3	1	3	2					2
CO4	3	3	3	3	1	3	2					2

UNIT I

Introduction to Programming: Computer - Components, Types of Languages, Compiler, Algorithms and their representations: Flowcharts, Pseudo Code.
Introduction to C: "Hello World" in C – Editor, Compiler, Execution Environment. C as a Middle Level Language. Basic Structure of C program, Standard Library and Header Files, Tokens in C - Variable, Constant (literal and named), Data types, Keywords, Variable Declaration and Assignment. Operators - Precedence & Associativity. Type conversion, Input and Output statements.
Selection and Looping Statements: If statement, If-Else Statement, Nested If, Examples, Multi-way selection: Switch, Else-If, examples, While Statement, For Statement, Nested Loops, do-while Statement, Break and Continue statements, Example programs

UNIT II

propagation (Single & Multimode Fibres), Propagation of signal through optical fibre, Applications.

UNIT III

EM fields: Basic laws of electro magnetism, Maxwell's equations (Differential form only) - propagation of EM wave in dielectric medium – Poynting Vector.
Quantum Mechanics: Introduction - Matter waves – Schröedinger Time Independent and Time Dependent wave equations – Particle in a box.
Free Electron Theory: Introduction - Defects of Classical free electron theory – Quantum Free electron theory - concept of Fermi Energy – Density of States

UNIT IV

Band Theory of Solids: Bloch's theorem – Kronig – Penney model (qualitative) – energy bands in crystalline solids – classification of crystalline solids– effective mass of electron & concept of hole.

Semi-Conductor Physics: Conduction – Density of carriers in Intrinsic and Extrinsic semiconductors – Drift & Diffusion – relevance of Einstein's equation- Hall effect.

TEXT BOOKS:

4. A text book of Engineering physics by Dr.M.N.Avadhanulu And Dr. P.G Kshir sagar,Schand &Company Ltd (2017)
5. P.K.Palanisamy, Engineering Physics, Sci Tech, Chennai
6. Engineering Physics, 2nd Edition, H.K.Malik & A.K.Singh, Mc Graw Hill Education, Chennai

REFERENCE BOOKS:

3. Solid State Physics by A.J.Dekkar, Mac Millan Publishers
4. Ajoy Ghatak, Optics, 2nd Ed., Tata McGraw Hill, 1994

E-RESOURCES:

1.NPTEL
2.www.doitpoms.ac.uk

ENVIRONMENTAL STUDIES
(Common to CE,EEE,ME,CSE and IT)

Lecture – Tutorial: 2-1 **Internal Marks:** 40
Credits: -- **External Marks:** 60

Prerequisites:

Course Objectives:

- Basic understanding of ecosystem and to know the importance of biodiversity.
- Understanding of natural resources.
- To understand different types of pollutants effecting the environment.
- To know global environmental problems, problems associated with over population and burden on environment.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1	Realize the importance of ecosystem and biodiversity for maintaining ecological balance.
CO2	Understand the role of natural resources for the sustenance of life on earth and recognize the need to conserve them.
CO3	Identify the environmental pollutants and abatement devices.
CO4	Gain the importance of sustainability.

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	2		3			2	3	2			2	1
CO2	2		3			2	3	2			2	1
CO3	2		3			2	3	2			2	1
CO4	2		3			2	3	2			2	1

UNIT I

Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Ecological succession. – Food chains, food webs and ecological pyramids, flow of energy, biogeochemical cycles.

Biodiversity and its conservation: Definition: genetic, species and ecosystem diversity- classification - Value of biodiversity, India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts - Endangered and endemic species of India – Conservation of biodiversity.

UNIT II

Natural Resources: Natural resources and associated problems

Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people.

Water resources – Use and over utilization of surface and ground water –

describing polygons with circles.
Conics: Construction of Parabola, Ellipse and Hyperbola by using general methods and also draw tangents & normals for the curves.

UNIT II

Introduction to orthographic projections:
Projections of points and lines: Horizontal plane, vertical plane, profile plane, importance of reference planes, projections of points in various quadrants. Projections of straight lines- perpendicular lines, inclined lines and parallel to either of the reference planes(HP,VP or PP).
Projections of lines inclined to both the planes:
Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclination .

UNIT III

Projections of planes: regular planes perpendicular/parallel to one plane and inclined to the other reference plane.
Projections of Solids: projections of Prisms, Pyramids, Cones and Cylinders with the axis parallel/perpendicular/ inclined to one of the planes and vice versa.

UNIT IV

Transformation of Projections: AutoCAD Fundamentals.
Conversion of Pictorial views to orthographic views Using AutoCAD and conventional.
Conversion of orthographic views to isometric views. Isometric drawing of simple objects through AutoCAD.

TEXT BOOKS:
1. Engineering Drawing by N.D. Butt, Chariot Publications
2. Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill Publishers

REFERENCE BOOKS:
1. Engineering Drawing by K.L.Narayana & P. Kannaiah, Scitech Publishers
2. Engineering Graphics for Degree by K.C. John, PHI Publishers
3. Engineering Graphics by PI Varghese, McGrawHill Publishers
4. Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, New Age Publishers

E-RESOURCES:
2. http://nptel.iitm.ac.in/

COURSE STRUTURE AND SYLLABUS FOR FIRST YEAR PG PROGRAMME

I SEMESTER

S. No.	Course Code	Title of the Course	Hours Per Week			Internal Marks	External Marks	Total Marks	Credits
			L	P	Total				
	18CESE101	Advanced concrete technology	4	--	4	40	60	100	3
2	18CESE102	Theory of Elasticity	4	--	4	40	60	100	3
3	18CESE103	Matrix Analysis of Structures	4	--	4	40	60	100	3
4	18CESE104	Structural Dynamics	4	--	4	40	60	100	3
5	18CESE105A 18CESE105B 18CESE105C	**Elective-1** 1. Experimental Stress Analysis 2. Sub-Structure Design 3.Structural Optimization	4	--	4	40	60	100	3
6	18CESE106A 18CESE106B 18CESE106C	**Elective – II** 1. Repair and Rehabilitation of Structures 2. Analysis and Design of Tall Buildings 3. Plastic Analysis and Design	4	--	4	40	60	100	3
7	18CESE161	Advanced Structural Engineering Laboratory	--	3	3	40	60	100	2
Total			**24**	**3**	**27**	**280**	**420**	**700**	**20**

L: Lecture **P**: Practical

Head of The Department
CIVIL ENGINEERING
NRI Institute of Technology
POTHAVARAPPADU.

II SEMESTER

S. No.	Course Code	Title of the Course	Hours Per Week			Internal Marks	External Marks	Total Marks	Credits
			L	P	Total				
1	18CESE201	Finite Element Method	4	--	4	40	60	100	3
2	18CESE202	Earthquake Resistant Design	4	--	4	40	60	100	3
3	18CESE203	Stability of Structures	4	--	4	40	60	100	3
4	18CESE204	Theory of Plates & Shells	4	--	4	40	60	100	3
5	18CESE205A 18CESE205B 18CESE205C	**Elective-1** 1. Pre-Stressed Concrete 2. Mechanics of Composite Material 3. Fracture Mechanics	4	--	4	40	60	100	3
6	18CESE206A 18CESE206B 18CESE206C	**Elective – II** 1. Industrial Structures 2.Bridge Engineering 3. Earth Retaining Structures	4	--	4	40	60	100	3
7	18CESE261	CAD Laboratory	--	3	3	40	60	100	2
Total			24	3	27	280	420	700	20

L: Lecture

P: Practical

Head of The Department
CIVIL ENGINEERING
NRI Institute of Technology
POTHAVARAPPADU

I Year I Semester		**L**	**P**	**C**
18CESE 101	**ADVANCED CONCRETE TECHNOLOGY**	**4**	**0**	**3**

UNIT – I

Concrete Making Materials: Cement – Bogus Compounds – Hydration Process – Types of Cement – Aggregates – Gradation Charts – Combined Aggregate – Alkali Silica Reaction – Admixtures – Chemical and Mineral Admixtures. Bureau of Indian Standards (BIS) Provisions.

Form work: Materials – structural requests – form work systems – connections – Specifications – design of form work – shores – removal for forms - shores – reshoring – Failure of form work.

UNIT – II

Fresh And Hardened Concrete: Fresh Concrete – workability tests on Concrete – Setting Times of Fresh Concrete – Segregation and bleeding.

Hardened Concrete: Abrams Law, Gel space ratios, Maturity concept – Stress strain Behaviour – Creep and Shrinkage – Durability Tests on Concrete – Non Destructive Testing of Concrete. BIS Provisions.

UNIT – III

High Strength Concrete – Microstructure – Manufacturing and Properties – Design of HSC

Using Erintroy Shaklok method – Ultra High Strength Concrete.

High Performance Concrete – Requirements and Properties of High Performance Concrete

– Design Considerations. BIS Provisions.

UNIT – IV

Special Concretes: Self Compacting concrete, Polymer Concrete, Fibre Reinforced Concrete – Reactive Powder Concrete – Requirements and Guidelines – Advantages and Applications.

UNIT – V

Concrete Mix Design: Quality Control – Quality Assurance – Quality Audit - Mix Design Method – BIS Method – DOE Method – Light Weight Concrete, Self Compacting Concrete.

REFERENCES:

1. Properties of Concrete by A.M.Neville, ELBS publications Oct 1996.
2. Concrete: Micro Structure, Properties and Materials by P.K.Mehta and P.J.Monteiro,. Mc.
Graw-Hill Publishing Company Ltd. New Delhi
3. Concrete Technology by M.S.Shetty, S.Chand & Co 2009.
4. Concrete Technology by A.R. Santhakumar, Oxford University Press Oct 2006.
5. Design of Concrete Mixes by N.Krishna Raju, CBS Publications, 2000.
6. Special Structural concretes by Rafat Siddique, Galgotia Publications 2000.
7. Relevant BIS Codes

I Year I Semester **L P C**

18CESE102 **THEORY OF ELASTICITY** **4 0 3**

UNIT-I Elasticity – Notation for forces and stresses – components of stresses and strains – Hooke's Law - Plane Stress – Plane strain – Differential Equations of equilibrium – Boundary conditions – Compatibility equations - Stress function – Boundary Conditions.

UNIT -II Two dimensional problems in rectangular co-ordinates – Solution by polynomials – Saint Venant's principle – Determination of displacements – Bending of simple beams – Application of Fourier series for two dimensional problems for gravity loading

UNIT-III Two dimensional problems in polar co-ordinates - General equations in polar co-ordinates – Stress distribution for problems having symmetrical about an axis - Strain components in polar co-ordinates – Displacements for symmetrical stress distributions - Stresses for plates with circular holes subjected to far field tension – stress concentration factor.

UNIT-IV Analysis of stress and strain in three dimension - Principal stresses – Stress ellipsoid and stress director surface – Determination of principal stresses - Maximum shear stress – Homogeneous Deformation – General Theorems - Differential equations of equilibrium – Conditions of compatibility – Equations of equilibrium in terms of displacements – Principle of superposition – Uniqueness of solution –Reciprocal theorem.

UNIT-V Torsion of prismatical bars – Bars with elliptical cross section – Other elementary solution – Membrane analogy – Torsion of rectangular bars – Solution of torsional problems by energy method.

REFERENCES:

1. Theory of Elasticity- Timoshenko & Goodier

2.Elasticity: Theory, Applications and Numeric- Martin H. Sadd

I Year I Semester **L P C**

18CESE103 MATRIX ANALYSIS OF STRUCTURES 4 0 3

UNIT-I Introduction of matrix methods of analysis – Static and kinematic indeterminacy – Degree of freedom – Structure idealization-stiffness and flexibility methods – Suitability: Element stiffness matrix for truss element, beam element and Torsional element- Element force - displacement equations

UNIT-II Stiffness method – Element and global stiffness equation – coordinate transformation and global assembly – structure stiffness matrix equation – analysis of simple pin jointed trusses – continuous beams – rigid jointed plane frames

UNIT-III Stiffness method for Grid elements – development of stiffness matrix – coordinate transformation. Examples of grid problems – tapered and curved beams

UNIT-IV Additional topics in stiffness methods – discussion of band width – semi band width – static condensation – sub structuring –Loads between joints-Support displacements- inertial and thermal stresses-Beams on elastic foundation by stiffness method.

UNIT-V Space trusses and frames - Member stiffness for space truss and space frame–Transformation matrix from Local to Global – Analysis of simple trusses, beams and frames

REFERENCES:

1. Matrix analysis of structures- Robert E Sennet- Prentice Hall-Englewood cliffs-New Jercy

2. Advanced structural analysis-Dr. P. Dayaratnam- Tata McGraw hill publishing company limited.

3. Indeterminate Structural analysis- C K Wang

4. Analysis of tall buildings by force – displacement – Method M. Smolira – Mc. Graw Hill.

5. Foundation Analysis and design – J.E. Bowls.

I Year I Semester **L P C**

18CESE104 STRUCTURAL DYNAMICS **4 0 3**

UNIT-I Introduction to Structural Dynamics: Fundamental objective of Dynamic analysis – Types of prescribed loadings – methods of Discretization – Formulation of the Equations of Motion.

UNIT-II Theory of Vibrations: Introduction – Elements of a Vibratory system – Degrees of Freedom of continuous systems - Oscillatory motion – Simple Harmonic Motion – Free Vibrations of Single Degree of Freedom (SDOF) systems – Undamped and Damped – Critical damping – Logarithmic decrement – Forced vibrations of SDOF systems – Harmonic excitation – Dynamic magnification factor – Band width.

UNIT-III Single Degree of Freedom System: Formulation and Solution of the equation of Motion – Free vibration response – Response to Harmonic, Periodic, Impulsive and general dynamic loadings – Duhamel integral.

UNIT-IV Multi Degree of Freedom System: Selection of the Degrees of Freedom – Evaluation of Structural Property Matrices – Formulation of the MDOF equations of motion - Undamped free vibrations – Solution of Eigen value problem for natural frequencies and mode shapes – Analysis of dynamic response - Normal coordinates.

UNIT-V Continuous Systems: Introduction – Flexural vibrations of beams – Elementary case – Equation of motion – Analysis of undamped free vibration of beams in flexure – Natural frequencies and mode shapes of simple beams with different end conditions.

REFERENCES:

1. Dynamics of Structures by Clough & Penzien.

2. Structural Dynamics A K Chopra

I Year I Semester **L P C**

18CESE105A EXPERIMENTAL STRESS ANALYSIS 4 0 3

UNIT-I Introduction and Strain measurement methods – Model & Prototype – Dimensional analysis-Factors influencing model design – Scale factors and Model material properties – Methods of model design. Definition of strain and its relation to experimental determinations - properties of strain gauge systems – Mechanical, Optical, Acoustic and Pneumatic types.

UNIT-II Electrical resistance strain gages: Introduction – gauge construction – strain gauge adhesives - mounting methods – gauge sensitivities and gage factor – performance characteristics of wire and foil strain gauges – environmental effects. Analysis of strain gauge data – the three element rectangular rosette – the delta rosette – correction for transverse sensitivity.

UNIT-III Non – destructive testing: Introduction – objectives of non destructive testing. Ultrasonic pulse velocity method – Rebound Hammer method (Concrete hammer) – Acoustic Emissionapplication to assessment of concrete quality.

UNIT-IV Theory of photo elasticity: Introduction – temporary double refraction – Index ellipsoid and stress ellipsoid – the stress optic law – effects of stressed model in a polariscope for various arrangements - fringe sharpening.

UNIT-V Two dimensional photo elasticity: Introduction – iso-chromatic fringe patterns – isoclinicfringe patterns – compensation techniques – calibration methods – separation methods – materials for photo- elasticity – properties of photo-elastic materials .

REFERENCES:

1. Experimental Stress Analysis- Riley and Dally

2. Experimental Stress Analysis - L.S. Srinath

3. Experimental Stress Analysis – Lee

4. Experimental Stress Analysis- Sadhu Singh

I Year I Semester		**L**	**P**	**C**
18CESE105C	**STRUCTURAL OPTMIZATION**	**4**	**0**	**3**

UNIT-I Introduction: Need and scope for optimization – statements of optimization problemsObjective function and its surface design variables- constraints and constraint surfaceClassification of optimization problems (various functions continuous, discontinuous and discrete) and function behavior (monotonic and unimodal)

UNIT-II Classical optimization techniques: Differential calculus method, multi variable optimization by method of constrained variation and Lagrange multipliers (generalized problem) Khun-Tucker conditions of optimality -Fully stressed design and optimality criterion based algorithmsintroduction, characteristics of fully stressed design theoretical basis-examples

UNIT-III Non-Liner programming: Unconstrained minimization- Fibonacci, golden search, Quadratic and cubic interpolation methods for a one dimensional minimization and univariate method, Powel's method, Newton's method and Davidon Fletcher Powell's method for multivariable optimization- Constrained minimization-Cutting plane method- Zoutendjik's method- penalty function methods

UNIT-IV Linear programming: Definitions and theorems- Simplex method-Duality in Linear programming- Plastic analysis and Minimum weight design and rigid frame

UNIT-V ntroduction to quadratic programming: Geometric programming- and dynamic programmingDesign of beams and frames using dynamic programming technique

REFERENCES

1. Optimization Theory and Applications – S.S. Rao, Wiley Eastern Limited, New Delh Optimization Concepts and Application in Engineering- Belegundu A.D. and Chandrupatla T.R

I Year I Semester **L P C**

18CESE105B **SUB-STRUCTURE DESIGN** **4 0 3**

UNIT-I Soil Exploration – Importance, Terminology, planning - Geophysical methods. Borings, location, spacing and depth, methods of boring including drilling, stabilization of boreholes, boring records.

UNIT-II Soil sampling – Methods of sampling -Types of samples and samplers-cleaning of bore holes, preservation, labeling and shipment of samples - Design considerations of open drive samplers.

UNIT-III Shallow Foundations –Bearing capacity – General bearing capacity equation, Meyerhof's, Hansen's and Vesic's bearing capacity factors - Bearing capacity of stratified soils - Bearing capacity based on penetration resistance- safe bearing capacity and allowable bearing pressure. (Ref: IS -2131 & IS 6403)

UNIT-IV Types and choice of type. Design considerations including location and depth, Proportioning of shallow foundations- isolated and combined footings and mats - Design procedure for mats. Floating foundation- Fundamentals of beams on Elastic foundations. .(Ref: IS -456 & N.B.C. relevant volume).

UNIT-V Pile foundations-Classification of piles-factors influencing choice-Load - carrying capacity of single piles in clays and sands using static pile formulae- á - â - and λ - methods –Dynamic pile formulae-limitations-Monotonic and cyclic pile load tests – Under reamed piles. Pile groups -Efficiency of pile groups- Different formulae-load carrying capacity of pile groupsin clays and sands – settlement of pile groups in clays and sands – Computation of load on each pile in a group.

REFERENCES:

1. Principles of Foundation Engineering by Braja M. Das.

2. Soil Mechanics in Engineering Practice by Terzagi and Peck

3. Foundation Design by Wayne C. Teng, John Wiley & Co.,

4. Foundation Analysis and Design by J.E. Bowles McGraw Hill Publishing Co.,

5. Analysis and Design of sub structures by Swami Saran

6. Design Aids in Soil Mechanics and Foundation Engineering by Shanbaga R. Kaniraj,Tata Mc. Graw Hill.

7. Foundation Design and Construction by MJ Tomlinson – Longman Scientific 8. A short course in Foundation Engineering by Simmons and Menzes – ELBS.

I Year I Semester **L P C**

18CESE106A REPAIR AND REHABILITATION OF STRUCTURES 4 0 3

UNIT I Materials for repair and rehabilitation -Admixtures- types of admixtures- purposes of using admixtures- chemical composition- Natural admixtures- Fibres- wraps- Glass and Carbon fibre wraps- Steel Plates-Non destructive evaluation: Importance- Concrete behavior under corrosion, disintegrated mechanisms- moisture effects and thermal effects – Visual investigation- Acoustical emission methods- Corrosion activity measurement- chloride content – Depth of carbonation- Impact echo methods- Ultrasound pulse velocity methods- Pull out tests.

UNIT II Strengthening and stabilization- Techniques- design considerations-Beam shear capacity strengthening- Shear Transfer strengthening-stress reduction techniques- Column strengthening-flexural strengthening- Connection stabilization and strengthening, Crack stabilization.

UNIT III Bonded installation techniques- Externally bonded FRP- Wet layup sheet, bolted plate, near surface mounted FRP, fundamental debonding mechanisms- intermediate crack debondingCDC debonding- plate end debonding- strengthening of floor of structures.

UNIT IV Fibre reinforced concrete- Properties of constituent materials- Mix proportions, mixing and casting methods-Mechanical properties of fiber reinforced concrete- applications of fibre reinforced concretes-Light weight concrete- properties of light weight concrete- No fines concrete- design of light weight concrete- Flyash concrete-Introduction- classification of flyash- properties and reaction mechanism of flyash- Properties of flyash concrete in fresh state and hardened state- Durability of flyash concretes.

UNIT V High performance concretes- Introduction- Development of high performance concretesMaterials of high performance concretesProperties of high performance concretes- Self Consolidating concrete-propertiesqualifications.

REFERENCE: 1. Concrete technology- Neville & Brooks

2. Special Structural concrete- Rafat Siddique

3. Concrete repair and maintenance illustrated- Peter H Emmons

4. Concrete technology-M S Shetty

I Year I Semester **L P C**

18CESE106B ANALYSIS AND DESIGN OF TALL BUILDINGS 4 0 3

UNIT I. Design Criteria Philosophy, Materials – Modern concepts – High Performance Concrete, Fibre Reinforced Concrete, Light weight concrete, Self Compacting Concrete

UNIT II. Gravity Loading – Dead load, Live load, Impact load, Construction load, Sequential loading. Wind Loading – Static and Dynamic Approach, Analytical method, Wind Tunnel Experimental methods. Earthquake Loading – Equivalent lateral Load analysis, Response Spectrum Method, Combination of Loads.

UNIT III Behavior of Structural Systems- Factors affecting the growth, height and structural form, Behaviour of Braced frames, Rigid Frames, In-filled frames, Shear walls, Coupled Shear walls, Wall–Frames, Tubular, Outrigger braced, Hybrid systems.

UNIT IV Analysis and Design- Modeling for approximate analysis, Accurate analysis and reduction techniques, Analysis of structures as an integral unit, Analysis for member forces, drift and twist. Computerized 3D analysis. Design for differential movement, Creep and Shrinkage effects, Temperature Effects and Fire Resistance.

UNIT V Stability Analysis- Overall buckling analysis of frames, wall–frames, Approximate methods, Second order effect of gravity loading, P–Delta Effects, Simultaneous first order and P-Delta analysis, Translational instability, Torsional Instability, Out of plumb effects, Effect of stiffness of members and foundation rotation in stability of structures.

TEXT BOOKS:

1. Bryan Stafford Smith and Alex Coull, "Tall Building Structures - Analysis and Design", John Wiley and Sons, Inc., 1991.

2. Taranath B.S, "Structural Analysis and Design of Tall Buildings", McGraw-Hill, 1988.

I Year I Semester **L P C**

18CESE106C **PLASTIC ANALYSIS AND DESIGN** **4 0 3**

UNIT I Introduction and basic hypothesis: Concepts of stress and strain – relation of steel Moment curvature relation- basic difference between elastic and plastic analysis with examples- Yield condition, idealizations, collapse criteria- Virtual work in the elastic-plastic state-Evaluation of fully plastic moment and shape factors for the various practical sections.

UNIT II Method of Limit Analysis: Introduction to limit analysis of simply supported fixed beams and continuous beams, Effect of partial fixity and end, invariance of collapse loads, basic theorems of limit analysis, rectangular portal frames, gable frames, grids, superposition of mechanisms, drawing statistical bending moment diagrams for checks.

UNIT III Limit design Principles: Basic principles, limit design theorems, application of limit design theorems, trial and error method, method of combining mechanisms, plastic moment distribution method, load replacement method, continuous beams and simple frames designs using above principles.

UNIT IV Deflection in Plastic beams and frames: Load deflection relations for simply supported beams, deflection of simple pin based and fixed based portal frames, method of computing deflections.

UNIT V Minimum weight Design: Introduction to minimum Weight and linear Weight functionsFoulkes theorems and its geometrical analogue and absolute minimum weight design. –

REFERENCES: 1. Plastic Methods of Structural analysis- B G Neal, Chapman and Rall publications 2. Plastic analysis and Design – C E Messennet, M A Seve

I Year I Semester **L P C**

18CESE106C DVANCED STRUCTURAL ENGINEERING LABORATORY 0 3 2

1. Strain measurement - Electrical resistance strain gauges
2. Non destructive testing- Impact Hammer test, UPV test
3. Qualifications tests on Self compaction concrete- L Box test, J Box test, U box test, Slump test
4. Tests on Buckling of columns – Southwell plot
5. Repair and rehabilitation of concrete beams
6. Chemical Analysis of water for suitability in concreting with and without Reinforcement.
7. Chemical Analysis of sand and Aggregate for Suitability in Construction.

NOTE: A minimum of five experiments from the above set have to be conducted.

II SEMESTER

S. No.	Course Code	Title of the Course	Hours Per Week			Internal Marks	External Marks	Total Marks	Credits
			L	P	Total				
1	**18CESE201**	Finite Element Method	4	--	4	40	60	100	3
2	**18CESE202**	Earthquake Resistant Design	4	--	4	40	60	100	3
3	**18CESE203**	Stability of Structures	4	--	4	40	60	100	3
4	**18CESE204**	Theory of Plates & Shells	4	--	4	40	60	100	3
5	**18CESE205A** **18CESE205B** **18CESE205C**	**Elective-1** 1. Pre-Stressed Concrete 2. Mechanics of Composite Material 3. Fracture Mechanics	4	--	4	40	60	100	3
6	**18CESE206A** **18CESE206B** **18CESE206C**	**Elective – II** 1. Industrial Structures 2.Bridge Engineering 3. Earth Retaining Structures	4	--	4	40	60	100	3
7	**18CESE261**	CAD Laboratory	--	3	3	40	60	100	2
Total			**24**	**3**	**27**	**280**	**420**	**700**	**20**

L: Lecture

P: Practical

FINITE ELEMENT METHOD
(18D1287401)

UNIT I Introduction: Review of stiffness method- Principle of Stationary potential energy-Potential energy of an elastic body- Rayleigh-Ritz method of functional approximation - variational approaches -weighted residual methods

UNIT II Finite Element formulation of truss element: Stiffness matrix- properties of stiffness matrix – Selection of approximate displacement functions-solution of a plane truss- transformation matrix and stiffness matrix for a 3-D truss- Inclined and skewed supports- Galerkin's method for 1-D truss – Computation of stress in a truss element.

UNIT III Finite element formulation of Beam elements: Beam stiffness-assemblage of beam stiffness matrix- Examples of beam analysis for concentrated and distributed loading- Galerkin's method - 2-D Arbitrarily oriented beam element – inclined and skewed supports – rigid plane frame examples

UNIT IV Finite element formulation for plane stress, plane strain and axisymmetric problemsDerivation of CST and LST stiffness matrix and equations-treatment of body and surface forces-Finite Element solution for plane stress and axisymmetric problems- comparison of CST and LST elements –convergence of solution-interpretation of stresses

UNIT V Iso-parametric Formulation: An isoparametric bar element- plane bilinear isoparametric element – quadratic plane element - shape functions, evaluation of stiffness matrix, consistent nodal load vector - Gauss quadrature- appropriate order of quadrature – element and mesh instabilities – spurious zero energy modes, stress computation- patch test.

REFERENCES:

1. Concepts and applications of Finite Element Analysis – Robert D. Cook, Michael E Plesha, John Wiley & sons Publications
2. A first course in the Finite Element Method – Daryl L. Logan, Thomson Publications
3. Introduction to Finite Elements in Engineering- Tirupati R. Chandrupatla, Ashok D. Belgunda,

EARTHQUAKE RESISTANT DESIGN

(18D1287402)

UNIT I Engineering seismology – rebound theory – plate tectonics – seismic waves - earthquake size and various scales – local site effects – Indian seismicity – seismic zones of India – theory of vibrations – near ground and far ground rotation and their effects.

UNIT II Seismic design concepts – EQ load on simple building – load path – floor and roof diaphragms – seismic resistant building architecture – plan configuration – vertical configuration – pounding effects – mass and stiffness irregularities – torsion in structural system- Provision of seismic code (IS 1893 & 13920) – Building system – frames – shear wall – braced frames – layout design of Moment Resisting Frames(MRF) – ductility of MRF – Infill wall – Nonstructural elements.

UNIT III Calculation of EQ load – 3D modeling of building systems and analysis (theory only) Design and ductile detailing of Beams and columns of frames Concept of strong column weak beams, Design and ductile detailing of shear walls

UNIT IV Cyclic loading behavior of RC, steel and pre- stressed concrete elements - modern conceptsBase isolation – Adaptive systems – case studies.

UNIT V Retrofitting and restoration of buildings subjected to damage due to earthquakes- effects of earthquakes – factors related to building damages due to earthquake- methods of seismic retrofitting- restoration of buildings

REFERENCES

1. Pankaj Agarwal and Manish ShriKhande, Earthquake Resistant Design of Structures, Prentice – Hall of India, 2007, New Delhi.

2. Bullen K.E., Introduction to the Theory of Seismology, Great Britain at the University Printing houses, Cambridge University Press 1996.

3. Relevant code of practices.

STABILITY OF STRUCTURES

(18D1287403)

UNIT I Beam columns: Differential equation for beam columns – Beams column with concentrated loads – continuous lateral load – couples – Beam column with built in ends – continuous beams with axial load – application of Trigonometric series – Determination of allowable stresses.

UNIT II Elastic buckling of bars : Elastic buckling of straight columns – Effect of shear stress on buckling – Eccentrically and laterally loaded columns –Sway & Non Sway mode - Energy methods – Buckling of a bar on elastic foundation – Buckling of bar with intermediate compressive forces and distributed axial loads – Buckling of bars with change in cross section – Effect of shear force on critical load – Built up columns – Effect of Initial curvature on bars – Buckling of frames – Sway & Non Sway mode.

UNIT III In-elastic buckling: Buckling of straight bars – Double modulus theory Tangent modulus theory. Experiments and design formulae: Experiments on columns – Critical stress diagram – Empirical formulae of design – various end conditions – Design of columns based on buckling. Mathematical Treatment of stability problems: Buckling problem orthogonality relation – Ritz method –Stiffness method and formulation of Geometric stiffness matrix- Applications to simple frames

UNIT IV Torsional Buckling: Pure torsion of thin walled bars of open cross section – Non uniform torsion of thin walled bars of open cross section - Torsional buckling – Buckling of Torsion and Flexure.

UNIT V Lateral Buckling of simply supported Beams: Beams of rectangular cross section subjected for pure bending, Buckling of I Section subjected to pure bending.

REFERENCES:

1. Theory of Elastic stability by Timshenko & Gere-Mc Graw Hill

2. Theory of Stability of Structures by Alexander ChaJes.

THEORY OF PLATES AND SHELLS

(18D1287404)

UNIT I Derivation of governing differential equation for plate– in plane bending and transverse bending effects- Rectangular plates: Plates under various loading conditions like concentrated, uniformly distributed load and hydrostatic pressure. Navier and Levy's type of solutions for various boundary condition.

UNIT II Circular plates: Symmetrically loaded, circular plates under various loading conditions, Annular plates.

UNIT III Introduction to Shells- Single and double curvature- Equations of Equilibrium of Shells: Derivation of stress resultants, Principles of membrane theory and bending theory.

UNIT IV Cylindrical Shells: Derivation of the governing DKJ equation for bending theory, details of Schorer's theory. Application to the analysis and design of short and long shells. Use of ASCE Manual coefficients for the design.

UNIT V Beam theory of cylindrical shells: Beam and arch action. Design of diaphragms - Geometry analysis and design of elliptic Paraboloid, Conoidal and Hyperbolic Paraboloid shapes by membrane theory.

REFERENCES:

1. Theory of Plates and Shells – Timoshenko and Krieger, McGraw-Hill book company, INC, New york.

2. K. Chandra Sekhara

3. A Text Book of Plate Analysis – Bairagi, K, Khanna Publisher, New Delhi.

4. Design and Construction of Concrete Shell Roofs – Ramaswamy, G.S, Mc Graw – Hill, New York.

PRESTRESSED CONCRETE

(18D1287511)

UNIT I General principles of Pre-stressing- Pre-tensioning and Post tensioning - Pre tensioning and Post tensioning methods- Different systems of Pre-stressing- Analysis of prestress and Bending stresses– Resultant – stress at a section – pressure line – concept of load balancing – stresses in tendons.

UNIT II Losses of Pre-stressing- Loss of Pre-stress in pre-tensioned and post tensioned members due to various causes -Elastic shortening of concrete, shrinkage of concrete, creep of concrete, Relaxation of steel, slip in anchorage, differential shrinkage-bending of members and frictional losses- Long term losses

UNIT III Flexural, shear; torsional resistance and design of Prestressed concrete section. Types of flexural failure – code procedures-shear and principal stresses – Prestressed concrete members in torsion – Design of sections for flexure, Axial Tension, Compression and bending, shear, Bond

UNIT IV Analysis of continuous beams –Elastic theory- Linear transformation and Concordant tendonsDeflections of pre-stressed concrete beams: Importance of control of deflections- factors influencing deflections-short term deflections of un-cracked member – prediction of long term deflections

UNIT V Analysis of end blocks: By Guyon's method and Magnel's method, Anchorage zone stressesApproximate method of design- anchorage zone reinforcement- transfer of pre stresses- pre tensioned members-Composite sections: Introduction-Analysis for stresses- differential shrinkage- general design considerations

REFERENCES:

1. Prestressed Concrete- N. Krishna Raju
2. Prestressed Concrete- S. Ramamrutham
3. Prestressed Concrete- P. Dayaratnam
4. Prestressed Concrete- T.Y.Lin

MECHANICS OF COMPOSITE MATERIALS

UNIT I Introduction to Composite Materials: Introduction ,Classification: Polymer Matrix Composites, Metal Matrix Composites, Ceramic Matrix Composites, Carbon–Carbon Composites, Fiber-Reinforced Composites and nature-made composites, and applicationReinforcements: Fibres- Glass, Silica, Kevlar, carbon, boron, silicon carbide, and born carbide fibres. Particulate composites, Polymer composites, Thermoplastics, Thermosetts, Metal matrix and ceramic composites.-Manufacturing methods: Autoclave, tape production, moulding methods, filament winding, man layup, pultrusion, RTM.

UNIT II Macromechanical Analysis of a Lamina: Introduction, Definitions: Stress, Strain ,Elastic Moduli, Strain Energy. Hooke's Law for Different Types of Materials, Hooke's Law for a Two-Dimensional Unidirectional Lamina, Plane Stress Assumption, Reduction of Hooke's Law in Three Dimensions to Two Dimensions, Relationship of Compliance and Stiffness Matrix to Engineering Elastic Constants of a Lamina,

UNIT III Hooke's Law for a Two-Dimensional Angle Lamina, Engineering Constants of an Angle Lamina, Invariant Form of Stiffness and Compliance Matrices for an Angle Lamina Strength Failure Theories of an Angle Lamina : Maximum Stress Failure Theory Strength Ratio, Failure Envelopes, Maximum Strain Failure Theory ,Tsai–Hill Failure Theory, Tsai–Wu Failure Theory, Comparison of Experimental Results with Failure Theories. Hygrothermal Stresses and Strains in a Lamina: Hygrothermal Stress–Strain Relationships for a Unidirectional Lamina, Hygrothermal Stress–Strain Relationships for an Angle Lamina

UNIT IV Micromechanical Analysis of a Lamina :Introduction, Volume and Mass Fractions, Density, and Void Content, Evaluation of the Four Elastic Moduli, Strength of Materials Approach, Semi-Empirical Models, Elasticity Approach, Elastic Moduli of Lamina with Transversely Isotropic Fibers, Ultimate Strengths of a Unidirectional Lamina, Coefficients of Thermal Expansion, Coefficients of Moisture Expansion

UNIT V Macromechanical Analysis of Laminates: Introduction , Laminate Code , Stress–Strain Relations for a Laminate, In-Plane and Flexural Modulus of a Laminate , Hygrothermal Effects in a Laminate, Warpage of Laminates -Failure, Analysis, and Design of Laminates : Introduction , Special Cases of Laminates, Failure Criterion for a Laminate, Design of a Laminated Composite

TEXT BOOKS:

1. Engineering Mechanics of Composite Materials by Isaac and M Daniel, Oxford University Press, 1994.
2. B. D. Agarwal and L. J. Broutman, Analysis and performance of fibre Composites, WileyInterscience, New York, 1980.

3. Mechanics of Composite Materials, Second Edition (Mechanical Engineering), By Autar K. Kaw ,Publisher: CRC

FRACTURE MECHANICS

(18CESE205C)

UNIT I Introduction: Fundamentals of elastic and plastic behaviour of materials-stresses in a plate with a hole – Stress Concentration factor-modes of failure- Brittle fracture and ductile fracturehistory of fracture mechanics-Griffiths criteria for crack propagation cracks- Energy release rate, GI GII and GIII - Critical energy release rate GIc , GIIc and GIIIc – surface energy - R curves – compliance.

UNIT II Principles of Linear Elastic Fracture Mechanics: SOM vs Fracture Mechanics - stressed based Criteria for fracture- Stress Intensity Factors- KI K II and K III – Critical stress Intensity Factors, KIc KIIc and KIIc – crack tip plastic zone – Erwin's plastic zone correction -Critical crack length-Load carrying capacity of a cracked component-Design of components based on fracture mechanics.

UNIT III Mixed mode crack propagation- Maximum tangential stress criterion – crack propagation angle -Material characterisation by Crack Tip Opening Displacements (CTOD)- Crack Mouth Opening Displacement (CMOD)- Critical crack tip opening displacement (CTODc) –critical Crack Mouth Opening Displacement (CMODc).

UNIT IV Fatigue Crack propagation- Fatigue load parameters Fatigue crack growth curve –Threshold stress intensity factor-Paris law- Retardation effects.

UNIT V Applications of fracture Mechanics to concrete- reasons –strain softening behaviour –Bazant's size effect law.

REFERENCES

1. Elementary engineering fracture mechanics – David Broek – Sijthoff & Noordhoff – Netherlands. 1. Elements of Fracture Mechanics – Prasanth Kumar, wiley Eastern Publications

2. Fracture Mechanics: Fundamentals and applications – T. L. Andrason, PhD, CRC publications

3. Fracture Mechanics of Concrete: Applications of fracture mechanics to concrete, Rock, and other quasi-brittle materials, Surendra P. Shah, Stuart E. Swartz, Chengsheng Ouyang, John Wiley & Son publication

INDUSTRIAL STRUCTURES

(18CESE206A)

UNIT I Planning and functional requirements- classification of industries and industrial structuresplanning for layout- requirements regarding lighting ventilation and fire safety- protection against noise and vibrations

UNIT II Industrial buildings- roofs for industrial buildings (Steel) - design of gantry girder- design of corbels and nibs- machine foundations

UNIT III Design of Folded plates- Design considerations- analysis of folded plates- analysis of multibay folded plates- design of diaphragm beam

UNIT IV Power plant structures- Bunkers and silos- chimney and cooling towers- Nuclear containment structures

UNIT V Power transmission structures- transmission line towers- tower foundations- testing towers

REFERENCES:

1. Advanced reinforced concrete design- N. Krishnam Raju

2. Handbook on machine foundations- P. Srinivasulu and C.V. Vaidyanathan

3. Tall Chimneys- Design and construction – S.N. Manohar

4. Transmission Line Structures- A.R. Santakumar and S.S. Murthy

5. SP 32: 1986, Handbook on functional requirements of Industrial buildings 6. Design of shells- K. Chandrasekhara

BRIDGE ENGINEERING

(18D1287522)

UNIT I Masonry arch Bridge design details- Rise, radius, and thickness of arch- Arch ringDimensioning of sub structures- Abutments pier and end connections.(Ref: IRC-SP-13)

UNIT II Super Structure: Slab bridge- Wheel load on slab- effective width method-slabs supported on two edges- cantilever slabs- dispersion length- Design of interior panel of slab- Pigeaud's method- design of longitudinal girders- Guyon-Messonet method- Hendry Jaegar methodCourbon's theory. (Ref: IRC-21), voided slabs, T-Beam bridges.

UNIT III Plate girder bridges- Elements of plate girder and their design-web-flange-intermediate stiffener- vertical stiffeners- bearing stiffener-design problem

UNIT IV Prestressed Concrete and Composite bridges- Preliminary dimensions-flexural and torsional parameters- Courbon's Theory – Distribution coefficients by exact analysis- design of girder section- maximum and minimum prestressing forces-eccentricity- live load and dead load shear forces- cable zone in girder- check for stresses at various sections- check for diagonal tension- diaphragms and end block design- short term and long term deflections- Composite action of composite brides-shear connectors- composite or transformed section- design problem. (Ref: IRC: Section-VI)

UNIT V Sub structure- Abutments- Stability analysis of abutments- piers- loads on piers – Analysis of piers- Design problem(Ref: IRC-13, IRC-21, IRC-78)- Pipe culvert-Flow pattern in pipe culvers- culvert alignment-culvert entrance structure- Hydraulic design and structural design of pipe culverts- reinforcements in pipes .(Ref: IRC: SP-13)

REFERENCES:

1. Design of concrete bridges- Aswini, Vazirani, Ratwani

2. Essentials of bridge engineering- Jhonson Victor D

3. Design of bridges- Krishna Raju

EARTH RETAINING STRUCTURES

(18CESE206C)

UNIT I Earth pressures – Different types and their coefficients- Classical Theories of Earth pressure – Rankine's and Coulomb's Theories for Active and Passive earth pressure- Computation of Lateral Earth Pressure in Homogeneous and Layered soils- Graphical solutions for Coulomb's Theory in active and passive conditions.

UNIT II Retaining walls – different types - Type of Failures of Retaining Walls – Stability requirements – Drainage behind Retaining walls – Provision of Joints – Relief Shells.

UNIT III Sheet Pile Structures – Types of Sheet piles – Cantilever sheet piles in sands and clays – Anchored sheet piles – Free earth and Fixed earth support methods – Row's moment reduction method – Location of anchors, Forces in anchors.

UNIT IV Soil reinforcement – Reinforced earth - Different components – their functions – Mechanics of reinforced earth – Failure modes-Failure theories – Design of Embakments on problematic soils.

UNIT V Braced cuts and Cofferdams: Lateral Pressure in Braced cuts – Design of Various Components of a Braced cut – Stability of Braced cuts – Bottom Heave in cuts. – types of cofferdam, suitability, merits and demerits – Design of single – wall cofferdams and their stability aspects – TVA method and Cummins' methods.

REFERENCES

1. Principles of Foundation Engineering by Braja M. Das.
2. Foundation analysis and design – Bowles, JE – McGraw Hill
3. Soil Mechanics in Engineering Practice – Terzaghi, K and Rolph, B. peck 2nd Edn. – John Wiley & Co.,
4. Analysis and Design of Foundations and Retaining Structures, Prakash, S – Saritha Prakashan, Mearut.

CAD LABORATORY

(18CESE261)

Analysis and Design using STADD, STRAP, STRUDS, ANSYS

1. Programming for beams subject to different loading (mandatory).

2. Analysis of reinforced concrete multistoried building

3. Analysis of steel transmission line tower

4. Analysis of plane and space truss

5. Analysis of plane and space frame

6. Determination of mode shapes and frequencies of tall buildings using lumped mass (stick model) approximation

7. Wind analysis on tall structure

8. Analysis of pre stressed concrete bridge girder

9. Analysis of Cylindrical shell

10. Modal Analysis of a Cantilever Beam

NOTE: A minimum of eight (including item 1) from the above set have to be conducted.

REFERENCE: Computer aided design laboratory (Civil Engineering) by Shesha Prakash and Suresh.S

NRI INSTITUTE OF TECHNOLOGY

POTHAVARAPPADU (V), (VIA) NUNNA, AGIRIPALLI (M), PIN – 521 212

POWER ELECTRONICS AND DRIVES

COURSE STRUTURE AND SYLLABUS FOR FIRST YEAR PG PROGRAMME

I SEMESTER

Sl. No.	Course Code	Title of the Course	L	P	Total	Internal Marks	External Marks	Total Marks	No. of Credits
1	18EEPE101	Electrical Machine Modeling and Analysis	4	--	4	40	60	100	4
2	18EEPE102	Analysis of Power Electronic Converters	4	--	4	40	60	100	4
3	18EEPE103	Power Electronic Control of DC Drives	4	--	4	40	60	100	4
4	18EEPE104	Flexible AC Transmission Systems	4	--	4	40	60	100	4
5	18EEPE105A 18EEPE105B 18EEPE105C	**Elective – I** i. Modern Control Theory ii. Power Quality iii. Optimization Techniques	4	--	4	40	60	100	4
6	18EEPE106A 18EEPE106B 18EEPE106C	**Elective – II** i. Energy Auditing, Conservation and Management ii. Artificial Intelligence Techniques iii. HVDC Transmission	4	--	4	40	60	100	4
7	18EEPE161	Simulation - Lab	--	3	3	40	60	100	2
		Total	**24**	**3**	**27**	**280**	**420**	**700**	**20**

II SEMESTER

Sl. No.	Course Code	Title of the Course	L	P	Total	Internal Marks	External Marks	Total Marks	No. of Credits
1	18EEPE201	Switched Mode Power Conversion	4	--	4	40	60	100	4
2	18EEPE202	Power Electronic Control of AC Drives	4	--	4	40	60	100	4
	18EEPE203	Digital Controllers	4	--	4	40	60	100	4
4	18EEPE204	Custom Power devices	4	--	4	40	60	100	4
5	18EEPE205A 18EEPE205B 18EEPE205C	**Elective – III** i. Renewable Energy Systems ii. Reactive Power Compensation & Management iii. Electrical Distribution Systems	4	--	4	40	60	100	4
6	18EEPE206A 18EEPE206B 18EEPE206C	Elective – IV i. Smart Grid Technologies ii. Special Machines iii. Programmable Logic Controllers & Applications	4	--	4	40	60	100	4
7	18EEPE261	Power Converters & Drives Laboratory	--	3	--	40	60	100	2
		Total	**24**	**3**	**27**	**280**	**420**	**700**	**20**

L - LECTURE T – TUTORIAL P - PRACTICLE S - SELF STUDY

Dr. N. SAMBASIVA RAO
B.Tech, M.Tech, Ph.D, MISTE
Head of the Department & Professor of EEE
NRI INSTITUTE OF TECHNOLOGY (KN)

18EEPE101 - ELECTRICAL MACHINE MODELING AND ANALYSIS

Lecture – Tutorial:	4-0	Internal Marks:	40
Credits:	4	External Marks:	60

UNIT I

Basic concepts of Modeling

Basic Two-pole Machine representation of Commutator machines, 3-phase synchronous machine with and without damper bars and 3-phase induction machine, Kron's primitive Machine voltage, current and Torque equations.

UNIT II

DC Machine Modeling

Mathematical model of separately excited D.C motor – Steady State analysis-Transient State analysis-Sudden application of Inertia Load-Transfer function of Separately excited D.C Motor-Mathematical model of D.C Series motor, Shunt motor-Linearization Techniques for small perturbations

UNIT III

Reference frame theory & Modeling of single phase Induction Machines:

Linear transformation-Phase transformation - three phase to two phase transformation (abc to $\alpha\beta0$) and two phase to three phase transformation $\alpha\beta0$ to abc - -Power equivalence- Mathematical modeling of single phase induction machines.

UNIT IV

Modeling of three phase Induction Machine

Generalized model in arbitrary reference frame-Electromagnetic torque-Derivation of commonly used Induction machine models- Stator reference frame model-Rotor reference frame model-Synchronously rotating reference frame model-state space model with flux linkages as variables

UNIT V

Modeling of Synchronous Machine& Special machines

Synchronous machine inductances –voltage equations in the rotor's dq0 reference frame electromagnetic torque-current in terms of flux linkages-three synchronous machine model modeling of PM Synchronous motor, modeling of BLDC motor, modeling of Switched Reluctance motor

TEXT BOOKS:

1. P.S.Bimbra, "Generalized Theory of Electrical Machines", Khanna Publications, 5th edition,1995 (Units - I, II,).

2. P.C.Krause, Oleg Wasynczuk, and Scott D.Sudhoff, "Analysis of Electrical Machinery and Drive Systems", IEEE Press, Third Edition, 2013 (Units - IV, V).

REFERENCE BOOKS:

1. R.Krishnan, "Electric Motor Drives - Modeling, Analysis & control", Pearson Publications, First Edition, 2002 (Units - II, IV, V).

2. Chee Mun Ong, "Dynamic simulation of Electric machinery using Matlab / Simulink",Prentice Hall Publications,1998 (Units-II, IV, V).

E-RESOURCES:

1. http://nptel.ac.in/course.php
2. http://jntuk-coeerd.in/

18EEPE102 - ANALYSIS OF POWER ELECTRONIC CONVERTERS

Lecture – Tutorial:	4-0	Internal Marks:	40
Credits:	4	External Marks:	60

UNIT I

AC voltage Controllers

Single Phase AC Voltage Controllers with PWM control only –synchronous tap changers – Three Phase AC Voltage Controllers-Analysis of Controllers with star and delta connected resistive, resistive –inductive loads-Effects of source and load inductances–Application- numerical problems.

UNIT II

AC-DC converters

Single phase full and half Converters with inductive load– Power factor improvements: Extinction angle control-symmetrical angle control - single phase sinusoidal PWM-Single phase series converters- numerical problems - Three Phase full and half Converter with inductive load–harmonic analysis -Power factor improvements-three phase PWM-twelve pulse converters numerical problems

UNIT III

Power Factor Correction Converters

Single-phase single stage boost power factor corrected rectifier, power circuit principle of Operation, and steady state- analysis, Three phase boost PFC converter.

UNIT IV

PWM Inverters

single phase full bridge inverters - sinusoidal PWM – modified PWM – phase displacement Control – Trapezoidal, staircase, stepped, harmonic injection and delta modulation – numerical problems - Three-Phase Inverters- Sinusoidal PWM- 60_0 PWM- Third Harmonic PWM- Space Vector Modulation- Comparison of PWM Techniques-current source inverters-Variable dc link inverter - numerical problems.

UNIT V

Multi-level inverters

Multilevel Concept, Types of Multilevel Inverters- Diode-Clamped Multilevel Inverter, Features of Diode-Clamped Inverter, Improved Diode-Clamped Inverter- Flying-Capacitors Multilevel Inverter-Features of Flying-Capacitors Inverter- Cascaded Multilevel Inverter- Principle of Operation-Features of Cascaded Inverter- Switching Device Currents-DC-Link Capacitor Voltage Balancing-Features of Multilevel Inverters- Comparisons of Multilevel Converters

TEXT BOOKS

1. Power Electronics-Md.H.Rashid –Pearson Education Third Edition- First IndianReprint- 2008

2. Power Electronics- Ned Mohan, Tore M.Undelan and William P.Robbins –John Wiley& Sons -2nd Edition.

3.Power Electronics – Lander –Ed.2009

REFERENCE BOOKS

1. Modern power Electronics and AC Drives – B.K.Bose

2. Power Converter Circuits – William Shepherd & Li Zhang-Yes Dee Publishing PvtLtd

E-RESOURCES

1. http://nptel.ac.in/course.php

2. http://jntuk-coeerd.in/

18EEPE103 - POWER ELECTRONIC CONTROL OF DC DRIVES

Lecture – Tutorial:	4-0	**Internal Marks:**	40
Credits:	4	**External Marks:**	60

UNIT I

Introduction on single phase convertor fed DC motor drive:
Basic power electronic drive system, components, stability of power electronic drive, single Phase full-convertor and half-convertor fed dc drives for continuous and discontinuous mode of operation. Four quadrant operation of drive using dual convertor.

UNIT II

Three phase AC-DC convertor fed DC motor drive:
Three phase full-convertor and half-convertor fed dc drives for continuous and discontinuous mode of operation. Four quadrant operation of drive using three phase dual convertor. Pulsating torque

UNIT III

Modeling of AC-DC convertor fed DC drive components & design of controller:
Transfer function of Dc motor and load, convertor, current and speed controllers, current and speed feedback elements. Design of current controller and speed controller. Closed loop two quadrant DC motor drive, closed loop four quadrant DC motor drive, introduction to simulation of DC motor drive.

UNIT IV

DC-DC convertor fed DC motor drive:
Four quadrant DC-DC convertor fed dc motor drive, steady state analysis of DC-DC convertor dc motor drive, pulsating torques.

UNIT V

Closed loop operation of DC-DC convertor fed dc motor drive:
Design of current controller, design of speed controller, modeling of current and speed controller, introduction to simulation of speed-controlled dc motor drive.

TEXT BOOKS

1. Electrical Motor Drives Modeling, Analysis and Control – R. Krishna, Prentice Hall India.

2. Power Semiconductor Controlled Drives – G.K. Dubey.Prentice Hall India.

REFERENCE BOOKS

1. Power Electronics and Motor control – Shepherd, Hulley, Liang-II Edition, Cambridge University Press.

2. Power electronic circuits, devices and applications – M.H.Rashid – PHI.

E-RESOURCES

1. http://nptel.ac.in/course.php
2. http://jntuk-coeerd.in/

18EEPE104 - FLEXIBLE AC TRANSMISSION SYSTEMS

Lecture – Tutorial:	4-0	**Internal Marks:**	40
Credits:	4	**External Marks:**	60

UNIT I

FACTS concepts, Transmission interconnections, power flow in an AC System, Loading capability limits, Dynamic stability considerations, importance of controllable parameters, basic types of FACTS controllers, benefits from FACTS controllers.

UNIT II

Basic concept of voltage and current source converters, comparison of current source converters with voltage source converters. Static shunt compensation: Objectives of shunt compensation, midpoint voltage regulation, voltage instability prevention, improvement of transient stability, Power oscillation damping, methods of controllable var generation, variable impedance type static var generators, switching converter type var generators, hybrid var generators.

UNIT III

SVC and STATCOM: The regulation and slope transfer function and dynamic Performance, transient stability enhancement and power oscillation damping, operating point control and summary of compensation control.

UNIT IV

Static series compensators: Concept of series capacitive compensation, improvement of transient stability, power oscillation damping, functional requirements. GTO thyristor-controlled series capacitor (GSC), thyristor switched series capacitor (TSSC), and thyristor controlled series capacitor (TCSC), control schemes for GSC, TSSC and TCSC.

UNIT V

Unified Power Flow Controller: Basic operating principle, conventional transmission control capabilities, independent real and reactive power flow control, comparison of the UPFC to series compensators and phase angle regulators

TEXT BOOKS

1. "Understanding FACTS Devices" N.G.Hingorani and L.Guygi, IEEE Press. Indian Edition is available:--Standard Publications

REFERENCE BOOKS

1. Sang.Y.Hand John.A.T, "Flexible AC Transmission systems" IEEE Press (2006).
2. HVDC & FACTS Controllers: applications of static converters in power systems- Vijay K.Sood-Springer publishers

E-RESOURCES

1. http://nptel.ac.in/course.php
2. http://jntuk-coeerd.in/

18EEPE105(A) - MODERN CONTROL THEORY

Lecture – Tutorial:	4-0	**Internal Marks:**	40
Credits:	4	**External Marks:**	60

UNIT I

State Variable Analysis

The concept of state – State Equations for Dynamic systems – State diagram - Linear Continuous time model for physical systems – Existence and Uniqueness of Solutions to Continuous – Time State Equations – Solutions – Linear Time Invariant Continuous – Time State Equations – State transition matrix and it's properties

UNIT II

State Variable Techniques

General concept of Controllability - General concept of Observability Controllability tests for Continuous &Time Invariant systems - Observability tests for Continuous &Time Invariant systems - Controllability and Observability of state model in Jordan Canonical form - Controllability and Observability Canonical forms of State model – State feedback controller ,design through pole assignment.

UNIT III

Non Linear Systems – I

Introduction – Non Linear Systems – Types of Non – Linearities – Saturation – Dead – Zone – Backlash – Jump Phenomenon etc; - Singular Points – Introduction to Linearization of nonlinear systems, properties of Non Linear Systems – Describing function – describing function analysis of nonlinear systems- Stability analysis of Non – Linear systems through describing functions.

UNIT IV

Non-Linear Systems – II

Introduction to phase – plane analysis, Method of Isoclines for Constructing Trajectories, singular points, phase – plane analysis of nonlinear control systems.

UNIT V

Stability Analysis

Stability in the sense of Lyapunov, Lyapunov's stability and Lyapunov's instability theorems – Stability Analysis of the Linear Continuous time invariant systems by Lyapunov second method – Generation of Lyapunov functions – Variable gradient method – Krasooviski's method

TEXT BOOKS:

1. Modern Control System Theory by M. Gopal – New Age International – 1984
2. Modern Control Engineering by Ogata. K – Prentice Hall – 1997

REFERENCE BOOKS:

1. Nonlinear systems, Hassan K. Klalil, Prentice Hall, 1996
2. Modern control systems, Richard C. Dorf and Robert H. Bishop, 11th Edition, Pearson Edu, India, 2009

E-RESOURCES:

1. http://nptel.ac.in/course.php
2. http://jntuk-coeerd.in/

18EEPE105(B) - POWER QUALITY

Lecture – Tutorial:	4-0	Internal Marks:	40
Credits:	4	External Marks:	60

UNIT I

Introduction

Overview of Power Quality - Concern about the Power Quality - General Classes of Power Quality Problems – Transients -Long-Duration Voltage Variations - Short-Duration Voltage Variations - Voltage Unbalance - Waveform Distortion - Voltage fluctuation - Power Frequency Variations - Power Quality Terms - Voltage Sags and Interruptions - Sources of Sags and Interruptions – Nonlinear loads.

UNIT II

Transient Over Voltages

Source of Transient Over Voltages - Principles of Over Voltage Protection - Devices for Over Voltage Protection - Utility Capacitor Switching Transients - Utility Lightning Protection – Load Switching Transient Problems - Computer Tools for Transient Analysis

UNIT III

Harmonic Distortion and solutions

Voltage vs. Current Distortion - Harmonics vs. Transients - Power System Quantities under Non sinusoidal Conditions - Harmonic Indices – Sources of harmonics - Locating Sources of Harmonics – System Response Characteristics - Effects of Harmonic Distortion – Inter harmonics - Harmonic Solutions Harmonic Distortion Evaluation - Devices for Controlling Harmonic Distortion - Harmonic Filter Design - Standards on Harmonics

UNIT IV

Long Duration Voltage Variations:

Principles of Regulating the Voltage - Device for Voltage Regulation - Utility Voltage Regulator Application - Capacitor for Voltage Regulation - End-user Capacitor Application – Regulating Utility Voltage with Distributed Resources – Flicker

UNIT V

Distributed Generation and Power Quality:

Resurgence of Distributed Generation - DG Technologies - Interface to the Utility System - Power Quality Issues - Operating Conflicts - DG on Low Voltage Distribution Networks - Interconnection standards - Wiring and Grounding - Typical Wiring and Grounding Problems - Solution to Wiring and grounding Problems

TEXT BOOKS:

1. Electrical Power Systems Quality, Dugan R C, McGranaghan M F, Santoso S, and Beaty H W, Second Edition, McGraw-Hill, 2002.
2. Power Quality Primer, Kennedy B W, First Edition, McGraw-Hill, 2000.
3. Understanding Power Quality Problems: Voltage Sags and Interruptions, Bollen M H J, First Edition, IEEE Press; 2000.

REFERENCE BOOKS:

1. Power Quality c.shankaran, CRC Press, 2001
2. Harmonics and Power Systems –Francisco C.DE LA Rosa-CRC Press (Taylor & Francis)
3. Power Quality in Power systems and Electrical Machines-EwaldF.fuchs, Mohammad A.S. Masoum-Elsevier

E-RESOURCES:

1. http://nptel.ac.in/course.php
2. http://jntuk-coeerd.in/

18EEPE105(C) - OPTIMIZATION TECHNIQUES

Lecture – Tutorial:	4-0	**Internal Marks:**	40
Credits:	4	**External Marks:**	60

UNIT I

Introduction and Classical Optimization Techniques: Statement of an Optimization problem – design vector – design constraints – constraint surface – objective function – objective function surfaces – classification of Optimization problems. Single variable Optimization – multi variable Optimization without constraints – necessary and sufficient conditions for minimum/maximum – multivariable Optimization with equality constraints. Solution by method of Lagrange multipliers – multivariable Optimization with inequality constraints – Kuhn – Tucker conditions.

UNIT II

Linear Programming: Standard form of a linear programming problem – geometry of linear programming problems – definitions and theorems – solution of a system of linear simultaneous equations – pivotal reduction of a general system of equations – motivation to the simplex method – simplex algorithm - Duality in Linear Programming – Dual Simplex method.

UNIT III

Nonlinear Programming: Unconstrained cases - One – dimensional minimization methods: Classification, Fibonacci method and Quadratic interpolation method – Uni variate method, Powell's method and steepest descent method.

Constrained cases - Characteristics of a constrained problem, Classification, Basic approach of Penalty Function method; Basic approaches of Interior and Exterior penalty function methods. Introduction to convex Programming Problem.

UNIT IV

Introduction to Evolutionary Methods: Evolutionary programming methods - Introduction to Genetic Algorithms (GA)– Control parameters –Number of generation, population size, selection, reproduction, crossover and mutation – Operator selection criteria – Simple mapping of objective function to fitness function – constraints – Genetic algorithm steps – Stopping criteria –Simple examples.

UNIT V

Introduction to Swarm Intelligence Systems: Swarm intelligence programming methods - Basic Partial Swarm Optimization – Method – Characteristic features of PSO procedure of the global version – Parameters of PSO (Simple PSO algorithm – Operators selection criteria – Fitness function constraints) – Comparison with other evolutionary techniques – Engineering applications of PSO.

TEXT BOOKS:

1. "Engineering optimization: Theory and practice"-by S. S.Rao, New Age International (P) Limited, 3rd edition, 1998.
2. Soft Computing with Matlab Programming by N.P.Padhy&S.P.Simson, Oxford University Press – 2015

REFERENCE BOOKS:

1. "Optimization methods in operations Research and Systems Analysis" by K.V.Mital and C.Mohan, New Age International (P) Limited, Publishers, 3rd edition, 1996.
2. Genetic Algorithms in search, optimization, and Machine Learning by David .Goldberg, ISBN:978-81-7758-829-3, Pearsonby Dorling Kindersley (India) Pvt. Ltd.
3. "Operations Research: An Introduction" by H.A.Taha, PHI pvt. Ltd., 6th edition.
4. Linear Programming by G.Hadley.,Narosa Publishers.

E-RESOURCES:

1. http://nptel.ac.in/course.php
2. http://jntuk-coeerd.in/

18EEPE106(A) - ENERGY AUDITING, CONSERVATION AND MANAGEMENT

Lecture – Tutorial:	4-0	**Internal Marks:**	40
Credits:	4	**External Marks:**	60

UNIT I

UNIT I: Basic Principles of Energy Audit

Energy audit- definitions, concept, types of audit, energy index, cost index ,pie charts, Sankey diagrams, load profiles, Energy conservation schemes- Energy audit of industries- energy saving potential, energy audit of process industry, thermal power station, building energy audit

UNIT II

UNIT II: Energy Management –I

Principles of energy management, organizing energy management program, initiating, planning, controlling, promoting, monitoring, reporting. Energy manger, Qualities and functions, language, Questionnaire – check list for top management

UNIT III

UNIT III: Energy Efficient Motors and Lighting

Energy efficient motors , factors affecting efficiency, loss distribution , constructional details , characteristics – variable speed , variable duty cycle systems, RMS hp- voltage variation-voltage unbalance- over motoring- motor energy audit. Good lighting system design and practice, lighting control, lighting energy audit

UNIT IV

Power Factor Improvement and energy instruments

Power factor – methods of improvement , location of capacitors , Power factor with non-linear loads, effect of harmonics on p.f. , p.f motor controllers – Energy Instruments- watt meter, data loggers, thermocouples, pyrometers, lux meters, tong testers ,application of PLC's

UNIT V

Economic Aspects and their computation

Economics Analysis-Depreciation Methods, time value of money, rate of return, present worth method, replacement analysis and life cycle costing analysis – Energy efficient motors. Calculation of simple payback method, net present worth method- Power factor correction, lighting – Applications of life cycle costing analysis, return on investment.

TEXT BOOKS:

1. Energy management by W.R. Murphy & G. Mckay Butter worth, Heinemann publications.
2. Energy efficient electric motors by John .C. Andreas, Marcel Dekker Inc Ltd-2nd edition, 1995-
3. Energy management by Paul o' Callaghan, Mc-graw Hill Book company-1st edition, 1998

REFERENCE BOOKS:

1. Energy management hand book by W.C.Turner, John wiley and sons
2. Energy management and good lighting practice : fuel efficiency- booklet12-EEO

E-RESOURCES:

1. http://nptel.ac.in/course.php
2. http://jntuk-coeerd.in/

18EEPE106(B) - ARTIFICIAL INTELLIGENCE TECHNIQUES

Lecture – Tutorial:	4-0	**Internal Marks:**	40
Credits:	4	**External Marks:**	60

UNIT I

Introduction to Neural Networks

Introduction, Humans and Computers, Biological Neural Networks, Historical development of neural network, Terminology and Topology, Biological and artificial neuron models, Basic learning laws.

UNIT II

Feed Forward Neural Networks

Introduction, Perceptron models: Discrete, continuous and multi-category, Training algorithms: Discrete and Continuous Perceptron Networks, Perceptron convergence theorem, Limitations and applications of the Perceptron model, Generalized delta learning rule, Feedforward recall and error back propagation training-Radial basis function algorithms-Hope field networks

UNIT III

Genetic algorithms &Modelling-introduction-encoding-fitness function-reproduction operators-genetic operators-cross over and mutation-generational cycle-convergence of genetic algorithm

UNIT IV

Classical and Fuzzy Sets

Introduction to classical sets - properties, operations and relations; Fuzzy sets, membership, Uncertainty, operations, properties, fuzzy relations, cardinalities, membership functions. Fuzzy Logic System Components-Fuzzification, Membership value assignment, development of rule base and decision making system, defuzzification to crisp sets, defuzzification methods.

UNIT V

Application of AI Techniques: Design of PI controller for speed control of DC motor using neural networks and fuzzy logic-PWM Controllers -Selected harmonic elimination PWM Space vector PWM using neural network.

TEXT BOOKS:

1. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by Rajasekharan andPai – PHI Publication.
2. Introduction to Artificial Neural Systems - Jacek M. Zuarda, Jaico Publishing House, 1997.

REFERENCE BOOKS:

1. Modern Power Electronics and AC Drives –B.K.Bose-Pearson Publications
2. Genetic Algorithms- David E Goldberg. Pearson publications.

E-RESOURCES:

1. http://nptel.ac.in/course.php
2. http://jntuk-coeerd.in/

18EEPE106(C) - HVDC TRANSMISSION

Lecture – Tutorial:	4-0	**Internal Marks:**	40
Credits:	4	**External Marks:**	60

UNIT I

Limitation of EHV AC Transmission, Advantages of HVDC Technical economical reliability aspects. HVDC Transmission: General considerations, Power Handling Capabilities of HVDC Lines, Basic Conversion principles, static converter configuration. Types of HVDC links- Apparatus and its purpose.

UNIT II

Static Power Converters: 6-pulse bridge circuit and 12-pulse converters, converter station and Terminal equipment, commutation process, Rectifier and inverter operation, equivalent circuit for converter – special features of converter transformers. Comparison of the perform of diametrical connection with 6-pulse bridge circuit

UNIT III

Control of HVDC Converters and systems: constant current, constant extinction angle and constant Ignition angle control. Individual phase control and equidistant firing angle control, DC power flow control. Factors responsible for generation of Harmonics voltage and current harmonics effect of variation of α and μ. Filters Harmonic elimination.

UNIT IV

Interaction between HV AC and DC systems – Voltage interaction, Harmonic instability problems and DC power modulation. Development of DC circuit Breakers, Multi terminal DC links and systems; series, parallel and series parallel systems, their operation and control.

UNIT V

Transient over voltages in HV DC systems: Over voltages due to disturbances on DC side, over voltages due to DC and AC side line faults. Converter faults and protection in HVDC Systems: Converter faults, over current protection - valve group, and DC line protection, circuit breakers. Over voltage protection of converters, surge arresters

TEXT BOOKS:

1. S Kamakshaih and V Kamaraju:HVDC Transmission- MG hill.
2. K.R. Padiyar : High Voltage Direct current Transmission, Wiley Eastern Ltd., New Delhi – 1992.
3. E.W. Kimbark : Direct current Transmission, Wiley Inter Science – New York.

REFERENCE BOOKS:

1. J. Arillaga : H.V.D.C. Transmission Peter Peregrinus ltd., London UK 1983
2. Vijay K Sood: HVDC and FACTS controllers: Applications of static converters in power systems by, Kluwer Academic Press.

E-RESOURCES:

1. http://nptel.ac.in/course.php
2. http://jntuk-coeerd.in/

18EEPE161 - SIMULATION LABORATORY

Practice:	3	**Internal Marks:**	40
Credits:	2	**External Marks:**	60

List of Experiments:

1. Switching characteristics simulation analysis of Thyristor, MOSFET, IGBT.
2. Simulation analysis of single phase full converter using R-L load, R-L-E load with and without LC Filter.
3. Simulation analysis of three phase full converter using R-L-E Load.
4. Simulation analysis of single phase AC Voltage controller with PWM control for RL load.
5. Simulation analysis of three phase AC Voltage controller using RL load.
6. Simulation analysis of single phase inverter with sinusoidal PWM control for R & RL – loads.
7. Simulation analysis of three phase inverter with Sinusoidal PWM control for R & RL - Loads.
8. Simulation analysis of Buck, Boost& Buck-Boost DC-DC converters.
9. Simulation analysis of three phase converter fed DC motor.
10. Development of mathematical model and simulation analysis of induction machines under
11. balanced and symmetrical conditions for the following
    a. dq model in synchronous reference frame
    b. dq model in stator reference frame
    c. dq model in rotor reference frame
12. Simulation analysis of Volts/Hz closed-loop speed control of an induction motor drive.
13. Simulation analysis of Open-loop Volts/Hz control of a synchronous motor drive.
14. Simulation analysis of Speed control of a permanent magnet synchronous motor.
15. Simulation analysis of Capacitor-start capacitor-run single-phase induction motor.

EQUIPMENT REQUIRED:

REFERENCE BOOKS:

1. Rashid, Muhammad H. *Spice for power electronics and electric power*. CRC Press, 2012.
2. Shaffer, Randall. *Fundamentals of power electronics with MATLAB*. Firewall Media, 2013.
3. Robert W. Erickson &Dragon Maksimovic, " Fundamentals of Power Electronics" Second Edition, 2001 Springer science and Business media.
4. Ned Mohan, T. M. Udeland and W.P Robbin, "Power Electronics converters, Application and design" John Wiley and sons. Wiley India edition, 2006.
5. Rashid M.H., "Power Electronics Circuits, Devices and Applications ", Prentice Hal India, New Delhi, 1995

E-RESOURCES:

1.
2.

VIRTUAL LABS:

1.
2.
3.

18D1252401 - SWITCHING MODE POWER CONVERSION

Lecture – Tutorial:	4-0	**Internal Marks:**	40
Credits:	4	**External Marks:**	60

UNIT I

Non-isolated switch mode converters:
Control of DC-DC converters, Buck converters, Boost converters, Buck-Boost converter, CUK Converter, Converter realization with nonideal components.

UNIT II

Resonant converters:
Basic resonant circuit concepts, series resonant circuits, parallel resonant circuits, zero current switching Quasi-resonant buck converter, zero current switching Quasi-resonant boost converter, zero voltage switching Quasi-resonant buck converter, zero voltage switching Quasi-resonant boost converter

UNIT III

Isolated switch-mode converters:
Forwarded converter, fly back converter, Push-pull converter, half-bridge converter, full ridge Converter

UNIT IV

Control schemes of switching converters:
Voltage-mode control, Current-mode control, control scheme for resonant converters, proportional integral controller. Magnetic design consideration: Transformers design, DC inductor and capacitor design

UNIT V

Modeling& Control design based on linearization:
Formulation of averaged models for buck and boost converters average circuits models, small - signal analysis and linearization. Control design based on linearization: Transfer function of converters, control design, large signal issues in voltage-mode & current-mode control.

TEXT BOOKS:

1. Power Electronics – IssaBataresh, Jhonwilley publications,2004
2.Power switching converters-simonang, alejandro olive, CRC Press (Taylor &franicsgroup).

REFERENCE BOOKS:

1. Elements of Power Electronics – Philip T. Krein, Oxford University press.
2.Power Electronics: converters Applications & Design - Mohan, Undeland, Robbins-Wiley publications

E-RESOURCES:

1. http://nptel.ac.in/course.php
2. http://jntuk-coeerd.in/

18D1252402 - POWER ELECTRONIC CONTROL OF AC DRIVES

Lecture – Tutorial:	4-0	**Internal Marks:**	40
Credits:	4	**External Marks:**	60

UNIT I

3-phase induction motor drives – Part 1

Analysis of IM fed from non-sinusoidal supply, harmonic equivalent circuit, transient analysis – starting and plugging; variable frequency control, torque-slip relation, starting torque and braking torque, closed-loop VSI fed IM drive. Slip-ring IM controls, closed-loop speed control with static rotor resistance, closed-loop speed control by using slip power recovery scheme.

UNIT II

3-phase induction motor drives – Part 2

Concept of space vector, vector control of IM: direct or feed-back vector control, flux vector estimation, indirect or feed forward vector control, vector control of line side PWM converter, stator flux-oriented vector control, vector control of converter fed inverter drive.

UNIT III

Synchronous motor and BLDC motor drives

Variable frequency control of synchronous motor, closed-loop control of inverter fed synchronous motor drive. Permanent magnet synchronous motor drive. BLDC motor drives, VSI fed BLDC motor drives, back emf, phase current and torque waveforms, control of BLDC motors with sensors, sensor-less control of BLDC motors

UNIT IV

Traction drives

Motors employed in railway traction and road-vehicles, control of railway traction dc motors using ac-dc converters, control of railway traction ac motors using ac-dc and dc-ac converters, power electronic control circuits of electric vehicles and hybrid electric vehicles

UNIT V

Switched reluctance and stepper motor drives

Switched reluctance motor operation and control: modes of operation, converter circuits closed loop speed control. Stepper motor characteristics drive circuits for uni-polar and bipolar stepper motors.

TEXT BOOKS:

1. Electric motor drives, modeling, analysis and control", R. Krishnan, PHI Publishers
2. "Control of electric drives", W. Leonhard, Springer Verilog
3. "Vector control of AC machines", ArindamGhosh, Gerard Ledwich
4. "Power Electronics: Converters,Application and design" ,Mohan, Undeland and Robbins, Wiley Publications.
5. "Urban transport and hybrid electric vehicles", Edited by SerefSoylu, Published online, 18 Aug 2010. Available:http://www.intechopen.com/books/urban-transport-and-........

REFERENCE BOOKS:

1. "Power control of AC motors", J.M.D. Murphy and F. G. Turnbul
2. "Power semiconductor drives", G. K. Dubey, Printice Hall International
3. "Fundamentals of electric drives", G. K. Dubey, Narosa Publishing House

E-RESOURCES:

1. http://nptel.ac.in/course.php
2. http://jntuk-coeerd.in/

18D1252403 - DIGITAL CONTROLLERS

Lecture – Tutorial:	4-0	**Internal Marks:**	40
Credits:	4	**External Marks:**	60

UNIT I

PIC MICROCONTROLLERS

PIC Microcontrollers: Overview and Features, PIC 16C6X/7X, FSR(File Selection Register) [Indirect Data Memory Address Pointer], PIC Reset Actions, PIC Oscillator Connections, PIC Memory Organizations, PIC PIC 16C6X/7X Instructions, Addressing Modes, I/O Ports, Interrupts in PIC 16C61/71, PIC 16C61/71 Timers, PIC 16C71 Analog-to-Digital Converter (ADC)

UNIT II

INTRODUCTION TO DSP

Introduction to the C2xx DSP core and code generation, The components of the C2xx DSP core, Mapping external devices to the C2xx core , peripherals and Peripheral Interface , System configuration registers , Memory , Types of Physical Memory , memory Addressing Modes , Assembly Programming using C2xx DSP, Instruction Set, Software Tools.

UNIT III

I/O & CONTROL REGISTERS

Pin Multiplexing (MUX) and General Purpose I/O Overview, Multiplexing and General Purpose I/O Control Registers. Introduction to Interrupts, Interrupt Hierarchy, Interrupt Control Registers, Initializing and Servicing Interrupts in Software.

UNIT IV

ADC & EVENT MANAGER

ADC Overview , Operation of the ADC in the DSP , Overview of the Event manager (EV) , Event Manager Interrupts , General Purpose (GP) Timers , Compare UNITs, Capture UNITS And Quadrature Enclosed Pulse (QEP) Circuitry , General Event Manager Information

UNIT V

FPGA

Introduction to Field Programmable Gate Arrays – CPLD Vs FPGA – Types of FPGA , Xilinx XC3000 series , Configurable logic Blocks (CLB), Input/Output Block (IOB) – Programmable Interconnect Point (PIP) – Xilinx 4000 series – HDL programming – overview of Spartan 3E and Virtex II pro FPGA boards- case study.

TEXT BOOKS:

1. Microcontrollers-Theory and Applications by Ajay V Deshmukh, McGraw Hills
2. Microcontrollers by Kennith J ayala, Thomson publishers
3. Microprocessor and Microcontrollers by Prof C.R.Sarma.
4. Hamid.A.Toliyat and Steven G.Campbell"DSP Based Electro Mechanical Motion Control " CRC Press New York , 2004.

REFERENCE BOOKS:

1. XC 3000 series datasheets (version 3.1). Xilinx,Inc.,USA, 1998.
2. Wayne Wolf," FPGA based system design ", Prentice hall, 2004

E-RESOURCES:

1. http://nptel.ac.in/course.php
2. http://jntuk-coeerd.in/

18D1252404 - CUSTOM POWER DEVICES

Lecture – Tutorial:	4-0	**Internal Marks:**	40
Credits:	4	**External Marks:**	60

UNIT I

Introduction

Custom Power and Custom Power Devices - power quality variations in distribution circuits – Voltage Sags, Swells, and Interruptions - System Faults – Over voltages and Under voltages - Voltage Flicker - Harmonic Distortion - Voltage Notching - Transient Disturbances - Characteristics of Voltage Sags.

UNIT II

Overview of Custom Power Devices

Reactive Power and Harmonic Compensation Devices - Compensation Devices for Voltage Sags and Momentary Interruptions - Backup Energy Supply Devices - Battery UPS – Super Conducting Magnetic Energy Storage systems - Flywheel – Voltage Source Converter – Multilevel converters.

UNIT III

Reactive Power and Harmonic Compensation Devices

Var control devices - Static Var Compensator – Topologies - Direct Connected Static Var Compensation for Distribution Systems – Static Series Compensator - Static Shunt ompensator (DSTATCOM) - Interaction with Distribution Equipment and System – Installation Considerations.

UNIT IV

High-Speed Source Transfer Switches, Solid State Limiting, And Breaking Devices:

Source Transfer Switch - Static Source Transfer Switch (SSTS),- Hybrid source transfer switch High-speed mechanical source transfer switch - Solid state current limiter - Solid state breaker. Application of Custom Power Devices in Power Systems

UNIT V

Application of Custom Power Devices in Power Systems

P-Q theory – Control of P and Q – Dynamic Voltage Restorer (DVR) – Operation and control – Interline Power Flow Controller (IPFC) – Operation and control – Unified Power Quality Conditioner (UPQC) – Operation and control. Recent custom power devices.

TEXT BOOKS:

1. Guidebook on Custom Power Devices, Technical Report, Published by EPRI, Nov 2000
2. Power Quality Enhancement Using Custom Power Devices – Power Electronics and Power Systems, Gerard Ledwich, ArindamGhosh, Kluwer Academic Publishers, 2002.

REFERENCE BOOKS:

1. Power Quality, C. Shankaran, CRC Press, 2001
2. Instantaneous power theory and application to power conditioning, H. Akagiet.al., IEEE Press, 2007.
3. Custom Power Devices - An Introduction, ArindamGhosh and Gerard Ledwich, Springer, 2002
4. A Review of Compensating Type Custom Power Devices for Power Quality Improvement, Yash Pal et.al., Joint International Conference on Power System Technology and IEEE Power India Conference, 2008. POWERCON 2008.

E-RESOURCES:

1. http://nptel.ac.in/course.php
2. http://jntuk-coeerd.in/

18EEPE205A - RENEWABLE ENERGY SYSTEMS

Lecture – Tutorial:	4-0	**Internal Marks:**	40
Credits:	4	**External Marks:**	60

UNIT I

Solar Energy - Availability - Solar radiation data and measurement - Estimation of average solar radiation - Solar water heater types - Heat balance – Flat plate collector efficiency – Efficiency of heat removal - Thermo siphon flow calculation - Forced circulation calculation – Evacuated collectors - Basics of solar concentrators Solar Energy Applications - Solar air heaters – Solar Chimney - Crop driers - Passive solar system - Active solar systems - Water desalination - Output from solar still – Principle of solar ponds.

UNIT II

Wind Energy – Nature of wind – Characteristics – Variation with height and time – Power in wind – Aerodynamics of Wind turbine – Momentum theory – Basics of aerodynamics – Aero foils and their characteristics – HAWT – Blade element theory – Prandtl's lifting line theory (prescribed wake analysis) VAWT aerodynamics – Wind turbine loads – Aerodynamic loads in
steady operation – Yawed operation and tower shadow. Wind Energy Conversion System – Siting – Rotor selection – Annual energy output – Horizontal axis wind turbine (HAWT) – Vertical axis wind turbine (VAWT) – Rotor design considerations – Number of blades – Solidity
- Blade profile – Upwind/Downwind – Yaw system – Tower – Braking system – Synchronous and asynchronous generators and loads – Integration of wind energy converters to electrical networks – Inverters – Control system – Requirement and strategies – Noise Applications of wind energy

UNIT III

Biomass energy - Bio fuel classification – Examples of thermo chemical, Pyrolysis, biochemical
and agrochemical systems – Energy farming – Direct combustion for heat – Process heat and electricity – Ethanol production and use – Anaerobic digestion for biogas – Different digesters – Digester sizing – Applications of Biogas - Operation with I.C. Engine

UNIT IV

Ocean Energy - OTEC Principle - Lambert's law of absorption - Open cycle and closed cycle - heat exchanger calculations – Major problems and operational experience. Tidal Power - Principles of power generation - components of power plant – Single and two basin systems –
Turbines for tidal power - Estimation of energy – Maximum and minimum power ranges - tidal Power house. Wave Energy – Concept of energy and power from waves – Wave characteristics – period and wave velocities - Different wave energy conservation devices (Saltor duck, oscillating water column and dolphin types) – operational experience.

UNIT V

Geothermal Energy - Classification- Fundamentals of geophysics - Dry rock and hot aquifer energy analysis - Estimation of thermal power - Extraction techniques - Prime movers.

TEXT BOOKS:

1. Renewable Energy Resources Basic Principles and Applications / G.N.Tiwari and M.K.Ghosal / Narosa
2. Solar Energy - Principles of thermal collection and storage/ S.P. Sukhatme / TMH
3. Wind Energy Handbook / Tony Burton, David Sharpe, Nick Jenkins and Ervin Bossanyi / Wiley Wind Electrical Systems / S.N.Bhadra, D.Kastha and S.Banerjee / Oxford
4. Biogas Technology - A Practical Hand Book / K.Khendelwal& S.S. Mahdi / McGraw-Hill.

E-RESOURCES:

1. http://nptel.ac.in/course.php
2. http://jntuk-coeerd.in/

18EEPE205B - REACTIVE POWER COMPENSATION & MANAGEMENT

Lecture – Tutorial:	4-0	**Internal Marks:**	40
Credits:	4	**External Marks:**	60

UNIT I

Load Compensation

Objectives and specifications – reactive power characteristics – inductive and capacitive approximate biasing – Load compensator as a voltage regulator – phase balancing and power Factor correction of unsymmetrical loads- examples.

UNIT II

Reactive power compensation in transmission system:

Steady state -Uncompensated line – types of compensation – Passive shunt and series and dynamic shunt compensation – examples Transient state - Characteristic time periods – passive shunt compensation – static compensations- series capacitor compensation –compensation using synchronous condensers – examples

UNIT III

Reactive power coordination:

Objective – Mathematical modeling – Operation planning – transmission benefits – Basic concepts of quality of power supply – disturbances- steady –state variations – effects of under voltages – frequency – Harmonics, radio frequency and electromagnetic interferences

UNIT IV

Distribution side Reactive power Management:

System losses –loss reduction methods – examples – Reactive power planning – objectives – Economics Planning capacitor placement – retrofitting of capacitor banks

User side reactive power management:

KVAR requirements for domestic appliances – Purpose of using capacitors – selection of capacitors – deciding factors – types of available capacitor, characteristics and Limitations

UNIT V

Reactive power management in electric traction systems and are furnaces:

Typical layout of traction systems – reactive power control requirements – distribution transformers- Electric arc furnaces – basic operations- furnaces transformer –filter requirements – remedial measures –power factor of an arc furnace

TEXT BOOKS:

1. Reactive power control in Electric power systems by T.J.E.Miller, John Wiley and sons, 1982
2. Reactive power Management by D.M.Tagare,Tata McGraw Hill,2004

E-RESOURCES:

1. http://nptel.ac.in/course.php
2. http://jntuk-coeerd.in/

18D1252513 - ELECTRICAL DISTRIBUTION SYSTEMS

Lecture – Tutorial:	4-0	**Internal Marks:**	40
Credits:	4	**External Marks:**	60

UNIT I

(Residential, Commercial, Agricultural and Industrial) and their characteristics

UNIT II

Distribution Feeders and Substations: Design consideration of Distribution feeders: Radial and loop types of primary feeders, voltage levels, feeder-loading. Design practice of the secondary distribution system. Location of Substations: Rating of a Distribution Substation, service area with 'n' primary feeders. Benefits derived through optimal location of substations.

UNIT III

System analysis : Voltage drop and power loss calculations : Derivation for volt-drop and power loss in lines, manual methods of solution for radial networks, three-phase balanced primary lines, non-three-phase primary lines.

UNIT IV

Protective devices and coordination: Objectives of distribution system protection, types of common faults and procedure for fault calculation. Protective Devices: Principle of operation of fuses, circuit reclosers, line sectionalizer and circuit breakers. Coordination of protective devices: General coordination procedure.

UNIT V

Capacitive compensation for power factor control: Different types of power capacitors, shunt and series capacitors, effect of shunt capacitors (Fixed and switched) power factor correction, capacitor location. Economic justification. Procedure to determine the best capacitor location. Voltage control: Equipment for voltage control, effect of series capacitors, effect of AVB/AVR, line drop compensation.

TEXT BOOKS:

1. "Electric Power Distribution System Engineering " byTuranGonen, Mc.Graw-Hill Book Company,1986.
2. Electric Power Distribution-by A.S.Pabla, Tata McGraw-Hill Publishing

Company, 4th edition, 1997.

REFERENCE BOOKS:

1. Electrical Distribution V.Kamaraju-McGraw Hill

2. Handbook of Electrical Power Distribution – Gorti Ramamurthy-Universities press

E-RESOURCES:

1. http://nptel.ac.in/course.php
2. http://jntuk-coeerd.in/

18EEPE206A - SMART GRID TECHNOLOGIES

Lecture – Tutorial:	4-0	**Internal Marks:**	40
Credits:	4	**External Marks:**	60

UNIT I

Introduction to Smart Grid: Evolution of Electric Grid, Concept of Smart Grid, Definitions, Need of Smart Grid, Functions of Smart Grid, Opportunities & Barriers of Smart Grid, Difference between conventional & smart grid, Concept of Resilient &Self Healing Grid, Present Development & International policies on Smart Grid. Case study of Smart Grid

UNIT II

Smart Grid Technologies: Part 1: Introduction to Smart Meters, Real Time Prizing, Smart Appliances, Automatic Meter Reading(AMR), Outage Management System(OMS), Plug in Hybrid Electric Vehicles(PHEV), Vehicle to Grid, Smart Sensors, Home & Building Automation, Phase Shifting Transformers.

UNIT III

Smart Grid Technologies: Part 2: Smart Substations, Substation Automation, Feeder Automation. Geographic Information System(GIS), Intelligent Electronic Devices(IED) & their application for monitoring & protection, Smart storage like Battery, SMES, Pumped Hydro, Compressed Air Energy Storage, Wide Area Measurement System(WAMS), Phase Measurement Unit (PMU).

UNIT IV

Microgrids and Distributed Energy Resources: Concept of micro grid, need & applications of micro grid, formation of microgrid, Issues of interconnection, protection & control of micro grid. Plastic & Organic solar cells, Thin film solar cells, Variable speed wind generators, fuel cells, micro turbines, Captive power plants, Integration of renewable energy sources.

UNIT V

Power Quality Management in Smart Grid: Power Quality & EMC in Smart Grid, Power Quality issues of Grid connected Renewable Energy Sources, Power Quality Conditioners for Smart Grid, Web based Power Quality monitoring, Power Quality Audit.

Information and Communication Technology for Smart Grid: Advanced Metering Infrastructure (AMI), Home Area Network (HAN), Neighborhood Area Network (NAN), Wide Area Network (WAN).

TEXT BOOKS:

1. Ali Keyhani, Mohammad N. Marwali, Min Dai "Integration of Green and Renewable Energy in Electric Power Systems", Wiley
2. JanakaEkanayake, Nick Jenkins, KithsiriLiyanage, Jianzhong Wu, Akihiko Yokoyama,"Smart Grid: Technology and Applications", Wiley
3. Jean Claude Sabonnadière, NouredineHadjsaïd, "Smart Grids", Wiley Blackwell 19
4. S. Chowdhury, S. P. Chowdhury, P. Crossley, "Microgrids and Active Distribution Networks." Institution of Engineering and Technology, 30 Jun 2009

REFERENCE BOOKS:

1. Andres Carvallo, John Cooper, "The Advanced Smart Grid: Edge Power DrivingSustainability: 1", Artech House Publishers July 2011
2. James Northcote, Green, Robert G. Wilson "Control and Automation of Electric Power Distribution Systems (Power Engineering)", CRC Press
3. MladenKezunovic, Mark G. Adamiak, Alexander P. Apostolov, Jeffrey George Gilbert "Substation Automation (Power Electronics and Power Systems)", Springer

E-RESOURCES:

1. http://nptel.ac.in/course.php
2. http://jntuk-coeerd.in/

18D1252522 - SPECIAL MACHINES

Lecture – Tutorial:	4-0	**Internal Marks:**	40
Credits:	4	**External Marks:**	60

UNIT I

Stepper Motors

Constructional features, Principle of operation, Modes of excitation torque production in Variable Reluctance (VR) stepping motor, Dynamic characteristics, Drive systems and circuit for open loop control, closed loop control of stepping motor.

UNIT II

Permanent Magnet Synchronous Motors (PMSM) and Switched Reluctance Motors (SRM)

PMSM: Power electronic controllers, Torque speed characteristics, Self control, Vector control, Current control - SRM: Constructional features, Principle of operation. Torque equation, Characteristics, Control Techniques, Drive concept.

UNIT III

Permanent Magnet Brushless DC Motors

Concept of electronic commutation, Hall sensors, Optical sensors, back emf detection, Multiphase Brushless motor, Square wave permanent magnet brushless motor drives, Torque and emf equation, Torque-speed characteristics, Speed control by microcontroller.

UNIT IV

Servomotors and AC Tachometers

Servomotor – Types – Constructional features – Principle of Operation – Characteristics - Control – Microprocessor based applications.

AC Tachometers: Permanent magnet ac tachometer, AC induction tachometer, Schematic diagrams, Operating principle.

UNIT V

Linear Motors

Linear Motors: Linear Induction Motor (LIM) Classification – Construction – Principle of operation – Concept of Current sheet –Goodness factor – DC Linear Motor (DCLM) types – Circuit equation – DCLM control-applications.

TEXT BOOKS:

1. Miller, T.J.E. "Brushless Permanent Magnet and Reluctance Motor Drives", Clarendon ,Press, Oxford, 1989.
2. Kenjo, T, "Stepping Motors and their Microprocessor control", Clarendon Press, Oxford, 1989.
3. Naser A and Boldea I, "Linear Electric Motors: Theory, Design and Practical Application", Prentice Hall Inc., New Jersey,1987
4. Special Electrical Machines-K.Venkataratnam- University press

REFERENCE BOOKS:

1. Floyd E Saner,"Servo Motor Applications", Pittman USA, 1993.
2. Kenjo, T and Naganori, S "Permanent Magnet and brushless DC motors", Clarendon Press, Oxford, 1989.
3. Generalized Theory of Electrical Machines – P.S.Bimbra-Khanna publications-5th edition- 1995

E-RESOURCES:

1. http://nptel.ac.in/course.php
2. http://jntuk-coeerd.in/

18EEPE206C - PROGAMMABLE LOGIC CONTROLLERS & APPLICATIONS

Lecture – Tutorial:	4-0	**Internal Marks:**	40
Credits:	4	**External Marks:**	60

UNIT I

PLC Basics: PLC system, I/O modules and interfacing, CPU processor, programming equipment, programming formats, construction of PLC ladder diagrams, devices connected to I/O modules

UNIT II

PLC Programming: Input instructions, outputs, operational procedures, programming examples using contacts and coils. Drill press operation. Digital logic gates, programming in the Boolean algebra system, conversion examples. Ladder diagrams for process control: Ladder diagrams and sequence listings, ladder diagram construction and flow chart for spray process system.

UNIT III

PLC Registers: Characteristics of Registers, module addressing, holding registers, input registers, output registers. PLC Functions: Timer functions and Industrial applications, counters, counter function industrial applications, Arithmetic functions, Number comparison functions, number conversion functions.

UNIT IV

Data Handling functions: SKIP, Master control Relay, Jump, Move, FIFO, FAL, ONS, CLR and Sweep functions and their applications. Bit Pattern and changing a bit shift register, sequence functions and applications, controlling of two axis and three axis Robots with PLC, Matrix functions.

UNIT V

Analog PLC operation: Analog modules and systems, Analog signal processing, multi bit data processing, analog output application examples, PID principles, position indicator with PID control, PID modules, PID tuning, PID functions.

TEXT BOOKS:

1. Programmable Logic Controllers – Principle and Applications by John W. Webb and Ronald A. Reiss, Fifth Edition, PHI
2. Programmable Logic Controllers – Programming Method and Applications by JR. Hackworth and F.D Hackworth Jr. – Pearson, 2004.

REFERENCE BOOKS:

1. Introduction to Programmable Logic Controllers- Gary Dunning-Cengage Learning.
2. Programmable Logic Controllers –W.Bolton-Elsevier publisher.

E-RESOURCES:

1. http://nptel.ac.in/course.php
2. http://jntuk-coeerd.in/

18EEPE261- POWER CONVERTERS AND DRIVES LAB

Practice:	3	**Internal Marks:**	40
Credits:	2	**External Marks:**	60

List of Experiments:

1. Analysis and speed control of DC motor drive using 3-phase full Converter.
2. Analysis of a four quadrant Chopper feeding DC motor.
3. Analysis of a 3-phase A.C. Voltage controller fed to R & RL - load.
4. Analysis of Buck, Boost, Buck-Boost DC-DC converters.
5. Analysis of Single Phase IGBT based PWM Inverter connected to R & R-L load.
6. Analysis of 3-phase IGBT based PWM Inverter feeding R & R-L load.
7. Analysis and speed control of 3 phase slip ring Induction motor by Static Rotor Resistance controller.
8. Analysis of three phase SVPWM Pulse generation using PIC Micro controller/DSP processor.
9. Analysis of DSP based V/F Control of 3 phase Induction motor.
10. Analysis of vector control-based speed control of three phase Induction Motor drive.

EQUIPMENT REQUIRED:

REFERENCE BOOKS:

1. Robert W. Erickson &Dragon Maksimovic" Fundamentals of Power Electronics" Second Edition, 2001 Springer science and Business media
2. Ned Mohan,T.MUndeland and W.P Robbin, "Power Electronics converters, Applicationand design" John Wiley and sons.Wiley India edition, 2006.
3. Fundamentals of Power Electronics With MATLAB Randall Sbaffer.
4. Rashid M.H., "Power Electronics Circuits, Devices and Applications ", PrenticeHal India,New Delhi, 1995.

E-RESOURCES:

1.
2.
3.
4.

VIRTUAL LABS:

1.
2.
3.

NRI INSTITUTE OF TECHNOLOGY

An Autonomous Institution, Permanently Affiliated to JNTUK, Kakinada
(Accredited by NAAC with "A" Grade and ISO 9001:2015 Certified Institute)
Pothavarappadu (V), Via Nunna, Agiripalli (M), PIN-521 212.

COURSE STRUCTURE FOR

M.TECH

IN

THERMAL ENGINEERING

DEPARTMENT OF MECHANICAL ENGINEERING

M·Tech

SEMESTER-I

S.No.	Subject	L	P	C
1	Optimization Techniques & Applications	4	--	3
2	Advanced Thermodynamics	4	--	3
3	Advanced Heat & Mass Transfer	4	--	3
4	Advanced Fluid Mechanics	4	--	3
5	**Elective – I** 1. Gas Dynamics 2. Refrigeration & Cryogenics 3. Renewable Energy Technologies 4. Theory and Technologies of Fuel Cells	4	--	3
6	**Elective – II** 1. Advanced IC Engines 2. Solar Energy Technology 3. Turbo Machines 4. Alternative Fuels Technologies	4	--	3
7	Thermal Engineering Lab	--	3	2
Total Credits				**20**

18METE102 ADVANCED THERMODYNAMICS

Lectures : 4 Periods / Week **Internal Assessment : 40**
Semester end Exam : 3 hrs **Semester end Examination : 60**
Credits : 3

UNIT -I:

REVIEW OF THERMODYNAMIC LAWS AND COROLLARIES: Transient flow analysis, Second law thermodynamics, Entropy, Availability and unavailability, Thermodynamic potential. Maxwell relations, Specific heat relations, Mayer's relation. Evaluation of thermodynamic properties of working substance

UNIT-II:

P.V.T SURFACE: Equation of state. Real gas behavior, Vander Waal's equation, Generalization compressibility factor. Energy properties of real gases. Vapour pressure, Clausius, Clapeyro equation. Throttling, Joule. Thompson coefficient. Non reactive mixtures of perfect gases. Governing laws, Evaluation of properties, Psychometric mixture properties and psychometric chart, Air conditioning processes, cooling towers. Real gas mixture.

UNIT-III:

COMBUSTION: Combustion Reactions, Enthalpy of formation. Entropy of formation, Reference levels of tables. Energy of formation, Heat reaction, Adiabatic flame temperature generated product, Enthalpies, Equilibrium. Chemical equilibrium of ideal gased, Effect of non reacting gases equilibrium in multiple reactions, The vent hoff's equation. The chemical potential and phase equilibrium. The Gibbs phase rule.

UNIT-IV:

POWER CYCLES: Review binary vapour cycle, co generation and combined cycles, Second law analysts of cycles. Refrigeration cycles. Thermodynamics off irreversible processes. Introduction, Phenomenological laws, Onsaga Reciprocity relation, Applicability of the Phenomenological relations, Heat flux and entropy production, Thermodynamic phenomena, Thermo electric circuits.

UNIT V:

DIRECT ENERGY CONVERSION INTRODUCTION: Fuel cells, Thermo electric energy, Thermo ionic power generation, Thermodynamic devices magneto hydronamic generations, Photovoltaic cells.

TEXT BOOKS:

1. Basic and Applied Thermodynamics/ P.K.Nag/ TMH
2. Thermodynamics/Holman/ Me Graw Hill.

REFERENCES

1. Engg. Thermodynamics/P.L.Dhar / Elsevier

18METE101 Optimization Techniques & Applications

Lectures : 4 Periods / Week
Semester end Exam : 3 hrs
Credits : 3

Internal Assessment : 40
Semester end Examination : 60

UNIT I:

Single variable non linear unconstrained optimization: One dimensional minimization methods:- Uni-modal function ,elimination methods, unrestricted search, exhaustive search,, Fibonacci method, golden section method, interpolation method.

UNIT II:

Multi variable non-linear unconstrained optimization: Direct search method, search methods, invariant method, pattern search method, Rossen - Brocks method of rotating decent methods, gradient of function, steepest decent method, Fletcher Reeves method, variable metric method.

UNIT III:

Geometric programming: Polynomial – arithmetic - geometric inequality – unconstrained G.Pconstrained

G.P. DYNAMIC PROGRAMMING: Multistage decision process, principles of optimality, examples, conversion of final problem to an initial value problem, application of dynamic programming , production inventory, allocation, scheduling replacement.

UNIT IV:

Linear programming – Formulation – Sensitivity analysis. Change in the constraints, cost coefficients, coefficients of the constraints, addition and deletion of variable, constraints. Simulation – Introduction – Types- steps – application – inventory – queuing – thermal system. Integer Programming- Introduction – formulation – Gomory cutting plane algorithm – Zero or one algorithm, branch and bound method.

UNIT V:

Stochastic programming: Basic concepts of probability theory, random variables- distributions-mean, variance, correlation, co variance, joint probability distribution- stochastic linear, dynamic programming.

Text Books:

1. Optimization theory & Applications / S.S.Rao / New Age International.
2. Introductory to operation Reasearch / Kasan & Kumar / Springar.
3. Optimization Techniques theory and practice / M.C.Joshi, K.M.Moudgalya/ Narosa Publications

Reference Books :

1. S.D.Sharma / Operations Research
2. Operation Reasearch / H.A.Taha /TMH
3. Optimization in operations research / R.LRardin /
1. Optimization Techniques /Chandraputla

18METE103 ADVANCED HEAT & MASS TRANSFER

Lectures : 4 Periods / Week **Internal Assessment : 40**
Semester end Exam : 3 hrs **Semester end Examination : 60**
Credits : 3

UNIT-I:

BRIEF INTRODUCTION TO DIFFERENT MODES OF HEAT TRANSFER: Conduction: General heat Conduction equation-initial and boundary conditions.

Transient heat conduction: Lumped system analysis-Heisler charts-semi infinite solid-use of shape factors in conduction-2D transient heat conduction-product solutions.

UNIT- II:

FINITE DIFFERENCE METHODS FOR CONDUCTION: ID & 2D steady state and simple transient heat conduction problems-implicit and explicit methods.

Forced Convection: Equations of fluid flow-concepts of continuity, momentum equations derivation of energy equation-methods to determine heat transfer coefficient: Analytical methods dimensional analysis and concept of exact solution. Approximate method-integral analysis.

UNIT-III:

EXTERNAL FLOWS: Flow over a flat plate: integral method for laminar heat transfer coefficient for different velocity and temperature profiles. Application of empirical relations to variation geometries for laminar and turbulent flows.

Internal flows: Fully developed flow: integral analysis for laminar heat transfer coefficienttypes of flow-constant wall temperature and constant heat flux boundary conditionshydrodynamic & thermal entry lengths; use of empirical correlations.

UNIT-IV:

FREE CONVECTION: Approximate analysis on laminar free convective heat transfer boussinesque approximation-different geometries-combined free and forced convection.

Boiling and condensation: Boiling curve-correlations-Nusselts theory of film condensation on a vertical plate-assumptions & correlations of film condensation for different geometries.

UNIT-V:

RADIATION HEAT TRANSFER: Radiant heat exchange in grey, non-grey bodies, with transmitting. Reflecting and absorbing media, specular surfaces, gas radiation-radiation from flames.

Mass Transfer: Concepts of mass transfer-diffusion & convective mass transfer analogies-significance of non-dimensional numbers.

TEXT BOOKS:

1. Principals of Heat Transfer/Frank Kreith/Cengage Learning
2. Heat Transfer / Necati Ozisik / TMH

REFERENCES:

1. Fundamentals of Heat and Mass Transfer-5th Ed. / Frank P. Incropera/John Wiley

2. Thermodynamics/Sonnatag & Van Wylen / John Wiley & Sons
3. Thermodynamics for Engineers/Doolittle-Messe / John Wiley & Sons
4. Irreversible thermodynamics/HR De Groff.
5. Thermal Engineering / Soman / PHI
6. Thermal Engineering / Rathore / TMH
7. Engineering Thermodynamics/Chatopadyaya/

18METE104 ADVANCED FLUID MECHANICS

Lectures : 4 Periods / Week
Semester end Exam : 3 hrs
Credits : 3

Internal Assessment : 40
Semester end Examination : 60

UNIT I:

INVISCID FLOW OF INCOMPRESSIBLE FLUIDS: Lagrangian and Eulerain Descriptions of fluid motion- Path lines, Stream lines, Streak lines, stream tubes – velocity of a fluid particle, types of flows, Equations of three dimensional continuity equation- Stream and Velocity potential functions.

Basic Laws of fluid Flow: Condition for irrotationality, circulation & vorticity Accelerations in Cartesystems normal and tangential accelerations, Euler's, Bernouli equations in 3D– Continuity and Momentum Equations

UNIT II:

Viscous Flow: Derivation of Navier-Stoke's Equations for viscous compressible flow – Exact solutions to certain simple cases : Plain Poisoulle flow - Coutte flow with and without pressure gradient - Hagen Poisoulle flow - Blasius solution.

UNIT III:

Boundary Layer Concepts : Prandtl's contribution to real fluid flows – Prandtl's boundary layer theory - Boundary layer thickness for flow over a flat plate – Approximate solutions – Creeping motion (Stokes) – Oseen's approximation - Von-Karman momentum integral equation for laminar boundary layer — Expressions for local and mean drag coefficients for different velocity profiles.

UNIT IV:

Introduction to Turbulent Flow: Fundamental concept of turbulence – Time Averaged Equations – Boundary Layer Equations - Prandtl Mixing Length Model - Universal Velocity Distribution Law: Van Driest Model –Approximate solutions for drag coefficients – More Refined Turbulence Models – k-epsilon model - boundary layer separation and form drag – Karman Vortex Trail, Boundary layer control, lift on circular cylinders

Internal Flow: Smooth and rough boundaries – Equations for Velocity Distribution and frictional Resistance in smooth rough Pipes – Roughness of Commercial Pipes – Moody's diagram.

UNIT V:

Compressible Fluid Flow – I: Thermodynamic basics – Equations of continuity, Momentum and Energy - Acoustic Velocity Derivation of Equation for Mach Number – Flow Regimes – Mach Angle – Mach Cone – Stagnation State

Compressible Fluid Flow – II: Area Variation, Property Relationships in terms of Mach number, Nozzles, Diffusers – Fanno and Releigh Lines, Property Relations – Isothermal Flow in

2. Elements of Heat Transfer/E. Radha Krishna/CRC Press/2012
3. Introduction to Heat Transfer/SK Som/PHI
4. Heat Transfer / Nellis & Klein / Cambridge University Press / 2012.
5. Heat Transfer/ P.S. Ghoshdastidar/ Oxford Press
6. Engg. Heat & Mass Transfer/ Sarit K. Das/Dhanpat Rai
7. Heat Transfer/ P.K.Nag /TMH
8. Heat Transfer / J.P Holman/MGH

18METE105A GAS DYNAMICS

Lectures : 4 Periods / Week
Semester end Exam : 3 hrs
Credits : 3

Internal Assessment : 40
Semester end Examination : 60

UNIT I:- Basic concepts : Introduction to compressible flow, A brief review of thermodynamics and fluid mechanics, Integral forms of conservation equations, Differential conservation equations, Continuum Postulates, Acoustic speed and Mach number, Governing equations for compressible flows

UNIT II:-One-dimensional compressible flow: One dimensional flow concept, Isentropic flows, Stagnation/Total conditions, Characteristics speeds of gas dynamics, Dynamic pressure and pressure coefficients, Normal shock waves, Rankine-Hugonoit equations, Rayleigh flow, Fanno flow, Crocco's theorem.

UNIT III :- Two-dimensional flows: Oblique shock wave and its governing equations, θ-B-M relations, The Hodograph and Shock Polar, Supersonic flow over wedges and cones, Mach line, Attached and Detached shock, Reflections and interaction of oblique shock waves, Expansion waves, Prandtl-Meyer flow and its governing equations, Supersonic flow over convex and concave corners, Approximation of continuous expansion waves by discrete waves.

UNIT IV:- Quasi-one dimensional flows: Governing equations, Area velocity relations, Isentropic flow through variable-area ducts, Convergent-divergent (or De Laval) nozzles, Overexpanded and under-expanded nozzles, Diffusers.

UNIT V :- Unsteady wave motions: Moving normal shock waves, Reflected shock waves, Physical features of wave propagation, Elements of acoustic theory, Incident and reflected waves, Shock tube relations, Piston analogy, Incident and reflected expansion waves, Finite compression waves, Shock tube relations.

Introduction to experimental facilities: Subsonic wind tunnels, Supersonic wind tunnels, Shock tunnels, Free-piston shock tunnel, Detonation-driven shock tunnels, and Expansion tubes.

TEXT BOOKS:

1. Gas Damics by S.M Yahya
2. Gas Dynamics by Radha Krishnan

REFERENCES:

1. Gas Dyanamics by Zucker
2. Dynamics and Thermodynamics of compressible fluid flow (Vol. I, II) by Ascher H.Shapiro
3. Elements of Gas Dynamics by H.W. Liepmann and A. Roshko
4. Fundamentals of Gas Dynamics by V. Babu
5. Modern Compressible Flow by John D. Anderson,Jr.

Long Ducts – Normal Compressible Shock, Oblique Shock: Expansion and Compressible Shocks – Supersonic Wave Drag.

TEXT BOOKS:

1. Fluid Mechanics / L.Victor Steeter / TMH
2. 2. Fluid Mechanics / Frank M.White / MGH

REFERENCES:

1. Fluid Mechanics and Machines/Modi and Seth/Standard Book House
2. Fluid Mechanics/Cohen and Kundu/Elsevier/5th edition
3. Fluid Mechanics/Potter/Cengage Learning
4. Fluid Mechanics/William S Janna/CRC Press
5. Fluid Mechanics / Y.A Cengel and J.M Cimbala/MGH
6. Boundary Layer Theory/ Schlichting H /Springer Publications
7. Dynamics & Theory and Dynamics of Compressible Fluid Flow/ Shapiro.
8. Fluid Dynamics/ William F. Hughes & John A. Brighton/TMH

18METE105B REFRIGERATION AND CRYOGENICS

Lectures : 4 Periods / Week | **Internal Assessment : 40**
Semester end Exam : 3 hrs | **Semester end Examination : 60**
Credits : 3

Unit-I: VAPOUR COMPRESSION REFRIGERATION SYSTEMS: Analysis of vapour compression refrigeration cycle

COMPOUND VAPOUR COMPRESSION SYSTEM: Removing of flash gas – inter cooling – compound compression ultra water inter cooler -liquid flash cooler – flash inlet cooler, multiple evaporator and compression systems, one compressor system – individual compressors – compound compression – cascade systems.

Unit-II: ABSOPTION REFRIGERATION SYSTEM WITH MULTIPLE EVOPARATORS

Three fluid absorption systems-the Lithium Bromide water absorption system, Steam jet water vapour systems – thermoelectric refrigeration systems – vortex refrigeration system – pulse tube refrigeration. Desirable properties of refrigerants – designation of refrigerants – inorganic, halo carbon refrigerants – inorganic halo carbon reactions- secondary refrigerants – reaction of refrigerants with moisture and oil – properties of mixtures of refrigerants – ozone depletion potential and global warming potential of CFC refrigerants – substitutes for CFC refrigerants

Unit-III : CRYOGENICS

Introduction necessity of low temperature - Multistage Refrigeration system -Cascade system - Manufacture of dry ice-Joule Thompson coefficient.

Liquification of air - Linde system- Analysis- Dual pressure cycle analysis-Liquefaction of Hydrogen and Helium-problems.

UNIT-IV: APPLICATION OF LOWER TEMPERATURES

Effects on the properties of metals-strength-Thermal properties-super conductivity-super fluidity. Applications like expansion fitting - cryobiology-cryosurgery - space research-computers underground power lines.

UNIT- V: LOW TEMPERATURE INSULATION

Reflective insulation-Evacuated powders-Rigid foams-Super insulation. Cooling by adiabatic demagnetization - Gas separation and cryogenic systems separation of gases- Rectifying columns- Air separating- single and double columns Air separation plant. Storage and handling of cryogenic liquids - Dewars and other types of containers

TEXT BOOKS:

1. C.P. Arora, *Refrigeration & Air-Conditioning by* TMH
2. R.F Barron ,*Cryogenic Systems* , Oxford University Press .

REFERENCE BOOKS:

1. Stoecker W.F.*Refrigeration & Air-Conditioning, and Jones,* J.W., McGraw Hill
2. Manohar Prasad, *Refrigeration & Air-Conditioning* , New Age .
3. Domkunduwar, *Refrigeration & Air-Conditioning and Arora* , Dhanpatrai & Sons

18METE105C RENEWABLE ENERGY TECHNOLOGIES

Lectures : 4 Periods / Week **Internal Assessment : 40**
Semester end Exam : 3 hrs **Semester end Examination : 60**
Credits : 3

UNIT-I

Introduction, Energy Scenario, Survey of energy resources. Classification and need for conventional energy resources.

Solar Energy: The Sun-sun-Earth relationship, Basic matter to waste heat energy circuit, Solar Radiation, Attention, Radiation measuring instruments.

Solar Energy Applications: Solar water heating. Space heating, Active and passive heating. Energy storage. Selective surface. Solar stills and ponds, solar refrigeration, Photovoltaic generation.

UNIT -II

GEOTHERMAL ENERGY: Structure of earth, Geothermal Regions, Hot springs. Hot Rocks, Hot Aquifers. Analytical methods to estimate thermal potential. Harnessing techniques, Electricity generating systems.

UNIT-III

DIRECT ENERGY CONVERSION: Nuclear Fusion: Fusion, Fusion reaction, P-P cycle, Carbon cycle, Deuterium cycle, Condition for controlled fusion, Fuel cells and photovoltaic. Thermionic & thermoelectric generation, MHD generator.

Hydrogen Gas as Fuel: Production methods, Properties, I.C. Engines applications, Utilization strategy, Performances.

UNIT-IV

BIO-ENERGY: Biomass energy sources. Plant productivity, Biomass wastes, aerovic and Anaerobic bioconversion processed, Raw metrical and properties of bio-gas, Bio-gas plant technology and status, the energetic and economics of biomass systems, Biomass gasification

UNIT V:

WIND ENERGY: Wind, Beaufort number, Characteristics, Wind energy conversion systems, Types, Betz model. Interference factor. Power coefficient, Torque coefficient and Thrust coefficient, Lift machines and Drag machines. Matching, Electricity generation.

Energy From Oceans: Tidal energy. Tides. Diurnal and semi-diurnal nature, Power from tides, Wave Energy, Waves, Theoretical energy available. Calculation of period and phase velocity of waves, Wave power systems, Submerged devices. Ocean thermal Energy, Principles, Heat exchangers, Pumping requirements, Practical considerations.

TEXT BOOK:

1. Renewable Energy Resources/ John Twidell & Tony Weir/Taylor & Francis/2nd edition

REFERENCES:

1. Renewable Energy Resources- Basic Principles and Applications/ G.N.Tiwari and M.K.Ghosal/ Narosa Publications

2. Biological Energy Resources/ Malcolm Fleischer & Chris Lawis/E&FN Spon

18METE105D THEORY AND TECHNOLOGIES OF FUEL CELLS

Lectures : 4 Periods / Week
Semester end Exam : 3 hrs
Credits : 3

Internal Assessment : 40
Semester end Examination : 60

UNIT I : INTRODUCTION

Relevance, Principle, various configurations (Alkaline, Acid, Proton Exchange Membrane, direct methanol, molten carbonate and solid oxide fuel cells) fuel cell applications. Basic theory of electrochemistry, electrochemical energy conversion, electrochemical techniques. Thermodynamics of fuel cells. Heat and mass transfer in fuel cells. Single cell characteristics.

UNIT II: MODELLING

Electrochemical model. Heat and mass transfer model. System thermodynamic model.

UNIT III: LOW AND HIGH TEMPERATURE FUEL CELLS

Proton exchange membrane fuel cell (PEMFC) and direct methanol fuel cell (DMFC): their special features and characteristics. Molten carbonate fuel cell (MCFC) and solid oxide fuel cell (SOFC) for power generation, their special features and characteristics.

UNIT IV: FUELS AND FUEL PROCESSING

Availability, production and characteristics of Hydrogen , fossil fuel – diverted fuels and biomass- diverted fuels. Principles of design of PEMFC, DMFC and SOFC.

UNIT V: FUEL CELL SYSTEM

Materials, component, stack, interconnects, internal and external reforming, system layout, operation and performance.

TEXT BOOKS:

1. Basu, S. (Ed) Fuel Cell Science and Technology, Springer, N.Y. (2007).
2. O'Hayre, R. P., S. Cha, W. Colella, F. B. Prinz, Fuel Cell Fundamentals, Wiley, NY(2006)

REFERENCES:

1. J., Dick A., Fuel Cell Systems Explained, 2nd Ed. Wiley, 2003.
2. Liu, H., Principles of fuel cells, Taylor & Francis, N.Y. (2006).
3. Bard, A. J. , L. R., Faulkner, Electrochemical Methods, Wiley, N.Y. (2004) Ref Book.
4. M.T.M. Koper (ed.), Fuel Cell Catalysis, Wiley, Larminie 2009.
5. J.O'M. Bockris, A.K.N. Reddy, Modern Electrochemistry, Springer 1998.

18METE106A ADVANCED I.C. ENGINES

Lectures : 4 Periods / Week
Semester end Exam : 3 hrs
Credits : 3

Internal Assessment : 40
Semester end Examination : 60

UNIT - I: Introduction – Historical Review – Engine Types – Design and operating Parameters.
Cycle Analysis: Thermo-chemistry of Fuel – Air mixtures, properties – Ideal Models of Engine cycles – Real Engine cycles - differences and Factors responsible – Computer Modeling.

UNIT - II:
GAS EXCHANGE PROCESSES: Volumetric Efficiency – Flow through ports – Supercharging and Turbo charging.
Charge Motion: Mean velocity and Turbulent characteristics – Swirl, Squish – Pre-chamber Engine flows.

UNIT - III:
COMBUSTION IN S.I ENGINES: Combustion and Speed – Cyclic Variations – Ignition – Abnormal combustion Fuel factors, MPFI, SI engine testing P-θ diagram.
Combustion in CI engines: Essential Features –Fuel Spray Behavior – Ignition Delay – Mixing Formation and control, Common rail fuel injection system.

UNIT - IV:
POLLUTANT FORMATION AND CONTROL: Nature and extent of problems – Nitrogen Oxides, Carbon monoxide, unburnt Hydrocarbon and particulate Emissions – Measurement – Exhaust Gas Treatment, Catalytic converter, SCR, Particulate Traps, Lean, NOx, Catalysts.

UNIT - V:
ENGINE HEAT TRANSFER: Importance of heat transfer, heat transfer and engine energy balance, Convective heat transfer , radiation heat transfer, Engine operating characteristics. Fuel supply systems for S.I. and C.I engines to use gaseous fuels like LPG, CNG and Hydrogen.
Modern Trends in IC Engines: Lean Burning and Adiabatic concepts, Rotary Engines, Modification in I.C engines to suit Bio – fuels, HCCI and GDI concepts.

TEXT BOOK:
1. I.C. Engines Fundamentals/J.B Heywood/TMH

REFERENCES:
1. I.C. Engines / V.Ganesan/TMH
2. I.C. Engines/G.K. Pathak & DK Chevan/ Standerd Publications
3. Computer Simulation of C.I. Engine Process/ V.Ganesan/University Press
4. Fundamentals of IC Engines/HN Gupta/PHI/2nd edition
5. I.C. Engines/Fergnson/Wiley
6. The I.C. Engine in theory and Practice Vol.I / Teylor / IT Prof. And Vol.II

18METE106B SOLAR ENERGY TECHNOLOGY

Lectures : 4 Periods / Week
Semester end Exam : 3 hrs
Credits : 3

Internal Assessment : 40
Semester end Examination : 60

UNIT - I

Introduction – Solar energy option, specialty and potential – Sun – Earth – Solar radiation, beam and diffuse – measurement – estimation of average solar radiation on horizontal and tilted surfaces – problems – applications. Capturing solar radiation – physical principles of collection – types – liquid flat plate collectors – construction details – performance analysis – concentrating collection – flat plate collectors with plane reflectors – cylindrical parabolic collectors – Orientation and tracking – Performance Analysis.

UNIT - II

DESIGN OF SOLAR WATER HEATING SYSTEM AND LAYOUT

Power generation – solar central receiver system – Heliostats and Receiver – Heat transport system – solar distributed receiver system – Power cycles, working fluids and prime movers, concentration ratio.

UNIT - III

THERMAL ENERGY STORAGE: Introduction – Need for – Methods of sensible heat storage using solids and liquids – Packed bed storage – Latent heat storage – working principle – construction – application and limitations. Other solar devices – stills, air heaters, dryers, Solar Ponds & Solar Refrigeration, active and passive heating systems.

UNIT - IV

DIRECT ENERGY CONVERSION: solid-state principles – semiconductors – solar cells – performance – modular construction – applications. conversion efficiencies calculations.

UNIT - V

ECONOMICS: Principles of Economic Analysis – Discounted cash flow – Solar system – life cycle costs – cost benefit analysis and optimization – cost based analysis of water heating and photo voltaic applications.

TEXT BOOK:

1. Principles of solar engineering/ Kreith and Kerider/Taylor and Franscis/2nd edition

REFERENCES:

1. Solar energy thermal processes/ Duffie and Beckman/John Wiley & Sons
2. Solar energy: Principles of Thermal Collection and Storage/ Sukhatme/TMH/2nd edition
3. Solar energy/ Garg/TMH
4. Solar energy/ Magal/Mc Graw Hill
5. Solar Thermal Engineering Systems / Tiwari and Suneja/Narosa
6. Power plant Technology/ El Wakil/TMH

18METE106C TURBO MACHINES

Lectures : 4 Periods / Week
Semester end Exam : 3 hrs
Credits : 3

Internal Assessment : 40
Semester end Examination : 60

UNIT-I:

FUNDAMENTALS OF TURBO MACHINES: Classifications, Applications, Thermodynamic analysis, Isentropic flow. Energy transfer. Efficiencies, Static and Stagnation conditions, Continuity equations, Euler's flow through variable cross sectional areas, Unsteady flow in turbo machines

UNIT -II:

STEAM NOZZLES: Convergent and Convergent-Divergent nozzles, Energy Balance, Effect of back pressure of analysis. Designs of nozzles.

Steam Turbines: Impulse turbines, Compounding, Work done and Velocity triangle, Efficiencies, Constant reactions, Blading, Design of blade passages, Angle and height, Secondary flow. Leakage losses, Thermodynamic analysis of steam turbines.

UNIT-III:

GAS DYNAMICS: Fundamental thermodynamic concepts, isentropic conditions, mach numbers and area, Velocity relations, Dynamic Pressure, Normal shock relation for perfect gas. Super sonic flow, oblique shock waves. Normal shock recoveries, Detached shocks, Aerofoil theory.

Centrifugal compressor: Types, Velocity triangles and efficiencies, Blade passage design, Diffuser and pressure recovery. Slip factor, Stanitz and Stodolas formula's, Effect of inlet mach numbers, Pre whirl, Performance

UNIT-IV:

AXIAL FLOW COMPRESSORS: Flow Analysis, Work and velocity triangles, Efficiencies, Thermodynamic analysis. Stage pressure rise, Degree of reaction, Stage Loading, General design, Effect of velocity, Incidence, Performance

Cascade Analysis: Geometrical and terminology. Blade force, Efficiencies, Losses, Free end force, Vortex Blades.

UNIT-V:

AXIAL FLOW GAS TURBINES: Work done. Velocity triangle and efficiencies, Thermodynamic flow analysis, Degree of reaction, Zweifels relation, Design cascade analysis, Soderberg, Hawthrone, Ainley, Correlations, Secondary flow, Free vortex blade, Blade angles for variable degree of reaction. Actuator disc, Theory, Stress in blades, Blade assembling, Material and cooling of blades, Performances, Matching of compressors and turbines, Off design performance.

TEXTBOOK:

1. Principles of Turbo Machines/DG Shepherd / Macmillan

REFERENCES:

1. Fundamentals of Turbomachinery/William W Perg/John Wiley & Sons
2. Element of Gas Dynamics/Yahya/TMH
3. Principles of Jet Propulsion and Gas Turbine/NJ Zucrow/John Wiley & Sons/Newyork
4. Turbines, Pumps, Compressors/Yahya/TMH
5. Theory and practice of Steam Turbines/ WJ Kearton/ELBS Pitman/London
6. Element of Gas Dynamics/Liepeman and Roshkow/ Dover Publications

18METE106D ALTERNATIVE FUELS TECHNOLOGIES

Lectures : 4 Periods / Week
Semester end Exam : 3 hrs
Credits : 3

Internal Assessment : 40
Semester end Examination : 60

UNIT I:-

Fossil fuels and their limitations; Engine requirements; Potential alternative liquid and gaseous fuels.

UNIT II:-

Methods of production; Properties, safety aspects, handling and distribution of various liquid alternative fuels like alcohols, vegetable oils, Di-methyl and Di-ethyl ether etc.

UNIT III:-

Different ways of using alternative liquid fuels in engines, performance and emission characteristics; Conversion of vegetable oils to their esters and effect on engine performance.

UNIT IV:-

Use of gaseous fuels like biogas, LPG, hydrogen, natural gas, producer gas etc. in SI/CI engines; Production, storage, distribution and safety aspects of gaseous fuels.

UNIT V:-

Different approaches like duel fuel combustion and surface ignition to use alternative fuels in engines; Use of additives to improve the performance with alternative fuels; Hybrid power plants and fuel cell.

TEXT BOOK:

1. Alternative Fuels: The Future of Hydrogen, Second Edition, Michael Frank Hordeski, CRC Press

REFERENCES:

1. Alternative Fuels for Transportation, A S Ramadhas, CRC Press
2. Alternative Fuels & Advanced Technology Vehicles: Incentives & Considerations, Thomas Huber, Jack Spera, Nova Science Publishers.

18METE161 THERMAL ENGINEERING LABORATORY

Practicals : 3 Periods / Week
Semester end Exam : 3 hrs
Credits : 2

Internal Assessment : 40
Semester end Examination : 60

1. Compressibility factor measurement of different real gases.
2. Dryness fraction estimation of steam.
3. Flame propagation analysis of gaseous fuels.
4. Performance test and analysis of exhaust gases of an I.C. Engine.
5. Heat Balance sheet, Volumetric Efficiency and air fuel ratio estimation of an I.C. Engine.
6. COP estimation of vapour compression refrigeration test.
7. Performance analysis of Air conditioning unit.
8. Performance analysis of heat pipe.
9. Performance evaluation of Solar Flat Plate Collector
10. Performance evaluation of Shell and Tube heat exchanger.
11. Performance evaluation of combined steam and gas power generation cycle.
12. Measurement of boundary layer thickness over an object using wind tunnel.

M.Tech

SEMESTER-II

S.No.	Subject	L	P	C
1	Fuels, Combustion & Environment	4	--	3
2	Energy Management	4	--	3
3	Finite Element Method	4	--	3
4	Computational Fluid Dynamics	4	--	3
5	**Elective– III** 1. Materials Technology 2. Convective Heat Transfer 3. Thermal and Nuclear Power Plants 4. Advanced Automobile Engineering	4	--	3
6	**Elective– IV** 1. Thermal Measurements and Process Controls 2. Cryogenic Engineering 3. Jet Propulsion and Rocketry 4. Equipment Design for Thermal Systems	4	--	3
7	Thermal Systems Design Lab	--	3	2
	Total Credits			**20**

M.Tech

SEMESTER-III

S. No.	Subject	L	P	Credits
1	Comprehensive Viva-Voce	--	--	2
2	Seminar – I	--	--	2
3	Project Work Part - I	--	--	16
	Total Credits			**20**

SEMESTER-IV

S. No.	Subject	L	P	Credits
1	Seminar – II	--	--	2
2	Project Work Part - II	--	--	18
	Total Credits			**20**

Head, Mechanical Department
NRI Institute of Technology
POTHAVARAPPADU (V)
Agiripalli (Mdl), Krishna Dt.

18METE201 FUELS, COMBUSTION AND ENVIRONMENT

Lectures : 4 Periods / Week
Semester end Exam : 3 hrs
Credits : 3

Internal Assessment : 40
Semester end Examination : 60

UNIT – I:

FUELS: Detailed classification – Conventional and Unconventional Solid, Liquid, gaseous fuels and nuclear fuels – Origin of Coal – Analysis of coal.

Coal – Carborisation, Gasification and liquification – Lignite: petroleum based fuels – problems associated with very low calorific value gases: Coal Gas – Blast Furnace Gas - Alcohols and Biogas.

UNIT – II :

PRINCIPLES OF COMBUSTION: Chemical composition – Flue gas analysis – dew point of products – Combustion stochiometry. Chemical kinetics – Rate of reaction – Reaction order – Molecularity – Zeroth, first, second and third order reactions - complex reactions – chain reactions. Theories of reaction Kinetics – General oxidation behavior of HC's.

UNIT – III:

THERMODYNAMICS OF COMBUSTION: Enthalpy of formation – Heating value of fuel - Adiabatic flame Temperature – Equilibrium composition of gaseous mixtures.

UNIT – IV:

LAMINAR AND TURBULENT FLAMES PROPAGATION AND STRUCTURE: Flame stability – Burning velocity of fuels – Measurement of burning velocity – factors affecting the burning velocity.

Combustion of fuel, droplets and sprays – Combustion systems – Pulverized fuel furnaces – fixed, Entrained and Fluidised Bed Systems.

UNIT – V:

ENVIRONMENTAL CONSIDERATIONS: Air pollution – Effects on Environment, Human Health etc. Principal pollutants – Legislative Measures – Methods of Emission control.

TEXT BOOK:

1. Fuels and combustion / Sharma and Chander Mohan/ Tata Mc Graw Hill

REFERENCES:

1. Combustion Fundamentals / Roger A strehlow / Mc Graw Hill
2. Fuels and combustion / Sharma and Chander Mohan/ Tata Mc Graw Hill
3. Combustion Engineering and Fuel Technology / Shaha A.K./ Oxford and IBH.
4. Principles of Combustion / Kanneth K.Kuo/ Wiley and Sons.
5. Combustion / Sarkar / Mc. Graw Hill.
6. An Introduction to Combustion / Stephen R. Turns/ Mc. Graw Hill International Edition.
7. Combustion Engineering / Gary L. Berman & Kenneth W. Ragland/ Mc. Graw Hill International Edition.

18METE202 ENERGY MANAGEMENT

Lectures : 4 Periods / Week
Semester end Exam : 3 hrs
Credits : 3

Internal Assessment : 40
Semester end Examination : 60

UNIT-I

INTRODUCTION: Principles of energy management. Managerial organization, Functional areas for i) manufacturing industry, ii) Process industry, iii) Commerce, iv) Government, Role of Energy manager in each of these organizations. Initiating, Organizing and managing energy management programs

UNIT -II

ENERGY AUDIT: Definition and concepts. Types of energy audits, Basic energy concepts, Resources for plant energy studies. Data gathering, Analytical techniques. Energy Conservation: Technologies for energy conservation, Design for conservation of energy materials, Energy flow networks. Critical assessment of energy usage. Formulation of objectives and constrains, Synthesis of alternative options and technical analysis of options. Process integration.

UNIT-III

ECONOMIC ANALYSIS: Scope, Characterization of an investment project. Types of depreciation, Time value of money. Budget considerations, Risk analysis.

UNIT-IV

METHODS OF EVALUATION OF PROJECTS: Payback, Annualized costs, Investor's rate of return, Present worth, Internal rate of return, Pros and cons of the common method of analysis, Replacement analysis.

UNIT-V

ALTERNATIVE ENERGY SOURCES: SOLAR ENERGY: Types of devices for solar energy collections, Thermal storage system, Control systems. Wind Energy, Availability, Wind Devices, Wind Characteristics, performance of turbines and systems.

TEXT BOOK:

1. Energy Management Principles / CB Smith/ Pergamon Press

REFERENCES:

1. Energy Management Hand Book / W.C. Turner (Ed)
2. Energy Management / W.R.Murthy and G.Mc.Kay / BS Publication
3. Management / H.Koontz and Cyrill Donnel / McGraw Hill
4. Financial Management / S.C.Kuchhal / Chaitanya Publishing House

18METE203 FINITE ELEMENT METHOD

Lectures : 4 Periods / Week
Semester end Exam : 3 hrs
Credits : 3

Internal Assessment : 40
Semester end Examination : 60

UNIT - I

Formulation Techniques: Methodology, Engineer ing probl ems and governing di f ferent ial equat ions , f ini te element s . , Variational methods-potential energy method, Raleigh Ritz method, strong and weak forms, Galerkin and weighted residual methods, calculus of variations, Essential and natural boundary conditions.

UNIT – II

One-dimensional elements: Bar, trusses, beams and frames, displacements, stresses and temperature effects.

UNIT – III

Two dimensional problems: CST, LST, four noded and eight nodded rectangular elements, Lagrange basis for triangles and rectangles, serendipity interpolation functions. Axisymmetric Problems: Axisymmetric formulations, Element matrices, boundary conditions. Heat Transfer problems: Conduction and convection, examples: - two-dimensional fin.

UNIT – IV

Isoparametric formulation: Concepts, sub parametric, super parametric elements, numerical integration, Requirements for convergence, h-refinement and p-refinement, complete and incomplete interpolation functions, pascal's triangle, Patch test.

UNIT – V

Finite elements in Structural Analysis: Static and dynamic analysis, eigen value problems, and their solution methods, case studies using commercial finite element packages.

TEXT BOOK:

1. Zienckiwicz O.C. & R. L. Taylor, Finite Element Method, McGraw-Hill, 1983.

REFERENCES:

1. J.N. Reddy, Finite element method in Heat transfer and fluid dynamics, CRC press, 1994
2. Finite element methods by Chandrupatla & Belagundu.
3. K. J. Bathe, Finite element procedures, Prentice-Hall, 1996
4. Concepts And Applications Of Finite Element Analysis, by Witt Plesha Malkus, Robert D Cook 4Th Ed Wiley India Pvt Ltd

18METE204 COMPUTATIONAL FLUID DYNAMICS

Lectures : 4 Periods / Week **Internal Assessment : 40**
Semester end Exam : 3 hrs **Semester end Examination : 60**
Credits : 3

UNIT – I

Introduction: Finite difference method, finite volume method, finite element method, governing equations and boundary conditions. Derivation of finite difference equations.

Solution methods: Solution methods of elliptical equations – finite difference formulations, interactive solution methods, direct method with Gaussian elimination.

Parabolic equations-explicit schemes and Von Neumann stability analysis, implicit schemes, alternating direction implicit schemes, approximate factorization, fractional step methods, direct method with tridiagonal matrix algorithm.

UNIT – II

Hyperbolic equations: Explicit schemes and Von Neumann stability analysis, implicit schemes, multi step methods, nonlinear problems, second order one-dimensional wave equations. Burgers equations: Explicit and implicit schemes, Runge-Kutta method.

UNIT – III

Formulations of incompressible viscous flows: Formulations of incompressible viscous flows by finite difference methods, pressure correction methods, vortex methods.

Treatment of compressible flows: potential equation, Eluer equations, Navier-stokes system of equations, flowfield-dependent variation methods, boundary conditions, example problems.

UNIT – IV

Finite volume method: Finite volume method via finite difference method, formulations for two and three-dimensional problems.

UNIT – V

Standard variational methods: Linear fluid flow problems, steady state problems, Transient problems.

TEXT BOOK:

1. Computational fluid dynamics, T. J.Chung, Cambridge University press,2002.
2. Computational Fluid Dynamics by John D. Anderson /TMH

REFERENCE:

1. Text book of fluid dynamics, Frank Chorlton, CBS Publishers &distributors, 1985.
2. Computational Techniques for Fluid Dynamics, Volume 1& 2 By C. A. J. Fletcher/ Springer

18METE205A MATERIALS TECHNOLOGY

Lectures : 4 Periods / Week **Internal Assessment : 40**
Semester end Exam : 3 hrs **Semester end Examination : 60**
Credits : 3

UNIT I:
Elasticity in metals, mechanism of plastic deformation, slip and twinning, role of dislocations, yield stress, shear strength of perfect and real crystals, strengthening mechanism, work hardening, solid solution, grain boundary strengthening. Poly phase mixture, precipitation, particle, fiber and dispersion strengthening, effect of temperature, strain and strain rate on plastic behavior, super plasticity, Yield criteria: Von-mises and Tresca criteria.
UNIT II:
Griffth's Theory, stress intensity factor and fracture Toughness, Toughening Mechanisms, Ductile and Brittle transition in steel, High Temperature Fracture, Creep, Larson – Miller parameter, Deformation and Fracture mechanism maps.
UNIT III:
Fatigue, fatigue limit, features of fatigue fracture, Low and High cycle fatigue test, Crack Initiation and Propagation mechanism and paris Law, Effect of surface and metallurgical parameters on Fatigue, Fracture of non-metallic materials, fatigue analysis, Sources of failure, procedure of failure analysis. Motivation for selection, cost basis and service requirements, Selection for Mechanical Properties, Strength, Toughness, Fatigue and Creep.
UNIT IV:
MODERN METALLIC MATERIALS: Dual Steels, Micro alloyed, High Strength Low alloy (HSLA) Steel, Transformation induced plasticity (TRIP) Steel, Maraging Steel, Inter metallics, Ni and Ti Aluminides. Processing and applications of Smart Materials, Shape Memory alloys, Metallic Glass Quasi Crystal and Nano Crystalline Materials.
UNIT V:
NONMETALLIC MATERIALS: Polymeric materials and their molecular structures, Production Techniques for Fibers, Foams, Adhesives and Coatings, structure, Properties and Applications of Engineering Polymers, Advanced Structural Ceramics WC, TiC, TaC, A12O3, SiC, Si3N4, CBN and Diamond – properties, Processing and applications.

TEXT BOOKS:
1. Mechanical Behavior of Materials/Thomas H. Courtney/ McGraw Hill/2 nd Edition/2000.
2. Mechanical Metallurgy/George E. Dicter/McGraw Hill, 1998.
REFERENCES:
1 Selection and use of Engineering Materials 3e/Charles J.A/Butterworth Heiremann.
2 Engineering Materials Technology/James A Jacob Thomas F Kilduff/Pearson
3 Material Science and Engineering/William D Callister/John Wiley and Sons
4 Plasticity and plastic deformation by Aritzur.

18METE205B CONVECTIVE HEAT TRANSFER

Lectures : 4 Periods / Week
Semester end Exam : 3 hrs
Credits : 3

Internal Assessment : 40
Semester end Examination : 60

UNIT-I:

Introduction to Forced, free & combined convection – convective heat transfer coefficient – Application of dimensional analysis to convection – Physical interpretation of dimensionless numbers.

Equations of Convective Heat Transfer: Continuity, Navier-Strokes equation & energy equation for steady state flows – similarity – Equations for turbulent convective heat transfer – Boundary layer equations for laminar, turbulent flows – Boundary layer integral equations.

UNIT-II:

EXTERNAL LAMINAR FORCED CONVECTION: Similarity solution for flow over an isothermal plate – integral equation solutions – Numerical solutions – Viscous dissipation effects on flow over a flat plate.

External Turbulent Flows: Analogy solutions for boundary layer flows – Integral equation solutions – Effects of dissipation on flow over a flat plate.

Internal Laminar Flows: Fully developed laminar flow in pipe, plane duct & ducts with other cross-sectional shapes – Pipe flow & plane duct flow with developing temperature field – Pipe flows & plane duct flow with developing velocity & temperature fields.

Internal Turbulent Flows: Analogy solutions for fully developed pipe flow –Thermally developing pipe & plane duct flow.

UNIT – III:

NATURAL CONVECTION: Boussineq approximation – Governing equations – Similarity – Boundary layer equations for free convective laminar flows – Numerical solution of boundary layer equations.

Free Convective flows through a vertical channel across a rectangular enclosure – Horizontal enclosure – Turbulent natural convection.

UNIT – IV:

COMBINED CONVECTION: Governing parameters & equations – laminar boundary layer flow over an isothermal vertical plate – combined convection over a horizontal plate – correlations for mixed convection – effect of boundary forces on turbulent flows – internal flows - internal mixed convective flows – Fully developed mixed convective flow in a vertical plane channel & in a horizontal duct.

UNIT - V:

CONVECTIVE HEAT TRANSFER THROUGH POROUS MEDIA: Area weighted velocity – Darcy flow model – energy equation – boundary layer solutions for 2-D forced convection – Fully developed duct flow – Natural convection in porous media – filled enclosures – stability of

18METE205C THERMAL AND NUCLEAR POWER PLANTS

Lectures : 4 Periods / Week **Internal Assessment : 40**
Semester end Exam : 3 hrs **Semester end Examination : 60**
Credits : 3

UNIT -I

INTRODUCTION: Sources of energy, Type of Power plants. Direct energy conversion system, Energy sources in India, Recent developments in power generation, Combustion of coal, Volumetric analysis, Gravimetric analysis, Fuel gas analysis.

Steam power plant: Introduction. General layout of steam power plant, Modern coal fired Steam power plant. Power plant cycle, Fuel Handling, Combustion equipment, Ash handling, Dust collectors.

UNIT-II

GAS TURBINE POWER PLANT: Cogeneration. Combined cycle power plant, Analysis, Waste heat recovery, IGCC power plant, Fluidized bed, Combustion, Advantages, Disadvantages

UNIT-III

NUCLEAR POWER PLANT: Nuclear physics, Nuclear Reactor, Classification, Types of reactors, Site selection. Method of enriching uranium. Application of nuclear power plant. Nuclear Power Plant Safety: Bi-Product of nuclear power generation, Economics of nuclear power plant, Nuclear power plant in India, Future of nuclear power.

UNIT-IV

ECONOMICS OF POWER GENERATION: Factors affecting the economics, Loading factors, Utilization factor, Performance and operating characteristics of power plant, Point economic load sharing, Depreciation. Energy rate, Criteria for optimum loading. Specific economic energy problem

UNIT-V

POWER PLANT INSTRUMENTATIONS: Classification, Pressure measuring instrument, Temperature measurement and Flow Measurement, Analysis of combustion gases, Pollution, types, Methods of control.

TEXT BOOKS:

1. Nuclear Power Plant Engineering/ James H. Rust/Haralson Publishing Company.
2. Powr Plant Technology / Mohamed Mohamed El-Wakil /Tata McGraw Hill
3. Thermal Engineering in Power Systems/R.S Amano, B. Sunden/WIT Press

REFERENCES:

1. Power Plant Engineering / P.K.Nag / TMH
2. Power Plant Engineering / R.K.Rajput/ Lakshmi Publications.
3. Power Plant Engineering / P.C.Sharma/ Kotearia Publications.
4. Power Plant Technology / Wakil.

horizontal porous layers.

TEXT BOOK:

1. Convective Heat & Mass Transfer /Kays & Crawford/TMH

REFERENCE:

1. Introduction to Convective Heat Transfer Analysis/ Patrick H. Oosthuigen & David Naylor, MGH

18METE205D ADVANCED AUTOMOBILE ENGINEERING

Lectures : 4 Periods / Week
Semester end Exam : 3 hrs
Credits : 3

Internal Assessment : 40
Semester end Examination : 60

UNIT I:- Transmission systems

Clutch, gearbox, propeller shaft, differential, axle and wheels

UNIT II:- Breaking systems

Mechanical, hydraulic & pneumatic breaking systems. Antilock breaking systems. Safety and security

UNIT III :- Steering & Suspension systems Mechanical and power steering. Mechanical, electronic and adaptive suspension systems.

UNIT IV :- Electrical & Electronic systems

Wiring circuits, Trouble diagnosis & Trouble shooting, charging, starting and lighting system.

UNIT V :- Hybrid vehicles & Motor vehicle act

Components of hybrid vehicles, Motor vehicle act.

TEXT BOOKS:

1. Automobile Engineering – by – Sudhir Kumar Saxena – University science press
2. Automotive Mechanics – by – S. Srinivasan – 2nd ed Mc GrawHill

REFERENCES:

1. Automobile Engineering – by – Kirpal Singh, Vol.I & II
2. Automobile Engineering – by – Hitner
3. Automotive Mechanics – by – Crouse, W.H & D.L. Anlin, 1oth Edition, McGrawHill

18METE206A THERMAL MEASUREMENTS AND PROCESS CONTROLS

Lectures : 4 Periods / Week **Internal Assessment : 40**
Semester end Exam : 3 hrs **Semester end Examination : 60**
Credits : 3

UNIT-I

GENERAL CONCEPTS: Fundamental elements of a measuring instrument. Static and dynamic characteristics – errors in instruments – Different methods of measurement and their analysis – Sensing elements and transducers.

Measurement of pressure – principles of pressure measurement, static and dynamic pressure, vacuum and high pressure measuring – Measurement of low pressure, Manometers, Calibration methods, Dynamic characteristics- design principles.

UNIT-II

MEASUREMENT OF FLOW: Obstruction meters, variable area meters. Pressure probes, compressible fluid flow measurement, Thermal anemometers, calibration of flow measuring instruments. Introduction to design of flow measuring instruments.

UNIT-III

TEMPERATURE MEASUREMENT: Different principles of Temperature Measurement, use of bimetallic thermometers – Mercury thermometers, Vapor Pressure thermometers, Thermo positive elements, thermocouples in series & parallel, pyrometry, measurement of heat flux, calibration of temperature measuring instruments. Design of temperature measuring instruments.

UNIT-IV

Level Measurement: Direct & indirect methods, manometric methods, float level meters, electrical conductivity, Capacitive, Ultrasonic, and Nucleonic Methods. Measurement of density – Hydrometer, continuous weight method, Gamma rays, Gas impulse wheel.

Velocity Measurement – Coefficient of viscosity, Ostesld method, free fall of piston under gravity, torque method. Measurement of moisture content and humidity. Measurement of thermal conductivity of solids, liquids and gases.

UNIT-V

PROCESS CONTROL: Introduction and need for process control principles, transfer functions, block diagrams, signal flow graphs, open and closed loop control systems – Analysis of First & Second order systems with examples of mechanical and thermal systems. Control System Evaluation – Stability, steady state regulations, transient regulations.

TEXT BOOK:

1. Measurement System, Application & Design – E.O. Doeblin, MGH

REFERENCES:

1. Mechanical and Industrial Measurements – R.K. Jain – Khanna Publishers.

18METE206B CRYOGENIC ENGINEERING

Lectures : 4 Periods / Week
Semester end Exam : 3 hrs
Credits : 3

Internal Assessment : 40
Semester end Examination : 60

UNIT -I:

INTRODUCTION TO CRYOGENIC SYSTEMS: Mechanical Properties at low temperatures. Properties of Cryogenic Fluids.

Gas Liquefaction: Minimum work for liquefaction. Methods to protect low temperature. Liquefaction systems for gages other than Neon. Hydrogen and Helium.

UNIT II:

LIQUEFACTION SYSTEMS FOR NEON, HYDROGEN AND HELIUM: Components of Liquefaction systems. Heat exchangers. Compressors and expanders. Expansion valve, Losses in real machines.

UNIT-III:

GAS SEPARATION AND PURIFICATION SYSTEMS: Properties of mixtures, Principles of mixtures, Principles of gas separation, Air separation systems.

UNIT-IV:

CRYOGENIC REFRIGERATION SYSTEMS: Working Medium, Solids, Liquids, Gases, Cryogenic fluid storage & transfer, Cryogenic storage systems, Insulation, Fluid transfer mechanisms, Cryostat, Cryo Coolers

UNIT-V:

APPLICATIONS: Space technology, In-Flight air separation and collection of LOX, Gas industry, Biology, Medicine, Electronics.

TEXT BOOK:

1. Cryogenic Systems/ R.F.Barren/ Oxford University Press

REFERENCES:

2. Cryogenic Research and Applications: Marshal Sitting/ Von Nostrand/ Inc. New Jersey
3. Cryogenic Heat Transfer/ R.F.Baron
4. Cryogenic Engineering Edit / B.A. Hands/ Academic Press, 1986

2. Mechanical Measurements – Buck & Beckwith – Pearson.
3. Control Systems, Principles & Design, 2nd Edition – M. Gopal – TMH.

18METE206C JET PROPULSION AND ROCKETRY

Lectures : 4 Periods / Week **Internal Assessment : 40**
Semester end Exam : 3 hrs **Semester end Examination : 60**
Credits : 3

UNIT - I:

TURBO JET PROPULSION SYSTEM: Gas turbine cycle analysis – layout of turbo jet engine. Turbo machinery- compressors and turbines, combustor, blade aerodynamics, engine off design performance analysis.

Flight Performance: Forces acting on vehicle – Basic relations of motion – multi stage vehicles.

UNIT - II:

PRINCIPLES OF JET PROPULSION AND ROCKETRY: Fundamentals of jet propulsion, Rockets and air breathing jet engines – Classification – turbo jet , turbo fan, turbo prop, rocket (Solid and Liquid propellant rockets) and Ramjet engines.

Nozzle Theory and Characteristics Parameters: Theory of one dimensional convergent – divergent nozzles – aerodynamic choking of nozzles and mass flow through a nozzle – nozzle exhaust velocity – thrust, thrust coefficient, Ac / At of a nozzle, Supersonic nozzle shape, non adapted nozzles, summer field criteria, departure from simple analysis – characteristic parameters – 1) characteristic velocity, 2) specific impulse 3) total impulse 4) relationship between the characteristic parameters 5) nozzle efficiency, combustion efficiency and overall efficiency.

UNIT - III:

AERO THERMO CHEMISTRY OF THE COMBUSTION PRODUCTS: Review of properties of mixture of gases – Gibbs – Dalton laws – Equivalent ratio, enthalpy changes in reactions, heat of reaction and heat of formation – calculation of adiabatic flame temperature and specific impulse – frozen and equilibrium flows.

Solid Propulsion System: Solid propellants – classification, homogeneous and heterogeneous propellants, double base propellant compositions and manufacturing methods. Composite propellant oxidizers and binders. Effect of binder on propellant properties. Burning rate and burning rate laws, factors influencing the burning rate, methods of determining burning rates.

UNIT - IV:

Solid propellant rocket engine – internal ballistics, equilibrium motor operation and equilibrium pressure to various parameters. Transient and pseudo equilibrium operation, end burning and burning grains, grain design. Rocket motor hard ware design. Heat transfer considerations in solid rocket motor design. Ignition system, simple pyro devices.

Liquid Rocket Propulsion System: Liquid propellants – classification, Mono and Bi propellants, Cryogenic and storage propellants, ignition delay of hypergolic propellants, physical and chemical characteristics of liquid propellant. Liquid propellant rocket engine – system layout, pump and pressure feed systems, feed system components. Design of combustion

5. Cryogenic Engineering/ R.B.Scottm Vin Nostrand/ Inc. New Jersey, 1959
6. Experimental Techniques in Low Temperature Physics- O.K. White, Oxford Press, 1968
7. Cryogenic Process Engineering/ K.D. Timmerhaus & TM Flynn/ Plenum Press, 1998
8. Hand Book of Cryogenic Engineering – J.G.Weisend –II, Taylor and Francis, 1998

18METE206D EQUIPMENT DESIGN FOR THERMAL SYSTEMS

Lectures : 4 Periods / Week | **Internal Assessment : 40**
Semester end Exam : 3 hrs | **Semester end Examination : 60**
Credits : 3

UNIT -I:

CLASSIFICATION OF HEAT EXCHANGERS: Introduction, Recuperation & regeneration, Tabular heat exchangers, Double pipe, shell & tube heat exchanger, Plate heat Exchangers, Gasketed plate heat exchanger. Spiral plate heat exchanger, Lamella heat exchanger, Extended surface heat exchanger, Plate fin and Tabular fin.

Basic Design Methods of Heat Exchanger: Introduction, Basic equations in design, Overall heat transfer coefficient, LMTD method for heat exchanger analysis, Parallel flow, Counter flow. Multipass, cross flow heat exchanger design calculations:

UNIT-II:

DOUBLE PIPE HEAT EXCHANGER: Film coefficient for fluids in annulus, fouling factors, Calorific temperature, Average fluid temperature, The calculation of double pipe exchanger, Double pipe exchangers in series parallel arrangements. Shell & Tube Heat Exchangers: Tube layouts for exchangers, Baffle heat exchangers, Calculation of shell and tube heat exchangers, Shell side film coefficients, Shell side equivalent diameter, The true temperature difference in a 1-2 heat exchanger. Influence of approach temperature on correction factor. Shell side pressure drop, Tube side pressure drop, Analysis of performance of 1-2 heat exchanger and design of shell & tube heat exchangers, Flow arrangements for increased heat recovery, the calculation of 2-4 exchangers.

UNIT-III:

CONDENSATION OF SINGLE VAPOURS: Calculation of horizontal condenser, Vertical condenser, De-Super heater condenser, Vertical condenser-sub-Cooler, Horizontal Condenser-Subcooler, Vertical reflux type condenser. Condensation of steam.

UNIT-IV:

VAPORIZERS, EVAPORATORS AND REBOILERS: Vaporizing processes, Forced circulation vaporizing exchanger, Natural circulation vaporizing exchangers, Calculations of a reboiler. Extended Surfaces: Longitudinal fins. Weighted fin efficiency curve, Calculation of a Double pipe fin efficiency curve. Calculation of a double pipe finned exchanger, Calculation of a longitudinal fin shell and tube exchanger.

UNIT-V:

DIRECT CONTACT HEAT EXCHANGER: Cooling towers, relation between wet bulb & dew point temperatures, The Lewis number and Classification of cooling towers, Cooling tower internals and the roll of fill, Heat Balance. Heat Transfer by simultaneous diffusion and chamber, characteristic length, constructional features, and chamber wall stresses. Heat transfer and cooling aspects. Uncooled engines, injectors – various types, injection patterns, injector characteristics, and atomization and drop size distribution, propellant tank design.

UNIT - V:

RAMJET AND INTEGRAL ROCKET RAMJET PROPULSION SYSTEM: Fuel rich solid propellants, gross thrust, gross thrust coefficient, combustion efficiency of ramjet engine, air intakes and their classification – critical, super critical and sub-critical operation of air intakes, engine intake matching, classification and comparison of IIRR propulsion systems.

TEXT BOOKS:

1. Mechanics and Dynamics of Propulsion/ Hill and Peterson/John Wiley & Sons
2. Rocket propulsion elements/Sutton/John Wiley & Sons/8th Edition

REFERENCES:

1. Gas Turbines/Ganesan /TMH
2. Gas Turbines & Propulsive Systems/Khajuria & Dubey/Dhanpat Rai & Sons
3. Rocket propulsion/Bevere/
4. Jet propulsion /Nicholas Cumpsty/

18METE261 THERMAL SYSTEMS DESIGN LAB

Practicals : 3 Periods / Week
Semester end Exam : 3 hrs
Credits : 3

Internal Assessment : 40
Semester end Examination : 60

Using software packages such as T K Solver, ANSYS, CATIA, PRO-E, HYPER MESH, NASTRAN, CFX, STARCD, MATLAB, FLUENT, GAMBIT etc., should design, model, analyze and optimize

(a) Various mechanical components of Steam, Nuclear, gas turbine and Solar power plants.

(b) Heat Exchangers.

(c) Cryogenic systems

(d) Propulsion systems

(e) Refrigeration & Air conditioning systems.

(f) Internal Combustion Engine systems

(g) Internal flows & External flows over stream lined bodies.

(h) Nano-fluid characteristics.

(i) Bio-fuel characteristics.

(j) Wind Energy systems.

convection, Analysis of cooling tower requirements, Deign of cooling towers, Determination of the number of diffusion units, Calculation of cooling tower performance.

TEXT BOOK:

1. Process Heat Transfer/D.Q.Kern/ TMH

REFERENCES:

1. Heat Exchanger Design/ A.P.Fraas and M.N.Ozisicj/ John Wiely & sons, New York.
2. Cooling Towers / J.D.Gurney and I.A. Cotter/ Maclaren

DIGITALELECTRONICSANDCOMMUNICATIONSYSTEMS

COURSESTRUCTUREFORFIRSTYEARM.TECHPROGRAMME

ISEMESTER

Sl. No	Subject Code	Subject	L	P	Total	Internal Marks	External Marks	Total Marks	Credits
1	18ECDC101	DigitalSystemDesign	4	--	4	40	60	100	3
2	18ECDC102	AdvancedMicrocontrollersanditsApplications	4	--	4	40	60	100	3
3	18ECDC103	DigitalDataCommunications	4	--	4	40	60	100	3
4	18ECDC104	AdvancedDigitalSignalProcessing	4	--	4	40	60	100	3
5	18ECDC105A 18ECDC105B 18ECDC105C	ElectiveI I. TransformTechniques II. VLSI Technology&Design III. DetectionandEstimationTheory	4	--	4	40	60	100	3
6	18ECDC106A 18ECDC106B 18ECDC106C	ElectiveII I. StatisticalSignalProcessing II. OpticalCommunicationTechnology III. NetworkSecurity&Cryptography	4	--	4	40	60	100	3
7	18ECDC161	DesignandSimulationLab	--	3	3	40	60	100	2
		Total Credits	24	3	27	280	420	700	20

IISEMESTER

Sl. No	Subject Code	Subject	L	P	Total	Internal Marks	External Marks	Total Marks	Credits
1	18ECDC201	CodingTheory&Applications	4	--	4	40	60	100	3
2	18ECDC202	EmbeddedSystemDesign	4	--	4	40	60	100	3
3	18ECDC203	Imageand Video Processing	4	--	4	40	60	100	3
4	18ECDC204	Wireless Communications &Networks	4	--	4	40	60	100	3
5	18ECDC205A 18ECDC205B 18ECDC205C	ElectiveIII I. CMOSAnalog&DigitalICDesign II. AdvancedComputerArchitecture III. DesignofFaultTolerance	4	--	4	40	60	100	3
	18ECDC206A 18ECDC206B 18ECDC206C	ElectiveIV I. DSPProcessors andArchitectures II. EMI/EMC III. ObjectiveOriented Program	4	--	4	40	60	100	3
7	18ECDC261	AdvancedCommunications Laboratory	--	3	3	40	60	100	2
		Total Credits	24	3	27	280	420	700	20

L–LECTURE P–PRACTICAL

I Year I Semester **L P C**

18ECDC101 DIGITAL SYSTEM DESIGN 4 0 3

UNIT-I: Minimization Procedures and CAMP Algorithm:
Review on minimization of switching functions using tabular methods, k-map, QM algorithm, CAMP-I algorithm, Phase-I: Determination of Adjacencies, DA, CSC, SSMs and EPCs,, CAMPI algorithm, Phase-II: Passport checking,Determination of SPC, CAMP-II algorithm: Determination of solution cube, Cube based operations, determination of selected cubes are wholly within the given switching function or not, Introduction to cube based algorithms.

UNIT-II: PLA Design, Minimization and Folding Algorithms:
Introduction to PLDs, basic configurations and advantages of PLDs, PLA-Introduction, Block diagram of PLA, size of PLA, PLA design aspects, PLA minimization algorithm(IISc algorithm), PLA folding algorithm(COMPACT algorithm)-Illustration of algorithms with suitable examples.

UNIT -III: Design of Large Scale Digital Systems:
Algorithmic state machinecharts-Introduction, Derivation of SM Charts, Realization of SM Chart, control implementation, control unit design, data processor design, ROM design, PAL design aspects, digital system design approaches using CPLDs, FPGAs and ASICs.

UNIT-IV: Fault Diagnosis in Combinational Circuits:
Faults classes and models, fault diagnosis and testing, fault detection test, test generation, testing process, obtaining a minimal complete test set, circuit under test methods- Path sensitization method, Boolean difference method, properties of Boolean differences, Kohavi algorithm, faults in PLAs, DFT schemes, built in self-test.

UNIT-V: Fault Diagnosis in Sequential Circuits:
Fault detection and location in sequential circuits, circuit test approach, initial state identification, Haming experiments, synchronizing experiments, machine identification, distinguishing experiment, adaptive distinguishing experiments.

TEXT BOOKS:
1. Logic Design Theory-N. N. Biswas, PHI
2. Switching and Finite Automata Theory-Z. Kohavi , 2nd Edition, 2001, TMH
3. Digital system Design using PLDd-Lala

REFERENCE BOOKS:
1. Fundamentals of Logic Design – Charles H. Roth, 5th Ed., Cengage Learning.
2. Digital Systems Testing and Testable Design – MironAbramovici, Melvin A. Breuer and Arthur D. Friedman- John Wiley & Sons Inc.

I Year I Semester **L P C**

18ECDC102 ADVANCED MICROCONTROLLERS & ITS APPLICATIONS 4 0 3

UNIT-I: PIC Architecture: Overview of PIC series microcontrollers, block diagram, file register set, memory segmentation, hardware input/output ports, memory addresses, support devices. **Instruction Set and Programming of PIC Series Microcontrollers:** Instruction formats, Addressing modes, instruction set, simple programs involving logical, branch and call instructions, sorting, evaluating arithmetic expressions, string manipulations.

UNIT-II: Peripheral Interface: A/D and D/A interfacing, EEPROM interfacing, interfacing with input switch, keyboard, output displays like LED, LCD and seven segment LED.
Communication Interface: Serial communication standards, serial programming using USART, SPI bus and I2C protocols.

UNIT-III: ARM Processor Fundamentals: The RISC Design Philosophy, ARM Design Philosophy, Registers, Current Program Status Register, Pipeline Exceptions, Interrupts, and the Vector Table ARM Processor Families.

UNIT-IV: Introduction to the ARM Instruction Set: Data Processing Instructions, Branch Instructions, Load-Store Instructions, Software Interrupt Instruction, Program Status Register Instructions. Loading Constants.

UNIT-V: Interfacing ARM Processor: Interfacing LEDs to ARM 7 Controller, Hex counter using seven segment displays, Interfacing of 16X2 LCD Display, Interfacing a stepper motor to ARM 7 controller.

Text Books

1. Han Way Huang, PIC Microcontroller: An Introduction to Software and Hardware Interfacing, Cengage Learning Publication.

2. M.A.Mazidi, PIC Microcontroller & Embedded Systems: Using Assembly and C for PIC18, Pearson Education Publication.

3. ARM System Developer's Guide Designing and Optimizing System Software Andrew N. Sloss Morgan Kaufmann Publication

I Year I Semester **L P C**

18ECDC103 DIGITAL DATA COMMUNICATIONS **4 0 3**

UNIT -I: Digital Modulation Schemes: BPSK, QPSK, 8PSK, 16PSK, 8QAM, 16QAM, DPSK – Methods, Band Width Efficiency, Carrier Recovery, Clock Recovery.

UNIT -II: Basic Concepts of Data Communications, Interfaces and Modems: Data Communication Networks, Protocols and Standards, UART, USB, Line Configuration, Topology, Transmission Modes, Digital Data Transmission, DTE-DCE interface, Categories of Networks – TCP/IP Protocol suite and Comparison with OSI model.

UNIT -III: Error Correction: Types of Errors, Vertical Redundancy Check (VRC), LRC, CRC, Checksum, Error Correction using Hamming code
Data Link Control: Line Discipline, Flow Control, Error Control
Data Link Protocols: Asynchronous Protocols, Synchronous Protocols, Character Oriented Protocols, Bit-Oriented Protocol, Link Access Procedures.

UNIT -IV: Multiplexing: Frequency Division Multiplexing (FDM), Time Division Multiplexing (TDM), Multiplexing Application, DSL.
Local Area Networks: Ethernet, Other Ether Networks, Token Bus, Token Ring, FDDI.
Metropolitan Area Networks: IEEE 802.6, SMDS
Switching: Circuit Switching, Packet Switching, Message Switching.
Networking and Interfacing Devices: Repeaters, Bridges, Routers, Gateway, Other Devices.

UNIT -V: Multiple Access Techniques: Frequency- Division Multiple Access (FDMA), Time - Division Multiple Access (TDMA), Code - Division Multiple Access (CDMA), OFDM and OFDMA. Random Access, Aloha- Carrier Sense Multiple Access (CSMA)- Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA), Controlled Access- Reservation- Polling- Token Passing, Channelization.

TEXT BOOKS:

1. Data Communication and Computer Networking - B. A.Forouzan, 2nd Ed., 2003, TMH.
2. Advanced Electronic Communication Systems - W. Tomasi, 5th Ed., 2008, PEI.

REFERENCE BOOKS:

1. Data Communications and Computer Networks - Prakash C. Gupta, 2006, PHI.
2. Data and Computer Communications - William Stallings, 8th Ed., 2007, PHI.
3. Data Communication and Tele Processing Systems -T. Housely, 2nd Ed, 2008, BSP.
4. Data Communications and Computer Networks- Brijendra Singh, 2ndEd., 2005, PHI.

I Year I Semester **L P C**

18ECDC104 ADVANCED DIGITAL SIGNAL PROCESSING 4 0 3

UNIT –I: Review of DFT, FFT, IIR Filters and FIR Filters: Multi Rate Signal Processing: Introduction, Decimation by a factor D, Interpolation by a factor I, Sampling rate conversion by a rational factor I/D, Multistage Implementation of Sampling Rate Conversion, Filter design & Implementation for sampling rate conversion.

UNIT –II: Applications of Multi Rate Signal Processing: Design of Phase Shifters, Interfacing of Digital Systems with Different Sampling Rates, Implementation of Narrow Band Low Pass Filters, Implementation of Digital Filter Banks, Sub-band Coding of Speech Signals, Quadrature Mirror Filters, Trans-multiplexers, Over Sampling A/D and D/A Conversion.

UNIT -III: Non-Parametric Methods of Power Spectral Estimation: Estimation of spectra from finite duration observation of signals, Non-parametric Methods: Bartlett, Welch & Blackman-Tukey methods, Comparison of all Non-Parametric methods

UNIT –IV: Implementation of Digital Filters: Introduction to filter structures (IIR & FIR), Frequency sampling structures of FIR, Lattice structures, Forward prediction error, Backward prediction error, Reflection coefficients for lattice realization, Implementation of lattice structures for IIR filters, Advantages of lattice structures.

UNIT –V: Parametric Methods of Power Spectrum Estimation: Autocorrelation & Its Properties, Relation between auto correlation & model parameters, AR Models - Yule-Walker & Burg Methods, MA & ARMA models for power spectrum estimation, Finite word length effect in IIR digital Filters – Finite word-length effects in FFT algorithms.

TEXT BOOKS:

1. Digital Signal Processing: Principles, Algorithms & Applications - J.G.Proakis& D. G. Manolakis, 4th Ed., PHI.
2. Discrete Time Signal Processing - Alan V Oppenheim & R. W Schaffer, PHI.
3. DSP – A Practical Approach – Emmanuel C. Ifeacher, Barrie. W. Jervis, 2 Ed., Pearson Education.

REFERENCE BOOKS:

1. Modern Spectral Estimation: Theory & Application – S. M .Kay, 1988, PHI.
2. Multi Rate Systems and Filter Banks – P.P.Vaidyanathan – Pearson Education.
3. Digital Signal Processing – S.Salivahanan, A.Vallavaraj, C.Gnanapriya, 2000,TMH
4. Digital Spectral Analysis – Jr. Marple

I Year I Semester **L P C**

18ECDC105A **TRANSFORM TECHNIQUES (ELECTIVE – I)** **4 0 3**

UNIT -I: Fourier Analysis: Fourier series, Examples, Fourier Transform, Properties of Fourier Transform, Examples of Fourier transform, sampling theorem, Partial sum and Gibbs phenomenon, Fourier analysis of Discrete time Signals, Discrete Fourier ransform. Time – Frequency Analysis: Window function, Short Time Fourier Transform, Discrete Short Time Fourier Transform, Continuous wavelet transform, Discrete wavelet transform, wavelet series, Interpretations of the Time-Frequency plot.

UNIT -II: Transforms: Walsh, Hadamard, Haar and Slant Transforms, DCT, DST, KLT, Singular value Decomposition – definition, properties and applications

UNIT -III: Continuous Wavelet Transform (CWT): Short comings of STFT, Need for wavelets, Wavelet Basis- Concept of Scale and its relation with frequency, Continuous time wavelet Transform Equation- Series Expansion using Wavelets- CWT- Tiling of time scale plane for CWT. Important Wavelets: Haar, Mexican Hat, Meyer, Shannon, Daubechies.

UNIT -IV: Multi Rate Analysis and DWT: Need for Scaling function – Multi Resolution Analysis, Two-Channel Filter Banks, Perfect Reconstruction Condition, Relationship between Filter Banks and Wavelet Basis, DWT, Structure of DWT Filter Banks, Daubechies Wavelet Function, Applications of DWT.

UNIT -V: Wavelet Packets and Lifting: Wavelet Packet Transform, Wavelet packet algorithms, Thresholding-Hard thresholding, Soft thresholding, Multidimensional Wavelets, Bi-orthogonal basis- B-Splines, Lifting Scheme of Wavelet Generation, Multi Wavelets

TEXT BOOKS:

1. A Wavelet Tour of Signal Processing theory and applications -RaghuveerM.Rao and Ajit S. Bopardikar, Pearson Edu, Asia, New Delhi, 2003.

2. K.P.Soman and K.I Ramachandran, “ Insight into Wavelets – from theory to practice” PHI, Second edition,2008

REFERENCE BOOKS:

1. Fundamentals of Wavelets- Theory, Algorithms and Applications -Jaideva C Goswami, Andrew K Chan, John Wiley & Sons, Inc, Singapore, 1999.

2. JaidevaC.Goswami and Andrew K.Chan, “ Fundamentals of Wavelets” Wiley publishers, 2006

3. A Wavelet Tour of Signal Processing-Stephen G. Mallat, Academic Press, 2 Ed 4. Digital Image Processing – S.Jayaraman, S.Esakkirajan, T.Veera Kumar – TMH,2009

I Year I Semester **L P C**

18ECDC105B **VLSI TECHNOLOGY & DESIGN (ELECTIVE – I)** **4 0 3**

UNIT-I: VLSI Technology: Fundamentals and applications, IC production process, semiconductor processes, design rules and process parameters, layout techniques and process parameters.
VLSI Design: Electronic design automation concept, ASIC and FPGA design flows, SOC designs, design technologies: combinational design techniques, sequential design techniques, state machine logic design techniques and design issues.

UNIT-II: CMOS VLSI Design: MOSTechnology and fabrication process of pMOS, nMOS, CMOS and BiCMOS technologies, comparison of different processes.
Building Blocks of a VLSI circuit: Computer architecture, memory architectures, communication interfaces, mixed signal interfaces.
VLSI Design Issues: Design process, design for testability, technology options, power calculations, package selection, clock mechanisms, mixed signal design.

UNIT-III: Basic electrical properties of MOS and BiCMOS circuits, MOS and BiCMOS circuit design processes, Basic circuit concepts, scaling of MOS circuits-qualitatitive and quantitative analysis with proper illustrations and necessary derivations of expressions.

UNIT-IV: Subsystem Design and Layout: Some architectural issues, switch logic, gate logic, examples of structured design (combinational logic), some clocked sequential circuits, other system considerations.
Subsystem Design Processes: Some general considerations and an illustration of design processes, design of an ALU subsystem.

UNIT-V: Floor Planning: Introduction, Floor planning methods, off-chip connections.
Architecture Design: Introduction, Register-Transfer design, high-level synthesis, architectures for low power, architecture testing.
Chip Design: Introduction and design methodologies.

TEXT BOOKS:

1. Essentials of VLSI Circuits and Systems, K. Eshraghian, Douglas A. Pucknell, SholehEshraghian, 2005, PHI Publications.
2. Modern VLSI Design-Wayne Wolf, 3rd Ed., 1997, Pearson Education.
3. VLSI Design-Dr.K.V.K.K.Prasad, KattulaShyamala, Kogent Learning Solutions Inc., 2012.

REFERENCE BOOKS:

1. VLSI Design Technologies for Analog and Digital Circuits, Randall L.Geiger, Phillip E.Allen, Noel R.Strader, TMH Publications, 2010.
2. Introduction to VLSI Systems: A Logic, Circuit and System Perspective- Ming-BO Lin, CRC Press, 2011.
3. Principals of CMOS VLSI Design-N.H.E Weste, K. Eshraghian, 2nd Edition, Addison Wesley.

I Year I Semester **L P C**

18ECDC105C **DETECTION AND ESTIMATION THEORY (ELECTIVE – I)** **4 0 3**

UNIT –I: Random Processes: Discrete Linear Models, Markov Sequences and Processes, Point Processes, and Gaussian Processes.

UNIT –II: Detection Theory: Basic Detection Problem, Maximum A posteriori Decision Rule, Minimum Probability of Error Classifier, Bayes Decision Rule, Multiple-Class Problem (Bayes)-minimum probability error with and without equal a priori probabilities, Neyman-Pearson Classifier, General Calculation of Probability of Error, General Gaussian Problem, Composite Hypotheses.

UNIT –III: Linear Minimum Mean-Square Error Filtering: Linear Minimum Mean Squared Error Estimators, Nonlinear Minimum Mean Squared Error Estimators. Innovations, Digital Wiener Filters with Stored Data, Real-time Digital Wiener Filters, Kalman Filters.

UNIT –IV: Statistics: Measurements, Nonparametric Estimators of Probability Distribution and Density Functions, Point Estimators of Parameters, Measures of the Quality of Estimators, Introduction to Interval Estimates, Distribution of Estimators, Tests of Hypotheses, Simple Linear Regression, Multiple Linear Regression.

UNIT –V:
Estimating the Parameters of Random Processes from Data:
Tests for Stationarity and Ergodicity, Model-free Estimation, Model-based Estimation of Autocorrelation Functions, Power Special Density Functions.

TEXT BOOKS:

1. Random Signals: Detection, Estimation and Data Analysis - K. Sam Shanmugan& A.M. Breipohl, Wiley India Pvt. Ltd, 2011.
2. Random Processes: Filtering, Estimation and Detection - Lonnie C. Ludeman, Wiley India

REFERENCE BOOKS:

1. Fundamentals of Statistical Signal Processing: Volume I Estimation Theory– Steven.M.Kay, Prentice Hall, USA, 1998.
2. Fundamentals of Statistical Signal Processing: Volume I Detection Theory– Steven.M.Kay, Prentice Hall, USA, 1998.
3. Introduction to Statistical Signal Processing with Applications - Srinath, Rajasekaran, Viswanathan, 2003, PHI.
4. Statistical Signal Processing: Detection, Estimation and Time Series Analysis – Louis L.Scharf, 1991, Addison Wesley.
5. Detection, Estimation and Modulation Theory: Part – I – Harry L. Van Trees, 2001, John Wiley & Sons, USA.
6. Signal Processing: Discrete Spectral Analysis – Detection & Estimation – Mischa Schwartz, Leonard Shaw, 1975, McGraw Hill.

I Year I Semester **L P C**

18ECDC106A **STATISTICAL SIGNAL PROCESSING (ELECTIVE - II)** **4 0 3**

UNIT I: Signal models and characterization: Types and properties of statistical models for signals and how they relate to signal processing,Common second-order methods of characterizing signals including autocorrelation, partial correlation, cross-correlation, power spectral density and cross power spectral density.

UNIT II: Spectral estimation: Nonparametric methods for estimation of power spectral density, autocorreleation, cross-correlation,transfer functions, and coherence form finite signal samples.

UNIT III: Review of signal processing: A review on random processes, Areview on filtering random processes, Examples.
Statistical parameter estimation: Maximum likehood estimation, maximum a posterior stimation, Cramer-Rao bound.

UNIT IV: Eigen structure based frequency estimation: Pisarenko, MUSIC, ESPRIT their application sensor array direction finding.
Spectrum estimation: Moving average (MA), Auto Regressive (AR), Auto Regressive Moving Average (ARMA), Various non-parametirc approaches.

UNIT V: Wiener filtering: The finite impulse case, causal and non-causal infinite impulse responses cases, Least mean squares adaptation, recursive least squares adaptation, Kalman filtering.

TEXT BOOKS:
1. Steven M.Kay, fundamentals of statistical signal processing: estimation. Theory,Pretice-Hall,1993.
2. Monsoon H. Hayes, Stastical digital signal processing and modeling, USA, Wiley,1996.

REFERENCE BOOKS:
1. DimitrisG.Manolakis, Vinay K. Ingle, and Stephen M. Kogon, Statistical and adaptive signal processing, Artech House, Inc,2005, ISBN 1580536107

I Year I Semester **L P C**

18ECDC106B **OPTICAL COMMUNICATION TECHNOLOGY** **4 0 3**
(ELECTIVE - II)

UNIT –I: Signal propagation in Optical Fibers: Geometrical Optics approach and Wave Theory approach, Loss and Bandwidth, Chromatic Dispersion, Non Linear effects-Stimulated Brillouin and Stimulated Raman Scattering, Propagation in a Non-Linear Medium, Self-Phase Modulation and Cross Phase Modulation, Four Wave Mixing, Principle of Solitons.

UNIT –II: Fiber Optic Components for Communication & Networking: Couplers, Isolators and Circulators, Multiplexers, Bragg Gratings, Fabry-Perot Filters, Mach Zender Interferometers, Arrayed Waveguide Grating, Tunable Filters, High Channel Count Multiplexer Architectures, Optical Amplifiers, Direct and External Modulation Transmitters, Pump Sources for Amplifiers, Optical Switches and Wavelength Converters.

UNIT –III: Modulation and Demodulation: Signal formats for Modulation, Subcarrier Modulation and Multiplexing, Optical Modulations – Duobinary, Single Side Band and Multilevel Schemes, Ideal and Practical receivers for Demodulation, Bit Error Rates, Timing Recovery and Equalization, Reed-Solomon Codes for Error Detection and Correction.

UNIT -IV: Transmission System Engineering: System Model, Power Penalty in Transmitter and Receiver, Optical Amplifiers, Crosstalk and Reduction of Crosstalk, Cascaded Filters, Dispersion Limitations and Compensation Techniques.

UNIT –V: Fiber Non-linearities and System Design Considerations: Limitation in High Speed and WDM Systems due to Non-linearities in Fibers, Wavelength Stabilization against Temperature Variations, Overall System Design considerations – Fiber Dispersion, Modulation, Non-Linear Effects, Wavelengths, All Optical Networks.

TEXT BOOKS:
1. Optical Networks: A Practical Perspective - Rajiv Ramaswami and Kumar N. Sivarajan, 2nd Ed., 2004, Elsevier Morgan Kaufmann Publishers (An Imprint of Elsevier). 2. Optical Fiber Communications – Gerd Keiser, 3rd Ed., 2000, McGraw Hill.

REFERENCE BOOKS:
1. Optical Fiber Communications: Principles and Practice – John.M.Senior, 2nd Ed., 2000, PE.
2. Fiber Optics Communication – Harold Kolimbris, 2nd Ed., 2004, PEI
3. Optical Networks: Third Generation Transport Systems – Uyless Black, 2nd Ed., 2009, PEI
4. Optical Fiber Communications – GovindAgarwal, 2nd Ed., 2004, TMH.
5. Optical Fiber Communications and Its Applications – S.C.Gupta, 2004, PHI.

I Year I Semester **L P C**

18ECDC106C **NETWORK SECURITY AND CRYPTOGRAPHY (ELECTIVE - II)** **4 0 3**

UNIT -I: Introduction: Attacks, Services and Mechanisms, Security attacks, Security services, A Model for Internetwork security.Classical Techniques:Conventional Encryption model, Steganography, Classical Encryption Techniques.
Modern Techniques: Simplified DES, Block Cipher Principles, Data Encryption standard, Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles and Modes of operations.

UNIT -II: Encryption Algorithms: Triple DES, International Data Encryption algorithm, Blowfish, RC5, CAST-128, RC2, Characteristics of Advanced Symmetric block cifers. **Conventional Encryption :**Placement of Encryption function, Traffic confidentiality, Key distribution, Random Number Generation.

UNIT -III: Public Key Cryptography: Principles, RSA Algorithm, Key Management, Diffie-Hellman Key exchange, Elliptic Curve Cryptograpy.**Number Theory:**Prime and Relatively prime numbers, Modular arithmetic, Fermat's and Euler's theorems, Testing for primality, Euclid's Algorithm, the Chinese remainder theorem, Discrete logarithms.

UNIT -IV: Message Authentication and Hash Functions: Authentication requirements and functions, Message Authentication, Hash functions, Security of Hash functions and MACs.
Hash and Mac Algorithms MD File, Message digest Algorithm, Secure Hash Algorithm, RIPEMD-160, HMAC.Digital signatures and Authentication protocols: Digital signatures, Authentication Protocols, Digital signature standards.
Authentication Applications : Kerberos, X.509 directory Authentication service. Electronic Mail Security: Pretty Good Privacy, S/MIME.

UNIT –V: IP Security: Overview, Architecture, Authentication, Encapsulating Security Payload, Combining security Associations, Key Management. Web Security: Web Security requirements, Secure sockets layer and Transport layer security, Secure Electronic Transaction.
Intruders, Viruses and Worms Intruders, Viruses and Related threats.
Fire Walls: Fire wall Design Principles, Trusted systems.

TEXT BOOKS:

1. Cryptography and Network Security: Principles and Practice - William Stallings, Pearson Education.
2. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education.

REFERENCE BOOKS:

1. Fundamentals of Network Security by Eric Maiwald (Dreamtech press)
2. Network Security - Private Communication in a Public World by Charlie Kaufman, Radia Perlman and Mike Speciner, Pearson/PHI.
3. Principles of Information Security, Whitman, Thomson.
4. Network Security: The complete reference, Robert Bragg, Mark Rhodes, TMH
5. Introduction to Cryptography, Buchmann, Springer.

I Year I Semester **L P C**

18ECDC161 **DESIGN AND SIMULATION LABORATORY** **0 3 2**

PART-A: VLSI Lab (Front-end Environment)
The students are required to design the logic circuit to perform the following experiments using necessary simulator (Xilinx ISE Simulator/ Mentor Graphics Questa Simulator) to verify the logical /functional operation and to perform the analysis with appropriate synthesizer (Xilinx ISE Synthesizer/Mentor Graphics Precision RTL) and then verify the implemented logic with different hardware modules/kits (CPLD/FPGA kits).
The students are required to acquire the knowledge in both the Platforms (Xilinx and Mentor graphics) by perform at least FOUR experiments on each Platform.

List of Experiments: 1. Realization of Logic gates. 2. Parity Encoder. 3. Random Counter. 4. Synchronous RAM. 5. ALU. 6. UART Model. 7. Traffic Light Controller using Sequential Logic circuits 8. Finite State Machine (FSM) based logic circuit.

PART-B: VLSI Lab (Back-end Environment)
The students are required to design and implement the Layout of the following experiments of any THREE using CMOS 130nm Technology with Mentor Graphics Tool.

List of Experiments:
1. Inverter Characteristics.
2. Full Adder.
3. RS-Latch, D-Latch and Clock Divider.
4. Synchronous Counter and Asynchronous Counter.
5. Digital-to-Analog-Converter.
6. Analog-to-Digital Converter.

Lab Requirements for Part-A and Part-B: Software: Xilinx ISE Suite 13.2 Version, Mentor Graphics-Questa Simulator, Mentor Graphics-Precision RTL, Mentor Graphics Back End/Tanner Software tool. **Hardware:** Personal Computer with necessary peripherals, configuration and operating System and relevant VLSI (CPLD/FPGA) hardware Kits.

PART-C: Embedded Systems Laboratory
The Students are required to write the programs using C-Language according to the Experiment requirements using RTOS Library Functions and macros ARM-926 developer kits.

The following experiments are required to develop the algorithms, flow diagrams, source code and perform the compilation, execution and implement the same using necessary hardware kits for verification. The programs developed for the implementation should be at the level of an embedded system design.

The students are required to perform at least THREE experiments.

List of Experiments: (using ARM-926 with PERFECT RTOS)

1.Register a new command in CLI.

2.Create a new Task.

3.Interrupt handling.

4.Allocate resource using semaphores.

5.Share resource using MUTEX.

6.Avoid deadlock using BANKER'S algorithm.

Lab Requirements for PART-C: Software:

i. Eclipse IDE for C and C++ (YAGARTO Eclipse IDE), Perfect RTOS Library

ii. LINUX Environment for the compilation using Eclipse IDE & Java with latest version.

Hardware:

i. The development kits of ARM-926 Developer Kits Boards.

ii. Serial Cables, Network Cables and recommended power supply for the board.

******

I Year II Semester		L P C
18D1238401	CODING THEORY AND APPLICATIONS	4 0 3

UNIT –I: Coding for Reliable Digital Transmission and Storage: Mathematical model of Information, A Logarithmic Measure of Information, Average and Mutual Information and Entropy, Types of Errors, Error Control Strategies.
Linear Block Codes: Introduction to Linear Block Codes, Syndrome and Error Detection, Minimum Distance of a Block code, Error-Detecting and Error-correcting Capabilities of a Block code, Standard array and Syndrome Decoding, Probability of an undetected error for Linear Codes over a BSC, Hamming Codes. Applications of Block codes for Error control in data storage system

UNIT –II: Cyclic Codes: Description, Generator and Parity-check Matrices, Encoding, Syndrome Computation and Error Detection, Decoding ,Cyclic Hamming Codes, Shortened cyclic codes, Error-trapping decoding for cyclic codes, Majority logic decoding for cyclic codes.

UNIT –III: Convolution Codes: Encoding of Convolution Codes, Structural and Distance Properties, maximum likelihood decoding, Sequential decoding, Majority- logic decoding of Convolution codes. Application of Viterbi Decoding and Sequential Decoding, Applications of Convolution codes in ARQ system.

UNIT –IV: Burst –Error-Correcting Codes: Decoding of Single-Burst error Correcting Cyclic codes, Single-Burst-Error-Correcting Cyclic codes, Burst-Error-Correcting Convolutional Codes, Bounds on Burst Error-Correcting Capability, Interleaved Cyclic and Convolution Codes, Phased-Burst –Error-Correcting Cyclic and Convolution codes.

UNIT -V: BCH – Codes: BCH code- Definition, Minimum distance and BCH Bounds, Decoding Procedure for BCH Codes- Syndrome Computation and Iterative Algorithms, Error Location Polynomials and Numbers for single and double error correction

TEXT BOOKS:
1. Error Control Coding- Fundamentals and Applications –Shu Lin, Daniel J.Costello, Jr,Prentice Hall, Inc.
2. Error Correcting Coding Theory-Man Young Rhee- 1989, McGraw-Hill Publishing.

REFERENCE BOOKS:
1. Digital Communications-Fundamental and Application - Bernard Sklar, PE.
2. Digital Communications- John G. Proakis, 5th Ed., 2008, TMH.
3. Introduction to Error Control Codes-Salvatore Gravano-oxford
4. Error Correction Coding – Mathematical Methods and Algorithms – Todd K. Moon, 2006, Wiley India.
5. Information Theory, Coding and Cryptography – Ranjan Bose, 2nd Ed, 2009, TMH.

I Year II Semester **L P C**

18D1238402 **EMBEDDED SYSTEM DESIGN** **4 0 3**

UNIT-I: Introduction An Embedded System-Definition, Examples, Current Technologies, Integration in system Design, Embedded system design flow, hardware design concepts, software development, processor in an embedded system and other hardware units, introduction to processor based embedded system design concepts.

UNIT-II: Embedded Hardware Embedded hardware building blocks, Embedded Processors – ISA architecture models, Internal processor design, processor performance, Board Memory – ROM, RAM, Auxiliary Memory, Memory Management of External Memory, Board Memory and performance. Embedded board Input / output – Serial versus Parallel I/O, interfacing the I/O components, I/O components and performance, Board buses – Bus arbitration and timing, Integrating the Bus with other board components, Bus performance.

UNIT-III: Embedded Software Device drivers, Device Drivers for interrupt-Handling, Memory device drivers, On-board bus device drivers, Board I/O drivers, Explanation about above drivers with suitable examples. Embedded operating systems – Multitasking and process Management, Memory Management, I/O and file system management, OS standards example – POSIX, OS performance guidelines, Board support packages, Middleware and Application Software – Middle ware, Middleware examples, Application layer software examples

UNIT-IV: Embedded System Design, Development, Implementation and Testing Embedded system design and development lifecycle model, creating an embedded system architecture, introduction to embedded software development process and tools- Host and Target machines, linking and locating software, Getting embedded software into the target system, issues in Hardware-Software design and co-design.
Implementing the design-The main software utility tool, CAD and the hardware, Translation tools, Debugging tools, testing on host machine, simulators, Laboratory tools, System Boot-Up

UNIT-V: Embedded System Design-Case Studies Case studies- Processor design approach of an embedded system –Power PC Processor based and Micro Blaze Processor based Embedded system design on Xilinx platform-NiosII Processor based Embedded system design on Altera platform-Respective Processor architectures should be taken into consideration while designing an Embedded System.

TEXT BOOKS:

1. Tammy Noergaard "Embedded Systems Architecture: A Comprehensive Guide for Engineers and Programmers", Elsevier(Singapore) Pvt. Ltd. Publications, 2005.
2. Frank Vahid, Tony D. Givargis, "Embedded system Design: A Unified Hardware/Software Introduction", John Wily & Sons Inc.2002.

REFERENCE BOOKS:

1. Peter Marwedel, "Embedded System Design", Science Publishers, 2007.
2. Arnold S Burger, "Embedded System Design", CMP.
3. Rajkamal, "Embedded Systems: Architecture, Programming and Design", TMH Publications, Second Edition, 2008.

I Year II Semester **L P C**

18D1238403 **IMAGE AND VIDEO PROCESSING** **4 0 3**

UNIT –I: Fundamentals of Image Processing and Image Transforms: Introduction, Image sampling, Quantization, Resolution, Image file formats, Elements of image processing system, Applications of Digital image processing Introduction, Need for transform, image transforms, Fourier transform, 2 D Discrete Fourier transform and its transforms, Importance of phase, Walsh transform, Hadamard transform, Haar transform, slant transform Discrete cosine transform, KL transform, singular value decomposition, Radon transform, comparison of different image transforms.

UNIT –II: Image Enhancement: Spatial domain methods: Histogram processing, Fundamentals of Spatial filtering, Smoothing spatial filters, Sharpening spatial filters. Frequency domain methods: Basics of filtering in frequency domain, image smoothing, image sharpening, Selective filtering.
Image Restoration: Introduction to Image restoration, Image degradation, Types of image blur, Classification of image restoration techniques, Image restoration model, Linear and Nonlinear image restoration techniques, Blind deconvolution

UNIT –III: Image Segmentation: Introduction to image segmentation, Point, Line and Edge Detection, Region based segmentation., Classification of segmentation techniques, Region approach to image segmentation, clustering techniques, Image segmentation based on thresholding, Edge based segmentation, Edge detection and linking, Hough transform, Active contour
Image Compression: Introduction, Need for image compression, Redundancy in images, Classification of redundancy in images, image compression scheme, Classification of image compression schemes, Fundamentals of information theory, Run length coding, Shannon – Fano coding, Huffman coding, Arithmetic coding, Predictive coding, Transformed based compression, Image compression standard, Wavelet-based image compression, JPEG Standards.

UNIT -IV: Basic Steps of Video Processing: Analog Video, Digital Video. Time-Varying Image Formation models: Three-Dimensional Motion Models, Geometric Image Formation, Photometric Image Formation, Sampling of Video signals, Filtering operations.

UNIT –V: 2-D Motion Estimation: Optical flow, General Methodologies, Pixel Based Motion Estimation, Block- Matching Algorithm, Mesh based Motion Estimation, Global Motion Estimation, Region based Motion Estimation, Multi resolution motion estimation, Waveform based coding, Block based transform coding, Predictive coding, Application of motion estimation in Video coding.

TEXT BOOKS:

1. Digital Image Processing – Gonzaleze and Woods, 3rd Ed., Pearson.
2. Video Processing and Communication – Yao Wang, JoemOstermann and Ya–quinZhang. 1st Ed., PH Int.
3. S.Jayaraman, S.Esakkirajan and T.VeeraKumar, "Digital Image processing, Tata McGraw Hill publishers, 2009

REFRENCE BOOKS:

1. Digital Image Processing and Analysis-Human and Computer Vision Application with CVIP Tools – ScotteUmbaugh, 2nd Ed, CRC Press, 2011.
2. Digital Video Processing – M. Tekalp, Prentice Hall International.
3. Digital Image Processing – S.Jayaraman, S.Esakkirajan, T.Veera Kumar – TMH, 2009.
4. Multidimentional Signal, Image and Video Processing and Coding – John Woods, 2nd Ed, Elsevier.
5. Digital Image Processing with MATLAB and Labview – Vipula Singh, Elsevier.
6. Video Demystified – A Hand Book for the Digital Engineer – Keith Jack, 5th Ed.,

I Year II Semester **L P C**

18D1238404 WIRELESS COMMUNICATIONS AND NETWORKS 4 0 3

UNIT -I:
The Cellular Concept-System Design Fundamentals:
Introduction, Frequency Reuse, Interference and system capacity – Co channel Interference and system capacity, Channel planning for Wireless Systems, Adjacent Channel interference, Power Control for Reducing interference, Improving Coverage & Capacity in Cellular Systems- Cell Splitting, Sectoring, Channel Assignment Strategies, Handoff Strategies- Prioritizing Handoffs, Practical Handoff Considerations, Trunking and Grade of Service

UNIT –II: Mobile Radio Propagation: Large-Scale Path Loss: Introduction to Radio Wave Propagation, Free Space Propagation Model, Relating Power to Electric Field, Basic Propagation Mechanisms, **Reflection**: Reflection from Dielectrics, Brewster Angle, Reflection from prefect conductors, Ground Reflection (Two-Ray) Model, **Diffraction**: Fresnel Zone Geometry, Knife-edge Diffraction Model, Multiple knife-edge Diffraction, Scattering, Outdoor Propagation Models- Longley-Ryce Model, Okumura Model, Hata Model, PCS Extension to Hata Model, Walfisch and Bertoni Model, Wideband PCS Microcell Model, Indoor Propagation Models-Partition losses (Same Floor), Partition losses between Floors, Log-distance path loss model, Ericsson Multiple Breakpoint Model, Attenuation Factor Model, Signal penetration into buildings, Ray Tracing and Site Specific Modeling.

UNIT –III: Mobile Radio Propagation: Small –Scale Fading and Multipath Small Scale Multipath propagation-Factors influencing small scale fading, Doppler shift, Impulse Response Model of a multipath channel- Relationship between Bandwidth and Received power, Small-Scale Multipath Measurements-Direct RF Pulse System, Spread Spectrum Sliding Correlator Channel Sounding, Frequency Domain Channels Sounding, Parameters of Mobile Multipath Channels-Time Dispersion Parameters, Coherence Bandwidth, Doppler Spread and Coherence Time, Types of Small-Scale Fading-Fading effects Due to Multipath Time Delay Spread, Flat fading, Frequency selective fading, Fading effects Due to Doppler Spread-Fast fading, slow fading, Statistical Models for multipath Fading Channels-Clarke's model for flat fading, spectral shape due to Doppler spread in Clarke's model, Simulation of Clarke and Gans Fading Model, Level crossing and fading statistics, Two-ray Rayleigh Fading Model.

UNIT -IV: Equalization and Diversity Introduction, Fundamentals of Equalization, Training a Generic Adaptive Equalizer, Equalizers in a communication Receiver, Linear Equalizers, Non-linear Equalization-Decision Feedback Equalization (DFE), Maximum Likelihood Sequence Estimation (MLSE) Equalizer, Algorithms for adaptive equalization-Zero Forcing Algorithm, Least Mean Square Algorithm, Recursive least squares algorithm. Diversity -Derivation of selection Diversity improvement, Derivation of Maximal Ratio Combining improvement, Practical Space Diversity Consideration-Selection Diversity, Feedback or Scanning Diversity, Maximal Ratio Combining, Equal Gain Combining, Polarization Diversity, Frequency Diversity, Time Diversity, RAKE Receiver.

UNIT -V: Wireless Networks Introduction to wireless Networks, Advantages and disadvantages of Wireless Local Area Networks, WLAN Topologies, WLAN Standard IEEE 802.11, IEEE 802.11 Medium Access Control, Comparison of IEEE 802.11 a,b,g and n standards, IEEE 802.16 and its enhancements, Wireless PANs, HiperLan, WLL.

TEXT BOOKS:

1. Wireless Communications, Principles, Practice – Theodore, S. Rappaport, 2nd Ed., 2002, PHI.
2. Wireless Communications-Andrea Goldsmith, 2005 Cambridge University Press.
3. Mobile Cellular Communication – Gottapu SasibhushanaRao, Pearson Education, 2012.

REFERENCE BOOKS:

1. Principles of Wireless Networks – KavehPahLaven and P. Krishna Murthy, 2002, PE
2. Wireless Digital Communications – KamiloFeher, 1999, PHI.
3. Wireless Communication and Networking – William Stallings, 2003, PHI.
4. Wireless Communication – UpenDalal, Oxford Univ. Press
5. Wireless Communications and Networking – Vijay K. Gary, Elsevier.

I Year II Semester **L P C**

18D1238511 **CMOS ANALOG AND DIGITAL IC DESIGN** **4 0 3**

(Elective-III)

UNIT-I: MOS Devices and Modeling The MOS Transistor, Passive Components- Capacitor & Resistor, Integrated circuit Layout, CMOS Device Modeling - Simple MOS Large-Signal Model, Other Model Parameters, Small- Signal Model for the MOS Transistor, Computer Simulation Models, Sub-threshold MOS Model.

MOS Design Pseudo NMOS Logic – Inverter, Inverter threshold voltage, Output high voltage, Output Low voltage, Gain at gate threshold voltage, Transient response, Rise time, Fall time, Pseudo NMOS logic gates, Transistor equivalency, CMOS Inverter logic.

UNIT-II: Combinational MOS Logic Circuits: MOS logic circuits with NMOS loads, Primitive CMOS logic gates – NOR & NAND gate, Complex Logic circuits design – Realizing Boolean expressions using NMOS gates and CMOS gates , AOI and OIA gates, CMOS full adder, CMOS transmission gates, Designing with Transmission gates.

Sequential MOS Logic Circuits Behaviour of bistable elements, SR Latch, Clocked latch and flip flop circuits, CMOS D latch and edge triggered flip-flop.

UNIT -III: Dynamic Logic Circuits Basic principle, Voltage Bootstrapping, Synchronous dynamic pass transistor circuits, Dynamic CMOS transmission gate logic, High performance Dynamic CMOS circuits.

Semiconductor Memories Types, RAM array organization, DRAM – Types, Operation, Leakage currents in DRAM cell and refresh operation, SRAM operation Leakage currents in SRAM cells, Flash Memory- NOR flash and NAND flash.

UNIT -IV: Analog CMOS Sub-Circuits MOS Switch, MOS Diode, MOS Active Resistor, Current Sinks and Sources, Current Mirrors-Current mirror with Beta Helper, Degeneration, Cascode current Mirror and Wilson Current Mirror, Current and Voltage References, Band gap Reference.

UNIT-V: CMOS Amplifiers Inverters, Differential Amplifiers, Cascode Amplifiers, Current Amplifiers, Output Amplifiers, High Gain Amplifiers Architectures.

CMOS Operational Amplifiers Design of CMOS Op Amps, Compensation of Op Amps, Design of Two-Stage Op Amps, Power- Supply Rejection Ratio of Two-Stage Op Amps, Cascode Op Amps, Measurement Techniques of OP Amp.

TEXT BOOKS:

1. Digital Integrated Circuit Design – Ken Martin, Oxford University Press, 2011.
2. CMOS Digital Integrated Circuits Analysis and Design – Sung-Mo Kang, Yusuf Leblebici, TMH, 3rd Ed., 2011.
3. CMOS Analog Circuit Design - Philip E. Allen and Douglas R. Holberg, Oxford University Press, International Second Edition/Indian Edition, 2010.
4. Analysis and Design of Analog Integrated Circuits- Paul R. Gray, Paul J. Hurst, S. Lewis and R. G. Meyer, Wiley India, Fifth Edition, 2010.

REFERENCE BOOKS:

1. Analog Integrated Circuit Design- David A. Johns, Ken Martin, Wiley Student Edn, 2016.
2. Design of Analog CMOS Integrated Circuits- BehzadRazavi, TMH Edition.
3. CMOS: Circuit Design, Layout and Simulation- Baker, Li and Boyce, PHI.
4. Digital Integrated Circuits – A Design Perspective, Jan M. Rabaey, BorivojeNikolic, 2nd Ed., PHI

I Year II Semester **L P C**

18ECDC205B ADVANCED COMPUTER ARCHITECTURE **4 0 3**

(Elective-III)

UNIT-I: Fundamentals of Computer Design: Fundamentals of Computer design, Changing faces of computing and task of computer designer, Technology trends, Cost price and their trends, measuring and reporting performance, Quantitative principles of computer design, Amdahl's law. Instruction set principles and examples- Introduction, classifying instruction set-memory addressing- type and size of operands, Operations in the instruction set.

UNIT-II: Pipelines: Introduction, basic RISC instruction set, Simple implementation of RISC instruction set, Classic five stage pipe lined RISC processor, Basic performance issues in pipelining, Pipeline hazards, and Reducing pipeline branch penalties.
Memory Hierarchy Design: Introduction, review of ABC of cache, Cache performance, Reducing cache miss penalty, Virtual memory.

UNIT-III: Instruction Level Parallelism (ILP)-The Hardware Approach: Instruction-Level parallelism, Dynamic scheduling, Dynamic scheduling using Tomasulo's approach, Branch prediction, High performance instruction delivery- Hardware based speculation.
ILP Software Approach: Basic compiler level techniques, Static branch prediction, VLIW approach, Exploiting ILP, Parallelism at compile time, Cross cutting issues - Hardware verses Software.

UNIT-IV: Multi Processors and Thread Level Parallelism: Multi Processors and Thread level Parallelism- Introduction, Characteristics of application domain, Systematic shared memory architecture, and Distributed shared – Memory architecture, Synchronization.

UNIT-V: Inter Connection and Networks: Introduction, Interconnection network media, Practical issues in interconnecting networks, Examples of inter connection, Cluster, Designing of clusters.
Intel Architecture: Intel IA-64 ILP in embedded and mobile markets Fallacies and pit falls.

TEXT BOOKS:

1. John L. Hennessy, David A. Patterson - Computer Architecture: A Quantitative Approach, 3rd Edition, an Imprint of Elsevier

REFERENCE BOOKS:

1. John P. Shen and Miikko H. Lipasti -, Modern Processor Design : Fundamentals of Super Scalar Processors
2. Computer Architecture and Parallel Processing - Kai Hwang, Faye A.Brigs., MC Graw Hill.
3. Advanced Computer Architecture - A Design Space Approach, Dezso Sima, Terence Fountain, Peter Kacsuk, Pearson Ed.

I Year II Semester **L P C**

18ECDC205C **DESIGN OF FAULT TOLERANCE** **4 0 3**

(Elective-III)

UNIT-I Basic concepts of Reliability: Failures and faults, Reliability and failure rate, Relation between reliability & mean time between failure, Maintainability & Availability, reliability of series and parallel systems. Modeling of faults. Test generation for combinational logic circuits :conventional methods (path sesitisation,Boolean difference), Random testing, transition count testing and signature analysis.

UNIT-II Fault Tolerant Design-I: Basic concepts ,static,(NMR,use of error correcting codes), dynamic, hybrid and self purging redundancy, Sift-out Modular Redundancy (SMR), triple modular redundancy, SMR reconfiguration.

UNIT-III Fault Tolerant Design-II: Time redundancy, software redundancy, fail-soft operation, examples of practical fault tolerant systems, introduction to fault tolerant design of VLSI chips.

UNIT-IV Self checking circuits: Design of totally self checking checkers, checkers using m-out of a codes, Berger codes and low cost residue code, self-checking sequential machines, partially self-checking circuits. Fail safe Design: Strongly fault secure circuits, fail-safe design of sequential circuits using partition theory and Berger codes, totally self checking PLA design.

UNIT-V Design for testable combination logic circuits: Basic concepts of testability, controllability and observability. The Read-Muller expansion technique, level OR-AND-OR design, use of control and syndrome-testing design. Built-in-test, built-in-test of VLSI chips, design for autonomous self-test, design in testability into logic boards.

TEXT BOOKS:

1. Parag K. Lala, Fault Tolerant & Fault Testable Hardware Design, (PHI) 1985
2. Parag K. Lala, Digital systems Design using PLD's, PHI 1990.

REFERENCE BOOKS:

1. N.N. Biswas, Logic Design Theory, PHI 1990.
2. Konad Chakraborthy & Pinaki Mazumdar, Fault tolerance and Reliability Techniques for high – density random – access memories Reason, 2002.

I Year II Semester **L P C**

18ECDC206A DIGITAL SIGNAL PROCESSORS & ARCHITECTURES 4 0 3
(ELECTIVE -IV)

UNIT –I: Introduction to Digital Signal Processing: Introduction, A Digital signal-processing system, The sampling process, Discrete time sequences. Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), linear time invariant systems, Digital filters, Decimation and interpolation

Computational Accuracy in DSP Implementations: Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors, Compensating filter.

UNIT –II: Architectures for Programmable DSP Devices: Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation UNIT, Programmability and Program Execution, Speed Issues, Features for External interfacing.

UNIT -III: Programmable Digital Signal Processors: Commercial Digital signal-processing Devices, Data Addressing modes of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX Processors, Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX instructions and Programming, On-Chip Peripherals, Interrupts of TMS320C54XX processors, Pipeline operation of TMS320C54XX Processors.

UNIT –IV: Analog Devices Family of DSP Devices: Analog Devices Family of DSP Devices – ALU and MAC block diagram, Shifter Instruction, Base Architecture of ADSP 2100, ADSP-2181 high performance Processor. Introduction to Blackfin Processor - The Blackfin Processor, Introduction to Micro Signal Architecture, Overview of Hardware Processing Units and Register files, Address Arithmetic Unit, Control Unit, Bus Architecture and Memory, Basic Peripherals.

UNIT –V: Interfacing Memory and I/O Peripherals to Programmable DSP Devices: Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct memory access (DMA).

TEXT BOOKS:

1. Digital Signal Processing – Avtar Singh and S. Srinivasan, Thomson Publications, 2004.
2. A Practical Approach to Digital Signal Processing - K Padmanabhan, R. Vijayarajeswaran, Ananthi. S, New Age International, 2006/2009
3. Embedded Signal Processing with the Micro Signal Architecture Publisher: Woon-SengGan, Sen M. Kuo, Wiley-IEEE Press, 2007

REFERENCE BOOKS:

1. Digital Signal Processors, Architecture, Programming and Applications – B. Venkataramani and M. Bhaskar, 2002, TMH.
2. Digital Signal Processing –Jonatham Stein, 2005, John Wiley.
3. DSP Processor Fundamentals, Architectures & Features – Lapsley et al. 2000, S. Chand & Co.
4. Digital Signal Processing Applications Using the ADSP-2100 Family by The Applications Engineering Staff of Analog Devices, DSP Division, Edited by Amy Mar, PHI
5. *The Scientist and Engineer's Guide to Digital Signal Processing* by Steven W. Smith, Ph.D., California Technical Publishing, ISBN 0-9660176-3-3, 1997
6. *Embedded Media Processing* by David J. Katz and Rick Gentile of Analog Devices, Newnes , ISBN 0750679123, 2005

I Year II Semester **L P C**

18D1238522 **EMI/EMC** **4 0 3**

(ELECTIVE -IV)

UNIT -I: Introduction, Natural and Nuclear Sources of EMI / EMC: Electromagnetic environment, History, Concepts, Practical experiences and concerns, frequency spectrum conservations, An overview of EMI / EMC, Natural and Nuclear sources of EMI.

UNIT -II: EMI from Apparatus, Circuits and Open Area Test Sites: Electromagnetic emissions, Noise from relays and switches, Non-linearities in circuits, passive inter modulation, Cross talk in transmission lines, Transients in power supply lines, Electromagnetic interference (EMI), Open area test sites and measurements.

UNIT -III: Radiated and Conducted Interference Measurements and ESD: Anechoic chamber, TEM cell, GH TEM Cell, Characterization of conduction currents / voltages, Conducted EM noise on power lines, Conducted EMI from equipment, Immunity to conducted EMI detectors and measurements, ESD, Electrical fast transients / bursts, Electrical surges.

UNIT -IV: Grounding, Shielding, Bonding and EMI filters: Principles and types of grounding, Shielding and bonding, Characterization of filters, Power lines filter design.

UNIT -V: Cables, Connectors, Components and EMC Standards: EMI suppression cables, EMC connectors, EMC gaskets, Isolation transformers, opto isolators, National / International EMC standards.

TEXT BOOKS:

1. Engineering Electromagnetic Compatibility - Dr. V.P. Kodali, IEEE Publication, Printed in India by S. Chand & Co. Ltd., New Delhi, 2000.
2. Electromagnetic Interference and Compatibility IMPACT series, IIT – Delhi, Modules 1– 9.

REFERENCE BOOKS:

1. Introduction to Electromagnetic Compatibility - Ny, John Wiley, 1992, by C.R. Pal.

I Year II Semester **L P C**

18ECDC206C **OBJECT ORIENTED PROGRAMMING (ELECTIVE -IV)** **4 0 3**

Objective: Implementing programs for user interface and application development using core java principles

UNIT I: ***Objective: Focus on object oriented concepts and java program structure and its installation***
Introduction to OOP Introduction, Need of Object Oriented Programming, Principles of Object Oriented Languages, Procedural languages Vs OOP, Applications of OOP, History of JAVA, Java Virtual Machine, Java Features, Installation of JDK1.6

UNIT II: ***Objective: Comprehension of java programming constructs, control structures in Java*** **Programming Constructs**
Variables , Primitive Datatypes, Identifiers- Naming Coventions, Keywords, Literals, Operators-Binary,Unary and ternary, Expressions, Precedence rules and Associativity, Primitive Type Conversion and Casting, Flow of control-Branching, Conditional, loops.
Classes and Objects- classes, Objects, Creating Objects, Methods, constructors-Constructor overloading, Garbage collector, Class variable and Methods-Static keyword, this keyword, Arrays, Command line arguments

UNIT III: ***Objective: Implementing Object oriented constructs such as various class hierarchies, interfaces and exception handling***
Inheritance: Types of Inheritance, Deriving classes using extends keyword, Method overloading, super keyword, final keyword, Abstract class
Interfaces, Packages and Enumeration: Interface-Extending interface, Interface Vs Abstract classes, Packages-Creating packages , using Packages, Access protection, java.lang package
Exceptions & Assertions - Introduction, Exception handling techniques-try...catch, throw, throws, finally block, user defined exception, Assertions

UNIT IV: ***Objective: Understanding of Thread concepts and I/O in Java***
MultiThreading :java.lang.Thread, The main Thread, Creation of new threads, Thread priority, Multithreading, Syncronization, suspending and Resuming threads, Communication between Threads
Input/Output: reading and writing data, java.io package

UNIT V: ***Objective: Being able to build dynamic user interfaces using applets and Event handling in java***
Applets- Applet class, Applet structure, An Example Applet Program, Applet Life Cycle, paint(),update() and repaint()
Event Handling -Introduction, Event Delegation Model, java.awt. event Description, Event Listeners, Adapter classes, Inner classes

UNIT VI: ***Objective: Understanding of various components of Java AWT and Swing and writing code snippets using them***
Abstract Window Toolkit Why AWT?, java.awt package, Components and Containers, Button, Label, Checkbox, Radio buttons, List boxes, Choice boxes, Text field and Text area, container classes, Layouts, Menu, Scroll bar
Swing: Introduction , JFrame, JApplet, JPanel, Components in swings, Layout Managers, JList and JScroll Pane, Split Pane, JTabbedPane, Dialog Box

Text Books:

1. The Complete Refernce Java, 8ed, Herbert Schildt, TMH
2. Programming in JAVA, Sachin Malhotra, Saurabhchoudhary, Oxford.
3. JAVA for Beginners, 4e, Joyce Farrell, Ankit R. Bhavsar, Cengage Learning.
4. Object oriented programming with JAVA, Essentials and Applications, Raj Kumar Bhuyya, Selvi, Chu TMH
5. Introduction to Java rogramming, 7thed, Y Daniel Liang, Pearson

Reference Books:

1. JAVA Programming, K.Rajkumar.Pearson
2. Core JAVA, Black Book, NageswaraRao, Wiley, Dream Tech
3. Core JAVA for Beginners, RashmiKanta Das, Vikas.
4. Object Oriented Programming through JAVA , P Radha Krishna , University Press.

I Year II Semester **L P C**

18ECDC2061 ADVANCED COMMUNICATION **0 3 2**

Note:

E. Minimum of 10 Experiments have to be conducted

F. All Experiments may be Simulated using MATLAB and to be verified using related Training kits.

1. Measurement of Bit Error Rate using Binary Data
2. Verification of minimum distance in hamming code
3. Determination of output of Convolution Encoder for a given sequence
4. Determination of output of Convolution Decoder for a given sequence
5. Efficiency of DS Spread- Spectrum Technique
6. Simulation of Frequency Hopping (FH) system
7. Effect of Sampling and Quantization of Digital Image
8. Verification of Various Transforms (FT / DCT/ Walsh / Hadamard) on a given Image (Finding Transform and Inverse Transform)
9. Point, Line and Edge detection techniques using derivative operators.
10. Implementation of FIR filter using DSP Trainer Kit (C-Code/ Assembly code)
11. Implementation of IIR filter using DSP Trainer Kit (C-Code/ Assembly code)
12. Determination of Losses in Optical Fiber
13. Observing the Waveforms at various test points of a mobile phone using Mobile Phone Trainer
14. Study of Direct Sequence Spread Spectrum Modulation & Demodulation using CDMA-DSS-BER Trainer
15. Study of ISDN Training System with Protocol Analyzer
16. Characteristics of LASER Diode.

NRI INSTITUTE OF TECHNOLOGY

(An Autonomous Institution Permanently Affiliated to JNTUK, Kakinada)
(Accredited by NAAC with 'A' Grade, ISO 9001: 2008 Certified Institution)
POTHAVARAPPADU (V), VIA NUNNA, AGIRIPALLI (M), PIN -521212

COMPUTER SECIENCE AND ENGINEERING
COURSE STRUCTURE FOR FIRST YEAR M.TECH PROGRAMME

I Semester

Sl. No.	Subject Code	Subject	L	P	Total	Internal Marks	External Marks	Total Marks	Credits
1	18CSCS101	Advanced data structures and algorithm analysis	4	--	4	40	60	100	4
2	18CSCS102	Mathematical foundations of computer science	4	--	4	40	60	100	4
3	18CSCS103	Computer organization and architecture	4	--	4	40	60	100	4
4	18CSCS104	Database management systems	4	--	4	40	60	100	4
5	18CSCS105	Advanced operating systems	4	--	4	40	60	100	4
6	18CSCS106	Data warehousing and data mining	4	--	4	40	60	100	4
7	18CSCS161	CSE Lab 1	--	3	3	40	60	100	2
Total			24	3	27	280	420	700	20

II Semester

Sl. No.	Subject Code	Subject	L	P	Total	Internal Marks	External Marks	Total Marks	Credits
1	18CSCS201	Cyber security	4	--	4	40	60	100	4
2	18CSCS202	Computer networks	4	--	4	40	60	100	4
3	18CSCS203	Big data analytics	4	--	4	40	60	100	4
4	18CSCS204	Advanced unix programming	4	--	4	40	60	100	4
5	18CSCS205A 18CSCS205B 18CSCS205C 18CSCS205D	Elective – 1 1. Software engineering 2. Artificial intelligence 3. Compiler design 4. Machine learning	4	--	4	40	60	100	4
6	18CSCS206A 18CSCS206B 18CSCS206C 18CSCS206D	Elective – 2 1. Image processing 2. Parallel algorithms 3. Cloud Computing 4. Mobile computing	4	--	4	40	60	100	4
7	18CSCS261	CSE Lab 2	--	3	3	40	60	100	2
Total			24	3	27	280	420	700	20

L-LECTURE P-PRACTICAL

H.O.D

Head, CSE Department
NRI Institute of Technology
POTHAVARAPPADU (Vill)
Agiripalli (Mdl.), Krishna Dist.

Subject Code: 18CSCS101	L	P	C
I Year – I SEMESTER	4	0	3

ADVANCED DATA STRUCTURES AND ALGORITHM ANAYLSIS

UNIT- I:

Introduction to Data Structures, Singly Linked Lists, Doubly Linked Lists, Circular Lists-Algorithms. Stacks and Queues: Algorithm Implementation using Linked Lists.

UNIT-II:

Searching-Linear and Binary Search Methods. Sorting-Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort. Trees- Binary trees, Properties, Representation and Traversals (DFT, BFT), Expression Trees(Infix,prefix,postfix).Graphs-Basic Concepts , Storage Structures and Traversals.

UNIT- III:

Dictionaries, ADT, The List ADT, Stack ADT, Queue ADT, Hash Table Representation, Hash Functions, Collision Resolution-Separate Chaining, Open Addressing-Linear Probing, Double Hashing.

UNIT- IV:

Priority queues- Definition, ADT, Realising a Priority Queue Using Heaps, Definition, Insertion, Deletion .Search Trees- Binary Search Trees, Definition, ADT, Implementation, Operations-Searching, Insertion, Deletion.

UNIT –V:

Search Trees- AVL Trees, Definition, Height of AVL Tree, Operations, Insertion, Deletion and Searching. Search Trees- Introduction to Red-Black and Splay Trees, B-Trees, Height of B-Tree, Insertion, Deletion and Searching, Comparison of Search Trees.

TEXT BOOKS:

Data Structures: A Pseudocode Approach, 2/e, Richard F.Gilberg, Behrouz A. Forouzon, Cengage.
Data Structures, Algorithms and Applications in java, 2/e, Sartaj Sahni, University Press.

REFERENCES BOOKS:

Data Structures And Algorithm Analysis, 2/e, Mark Allen Weiss, Pearson.
Data Structures And Algorithms, 3/e, Adam Drozdek, Cengage.
C and Data Structures: A Snap Shot Oriented Treatise Using Live Engineering Examples, N.B.Venkateswarulu, E.V.Prasad, S Chand & Co,2009.

Subject Code: 18CSCS102 | | L | P | C

	L	P	C
Subject Code: 18CSCS102			
I Year – I SEMESTER	4	0	3

MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

UNIT- I:

Mathematical Logic: Statements and notations, Connectives, Well formed formulas, Truth Tables, tautology, equivalence implication, Normal forms, Theory of inference for the statement calculus, Rules of inference, Consistency of premises and indirect method of proof, Automatic Theorem Proving Predicate calculus: Predicates, statement functions, variables and quantifiers, predicate formulas, free & bound variables, universe of discourse, inference theory of predicate calculus

UNIT- II :

Set theory & Relations: Introduction, Relations and ordering, Properties of binary Relations, Equivalence, Compatibility Relations, Partial ordering, Hasse diagram. Functions: composition of functions, Inverse Function, Recursive Functions, Lattice and its Properties, Pigeon hole Principles and its application. Algebraic structures: Algebraic systems, Examples and general properties, Semi groups and Monoids, groups, sub groups, Definitions, Examples, homomorphism, Isomorphism and related problems.

UNIT- III:

Elementary Combinatorics: Basis of counting, Enumeration of Combinations & Permutations, Enumerating of Combinations & Permutations with repetitions and constrained repetitions, Binomial Coefficients, Binomial Multinomial theorems, principles of Inclusion – Exclusion.

UNIT- IV:

Recurrence Relations: Generating Function of Sequences, Calculating Coefficient of generating functions, Recurrence relations, Solving recurrence relation by substitution and Generating functions, The method of Characteristic roots, Solution of Inhomogeneous Recurrence Relation.

UNIT- V:

Graph Theory: Representation of Graph, Spanning Trees, BFS, DFS, Kruskals Algorithm, Binary trees, Planar Graphs, Graph Theory and Applications, Basic Concepts, Isomorphism and Sub graphs, Multi graphs and Euler circuits, Hamiltonian graphs, Chromatic Numbers.

TEXT BOOKS:

Discrete Mathematical Structures with Applications to computer science J.P Tremblery, R.Manohar, TMH

Discrete Mathematical for computer Scientists & Mathematicians " J.L. Molt, A.Kandel T.P.Baker, PHI

REFERENCE TEXTBOOKS:

Elements of Discrete Mathematics, C L Liu, D P Mohanpatra, TMH

Discrete Mathematics, Schaum's Outlines, Lipschutz, Lipson TMH.

Discrete Mathematical Structures, Kolman, Busby, Ross, 6th ed., PHI, 2009

Subject Code: 18CSCS103	L	P	C
I Year – I SEMESTER	4	0	3

COMPUTER ORGANIZATION AND ARCHITECTURE

UNIT- I:

Number Systems And Computer Arithmetic Signed And Unsigned Numbers, Addition and Subtraction, Multiplication, Division, Floating Point Representation Logical Operation, Gray Code, BCD Code, Error Detecting Codes. Boolean Algebra, Simplification of Boolean Expressions- Maps.

UNIT- II:

Combinational and Sequential Circuits Decoders, Encoders, Multiplexers, Half and Full Adders, Shift Registers, Flip-Flops, Binary Counters, Memory Unit.

UNIT- III:

Memory Organisation Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory Concept.

UNIT- IV:

ALU Design Addition and Subtraction, Sign and Unsigned Numbers, Multiplication and Division Algorithms, BCD Adders.

UNIT- V :

Input –Output Organisation Peripheral Devices, Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupts, DMA, Input Output Processor, Serial Communication.

TEXT BOOKS:

Computer System Architecture, 3/e, Moris Mano, Pearson/PHI.
Micro Processor and Interfacing, 2/e, Douglas V.Hall, TMH.

REFERENCE BOOKS:

Digital Logic and Computer Organisation, Rajaraman, Radha Krishnan, PHI.
Micro Computer Systems: 8086/8088 family, 2/e, Liu, Gibson, PHI.
Computer Organisation and Architecture, 7/e, Stallings, Pearson.

Subject Code: 18CSCS104	**L**	**P**	**C**
I Year – I SEMESTER	**4**	**0**	**3**

DATABASE MANAGEMENT SYSTEMS

UNIT- I:

Database System Applications, Purpose of Database Systems, View of Data – Data Abstraction, Instances and Schemas, Data Models – the ER Model, Relational Model, Other Models – Database Languages – DDL, DML, Database Access from Applications Programs, Transaction Management, Data Storage and Querying, Database Architecture, Database Users .and Administrators, History of Database Systems. Introduction to Database design, ER diagrams, Beyond ER Design, Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER Model, Conceptual Design with the ER Model, Conceptual Design for Large enterprises. Relational Model: Introduction to the Relational Model – Integrity Constraints Over Relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design, Introduction to Views – Destroying /altering Tables and Views.

UNIT- II :

Relational Algebra and Calculus: Relational Algebra – Selection and Projection, Set operations, Renaming, Joins, Division, Examples of Algebra Queries, Relational calculus – Tuple relational Calculus – Domain relational calculus – Expressive Power of Algebra and calculus. Form of Basic SQL Query – Examples of Basic SQL Queries, Introduction to Nested Queries, Correlated Nested Queries, Set – Comparison Operators, Aggregate Operators, NULL values – Comparison using Null values – Logical connectives – AND, OR and NOT – Impact on SQL Constructs, Outer Joins, Disallowing NULL values, Complex Integrity Constraints in SQL Triggers and Active Data bases.

UNIT- III :

Introduction to Schema Refinement – Problems Caused by redundancy, Decompositions – Problem related to decomposition, Functional

Dependencies - Reasoning about FDS, Normal Forms – FIRST, SECOND, THIRD Normal forms – BCNF –Properties of Decompositions- Loss less- join Decomposition, Dependency preserving Decomposition, Schema Refinement in Data base Design – Multi valued Dependencies – FOURTH Normal Form, Join Dependencies, FIFTH Normal form, Inclusion Dependencies.

UNIT- IV:

Overview of Transaction Management: The ACID Properties, Transactions and Schedules, Concurrent Execution of Transactions – Lock Based Concurrency Control, Deadlocks – Performance of Locking – Transaction Support in SQL. Concurrency Control: Serializability, and recoverability – Introduction to Lock Management – Lock Conversions, Dealing with Dead Locks, Specialized Locking Techniques – Concurrency Control without Locking. Crash recovery: Introduction to Crash recovery, Introduction to ARIES, the Log , Other Recovery related Structures, the Write-Ahead Log Protocol, Check pointing, recovering from a System Crash, Media recovery

UNIT-V:

Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing – Clustered Indexes, Primary and Secondary Indexes, Index data Structures – Hash Based Indexing, Tree based Indexing, Comparison of File Organizations. Storing data: Disks and Files: -The Memory Hierarchy – Redundant Arrays of Independent Disks. Tree Structured Indexing: Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM) B+ Trees: A Dynamic Index Structure, Search, Insert, Delete. Hash Based Indexing: Static Hashing, Extendable hashing, Linear Hashing, Extendble vs.Linear Hashing.

TEXT BOOKS:

Database Management Systems, Raghu Ramakrishna, Johannes Gehrke, TMH, 3rd Edition, 2003.

Database System Concepts, A.Silberschatz, H.F. Korth, S. Sudarshan, McGraw hill, VI edition, 2006.

Fundamentals of Database Systems 5th edition. Ramez Elmasri, Shamkant B.Navathe, Pearson Education, 2008.

REFERENCE BOOKS:

Database Management System Oracle SQL and PL/SQL,P.K.Das Gupta, PHI.

Database System Concepts, Peter Rob & Carlos Coronel, Cengage Learning, 2008.

Database Systems, A Practical approach to Design Implementation and Management Fourth edition, Thomas Connolly, Carolyn Begg, Pearson education.

Subject Code: 18CSCS105	L	P	C
I Year – I SEMESTER	4	0	3

ADVANCED OPERATING SYSTEMS

UNIT - I:

Architectures of Distributed Systems - System Architecture types - issues in distributed operating systems - communication networks - communication primitives. Theoretical Foundations - inherent limitations of a distributed system - lamp ports logical clocks - vector clocks - casual ordering of messages - global state - cuts of a distributed computation - termination detection. Distributed Mutual Exclusion - introduction - the classification of mutual exclusion and associated algorithms - a comparative performance analysis.

UNIT - II:

Distributed Deadlock Detection -Introduction - deadlock handling strategies in distributed systems - issues in deadlock detection and resolution - control organizations for distributed deadlock detection - centralized and distributed deadlock detection algorithms -hierarchical deadlock detection algorithms. Agreement protocols - introduction-the system model, a classification of agreement problems, solutions to the Byzantine agreement problem, applications of agreement algorithms. Distributed resource management: introduction-architecture - mechanism for building distributed file systems - design issues - log structured file systems.

UNIT - III:

Distributed shared memory-Architecture- algorithms for implementing DSM - memory coherence and protocols - design issues. Distributed Scheduling - introduction - issues in load distributing - components of a load distributing algorithm - stability - load distributing algorithm - performance comparison - selecting a suitable load sharing algorithm - requirements for load distributing -task migration and associated issues. Failure Recovery and Fault tolerance: introduction- basic concepts - classification of failures - backward and forward error recovery, backward error recovery- recovery in concurrent systems - consistent set of check points - synchronous and asynchronous check pointing and recovery - check pointing for distributed database systems- recovery in replicated distributed databases.

UNIT - IV:

Protection and security -preliminaries, the access matrix model and its implementations.-safety in matrix model- advanced models of protection. Data security - cryptography: Model of cryptography, conventional cryptography- modern cryptography, private key cryptography, data encryption standard- public key cryptography - multiple encryption - authentication in distributed systems.

UNIT - V:

Multiprocessor operating systems - basic multiprocessor system architectures - inter connection networks for multiprocessor systems - caching - hypercube architecture. Multiprocessor Operating System - structures of multiprocessor operating system, operating system design issues- threads- process synchronization and scheduling. Database Operating systems :Introduction- requirements of a database operating system Concurrency control : theoretical aspects - introduction, database systems - a concurrency control model of database systems- the problem of concurrency control - serializability theory- distributed database systems, concurrency control algorithms - introduction, basic synchronization primitives, lock based algorithms-timestamp based algorithms, optimistic algorithms - concurrency control algorithms, data replication.

TEXT BOOKS:

Mukesh Singhal, Niranjan G.Shivaratri, "Advanced concepts in operating systems: Distributed, Database and multiprocessor operating systems", TMH, 2001

REFERENCE Books:

1. Andrew S.Tanenbaum, "Modern operating system", PHI, 2003
2. Pradeep K.Sinha, "Distributed operating system-Concepts and design", PHI, 2003.
3. Andrew S.Tanenbaum, "Distributed operating system", Pearson education, 2003

Subject Code: 18CSCS106	**L**	**P**	**C**
I Year – I SEMESTER	**4**	**0**	**3**

DATA WAREHOUSING AND DATA MINING

UNIT 1: DATA WAREHOUSING:

Data warehousing Components –Building a Data warehouse — Mapping the Data Warehouse to a Multiprocessor Architecture – DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools –Metadata.

UNIT II: BUSINESS ANALYSIS:

Reporting and Query tools and Applications – Tool Categories – The Need for Applications – Cognos Impromptu – Online Analytical Processing (OLAP) – Need – Multidimensional Data Model – OLAP Guidelines – Multidimensional versus Multirelational OLAP – Categories of Tools – OLAP Tools and the Internet.

UNIT III: DATA MINING:

Introduction – Data – Types of Data – Data Mining Functionalities – Interestingness of Patterns – Classification of Data Mining Systems – Data Mining Task Primitives – Integration of a Data Mining System with a Data Warehouse – Issues –Data Preprocessing.

UNIT IV :ASSOCIATION RULE MINING AND CLASSIFICATION:

Mining Frequent Patterns, Associations and Correlations – Mining Methods – Mining various Kinds of Association Rules – Correlation Analysis – Constraint Based Association Mining – Classification and Prediction – Basic Concepts – Decision Tree Induction – Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction.

UNIT V : CLUSTERING AND TRENDS IN DATA MINING:

Cluster Analysis – Types of Data – Categorization of Major Clustering Methods – K-means– Partitioning Methods – Hierarchical Methods – Density-Based Methods –Grid Based Methods – Model-Based Clustering Methods – Clustering High Dimensional Data – Constraint – Based Cluster Analysis – Outlier Analysis – Data Mining Applications.

TEXT BOOKS:

Alex Berson and Stephen J.Smith, "Data Warehousing, Data Mining and OLAP", Tata McGraw – Hill Edition, Thirteenth Reprint 2008.

Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques", Third Edition, Elsevier, 2012.

REFERENCES:

Pang-Ning Tan, Michael Steinbach and Vipin Kumar, "Introduction to Data Mining", Person Education, 2007.

K.P. Soman, Shyam Diwakar and V. Aja, "Insight into Data Mining Theory and Practice", Eastern Economy Edition, Prentice Hall of India, 2006.

G. K. Gupta, "Introduction to Data Mining with Case Studies", Eastern Economy Edition, Prentice Hall of India, 2006.

Daniel T. Larose, "Data Mining Methods and Models", Wiley-Interscience, 2006.

Subject Code: 18CSCS161	**L**	**P**	**C**
I Year – I SEMESTER		**03**	**2**

CSE LAB 1

Data Structures Programs:

To implement Stacks& Queues using Arrays & Linked Lists
To implement Stack ADT, Queue ADT using arrays & Linked Lists
To implement Dequeue using Double Linked List & Arrays
To perform various Recursive & Non-recursive operations on Binary Search Tree
To implement BFS & DFS for a graph
To implement Merge & Heap sort of given elements
To perform various operations on AVL trees
To implement Krushkal's algorithm to generate a min-cost spanning tree
To implement Prim's algorithm to generate min-cost spanning tree
10.To implement functions of Dictionary using Hashing

Operating system programs:

Program to implement FCFS(First Come First Serve)scheduling
Algorithms Program to implement SJF(Shortest Job First)Scheduling
Algorithm Program to implement Priority Scheduling algorithm
Program to implement Round Robin Scheduling algorithm
Program to implement FIFO(First In First Out) Page Replacement Algorithm
Program to implement LRU(least Recently used)Page Replacement Algorithm
Program to implement LFU(Least Frequently used)Page Replacement Algorithm
Write a program to implement how Disk Scheduling is done in operating system
Draw the appropriate C.P.U performance graphs for SJF Scheduling Algorithm

Operating system programs:

Program to implement FCFS(First Come First Serve)scheduling
Algorithms Program to implement SJF(Shortest Job First)Scheduling
Algorithm Program to implement Priority Scheduling algorithm
Program to implement Round Robin Scheduling algorithm
Program to implement FIFO(First In First Out) Page Replacement Algorithm
Program to implement LRU(least Recently used)Page Replacement Algorithm
Program to implement LFU(Least Frequently used)Page Replacement Algorithm
Write a program to implement how Disk Scheduling is done in operating system
Draw the appropriate C.P.U performance graphs for SJF Scheduling Algorithm

Subject Code: 18D1258401	L	P	C
I Year –I I SEMESTER	4	0	3

CYBER SECURITY

UNIT I:

Introduction:

Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

UNIT II:

Conventional Encryption:

Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC

UNIT III:

Number Theory: Prime and Relatively Prime Numbers, Modular Arithmetic, Fermat's and Euler's Theorems, The Chinese Remainder theorem, Discrete logarithms

Public key: Public key cryptography principles, public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service

UNIT IV:

IP Security: IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management

Transport Level Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET)

Email Privacy: Pretty Good Privacy (PGP) and S/MIME.

UNIT V:

Intrusion Detection: Intruders, Intrusion Detection systems, Password Management.

Malicious Software: Viruses and related threats & Countermeasures.

Fire walls: Firewall Design principles, Trusted Systems.

TEXT BOOKS:

Network Security & Cryptography: Principles and Practices, William Stallings, PEA, Sixth edition. Hack Proofing your Network, Russell, Kaminsky, Forest Puppy, Wiley Dreamtech

REFERENCE BOOKS:

1. Network Security & Cryptography, Bernard Menezes, Cengage, 2010

Subject Code: 18D125840 **L P C**

I Year –I I SEMESTER **4 0 3**

COMPUTER NETWORKS

UNIT – I:

Introduction: Network Topologies WAN, LAN, MAN. Reference models- The OSI Reference Model-the TCP/IP Reference Model - A Comparison of the OSI and TCP/IP Reference Models

UNIT – II:

Physical Layer – Fourier Analysis – Bandwidth Limited Signals – The Maximum Data Rate of a Channel - Guided Transmission Media, Digital Modulation and Multiplexing: Frequency Division Multiplexing, Time Division Multiplexing, Code Division Multiplexing

Data Link Layer Design Issues, Error Detection and Correction, Elementary Data Link Protocols, Sliding Window Protocols

UNIT – III:

The Data Link Layer - Services Provided to the Network Layer – Framing – Error Control – Flow Control, Error Detection and Correction – Error-Correcting Codes – Error Detecting Codes, Elementary Data Link Protocols- A Utopian Simplex Protocol-A Simplex Stop and Wait Protocol for an Error free channel-A Simplex Stop and Wait Protocol for a Noisy Channel, Sliding Window Protocols-A One Bit Sliding Window Protocol-A Protocol Using Go-Back-N- A Protocol Using Selective Repeat

UNIT – IV:

The Medium Access Control Sublayer-The Channel Allocation Problem-Static Channel Allocation-Assumptions for Dynamic Channel Allocation, Multiple Access Protocols-Aloha-Carrier Sense Multiple Multiple Access Protocols-Collision-Free Protocols-Limited Contention Protocols-Wireless LAN Protocols, Ethernet-Classic Ethernet Physical Layer-Classic Ethernet MAC Sublayer Protocol-Ethernet Performance-Fast Ethernet Gigabit Ethernet-10-Gigabit Ethernet-Retrospective on Ethernet, Wireless Lans-The 802.11 Architecture and Protocol Stack-The 802.11 Physical Layer-The802.11 MAC Sublayer Protocol-The 805.11 Frame Structure-Services

UNIT – V:

Design Issues-The Network Layer Design Issues – Store and Forward Packet Switching-Services Provided to the Transport layer- Implementation of Connectionless Service-Implementation of Connection Oriented Service-Comparison of Virtual Circuit and Datagram Networks, Routing Algorithms-The Optimality principle-Shortest path Algorithm, Congestion Control Algorithms-Approaches to Congestion Control-Traffic Aware Routing-Admission Control-Traffic Throttling-Load Shedding.

TEXT BOOKS:

Computer Networks, Tanenbaum and David J Wetherall, 5th Edition, Pearson Edu, 2010

Computer Networks: A Top Down Approach, Behrouz A. Forouzan, FirouzMosharraf, McGraw Hill Education

REFERENCE BOOKS:

Larry L. Peterson and Bruce S. Davie, "Computer Networks - A Systems Approach" (5th ed), Morgan Kaufmann/ Elsevier, 2011

Subject Code: 18D1258403	L	P	C
I Year –I I SEMESTER	4	0	3

BIG DATA ANALYTICS

UNIT-I

Data structures in Java: Linked List, Stacks, Queues, Sets, Maps; Generics: Generic classes and Type parameters, Implementing Generic Types, Generic Methods, Wrapper Classes, Concept of Serialization

UNIT-II

Working with Big Data: Google File System, Hadoop Distributed File System (HDFS) – Building blocks of Hadoop (Namenode, Datanode, Secondary Namenode, Job Tracker, Task Tracker), Introducing and Configuring Hadoop cluster (Local, Pseudo-distributed mode, Fully Distributed mode), Configuring XML files.

UNIT-III

Writing MapReduce Programs: A Weather Dataset, Understanding Hadoop API for MapReduce Framework (Old and New), Basic programs of Hadoop MapReduce: Driver code, Mapper code, Reducer code, Record Reader, Combiner, Partitioner

UNIT-IV

Hadoop I/O: The Writable Interface, Writable Comparable and comparators, Writable Classes: Writable wrappers for Java primitives, Text, Bytes Writable, Null Writable, Object Writable and Generic Writable, Writable collections, Implementing a Custom Writable: Implementing a Raw Comparator for speed, Custom comparators

UNIT-V

Pig: Hadoop Programming Made Easier

Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin

Applying Structure to Hadoop Data with Hive:

Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data

TEXT BOOKS:

1.Big Java 4th Edition, Cay Horstmann, Wiley John Wiley & Sons, INC

2.Hadoop: The Definitive Guide by Tom White, 3rd Edition, O'reilly

3. Hadoop in Action by Chuck Lam, MANNING Publ.

4. Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk,Bruce Brown, Rafael Coss

REFERENCE BOOKS:

Hadoop in Practice by Alex Holmes, MANNING Publ.

Hadoop MapReduce Cookbook, Srinath Perera, Thilina Gunarathne

SOFTWARE LINKS:

Hadoop:http://hadoop.apache.org/

Hive: https://cwiki.apache.org/confluence/display/Hive/Home

Piglatin: http://pig.apache.org/docs/r0.7.0/tutorial.html

Subject Code: 18D1258404	L	P	C
I Year – II SEMESTER	4	0	3

ADVANCED UNIX PROGRAMMING

UNIT-I

Introduction to unix-Brief History-What is Unix-Unix Components-Using Unix-Commands in Unix-Some Basic Commands-Command Substitution-Giving Multiple Commands.

UNIT-II

The File system –The Basics of Files-What's in a File-Directories and File Names-Permissions-I Nodes-The Directory Hierarchy, File Attributes and Permissions-The File Command knowing the File Type-The Chmod Command Changing File Permissions-The Chown Command Changing the Owner of a File-The Chgrp Command Changing the Group of a File.

UNIT-III

Using the Shell-Command Line Structure-Met characters-Creating New Commands-Command Arguments and Parameters-Program Output as Arguments-Shell Variables- -More on I/O Redirection-Looping in Shell Programs.

UNIT-IV

Filters-The Grep Family-Other Filters-The Stream Editor Sed-The AWK Pattern Scanning and processing Language-Good Files and Good Filters.

UNIT-V

Shell Programming-Shell Variables-The Export Command-The Profile File a Script Run During Starting-The First Shell Script-The read Command-Positional parameters-The $? Variable knowing the exit Status-More about the Set Command-The Exit Command-Branching Control Structures-Loop Control Structures-The Continue and Break Statement-The Expr Command: Performing Integer Arithmetic-Real Arithmetic in Shell Programs-The here Document(<<)-The Sleep Command-Debugging Scripts-The Script Command-The Eval Command-The Exec Command. The Process-The Meaning-Parent and Child Processes-Types of Processes-More about Foreground and Background processes-Internal and External Commands-Process Creation-The Trap Command-The Stty Command-The Kill Command-Job Control.

TEXT BOOKS:

The Unix programming Environment by Brain W. Kernighan & Rob Pike, Pearson.
Introduction to Unix Shell Programming by M.G.Venkateshmurthy, Pearson.

REFERENCE BOOKS:

1. Unix and shell programmingby B.M. Harwani, OXFORD university press.

Subject Code: 18D1258511		L	P	C

	L	P	C
Subject Code: 18D1258511	**L**	**P**	**C**
I Year – II SEMESTER	**4**	**0**	**3**

SOFTWARE ENGINEERING
(Elective – 1)

UNIT-I:

Software and Software Engineering: The Nature of Software, The Unique Nature of Web Apps, Software Engineering, Software Process, Software Engineering Practice, Software Myths.

Process Models: A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal and Team Process Models, Process Terminology, Product and Process.

UNIT-II:

Requirements Analysis And Specification: Requirements Gathering and Analysis, Software Requirement Specification (SRS), Formal System Specification.

Software Design: Overview of the Design Process, How to Characterise of a Design?, Cohesion and Coupling, Layered Arrangement of Modules, Approaches to Software Design

UNIT – III:

Function-Oriented Software Design: Overview of SA/SD Methodology, Structured Analysis, Developing the DFD Model of a System, Structured Design, Detailed Design, Design Review, over view of Object Oriented design.

User Interface Design: Characteristics of Good User Interface, Basic Concepts, Types of User Interfaces, Fundamentals of Component-based GUI Development, A User Interface Design Methodology.

UNIT – IV:

Coding And Testing: Coding, Code Review, Software Documentation, Testing, Unit Testing, Black-Box Testing, White-Box Testing, Debugging, Program Analysis Tool, Integration Testing, Testing Object-Oriented Programs, System Testing, Some General Issues Associated with Testing

UNIT – V:

Software Reliability And Quality Management: Software Reliability, Statistical Testing, Software Quality, Software Quality Management System, ISO 9000, SEI Capability Maturity Model.

Computer Aided Software Engineering: Case and its Scope, Case Environment, Case Support in Software Life Cycle, Other Characteristics of Case Tools, Towards Second Generation CASE Tool, Architecture of a Case Environment

TEXT BOOKS:

1. Software Engineering A practitioner's Approach, Roger S. Pressman, Seventh Edition McGraw Hill International Edition.
2. Fundamentals of Software Engineering, Rajib Mall, Third Edition, PHI.
3. Software Engineering, Ian Sommerville, Ninth edition, Pearson education

REFERENCE BOOKS:

1. Software Engineering : A Primer, Waman S Jawadekar, Tata McGraw-Hill, 2008
2. Software Engineering, A Precise Approach, Pankaj Jalote, Wiley India,2010.
3. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.

Software Engineering1: Abstraction and modeling, Diner Bjorner, Springer International edition, 2006.

Subject Code: 18CSCS205C | L | P | C
I Year – II SEMESTER | 4 | 0 | 3

COMPILER DESIGN
(Elective – 1)

UNIT – I

Introduction Language Processing, Structure of a compiler the evaluation of Programming language, The Science of building a Compiler application of Compiler Technology. Programming Language Basics.

Lexical Analysis-: The role of lexical analysis buffing, specification of tokens. Recognitions of tokens the lexical analyzer generator lexical

UNIT –II

Syntax Analysis -: The Role of a parser, Context free Grammars Writing A grammar, top down passing bottom up parsing Introduction to Lr Parser.

UNIT –III

More Powerful LR parser (LR1, LALR) Using Armigers Grammars Equal Recovery in Lr parser Syntax Directed Transactions Definition, Evolution order of SDTS Application of SDTS. Syntax Directed Translation Schemes.

UNIT – IV

Intermediated Code: Generation Variants of Syntax trees 3 Address code, Types and Deceleration, Translation of Expressions, Type Checking. Canted Flow Back patching?

UNIT – V

Runtime Environments, Stack allocation of space, access to Non Local date on the stack Heap Management code generation – Issues in design of code generation the target Language Address in the target code Basic blocks and Flow graphs. A Simple Code generation.

TEXT BOOKS:

Compilers, Principles Techniques and Tools. Alfred V Aho, Monical S. Lam, Ravi Sethi Jeffery D. Ullman,2nd edition,pearson,2007

Compiler Design K.Muneeswaran, OXFORD

Principles of compiler design, 2nd edition, Nandhini Prasad, Elsebier.

REFERENCE BOOKS:

Compiler Construction, Principles and practice, Kenneth C Louden, CENGAGE
Implementations of Compiler, A New approach to Compilers including the algebraic methods,Yunlinsu,SPRINGER

Subject Code: 18CSCS205B

I Year – II SEMESTER

L	P	C
4	0	3

ARTIFICIAL INTELLIGENCE
(Elective – 1)

UNIT-I:

Introduction to artificial intelligence: Introduction ,history, intelligent systems, foundations of AI, applications, tic-tac-tie game playing, development of ai languages, current trends in AI

UNIT-II:

Problem solving: state-space search and control strategies : Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative-deepening a*, constraint satisfaction

Problem reduction and game playing: Introduction, problem reduction, game playing, alpha-beta pruning, two-player perfect information games

UNIT-III:

Logic concepts: Introduction, propositional calculus, proportional logic, natural deduction system, axiomatic system, semantic tableau system in proportional logic, resolution refutation in proportional logic, predicate logic

UNIT-IV:

Knowledge representation: Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames **advanced knowledge representation techniques:** Introduction, conceptual dependency theory, script structure, cyc theory, case grammars, semantic web

UNIT-V:

Expert system and applications: Introduction phases in building expert systems, expert system versus traditional systems, rule-based expert systems blackboard systems truth maintenance systems, application of expert systems, list of shells and tools

TEXT BOOKS:

Artificial Intelligence- Saroj Kaushik, CENGAGE Learning,
Artificial intelligence, A modern Approach , 2nd ed, Stuart Russel, Peter Norvig, PEA
Artificial Intelligence- Rich, Kevin Knight, Shiv Shankar B Nair, 3rd ed,
TMH Introduction to Artificial Intelligence, Patterson, PHI

REFERNCE BOOKS:

Atificial intelligence, structures and Strategies for Complex problem solving, -George F Lugar, 5th ed, PEA
Introduction to Artificial Intelligence, Ertel, Wolf Gang, Springer
Artificial Intelligence, A new Synthesis, Nils J Nilsson, Elsevier

Subject Code: 18CSCS205D	L	P	C
I Year – II SEMESTER	4	0	3

MACHINE LEARNING
(Elective – 1)

UNIT -I: The ingredients of machine learning, Tasks: the problems that can be solved with machine learning, Models: the output of machine learning, Features, the workhorses of machine learning. **Binary classification and related tasks:** Classification, Scoring and ranking, Class probability estimation

UNIT- II: Beyond binary classification: Handling more than two classes, Regression, Unsupervised and descriptive learning. **Concept learning**: The hypothesis space, Paths through the hypothesis space, Beyond conjunctive concepts

UNIT- III: Tree models: Decision trees, Ranking and probability estimation trees, Tree learning as variance reduction. **Rule models:** Learning ordered rule lists, Learning unordered rule sets, Descriptive rule learning, First-order rule learning

UNIT -IV: Linear models: The least-squares method, The perceptron: a heuristic learning algorithm for linear classifiers, Support vector machines, obtaining probabilities from linear classifiers, Going beyond linearity with kernel methods. **Distance Based Models:** Introduction, Neighbours and exemplars, Nearest Neighbours classification, Distance Based Clustering, Hierarchical Clustering.

UNIT- V: Probabilistic models: The normal distribution and its geometric interpretations, Probabilistic models for categorical data, Discriminative learning by optimising conditional likelihood Probabilistic models with hidden variables. **Features:** Kinds of feature, Feature transformations, Feature construction and selection. Model ensembles: Bagging and random forests, Boosting

TEXT BOOKS:

Machine Learning: The art and science of algorithms that make sense of data, Peter Flach, Cambridge.

Machine Learning, Tom M. Mitchell, MGH.

REFERENCE BOOKS:

Understanding Machine Learning: From Theory to Algorithms, Shai Shalev-Shwartz, Shai Ben-David, Cambridge.

Machine Learning in Action, Peter Harington, 2012, Cengage.

Subject Code: 18CSCS206A | **L** **P** **C**

I Year – II SEMESTER | **4** **0** **3**

DIGITAL IMAGE PROCESSING
(Elective -2)

UNIT I:
Introduction: Applications of Computer Graphics and Image Processing, Fundamentals on Pixel concepts, effect of Aliasing and Jaggles, Advantages of high resolution systems **DDA line algorithms:** Bresenhams line and circle derivations and algorithms

UNIT II:
2-D Transformations: Translations, Scaling, rotation, reflection and shear transformations, Homogeneous coordinates, **Composite Transformations-** Reflection about an arbitrary line; Windowing and clipping, viewing transformations, Cohen- Sutherland clipping algorithm

UNIT III:
Digital Image Properties: Metric and topological properties of Digital Images, Histogram, entropy, Visual Perception, Image Quality, Color perceived by humans, Color Spaces, Palette Images, color Constancy
Color Images: Pixel brightness transformations, Local Preprocessing, image smoothing, Edge detectors, Robert Operators, Laplace, Prewitt, Sobel, Fri-chen, Canny Edge detection

UNIT IV:
Mathematical Morphology: Basic Mathematical Concepts, Binary dilation and Erosion, Opening and closing, Gray Scale dilation and erosion, Skeleton, Thinning , Thickening Ultimate erosion, Geodesic transformations, Morphology and reconstruction, Morphological Segmentation

UNIT V:
SEGMENTATION: Threshold detection methods, Optimal Thresholding, Edge based Segmentation-Edge image thresholding, Edge relaxation, Border tracing, Hough Transforms, Region based segmentation: Region Mergingm Region Splitting, Splitting and Merging, Watershed Segmentation.
Image Data Compression: Image data Properties, Discrete Image Transformations in data compression, Discrete Cosine and Wavelet Transforms, Types of DWT and merits; Predicative Compression methods, Hierarchical and Progressive Compression methods, Comparison of Compression methods, JPEG- MPEG Image Compression methods.

Text Books:
Computer Graphics C Version, Donald Hearn, M Paulli Baker , Pearson (Unit I and Unit II)
Image Processing, Analysis and Machine Vision, Millan Sonka, Vaclov Halvoc, Roger Boyle, Cengage Learning, 3ed, (Unit III, Unit IV, Unit V and Unit VI)

References:
Computer & Machine Vision, Theory , Algorithms , Practicles, E R Davies, Elsevier, 4ed
Digital Image Processing with MATLAB and LABVIEW, Vipul Singh, Elsevier

Sbject Code: 18CSCS206B
I Year – II SEMESTER

L	P	C
4	0	3

PARALLEL ALGORITHMS
(Elective – 2)

UNIT1: Introduction:

Computational demand in various application areas, advent of parallel processing, terminology-pipelining, Data parallelism and control parallelism-Amdahl's law.

UNIT II: Scheduling:

Organizational features of Processor Arrays, Multi processors and multi-computers. Mapping and scheduling aspects of algorithms. Mapping into meshes and hyper cubes-Load balancing-List scheduling algorithm Coffman-graham scheduling algorithm for parallel processors.

UNIT III: Algorithms:

Elementary Parallel algorithms on SIMD and MIMD machines, Analysis of these algorithms. Matrix Multiplication algorithms on SIMD and MIMD models. Fast Fourier Transform algorithms. Implementation on Hyper cube architectures. Solving linear file -system of equations, parallelizing aspects of sequential methods back substitution and Tri diagonal.

UNIT IV: Sorting:

Parallel sorting methods, Odd-even transposition Sorting on processor arrays, Biotonic ,merge sort on shuffle - exchange ID , Array processor,2D-Mesh processor and Hypercube Processor Array. Parallel Quick-sort on Multi processors. Hyper Quick sort on hypercube multi computers. Parallel search operations. Ellis algorithm and Manber and ladner's Algorithms for dictionary operations.

UNIT V: Searching

Parallel algorithms for Graph searching, All Pairs shortest paths and inimum cost spanning tree. Parallelization aspects of combinatorial search algorithms with Focus on Branch and Bound Methods and Alpha-beta Search methods.

TEXT BOOKS:

1. Parallel computing t h e o r y and practice, Michel J.Quinn
2. Programming Parallel Algorithms, Guy E. Blelloch, Communications of the ACM

Subject Code: 18D1258523 **L P C**
I Year –I I SEMESTER **4 0 3**

CLOUD COMPUTING
(Elective -2)

UNIT I:

Introduction: Network centric computing, Network centric content, peer-to –peer systems, cloud computing delivery models and services, Ethical issues, Vulnerabilities, Major challenges for cloud computing

Parallel and Distributed Systems: introduction, architecture, distributed systems, communication protocols, logical clocks, message delivery rules, concurrency, model concurrency with Petri Nets.

UNIT II:

Cloud Infrastructure: At Amazon, The Google Perspective, Microsoft Windows Azure, Open Source Software Platforms, Cloud storage diversity, Inter cloud, energy use and ecological impact, responsibility sharing, user experience, Software licensing

Cloud Computing : Applications and Paradigms: Challenges for cloud, existing cloud applications and new opportunities, architectural styles, workflows, The Zookeeper, The Map Reduce Program model, HPC on cloud, biological research

UNIT III:

Cloud Resource virtualization: Virtualization, layering and virtualization, virtual machine monitors, virtual machines, virtualization- full and para, performance and security isolation, hardware support for virtualization, Case Study: Xen, vBlades

Cloud Resource Management and Scheduling: Policies and Mechanisms, Applications of control theory to task scheduling, Stability of a two-level resource allocation architecture, feed back control based on dynamic thresholds, coordination, resource bundling, scheduling algorithms, fair queuing, start time fair queuing, cloud scheduling subject to deadlines, Scheduling Map Reduce applications, Resource management and dynamic application scaling

UNIT IV:

Storage Systems: Evolution of storage technology, storage models, file systems and database, distributed file systems, general parallel file systems. Google file system., Apache Hadoop, Big Table, Megastore (text book 1), Amazon Simple Storage Service(S3) (Text book 2)

Cloud Security: Cloud security risks, security – atop concern for cloud users, privacy and privacy impact assessment, trust, OS security, Virtual machine security, Security risks

UNIT V:

Cloud Application Development: Amazon Web Services : EC2 – instances, connecting clients, security rules, launching, usage of S3 in Java, Installing Simple Notification Service on Ubuntu 10.04, Installing Hadoop on Eclipse, Cloud based simulation of a Distributed trust algorithm, Cloud service for adaptive data streaming (Text Book 1)

Google: Google App Engine, Google Web Toolkit (Text Book 2)

Micro Soft: Azure Services Platform, Windows live, Exchange Online, Share Point Services, Microsoft Dynamics CRM (Text Book 2)

TEXT BOOKS:

Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier

Cloud Computing, A Practical Approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH

REFERNCE BOOK:

Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christen vecctiola, S Tammarai selvi, TMH

Sbject Code: 18CSCS206D **L P C**
I Year – II SEMESTER **4 0 3**

MOBILE COMPUTING
(Elective -2)

UNIT- I

Introduction: Mobile Communications, Mobile Computing – Paradigm, Promises/Novel Applications and Impediments and Architecture; Mobile and Handheld Devices, Limitations of Mobile and Handheld Devices.

GSM – Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services, GPRS.

UNIT –II

(Wireless) Medium Access Control (MAC): Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA, Wireless LAN/(IEEE 802.11)

UNIT –III

Mobile Network Layer: IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, DHCP.

UNIT –IV

Mobile Transport Layer: Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Transport Layer Protocols for Mobile Networks.

Database Issues: Database Hoarding & Caching Techniques, Client-Server Computing & Adaptation, Transactional Models, Query processing, Data Recovery Process & QoS Issues.

UNIT- V

Data Dissemination and Synchronization : Communications Asymmetry, Classification of Data Delivery Mechanisms, Data Dissemination, Broadcast Models, Selective Tuning and Indexing Methods, Data Synchronization – Introduction, Software, and Protocols.

Mobile Ad hoc Networks (MANETs) : Introduction, Applications & Challenges of a MANET, Routing, Classification of Routing Algorithms, Algorithms such as DSR, AODV, DSDV, etc. , Mobile Agents, Service Discovery.

Protocols and Platforms for Mobile Computing: WAP, Bluetooth, XML, J2ME, Java Card, PalmOS, Windows CE, SymbianOS, Linux for Mobile Devices, Android.

TEXT BOOKS:

Jochen Schiller, "Mobile Communications", Addison-Wesley, Second Edition, 2009. Raj Kamal, "Mobile Computing", Oxford University Press, 2007, ISBN: 0195686772

REFERENCE BOOKS:

ASOKE K TALUKDER, HASAN AHMED, ROOPA R YAVAGAL, "Mobile Computing, Technology Applications and Service Creation" Second Edition, Mc Graw Hill.

UWE Hansmann, Lother Merk, Martin S. Nocklous, Thomas Stober, "Principles of Mobile Computing," Second Edition, Springer.

CSE LAB-2

1. a) Study of Unix/Linux general purpose utility command list
man,who,cat, cd, cp, ps, ls, mv, rm, mkdir, rmdir, echo, more, date, time, kill, history, chmod, chown, finger, pwd, cal, logout, shutdown.
Study of vi editor.
Study of Bash shell, Bourne shell and C shell in Unix/Linux operating system.
Study of Unix/Linux file system (tree structure).
Study of .bashrc, /etc/bashrc and Environment variables.

2.Write a C program that makes a copy of a file using standard I/O, and system calls

3.Write a C program to emulate the UNIX ls –l command.

4.Write a C program that illustrates how to execute two commands Concurrently with command pipe Ex: - ls –l | sort

5.Write a C program that illustrates two processes communicating using shared memory

6.Write a C program to simulate producer and consumer problem usingsemaphores

7.Write C program to create a thread using pthreads library and let it run its function.

8.Write a C program to illustrate concurrent execution of threads using pthreads library.

9.Understanding and using of commands like ifconfig, netstat, ping, arp, telnet, ftp, finger, traceroute, whoisetc. Usage of elementary socket system calls (socket (),bind(), listen(), accept(),connect(),send(),recv(),sendto(),recvfrom()).

10.Implementation of Connection oriented concurrent service (TCP).

11.Implementation of Connectionless Iterative time service (UDP).

12.Implementation of Select system call.

13.Implementation of gesockopt (), setsockopt () system calls.

14.Implementation of getpeername () system call.

15.Implementation of remote command execution using socket system calls.

Sbject Code: 18CSCS261	**L**	**P**	**C**
I Year – II SEMESTER	**0**	**3**	**2**