

**ACADEMIC REGULATIONS
(NRIA18)
COURSE STRUCTURE
AND
DETAILED SYLLABUS
(I YEAR)**

**MECHANICAL
ENGINEERING**

For

**B.Tech FOUR YEAR DEGREE COURSE
(Applicable from 2018-19 Batches)**



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

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Ref: NRIIT/Academic Calendar/B.Tech/ 2018-19

Dt. 04.08.2018

Revised ACADEMIC CALENDAR For I B.TECH (2018 BATCH)
Academic Year 2018 -19

I B.TECH I SEMESTER			
Description	From	To	Weeks
Commencement of Class Work	11-06-2018		
Induction Program	11-06-2018	30-06-2018	3 weeks
I Phase of Instructions	02-07-2018	25-08-2018	8 weeks
I Mid –Term Examinations (Subjective and Online Objective)	27-08-2018	01-09-2018	1 week
II Phase of Instructions	03-09-2018	10-11-2018	9 weeks
II Mid –Term Examinations (Subjective and Online Objective)	12-11-2018	17-11-2018	1 week
Preparation & Practicals	19-11-2018	24-11-2018	1 week
End Examinations	26-11-2018	08-12-2018	2 weeks
Class Tests			
I Class Test conducted during class hours	13-08-2018	18-08-2018	1 week
II Class Test conducted during class hours	22-10-2018	27-10-2018	1 week
Assignments			
I Assignment submission	20-08-2018	25-08-2018	1 week
II Assignment submission	05-11-2018	10-11-2018	1 week
I B.TECH II SEMESTER			
Commencement of Class Work	10-12-2018		
I Phase of Instructions	10-12-2018	09-02-2019	9 weeks
I Mid –Term Examinations (Subjective and Online Objective)	11-02-2019	16-02-2019	1 week
II Phase of Instructions	18-02-2019	13-04-2019	8 weeks
II Mid –Term Examinations (Subjective and Online Objective)	15-04-2019	20-04-2019	1 week
Preparation & Practicals	22-04-2019	27-04-2019	1 week
End Examinations	29-04-2019	11-05-2019	2 weeks
Commencement of II Year Class Work	10-06-2019		
Class Tests			
I Class Test conducted during class hours	21-01-2019	26-01-2019	1 week
II Class Test conducted during class hours	25-03-2019	30-03-2019	1 week
Assignments			
I Assignment submission	04-02-2019	09-02-2019	1 week
II Assignment submission	08-04-2019	13-04-2019	1 week


(Dr. N. Samba Siva Rao)

Controller of Examinations

CONTROLLER OF EXAMINATIONS
NRI INSTITUTE OF TECHNOLOGY
Autonomous Exam Cell

AUTONOMOUS

3. Administrative Office


(Dr. C. Naga Bhaskar)

Principal
PRINCIPAL

NRI Institute of Technology
Pothavarappadu (V), Agiripalli (M)



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DEPARTMENT OF MECHANICAL 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)				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

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
Credits: 4

Internal Marks: 40
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 $1/3^{\text{rd}}$ and $3/8^{\text{th}}$ 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.nptelvideos.com/mathematics/ (Math Lectures from MIT, Stanford, IIT'S)

2. nptel.ac.in/courses/122104017

3. nptel.ac.in/courses/111105035

ENGINEERING PHYSICS

Lecture – 2-1
Tutorial:
Credits: 3

Internal Marks: 40
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 $[h k l]$ 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 – 2 - 3
Practice:
Credits: 3.5

Internal Marks: 40
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
Credits: --

Internal Marks: 40
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 and industrial 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/>

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
Credits: 1.5

Internal Marks: 40
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 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 - 3 - 1
Tutorial:
Credits: 4

Internal Marks: 40

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, Divergence 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 - Orthogonal 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 ($k > 0$), $e^{ax}V$, $x^n V$ - 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 identities.

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

ENGINEERING CHEMISTRY

Lecture – 2-1
Tutorial:
Credits: 3

Internal Marks: 40

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 tropesch 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
Credits: 4

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)

	<u>PO</u> <u>1</u>	<u>PO</u> <u>2</u>	<u>PO</u> <u>3</u>	<u>PO</u> <u>4</u>	<u>PO</u> <u>5</u>	<u>PO</u> <u>6</u>	<u>PO</u> <u>7</u>	<u>PO</u> <u>8</u>	<u>PO</u> <u>9</u>	<u>PO</u> <u>10</u>	<u>PO</u> <u>11</u>	<u>PO</u> <u>12</u>
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](http://www.vssut.ac.in/lecture_notes/lecture1424354156.pdf)

ENGINEERING MECHANICS

Lecture – Tutorial: 3 – 1
Credits: 4

Internal Marks: 40
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.**Hibbeler,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
Credits: 1.5

Internal Marks: 40
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. <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 PH 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

PROGRAMMING AND PROBLEM SOLVING WITH C LAB

Practice: 3
Credits: 1.5

Internal Marks: 40
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 with conditions 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 of $\sin x$ 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 its contents on screen.

b) Write a C program to copy files

Exercise - 14 Files Continued

a) Write a C program that 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. Programming in ANSI C 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/>

