ACADEMIC REGULATIONS
(NRIA20)
COURSE STRUCTURE
AND
DETAILED SYLLABUS

INFORMATION TECHNOLOGY

For

B.Tech FOUR YEAR DEGREE COURSE

NRI INSTITUTE OF TECHNOLOGY

An Autonomous Institution, Permanently Affiliated to INTUK, Kakinada

(Accredited with NAAC "A" Grade and ISO 9001:2015 Certified Institution)

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

STRUCTURE FOR B.TECH PROGRAMME

I YEAR I SEMESTER

S.NO.	COURSE CODE	TITLE OF THE COURSE	SCHEME OF INSTRUCTIION				SCHEME OF EXAMINATION			NO. OF CREDITS
			L	T	P/D	Total	CIA	SEA	Total	
1	20A1100101	Professional Communication	2	0	2	4	30	70	100	3
2	20A1100201	Engineering Mathematics-1	3	0	0	3	30	70	100	3
3	20A1100204	Applied Chemistry	3	0	0	3	30	70	100	3
4	20A1105392	Computer Engineering Workshop	1	0	4	5	15	35	50	3
5	20A1105301	Programming and Problem Solving With C	3	0	0	3	30	70	100	3
6	20A1100293	Applied Chemistry LAB	0	0	3	3	15	35	50	1.5
7	20A1105391	Programming and Problem Solving With C Lab	0	0	4	4	15	35	50	2
8	20A1100801	Environmental Sciences	2	0	0	2	30	70*	100	0
TOTAL			14	0	13	27	195	455	650	18.5

I YEAR II SEMESTER

S.NO.	COURSE CODE	TITLE OF THE COURSE	SCHEME OF INSTRUCTIION				SCHEME OF EXAMINATION			NO. OF CREDITS
			L	T	P/D	Total	CIA	SEA	Total	
1	20A1200201	Engineering Mathematics-2	3	0	0	3	30	70	100	3
2	20A1200203	Applied Physics	3	0	0	3	30	70	100	3
3	20A1204302	Digital Logic Design	2	0	2	4	30	70	100	3
4	20A1205401	Oops Through Java	3	0	0	3	30	70	100	3
5	20A1205303	Data Structures	3	0	0	3	30	70	100	3
6	20A1200292	Applied Physics Lab	0	0	3	3	15	35	50	1.5
7	20A1205491	Oops Through Java Lab	0	0	4	4	15	35	50	2
8	20A1205393	Data Structures Lab	0	0	3	3	15	35	50	1.5
9	20A1200191	Communicative English Lab	0	0	3	3	15	35	50	1.5
TOTAL			14	0	15	29	210	490	700	21.5

* No external Evaluation

STRUCTURE FOR SECOND YEAR B.TECH PROGRAMME

II 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	20A2100201	Vector calculus, Transform Techniques and Partial Differential Equations	3	0	0	3	30	70	100	3
2	20A2105401	Python Programming	3	0	0	3	30	70	100	3
3	20A2105402	Data Base Management Systems	3	0	0	3	30	70	100	3
4	20A2105403	Computer Organization and Architecture	3	0	0	3	30	70	100	3
5	20A2105404	Internet of Things	3	0	0	3	30	70	100	3
6	20A2105491	Python programming Lab	0	0	3	3	15	35	50	1.5
7	20A2105492	Data Base Management System Lab	0	0	3	3	15	35	50	1.5
8	20A2105493	Internet of ThingsLab	0	0	3	3	15	35	50	1.5
9	20A2105992	Web Application Development Using Full Stack – Frontend Development – Module - I	0	0	4	4	15	35	50	2
10	20A2105901	Aptitude and Reasoning	0	2	0	2	15	35	50*	0
Total			**15**	**2**	**13**	**30**	**225**	**525**	**750**	**21.5**

II 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	20A2200201	Probability and Statistics	3	0	0	3	30	70	100	3
2	20A2205401	Web Technologies	3	0	0	3	30	70	100	3
3	20A2205402	Software Engineering	3	0	0	3	30	70	100	3
4	20A2205403	Operating Systems	3	0	0	**3**	30	70	100	3
5	20A2205404	Formal Languages and Automata theory	3	0	0	3	30	70	100	3
6	20A2205491	Web Technologies Lab	0	0	3	3	15	35	50	1.5
7	20A2205492	Software Engineering Lab	0	0	3	3	15	35	50	1.5
8	20A2205493	Operating Systems and Unix Programming Lab	0	0	3	3	15	35	50	1.5
9	20A2205991	Applications of Python-Numpy, Pandas	0	0	4	4	15	35	50	2
10	20A2200802	Professional ethics and Human Values	0	2	0	2	30	70*	100	0
Total			**15**	**2**	**13**	**30**	**240**	**560**	**800**	**21.5**

*** Internal Evaluation**

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

Internship2Months(Mandatory)during summer vacation				
Honors/Minorcourses(The hours distribution can be3-0-2or3-1-0also)	**4**	0	**0**	**4**

PRPOPSED STRUCTURE FOR THIRD YEAR B.TECH PROGRAMME

III 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/D	Total	CIA	SEA	Total	
1	20A3105402	Artificial Intelligence	3	0	0	3	30	70	100	3
2	20A3105401	Computer Networks	3	0	0	3	30	70	100	3
3	20A3105403	Design and Analysis of Algorithms	3	0	0	3	30	70	100	3
4	20A310560X	OE-1	3	0	0	3	30	70	100	3
5	20A310551X	PE-1	3	0	0	3	30	70	100	3
6	20A3105491	Computer Networks lab	0	0	3	3	15	35	50	1.5
7	20A3105492	AI Programming Lab	0	0	3	3	15	35	50	1.5
8	20A3105991	DEVOPS	0	0	4	4	15	35	50	2
10	20A3105801	Employability Skills-1	2	0	0	2	30	70*	100	0
Summer Internship 2 Months (Mandatory) after second year (to be evaluated during V semester)			0	0	0	0	30	70	100	1.5
Total			17	0	10	27	255	595	850	21.5
Honors/Minor courses – 2			**3**	**0**	**2**	**5**	30	70	100	**4**

Code	Professional Elective – 1
20A3105511	1.1 Cloud computing
20A3105512	1.2 Software Testing Methodologies and Tools
20A3105513	1.3 Data Warehousing and Data Mining
20A3105514	1.4 Advanced Data Structures

III 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/D	Total	CIA	SEA	Total	
1	20A3205403	Machine Learning	3	0	0	3	30	70	100	3
2	20A3205402	Compiler Design	3	0	0	3	30	70	100	3
3	20A3205401	Cryptography and Network Security	3	0	0	3	30	70	100	3
4	20A320560X	OE-2	3	0	0	3	30	70	100	3
5	20A320551X	PE-2	3	0	0	3	30	70	100	3
6	20A3205491	Machine Learning Lab	0	0	3	3	15	35	50	1.5
7	20A3205492	R Programming lab	0	0	3	3	15	35	50	1.5
8	20A3205493	Compiler Design Lab	0	0	3	3	15	35	50	1.5
9	20A3205991	MEAN Stack Technologies	0	0	4	4	15	35	50	2
10	20A3205801	Employability Skills - 2	2	0	0	2	30	70*	100	0
Total			17	0	13	30	240	560	800	21.5
Honors/Minor courses – 3			**3**	**0**	**2**	**5**	30	70	100	**4**
Industrial/Research Internship (Mandatory) 2 Months during summer vacation										

Code	Professional Elective -2
20A3205511	2.1 Advanced Database Management Systems
20A3205512	2.2 Network Programming
20A3205513	2.3 Big data Analytics
20A3205514	2.4 Object Oriented Analysis and Design

IV 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/D	Total	CIA	SEA	Total	
1	PE3	1. Data Science 2. Block Chain Technology 3. Cognetive Science and Analytics(MOOCS) 4. Robotic Process Automation and Development	3	0	0	3	30	70	100	3
2	PE4	1. Deep Learning and Applications 2. Design Thinking and Innovaion(MOOCS) 3. Industrial IOT for SMART Cities 4. Natural Language Processing	3	0	0	3	30	70	100	3
3	PE5	1. IOT Design for connected Healthcare 2. Predictive Analytics 3. 3.Edge Computing(MOOCS) 4. 4.Social Networking and Semantics 5. 5.Data Visualization Techniques	3	0	0	3	30	70	100	3
4	OE3	Open Elective -3	3	0	0	3	30	70	100	3
5	OE4	Open Elective -4	3	0	0	3	30	70	100	3
6	HSS	Universal Human Values	3	0	0	3	30	70	100	3
7	Audit Course	Functional English for 21st Century Learning	2	0	0	2	30	70	100	0
8	SKILL ADVANCED COURSE	Data Visualization Lab	0	0	2	4	15	35	50	1
9	Summer Internship 2 Months (Mandatory) after third year (to be evaluated during VII semester)		0	0	0	0	30	70	100	3
Total			17	0	4	21	225	525	750	22
Honors/Minor courses – 3			**3**	**0**	**2**	**5**	30	70	100	**4**

IV 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/D	Total	CIA	SEA	Total	
1	Project	Major Project Project Work, Seminar and Internship in Industry	-	-	16	16	30	70	100	8
2	CSP	Community Service Project	-	-	8	8	100	0	100	4
Total			-	-	24	24	130	70	200	12

20A1100101: PROFESSIONAL COMMUNICATION
(Common to CE,EEE,ME,ECE,CSE,IT,AIML and DS)

Lecture – Practical:	2-2 Hours	**Internal Marks:**	30
Credits	3	**External Marks:**	70

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	Build the grammatical structures accurately in their real-time situations in either spoken or written form.
CO2	Extend their ability to use vocabulary from various texts along with GRE and technical vocabulary in written and spoken communication
CO3	Comprehend, analyze and evaluate texts critically. Demonstrate effective writing skills in specific forms of written communication (paragraphs, summaries, email and letters.)
CO4	Apply the strategies of reading various texts and graphs, and describe in prose.
CO5	Relate human values and professional ethics in their academic, professional and social lives.
CO6	Summarize the main events of the literary texts, from different socio-cultural contexts, and interpret them critically.

Contribution of Course Outcomes towards achievement of Program Outcome (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										**2**		**2**
CO4										**1**		**2**
CO5							1	**1**				**2**
CO6												**2**

UNIT I

1. **Text: A Drawer full of happiness** from "**Infotech English**", Maruthi Publications
2. **Reading:** Skimming text to get the main idea. Scanning to look for specific pieces of information.
3. **Reading for Writing:** Paragraph Writing (specific topics) using suitable Cohesive Devices; Linkers, Sign Posts and Transition Signals; Mechanics of Writing - Punctuation, Capital Letters.
4. **Vocabulary:** Technical vocabulary from across technical branches (20) GRE Vocabulary (20) (Antonyms and Synonyms, Word applications) Verbal Reasoning and Sequencing of Words.
5. **Grammar:** Content Words and Function Words; Word Forms: Verbs, Nouns, Adjectives and Adverbs; Nouns: Countables and Uncountables; Singular and Plural, Basic Sentence Structures; Simple Question Form - WH- Questions; Word Order in Sentences. Collocations (30 Phrases)

UNIT II

1. **Text: Nehru's letter to his daughter Indira on her birthday** from "**Infotech English**", Maruthi Publications
2. **Reading**: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.
3. **Reading for Writing**: Summarizing - identifying main idea/s and rephrasing what is read;

avoiding redundancies and repetitions.

4. **Vocabulary**: Technical vocabulary from across technical branches (20 words). GRE Vocabulary Analogies (20 words) (Antonyms and Synonyms, Word applications)
5. **Grammar**: Use of Articles and Zero Article; Prepositions; Connectives (25 words)

UNIT III

1. **Text: Stephen Hawking-Positivity 'Benchmark'** from "**Infotech English**", Maruthi Publications
2. **Reading**: Reading a text in detail by making basic inferences - recognizing and interpreting specific context clues; strategies to use text clues for comprehension. Critical Reading.
3. **Reading for Writing**: Summarizing - Identifying main ideas and Rephrasing what is read; avoiding Redundancies and Repetitions. Letter Writing-types, Format and Principles of Letter Writing. E-mail Etiquette, Writing CVs.
4. **Vocabulary**: Technical vocabulary from across technical branches (20 words). GRE Vocabulary (20 words) (Antonyms and Synonyms, Word applications) Association, Sequencing of Words
5. **Grammar**: Verbs, Phrasal Verbs - Tenses; Subject-Verb Agreement;

UNIT IV

1. **Text: Liking a Tree, Unbowed: Wangari Maathai-biography** from "**Infotech English**", Maruthi Publications
2. **Reading**: Studying the use of graphic elements in texts to convey information, reveal trends / patterns / relationships, communicative process or display complicated data.
3. **Reading for Writing**: Information transfer; describe, compare, contrast, identify significance/trends based on information provided in figures/charts/graphs/tables. Writing SOP, writing for media.
4. **Vocabulary**: Technical vocabulary from across technical branches (20 words) GRE Vocabulary (20 words) (Antonyms and Synonyms, Word applications) Cloze Encounters.
5. **Grammar**: Quantifying Expressions - Adjectives and Adverbs; Comparing and Contrasting; Use of Antonyms; Direct and Indirect Speech, Reporting Verbs for Academic Purposes. Idiomatic Expressions (25 Idioms)

UNIT V

1. **TEXT: Stay Hungry-Stay foolish** from "**Infotech English**", Maruthi Publications
2. **Reading**: Reading for Comprehension. RAP Strategy Intensive Reading and Extensive Reading Techniques.
3. **Reading for Writing**: Report writing (Significance, Format and Style of Writing Technical Reports)
4. **Vocabulary**: Technical vocabulary from across technical branches (20 words) GRE Vocabulary (20 words) (Antonyms and Synonyms, Word applications) Coherence, Matching Emotions.
5. **Grammar**: Change of Voice; Editing Short Texts – Identifying and Correcting Common Errors in grammar and usage (Articles, Prepositions, Tenses, Subject-Verb Agreement)

Text Book: "Infotech English", Maruthi Publications.

REFERENCE BOOKS:

1. **English Grammar in Use**, Raymond Murphy, Cambridge University Press.
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.
7. **English Vocabulary in Use,** Michael McCarthy and Felicity O'Dell, Cambridge University Press

E-RESOURCES

1. https://www.grammarbank.com/
2. http://guidetogrammar.org/grammar/index.htm
3. https://writeandimprove.com/
4. https://englishforeveryone.org/
5. http://www.englishvocabularyexercises.com/
6. https://englishplusmagazine.com/

20A1100201:ENGINEERING MATHEMATICS-I
(Common to CE,EEE,ME,ECE,CSE,IT,AIML and DS)

Lecture – Tutorial:	3-1	**Internal Marks:**	30
Credits:	3	**External Marks:**	70

Prerequisites: Fundamentals of matrices, Fundamentals of Trigonometry and Calculus.

Course Objectives:

- To instruct the concept of Matrices in solving linear algebraic equations
- To elucidate the different numerical methods to solve nonlinear algebraic equations
- To disseminate the use of different numerical techniques for carrying out numerical integration.
- To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications.

Course Outcomes:

CO1	Student will be able to develop the **use** of matrix algebra techniques that is needed by engineers for practical applications (L6) solve system of linear algebraic equations using Gauss elimination, Gauss Seidel and **write** Eigen values and eigenvectors of a matrix (L3)
CO2	Student will be able to **write** diagonal form and different factorizations of a matrix (L3), to find inverse of a matrix and integral powers of a matrix by Cayley-Hamilton Theorem **identify** the nature of a Quadratic form such as positive definite, positive semi definite etc., and use this information to facilitate the calculation of matrix characteristics (L2)
CO3	Student will be able to **evaluate** the approximate roots of polynomial and transcendental equations by different algorithms (L5)
CO4	Student will be able to **apply** Newton's forward & backward interpolation and Lagrange's formulae for unequal intervals (L3)
CO5	Student will be able to **apply** numerical integral techniques to different Engineering problems (L3)
CO6	Student will be able to **apply** different algorithms for approximating the solutions of ordinary differential equations with initial conditions to its analytical computations (L3)

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	2	2								
CO2	3	3	2	2								
CO3	3	3	2	2								
CO4	3	3	2	2								
CO5	3	3	2	2								
CO6	3	3	2	2								

UNIT – I: Solving systems of linear equations, Eigen values and Eigen vectors: (10hrs)

Rank of a matrix by echelon form and normal form – Solving system of homogeneous and non- homogeneous linear equations – Gauss

Elimination method – Eigen values and Eigen vectors and properties.

Unit – II: Cayley–Hamilton theorem and Quadratic forms: (10hrs)

Cayley-Hamilton theorem (without proof) – Applications – Finding the inverse and power of a matrix by Cayley-Hamilton theorem – Reduction to Diagonal form – Quadratic forms and nature of the quadratic forms – Reduction of quadratic form to canonical forms by orthogonal transformation.

UNIT – III: Iterative methods: (8 hrs)

Introduction– Bisection method – Method of false position– Iteration method

Newton-Raphson method (One variable).

Gauss-Jacobi and Gauss-Seidel methods for solving system of equations numerically.

UNIT – IV: Interpolation: (10 hrs)

Introduction– Errors in polynomial interpolation – Finite differences– Forward differences– Backward differences –Central differences – Relations between operators – Newton's forward and backward formulae for interpolation – Interpolation with unequal intervals – Lagrange's interpolation formula.

UNIT –V: Numerical integration and Solution of ordinary differential equations with initialconditions (10 hrs)

Trapezoidal rule– Simpson's $1/3^{rd}$ and $3/8^{th}$ rule– Solution of initial value problems by Taylor's series– Picard's method of successive approximations– Euler's method –Modified Euler's method – Runge-Kutta method (second and fourth order).

TEXT BOOKS:

1. **B. S. Grewal,** Higher Engineering Mathematics, 44^{th} Edition, Khanna Publishers.
2. **B. V. Ramana,**Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.
3. **David Poole,** Linear Algebra- A modern introduction, 4^{th} Edition, Cengage.

REFERENCE BOOKS:

1. **Steven C. Chapra,** Applied Numerical Methods with MATLAB for Engineering and Science,Tata Mc. Graw Hill Education.
2. **M. K. Jain, S.R.K. Iyengar and R.K. Jain,** Numerical Methods for Scientific and Engineering Computation, New Age International Publications.
3. **Lawrence Turyn,** Advanced Engineering Mathematics, CRC Press.

E-RESOURCES:1. www.nptel **videos.com/mathematics/(Math Lectures from MIT,Stanford,IIT'S**

2. nptl.ac.in/courses/1221104017

20A1100204: APPLIED CHEMISTRY
(Common to CSE,IT,AIML and DS)

Lecture:	3	**Internal Marks:**	30
Credits:	3	**External Marks:**	70

Prerequisites:

Course Objectives:

- Importance of usage of plastics in household appliances and composites (FRP) in aerospace and automotive industries.
- Outline the basics for the construction of electrochemical cells, batteries and fuel cells. Understand the mechanism of corrosion and how it can be prevented.
- Explain the preparation of semiconductors and nanomaterials, engineering applications of nanomaterials, superconductors and liquid crystals.
- Recall the increase in demand for power and hence alternative sources of power are studied due to depleting sources of fossil fuels. Advanced instrumental techniques are introduced.
- Outline the basics of computational chemistry and molecular switches

Course Outcomes:

CO1	***Analyze*** the different types of composite plastic materials and ***interpret*** the mechanism of conduction in conducting polymers.
CO2	Predict potential complications from combining various Chemicals, metals in engineering setting and categorize materials science relevant to corrosion phenomena.
CO3	Apply new materials with excellent engineering properties to take care of society needs and environment.
CO4	Analyze the principles of different analytical instrumentation and applications
CO5	Design models for energy by different natural sources
CO6	Understand the knowledge of computational chemistry and molecular machines

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	2	-	-	2	-	-	-	-	-
CO2	3	3	2	1	-	-	2	-	-	-	-	-
CO3	3	2	2	-	-	-	2	-	-	-	-	-
CO4	3	3	2	2	-	-	2	-	-	-	-	-
CO5	3	2	2	2	-	-	2	-	-	-	-	-
CO6	3	3	3	3	-	-	3	-	-	-	-	-

UNIT – I: POLYMER TECHNOLOGY

Polymerisation:- Introduction, methods of polymerization (emulsion and suspension), mechanical properties.

Plastics:Thermoplastic-Thermosetting, Compounding, fabrication (compression, injection, Transfer and extrusion), preparation, properties and applications (PVC, polycarbonates and Bakelite), mention some examples of plastic materials used in electronic gadgets.

Elastomers:- Introduction, preparation, properties and applications (Buna S, thiokol and polyurethanes).

Composite materials: Fibre reinforced plastics, conducting polymers, biodegradable polymers..

Unit – II: ELECTROCHEMICAL CELLS AND CORROSION

Single electrode potential, electrochemical series and uses of series, standard hydrogen electrode, calomel electrode, batteries (Dry cell, liquid Li ion battery), fuel cells (H2-O2).

Corrosion:-Definition, theories of corrosion (chemical and electrochemical), galvanic corrosion, differential aeration corrosion, factors influencing rate of corrosion, corrosion control method- Protective coatings (Galvanizing, tinning, electroplating and electroless plating [nickel])

UNIT – III: MATERIAL CHEMISTRY

Semiconductors: Preparation of semi conductors by zone refining, Czochralski crystal pulling – applications

Super conductors:-Type –I, Type II and applications

Nano materials:- Introduction, sol-gel method & Chemical reduction method of preparation , transmission electron microscopy [TEM], applications of fullerenes, carbon nanotubes (types, preparation and applications)

Liquid crystals:- Introduction-types-applications.

UNIT – IV :SPECTROSCOPIC TECHNIQUES & NON-CONVENTIONAL ENERGY SOURCES

SPECTROSCOPIC TECHNIQUES

Electromagnetic spectrum-UV laws of absorption, instrumentation, theory of electronic spectroscopy, Frank-condon principle, chromophores and auxochromes, applications, FT-IR Basic principle, instrumentation and IR stretching of functional groups (alcohols, carbonyls, amines) applications,

NON-CONVENTIONAL ENERGY SOURCES

Design, working, schematic diagram, advantages and disadvantages of photovoltaic cell, hydropower, geothermal power, tidal and wave power, ocean thermal energy conversion.

UNIT –V: ADVANCED CONCEPTS/TOPICS IN CHEMISTRY

Computational chemistry: Introduction to computational chemistry, molecular modelling and docking studies.

Molecular switches: characteristics of molecular motors and machines, Rotaxanes and Catenanes as artificial molecular machines, prototypes – linear motions in rotaxanes, an acid-base controlled molecular shuttle, a molecular elevator, an autonomous light-powered molecular motor

TEXT BOOKS:

1. P.C. Jain and M. Jain "**Engineering Chemistry**", 15/e, Dhanpat Rai & Sons, Delhi, (Latest edition).
2. Shikha Agarwal, "**Engineering Chemistry**", Cambridge University Press, New Delhi, (2019).
3. S.S. Dara, "**A Textbook of Engineering Chemistry**", S.Chand & Co, (2010).
4. Shashi Chawla, "Engineering Chemistry", Dhanpat Rai Publicating Co. (Latest edition).

REFERENCE BOOKS:

1. K. Sesha Maheshwaramma and Mridula Chugh, "**Engineering Chemistry**", Pearson India Edn.
2. (a) O.G. Palana, "**Engineering Chemistry**", Tata McGraw Hill Education Private Limited, (2009).
   (b) CNR Rao and JM Honig (Eds) "**Preparation and characterization of materials**" Academic press, New York (latest edition)
3. B. S. Murthy, P. Shankar and others, "**Textbook of Nanoscience and Nanotechnology**", University press (latest edition)

E-RESOURCES:

1. https://en.wikipedia.org >wiki> Conductive polymers
2. www.sae.org/fuel cells/fuelcells-types.htm
3. https://en.wikipedia.org >wiki> Nanomaterials
4. https://en.wikipedia.org >wiki> Electrochemical cell
5. https://en.wikipedia.org >wiki> Spectroscopy

20A1100801: ENVIRONMENTAL SCIENCES
(Common to CSE,IT,AIML and Ds)

Lecture – Tutorial:	2-0	**Internal Marks:**	30
Credits:	0	**External Marks:**	70*

Prerequisites:

Course Objectives:

The objectives of the course are to impart:

- Overall understanding of the natural resources.
- Basic understanding of the ecosystem and its diversity.
- Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities.
- An understanding of the environmental impact of developmental activities.
- Awareness on the social issues, environmental legislation and global treaties.

Course Outcomes:

CO1	➢ Illustrate the importance of sustainability in the progress of a nation. (L2)
CO2	➢ Infer the existence of ecosystems in maintaining ecological balance. (L2)
CO3	➢ Recall the importance of biodiversity and its conservation. (L1)
CO4	➢ Summarize the role of natural resources for the sustenance of life on earth and recognize the need to conserve them. (L2)
CO5	➢ Identify the environmental pollutants and the abatement devices to be used. (L3)
CO6	➢ Interpret environmental related acts and social issues. (L2)

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	2	-	-	2	3	2	-	-	2	2
CO2	3	2	2	-	-	2	3	2	-	-	2	2
CO3	3	2	2	-	-	2	3	2	-	-	2	2
CO4	3	2	2	-	-	2	3	2	-	-	2	2
CO5	3	2	2	-	-	2	3	2	-	-	2	2
CO6	3	2	2	-	-	2	3	2	-	-	2	2

UNIT I (6hrs)

Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, acid rains, ozone layer depletion, population growth and explosion, effects. Role of information technology in environment and human health.

Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem; Producers, consumers and decomposers. - Energy flow in the ecosystem - Food chains, food webs and ecological pyramids- Ecological succession.

UNIT II (4hrs)

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

UNIT III **(7hrs)**

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.

Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources.

Role of an individual in conservation of natural resources; Equitable use of resources for sustainable lifestyles.

UNIT IV **(5hrs)**

Environmental Pollution: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies, Sustainable Life Studies. Impact of Fire Crackers on Men and his well being.

Solid Waste Management: Sources, Classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products, Biomedical, Hazardous and e – waste management.

UNIT V **(6hrs)**

Social Issues and the Environment: Urban problems related to energy, rain water harvesting. Environmental ethics: Issues and possible solutions. Environmental Protection Act -Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act - Wildlife Protection Act -Forest Conservation Act. Environmental Management: Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS. Ecotourism, Green Campus – Green business and Green politics.

TEXT BOOKS:

1) Perspectives in Environment Studies, Anubha Kaushik, C P Kaushik, New Age International Publishers, 2014

2) Environmental Studies, K. V. S. G. Murali Krishna, VGS Publishers, Vijayawada

3) Environmental Studies, R. Rajagopalan, 2nd Edition, 2011, Oxford University Press.

4) 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) A Textbook of Environmental Studies, Shaashi Chawla, TMH, New Delhi

3) Environmental Studies, Benny Joseph, Tata McGraw Hill Co, New Delhi

E-RESOURCES: 1. http://nptel.ac.in/courses.php.

2. http://jntuk-coeerd.in/

20A1105301:-Programming and Problem solving with C
(Common to EEE,ME,ECE,CSE,IT,AIML and DS)

Lecture – Tutorial-Practical::	3-0-0	**Internal Marks:**	30
Credits:	3	**External Marks:**	70

Prerequisites: Basic knowledge on computers, Mathematics

Course Objectives: The objectives of Programming for Problem Solving Using C are

- To learn about the computer systems, computing environments, developing of a computer program and Structure of a C Program
- To gain knowledge of the operators, selection, control statements and repetition in C
- To learn about the design concepts of arrays, strings, enumerated structure and union types and their usage.
- To assimilate about pointers, dynamic memory allocation and know the significance of Preprocessor.
- To assimilate about File I/O and significance of functions

Course Outcomes:

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

CO1	Understand the programming terminology and implement various c-tokens & input-output statements to solve simple problems
CO2	Able to compare and differentiate various looping & branching constructs and apply the best looping structure for a given problem
CO3	Identify the necessity of modularity in programming and design various function types
CO4	Understand pointers and implement the programs to directly access memory locations
CO5	Interpret and implement the need of arrays and structure/union to store homogeneous and heterogeneous groups of data
CO6	Contrast the need of using files in programming and implement file 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									
CO2		1	3									
CO3		1	3									
CO4	3		1									
CO5			3									
CO6			3									

UNIT I : Objective: Notion of Computer Languages, algorithm, computational procedure, editing and executing programs and C Declarations

BASICS AND INTRODUCTION TO C: Basics of Computer, Introduction to C, Machine Assembly and High level Language, Assembler, Compiler and Interpreter, Structure of a C program, Programming Rules, Executing the C Program, Advantages of C, Header Files Flow Chart, Algorithm.

THE C DECLARATIONS: The C-Character set, Delimiters, Types of Tokens, The C keywords, Identifiers, Constants, Variables, C Data types, initialization, type modifiers type conversions, constant and volatile variables. Properties of Operators, Operator Priority ,comma and conditional operators, arithmetic, relational, assignment operators and expressions, logical , bitwise operators. Input and output in c: Formatted and Unformatted functions

UNIT II: Objective: Understanding branching, iteration, data representation using arrays and strings

DECISION STATEMENTS: The if statement, if-else, nested if else, if-else-if ladder, break, continue, goto, Switch statement, nested switch case, Switch case and nested ifs.
LOOP CONTROL: for loop, nested for loop, while, do-while, do-while statement with while loop.
ARRAYS: Array initialization, array terminology, characteristics of an array, 1-D array and its operations, 2-D arrays and operations, Multi -dimensional arrays.
STRINGS: Declaration and initialization of string, string standard functions, string conversion functions, memory functions, application of strings.

UNIT III: Objective: Modular programming and recursive solution formulation and storage classes

FUNCTIONS: Basics, function definition, return statement, types of functions, call by value ,call by reference, function as an argument, Functions with operators, Function and Decision Statements, Functions and loop Statements, Functions with arrays and Pointers Recursion-Types of Recursion, Rules for Recursive Function, Recursion versus Iterations Advantages and Disadvantages of Recursion, Efficiency of Recursion, Library Functions.
STORAGE CLASS: Variable Lifetime, Automatic Variables, External Variables, Static Variables, Register Variables.

UNIT IV: Objective: Understanding pointers, dynamic memory allocation and Preprocessor Directives.

POINTERS: Features of pointers, pointers and address, pointer declaration, void pointers arithmetic operations with pointers, pointers and arrays, array of pointers, pointers to pointers, pointers and strings. Dynamic memory allocation
PREPROCESSOR DIRECTIVES: The #define Directive, Defining and Undefining a Macros The #include Directive

UNIT V: Objective: Understanding derived data types of C and basic of file operations.

STRUCTURE AND UNION: Features of Structures, Declaration and initialization of Structures, Structure within Structure, Arrays of Structure, Pointer to Structure Structure and functions, typedef, Bit fields, Enumerated Data Type, Unions and Unions V Structures.
FILES: Streams and File Types, Steps for File Operations, FILE I/O, Structures Read and Write, Other file function, Command line Arguments.

TEXT BOOKS:

[1] Behrouz A. Forouzan & Richard F. Gilberg , —"Computer Science A Structured Programming Approach using C" , CENGAGE Learning, Third Edition.

REFERENCE BOOKS:

[1] Kernighan and Ritchie , —"The C programming language" , The (Ansi C Version), PHI second edition.
[2] Yashwant Kanetkar , —"Let us C" , BPB Publications, 2nd Edition 2001.
[3] Paul J. Dietel and Dr. Harvey M. Deitel, —"C: How to Program", Prentice Hall, 7 th edition (March 4,2012).
[4] Herbert Schildt, —"C:The Complete reference", McGraw Hill, 4th Edition, 2002.
[5]K.R.Venugopal, Sundeep R Prasad, —"Mastering C", McGraw Hill, 2nd Edition, 2015

E-RESOURCES:

1. http://cslibrary.stanford.edu/101/EssentialC.pdf
2. http://nptel.ac.in/courses/106104128/
3.http://www.vssut.ac.in/lecture_notes

20A1105391-Programming and Problem Solving with C Lab
(Common to EEE,ME,ECE,CSE,IT,AIML and DS)

Lecture – Tutorial-Practical::	0-0-4	**Internal Marks:**	15
Credits:	2	**External Marks:**	35

Prerequisites:

Course Objectives:

1. To make the student learn a programming language.
2. To learn problem solving techniques.
3. To teach the student to write programs in C and to solve the problems

Course Outcomes:

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

CO1	Understand basic Structure of the C-PROGRAMMING, declaration and usage of variables
CO2	Exercise conditional and iterative statements to inscribe C programs
CO3	Exercise user defined functions to solve real time problems
CO4	Inscribe C programs using Pointers to access arrays, strings and functions
CO5	Inscribe C programs using pointers and allocate memory using dynamic memory management functions
CO6	Exercise user defined data types including structures and unions to solve problems
CO7	Exercise files concept to show input and output of files in C

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									
CO2			2									
CO3			3									
CO4			2									
CO5			3									
CO6		2	3									
CO7		1	3									

Exercise 1:

1. Write a C program to print a block F using hash (#), where the F has a height of six characters and width of five and four characters.
2. Write a C program to compute the perimeter and area of a rectangle with a height of 7 inches and width of 5 inches.
3. Write a C program to display multiple variables.

Exercise 2:

1. Write a C program to calculate the distance between the two points.
2. Write a C program that accepts 4 integers p, q, r, s from the user where r and s are positive and p is even. If q is greater than r and s is greater than p and if the sum of r and s is greater than the sum of p and q print "Correct values", otherwise print "Wrong values".

Exercise 3:

1. Write a C program to convert a string to a long integer.
2. Write a program in C which is a Menu-Driven Program to compute the area of the various geometrical shape.
3. Write a C program to calculate the factorial of a given number

Exercise 4:

1. Write a program in C to display the n terms of even natural number and their

sum.
2. Write a program in C to display the n terms of harmonic series and their sum. 1 + 1/2 + 1/3 + 1/4 + 1/5 ... 1/n terms.
3. Write a C program to check whether a given number is an Armstrong number or not.

Exercise 5:
1. Write a program in C to print all unique elements in an array.
2. Write a program in C to separate odd and even integers in separate arrays.
3. Write a program in C to sort elements of array in ascending order.

Exercise 6:
1. Write a program in C for multiplication of two square Matrices.
2. Write a program in C to find transpose of a given matrix.

Exercise 7:
1. Write a program in C to search an element in a row wise and column wise sorted matrix.
2. Write a program in C to print individual characters of string in reverse order.

Exercise 8:
1. Write a program in C to compare two strings without using string library functions.
2. Write a program in C to copy one string to another string.

Exercise 9:
1. Write a C Program to Store Information Using Structures with Dynamically Memory Allocation
2. Write a program in C to demonstrate how to handle the pointers in the program.

Exercise 10:
1. Write a program in C to demonstrate the use of & (address of) and *(value at address) operator.
2. Write a program in C to add two numbers using pointers.

Exercise 11:
1. Write a program in C to add numbers using call by reference.
2. Write a program in C to find the largest element using Dynamic Memory Allocation.

Exercise 12:
1. Write a program in C to swap elements using call by reference.
2. Write a program in C to count the number of vowels and consonants in a string using a pointer.

Exercise 13:
1. Write a program in C to show how a function returning pointer.
2. Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc( ) function.

Exercise 14:
1. 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
2. Write a program in C to convert decimal number to binary number using the function.

Exercise 15:
1. Write a program in C to check whether a number is a prime number or not using the function.
2. Write a program in C to get the largest element of an array using the function.

Exercise 16:
1. Write a program in C to append multiple lines at the end of a text file.
2. Write a program in C to copy a file in another name.
3. Write a program in C to remove a file from the disk.

TEXT BOOKS:

[1] Behrouz A. Forouzan & Richard F. Gilberg , —"Computer Science A Structured Programming Approach using C" , CENGAGE Learning, Third Edition.

REFERENCE BOOKS:

[1] Kernighan and Ritchie , —"The C programming language" , The (Ansi C Version), PHI, second edition.
[2] Yashwant Kanetkar , —"Let us C" , BPB Publications, 2nd Edition 2001.
[3] Paul J. Dietel and Dr. Harvey M. Deitel, —"C: How to Program", Prentice Hall, 7 th edition (March 4,2012).
[4] Herbert Schildt, —"C:The Complete reference", McGraw Hill, 4th Edition, 2002.
[5]K.R.Venugopal, Sundeep R Prasad, —"Mastering C", McGraw Hill, 2nd Edition, 2015

E-RESOURCES:

1. http://cslibrary.stanford.edu/101/EssentialC.pdf
2. http://nptel.ac.in/courses/106104128/
3.http://www.vssut.ac.in/lecture_notes

20A1105392: Computer Engineering Workshop
(Common to CSE, IT, AIML and DS)

Lecture – Tutorial- Practical:	2-0-4	**Internal Marks:**	15
Credits:	3	**External Marks:**	35

Prerequisites:

Course Objectives:

The objective of this course is to

- Explain the internal parts of a computer, peripherals, I/O ports, connecting cables
- Demonstrate basic command line interface commands on Linux
- Teach the usage of Internet for productivity and self paced lifelong learning
- Describe about Compression, Multimedia and Antivirus tools
- Demonstrate Office Tools such as Word processors, Spreadsheets and Presentation tools

Course Outcomes:

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

CO1	Identify the basic computer peripherals
CO2	Acquire sufficient knowledge on assembling and disassembling a PC
CO3	Learn the installation procedure of Windows and Linux OS
CO4	Acquire knowledge on basic networking infrastructure, internet and World Wide Web
CO5	Learn productivity tools like Word, Excel and Power point

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 9**	**PO 10**	**PO 11**
CO1	1									
CO2	2	3								
CO3			2					3		
CO4			2					2		
CO5			2							

List of Experiments

Computer Hardware:

Experiment 1: Identification of peripherals of a PC, Laptop, Server and Smart Phones: Prepare a report containing the block diagram along with the configuration of each component and its functionality, Input/ Output devices, I/O ports and interfaces, main memory, cache memory and secondary storage technologies, digital storage basics, networking components and speeds.

Operating Systems:

Experiment 2: Virtual Machine setup:

- Setting up and configuring a new Virtual Machine
- Setting up and configuring an existing Virtual Machine
- Exporting and packaging an existing Virtual Machine into a portable format

Experiment 3: Operating System installation:

- Installing an Operating System such as Linux on Computer hardware.

Experiment 4: Linux Operating System commands:

- General command syntax
- Basic help commands
- Basic File system commands
- Date and Time
- Basic Filters and Text processing
- Basic File compression commands
- Miscellaneous: apt-get, vi editor

Networking and Internet:

Experiment 5: Networking Commands:

- ping, ssh, ifconfig, scp, netstat, ipstat, nslookup, traceroute, telnet, host, ftp, arp, wget,route

Experiment 6: Internet Services:

- Web Browser usage and advanced settings like LAN, proxy, content, privacy, security, cookies, extensions/ plugins
- Antivirus installation, configuring a firewall, blocking pop-ups
- Email creation and usage, Creating a Digital Profile on LinkedIn

Productivity Tools:

Experiment 7: Demonstration and practice on Microsoft Word, Power Point, Microsoft Excel

Experiment 8:

Basic HTML tags, Introduction to HTML5 and its tags, Introduction to CSS3 and its properties. Preparation of a simple website/ homepage

Assignment: Develop your home page using HTML Consisting of your photo, name, address and education details as a table and your skill set as a list.

Features to be covered:- Layouts, Inserting text objects, Editing text objects, Inserting Tables, Working with menu objects, Inserting pages, Hyper linking, Renaming, deleting, modifying pages, etc.,

Experiment 9: Automation of an activity using AI tools

Text Books:

1) Computer Fundamentals, Anita Goel, Pearson Education, 2017
2) PC Hardware Trouble Shooting Made Easy, TMH

References Books:

1) Essential Computer and IT Fundamentals for Engineering and Science Students, Dr.N.B.Vekateswarlu, S.Chand

e-Resources:

1) https://explorersposts.grc.nasa.gov/post631/2006-2007/computer_basics/ComputerPorts.do

TEXT BOOKS:
1.The Complete Reference Java, 8th edition, Herbert Schildt, TMH.
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:

http://www.javatpoint.com/
java.sun.com/docs/books/tutorial/java/TOC.html
http://www.learnjavaonline.org/
http://www.tutorialspoint.com/java/
www.java.com/en/download/faq/develop.xml
www.oracle.com › Java › Java SE
www.w3schools.com

20A1100293: Applied Chemistry Lab

Labs / Instructions Hours/Week	3	**Internal Marks:**	15
Credits:	1.5	**External Marks:**	35

Prerequisites: Knowledge on Volumetric analysis.

Course Objectives:

- To provide knowledge of chemistry practicals.
- 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:

CO1	Students of Engineering should understand and apply polymers and plastic technologies along with their utilization to solve the problems of the society.
CO2	Knowledge of cells and sensors utilized in many instruments is necessary to engineering students in solving and applying to batteries and fuel cells.
CO3	Knowledge of electrochemical cells is essential in understanding corrosion along with the methods of controlling to budding engineers.
CO4	Students should have the knowledge of water and its hardness, boiler troubles and problems associated with the environment and its sustainability.
CO5	Knowledge of fuels and energy, their advantages & disadvantages should be known by the students to solve and understand engineering problems.
CO6	Knowledge, design and analysis of materials should be understood by the Engineering students in solving the complex problems of the society.

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	1								
CO2	3	3	1	-								
CO3	3	2	2	-								
CO4	3	1	-	1								
CO5	3	2	2	1								
CO6	3	1	1	1								

List of Experiments

1. Introduction to Chemistry laboratory – Molarity, Normality, Primary, secondary standard solutions, Volumetric titrations, Quantitative analysis, Qualitative analysis, etc.
2. Determination of HCl using standard Na_2CO_3 solution.
3. Determination of alkalinity of a sample containing Na_2CO_3 and NaOH.
4. Determination of $KMnO_4$ using standard Oxalic acid solution.
5. Determination of total hardness of water using standard EDTA solution.
6. Determination of Iron using standard $K_2Cr_2O_7$ solution
7. Estimation of vitamin C
8. Determination of Iron by a Colorimetric method using thiocyanates as reagent.
9. Conductometric titration between strong acid and strong base.
10. Potentiometric titration between strong acid and strong base.
11. Preparation of Bakelite.
12. Determination of pH of water sample

EQUIPMENT REQUIRED:
PH meters, Potentiometers, Conductometers, colorimeters. **APPARATUS** Burettes, Pipettes, Conical flask, Beakers, Volumetric flask.
REFERENCE BOOKS:
1 . A Textbook of Quantitative Analysis, Arthur J. Vogel. *2.* Dr.JyotsnaCherukuri (2012) *Laboratory Manual of engineering chemistry-II,* VGSTechno Series 3. Chemistry Practical Manual, Lorven Publications 4. K. Mukkanti (2009) *Practical Engineering Chemistry,* B.S. Publication

20A120001: ENGINEERING MATHEMATICS-II
(Common to All Branches)

Lecture – Tutorial:	3-0	**Internal Marks:**	30
Credits:	3	**External Marks:**	70

Prerequisites: Fundamentals of matrices, Fundamentals of Trigonometry and Calculus.

Course Objectives:

- To familiarize a variety of well-known sequences and series, with a developing intuition about the behaviour of new ones.
- To enlighten the learners in the concept of differential equations and multivariable calculus.
- To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications.

Course Outcomes:

CO1	Student will be able to **find** the General/Particular solutions of first order and first degree ordinary differential equations by **apply** different methods **(L3),** know the applications of Newton's law of cooling, natural growth and decay problems and **find** orthogonal trajectories of the given family of curves. **(L3)**
CO2	Student will be able to **identify** the essential characteristics of linear differential equations with constant coefficients. **(L2)solve** the linear differential equations with constant coefficients by appropriate method **(L3)**
CO3	Student will be able to find convergence (or) divergence of a series **(L3)**
CO4	Student will be able to utilize mean value theorems to real life problems**(L3)**
CO5	Student will be able to find partial derivatives numerically and symbolically and use them to **analyze** and interpret the way a function varies. **(L4)acquire** the Knowledge maxima and minima of functions of several variable **(L1)Utilize** Jacobian of a coordinate transformation to deal with the problems in change of variables **(L3)**
CO6	Student will be able to **find** length of the arc, volume of solid of revolution and surface area of solid of revolution**(L3)**

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	2	2								
CO2	3	3	2	2								
CO3	3	3	2	2								
CO4	3	3	2	2								
CO5	3	3	2	2								
CO6	3	3	2	2								

UNIT – I: Differential equations of first order and first degree: (10hrs)

Linear differential equations– Bernoulli's equations –Exact equations and equations reducible to exact form. Applications: Newton's Law of cooling– Law of natural growth and decay– Orthogonal trajectories.

UNIT-II: Linear Differential equations of higher order: (10hrs)

Homogeneous and Non-homogeneous differential equations of higher order with constant coefficients – with non-homogeneous term of the type e^{ax}, sin ax,

cos ax, polynomials in x^n, $e^{ax}V(x)$ and $x^nV(x)$ – Method of Variation of parameters, Cauchy and Legendre's linear equations.

UNIT – III: Sequences, Series and Mean value theorems: (10hrs)

Sequences and Series: Convergences and divergence – Ratio test – Comparison tests – Integral test – Cauchy's root test – Alternate series– Leibnitz's rule.
Mean Value Theorems (without proofs): Rolle's Theorem – Lagrange's mean value theorem – Cauchy's mean value theorem – Taylor's and Maclaurin's theorems with remainders, Problems and applications on the above theorem.

UNIT – IV: Partial differentiation: (10hrs)

Introduction – Homogeneous function – Euler's theorem– Total derivative– Chain rule– Jacobian – Functional dependence –Taylor's and MacLaurin's series expansion of functions of two variables.Applications: Maxima and Minima of functions of two variables without constraints and Lagrange's multiplied method.

UNIT – V: Multiple integrals: (8hrs) **(8 hrs)**

Double and Triple integrals – Change of order of integration in double integrals – Change of variables to polar, cylindrical and spherical coordinates.
Applications: Finding Areas and Volumes

TEXT BOOKS:

1. **B. S. Grewal,** Higher Engineering Mathematics, 44th Edition, Khanna Publishers.
2. **B. V. Ramana,**Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.

REFERENCE BOOKS:

1. **Erwin Kreyszig,** Advanced Engineering Mathematics, 10th Edition, Wiley-India.
2. **Joel Hass, Christopher Heil and Maurice D. Weir,** Thomas calculus, 14thEdition, Pearson.
3. **Lawrence Turyn,** Advanced Engineering Mathematics, CRC Press, 2013.
4. **Srimantha Pal, S C Bhunia,** Engineering Mathematics, Oxford University Press.

E-RESOURCES:

1. www.nptel **videos.com/mathematics/(Math Lectures from MIT,Stanford,IIT'S**
2. nptl.ac.in/courses/1221104017

20A1200203: APPLIED PHYSICS
(Common to CSE, IT, AIML and DS)

Lecture – Tutorial:	3-0	**Internal Marks:**	30
Credits:	3	**External Marks:**	70

Prerequisites: Knowledge on fundamental concepts of waves, optics, sound and magnetism

Course Objectives:

- The course aims at making students to understand the basic concepts of Principles of Physics in a broader sense with a view to lay foundation for the various engineering courses.
- To develop analytical capability and solve various engineering problems.

Course Outcomes:

CO1	Apply the interaction of light with matter through interference, diffraction, polarization and identify these phenomena in different natural optical processes and optical instruments.
CO2	Apply the comprehended knowledge about laser and fibre optic communication systems in various engineering applications.
CO3	Interpret the knowledge of dielectric and magnetic materials with characteristic utility in appliances.
CO4	Apply the knowledge of basic quantum mechanics, to set up one dimensional Schrodinger's wave equation and its application to a infinite potential well.
CO5	Summarize the importance of free electrons in determining the properties of metals and understand the origin & role of energy bands in classifying the solids
CO6	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			2							
CO4	3											
CO5	3		2		2							
CO6	3				2							

Unit-I: Wave **(12hrs)**

Interference: Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) - Colors in thin films- Newton's Rings- Determination of wavelength and refractive index.

Diffraction: Introduction - Fresnel and Fraunhofer diffraction - Fraunhofer diffraction due to single slit, double slit - N-slits (Qualitative) – Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative).

Polarization: Introduction-Types of polarization - Double refraction - Nicol's Prism - Half wave and Quarter wave plates.

Unit-II: Lasers and Fiber optics

(8hrs)

Lasers: Introduction – Characteristics of laser – Spontaneous and Stimulated emissions of radiation – Einstein's coefficients – Population inversion – Lasing action - Pumping Schemes – Ruby laser – He-Ne laser - Applications of lasers.

Fiber optics: Introduction –Principle of optical fiber- Acceptance Angle - Numerical Aperture -

Classification of optical fibers based on refractive index profile and modes –

Propagation of electromagnetic wave through optical fibers - Applications.

Unit-III: Magnetic and Dielectric Materials **(10hrs)**

Magnetic Materials: Introduction - Origin of permanent magnetic moment - Classification of magnetic materials: Dia, para, Ferro, antiferro & Ferri magnetic materials - Domain concept for Ferromagnetism & Domain walls (Qualitative) - Hysteresis - soft and hard magnetic materials.

Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility and Dielectric constant - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field- Clausius- Mossotti equation.

Unit IV: Quantum Mechanics, Free Electron Theory **(8hrs)**

Quantum Mechanics: Dual nature of matter – Heisenberg's Uncertainty Principle – Significance and properties of wave function – Schrodinger's time independent and dependent wave equations– Particle in a one-dimensional infinite potential well.

Free Electron Theory: Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory– Equation for electrical conductivity based on quantum free electron theory- Fermi-Dirac distribution- Fermi energy-Density of states.

Unit - V: Band theory of Solids &Semiconductors **(10hrs)**

Band theory of Solids: Bloch's Theorem (Qualitative) - Kronig - Penney model (Qualitative)- E vs K diagram - v vs K diagram - effective mass of electron – Classification of crystalline solids-Concept of hole.

Semiconductors: Introduction- Intrinsic semiconductors – Density of charge carriers – Electrical conductivity – Fermi level – extrinsic semiconductors – density of charge carriers – dependence of Fermi energy on carrier concentration and temperature - Drift and diffusion currents – Einstein's equation- Hall effect – Hall coefficient – Applications of Hall effect.

TEXT BOOKS:

1. **M. N. Avadhanulu, P.G.Kshirsagar & TVS Arun Murthy**" A Text book of Engineering Physics"- S.Chand Publications, 11th Edition 2019.
2. Engineering Physics by **P.K.Palanisamy** SciTech publications

REFERENCE BOOKS:

1. Engineering Physics by **M.R.Srinivasan**, New Age international publishers (2009).
2. Engineering Physics - **Sanjay D. Jain, D. Sahasrabudhe and Girish**, University Press
3. **B.K. Pandey and S. Chaturvedi**, Engineering Physics, Cengage Learning

E-RESOURCES: www.doitpoms.ac.uk, http://www.itp.uni-hannover.de/~zawischa/ITP/diffraction.html, http://www.coherent.com/products/?834/Lasers, **http://plato.stanford.edu/entries/qm/**

20A1205303: Data Structures
(Common to CSE,IT,AIML,DS)

Lecture – Tutorial-Practical::	3-0-0	**Internal Marks:**	30
Credits:	3	**External Marks:**	70

Prerequisites: C- Programming

1. To impart basic knowledge of data structures.
2. Be familiar with basic techniques of algorithm analysis
3. Be familiar with writing recursive methods
4. To understand concepts about searching and sorting techniques
5. To design and implementation of various basic and advanced data structures like stacks, queues, lists, trees and graphs.
6. To introduce various techniques for representation of the data in the real world.

Course Outcomes:

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

CO1	Ability to illustrate the concepts of algorithm apply the learning concepts to design data structure for the given problem definition.
CO2	Analyze and implement operations on linked list and demonstrate their applications
CO3	Ability to design applications using stacks and queues and implements various types of Queues
CO4	Ability to analyze and implement operations on trees
CO5	Ability to demonstrate various operations on binary search trees and its applications
	Ability to evaluate the properties and operations on graphs and implement the graph 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	3	--	--	--	2	--	--	--	--	--	--	2
CO2	--	2	2	2	--	--	--	--	--	--	2	2
CO3	2	2	3	--	2	--	--	--	--	--	--	--
CO4	--	2	3	2	--	--	--	--	--	--	2	2
CO5	3	2	3	3	2	--	--	--	--	--	2	2

UNIT I :

Data Structures - Definition, Classification of Data Structures, Operations on Data Structures, Abstract Data Type (ADT), Preliminaries of algorithms. Time and Space complexity. Searching - Linear search, Binary search, Fibonacci search. Sorting- Insertion sort, Selection sort, Exchange (Bubble sort, quick sort), distribution (radix sort), merging (Merge sort) algorithms.

UNIT II:

Linked List: Introduction, Single linked list, Representation of Linked list in memory, Operations on Single Linked list-Insertion, Deletion, Search and Traversal ,Reversing Single Linked list, Applications on Single Linked list- Polynomial Expression Representation ,Addition and Multiplication, Sparse Matrix Representation using Linked List, Advantages and Disadvantages of Single Linked list, Double Linked list-Insertion, Deletion, Circular Linked list-Insertion, Deletion.

UNIT III:

Queues: Introduction to Queues, Representation of Queues-using Arrays and using Linke list, Implementation of Queues-using Arrays and using Linked list, Application of Queue Circular Queues, Deques, Priority Queues, Multiple Queues. Stacks: Introduction t Stacks, Array Representation of Stacks, Operations on Stacks, Linked list Representatio of Stacks, Operations on Linked Stack, Applications-Reversing list, Factorial Calculation Infix to Postfix Conversion, Evaluating Postfix Expressions..

UNIT IV:

Trees: Basic Terminology in Trees, Binary Trees-Properties, Representation of Binary Tree using Arrays and Linked lists. Binary Search Trees- Basic Concepts, BST Operations Insertion, Deletion, Tree Traversals, Applications-Expression Trees, Heap Sort, Balance Binary Trees- AVL Trees, Insertion, Deletion and Rotations.

UNIT V:

Graphs: Basic Concepts, Representations of Graphs-Adjacency Matrix and using Linked list, Graph Traversals (BFT & DFT), Applications- Minimum Spanning Tree Using Prims & Kruskals Algorithm, Dijkstra's shortest path, Transitive closure, Warshall's Algorithm

TEXT BOOKS:

1) Data Structures Using C. 2nd Edition.Reema Thareja, Oxford.
2) Data Structures and algorithm analysis in C, 2nded, Mark Allen Weiss

REFERENCE BOOKS:

1) Fundamentals of Data Structures in C, 2nd Edition, Horowitz, Sahni, Universities Press
2) Data Structures: A PseudoCode Approach, 2/e, Richard F.Gilberg, Behrouz A. Forouzon Cengage.
3) Data Structures with C, Seymour Lipschutz TMH

E-RESOURCES:

1) http://algs4.cs.princeton.edu/home/
2) https://faculty.washington.edu/jstraub/dsa/Master_2_7a.pdf

20A1205401: OOPS THROUGH JAVA
(Common to CSE,IT,AIML,DS)

Lecture – Tutorial-Practical::	3-0-0	**Internal Marks:**	30
Credits:	3	**External Marks:**	70

Prerequisites:

C Programming

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	Understand the concepts of object oriented programming
CO2	Able to **understand** the use of abstract classes and Packages in java.
CO3	Implement Exception Handling techniques and multiple inheritance through interfaces
CO4	Able to understand multithreaded applications with synchronization
CO5	Develop Graphical user interface applications using Swing and Applet Components

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	3	-	-	-	-	-	-	-	-	3
CO3	3	3	3	2	-	-	-	-	2	-	-	3
CO4	3	3	3	2	-	-	-	-	2	-	-	3

UNIT I

GENESIS OF JAVA: History of Java, Importance of java to Internet, Byte code, Java Features, Data types, variables, scope and life time of variables, arrays, operators, control statements, type conversion and casting, simple java program.
CLASSES AND OBJECTS: classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion, Exploring the String class, String Buffer Class, String Tokenizer.

UNIT II

INHERITANCE: Inheritance basics, Using super keyword, method overriding, Dynamic method dispatch using final with inheritance, abstract classes.
PACKAGES AND INTERFACES: Defining, Creating and Accessing a Package, importing packages, differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces..

UNIT III

EXCEPTION HANDLING AND MULTITHREADING: Exception handling Fundamentals, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exceptions. Differences between multi threading and multitasking, thread life cycle, creating threads, Concurrency utilities. APPLETS: Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets.

UNIT IV

EVENT HANDLING: Delegation event model, Events, Event sources, Event classes, Event Listeners, handling mouse and keyboard events, Adapter classes, inner classes. The AWT class hierarchy: labels, button, scrollbars, text components, check box, check box groups, choices, list boxes. Layout manager types: border, grid, flow, card and grid bag.

UNIT V

SWINGS: Introduction, limitations of AWT, components, containers EXPLORING SWINGS JApplet, JFrame and JComponent, text components, buttons – The JButton class, Check boxes, Radio buttons, Combo boxes. JTabbedPane.

TEXT BOOKS:

1.The Complete Reference Java, 8th edition, Herbert Schildt, TMH.

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:

http://www.javatpoint.com/
java.sun.com/docs/books/tutorial/java/TOC.html
http://www.learnjavaonline.org/
http://www.tutorialspoint.com/java/
www.java.com/en/download/faq/develop.xml
www.oracle.com › Java › Java SE
www.w3schools.com

20A1204302: DIGITAL LOGIC DESIGN
(Common to CSE,IT,AIML,DS)

Lecture – Tutorial-Practical:	2-0-2	**Internal Marks:**	30
Credits:	3	**External Marks:**	70

Prerequisites:

Computer fundamentals and Basic electronics

Course Objectives:

1. To study the basic philosophy underlying the various number systems, negative number representation, binary arithmetic
2. To study the theory of Boolean algebra and to study representation of switching functions using Boolean expressions and their minimization techniques
3. To introduce the basic tools for design of combinational logic
4. To study various programmable logic devices and their use in realization of switching functions
5. To introduce the basic tools for design of sequential logic
6. To learn simple digital circuits like registers and counters in preparation for computer engineering

Course Outcomes:

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

CO1	To define different number systems, binary addition and subtraction, 2's complement representation and operations with this representation.
CO2	To understand the different switching algebra theorems and apply them for logic functions
CO3	To define the Karnaugh map for a few variables and perform an algorithmic reduction of logic functions.
CO4	To design various combinational logic gates starting from simple ordinary gates to complex programmable logic devices & arrays.
CO5	To design various sequential circuits like latches and flip flops
CO6	To design and implement sequential circuits like registers and counters.

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**										
CO2	3	**2**										
CO3	3	**2**										
CO4	3	**2**	2							**2**		
CO5	3	**3**	2							**2**		
CO6	3	**3**	2							**2**		

UNIT I

DIGITAL SYSTEMS AND BINARY NUMBERS:

Digital Systems, Binary Numbers, Octal and Hexadecimal Numbers, Complements of Numbers, Signed Binary Numbers, Arithmetic addition and subtraction, 4-bit codes: BCD, EXCESS 3, alphanumeric codes, 9's complement, 2421, etc..

UNIT II

CONCEPT OF BOOLEAN ALGEBRA:

Basic Theorems and Properties of Boolean algebra, Boolean Functions, Canonical and Standard Forms, Minterms and Maxterms.

GATE LEVEL MINIMIZATION:

Map Method, Three-Variable K-Map, Four Variable K-Maps. Products of Sum Simplification, Sum of Products Simplification, Don't – Care Conditions, NAND and NOR Implementation, Exclusive OR Function.

UNIT III

COMBINATIONAL LOGIC:

Introduction, Analysis Procedure, Binary Adder–Subtractor, Binary Multiplier, Decoders, Encoders, Multiplexers, Demultiplexers, Priority Encoder, Code Converters, Magnitude Comparator, HDL Models of Combinational Circuits. Realization of Switching Functions Using PROM, PAL and PLA.

UNIT IV

SYNCHRONOUS SEQUENTIAL LOGIC:

Introduction to Sequential Circuits, Storage Elements: Latches, Flip-Flops, RS- Latch Using NAND and NOR Gates, Truth Tables. RS, JK, T and D Flip Flops, Truth and Excitation Tables, Conversion of Flip Flops.

UNIT V

REGISTERS AND COUNTERS:

Registers, Shift Registers, Ripple Counters, Synchronous Counters, Ring Counter, Johnson Counter.

TEXT BOOKS:

1. Digital Design, 5/e, M.Morris Mano, Michael D Ciletti, PEA.
2. Fundamentals of Logic Design, 5/e, Roth, Cengage

REFERENCE BOOKS:

1. Digital Logic and Computer Design, M.Morris Mano, PEA
2. Digital Logic Design, Leach, Malvino, Saha, TMH
3. Modern Digital Electronics, R.P. Jain, TMH.

E-RESOURCES:

1. https://nptel.ac.in/courses/106108099/
2. https://swayam.gov.in/course/1392-digital-circuits-and-systems
3. http://www.nesoacademy.org/electronics-engineering/digital-electronics/digital
4. https://www.youtube.com/playlist?list=PLWPirh4EWFpHk70zwYoHu87uVsCC8E2S

20A1200191: Communicative English Lab
(Common to All Branches (CE, EEE, MECH, ECE, CSE, IT, AIML, DS)

Labs / Instructions Hours/Week	3 Hours	**Internal Marks:**	15
Credits	1.5	**External Marks:**	35

PREREQUISITES: None

COURSE OBJECTIVES

1. To learn the sound systems of English and understand word stress of English.
2. To train the students in the art of conversation and discussion
3. To equip the students with good communication skills.
4. To emphasize the need of English in the technical world.
5. To improve their presentation and participation skills
6. To prepare them for interviews and future job environments.

COURSE OUTCOMES

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

CO 1	Demonstrate better understanding of the nuances of spoken English to put into use in various situation and events.
CO 2	Apply the rules of phonetics–pronunciation, accent and intonation– in their everyday communication
CO 3	Relate their understanding of the importance of spoken skills and the need for life-long learning in day-to-day communication.
CO 4	Construct strategies like critical and analytical skills to participate effectively in group discussions and debates.
CO 5	Demonstrate their ideas accurately and effectively in presentations.
CO 6	Build responses to the questions by listening to short audio texts and identify the context and specific pieces of information.

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										**1**		**2**
CO 2										**1**		**2**
CO 3												**2**
CO 4									**1**	**1**		**2**
CO 5										**2**		**2**
CO 6										**1**		**2**

UNIT I

- Making Inquiries on the phone, Thanking and Responding to Thanks, Responding to Requests and Asking for Directions
- Vowels, Consonants, Pronunciation, Phonetic Transcription, Common Errors in Pronunciation

UNIT II

- Asking for Clarifications, Inviting, Expressing Sympathy, Congratulating, Apologising, Advising, Suggesting, Agreeing and Disagreeing
- Word stress – Di-Syllabic Words, Poly-Syllabic Words, Weak and Strong Forms, Contrastive Stress (Homographs)

UNIT III

- Debating
- Stress in Compound Words, Rhythm, Intonation, Accent Neutralization.

UNIT IV

- Group Discussions
- Listening to Short Audio Texts, and Identifying the context and specific pieces of information to answer a series of questions in speaking.

UNIT V

- Presentation Skills and Interview Skills
- Newspapers reading; Understanding and identifying key terms and structures useful for writing reports.

Lab Manual: "Infotech English", Maruthi Publications.

Software: k-van solutions Multimedia language lab

REFERENCE BOOKS:

1. **Exercises in Spoken English Part 1,2,3,4,** OUP and CIEFL.
2. **English Pronunciation in use** - Mark Hancock, Cambridge University Press.
3. **English Phonetics and Phonology**-Peter Roach, Cambridge University Press.
4. **English Pronunciation in use**- Mark Hewings, Cambridge University Press.
5. **English Pronunciation Dictionary**- Daniel Jones, Cambridge University Press.
6. **English Phonetics for Indian Students**- P. Bala Subramanian, Mac Millan Publications

E-RESOURCES

1. https://learnenglish.britishcouncil.org/
2. https://rachelsenglish.com/
3. https://www.bbc.co.uk/learningenglish/
4. https://www.engvid.com/
5. https://bbclearningenglish.com

20A1200292: APPLIED PHYSICS LAB

Labs / Instructions Hours/Week	3	**Internal Marks:**	15
Credits:	1.5	**External Marks:**	35

Prerequisites: Knowledge on vernier callipers, Screw guage, common balance

Course Objectives:

- The Objective of this course is to make the students gain practical knowledge to co-relate with the theoretical studies.
- To achieve perfectness in experimental skills and the study of practical applications will bring more confidence and ability to develop and fabricate engineering and technical equipments.
- Training field oriented Engineering graduates to handle instruments and their design methods to improve the accuracy of measurements.

Course Outcomes:

CO1	Understand principle, concept, working of an instrument and can compare results with theoretical calculations.
CO2	Analyze the physical principle involved in the various instruments; also relate the principle to new application.
CO3	Understand design of an instrument with targeted accuracy for physical measurements.
CO4	Develop skills to impart practical knowledge in real time solution.
CO5	The various experiments in the areas of optics, mechanics and thermal physics will nurture the students in all branches of Engineering..
CO6	Think innovatively and also improve the creative skills that are essential for engineering.

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											
CO2	3	3		3					3			
CO3	3	3	1	3					3			
CO4	3	3		3								
CO5	3											
CO6	3	3	2	3								

List of Experiments

1. Study of variation of magnetic field along the axis of a current carrying circular coil by Stewart & Gee's method.
2. Determination of numerical aperture and acceptance angle of an optical fiber.
3. Determination of thickness of thin object by wedge method.
4. Determination of radius of curvature of given plano convex lens by Newton's rings.
5. Determination of wavelengths of different spectral lines in mercury spectrum using diffraction grating in normal incidence configuration.
6. Determination of dispersive power of the prism.
7. Sonometer: Verification of laws of string.
8. Study of I/V Characteristics of Semiconductor diode.
9. I/V characteristics of Zener diode.
10. Melde's experiment-Longitudinal and Transverse mode.
11. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
12. Estimation of Planck's constant using photoelectric effect.

13. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall Effect
14. Determination of wavelength of Laser light using diffraction grating.
15. Rigidity modulus of material of a wire-dynamic method (Torsional pendulum).

Note: Any 8 experiments out of 15 should be done in the laboratory and 2 experiments in virtual lab.

TEXT BOOKS:

S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.

REFERENCE BOOKS:

Engineering Physics / Applied Physics Lab Manual – **Spectrum Publications**

E-RESOURCES: **www.vlab.co.in**

Data Structures Lab
(20A1205393)

Lecture – Tutorial- Practical:	0-0-3	Internal Marks:	15
Credits:	1.5	External Marks:	35

Prerequisites:

C Programming

Course Objectives:

- To understand and implement basic data structures
- To Apply linear and non linear data structures in problem solving.
- Have a good understanding of how several fundamental algorithms work, particularly those concerned with sorting and searching.
- Have a good understanding of the fundamental data structures used in computer science
- It enables them to gain knowledge in practical applications of data structures.

Course Outcomes:

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

CO1	Implement different searching and sorting techniques. Compare different searching and sorting techniques.
CO2	Design linear data structures stacks, queues and linked lists.
CO3	Design nonlinear data structures trees and Graphs, and implement their operations
CO4	Be capable to identity the appropriate data structure for given problem
CO5	Have practical knowledge on the applications of data structures

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 9	PO 10	PO 11	PO 12
CO1	3	3	2	2	-	-	-	-	-	-	2
CO2	3	2	3	2	-	-	-	-	-	-	2
CO3	3	2	3	2	-	-	-	-	-	-	2
CO4	3	2	3	2	-	-	-	-	-	-	2
CO5	3	2	3	2	-	-	-	-	-	-	2

List of Experiments

Exercise 1:

a. Write a recursive C program to find the Factorial of an integer.
b. Write a recursive C program to calculate the GCD of two numbers.
c. Write a recursive C program for Towers of Hanoi: N disks are to be transferred from peg S to peg D with Peg I as the intermediate peg.
d. Write a recursive C program to display the Fibonacci Series: 0, 1, 1, 2, 3, 5, 8, ...N.

Exercise 2:

a. Write a recursive and non-recursive C program to implement Linear Search technique.
b. Write a recursive and non-recursive C program to implement Binary Search

technique.

Exercise 3:

a. Write C program that implement Insertion sort, to sort elements in an ascending order.
b. Write C program that implement Merge sort, to sort elements in an ascending order.
c. Write C program that implement Quick sort, to sort elements in an ascending order.

Exercise 4:

a. Write a C program to insert a node in a Single Linked List.
b. Write a C program to delete a node in a Single Linked List.
c. Write a C program to reverse elements in a Single Linked List.
d. Write a C program to insert a node in a Doubly Linked List.

Exercise 5:

a. Write C program that implement Stack (its operations) using arrays.
b. Write C program that implement Queue (its operations) using arrays.
c. Write C program that implement Queue using Two Stacks.

Exercise 6:

a. Write C program that implement Stack using Linked List.
b. Write C program that implement Queue using Linked List.
c. Write a C program to implement the Circular Queue.

Exercise 7:

a. Write a C program to insert elements in a Binary Search Tree (BST).
b. Write a C program to delete element in a Binary Search Tree (BST).
c. Write a C program to implement BST traversals: Inorder, Preorder, and Postorder.

Exercise 8:

a. Write a C program to implement the Max Heap.
b. Write C program that implement Heap sort, to sort elements in an ascending order.

Exercise 9:

a. Write a C program to implement the Breadth First Search technique on a Graph.
b. Write a C program to implement the Depth First Search technique on a Graph.

Exercise 10:

a. Write a C program to implement the Prim's algorithm to construct Minimum Spanning Tree.
b. Write a C program to implement the Kruskal's algorithm to construct Minimum Spanning Tree.

TEXT BOOKS:

1 Data Structures using C,Reema Thareja, Oxford
2.DATA STRUCTURE USING C,Udit Agarwal,KATSON Books
3 Data Structures using C, 2nd Edition, by A. K. Sharma, Pearson India

REFERENCE BOOKS:

1. Keneth. H. Rosen, Discrete Mathematics and its Applications, 6/e, Tata McGraw-Hill, 2009.
2. Richard Johnsonburg, Discrete mathematics, 7/e, Pearson Education, 2008

OOPS Through JAVA Lab
(20A1205491)

Lecture – Tutorial- Practical:	0-0-4	Internal Marks:	15
Credits:	2	External Marks:	35

Prerequisites:

C Programming

Course Objectives:

To develop programs using object oriented concepts.
To develop GUI applications and Client/Server communication using Java.

Course Outcomes:

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

CO1	Understand the concepts of object oriented programming.
CO2	Implement Exception Handling techniques and multiple inheritance through interfaces.
CO3	Apply thread capabilities and Collections framework.
CO4	Develop Graphical user interface applications using Swing and Applet Components.

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	2	3	--	2	--	--	--	--	--	--	--	--
CO3	--	--	2	--	2	--	--	--	3	--	--	2
CO4	--	--	2	2	--	--	--	--	2	--	--	3

List of Experiments

Exercise 1

a) Write a Java program that prints all real solutions to the quadratic equation ax2 + bx +c= 0. Read in a, b, c and use the quadratic formula. If the discriminant b2 -4ac is negative, display a message stating that there are no real solutions.

b) The Fibonacci sequence is defined by the following rule: The first two values in the sequence are 1 and1.Every subsequent value is the sum of the two values preceding it. Write a Java program that uses both recursive and non recursive functions to print the nth value in the Fibonacci sequence.

Exercise 2

a) Write a Java program that prompts the user for an integer and then prints out all prime numbers up to that integer.

b) Write a Java program to multiply two given matrices and find it's transpose (Exercise Find identity Matrix of a given size)

Exercise3

a) Write a Java program that checks whether a given string is a palindrome or not. Ex MALAYALAM is a palindrome.

b) Write a Java program for sorting a given list of names in ascending order.

c) Write a Java Program that reads a line of integers, and then displays each integer, and the sum of all the integers (Use StringTokenizer class of java.util)

Exercise 4

a) Write a Java program that reads a file name from the user, and then displays information

about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes.

b) Write a Java program that reads a file and displays the file on the screen, with a line number before each line.

c) Write a Java program that displays the number of characters, lines and words in a text file.

Exercise 5

Create an inheritance hierarchy of Rodent, Mouse, Gerbil, Hamster etc. In the base class provide methods that are common to all Rodents and override these in the derived classes to perform different behaviors, depending on the specific type of Rodent. Create an array of Rodent, fill it with different specific types of Rodents and call your base class methods

Exercise 6

(a) Write a java program to create an abstract class named Shape that contains an empty method named numberOfSides ( ).Provide three classes named Trapezoid, Triangle and Hexagon such that each one of the classes extends the class Shape. Each one of the classes contains only the method numberOfSides ( ) that shows the number of sides in the given geometrical figures.

(b) Write a Java program that demonstrates Packages

Exercise 7

a) Write a Java program demonstrating the life cycle of a thread.

b) Develop an applet that displays a simple message

Exercise 8

a) Develop an applet that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button named "Compute" is clicked.

b) Write a Java program that allows user to draw lines, rectangles and ovals.

Exercise 9

a) Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result.

b) Write a Java program for handling mouse events.

Exercise 10

a) Write a program that creates a user interface to perform integer divisions. The user enters two numbers in the textfields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a NumberFormatException. If Num2 were Zero, the program would throw an ArithmeticException Display the exception in a message dialog box.

b) Write a Java program that lets users create Pie charts. Design your own user interface (with Swings & AWT)

TEXT BOOKS:

1. The Complete Reference Java, 8th edition, Herbert Schildt, TMH.
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:

http://www.javatpoint.com/
java.sun.com/docs/books/tutorial/java/TOC.html
http://www.learnjavaonline.org/
http://www.tutorialspoint.com/java/
www.java.com/en/download/faq/develop.xml
www.oracle.com › Java › Java SE
www.w3schools.com

20A2100201: Vector Calculus, Transform Techniques and Partial Differential Equations

Lecture **Tutorial**	3 0	**Internal Marks:**	30
Credits	3	**External Marks:**	70

Course Objectives:

- To familiarize the techniques in partial differential equations
- To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real-world application

Course Outcomes:

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

CO1	Interpret the physical meaning of different operators such as gradient, cur land divergence (L5)
CO2	Estimate the work done against a field, circulation and flux using vector calculus (L5)
CO3	Apply the Laplace transform for solving differential equations (L3)
CO4	Find or compute the Fourier series of periodic signals (L3)
CO5	Knowandbe able to apply integral expressions for the forwards and inverse Fourier transform to arrange of non-periodic wave forms (L3)
CO6	Identify solution methods for partial differential equations that model physical processes (L3)

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	2	2	-	-	-	-	-	-	-	-
CO2	3	3	2	2	-	-	-	-	-	-	-	-
CO3	3	3	2	2	-	-	-	-	-	-	-	-
CO4	3	3	2	2	-	-	-	-	-	-	-	-
CO5	3	3	2	2	-	-	-	-	-	-	-	-
CO6	3	3	2	2	-	-	-	-	-	-	-	-

UNIT I

Unit–I: Vector calculus:
Vector Differentiation: Gradient –Directional derivative–Divergence–Curl–Scalar Potential. Vector Integration: Line integral–Work done–Area–Surface and volume integrals.
Vector integral theorems: Greens, Stokes and Gauss Divergence theorems (without proof)

UNIT II

Unit–II: Laplace Transforms:
Laplace transforms of standard functions – Shifting theorems – Transforms of derivatives and integrals – Inverse Laplace transforms– Convolution theorem (without proof).
Applications:
Solving ordinary differential equations (initial value problems) using Laplace transforms

UNIT III

Unit–III: Fourier series and Fourier Transforms:

Fourier Series:

Introduction – Periodic functions – Fourier series of periodic function –Dirichlet's conditions – Even and odd functions – Change of interval – Half-range sine and cosine series.

Fourier Transforms:

Fourier integral theorem (without proof) –Fourier sine and cosine integrals –Sine and cosine transforms – inverse trans forms –Finite Fourier transforms

UNIT IV

Unit–IV: PDE of first order:

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solutions of first order linear (Lagrange) equation and nonlinear (standard types) equations.

UNIT: V

UNIT-V:Second order PDE:

Second order PDE: Solutions of linearpartial differential equations with constant coefficient – term of the type$eax+by$, $sin(ax + by)$, $cos(ax + by)$, $xmyn$.

Method of separation of variables – introduction.

TEXT BOOKS:

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

2. B.V.Ramana, Higher Engineering Mathematics, 2007 Edition, Tata Mc.Graw Hill Education

REFERENCE BOOKS:

1. ErwinKreyszig, Advanced Engineering Mathematics, 10thEdition, Wiley-India.

2. Dean. G. Duffy, Advanced Engineering Mathematics with MATLAB, 3rdEdition, CRC Press.

3. Peter O'Neil, Advanced Engineering Mathematics, Cengage.

4. Srimantha Pal, SCBhunia, Engineering Mathematics, Oxford University Press

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

20A2105401-Python Programming

Lecture – Tutorial-Practical::	3-0-0				**Internal Marks:**	
Credits:	3				**External Marks:**	

Prerequisites:

Adequate exposure to Programming

A basic understanding on various computer concepts , C programming basic syntax

Course Objectives:

To learn the fundamentals of python programming

To get a solid understanding of python functions and data structures

To demonstrate the use of python lists and dictionaries.

To implement methods and functions to improve readability of programs.

Students able to describe and apply object-oriented programming methodology.

Course Outcomes:

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

CO 1	Experience with an interpreted Language and to build software for real needs
CO 2	Use basic Decision structures, Boolean logic, variable types, assignments and operators.
CO 3	Describe and use of Python lists, dictionaries, tuples and sets.
CO 4	Implement methods and functions to improve readability of programs
CO 5	Describe and apply object-oriented programming methodology, top-down concepts in algorithm design.

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**	**PSO1**	**PSO2**
CO 1	3	--	--	--	3	--	--	--	3	--	3	--	3	3
CO 2	--	3	2	--	--	--	--	--	--	--	--	--	2	3
CO 3	--	--	--	2	3	--	--	--	3	--	--	--	3	3

CO 4	--	--	--	3	3	--	--	--	3	--	--	--	2	3	- -
CO 5	--	--	--	3	--	--	--	--	--	--	3	--	3	3	3

UNIT I : DATA, EXPRESSIONS, STATEMENTS

Python Interpreter and Interactive mode; Values and Types: int, float, boolean, string, and list; Variables, Expressions, Statements, Tuple assignment, Precedence of operators, Comments; Modules and Functions, Function Definition and use, Flow of Execution, Parameters and Arguments; Illustrative programs: Exchange the values of two variables, Distance between two points.

UNIT II: *CONTROL FLOW, FUNCTIONS.*

Conditionals: Boolean values and operators, Conditional (if), Alternative (if-else), Chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, sum an array of numbers, Linear search, Binary search

UNIT III: *LISTS, TUPLES, DICTIONARIES*

Lists: List operations, List Slices, List Methods, List Loop, Mutability, Aliasing, Cloning lists, List parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing – list comprehension; Illustrative programs: selection sort, insertion sort, mergesort.

UNIT IV: *FILES, MODULES, PACKAGES AND EXCEPTION HANDLING*

Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file.

UNIT V:CLASSES AND OBJECTS

Implementation of classes and objects in Python: Classes and Objects, Methods and Self Argument, The __init_Method, Class Variables and Object Variables, The __del_Method, Public and Private Data Members, Private Methods,Built-in Functions to Check, Get, Set and Delete Class Attributes, Garbage Collection (Destroying Objects)

TEXT BOOKS:

1.Python Programming: A Modern Approach , Vamsi Kurama,Pearson

2. Learning Python , Mark Lutz ,Orielly

REFERENCE BOOKS:

Think Python , Allen Downey , Green Tea Press

E-RESOURCES:

https://www.tutorialspoint.com/python/index.htm

https://www.programiz.com/python-programming

https://www.w3schools.com/python/

https://www.javatpoint.com/python-tutorial

20A2105402-DATA BASE MANAGEMENT SYSTEMS

Lecture – Tutorial-Practical::	3-0-0				**Internal Marks:**	30
Credits:	3				**External Marks:**	70

Prerequisites:

Basic Database,Data Structures, Mathematics

Course Objectives:

- To understand the basic concepts and the applications of database systems.
- Learn and practice data modelling using the entity-relationship and developing database designs
- To master the basics of SQL and construct queries using SQL.
- Apply normalization techniques to normalize the database
- Understand the needs of database processing and learn techniques for controlling the consequences of concurrent data access
- Learn the concepts of transaction management and how they provide security and consistency
- Topics include data models, database design, relational model, relational algebra, transaction control, concurrency control, storage structures and access techniques.

Course Outcomes:

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

CO1	Ability to define, understand the database management system structure
CO2	Ability to apply as relational algebra to find solutions to a broad range of queries.
CO3	Ability to create applications using various normal forms, functional dependencies, validating and identifying anomalies
CO4	Will be able to explain the principle of transaction management design.
CO5	Understands and applies indexing mechanisms in databases

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**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	2	2	2	--	2	--	--	--	--	--	--	2	2	2	2
CO2	3	3	3	--	--	--	--	--	--	--	2	2	2	2	2
CO3	3	3	--	--	3	2	--	--	--	--	2	2	3	2	2
CO4	2	2	3	--	2	2	--	--	--	--	2	3	2	2	2
CO5	3	3	3	--	2	3	--	--	--	--	2	2	2	2	2

UNIT I :

DATABASE SYSTEM APPLICATIONS:

Database System Applications, Purpose of Database Systems, File Systems versus a DBMS, View of Data – Data Abstraction, Instances and Schemas, Data Models, Data Independence, Database Users and Administrators,

Structure of a DBMS.

INTRODUCTION TO DATABASE DESIGN:

Database Design and ER Diagrams, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design With the ER Model

UNIT II:

INTRODUCTION TO THE RELATIONAL MODEL:

Integrity constraint over relations, enforcing integrity constraints, querying relational data, logical data base design, introduction to views, Destroying/altering tables and views.

RELATIONAL ALGEBRA AND CALCULUS:

Relational Algebra – Selection and Projection, Set operations,Renaming, Joins,Division,Examples of Algebra Queries, Relational calculus – Tuple relationalCalculus – Domain relational calculus.

UNIT III:

SQL: QUERIES, CONSTRAINTS, TRIGGERS:

Form of basic SQL query, UNION, INTERSECT, and EXCEPT, Nested Queries, aggregation operators, NULL values, complex integrity constraints in SQL, Triggers and active data bases.

SCHEMA REFINEMENT:

Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, FIRST, SECOND, THIRD normal forms, BCNF, lossless join decomposition, multi-valued dependencies, FOURTH normal form, FIFTH normal Form.

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, and Other Recovery related Structures, theWrite-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, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Hash Based Indexing, Tree base Indexing, Comparison of File Organizations, Indexes and

Performance Tuning, Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.

TEXT BOOKS:

1. Data base Management Systems, Raghu Ramakrishnan, Johannes Gehrke, TMH, 3rd Edition,2003.

2. Data base System Concepts, A.Silberschatz, H.F. Korth, S.Sudarshan,McGraw hill, VI edition,2006.

3. Fundamentals of Database Systems 5th edition., Ramez Elmasri, Shamkant .Navathe,Pearson Education,2008.

REFERENCE BOOKS:

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.

2. Fundamentals of Database Systems, Elmasri Navrate, *Pearson Education*

3. Introduction to Database Systems, C. J. Date, *Pearson Education*

4. Oracle for Professionals, The X Team, S.Shah and V. Shah, *SPD*.

5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL,Shah, *PHI*.

6. Fundamentals of Database Management Systems, M. L. Gillenson, *Wiley Student* Edition.

E-RESOURCES:

1. https://www.javatpoint.com/dbms-tutorial

2. https://www.tutorialspoint.com/dbms/index.htm

3.https://www.geeksforgeeks.org/dbms/

20A2105403- Computer Organization and Architecture

Lecture – Tutorial-Practical::	3-0-0				**Internal Marks:**	30
Credits:	3				**External Marks:**	70

Prerequisites:

NIL

Course Objectives:

- To study the basic philosophy underlying the various number systems, negative number representation, binary arithmetic, binary codes and error detecting and correcting binarycode.
- To study the combinational logic design of various logic and switching devices and theirrealization
- Understand the architecture of a modern computer with its various processing units. Also the Performance measurement of the computer system.
- The memory organization of the computer and input output organization understanding

Course Outcomes:

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

CO1	Understand the numeric information in different forms and interpret different logic gates.
CO2	Analyze and Design various combinational circuits like Encoders, Decoders, Multiplexers, De-multiplexers, and Arithmetic Circuits.
CO3	Able to understand the basic components and the design of CPU, ALU and Control unit
CO4	Students can calculate the effective address of an operand by addressing modes
CO5	Ability to understand memory hierarchy and its impact on computer cost/performance..
CO6	Ability to understand the advantage of instruction level parallelism.

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**	**PSO1**	**PSO2**	**PSO**
CO1	2	-	2	2	--	--	--	--	--	--	--	--	2	--	2
CO2	3	--	3	--	3	--	--	--	--	--	--	--	--	3	--
CO3	--	--	2	2	2	--	--	--	--	--	--	--	--	--	3
CO4	--	--	2	3	3	--	--	--	--	--	--	--	--	2	--
CO5	--	--	3	2	--	--	--	--	--	--	--	2	2	3	--
CO6	--	--	--	2	2	--	--	--	--	--	--	--	3	2	--

UNIT I :

NUMBER SYSTEMS & BOOLEAN FUNCTIONS: Representation of numbers in different radix, conversation from one radix to another radix, r-1's compliments and r's compliments of signed numbers,Boolean theorems, principle of complementation & duality, De-Morgans theorems, Basic logic gates and Universal gates, NAND-NAND and NOR-NOR realizations, Standard SOP and POS.

UNIT II:

Design of Half adder, full adder half subtractor, full subtractor, 4-bit binary subtractor, adder-subtractor circuit, BCD adder circuit, 4 bit parallel adder, Carry look-a- head adder circuit. Decoders, Encoders, priority encoder, Multiplexer, Demultiplexer. Basic Structure Of Computers : Computer Types, Functional unit, Basic Operational concepts, Bus structures, Software, Performance.

UNIT III:

Register Transfer and Micro-Operations: Register Transfer Language, Register Transfer, Bus and memory Transfers, Arithmetic Micro-operations, Logic Microoperations, Shift Micro-operations, Arithmetic Logic Shift Unit. Basic Computer Organization and Design: Instruction codes, Computer Registers,Computer Instructions, Timing and Control, Instruction cycle, Memory ReferenceInstructions, Input-Output and Interrupts

UNIT IV:

Central Processing Unit: General register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer (RISC).Computer Arithmetic : Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating – point Arithmetic operations.

UNIT V:

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary memory, Associative Memory, Cache Memory, Virtual Memory, Memory Management Hardware.Input Output Organization: Peripheral Devices, Input-output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access (DMA)

TEXT BOOKS:

1 Morris M. Mano, Computer Systems Architecture.3 Ed, Pearson/PHI, 2013

2 Carl Hamacher, Zvonko Vranesic, Safwat Zaky: Computer Organization, 5th Edition, Tata McGraw Hill, 2002.

REFERENCE BOOKS:

John P.Hayes, 'Computer architecture and Organisation', Tata McGraw-Hill, Third edition, 1998.

E-RESOURCES:

https://www.tutorialspoint.com/computer_organization/index.asp

https://www.geeksforgeeks.org/computer-organization-basic-computer-instructions/

20A2105404- INTERNET OF THINGS

Lecture – Tutorial-Practical::	3-0-0				**Internal Marks**
Credits:	3				**External Marks**

Prerequisites: Python programming

Course Objectives:

The objective of this course is to explore the interconnection and integration of the physical world and the cyber space. Understand the design concepts in setting up IOT Devices. Study about the setup, configuration and installation of equipment for IOT.

Course Outcomes:

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

CO1	Understand Device-processor communication models & protocols.
CO2	Understand the application areas of IOT.
CO3	Visualize the effect of internet on Mobile Devices, Cloud & Sensor Networks.
CO4	Acquire programming experience with Raspberry Pi kit to interface various devices.
CO5	Implement Programming models for IoT Cloud Environment.

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**	PSO1	PSO2
CO1	2	2	--	--	2	--	--	--	2	--	--	--	2	-
CO2	--	--	--	2	--	--	2	--	--	--	--	--	2	
CO3	--	--	2	--	--	3	--	--	--	3	2	3	-	3
CO4	--	--	--	3	--	--	--	3	--	--	--	--	2	-
CO5	2	--	--	--	--	--	--	--	--	2	--	2	-	3

UNIT I : Introduction to Internet of Things

Introduction, Definition and Characteristics of IoT, Physical Design of IoT, Logical Design of IoT, IoT Enabled Technologies, IoT Levels and Deployment Templates

UNIT II: Domain Specific IoTs

Introduction, Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Lifestyle

UNIT III: IoT AND M2M

Introduction, M2M, Difference between IoT and M2M, SDN and NFV for IoT IoT System Management: Need for IoT Systems Management, SNMP, NETCONF, YANG, YANG-NETCONF, NETOPEER.

UNIT IV: IoT Physical Devices & Endpoints

What is an IoT Device, Exemplary Device: Raspberry Pi, About the Board, Linux on Raspberry Pi, Raspberry Pi Interfaces (Serial, SPI, and I2C), Programming Raspberry Pi with Python, Other IoT Devices

UNIT V: **IoT Physical Servers and Cloud Offerings**

Introduction to Cloud Storage Models & Communication APIs, WAMP - AutoBahn for IoT, Xively Cloud for IoT, Python Web Application Framework – Django, Designing a RESTful Web API.

TEXT BOOKS:

1. Arshdeep Bahga and Vijay Madisetti, —Internet of Things - A Hands-on Approach‖, Universities Press, 2015, ISBN: 9788173719547.

2. Matt Richardson & Shawn Wallace, O'Reilly (SPD),‖Getting Started with Raspberry Pi‖, 2014, ISBN: 978935023975.

REFERENCE BOOKS:

1. Pethuru Raj and Anupama C. Raman,"The Internet of Things: Enabling Technologies, Platforms, and Use Cases", (CRC Press).

2. Adrian McEwen, —Designing the Internet of Things‖, Wiley Publishers, 2013, ISBN: 978-1- 118-43062-0.

3. Daniel Kellmereit, —The Silent Intelligence: The Internet of Things‖, 2013, ISBN: 0989973700.

4. Ovidiu Vermesan, Peter Friess, “Internet of Things – From Research and Innovation to Market Deployment”, River Publishers Series in Communication, June 2014.

E-RESOURCES:

https://www.tutorialspoint.com/internet_of_things/internet_of_things_tutorial.pdf.

http://nptel.ac.in/courses/106105166

20A2105491-Python Programming Lab

Lecture – Tutorial-Practical::	0-0-3				**Internal Marks**
Credits:	1.5				**External Marks**

Prerequisites:

Adequate exposure to Programming

A basic understanding on various computer concepts , C programming basic syntax

Course Objectives:

To learn the fundamentals of python programming

To get a solid understanding of python functions and data structures

To demonstrate the use of python lists and dictionaries

To implement methods and functions to improve readability of programs.

Students able to describe and apply object-oriented programming methodology.

Students able to build software for real needs and prior introduction to testing software

Course Outcomes:

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

CO1	Experience with an interpreted Language and to build software for real needs
CO2	Use basic Decision structures, Boolean logic, variable types, assignments and operators.
CO3	Describe and use of Python lists, dictionaries, tuples and sets.
CO4	Implement methods and functions to improve readability of programs
CO5	Describe and apply object-oriented programming methodology, top-down concepts in algorithm design.
CO6	Design, code ,test and debug python language programs

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**	PSO1	PSO2
CO1	3	--	--	--	3	--	--	--	3	--	3	--	3	3
CO2	--	3	2	--	--	--	--	--	--	--	--	--	2	3
CO3	--	--	--	2	3	--	--	--	3	--	--	--	3	3
CO4	--	--	--	3	3	--	--	--	3	--	--	--	2	3

CO5	--	--	--	3	--	--	--	--	--	--	3	--	3	3
CO6	--	--	--	--	2	--	--	--	3	--	3	--	2	3

Exercise 1 - Basics

a) Running instructions in Interactive interpreter and a Python Script

b) Write a program to purposefully raise Indentation Error and Correct it

Exercise 2 - Operations

a) Write a program to compute distance between two points taking input from the user

(Pythagorean Theorem)

b) Write a program add.py that takes 2 numbers as command line arguments and prints its sum.

Exercise - 3 Control Flow

a) Write a Program for checking whether the given number is a even number or not.

b) Using a for loop, write a program that prints out the decimal equivalents of 1/2, 1/3, 1/4, . . . ,1/10

c) Write a program using a for loop that loops over a sequence.

d) Write a program using a while loop that asks the user for a number, and prints a countdownfrom that number to zero

Exercise 4 - Control Flow - Continued

a) Find the sum of all the primes below two million

b) Each new term in the Fibonacci sequence is generated by adding the previous two terms. Bystarting with 1 and 2,

the first 10 terms will be:1, 2, 3, 5, 8, 13, 21, 34, 55, 89, ...

c) By considering the terms in the Fibonacci sequence whose values do not exceed four million,find the sum of the

even-valued terms

Exercise - 5 - DS

a) Write a program combine_lists that combines these lists into a dictionary.

b) Write a program to count frequency of characters in a given file. Can you use character

frequency to tell whether the given file is a Python program file, C program file or a text file?

Exercise - 7 Files

a) Write a program to print each line of a file in reverse order.

b) Write a program to compute the number of characters, words and lines in a file.

Exercise - 8 Functions

a) Write a function ball_collide that takes two balls as parameters and computes if they are

colliding. Your function should return a Boolean representing whether or not the balls are colliding.

Hint: Represent a ball on a plane as a tuple of (x, y, r), r being the radius

If (distance between two balls centers) <= (sum of their radii) then (they are colliding)

b) Find mean, median, mode for the given set of numbers in a list.

Exercise - 9 Functions- Continued

a) Write a function nearly_equal to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on b.

b) Write a function dups to find all duplicates in the list.

c) Write a function unique to find all the unique elements of a list.

Exercise - 10 - Functions - Problem Solving

a) Write a function cumulative_product to compute cumulative product of a list of numbers.

b) Write a function reverse to reverse a list. Without using the reverse function.

c) Write function to compute gcd, lcm of two numbers. Each function shouldn't exceed one line.

Exercise 11 - Multi-D Lists

a) Write a program that defines a matrix and prints

b) Write a program to perform addition of two square matrices

c) Write a program to perform multiplication of two square matrices

Exercise - 12 - Modules

a)Write a program that defines a module "person" and import it

b)write a program that renames a module

Exercise - 13 OOP

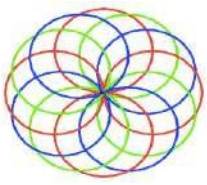
a) Class variables and instance variable and illustration of the self variable

i) Robot

ii) ATM Machine

Exercise - 14 GUI, Graphics

1. Write a GUI for an Expression Calculator using tk
2. Write a program to implement the following figures using turtle:



Exercise - 15 - Testing

a) Write a test-case to check the function even_numbers which return True on passing a list of all even numbers

b) Write a test-case to check the function reverse_string which returns the reversed string

Exercise - 16 - Advanced

Build any one classical data structure

TEXT BOOKS:

1. Python Programming: A Modern Approach , Vamsi Kurama,Pearson

2. Learning Python , Mark Lutz ,Orielly

REFERENCE BOOKS:

Think Python , Allen Downey , Green Tea Press

E-RESOURCES:

https://www.tutorialspoint.com/python/
https://docs.python.org/3/tutorial/
https://www.w3schools.com/python/
https://www.javatpoint.com/python-tutorial

20A2105492-DATABASEMANAGEMENTSYSTEMS LAB

Lecture – Tutorial-Practical::	0-0-3				**Internal Marks:**
Credits:	1.5				**External Marks**

Prerequisites:

C Programming, Mathematics

Course Objectives:

- Design and implement a database schema for a given problem-domain
- Populate and query a database using SQLDML/DDL commands.
- Declare and enforce integrity constraints on a database
- ProgrammingPL/SQLincludingstoredprocedures,stored functions,cursors,packages.
- Understand realtime database design models and cancodethemodel
- understandandretrieveinformationfromcomplexdesigneddatabasesusingcorrelatednestedqueries

Course Outcomes:

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

CO1	Queries for Creating, Dropping, and Altering Tables, Views, and Constraints
CO2	Queries to Retrieve and Change Data:Select, Insert,Delete,andUpdate
CO3	QueriesusingBuilt-InFunctions:StringFunctions,NumericFunctions,DateFunctionsandConversion Functions.
CO4	Queries using GroupBy,OrderBy,andHavingClauses
CO5	Queries on Joins and CorrelatedSub-Queries
CO6	Queries on Controlling Data:Commit,Rollback,andSavepoint

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	PSO1	PSO2
CO1	3	2	--	--	--	--	--	--	--	--	--	--	2	--
CO2	2	3	3	--	2	--	--	--	--	--	--	--	--	2
CO3	2	2	2	--	2	--	--	--	--	--	--	--	2	--
CO4	2	2	3	--	3	--	--	--	--	--	--	2	2	2
CO5	2	2	2	--	2	--	--	--	--	--	--	--	2	2
CO6	2	2	3	--	2	--	--	--	--	--	--	--	2	2

ListofExperiments :

SQL

1. QueriesforCreating,Dropping,andAlteringTables,Views,andConstraints
2. QueriestoRetrieveandChangeData:Select,Insert,Delete,andUpdate
3. QueriesusingoperatorsinSQL
4. QueriesusingBuilt-InFunctions:StringFunctions,NumericFunctions,DateFunctionsandConversion Functions
5. QueriesusingGroupBy,OrderBy,andHavingClauses
6. Queries on Controlling Data: Commit, Rollback, and Save point
7. Queries on Joins and Correlated Sub-Queries
8. Queries on Working with Index, Sequence, Synonym

PL/SQL

1. WriteaPL/SQLCodeusingBasicVariable,AnchoredDeclarations,andUsageofAssignmentOperation
2. WriteaPL/SQLCodeBindandSubstitutionVariables.PrintinginPL/SQL
3. WriteaPL/SQLblockusingSQLandControlStructuresinPL/SQL
4. WriteaPL/SQLCodeusingCursors,ExceptionsandCompositeDataTypes
5. WriteaPL/SQLCodeusingProcedures,Functions,TriggersandPackage

TEXT BOOKS:

FundamentalsofDatabaseSystems,ElmasriNavrate,6thedition, PearsonEducation

REFERENCE BOOKS:

1. ”DatabaseSystemConcepts”,.Korth,Slberchatz,Sudarshan,6thEdition,McGraw–Hill
2. PeterRobandCarlosCoronel,“DatabaseSystemsDesign,ImplementationandManagement”,Thomson Learning,5thEdition.
3. IntroductiontoDatabaseSystems,CJDate,Pearson

DatabaseManagementSystems,RaghuramaKrishnan,JohannesGehrke,TATAMcGrawHill3rdEdition

20A2105493- INTERNET OF THINGS LAB

Lecture – Tutorial- Practical::	**Internal Marks:**				
Credits:	1.5				**External Marks:**

Prerequisites: Python programming

Course Objectives:

The objective of this course, to give a comprehensive view of the —Internet of Things including Applications/ Potentials/ Challenges.To analyze enabling technologies to make it happen and to conduct Hands on activities .

Course Outcomes:

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

CO1	Understand the application areas of IOT.
CO2	Understand building blocks of Internet of Things and characteristics.
CO3	Understand enabling technologies Embedded Devices and communication protocols for Hands on activities.
CO4	Write programs using Python for processing Internet of Things

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**	**PSO1**	**PO**
CO1	3	--	--	--	--	2	--	3	--	--	2	--	3	-
CO2	--	--	2	2	--	--	2	--	2	2	--	2	--	
CO3	--	3	--	--	3	--	--	--	--	--	--	--	--	
CO4	--	--	--	--	--	--	--	3	--	--	2	--	3	-

CYCLE 1:

CYCLE - 1: Start Raspberry Pi and try various Linux commands in command terminal window: ls, cd, touch, mv, rm, man, mkdir, rmdir, tar, gzip, cat, more, less, ps, sudo, cron, chown, chgrp, ping etc.

CYCLE II:

1. Run some python programs on Pi like:
2. Read your name and print Hello message with name
3. Read two numbers and print their sum, difference, product and division.
4. Word and character count of a given string
5. Area of a given shape (rectangle, triangle and circle) reading shape and appropriate values from standard input
6. Print a name 'n' times, where name and n are read from standard input, using for and while loops.
7. Handle Divided by Zero Exception.

8. Print current time for 10 times with an interval of 10 seconds.
9. Read a file line by line and print the word count of each line.

CYCLE III:

1. Light an LED through Python program
2. Get input from two switches and switch on corresponding LEDs
3. Flash an LED at a given on time and off time cycle, where the two times are taken from a file.

CYCLE IV:

1. Access an image through a Pi web cam.
2. Control a light source using web page.
3. Implement an intruder system that sends an alert to the given email.
4. Get the status of a bulb at a remote place (on the LAN) through web.

CYCLE V:

1. Get an alarm from a remote area (through LAN) if smoke is detected.
2. Display the room temperature on the display devices using sensors.
3. The student should have hands on experience in using various sensors like humidity, smoke, light, etc. and should be able to use control web camera, network, and relays connected to the Pi.

REFERENCE BOOKS:

1. wwwusers.di.uniroma1.it/~spenza/files/labIoT2015/Lab-IoT-1.pdf.
2. www.mobileeducationkit.net/labmanuals/LAB-Manual-mbed.docx

Course Code- Web Application Development Using Full Stack – Frontend Development – Module - I

Lecture – Tutorial-Practical::	0-0-4				**Internal Marks**
Credits:	2				**External Marks**

Prerequisites:

Course Objectives:

The objective of this lab is to provide understanding about the core concepts of frontend programming for web application

Course Outcomes:

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

CO1	Analyze a web page and identify its elements and attributes
CO2	Demonstrate the important HTML tags for designing static pages and separate design from content using Cascading Style sheet
CO3	Implement MVC and responsive design to scale well across PC, tablet and Mobile Phone
CO4	Create web pages using HTML and Cascading Style Sheets.

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**	**PS O1**	**P C**
CO1	3	2	--	--	--	--	--	--	--	--	--	--	2	
CO2	2	3	3	--	2	--	--	--	--	--	--	--	-	
CO3	2	2	2	--	2	--	--	--	--	--	--	--	2	
CO4	2	2	3	--	3	--	--	--	--	--	--	2	2	

List of Experiments :

HTML

1) Introduction to HTML
2) Browsers and HTML
3) Editor's Offline and Online
4) Tags, Attribute and Elements
5) Doctype Element
6) Comments
7) Headings, Paragraphs, and Formatting Text
8) Lists and Links
9) Images and Tables

B) CSS

1) Introduction CSS
2) Applying CSS to HTML
3) Selectors, Properties and Values
4) CSS Colors and Backgrounds
5) CSS Box Model
6) CSS Margins, Padding, and Borders
7) CSS Text and Font Properties
8) CSS General Topic

TEXT BOOKS:

WebTechnologies,UttamKRoy,OxfordJavaServerPages,HansBergstan,Oreilly

REFERENCE BOOKS:

- Web Technologies, HTML<JavaScript,PHP,Java,JSP,XMLandAJAX,Blackbook,DreamTech.
- An Introduction to Web Design, Programming, PaulSWang, SandaSKatila,Cengage
- An introduction toWeb Design and Programming,WangThomson

20A2105901: APTITUDE AND REASONING

COURSE DESCRIPTION AND OBJECTIVE:

1. Students will be introduced to various Arithmetic and Reasoning Problems.
2. The students will have acquaintance with various topics like Time, Speed and Distance, Percentages, Data Interpretation etc…
3. Aptitude is designed to assess the logical thinking and how well they are able to think out of the box. These ability tests (All the companies do prefer this test) are strictly timed to assess the speed and accuracy of the students in solving the problems.

COURSE OUTCOMES:

Upon successful completion of this course, students will be able to

1. Solve the Arithmetic and Reasoning Problems as fast as possible and as simple as possible.
2. Exhibits good analytical skills and aptitude skills.
3. Perform well in all competitive exams like RRB, SSC, GROUPS, and BANKING etc…
4. Clear the aptitude section of exams for higher education like CAT, GMAT, and GRE etc…

UNIT – I

1. PERCENTAGES
2. SIMPLE INTEREST & COMPOUND INTEREST

UNIT – II

1. TIME AND WORK
2. PIPES AND CISTERN

UNIT- III

1. DIVISION OF WAGES
2. MAN DAYS & CHAIN RULE

UNIT- IV

1. CODING AND DECODING
2. ALPHABET & NUMBER SERIES

UNIT – V

1. ANALOGY
2. ODD ONE OUT

TEXT BOOKS:

1) **APTIPEDIA, WILEY**
2) **Quantative Aptitude, RS AGARWAL, S.Chand Publishers**

REFERENCE BOOKS:

1). HOW TO PREPARE FOR Quantative Aptitude, ARUN SHARMA, Mc GRAW HILL

20A2200201-PROBABILITY AND STATISTICS

Lecture – Tutorial:	3-0-0	**Internal Marks:**	30
Credits:	3	**External Marks:**	70

Prerequisites:--- NIL

Course Objectives:

- To familiarize the students with the foundations of probability and statistical methods
- To impart probability concepts and statistical methods in various applications Engineering

Course Outcomes:

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

CO1	Classify the concepts of data science and its importance
CO2	Interpret the association of characteristics and through the correlation and Regression tools
CO3	Make us of the concepts of probability and their applications
CO4	Apply discrete and Continuous probability distributions
CO5	Design the components of a classical hypothesis test
CO6	Infer the statistical inferential methods based on small and large sampling tests

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	2	2	--	--	--	--	--	--	--	--
CO2	3	3	2	2	--	--	--	--	--	--	--	--
CO3	3	3	2	2	--	--	--	--	--	--	--	--
CO4	3	3	2	2	--	--	--	--	--	--	-	--
CO5	3	3	2	2	--	--	--	--	--	--	-	--
CO6	3	3	2	2	--	--	--	--	--	--	--	--

UNIT I

Descriptive Statistics and Methods for Data Science : Data Science- Introduction to Statistics- Population Vs sample - Collection of Data – Primary and Secondary Data - Types of Varibales : Dependent and Independent , Catagorical and Continuous Variables – Data Visualization - Measures of Central Tendency - Measures of Variability (spread and variance) – Skewness and Kurtosis

UNIT II

Correlation and Curve Fitting : Correlation –Correlation Coefficient – Rank Correlation – Regression Coefficients an d properties – Regression lines – Method of Least Squares – Straight line – parabola – Exponential –power curves

UNIT III

Probability and distributions: Probability and conditional probability-Baye's theorem-Random variables- Discrete and continuous Random variables –Distribution Function- Mathematical Expectation and Variance – Binomial ,Poisson and Uniform and Normal Distributions

UNIT IV

Introduction – Population and Samples – Sampling distribution of Means and Variance (definition only) – Central li mit theorem (without proof) – Representation of the normal theory distributions –– Point and Interval estimation – Maximum error of estimate. Introduction – Hypothesis – Null and Alternative Hypothesis – Type I and Type II erro s – Level of significance

UNIT V

One tail and two-tail tests-Tests Concerning One Mean and Two Means (Large Samples) – Tests on Proportions. Introduction to t, χ^2 and F – Tests.

TEXT BOOKS:

1) Miller and Freund's, Probability and Statistics for Engineers,7/e, Pearson, 2008.
2) S. C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012.

REFERENCE BOOKS:

1) Shron L. Myers, Keying Ye, Ronald E Walpole, Probability and Statistics Engineers and the Scientists,8th Edition, Pearson 2007.
2) Jay l. Devore, Probability and Statistics for Engineering and the Sciences, 8th Edition, Cengage.
3) Sheldon M. Ross, Introduction to probability and statistics Engineers and the Scientists, 4th Edition, Academic Foundation, 2011.
4) Johannes Ledolter and Robert V. Hogg, Applied statistics for Engineers and Physical Scientists, 3rd Edition, Pearson, 2010.

E-RESOURCES:

1.nptel

20A2205401- Web Technologies

Lecture – Tutorial-Practical::	3-0-0				**Internal Marks:**	30
Credits:	3				**External Marks:**	70

Prerequisites:

1. Java Programming

2. DataBaseManagementSystems

Course Objectives:

To understand the concepts of Hyper Text Markup Language and Cascading Style Sheets

To learn JavaScript for creating dynamic websites

To learn the operations perform on data among web applications usingXML

To learn Server-SideProgramming using Servlets and JavaServerPages.

To learn the creationof pure DynamicWebApplication using JDBC

Course Outcomes:

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

CO1	Student able to Implement and design webbased applications using features of HTML
CO2	Implement webbased applications using features of XML
CO3	Student will Apply the concepts of server side technologies for dynamic web applications
CO4	Ability to design the webbased applications using effective database access with rich client interaction
CO5	Abilityto Develop reusable component for Graphical User Interface 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	PSO1	
CO1	-	-	3	-	-	-	-	-	-	-	-	2	3	
CO2	-	-	3	-	-	-	-	-	-	-	-	2	3	
CO3	3	-	2	-	-	-	-	-	-	-	-	2	3	
CO	-	3	3	2	-	-	-	-	-	-	-	2	3	

4															
CO5	-	3	-	3	2	-	-	-	-	-	-	3	3		-

UNIT I :

Introduction to Javascript, objects in JavaScript, Dynamic HTML with JavaScript

UNIT II:

Working with XML: Document Type Definition, XMLschemas, Documentobjectmodel, XSLT,DOM and SAX.

UNIT III:

Web Servers and Servlets: Tomcat web server, Introduction to Servlets: Lifecycle of a Servlet, JSDK, The Servlet API, The javax.servlet Package, Reading Servlet parameters, and Reading Initialization parameters. The javax.servlet HTTP package, Handling Http Request & Responses, Using Cookies-Session Tracking, Security Issues

UNIT IV:

Database Access: Database Programming using JDBC, studying javax.sql.*package, accessing a database from a JSP page, Introduction to JSP: The Problem with Servlet. The Anatomy of a JSP Page, JSPProcessing.JSP application design with MVC.

JSP Application Development: Generating Dynamic Content, Using Scripting Elements Implicit JSP Objects, Conditional Processing–Displaying Values Using an Expression to Set an Attribute, Declaring Variables and Methods Error Handling and Debugging Sharing Data Between JSP pages, Requests.

UNIT V:

PHP Programming: Introducing PHP: Creating PHP script, Running PHP script. **Working with variables and constants:** Using variables, Using constants, Data types,Operators.**Controlling program flow:** Conditional statements,Controlstatements,Arrays,functions.Working with forms and Databases such as MySQL.

TEXT BOOKS:

- TheComplete Reference,Java2, 3ed, PatrikNaughton, HerbertSchildt, TMH
- ProgrammingtheWorldWideWeb,RobetWSebesta,7ed,Pearson.
- WebTechnologies,UttamKRoy,OxfordJavaServerPages,HansBergstan,Oreilly

REFERENCE BOOKS:

- Web Technologies, HTML<JavaScript,PHP,Java,JSP,XMLandAJAX,Blackbook,DreamTech.
- An Introduction to Web Design, Programming, PaulSWang, SandaSKatila,Cengage
- An introduction toWeb Design and Programming,WangThomson
- Web application technologies concepts,Knuckles,JohnWiley.
- Programming worldwideweb,Sebesta,Pearson
- BeginningWebProgramming,JonDuckett,Wrox,WileyJavaserverpages,Pek owsky,Pearson

E-RESOURCES:

1. https://www.w3schools.com/
2. https://www.tutorialspoint.com/perl/
3. https://www.railstutorial.org/book
4. https://www.cs.usfca.edu/~galles/visualization/Algorithms.html

20A2205402- SOFTWARE ENGINEEEING

Lecture – Tutorial-Practical::	3	**0**	**0**	**Internal Marks:**	30
Credits:	3			**External Marks:**	70

Prerequisites:

Programming and problem solving, General Aptitude

Course Objectives:

1. To study pioneer of Software Development Life Cycle, Development models and Agile Software development.
2. To study the concepts related to analysis, design concepts of software development
3. To study fundamental concepts in software testing, including software testing objectives, process, criteria, strategies, and methods.
4. To discuss various software testing strategies viz., unit test; integration, regression, and system testing and validation testing
5. To learn the process of improve the quality of software work products.
6. To gain the techniques and skills on how to use modern software testing tools to support software testing projects.

Course Outcomes:

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

CO1	Understand the basic concepts of Software engineering and applications
CO2	Compare different software engineering process models
CO3	Analyze the principles of requirement Engineering
CO4	Create design models for software Engineering projects
CO5	Apply different testing techniques

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**	PSO1	PSO2	PSO3
CO1	2	--	--	--	--	--	--	--	--	--	--	--	2	--	--
CO2	--	--	2	--	--	--	--	--	3	--	2	--	--	3	--
CO3	--	2	3	--	--	--	--	2	--	3	2	--	--	--	--
CO4	--	2	--	--	--	--	--	--	--	3	--	--	2	--	3
CO5	--	--	2	--	--	--	--	--	--	2	--	--	--	3	--

UNIT I :

Software and Software Engineering: The Nature of Software, Defining Software, Software Application Domains, Legacy Software, The Unique Nature of Web Apps, Software Engineering, The Software Process, Software

Engineering Practice, The Essence of Practice, General Principles, Software Myths.
The Software Process: Software Engineering, Software Process, Generic process model, Prescriptive process model, specialized, unified process, Agile development, Agile Process, Extreme Programming, Other agile Process models, Specialized Process Models, The Unified Process, Personal and Team Process Models, Process Technology, Product and Process.

UNIT II:

Agile Development: Agility, Agility and the Cost of Change, Agile Process, Extreme Programming (XP) Other Agile Process Models, A Tool Set for the Agile Process.
Principles that guide practice, Software Engineering Knowledge, Principles That Guide Process, Principles That Guide Practice, Principles That Guide Each Framework Activity, Communication Principles, Planning Principles, Modeling Principles, Construction Principles, Deployment Principles

Understanding Requirements: Requirements Engineering, Establishing the Groundwork, Eliciting Requirements, Developing Use Cases, Building the Requirements Model, Negotiating Requirements, Validating Requirements.

UNIT III:

Requirements Modeling: Scenarios, Information and Analysis classes: Requirements Analysis, Scenario-Based Modeling, UML Models That Supplement the Use Case, Data Modeling Concepts, Class-Based Modeling.
Requirements Modeling: Flow, Behavior, Patterns, And Web apps: Requirements Modeling Strategies, Flow-Oriented Modeling, Creating a Behavioral Model, Patterns for Requirements Modeling, Requirement modeling for WebApps.

UNIT IV:

Design Concepts: Design within the Context of Software Engineering, the Design Process, Design Concepts, the Design Model.
Architectural Design: Software Architecture, Architectural Genres, Architectural Styles, Architectural Design, Assessing Alternative Architectural Designs.
Modeling Component-Level Design: What Is a Component? Designing Class-Based Components, Conducting Component Level Design, and Component level design for Web Apps.
Performing User Interface Design: The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps.

UNIT V:

Software Testing Strategies: A Strategic Approach to Software Testing, Strategic Issues, Test Strategies for Conventional Software, Test Strategies for Object-Oriented Software, Validation testing, System testing, the art of debugging.
Testing Conventional Applications: Software Testing Fundamentals, Internal and External Views of Testing, White Box Testing, Basis Path Testing, Control Structure Testing, Black-Box Testing, Model-Based Testing, Testing for Specialized Environments, Architectures, and Applications, Patterns for Software Testing.

TEXT BOOKS:

1. Roger S, "Software Engineering – A Practitioner's Approach", seventh edition, Pressman, 2010.

2. Ian Somerville, "Software Engineering". 9th ed, Pearson Education. 2011.

REFERENCE BOOKS:

1. Carlo Ghezzi, Mehdi Jazayeri and Dino Mandrioli, "Fundamentals of Software Engineering".2 ed, PHI. 2009
2. RajibMall, Fundamentals of Software Engineering. 3 ed, PHI. 2009.
3. Software Engineering, A Precise Approach, Pankaj Jalote, Wiley India,2010.
4. Hans Van Vliet, "Software Engineering: Principles and Practices"–, 2008.

E-RESOURCES:

1. http://www.dcnicn.com/BusinessNews/WVU-MIS13Apr00/Software-Engineering.pdf
2. http://www.comp.lancs.ac.uk/computing/resources/IanS/SE7/Presentations/PDF/ch1.pdf
3. http://sites.computer.org/ccse/SE2004Volume.pdf
4. http://homepages.cs.ncl.ac.uk/brian.randell/NATO/nato1968.PDF
5. http://www.dau.mil/pubs/pdf/SEFGuide 01-01.pdf
6. https://nptel.ac.in/courses/106101061/2
7. https://nptel.ac.in/courses/106101061/5

20A2205403 OPERATING SYSTEMS

Lecture – Tutorial-Practical::	3-0-0	**Internal Marks:**	30
Credits:	3	**External Marks:**	70

Prerequisites: Basics of Computer Organization.

Course Objectives:-Upon completion of this course, the student will be able to acquire the basic operating system concepts such as processes & threads.Explain the Details of some units such as memory management, I/O, and File systems.

CourseOutcomes:

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

CO1	Understand the important computer system resources and the structure and functioning of operating system.
CO2	Understand process management policies and scheduling of processes by CPU.
CO3	Evaluate the requirement for process synchronization and coordination handled by operating system. Describe and analyze the memory management and its allocation policies.
CO4	Understand demand paging, thrashing and principles of deadlocks.
CO5	Understand File system Interface, File System implementation, Mass-storage structure and Disk scheduling algorithms.

ContributionofCourseOutcomestowardsachievementofProgramOutcomes(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	2	-	-	-	-	-	-	-	-
CO2	2	3	2	2	-	-	-	-	-	-	-	-
CO3	2	2	2	2	-	-	-	-	-	-	-	-
CO4	2	3	3	2	-	-	-	-	-	-	-	-
CO5	2	3	3	2	-	-	-	-	-	-	-	-

UNITI :

Computer System and Operating System Overview: Overview of computer operating systems ,operating systems functions, operating systems structures and systems calls, operating systems generation.

UNITII:

Process Management – Process concept- process scheduling, operations, Inter process communication. MultiThread programming models. Process scheduling criteria and algorithms and their evaluation.

UNITIII:

Concurrency:Processsynchronization, thecritical-sectionproblem, Peterson'sSolution, synchronization Hardware, semaphores, classic problems of synchronization, monitors, Synchronization examples.
MemoryManagement:Swapping, contiguous memory allocation, paging, structure of the page table, segmentation.

UNITIV:

Virtual Memory Management: virtual memory, demand paging, page-Replacement, algorithms, Allocation of Frames, Thrashing. **Principles of deadlock** – system model, deadlock characterization, deadlock prevention,

detection and avoidance, recovery from deadlock.

UNITV:

File System Interface-The concept of a file, Access Methods, Directory structure, File system mounting, file sharing, protection.
File System implementation-File system structure, file system implementation, directory implementation, allocation methods, free-space management
Mass-storagestructure:overview of Mass storage structure, Diskstructure, disk attachment, disk scheduling, swap-space management.

TEXTBOOKS:

1. OperatingSystemConcepts-AbrahamSilberchatz,PeterB.Galvin,GregGagne7thEdition,JohnWiley.
2. OperatingSystems–InternalandDesignPrinciples,WilliamStallings,SixthEdition–2005,PearsonEducation.

REFERENCEBOOKS:

1. Operatingsystems-AConceptbasedApproach-D.M.Dhamdhere,2ndEdition,TMH.
2. OperatingSystemADesignApproach-Crowley,TMH.
3. ModernOperatingSystems,AndrewSTanenbaum3rdeditionPHI.

E-RESOURCES:

https://nptel.ac.in/courses/106105214/
https://www.udacity.com/course/introduction-to-operating-system-ud923
https://www.youtube.com/watch?v=qf668RboXLs
https://www.youtube.com/watch?v=VoaNyf9iO4Q&list=PLV8vIYTIdSnaHTjrBXjSyNTOWEtA33hvn

Formal Languages and Automata Theory

Lecture – Tutorial-Practical::	3-0-0	**Internal Marks:**	30
Credits:	3	**External Marks:**	70

Prerequisites:

Course Objectives:-

1. To give an overview of the theoretical foundations of computer science from the perspective of formal languages
2. To illustrate finite state machines to solve problems in computing
3. To explain the hierarchy of problems arising in the computer sciences.
4. To familiarize Regular grammars, context frees grammar.

CourseOutcomes:

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

CO1	Able to use basic concepts of formal languages of finite automata techniques
CO2	Student able to design Finite Automata's for different Regular Expressions and Languages
CO3	Construct context free grammar for various languages
CO4	Solve various problems of applying normal form techniques, push down automata and Turing Machines
CO5	Participate in GATE, PGECET and other competitive examinations

ContributionofCourseOutcomestowardsachievementofProgramOutcomes(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	2	-	-	-	-	-	-	-	-
CO2	2	3	2	2	-	-	-	-	-	-	-	-
CO3	2	2	2	2	-	-	-	-	-	-	-	-
CO4	2	3	3	2	-	-	-	-	-	-	-	-
CO5	2	3	3	2	-	-	-	-	-	-	-	-

UNIT I : FINITE AUTOMATA (FA)

Introduction to Finite Automata, Central Concepts of Automata Theory, Deterministic Finite Automata (DFA), Nondeterministic Finite Automata (NFA), Equivalence of NFA and DFA. Applications of Finite Automata, Finite Automata with Epsilon Transitions, Eliminating Epsilon transitions, Minimization of Deterministic Finite Automata, Finite automata with output (Moore and Mealy machines) and Inter conversion. Text search using automata.

UNIT II: REGULAR EXPRESSIONS (RE) & REGULAR GRAMMARS

Introduction, Identities of Regular Expressions, Finite Automata and Regular Expressions- Converting from DFA's to Regular Expressions, Converting Regular Expressions to Automata, applications of Regular Expressions.
Definition, regular grammars and FA, FA for regular grammar, Regular grammar for FA. Proving languages to be non-regular -Pumping lemma, Closure properties of regular languages. Applications of RE – RE in Unix

UNIT III: CONTEXTS FREE GRAMMER (CFG) & Push Down Automata(PDA)

Context Free Grammars: Ambiguity in context free grammars. Minimization of Context Free Grammars. Chomsky normal form, Greiback normal form, Pumping Lemma for Context Free Languages. Enumeration of properties of CFL.
Push Down Automata: Push down automata, definition, model, acceptance of CFL, Acceptance by final state and acceptance by empty state and its equivalence. Equivalence of CFL and PDA, interconversion. (Proofs not required).
Introduction to DCFL and DPDA.

UNIT IV: Turing Machines(TM)

Turing Machine, definition, model, design of TM, Computable functions, recursively enumerable languages. Church's hypothesis, counter machine, types of Turing machines (proofs not required). , linear bounded automata and context sensitive language.

UNIT V: Computability Theory:

Chomsky hierarchy of languages, decidability of, problems, Universal Turing Machine, undecidability of posts Correspondence problem, Turing reducibility, Definition of P and NP problems, NP complete and NP hard problems.

TEXTBOOKS:

1. "Introduction to Automata Theory Languages and Computation". Hopcroft H.E. and Ullman J. D. Pearson Education.

2. Introduction to Theory of Computation –Sipser 2nd edition Thomson.

REFERENCEBOOKS:

- Introduction to Formal Languages , Automata Theory and Computation – Kamala Krithivasan, Rama R
- Introduction to Computer Theory, Daniel I.A. Cohen, John Wiley.
- Theory of Computation : A Problem – Solving Approach- Kavi Mahesh, Wiley India Pvt. Ltd.
- "Elements of Theory of Computation", Lewis H.P. & Papadimition C.H. Pearson /PHI.
- Theory of Computer Science – Automata languages and computation -Mishra and Chandrashekaran, 2nd edition, PHI.
- Introduction to languages and the Theory of Computation, John C Martin, TMH..

E-RESOURCES:

1. Foundations of Computation-CAROL CRITCHLOW, DAVID ECK
2. Introduction to Theory of Computation- Anil Maheshwari,Michielsmid-carleton University-2012

20A2205491- WEB TECHNOLOGIES LAB

Lecture – Tutorial-Practical::	**Internal Marks:**				
Credits:	1.5				**External Marks:**

Prerequisites:

1. **JavaProgramming**
2. **DataBaseManagementSystems**

Course Objectives:

1	HyperTextMarkupLanguage(HTML)andCascadingStyleSheets(CSS)forlayingout(formatting)pages that contain text, images andgraphics
2	ExtensibleMarkupLanguages(XMLisusedtostoreandtransportdataamongwebpages),amechanismfordefining newtagsets and interchangingdataamongwebapplications
3	Client-sideProgrammingusingJavaScriptforvalidatingthe data
4	Server-SideProgrammingusingservletsaretogeneratestaticcontentandJavaServerPagesareusedtogenerate dynamiccontent
5	CreatingapureDynamicWebApplicationwhichretrievesthedatafromDatabaseaccordingtotheclient request usingJDBC
6	CreatingapureDynamicWebApplicationwhichretrievesthedatafromDatabaseaccordingtotheclient request usingPHP

Course Outcomes:

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

CO1	Createawebsitestaticallyordynamically
CO2	Getknowledgeon displayingand decoratingthecontentsin awebpage.
CO3	Learntheconceptsofstoreandtransportthedataamongwebpages
CO4	CreateobjectswithwhichtheclientcancommunicatewithserVer.
CO5	Generatestaticordynamiccontentaccordingtotheclient'srequest
CO6	ProvideUser Authentication byusingcookiesand back end operations usingJDBC and PHP

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	PSO1	PSO2
CO1	-	-	3	-	-	-	-	-	-	-	-	2	3	3
CO2	-	-	3	-	-	-	-	-	-	-	-	2	3	3
CO3	3	-	2	-	-	-	-	-	-	-	-	2	3	3
CO4	-	3	3	2	-	-	-	-	-	-	-	2	3	3
CO5	-	3	-	3	2	-	-	-	-	-	-	3	3	3
Total	3	6	11	5	2	-	-	-	-	-	-	11	3	3

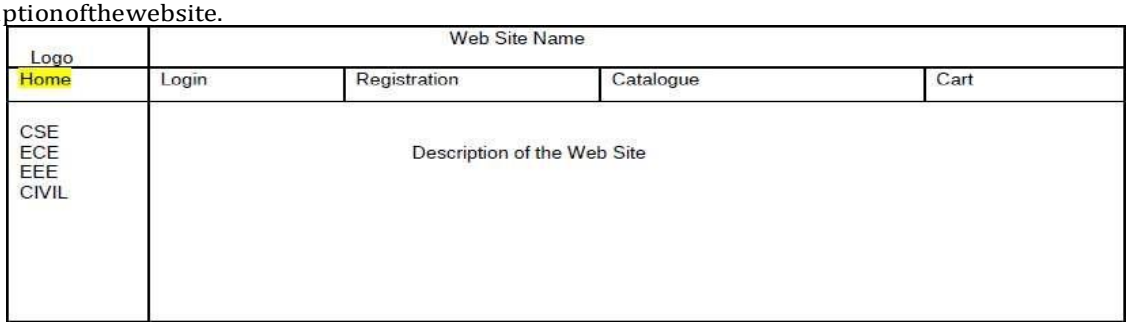
Week-1:
Designthefollowingstaticweb pagesrequired foranonlinebook storeweb site.

Week-1:
Designthefollowingstaticweb pagesrequired foranonlinebook storeweb site.
1)**HOMEPAGE:**
Thestatichomepagemust containthree**frames**.
Topframe: LogoandthecollegenameandlinkstoHomepage,Loginpage,Registrationpage,

Catalogue pageandCartpage (thedescriptionof these pageswillbegivenbelow).

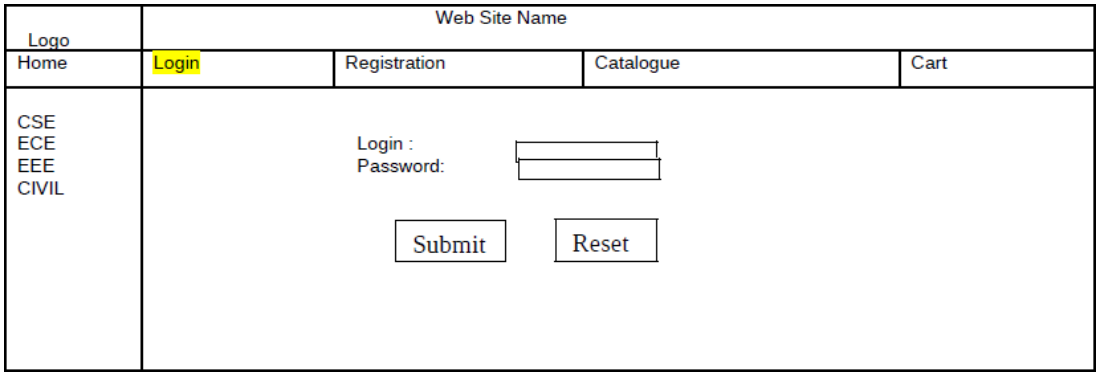
Leftframe: Atleastfourlinksfornavigation,whichwilldisplaythecatalogueofrespectivelinks. Fore.g.:Whenyouclickthelink**"CSE"**thecatalogueforCSEBooksshould be displayedintheRightframe.

Rightframe: The*pagestothelinksintheleftframemustbeloadedhere*.Initiallythispagecontains descriptionofthewebsite.



2) LOGINPAGE:

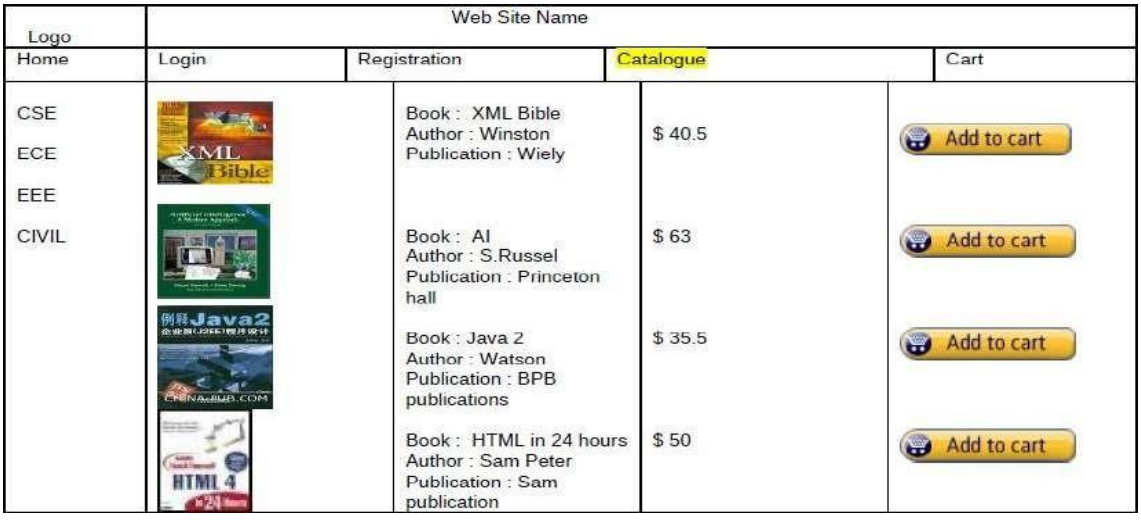
Thispagelooks likebelow:



3) CATOLOGUEPAGE:

Thecataloguepageshouldcontain thedetails ofall thebooksavailable inthe websiteina table.Thedetails should contain the following:

1. SnapshotofCoverPage.
2. AuthorName.
3. Publisher.
4. Price.
5. Addto cartbutton.



Note:Week2 containstheremainingpages andtheir description.

Week-2:

4) CARTPAGE: Thecart pagecontainsthedetailsabout thebookswhich areaddedto thecart.Thecartpageshould look likethis:

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
CSE ECE EEE CIVIL	**Book name** Java 2 XML bible	**Price** $35.5 $40.5	**Quantity** 2 1	**Amount** $70 $40.5
		Total amount -		$130.5

5) REGISTRATIONPAGE:

Createa"*registrationform* "withthefollowingfields

1) Name(Textfield)
2) Password(passwordfield)
3) E-mailid (textfield)
4) Phonenumber(text field)
5) Sex (radiobutton)
6) Dateofbirth(3selectboxes)
7) Languagesknown(checkboxes –English,Telugu,Hindi,Tamil)
8) Address(textarea)

WEEK3:

VALIDATION:

Write*JavaScript* to validatethe followingfields oftheaboveregistrationpage.

1. Name(Name shouldcontains alphabetsand thelength shouldnot belessthan 6characters).
2. Password(Passwordshouldnot belessthan6 characterslength).
3. E-mail id (should not contain any invalid and must follow the standard patternname@domain.com)
4. Phone number (Phone number should contain 10 digits only).Note:Youcan alsovalidatetheloginpagewiththeseparameters.UsePHPto connectwiththedatabaseto storetheabovedetails.

Week-4:

Designawebpageusing **CSS (C**ascading**S**tyle**S**heets**)**whichincludesthe following:

1) Usedifferent font, styles:

Inthestyledefinitionyoudefinehow eachselectorshouldwork(font,coloretc.).Then,inthebodyofyour pages,yourefertotheseselectorstoactivatethe styles.

Forexample:

```
<HTML>
<HEAD>
<style type="text/css">
B.headline {color:red; font-size:22px; font-family:arial; text-decoration:underline}
</style>

</HEAD>
```

```
<BODY>
<b>This is normal bold</b><br>
Selector {cursor:value}

For example:

<html>
<head>
<style type="text/css">
.xlink {cursor:crosshair}
.hlink{cursor:help}
</style>
</head>

<body>
<b>
<a href="mypage.htm" class="xlink">CROSS LINK</a>
<br>
<a href="mypage.htm" class="hlink">HELP LINK</a>
</b>
</body>
</html>

<b class="headline">This is headline style bold</b>
</BODY>

</HTML>
```

2) Setabackgroundimage forboththepageandsingleelementson thepage.Youcan definethe background imageforthepagelikethis:

```
BODY {background-image:url(myimage.gif);}
```

3) Control the repetition of the image with the background-repeat property.Asbackground-repeat: repeat
Tilesthe imageuntil theentirepageisfilled, justlikeanordinarybackground imageinplainHTML.

4) Define styles for links
asA:link
A:visitedA
:activeA:h
over
Example:
<styletype="text/css">
A:link {text-decoration:
none}A:visited {text-decoration:
none}A:active{text-decoration:none}
A:hover{text-decoration:underline;color:red;}
</style>

5) Workwithlayers:
Forexample:
LAYER1ONTOP:
<divstyle="position:relative;font-size:50px;z-index:2;">LAYER1
<div style="position:relative; top:-50; left:5; color:red; font-size:80px;
zindex:1">LAYER2
LAYER2ONTOP:
<divstyle="position:relative;font-size:50px;z-index:3;">LAYER1
<div style="position:relative; top:-50; left:5; color:red; font-size:80px;
zindex:4">LAYER2

6) Add a customized
cursor:Selector{cursor:va
lue}
Forexample:

```
<html>
<head>
<style type="text/css">
.xlink {cursor:crosshair}
.hlink{cursor:help}
</style>
</head>

<body>
<b>
<a href="mypage.htm" class="xlink">CROSS LINK</a>
<br>
<a href="mypage.htm" class="hlink">HELP LINK</a>
</b>
</body>
</html>
```

Week-5:
WriteanXMLfile which willdisplaytheBookinformation whichincludesthefollowing:

1) Title ofthebook
2) AuthorName
3) ISBNnumber
4) Publishername
5) Edition
6) Price

WriteaDocumentTypeDefinition(DTD)tovalidate theaboveXMLfile.DisplaytheXMLfileasfollows.
Thecontentsshouldbedisplayedinatable.Theheaderofthetableshouldbeincolor GREY.And the Authornamescolumnshouldbedisplayedinonecolorandshouldbecapitalizedandinbold.Useyour own colors forremaining columns.
UseXMLschemas XSLand CSS forthe abovepurpose.
Note:Giveatleastfor4 books. Itshouldbevalidsyntactically.Hint:You can usesome xml editors like XML-spy

Week-6:

1) InstallTOMCATwebserverandAPACHE.
WhileinstallationassignportnumberA040toTOMCATand8080toAPACHE.Makesurethattheseports areavailablei.e., no other process is usingthis port.

2) Accesstheabovedevelopedstaticwebpagesforbookswebsite,usingtheseserversbyputtingthe web pages developed in week-1 andweek-2 in thedocument root.
Access the pages by using the urls :http://localhost:4040/rama/books.html (for tomcat)http://localhost:8080/books.html (forApache)

Week-7:

UserAuthentication:
Assumefourusersuser1,user2,user3anduser4havingthepasswordspwd1,pwd2,pwd3andpwd4respectively. Writeaservelet fordoingthefollowing.

1. CreateaCookieandadd thesefouruser id'sand passwordsto this Cookie.
2. ReadtheuseridandpasswordsenteredintheLoginform(week1)andauthenticatewiththevalues(useridand passwords) available in thecookies.

If heisavaliduser(i.e.,user-name andpassword match)youshould welcomehimbyname(user-name)elseyou shoulddisplay"Youarenot anauthenticated user".
Useinit-parameterstodothis.Storetheuser-namesandpasswordsinthewebinf.xmlandaccessthemin theservlet byusingthegetInitParameters() method.

Week-8:

Installadatabase(Mysql orOracle).
Createatablewhichshouldcontainatleastthefollowingfields:name,password,email-id,phonenumber(theseshould hold the data from theregistration form).
Practice'**J**DBC'connectivity.
Writeajavaprogram/servlet/JSP/PHPtoconnecttothatdatabaseandextractdatafromthetablesanddisplaythe m. Experiment with various SQLqueries.
Insertthedetailsoftheuserswhoregisterwiththewebsite,wheneveranewuserclicksthesubmitbutton inthe

registration page(week2).

Week-9:

WriteaJSP whichdoes the followingjob:
Insert the details of the 3 or 4 users who register with the web site (week9) by using registrationform. Authenticate the user when he submits the login form using the user name and passwordfromthedatabase(similar to week8 instead of cookies).

Week-10:

Create tables in the database which contain the details of items (books in our case like Bookname , Price, Quantity, Amount)) of each category. Modify your catalogue page (week 2)in sucha way that you should connect to the database and extract data from the tables and display theminthecataloguepageusingJDBC.

TEXT BOOKS:

- TheComplete Reference,Java2, 3ed, PatrikNaughton, HerbertSchildt, TMH
- ProgrammingtheWorldWideWeb,RobetWSebesta,7ed,Pearson.
- WebTechnologies,UttamKRoy,OxfordJavaServerPages,HansBergstan,Oreilly

REFERENCE BOOKS:

- WebTechnologies,HTML<JavaScript,PHP,Java,JSP,XMLandAJAX,Blackboo k,DreamTech.
- AnIntroductiontoWebDesign,Programming,PaulSWang,SandaSKatila,Cengage
- AnintroductiontoWebDesignandProgramming,WangThomson
- Webapplicationtechnologiesconcepts,Knuckles,JohnWiley.
- Programmingworldwideweb,Sebesta,Pearson
- BeginningWebProgramming,JonDuckett,Wrox,WileyJavaserverpages,Pekowsk y,Pearson

E-RESOURCES:

1. https://www.w3schools.com/
2. https://www.tutorialspoint.com/perl/
3. https://www.railstutorial.org/book
4. https://www.cs.usfca.edu/~galles/visualization/Algorithms.html

20A2205492- SOFTWARE ENGINEEEING LAB

Lecture – Tutorial-Practical::	0-0-3			**Internal Marks:**	
Credits:	1.5			**External Marks:**	

Prerequisites:

Programming and problem solving, General Aptitude

Course Objectives:

- To understand the software engineering methodologies involved in the phases forproject development.
- To gain knowledge about open source tools used for implementing softwareengineering methods.
- To exercise developing product-startups implementing software engineering methods.
- To use Open source Tools, viz., StarUML / UMLGraph / Topcased

Course Outcomes:

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

CO1	Ability to translate end-user requirements into system and software requirements
CO2	Analyze the principles of requirement Engineering
CO3	Ability to generate a high-level design of the system from the software requirements
CO4	Create design models for software Engineering projects
CO5	Will have experience and/or awareness of testing problems and will be able to develop a simple testing report

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**	**PSO1**	**PSO**	**S C**
CO1	2	--	--	--	--	--	--	--	--	--	--	--	2	--	- -
CO2	--	--	2	--	--	--	--	--	3	--	2	--	--	3	- -
CO3	--	2	3	--	--	--	--	2	--	3	2	--	--	--	- -
CO4	--	2	--	--	--	--	--	--	--	3	--	--	3	--	3
CO5	--	--	3	--	--	--	--	--	--	2	--	--	--	3	- -

List of Experiments

(For at least 4 problems)

Prepare the following documents and develop the software project startup, prototype model, using software engineering methodology for at least two real time scenarios or for the sample experiments.

1. Problem Analysis and Project Planning -Thorough study of the problem – IdentifyProject scope, Objectives and Infrastructure.
2. Software Requirement Analysis – Describe the individual Phases/modules of theproject and Identify deliverables. Identify functional and non-functional requirements.
3. Data Modeling – Use work products – data dictionary.
4. Software Designing - Develop use case diagrams and activity diagrams, build and testclass diagrams, sequence diagrams and add interface to class diagrams.
5. Prototype model – Develop the prototype of the product.

Sample Projects:

1. Course management system (CMS)

A course management system (CMS) is a collection of software tools providing an online environment for course interactions. A CMS typically includes a variety of online tools and environments, such as:

- An area for faculty posting of class materials such as course syllabus and handouts
- An area for student posting of papers and other assignments
- A grade book where faculty can record grades and each student can view his or hergrades
- An integrated email tool allowing participants to send announcement email messagesto the entire class or to a subset of the entire class
- A chat tool allowing synchronous communication among class participants
- A threaded discussion board allowing asynchronous communication among participants

In addition, a CMS is typically integrated with other databases in the university so that students enrolled in a particular course are automatically registered in the CMS as participants in that course.

The Course Management System (CMS) is a web application for department personnel, Academic Senate, and Registrar staff to view, enter, and manage course information formerly submitted via paper.

Departments can use CMS to create new course proposals, submit changes for existing courses, and track the progress of proposals as they move through the stages of online approval.

2. Easy Leave

This project is aimed at developing a web based Leave Management Tool, which is of importance to either an organization or a college.

The **Easy Leave** is an Intranet based application that can be accessed throughout the organization or a specified group/Dept. This system can be used to automate the workflow of leave applications and their approvals. The periodic crediting of leave is also automated. There are features like notifications, cancellation of leave, automatic approval of leave, report generators etc in this Tool.

Functional components of the project:

There are registered people in the system. Some are approvers. An approver can also be a requestor. In an organization, the hierarchy could be Engineers/Managers/Business Managers/Managing Director etc. In a college, it could be Lecturer/Professor/Head of the Department/Dean/Principal etc.

Following is a list of functionalities of the system: A person should be able to

- login to the system through the first page of the application
- change the password after logging into the system
- see his/her eligibility details (like how many days of leave he/she is eligible for etc)
- query the leave balance

- see his/her leave history since the time he/she joined the company/college
- apply for leave, specifying the from and to dates, reason for taking leave, address for communication while on leave and his/her superior's email id
- see his/her current leave applications and the leave applications that are submitted to him/her for approval or cancellation
- approve/reject the leave applications that are submitted to him/her
- withdraw his/her leave application (which has not been approved yet)
- Cancel his/her leave (which has been already approved). This will need to beapproved by his/her Superior
- get help about the leave system on how to use the different features of the system
- As soon as a leave application /cancellation request /withdrawal /approval /rejection /password-change is made by the person, an automatic email should be sent to the person and his superior giving details about the action
- The number of days of leave (as per the assumed leave policy) should be automatically credited to everybody and a notification regarding the same be sent to them automatically
- An automatic leave-approval facility for leave applications which are older than 2 weeks should be there. Notification about the automatic leave approval should be sent to the person as well as his superior

3. E-Bidding

Auctions are among the latest economic institutions in place. They have been used since antiquity to sell a wide variety of goods, and their basic form has remained unchanged. In this dissertation, we explore the efficiency of common auctions when values are interdependent- the value to a particular bidder may depend on information available only to others-and asymmetric. In this setting, it is well known that sealed-bid auctions do not achieve efficient allocations in general since they do not allow the information held by different bidders to be shared.

Typically, in an auction, say of the kind used to sell art, the auctioneer sets a relatively low initial price. This price is then increased until only one bidder is willing to buy the object, and the exact manner in which this is done varies. In my model a bidder who drops out at some price can "reenter" at a higher price.

With the invention of E-commerce technologies over the Internet the opportunity to bid from the comfort of one's own home has seen a change like never seen before. Within the span ofa few short years, what may have began as an experimental idea has grown to an immensely popular hobby, and in some cases, a means of livelihood, the Auction Patrol gathers tremendous response every day, all day. With the point and click of the mouse, one may bid on an item they may need or just want, and in moments they find that either they are the top bidder or someone else wants it more, and you're outbid! The excitement of an auction all from the comfort of home is a completely different experience.

Society cannot seem to escape the criminal element in the physical world, and so it is the same with Auction Patrols. This is one area where in a question can be raised as to how safe Auction Patrols.

Proposed system
To generate the quick reports
To make accuracy and efficient calculations
To provide proper information briefly
To provide data security
To provide huge maintenance of records Flexibility of
transactions can be completed in time

4. Electronic Cash counter

This project is mainly developed for the Account Division of a Banking sector to provide better interface of the entire banking transactions. This system is aimed to give a better out look to the user interfaces and to implement all the banking transactions like:

- Supply of Account Information

- New Account Creations
- Deposits
- Withdraws
- Cheque book issues
- Stop payments
- Transfer of accounts
- Report Generations.

Proposed System:

The development of the new system contains the following activities, which try to automatethe entire process keeping in view of the database integration approach.

- User friendliness is provided in the application with various controls.
- The system makes the overall project management much easier and flexible.
- Readily upload the latest updates, allows user to download the alerts by clicking theURL.
- There is no risk of data mismanagement at any level while the project development isunder process.
- It provides high level of security with different level of authentication

Other Sample Projects :

1. Passport automation System
2. Book Bank
3. Online Exam Registration
4. Stock Maintenance System
5. Online course reservation system
6. E-ticketing
7. Software Personnel Management System
8. Credit Card Processing
9. E-book management System.
10. Recruitment system

TEXT BOOKS:

1. Roger S, "Software Engineering – A Practitioner's Approach", seventh edition, Pressman, 2010.

2. Ian Somerville, "Software Engineering". 9th ed, Pearson Education. 2011.
3. The unified modeling language user guide Grady Booch, James Rambaugh, Ivar Jacobson, Pearson Education

REFERENCE BOOKS:

1. Carlo Ghezzi, Mehdi Jazayeri and Dino Mandrioli, "Fundamentals of Software Engineering".2 ed, PHI. 2009
2. RajibMall, Fundamentals of Software Engineering. 3 ed, PHI. 2009.
3. Software Engineering, A Precise Approach, Pankaj Jalote, Wiley India,2010.
4. Hans Van Vliet, "Software Engineering: Principles and Practices"–, 2008.

E-RESOURCES:

1. http://www.dcnicn.com/BusinessNews/WVU-MIS13Apr00/Software-Engineering.pdf
2. http://www.comp.lancs.ac.uk/computing/resources/IanS/SE7/Presentations/PDF/ch1.pdf
3. http://sites.computer.org/ccse/SE2004Volume.pdf
4. http://homepages.cs.ncl.ac.uk/brian.randell/NATO/nato1968.PDF
5. http://www.dau.mil/pubs/pdf/SEFGuide_01-01.pdf
6. https://nptel.ac.in/courses/106101061/2
7. https://nptel.ac.in/courses/106101061/5

20A2205493: Operating Systems &Unix programming Lab

Lecture – Tutorial- Practical::	0-0-3	**Internal Marks:**	15
Credits:	1.5	**External Marks:**	35

Prerequisites: C-Programming

Operating Systems & Unix programming Lab

Course Objectives:

To understand the design aspects of operating system.
To study the process management concepts & Techniques.
To familiarize students with the Linux environment.
To learn the fundamentals of shell scripting/programming.

Course Outcomes:

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

CO1	Students able to implement CPU scheduling algorithms ,File Organization techniques and paging techniques
CO2	Students able to write shell scripts in Linux platform.

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	2	3	3	-	-	-	-	-	-
CO2	3	3	3	2	3	3	-	-	-	-	-	-

EXPERIMENTS :

PART-A

1. Simulate the following CPU scheduling algorithms a) Round Robin b) SJF c) FCFS d) Priority
2. Simulate MVT and MFT
3. Simulate all File Organization Techniques a) Single level directory b) Two level c) Hierarchical d) DAG
4. Simulate Bankers Algorithm for Dead Lock Avoidance
5. Simulate Bankers Algorithm for Dead Lock Prevention.
6. Simulate all page replacement algorithms a) FIFO b) LRU c) LFU Etc. ...
7. Simulate Paging Technique of memory management.
8. Simulate all file allocation strategies a) Sequential b) Indexed c) Linked

PART-B

1. Write a shell script to generate a multiplication table.
2. Write a shell script that copies multiple files to a directory.
3. Write a shell script which counts the number of lines and words present in a given file.
4. Write a shell script which displays the list of all files in the given directory.
5. Write a shell script(small calculator) that adds, subtracts, multiplies and divides the given two integers.
6. Write a shell script to reverse the rows and columns of a matrix.
7. Write a C program that counts the number of blanks in a text file.
8. C program Displaying real time of day for every 60 seconds
9. Write a C program that illustrates the creation of child process using fork system call.
10. Write a C program that illustrates file locking using semaphores.
11. Write a C program that implements a producer-consumer system with two processes.(using semaphores)
12. Write a C program that illustrates the following.

a)Creating a message queue.
b) Writing to a message queue.
c) Reading from a message queue.

TEXT BOOKS:

1. Operating System Concepts- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley.
2. Operating Systems' – Internal and Design Principles Stallings, Sixth Edition–2005, Pearson education
3.Advanced Programming in the UNIX Environment, 3rd EditionW. Richard Stevens, Stephen A. Rago
4.A Practical Guide to Linux Commands, Editors, and Shell ProgrammingMark G. Sobell, Matthew Helmke

REFERENCE BOOKS:

1. Operating systems- A Concept based Approach-D.M.Dhamdhere, 2nd Edition, TMH.
2. Operating System A Design Approach-Crowley, TMH.
3. Modern Operating Systems, Andrew S Tanenbaum 3rd edition PHI.
4. The Linux Programming Interface.A Linux and UNIX System Programming Handbook Michael Kerrisk.
5. Shell Programming in Unix, Linux and OS XThe Fourth Edition of Unix Shell Programming Stephen G. Kochan, Patrick Wood
6. Shell ScriptingHow to Automate Command Line Tasks Using Bash Scripting and Shell ProgrammingJaosn Cannon

E-RESOURCES:

https://www.tutorialspoint.com/unix/index.htm

https://www.guru99.com/unix-linux-tutorial.html
https://www.javatpoint.com/linux-tutorial
https://nptel.ac.in/courses/106105214/
https://www.udacity.com/course/introduction-to-operating-systems--ud923
https://www.youtube.com/watch?v=qf668RboXLs

Course Code- APPLICATIONS OF PYTHON- NumPy,Pandas

Lecture – Tutorial-Practical::	0-0-4				**Internal Marks:**	15
Credits:	2				**External Marks:**	35

Prerequisites:

Course Objectives:

The objective of this lab is to acquire programming skills in Python package NumPy and the fundamentals of the Pandas library in Python and how it is used to handle data and also develop basic skills in data analysis and visualization

Course Outcomes:

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

CO1	Understand the workings of various numerical techniques, different descriptive measures of Statistics, correlation and regression to solve the engineering problems
CO2	Understand how to apply some linear algebra operations to n-dimensional arrays
CO3	Use NumPy perform common data wrangling and computational tasks in Python
CO4	Use Pandas to create and manipulate data structures like Series and DataFrames, work with arrays, queries, and dataframes
CO5	Query DataFrame structures for cleaning and processing and manipulating files
CO6	Understand best practices for creating basic charts

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

	PO	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PS**	**PS**

	1	2	3	4	5	6	7	8	9	10	11	12	O1	O2
CO1	3	2	--	--	--	--	--	--	--	--	--	--	2	--
CO2	2	3	3	--	2	--	--	--	--	--	--	--	--	2
CO3	2	2	2	--	2	--	--	--	--	--	--	--	2	--
CO4	2	2	3	--	3	--	--	--	--	--	--	2	2	2
CO5	2	2	3	--	3	--	--	--	--	--	--	2	2	2
CO6	2	3	3	--	2	--	--	--	--	--	--	--	--	2

List of Experiments :

Exercise –I: Numpy

1) NumPy Installation using different scientific python distributions(Anaconda, Python(x,y), WinPython, Pyzo)
2) NumPy Basics (np.array, np.arrange, np.linespace, np.zeros, np.ones, np.random.random, np.empty)
3) Arrays (array.shape, len(array), array.ndim, array.dtype, array.astype(type), type(array))
4) Array Manipulation (np.append, np.insert, np.resize, np.delete, np.concatenate, np.vstack, np.hstack)
5) Mathematical Operations(np.add, np.substract, np.divide, np.multiply, np.sqrt, np.sin, np.cos, np.log, np.dot, np.roots) , Statistical Operations(np.mean, np.median, np.std, array.corrcoef( ))
6) NumPy data types
7) NumPy ndarray
8) NumPy String Operations
9) NumPy Financial functions
10) NumPy Functional Programming

Exercise –II: Pandas

A) Pandas DataSeries:
1) Write a Pandas program to create and display a one-dimensional array-like object containing an array of data using Pandas module.
2) Write a Pandas program to convert a Panda module Series to Python list and it's type.
3) Write a Pandas program to add, subtract, multiple and divide two Pandas Series.
4) Write a Pandas program to convert a NumPy array to a Pandas series. Sample Series: NumPy array: [10 20 30 40 50] Converted Pandas series: 0 10 1 20 2 30 3 40 4 50 dtype: int64

B) Pandas DataFrames:

Consider Sample Python dictionary data and list labels: exam_data = {'name': ['Anastasia', 'Dima', 'Katherine', '**J**ames', 'Emily', 'Michael', 'Matthew', 'Laura', 'Kevin', '**J**onas'], 'score': [12.5, 9, 16.5, np.nan, 9, 20, 14.5, np.nan, 8, 19], 'attempts': [1, 3, 2, 3, 2, 3, 1, 1, 2, 1], 'qualify': ['yes', 'no', 'yes', 'no', 'no', 'yes', 'yes', 'no', 'no', 'yes']} labels = ['a', 'b', 'c', 'd', 'e', 'f', 'g', 'h', 'i', 'j']
1) Write a Pandas program to create and display a DataFrame from a specified dictionary data which has the index labels.
2) Write a Pandas program to change the name '**J**ames' to 'Suresh' in name column of the DataFrame.
3) Write a Pandas program to insert a new column in existing DataFrame.
4) Write a Pandas program to get list from DataFrame column headers.

C) Pandas Index:
1) Write a Pandas program to display the default index and set a column as an Index in a given dataframe.
2) Write a Pandas program to create an index labels by using 64-bit integers, using floating-point numbers in a given dataframe.

D) Pandas String and Regular Expressions:
1) Write a Pandas program to convert all the string values to upper, lower cases in a given pandas series. Also find the length of the string values.
2) Write a Pandas program to remove whitespaces, left sided whitespaces and right sided whitespaces of the string values of a given pandas series.
3) Write a Pandas program to count of occurrence of a specified substring in a DataFrame column. 4) Write a Pandas program to swap the cases of a specified character column in a given DataFrame.

E) Pandas Joining and merging DataFrame:
1) Write a Pandas program to join the two given dataframes along rows and assign all data.
2) Write a Pandas program to append a list of dictioneries or series to a existing DataFrame and display the combined data.
3) Write a Pandas program to join the two dataframes with matching records from both sides where available.

F) Pandas Time Series:
1) Write a Pandas program to create
a) Datetime object for Jan 15 2012.
b) Specific date and time of 9:20 pm.
c) Local date and time.
d) A date without time.
e) Current date.
f) Time from a datetime.
g) Current local time.
2) Write a Pandas program to create a date from a given year, month, day and another date from a given string formats.
3) Write a Pandas program to create a time-series with two index labels and random values. Also print the type of the index

G) Pandas Styling:
1) Create a dataframe of ten rows, four columns with random values. Write a Pandas program to highlight the negative numbers red and positive numbers black.
2) Create a dataframe of ten rows, four columns with random values. Write a Pandas program to highlight the maximum value in each column.

H) Excel:
1) Write a Pandas program to import excel data into a Pandas dataframe.
2) Write a Pandas program to find the sum, mean, max, min value of a column of file.

I) Plotting:
1) Write a Pandas program to create a horizontal stacked bar plot of opening, closing stock prices of any stock dataset between two specific dates.
2) Write a Pandas program to create a histograms plot of opening, closing, high, low stock prices of stock dataset between two specific dates.

J) Pandas SQL Query:
1) Write a Pandas program to display all the records of a student file.

2) Write a Pandas program to select distinct department id from employees file.

TEXT BOOKS:

1. Python Programming: A Modern Approach , Vamsi Kurama,Pearson

2. Learning Python , Mark Lutz ,Orielly

REFERENCE BOOKS:

Think Python , Allen Downey , Green Tea Press

20A2200802: Professional Ethics & Human Values

Lecture – Tutorial- Practical:	0-2-0	**Internal Marks:**	30
Credits:	0	**External Marks:**	70*

Prerequisites:

Course Objectives:

- To create an awareness on Engineering Ethics and Human Values.
- To instill Moral and Social Values and Loyalty
- To appreciate the rights of others
- To create awareness on assessment of safety and risk

Course Outcomes

Students will be able to:
Identify and analyze an ethical issue in the subject matter under investigation or in a relevant field
Identify the multiple ethical interests at stake in a real-world situation or practice
Articulate what makes a particular course of action ethically defensible
Assess their own ethical values and the social context of problems
Identify ethical concerns in research and intellectual contexts, including academic integrity, use and citation of sources, the objective presentation of data, and the treatment of human subjects
Demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships, and field work
Integrate, synthesize, and apply knowledge of ethical dilemmas and resolutions in academic settings, including focused and interdisciplinary research.

Unit I- Human Values:

Morals, Values and Ethics-Integrity-Work Ethic-Service learning – Civic Virtue – Respect for others –Living Peacefully –Caring –Sharing –Honesty -Courage-Cooperation– Commitment – Empathy –Self Confidence Character –Spirituality.

Learning outcomes:

1. Learn about morals, values & work ethics.
2. Learn to respect others and develop civic virtue.
3. Develop commitment
4. Learn how to live peacefully

Unit II – Engineering Ethics:

Senses of 'Engineering Ethics-Variety of moral issued –Types of inquiry –Moral dilemmas – Moral autonomy –Kohlberg's theory-Gilligan's Theory-Consensus and controversy –Models of professional roles-Theories about right action-Self-interest -Customs and religion –Uses of Ethical theories –Valuing time –Cooperation –Commitment.

Learning outcomes:

1. Learn about the ethical responsibilities of the engineers.
2. Create awareness about the customs and religions.
3. Learn time management
4. Learn about the different professional roles.

Unit III Engineering as Social Experimentation:

Engineering As Social Experimentation –Framing the problem –Determining the facts – Codes of Ethics –Clarifying Concepts –Application issues –Common Ground -General Principles –Utilitarian thinking respect for persons. Learning outcomes:

1. Demonstrate knowledge to become a social experimenter.

2. Provide depth knowledge on framing of the problem and determining the facts.
3. Provide depth knowledge on codes of ethics.
4. Develop utilitarian thinking

Unit IV

Engineers Responsibility for Safety and Risk: Safety and risk –Assessment of safety and risk –Risk benefit analysis and reducing riskSafety and the Engineer-Designing for the safety-Intellectual Property rights (IPR). Learning outcomes:
1. Create awareness about safety, risk & risk benefit analysis.
2. Engineer's design practices for providing safety.
3. Provide knowledge on intellectual property rights.

Unit IV

Global Issues: Globalization –Cross-culture issues-Environmental Ethics –Computer Ethics –Computers as the instrument of Unethical behavior –Computers as the object of Unethical acts – Autonomous Computers-Computer codes of Ethics –Weapons Development -Ethics and Research –Analyzing Ethical Problems in research. Learning outcomes:
1. Develop knowledge about global issues.
2. Create awareness on computer and environmental ethics
3. Analyze ethical problems in research.
4. Give a picture on weapons development.

TEXT BOOKS:

1."Engineering Ethics includes Human Values" by M.Govindarajan, S.Natarajan and, V.S.Senthil Kumar-PHI Learning Pvt. Ltd-2009
2) "Engineering Ethics" by Harris, Pritchard and Rabins, CENGAGE Learning, India Edition, 2009.
3) "Ethics in Engineering" by Mike W. Martin and Roland Schinzinger –Tata McGrawHill–2003.
4) "Professional Ethics and Morals" by Prof.A.R.Aryasri, DharanikotaSuyodhana-Maruthi Publications.
5) "Professional Ethics and Human Values" by A.Alavudeen, R.KalilRahman and M. Jayakumaran, Laxmi Publications.
6) "Professional Ethics and Human Values" by Prof.D.R.Kiran-"Indian Culture, Values and Professional Ethics" by PS Murthy-BS Publication

Course Title: Artificial Intelligence

Lecture–Tutorial-Practical::	3-0-0	**Internal Marks:**	30
Credits:	3	**External Marks:**	70

Prerequisites: None

Course Objectives

- To learn the difference between optimal reasoning vs human like reasoning
- To understand the notions of state space representation, exhaustive search, heuristic search along with the time and space complexities
- To learn different knowledge representation techniques
- To understand the applications of AI: namely Game Playing, Theorem Proving, Expert Systems, Machine Learning and Natural Language Processing

Course Outcomes:
Upon Completion of the course, the students will be able to

CO1 Possess the ability to formulate an efficient problem space for a problem expressed in English.
CO 2 Possess the ability to select a search algorithm for a problem and characterize its time and space complexities.
CO3 Possess the skill for representing knowledge using the appropriate technique
CO4 Possess the ability to apply AI techniques to solve problems of Game Playing, Expert Systems, Machine Learning and Natural Language Processing
CO5 Apply the knowledge to develop the solutions for real life problems CO6 Develop new algorithms to contribute to the research arena

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**	**PO12**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	3	-	2	-	2	-	-	-	-	2	-	-	2	-	-
CO2	3	2	-	2	-	-	-	-	2	-	2	-	-	3	-
CO3	3	-	2	-	-	-	-	2	-	-	-	-	-	3	-
CO4	3	2	-	2	-	-	-		-	-	-	-	-	2	-
CO5	3	-	2	-	2	-	-	2	2	2	-	-	2	-	2

Unit–I

Introduction, History, Intelligent Systems, Foundations of AI, Sub areas of AI, Applications. Problem Solving –State-Space Search and Control Strategies: Introduction, General Problem Solving, Characteristics of Problem, Exhaustive Searches, HeuristicSearchTechniques,Iterative-DeepeningA*,ConstraintSatisfaction

UNIT II:

LogicConceptsandLogicProgramming:Introduction,PropositionalCalculus,Propositional Logic,NaturalDeduction System, Resolution Refutation in Propositional Logic, Predicate Logic,Logic Programming. RepresentingKnowledgeUsingRules:Logicprogramming,ProceduralVsDeclarativeknowledge,Forward Vs Backward Reasoning, Matching,Control Knowledge

UNIT III:

Knowledge Representation: Introduction, Approaches to Knowledge Representation, Knowledge RepresentationusingSemanticNetwork,ExtendedSemanticNetworksforKR, Knowledge Representation usingFrames,Conceptualdependencies,Scripts

UNIT IV:

Natural Language Processing: Steps in The Natural Language Processing, Syntactic Processing and AugmentedTransitionNets,SemanticAnalysis,NLPUnderstandingSystems;
Fuzzy Logic: CrispSets,Fuzzy Sets, Fuzzy Logic Control, Fuzzy Inferences & Fuzzy Systems Planning with state-spacesearch–partial-orderplanning–planninggraphs–planningandactingintherealworld

UNIT V:

Experts Systems: Overview of an Expert System, Architecture of an Expert Systems, Different Types of ExpertSystems, Architectures, Knowledge Acquisition and Validation Techniques, Knowledge System Building Tools,ExpertSystemShells.AIProgramminglanguages:Overviewof LISPandPROLOG, ProductionSysteminProlog

Text Book:

1. Artificial Intelligence, Elaine Rich and Kevin Knight, Tata Mcgraw-Hill Publications
2. Introduction To Artificial Intelligence & Expert Systems, Patterson, PHI publications

REFERENCE BOOKS:

1. ArtificialIntelligence,GeorgeFLuger,PearsonEducationPublications
2. ArtificialIntelligence: AmodernApproach,RussellandNorvig,PrenticeHall
3. ArtificialIntelligence,RobertSchalkoff,Mcgraw-HillPublications
4. ArtificialIntelligenceandMachineLearning,VinodChandraS.S.,AnandHareendranS.

E-RESOURCES

1. https://onlinecourses.nptel.ac.in/noc22_cs56/preview
2. https://nptel.ac.in/courses/106105077
3. https://nptel.ac.in/courses/106102220
4. https://onlinecourses.nptel.ac.in/noc19_me71/preview
5. https://nptel.ac.in/courses/106106126

Course Title: Computer Networks

Lecture – Tutorial:	3-0-0	**Internal Marks:**	30
Credits:	3	**External Marks:**	70

Prerequisites: Computer Networks

Course Objectives:

- Understand state-of-the-art in network protocols, architectures, and applications.
- Process of networking research
- Constraints and thought processes for networking research
- Problem Formulation—Approach---Analysis

Course Outcomes:

CO1	Able to understand OSI and TCP/IP models.
CO2	Understand data link layer protocols and flow control
CO3	Understand routing and network layer protocols and IPV4
CO4	Understand transport layer congestion, flow control and protocols
CO5	Understand application layer protocols

UNIT I : INTRODUCTION

OSI, TCP/IP and other networks models, Examples of Networks: Novell Networks, Arpanet, Internet, Network Topologies WAN, LAN, MAN.

PHYSICAL LAYER Transmission media copper, twisted pair wireless, switching and encoding asynchronous communications

UNIT II: DATA LINK LAYER:

Design issues, framing, error detection and correction, CRC, Elementary Protocol-stop and wait, Sliding Window. Medium Access Sub Layer: ALOHA, MAC addresses, Carrier sense multiple access, IEEE 802.X Standard Ethernet, Bridges.

UNIT III: NETWORK LAYER

Virtual circuit and Datagram subnets-Routing algorithm shortest path routing, Flooding, Hierarchical routing, Broad cast, Multi cast, distance vector routing. OSPF. IPV4

UNIT IV TRANSPORT LAYER

Transport Services, Connection management, TCP and UDP protocols congestion control.

UNIT V APPLICATION LAYER

Network Security, Domain name system, SNMP, Electronic Mail; the World WEB, Multi Media.

Text Book:

1. Tanenbaum and David J Wetherall, Computer Networks, 5th Edition, Pearson Edu, 2010.

REFERENCE BOOKS:

1. Computer Networks: A Top-Down Approach, Behrouz A. Forouzan, FirouzMosharraf, McGraw Hill Education.
2. Computer Networks, 5ed, David Patterson, Elsevier.
3. Larry L. Peterson and Bruce S. Davie, "Computer Networks- A Systems Approach" 5th Edition, Morgan Kaufmann/Elsevier, 2011.
4. Computer Networks, Mayank Dave, CENGAGE.
5. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education.
6. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson

E-RESOURCES

1. **www.tutorialspoint.com** 2. nptl.ac.in/courses/

Course Title: Design and Analysis of Algorithms

Lecture–Tutorial-Practical::	3-0-0	**Internal Marks:**	30
Credits:	3	**External Marks:**	70
Prerequisites: None			
Course Objectives			
• Analyze the asymptotic performance of algorithms and components • To study divide and conquer paradigm approach used to analyze and design algorithms • To study greedy method approach used to analyze and design algorithms. • To study Dynamic programming paradigm Backtracking approach used to analyze and design algorithms • To study Backtracking approach used to analyze and design algorithms • To study branch and bound paradigm and Deterministic approach used to analyze and design algorithms			
Course Outcomes: **Upon Completion of the course, the students will be able to**			

CO1:Analyze worst-case running times of algorithms using asymptotic analysis and components

CO2: Describe the divide and conquer method explains when an algorithmic design situation demands it.

CO3: Describe the greedy method explains when an algorithmic design situation demands it.

CO4: Describe the dynamic-programming paradigm explains when an algorithmic design demands it.

CO5: Describe the back tracking method explains when an algorithmic design demands it.

CO6: Describe the branch and bound paradigm and deterministic methods e-plain when an algorithmic design demands it.

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**	**PO12**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	3	-	2	-	2	-	-	-	-	2	-	-	2	-	-
CO2	3	2	-	2	-	-	-	-	2	-	2	-	-	3	-
CO3	3	-	2	-	-	-	-	2	-	-	-	-	-	3	-
CO4	3	2	-	2	-	-	-		-	-	-	-	-	2	-
CO5	3	-	2	-	2	-	-	2	2	2	-	-	2	-	2
CO6	3	-	3	3	-	-	-	-	-	-	-	-	3	3	3

UNIT I Introduction to Algorithms
Fundamentals of algorithmic problem solving – Analysis framework - Performance Analysis: - Space complexity, Time complexity - Growth of Functions: Asymptotic Notation- Big oh notation, Omega notation, Theta notation, little oh.

UNIT II Divide and Conquer: Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort, Finding the Maximum and Minimum

Unit III **Greedy method:**The General Method, Knapsack Problem, Job Sequencing with Deadlines, Minimum-cost Spanning Trees, Prim's Algorithm, Kruskal's Algorithms, Optimal Merge Patterns, Single Source Shortest Paths

UNIT IV Dynamic Programming: General method, applications-Matrix chain multiplication, Optimal binary search trees, 0/1knapsack problem, All pairs shortest path problem, Travelling sales person problem, Reliability design.

UNIT V Backtracking: General method, applications-n-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles.
Branch and Bound: General method, applications - Travelling sales person problem, 0/1 knapsack problem- LC Branch and Bound solution, FIFO Branch and Bound solution

TEXT BOOKS:

Fundamentals of Computer Algorithms, Ellis Horowitz, SatrajSahni and Rajasekaran, University press

REFERENCE BOOKS:

1. Introduction to The Design and Analysis of Algorithms, 3rd Edition, Anany Levitin, Pearson Education, 2017.
2. Introduction to Algorithms, second edition, T.H.Cormen, C.E.Leiserson, R.L. Rivest, and C.Stein, PHI Pvt. Ltd./ Pearson Education
3. Design and Analysis of algorithms, Aho, Ullman and Hopcroft,Pearson education.
4. Algorithms – Richard Johnson Baugh and Marcus Schaefer, Pearson Education

Course Code-Cloud Computing

Lecture – Tutorial- Practical::	3-0-0	**Internal Marks:**	30
Credits:	3	**External Marks:**	70

Prerequisites: C- Programming, Data Structures, Statistics fundamentals

Course Objectives:

The student will learn about the cloud environment, building software systems and components that scale to millions of users in modern internet cloud concepts capabilities across the various cloud service models including Iaas, Paas, Saas, and developing cloud based software applications on top of cloud platforms.

Course Outcomes:

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

CO1	Understanding the key dimensions of the challenge of Cloud Computing
CO2	Assessment of the economics , financial, and technological implications for selecting cloud computing for own organization
CO3	Assessing the financial, technological, and organizational capacity of employer's for actively initiating and installing cloud-based applications
CO4	Assessment of own organizations' needs for capacity building and training in cloud computing-related IT areas
CO5	Describe the features of Resource Management systems

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	2	--	3	--	--	--	--	--	--	
CO2	3	2	3	--	2	--	--	--	--	--	--	--

CO3	2	2	3	--	--	--	--	--	--	--	--	
CO4	3	-3	2	2	2	--	--	--	--	--	--	--
CO5	2	3	3	3	2	--	--	--	--	--	--	

UNIT-1: Systems modeling, Clustering and virtualization Scalable Computing over the Internet, Technologies for Network based systems, System models for Distributed and Cloud Computing, Software environments for distributed systems and clouds, Performance, Security And Energy Efficiency

UNIT-2: Implementation Levels of Virtualization, Virtualization Structures/ Tools and mechanisms, Virtualization of CPU, Memory and I/O Devices, Virtual Clusters and Resource Management, Virtualization for Data Center Automation.

UNIT-3: Cloud Computing and service Models, Architectural Design of Compute and Storage Clouds, Public Cloud Platforms, Inter Cloud Resource Management, Cloud Security and Trust Management. Service Oriented Architecture, Message Oriented Middleware.

UNIT-4 :Cloud Programming and Software Environments Features of Cloud and Grid Platforms, Parallel & Distributed Programming Paradigms, Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments.

UNIT-5: Policies and Mechanisms for Resource Management Applications of Control Theory to Task Scheduling on a Cloud, Stability of a Two Level Resource Allocation Architecture, Feedback Control Based on Dynamic Thresholds. Coordination of Specialized Autonomic Performance Managers, Resource Bundling, Scheduling Algorithms for Computing Clouds, Fair Queuing, Start Time Fair Queuing, Borrowed Virtual Time, Cloud Scheduling Subject to Deadlines, Scheduling MapReduce Applications Subject to Deadlines.

TEXT BOOKS:

1. Distributed and Cloud Computing, Kai Hwang, Geoffry C. Fox, Jack J. Dongarra MK Elsevier.
2. Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier.
3. Cloud Computing, A Hands on approach, ArshadeepBahga, Vijay Madisetti, University Press

REFERENCE BOOKS:

1. Cloud Computing, A Practical Approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH
2. Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christen vecctiola, S Tammaraiselvi, TMH

e-Resources:

1. **https://nptel.ac.in**
2. https://onlinecourses.nptel.ac.in/noc21_cs87/preview

Course Title: Software Testing Methodologies and Tools

Lecture – Practical:	3-0-0	**Internal Marks:**	30
Credits	3	**External Marks:**	70

Prerequisites: Software Engineering

Course Objectives

Fundamentals for various testing methodologies.

• Describe the principles and procedures for designing test cases.

• Provide supports to debugging methods.

• Acts as the reference for software testing techniques and strategies.

Course Outcomes

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

CO1	Understand the basic testing procedures.
CO2	Able to support in generating test cases and test suites.
CO3	Able to test the applications manually by applying different testing methods and automation tools..
CO4	Apply tools to resolve the problems in Real time environment.

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**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	2	-	-	-							-	-	2
CO2	3	2	2	2	-	-							-	3	2
CO3	2	2	3	2	-	-							2	2	-
CO4	3	3	2	-	-	-							-	2	3

UNIT I: Introduction: Purpose of Testing, Dichotomies, Model for Testing, Consequences of Bugs,Taxonomy of Bugs. Flow graphs and Path testing: Basics Concepts of Path Testing, Predicates, Path Predicates andAchievable Paths, Path Sensitizing, Path Instrumentation, Application of Path Testing.

UNIT II:

Transaction Flow Testing: Transaction Flows, Transaction Flow Testing Techniques. Dataflow testing: Basics of Dataflow Testing, Strategies in Dataflow Testing, Application of Dataflow Testing.
Domain Testing: Domains and Paths, Nice & Ugly Domains, Domain testing, Domains andInterfaces Testing, Domain and Interface Testing, Domains and Testability

UNIT III:. Paths, Path products and Regular expressions: Path Products & Path Expression, Reduction Procedure, Applications, Regular Expressions & Flow Anomaly Detection.
Syntax Testing: Why, What and How, A Grammar for formats, Test Case Generation, Implementation and Application and Testability Tips

UNIT IV:. Logic Based Testing: Overview, Decision Tables, Path Expressions, KV Charts, and Specifications.
State, State Graphs and Transition Testing: State Graphs, Good & Bad State Graphs, State Testing, and Testability Tips.

UNIT V: Software Testing Tools: Introduction to Testing, Automated Testing, Concepts of Test Automation, Introduction to list of tools like Win runner, Load Runner, Jmeter, About Win Runner ,Using Win runner, Mapping the GUI, Recording Test, Working with Test, Enhancing Test, Checkpoints, Test Script Language, Putting it all together, Running and Debugging Tests, Analyzing Results, Batch Tests, Rapid Test Script Wizard.

Text Book

1. Software testing techniques – Boris Beizer, Dreamtech, second edition.
2. Software Testing- Yogesh Singh, Camebridge

REFERENCE BOOKS:

The Craft of software testing - Brian Marick, Pearson Education.
2. Software Testing, 3rd edition, P.C. Jorgensen, Aurbach Publications (Dist.by SPD).
3. Software Testing, N.Chauhan, Oxford University Press.
4. Introduction to Software Testing, P.Ammann&J.Offutt, Cambridge Univ.Press.
5. Effective methods of Software Testing, Perry, John Wiley, 2nd Edition, 1999.
6. Software Testing Concepts and Tools, P.NageswaraRao, dreamtech Press
7. Win Runner in simple steps by Hakeem Shittu, 2007Genixpress.
8. Foundations of Software Testing, D.Graham& Others, Cengage Learning.

E-RESOURCES

Course Title: Data Warehousing and Data Mining

Lecture – Practical:	3-0-0	**Internal Marks:**	30
Credits	3	**External Marks:**	70

Prerequisites: Data Structures

Course Objectives

The objective of this course is to provide knowledge of techniques and strategies to create and use the data warehouses, to understand, learn different data mining techniques and to understand the applicability of these techniques.

Course Outcomes

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

CO1	Understand the basic concepts of warehousing and data preprocessing techniques
CO2	Derive various interesting patterns and associations in datasets.
CO3	Design and develop classifier models to predict future trends.
CO4	Apply unsupervised learning techniques for a given application.

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	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	3	-	-	-	-	-	-	-	2	-	-	2
CO2	2	2	-	3	-	-	-	-	-	-	-	-	-	3	2
CO3	2	2	-	3	2	-	-	-	-	-	-	2	2	2	-
CO4	3	2	-	3	-	-	-	-	-	-	-	2	-	2	3

UNIT I: DATAWAREHOUSING AND BUSINESSANALYSIS

Data Warehouse and Online Analytical Processing: Data Warehouse basic concepts, Data Warehouse Modeling: Data cube and OLAP, Data Warehouse Implementation, Data Generalization by Attribute Oriented Induction. Data Preprocessing: Overview, Data Cleaning, Data Integration,Data Reduction, Data Transformation and Data Discretization.

UNIT II: DATA MINING OVERVIEW AND ADVANCEDPATTERN MINING

Data Mining Introduction: Introduction, Why Data Mining, kinds of Data that can be mined, Patterns that can be Mined, technologies where it can be used, major issues in data Mining.

Mining Frequent Patterns, Associations, and Correlations: Basic Concepts, Frequent Item-set Mining Methods. (Apriori and FP growth algorithms)

UNIT III: CLASSIFICATION AND PREDICTION

Classification: Introduction, Decision tree induction, Bayesian Classification, Rule-Based Classification, Techniques to improve Classification Accuracy, Classification by Back propagation, Support Vector Machines

UNIT IV: CLUSTERING ANALYSIS

Cluster Analysis: Introduction, overview of basic clustering methods, Partitioning methods, Hierarchical methods, Density-Based Methods: DBSCAN& OPTICS, introduction to outlier analysis

UNIT V: WEB AND TEXT MINING

Multidimensional Analysis and Descriptive Mining of Complex Data Objects-Introduction, web mining, web content mining, web structure mining, we usage mining, Text mining, unstructured text, episode rule discovery for texts, hierarchy of categories, text clustering**.**

Text Books

[1].Jiawei Han and Micheline Kamber, ‐Data Mining Concepts and Techniques‖, Third Edition, Elsevier, 2012.

REFERENCE BOOKS:

[1].G.K.Gupta,―IntroductiontoDataMiningwithCaseStudies‖,EasterEconomyEdition,Prentice Hall of India, 2006
[2].APang-Ning Tan, Michael Steinbach and Vipin Kumar, ‐Introduction to DataMining|, Second Edition Pearson Education, 2016
[3].K.P. Soman, ShyamDiwakar and V. Ajay ‐Insight into Data mining Theory and Practice|, Easter Economy Edition, Prentice Hall of India, 2006

E-RESOURCES

Data Warehouse Tutorial For Beginners | Data Warehouse Concepts | Data Warehousing | Edureka (2017)https://www.youtube.com/watch?v=J326LIUrZM8&t=4s

How Artificial Neural Network (Ann) Algorithm Work | Data Mining | Introduction To Neural Network(2016)https://www.youtube.com/watch?v=fwnaijgpih,

Course Title: Advanced Data Structures

Lecture – Practical:	3-0-0	**Internal Marks:**	30
Credits	3	**External Marks:**	70
Prerequisites: Data Structures			

Course Objectives

- Describe and implement a variety of advanced data structures (hash tables, priority queues, balancedsearch trees, digital search trees).
- Analyze the space and time complexity of the algorithms studied in the course.
- Identify different solutions for a given problem; analyze advantages and disadvantages to differentsolutions.

Course Outcomes

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

CO1	Able to understand the importance, operations and application of Hashing
CO2	Able to understand implementation of skip lists
CO3	Able to get a good understanding about different balanced trees.
CO4	Able to understand the implementation of heaps and binomial queues.
CO5	Have an idea on applications of algorithms in a variety of areas, like string matching, indexing etc.
CO6	Able to understand the importance and applications of tries

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	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	-	-	-	-	-	-	-	-	-	-	-	2
CO2	3	2	2	2	-	-	-	-	-	-	-	-	-	3	2
CO3	2	2	3	2	-	-	-	-	-	-	-	-	2	2	-
CO4	3	3	2	-	-	-	-	-	-	-	-	-	-	2	3
CO5	2	2	3	2	2	2	-	-	-	-	-	-	3	3	-
CO6	3	3	2	-	-	-	-	-	-	-	-	-	3	2	3

Dictionaries: Sets,Dictionaries,Static Hashing- Hash Table, Hash Functions- Secure Hash Function, Overflow Handling, Theoretical Evaluation of Overflow Techniques

UNIT II: Dynamic Hashing and Skip Lists

Dynamic Hashing- Motivation for Dynamic Hashing, Dynamic Hashing Using Directories, Directory less Dynamic Hashing, Hash Table Restructuring, Skip Lists,Analysis of Skip Lists.

UNIT III: Balanced Trees

AVL Trees: Maximum Height of an AVL Tree, Insertions and Deletions. 2-3 Trees : Insertion,Deletion, applications, introduction to Red-black trees

UNIT IV: Priority Queues

Binary Heaps : Implementation of Insert and Delete min, Creating Heap.
Binomial Queues : Binomial Queue Operations, Binomial Amortized Analysis, Lazy BinomialQueues

UNIT V: Pattern matching and Tries

Pattern matching algorithms- the Boyer –Moore algorithm, the Knuth-Morris-Pratt algorithm
Tries: Definitions and concepts of digital search tree, Binary trie, Patricia , Multi-way trie

Text Book

1. Fundamentals of DATA STRUCTURES in C: 2 nded, , Horowitz , Sahani, Anderson-freed,Universities Press.
2. Data structures and Algorithm Analysis in C, 2 nd edition, Mark Allen Weiss, Pearson

REFERENCE BOOKS:

1. Data Structures, a Pseudocode Approach, Richard F Gilberg, Behrouz A Forouzan,Cengage.
2. Introduction to Algorithms, 3rd Edition by *Thomas H.* Cormen , *Charles E. Leiserson, Ronald L.Rivest, Clifford Stein*

E-RESOURCES

1. Web : http://lcm.csa.iisc.ernet.in/dsa/dsa.html
2. http://utubersity.com/?page_id=878
3. http://freevideolectures.com/Course/2519/C-Programming-and-Data-Structures
4. http://freevideolectures.com/Course/2279/Data-Structures-And-Algorithms

Course Title: Computer Networks Lab

Lecture – Tutorial-Practical::	0-0-3	**Internal Marks:**	15
Credits:	1.5	**External Marks:**	35

Prerequisites: Knowledge of C Programming, Basic commands of UNIX.

Knowledge of C Programming, Basic commands of UNIX

Course Objectives:

The object of this course is to provide hands-on practice on implementing different network related commands (like netstat, ping, arp, telnet, etc.,) and programming (like socket programming, routing algorithms, etc.,) in C programming and Java.

Course Outcomes:

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

CO1	Should be able to Calculate Data link layer farming methods like bit stuffing and byte stuffing.
CO2	Should be able to Analyze Cyclic redundancy check on different polynomials.
CO3	Should be able to understand Socket Programming Implementation by using TCP and UDP Protocols.

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	-	-	-	-	-	-	-	-
CO2	-	2	2	-	-	-	-	-	-	-	2	2
CO3	3	-	-	2	2	-	-	-	-	-	2	2

List of Programs

1. Understanding and using of commands like ifconfig, netstat, ping, arp, telnet, ftp, finger, traceroute, whois etc. Usage of elementary socket system calls (socket (), bind(), listen(), accept(),connect(),send(),recv(),sendto(),recvfrom()).
2. Implementation of Connection oriented concurrent service (TCP).
3. Implementation of Connectionless Iterative time service (UDP).
4. Implementation of Select(),of getpeername () system call.
5. Implementation of gesockopt (), setsockopt () system calls.
6. Implementation of remote command execution using socket system calls.
7. Implement the data link layer framing methods such as character stuffing and bit stuffing.
8. Implement on a data set of characters the three CRC polynomials – CRC 12, CRC 16 and CRC CCIP.
9. Implement Dijkstra's algorithm to compute the Shortest path thru a graph.
10. Implementation of Distance Vector Routing Algorithm.
11. Implementation of SMTP.
12. Implementation of FTP.

Note: Implement programs 2 to 6 in C and 8 to 12 in JAVA.

TEXT BOOKS:

1.Tanenbaum and David J Wetherall, Computer Networks, 5th Edition, Pearson Edu, 2010.
2.Computer Networks: A Top Down Approach, Behrouz A. Forouzan , FirouzMosharraf, McGraw Hill Education.

E-RESOURCES:

- http://www.softpanorama.org/Internals/unix_system_calls.shtml
- https://www.tutorialspoint.com/system-calls-in-unix-and-windows

Course Title: Artificial Intelligence Lab

Lecture–Tutorial-Practical::	0-0-3	**Internal Marks:**	15
Credits:	1.5	**External Marks:**	35

Prerequisites: Artificial Intelligence concepts

Course Objectives

- To provide skills for designing and analyzing AI based algorithms.
- To enable students to work on various AI tools.
- To provide skills to work towards solution of real life problems.

Course Outcomes:
UponCompletionofthecourse,thestudentswillbeableto
CO1: Elicit, analyze and specify software requirements.
CO2: Simulate given problem scenario and analyze its performance.
CO3: Develop programming solutions for given problem scenario.

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**	**PO12**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	3	-	2	-	2	-	-	-	-	2	-	-	2	-	-
CO2	3	2	-	2	-	-	-	-	2	-	2	-	-	3	-
CO3	3	-	2	-	-	-	-	2	-	-	-	-	-	3	-

List of Experiments

Use any language such as C/C++/LISP/PROLOG

1. Solve "Water Jug Problem".
2. Write a program to solve 8 queens' problem
3. Solve any problem using depth first search.
4. Solve any problem using best first search.
5. Solve 8-puzzle problem using best first search
6. Write A Program to Generate the output for A* Algorithm
7. Write a program to implement tower of Hanoi
8. Write predicates One converts centigrade temperatures to Fahrenheit, the other checks if a temperature is below freezing.
9. Write a program to solve the Monkey Banana problem
10. Write a program to solve Hill climbing.
11. Implementation of searching techniques in AI.
12. Installation and working on various AI tools viz. Python, R tool, GATE, NLTK, MATLAB, etc.
13. Data preprocessing and annotation and creation of datasets.
14. Learn existing datasets and Treebanks
15. Implementation of Knowledge representation schemes.
16. Application of Classification and clustering problem.
17. Natural language processing tool development.

Note: The concerned Course Coordinator will finalize the actual list of experiments/problems at the start of semester based on above generic list.

Course Title: DEVOPS LAB

Lecture – Practical:	0-0-4	**Internal Marks:**	15
Credits	2	**External Marks:**	35

Prerequisites:
Working knowledge of one or more high-level programming languages (C#, Java, PHP, Ruby, Python, etc.) Intermediate knowledge of administering Linux or Windows systems at the command-line level

Course Objectives : The Objective of this course is to give a strong foundation of the Development and its Operations.

Course Outcomes

Upon successful completion of the course, the student will be able to: Understand the traditional software development. Learn the rise of agile methodologies.• Define and design purpose of DevOps.•

CO1	Realize the importance of agile software development practices in determining the requirements for a software system
CO2	Analyze and execute iterative software development processes to manage software development activities.
CO3	Apply a systematic understanding of Agile principles and defined practices for a specific circumstance or need.
CO4	Examine the impact of DevOps in the successful completion of software development by improving team collaboration and software quality.
CO5	Perform software process improvement by applying DevOps capabilities at enterprise level.

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**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	2	-	-	-	-	2	2	-	-		3	2	3	3
CO2	2	3	2	3	-	-	-	-	-	-	2	3	3	3	3
CO3	2	2	3	3	2	-	2	-	2	-	2	-	2	-	3
CO4	2	-	2	2	2	-	2	-	-	-	-	3	2	3	-

CO5	-	-	2	2	2	-	3	-	2	-	2	3	3	3	3

PROGRAMS LIST

1) **In-depth knowledge of DevOps methodology**
2) **Implementing Software Version Control**
3) **Containerizing Code on production using Docke**
4) **Creating CI/CD Pipelines using Jenkins**
5) **Configuration Management using Puppet and Ansible**
6) **Automating build and test using Selenium and Maven**
7) **Container Orchestration using Kubernetes**
8) **Performance Tuning and Monitoring using Nagios**
9) **Devops Tools : Jenkins,Docker. Phantom.,NagiosVagrant,Ansible,GitHub.**

Course Code-Employability Skills-I

Lecture – Practical:	2-0-0	**Internal Marks:**	30
Credits	0	**External Marks:**	70*

Prerequisites: None

Course Objectives:
1.To explore and practice basic communication skills
2.To learn skills for effective discussions & team work
3.To assess and improve personal grooming

Course Outcomes

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

CO1	Establish effective communication with employers, supervisors, and co-workers
CO2	Identify to explore their values and career choices through individual skill assessments
CO3	Adapts positive attitude and appropriate body language
CO4	Interpret the core competencies to succeed in professional and personal life

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**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1								2		2					
CO2								2							
CO3										2					2
CO4								2		2		2			

UNIT I: Soft Skills:
An Introduction – Definition and Significance of Soft Skills; Process, Importance and Measurement of Soft Skill Development. Self-Discovery: Discovering the Self; Setting Goals; Beliefs, Values, Attitude, Virtue.

Unit 2: Positivity and Motivation:

Developing Positive Thinking and Attitude; Driving out Negativity; Meaning and Theories of Motivation; Enhancing Motivation Levels

UNIT III: Interpersonal Communication:
Interpersonal relations; communication models, process and barriers; team communication; developing interpersonal relationships through effective communication; listening skills; essential formal writing skills; corporate communication styles, assertion, persuasion, negotiation.

UNIT IV: Public Speaking:
Skills, Methods, Strategies and Essential tips for effective public speaking.Group Discussion: Importance, Planning, Elements, Skills assessed; Effectively disagreeing, Initiating, Summarizing and Attaining the Objective.

UNIT V: Non-Verbal Communication
Importance and Elements; Body Language. Teamwork and Leadership Skills: Concept of Teams; Building effective teams; Concept of Leadership and honing Leadership skills.

REFERENCE BOOKS:

1) Barun K. Mitra, Personality Development and Soft Skills, Oxford University Press, 2011.
2) S.P. Dhanavel, English and Soft Skills, Orient Blackswan, 2010.
3) R.S.Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning, S.Chand & Company Ltd., 2018. 4) Raman, Meenakshi & Sharma, Sangeeta, Technical Communication Principles and Practice, Oxford University Press, 2011.
5) R.S.Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning, S.Chand & Company Ltd., 2018.
6) Raman, Meenakshi & Sharma, Sangeeta, Technical Communication Principles and Practice, Oxford University Press, 2011.

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III 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/D	Total	CIA	SEA	Total	
1	Professional Core courses	Machine Learning	3	0	0	3	30	70	100	3
2	Professional Core courses	Compiler Design	3	0	0	3	30	70	100	3
3	Professional Core courses	Cryptography and Network Security	3	0	0	3	30	70	100	3
4	Open Elective Course/Job oriented elective	OE-2	2	0	2	4	30	70	100	3
5	Professional Elective courses	PE-2	3	0	0	3	30	70	100	3
6	Professional Core courses Lab	Machine Learning Lab	0	0	3	3	15	35	50	1.5
7	Professional Core courses Lab	R Programming lab	0	0	3	3	15	35	50	1.5
8	Professional Core courses Lab	Compiler Design Lab	0	0	3	3	15	35	50	1.5
9	Skill advanced course/ soft skill course*	MEAN Stack Technologies	0	0	4	4	15	35	50	2
10	Mandatory course (AICTE suggested)	Employability Skills - 2	2	0	0	2	30	70	100	0
Total			16	0	15	31	240	560	800	21.5
Honors/Minor courses - 3			**3**	**0**	**2**	**5**	30	70	100	**4**
Industrial/Research Internship (Mandatory) 2 Months during summer vacation										

Code	Professional Elective -2
	2.1 Advanced Database Management Systems
	2.2 Network Programming
	2.3 Big data Analytics
	2.4 Object Oriented Analysis and Design

Course Title: Machine Learning

Lecture – Practical:	3-0-0	**Internal**	30

		Marks:	
Credits	3	**External Marks:**	70

Prerequisites: Calculus and Probability

Course Objectives

1. Explain about data preprocessing and its uses in prediction
2. Explain how linear models are learning from the data.
3. Explain the Improving efficiency of the models using nonlinearity and ensembles
4. Explain how neural networks help in increasing efficiency

Course Outcomes

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

CO1	Understanding the machine learning basics and how data is preprocessed
CO2	How linear models help in prediction
CO3	Distance based models complexity
CO4	Probabilistic models understanding
CO5	Nonlinear models and ensembles improve efficiency

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**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	2	-	-	-	-	-	-	-	-	-	-	-	2
CO2	3	2	2	2	-	-	-	-	-	-	-	-	-	3	2
CO3	2	2	3	2	-	-	-	-	-	-	-	-	2	2	-
CO4	3	3	2	-	-	-	-	-	-	-	-	-	-	2	3
CO5	2	2	3	2	2	2	-	-	-	-	-	-	3	3	-

UNIT I The Ingredients of Machine Learning:

Introduction to Machine Learning, Types of Machine Learning, Models - The output of Machine Learning

Binary Classification and related tasks: Classification, Calculating accuracy in classification.

UNIT II(NLP):

Text data preprocessing, Bag of words, TF IDF, Word2vec, Plane and Hyper-plane for machine learning, Data Cleaning, Data Preprocessing (Min – Max Scaling), Normalizing, Standardize, Mean, Variance, Standard Deviation, One Hot Encoding

Unit III :

Beyond Binary Classification: Handling more than two classes, finding minimum and maximum of a function, Gradient Descent, Linear Regression, Multiple Regression, Calculating accuracy in regression (RMSE), Effect of outliers and noisy data, overfitting and underfitting models, K-fold cross validation, confusion matrix for cross validation imbalanced data, ROC_AUC curve for imbalanced data, F1 score

UNIT IV :

Logistic Regression: Sigmoid function in logistic regression, loss functions in logistic regression.

Linear Models: The Least Square method, Support Vector Machine (SVM)

Tree Model: Decision Trees, Ranking and Probability estimation trees,

UNIT V :

Distance Based Models: Distance Measures (Euclidean, Manhattan and Minkowski), Neighbors, KNN, Distance based

clustering, Hierarchical Clustering, Agglomerative Clustering
Probabilistic model: Naive Bayes algorithm for classification, Laplace, smoothing
Model Ensembles: Bagging and Random Forest, Boosting

Text Book

1. Machine Learning: The art and science of algorithms that make sense of data, Peter Flach, Cambridge.
2. Machine Learning, Tom M. Mitchell, MGH.

REFERENCE BOOKS:

1. Understanding Machine Learning: From Theory to Algorithms, Shai Shalev-Shwartz, Shai Ben- David, Cambridge.
2. Machine Learning in Action, Peter Harington, 2012, Cengage.

E-RESOURCES

1.https://alex.smola.org/drafts/thebook.pdf
2.https://www.slideshare.net/liorrokach/introduction-to-machine-learning-13809045

Title of the Course: Compiler Design

Lecture – Tutorial-Practical::	3-0-0	**Internal Marks:**	30
Credits:	3	**External Marks:**	70

Prerequisites: Formal Language and Automata Theory

Course Objectives:

1. To describe the design of a compiler including its phases and components and basic understanding of Grammars and language definition.
2. To Identify the similarities and differences among various parsing techniques and grammar transformation

Techniques.

3. To Understand the syntax analysis, intermediate code generation, type checking, the role of symbol table and its organization.

4. To Understand, design code generation and optimization schemes.

Course Outcomes:

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

CO1	To use the knowledge of patterns, tokens & regular expressions for solving a problem.
CO2	To apply the knowledge of lex tool & yacc tool to develop a scanner & parser.
CO3	To write the new code optimization techniques to improve the performance of a program in terms of speed & space.
CO4	To employ the knowledge of modern compiler & its features.
CO5	To participate in GATE, PGECET and other competitive examinations

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	2	3	3						-	2
CO2	2	3	3	2	2	2				2	2	3
CO3	3	3	3	3	3	2						2
CO4	3	2	3	2	3					2	2	2
CO5	3	3	3	1	-	2	1	1	-	2	-	2

UNIT I :

Overview of Compilation: Structure of a compiler – Lexical Analysis – Role of Lexical Analyzer – Input Buffering – Specification of Tokens – Recognition of Tokens – Lex – Finite Automata – Regular Expressions to Automata – Minimizing DFA. Interpretation, bootstrapping, LEX - lexical analyzer generator and Boot Strapping.

UNIT II:

SYNTAX ANALYSIS: Context free grammars, Top down parsing – Backtracking, LL (1), Recursive Descent Parsing, Predictive Parsing. Bottom up Parsing: Shift Reduce parsing, LR and LALR parsing, Operator Precedence parsing, Error recovery in parsing, handling ambiguous grammar, YACC – automatic parser generator.

UNIT III:

Semantic analysis: Intermediate forms of source Programs – abstract syntax tree, polish notation and three address codes. Attributed grammars, Syntax directed translation, Type checker.
Symbol Tables: Symbol table format, organization for block structures languages. Block structures and non block structure storage allocation: static, runtime stack and heap storage allocation.

UNIT IV:

RUN-TIME ENVIRONMENT AND CODE GENERATION :
Storage Organization, Stack Allocation Space, Access to Non-local Data on the Stack, Heap Management – Issues in Code Generation – Design of a simple Code Generator.

UNIT V:

CODE OPTIMIZATION:

Semantic preserving transformations, global common sub expression elimination, copy propagation, dead code elimination, constant folding, strength reduction, loop optimization. Instruction scheduling, inter procedural optimization.

Principal Sources of Optimization – Peep-hole optimization – DAG- Optimization of Basic Blocks-Global Data Flow Analysis – Efficient Data Flow Algorithm.

TEXT BOOKS:

1. Alfred V. Aho, Ravi Sethi & Jeffrey. D. Ullman, "Compilers Principles, Techniques & Tools", Pearson Education, third edition, 2007.

2. Andrew N. Appel, "Modern Compiler Implementation in C", Cambridge University Press, 2004.

REFERENCE BOOKS:

1. John R. Levine, Tony Mason, Doug Brown, "lex & yacc", O'Reilly Media, Inc., 1992.

2. Kenneth C. Louden, Compiler Construction: Principles and Practice, Course Technology Inc; International edition, 1997

E-RESOURCES:

1. https://www.holub.com/software/compiler.design.in.c.html

Course Title: Cryptography and Network Security

Lecture–Tutorial-Practical::	3-0-0	**Internal Marks:**	30
Credits:	3	**External Marks:**	70

Prerequisites: Students are expected to have knowledge on the following topics: Engineering Mathematics, Number Theory, Computer Networks, Problem Solving Skills, Web Technologies

Course Objectives

1. The Objectives of first unit is to present an overview of the main concepts of cryptography, understand the threats & attacks, understand ethical hacking
2. The Objectives of second unit is to understand the difference between stream ciphers & block ciphers, present an overview of the Feistel Cipher and explain the encryption and decryption, present an overview of DES, Triple DES, Blowfish, IDEA
3. The objectives of third unit is to present the basic principles of public key cryptography, Distinct uses of public key cryptosystems
4. The objectives of fourth unit is to Present overview of the basic structure of cryptographic functions, Message Authentication Codes, Understand the operation of SHA-512, HMAC, Digital Signature

Course Outcomes:

UponCompletionofthecourse,thestudentswillbeableto

CO1. Understand the principles of cryptography and security, with enciphering Techniques and analyze a variety of threats and attacks.

CO2. Distinguish the black ciphers and stream ciphers and apply them on a various symmetric cryptographic technique.

CO3. Understand the principle and mathematical models used in public-key cryptosystems by applying them on different (various) types of algorithms.

CO4. Analyze the message authentication functions with its types and digital certifications for secure communication.

CO5. Understand the user authentications principles and security approach at both the web and email.

CO6. Understand the concept of IP Security with its services and dealing with the prevention and detection of intrusions.

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

	PO1	PO2	PO3	PO 4	PO5	PO 6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	2	-	1	-	-	-	1	3	1	1
CO2	3	3	1	2	1	2	-	1	-	-	-	1	3	1	1
CO3	3	3	-	1	1	1	-	1	-	-	-	1	3	2	-
CO4	3	3	-	2	1	1	-	1	-	-	-	1	3	2	1
CO5	3	2	1	2	1	1	-	1	-	-	-	1	3	1	1
CO6	3	2	-	2	1	1	-	1	-	-	-	1	3	2	1

Unit–I

Introduction, Computer Security Concepts, Security Attacks, Security Services, Security Mechanisms, A Model for Network Security, Mathematics of Cryptography

Classical Encryption Techniques, Symmetric Cipher Model,Substitution Techniques, Transposition Techniques

UNIT II:

Symmetric Encryption, Mathematics of Symmetric Key Cryptography, Introduction to Modern Symmetric Key Ciphers, Data Encryption Standard, Advanced Encryption Standard, BlowFish, IDEA, CAST-128 algorithms

UNIT III:

Asymmetric Encryption, Mathematics of Asymmetric Key Cryptography, Number Theory, Prime Numbers, Fermat's and Euler's Theorems, Testing for Primality, The Chinese Remainder Theorem, Discrete Logarithms, Asymmetric Key Ciphers Principles of Public-Key Cryptosystems, The RSA Algorithm, Diffie-Hellman Key Exchange, ElGamal Cryptosystem, EllipticCipher Block Chaining Mode, Cipher Feedback Mode, Output Feedback Mode, Counter Mode,

UNIT IV:

DATA INTEGRITY, Digital Signature schemes, & Key Management

Message Integrity and message authentication, Cryptographic hash functions, Digital Signature and Key Management

UNIT V:

Network Security: Security at Application layer: PGP and MIME, Security at Transport layer: SSL and TLS, Security at Network layer: IPSec, System Security

Text Book:

1. Cryptography and Network Security Principles and Practice 6th Edition, William Stallings, Pearson Education
2. Cryptography and Network Security, Behrouz A Forouzan, DebdeepMukhopadhyay, 3E) Mc Gra Hill
3. AtulKahate, Cryptography and Network Security, TMH. (2003)

REFERENCE BOOKS:

1. Network Security Essentials: Applications and Standards, by William Stallings. Prentice Hall
2. Cryptography: Theory and Practice by Douglas R. Stinson, CRC press.
3. Charlie Kaufman, Radia Perlman, Mike Speciner, Network Security: Private Communication in Public World, 2 nd Edition,2011, Pearson Education. 95
4. Network Security and Cryptography, Bernard Meneges, Cengage Learning

E-RESOURCES:

1. http://users.abo.fi/ipetre/crypto/
2. https://www.vssut.ac.in/lecture_notes/lecture1428550736.pdf
3. https://analyticsindiamag.com/top-10-free-resources-to-learn-cybersecurity/
4. https://lecturenotes.in/subject/112/cryptography-and-network-security-cns
5. https://www.smartzworld.com/notes/cryptography-network-security-notes-pdf-cns-notes-pdf/
6. https://studentsfocus.com/cs6701-cns-notes-cryptography-network-security-lecture-handwritten-notes-cse-7th-sem-anna-university/
7. https://www.jntufastupdates.com/jntuk-r16-4-1-cns-material/

Course Title: Advanced Database Management Systems

Lecture – Tutorial-Practical:	3-0-0	**Internal Marks:**	30
Credits:3		**External Marks:**	70

Prerequisites: DBMS, Programming concepts

Course Objectives:

1.Design databases using data models, Query and manage databases .
2.Distinguish between centralized and distributed databases
3.Implement applications involving complex transaction processing.
4.Do query evaluation and query optimization

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

CO1	**Describe** basic database concepts, Data Models, Schemas, Instances, and Components in the DBMS architecture.
CO2	**Implement** practical solutions to GIS database problems using OO/OR database, spatial database, data warehousing and data mining approaches
CO3	**Evaluate** simple strategies for executing a distributed query to select the strategy that minimizes the amount of data transfer
CO4	**Demonstrate** the issues involved in data integration for distributed query processing
CO5	**Develop** practical skills in the use of these models and approaches to be able to select and apply the appropriate methods for a particular case
CO6	**Analysed** internal structures, query evaluation and optimization.

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	-	-	-
CO2	3	-	2	-	2	-	-	-	2	-	-	-
CO3	2	2			2	-	-	-	-	-	3	-
CO4	2	-	-	-	-	-	-	-	-	-	-	2
CO5	2	-	-	-	-	-	-	-	-	-	-	2
CO6	2	-	-	-	-	-	-	-	-	-	-	2

UNIT – I

INTRODUCTION

Introduction of object database systems: Structured data types, operations on structured data, encapsulation and ADTS, Inheritance**.**

UNIT – II

ORDBMS

Database design for ORDBMS, ORBMS implementation and challenges, OODBMS, comparison of RDBMS, OODBMS and ORDBMS. Introduction to Parallel databases, architectures for parallel databases, Parallel Query Evaluation: Data partitioning and parallelizing sequential operator evaluation code, parallelizing individual operations, and parallel query optimization.

UNIT-III

DISTRIBUTED DATABASES

Introduction to distributed databases: Features of distributed databases vs centralized databases, Why distributed databases.
DDBMS: Levels of transparency, reference architecture for DDB, types of data fragmentation, distribution transparency for read-only and update applications, distributed database access primitives, Integrity constraints in distributed databases.

UNIT – IV

DISTRIBUTED DATABASE DESIGN

Distributed database design: framework for distributed database design, the design of database fragmentation, allocation of fragments; Distributed Query processing: Equivalence of transformations for queries, transforming global queries into fragment queries, distributed grouping and aggregation functions.

UNIT – V

QUERY OPTIMIZATION

A framework for query optimization, join queries and general queries. non-join queries in a distributed DBMS, joins in a distributed DBMS, cost based query optimization. DBMS Vs IR systems, Introduction to Information retrieval, Indexing for text search, web search engine, managing text in a DBMS, a data model for XML, Querying XML data, and efficient evaluation of XML queries.

TEXT BOOKS:

1. Raghuramakrishnan and Johannes Gehrke, “Database Management Systems”, 3rd Edition, TMH, 2006.
2. S Ceri and G Pelagatti, “Distributed databases principles and systems”, 1st Edition, TMH, 2008.

REFERENCE BOOKS:

1. Silberschatz, Korth, “Database System Concepts”, 6th Edition, TMH, 2010.
2. Elmasri R, Navathe S B, Somayajulu D V L N, and Gupta S K, “Fundamentals of Database Systems”, 5th Edition, Pearson Education,2009.
3. C. J. Date, “Introduction to Database Systems”, 8th Edition, Pearson Education, 2009.

E-RESOURCES:

Course Title: Network Programming

Lecture – Practical:	3-0-0	**Internal Marks:**	30
Credits	3	**External Marks:**	70

Prerequisites: None

Course Objectives

- Students will gain the understanding of core network programming by using sockets and transport layer protocols like TCP and UDP
- Students will gain the understanding of inter process communication and implementation of different forms of IPC in client-server environment
- Students will get an exposure to various application layer protocols which are designed using sockets and transport layer protocols

Course Outcomes

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

CO1	Explain the client-server paradigm and socket structures.
CO2	Describe the basic concepts of TCP sockets and TCP echo client-server programs.
CO3	Discuss the UDP sockets and UDP echo client-server programs.
CO4	Explain Socket options and ability to understand IPC.
CO5	Apply the applications of sockets and demonstrate skill to design simple applications like FTP, TELNET etc.

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	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	3	-	-	-	-	-	-	-	-	3	3	-
CO2	-	2	3	3	-	-	-	-	-	-	-	-	2	2	2
CO3	-	2	2	3	2	-	-	-	-	-	-	-	2	2	2
CO4	2	2	3	-	-	-	-	-	-	-	-	-	3	-	3
CO5	2	2	2	2	3	-	-	-	-	-	-	-	3	2	3

UNIT I:

Introduction to Network Programming: OSI model-transport layer protocols: TCP, UDP and SCTP-network architecture: client-server and peer-to-peer systems, Sockets-socket Address structures: IPv4, IPv6 and Generic-value result arguments-Byte ordering functions-Byte manipulation functions-Address conversion functions

UNIT II:

TCP: introduction to TCP-TCP connection establishment and terminationTIME_WAIT State. Elementary TCP sockets – Socket-connect-bind-listen-accept-fork-exec function-concurrent servers-Close function-read and write functions

UNIT III:

TCP echo client server program-getsockname and getpeername functions I/O multiplexing: I/O models-Select function-TCP echo server using select function-shutdown function-Poll function

UNIT IV:

UDP: Introduction to UDP-difference between TCP and UDP-recvfrom( ) and sendto( ) functions-UDP echo client server program-UDP echo client server using select function. Socket Options: IPv4 socket options-IPv6 socket options

UNIT V: Generic socket options-TCP socket options. IPC: Introduction to IPC-forms of IPC-UNIX kernel support for pipes, FIFO, message queues, semaphores and shared memory Network programming concepts Implementation: FTP-ping-arp-SMTP-TELNET
Text Book: Unix Network programming, the socket networking API, W.Richard Stevens, bill fenner, Andrew m.rudoff ,PHI.
REFERENCE BOOKS: Advanced programming in the UNIX environment, W.Richard Stevens ,pearson education

Course Title: Big Data Analytics

Lecture – Practical:	**3-0-0**	**Internal Marks:**	30
Credits	3	**External Marks:**	70
Prerequisites: None			
Course Objectives			

- To understand the need and application of Map Reduce.
- To understand the various search algorithms applicable to Big Data.
- To analyze and interpret streaming data.
- To learn how to handle large data sets in main memory.
- To learn the various clustering techniques applicable to Big Data.

Course Outcomes

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

CO1	Understand the key issues in big data management and its associated applications in intelligent business and scientific computing
CO2	Acquire fundamental enabling techniques and scalable algorithms like Hadoop, Map Reduce and NO SQL in big data analytics
CO3	Students Interpret business models and scientific computing paradigms, and apply software tools for big data analytics
CO4	Achieve adequate perspectives of big data analytics in various applications like recommender systems, social media 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	PO12	PSO1	PSO2	PSO3
CO1	2			3			2					2	2		
CO2				3					3						2
CO3		3				3				2				3	
CO4				3					2			2	2		

UNIT I:

Evolution of Big data — Best Practices for Big data Analytics — Big data characteristics — Validating — The Promotion of the Value of Big Data — Big Data Use Cases- Characteristics of Big Data Applications — Perception and Quantification of Value -Understanding Big Data Storage — A General Overview of High-Performance Architecture — HDFS — MapReduce and YARN — Map Reduce Programming Mode

UNIT II:

Advanced Analytical Theory and Methods: Overview of Clustering — K-means — Use Cases — Overview of the Method — Determining the Number of Clusters — Diagnostics — Reasons to Choose and Cautions .- Classification: Decision Trees — Overview of a Decision Tree — The General Algorithm — Decision Tree Algorithms — Evaluating a Decision Tree — Decision Trees in R — Naïve Bayes — Bayes? Theorem — Naïve Bayes Classifier.

UNIT III:

Advanced Analytical Theory and Methods: Association Rules — Overview — Apriori Algorithm — Evaluation of Candidate Rules — Applications of Association Rules — Finding Association& finding similarity — Recommendation System: Collaborative Recommendation- Content Based Recommendation — Knowledge Based Recommendation- Hybrid Recommendation Approaches.

UNIT IV:

Introduction to Streams Concepts — Stream Data Model and Architecture — Stream Computing,
Sampling Data in a Stream — Filtering Streams — Counting Distinct Elements in a Stream — Estimating moments — Counting oneness in a Window — Decaying Window — Real time Analytics Platform(RTAP) applications — Case Studies — Real Time Sentiment Analysis, Stock Market Predictions. Using Graph Analytics for Big Data: Graph Analytics

UNIT V:

NoSQL Databases : Schema-less Models?: Increasing Flexibility for Data Manipulation-Key Value Stores- Document Stores — Tabular Stores — Object Data Stores — Graph Databases Hive — Sharding — Hbase — Analyzing big data with twitter — Big data for E-Commerce Big data for blogs — Review of Basic Data Analytic Methods using R

Text Book:

1. Jure Leskovec, AnandRajaraman, Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, Second Edition, 2014.

REFERENCE BOOKS:

1. Jiawei Han, MichelineKamber, Jian Pei, "Data Mining Concepts and Techniques", Morgan Kaufman Publications, Third Edition, 2011.
2. Ian H.Witten, Eibe Frank "Data Mining – Practical Machine Learning Tools and Techniques", Morgan Kaufman Publications, Third Edition, 2011.
3. David Hand, HeikkiMannila and Padhraic Smyth, "Principles of Data Mining", MIT Press,2001

E-RESOURCES

Big Data Analytics Tutorial (tutorialspoint.com)
Big Data Analytics Notes Pdf Download & List of Reference Books for BDA (ncertbooks.guru)

Course Code-OBJECT ORIENTED ANALYSIS AND DESIGN

Lecture – Tutorial-Practical::	3-0-0	**Internal Marks:**	30
Credits:	3	**External Marks:**	70

Prerequisites:

No particular skills are required as a prerequisite before learning UML.

Course Objectives:

- To understand how to solve complex problems
- Analyze and design solutions to problems using object oriented approach
- Study the notations of Unified Modeling Language
- Specify, analyze and design the use case driven requirements for a particular system.
- Model the event driven state of object and transform them into implementation specific layouts.
- Identify, Analyze the subsystems, various components and collaborate them interchangeably.

Course Outcomes:

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

CO1	Analyse, design, document the requirements through use case driven approach
CO2	Identify, analyse, and model structural concepts of the system
CO3	Develop,explore the conceptual model into various scenarios and applications.
CO4	Apply the concepts of architectural design for deploying the code for software.

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

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO 11**	**PO12**	PS O 1	PSO2	P S O 3
CO1	2	2	2		2							2			
CO2	3	3	3								2	2			
CO3	3	3			3	2					2	2			
CO4	2	2	3		2	2					2	3			
CO5	3	3	3		2	3					2	2			

UNIT I :

Introduction to UML:

The meaning of Object-Orientation, object identity, encapsulation, information hiding, polymorphism, genericity, importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Architecture

UNIT II:

Basic structural Modeling: Classes, relationships, common mechanisms, diagrams, Advanced structural modeling: advanced relationships, interfaces, types & roles, packages, instances.

Class & object diagrams: Terms, concepts, examples, modeling techniques, class & Object diagrams.

UNIT III:

Collaboration diagrams: Terms, Concepts, depicting a message, polymorphism in collaboration Diagrams, iterated messages, use of self in messages.

Sequence diagrams: Terms, concepts, differences between collaboration and sequence diagrams, depicting synchronous messages with/without priority call back mechanism broadcast message.

UNIT IV:

Behavioral Modeling: Interactions, use cases, use case diagrams, activity diagrams.

Advanced Behavioral Modeling: Events and signals, state machines, processes & threads, time and space, state chart diagrams.

UNIT V:

Architectural Modeling: Terms, concepts, examples, modeling techniques for component diagrams and deployment diagrams.

TEXT BOOKS:

1. The Unified Modeling Language User Guide, Grady Booch, Rambaugh, Ivar Jacobson, PEA

2. Fundamentals of Object Oriented Design in UML, Meilir Page- Jones, Addison Wesley

REFERENCE BOOKS:

1. Head First Object Oriented Analysis &Design, Mclaughlin, SPD OReilly,2006

2. Object oriented Analysis& Design Using UML, Mahesh ,PHI

3. The Unified Modeling Language Reference Manual, 2/e, Rambaugh, GradyBooch,etc., PEA

4. Object Oriented Analysis & Design, Satzinger, Jackson, Thomson

5 Object Oriented Analysis Design & implementation, Dathan.,Ramnath, University Press

6. Object Oriented Analysis & Design, John Deacon, PEA

7. Fundamentals of Object Oriented Analysis and Design in UML, M Pages-Jones, PEA

8. Object-Oriented Design with UML, Barclay, Savage, Elsevier,2008

E-RESOURCES:

1.https://www.geeksforgeeks.org/unified-modeling-language-uml-introduction/

2.https://www.javatpoint.com/uml

3.https://www.uml-diagrams.org/

Course Title: Machine Learning Lab

Lecture – Tutorial-Practical::	0-0-3	**Internal Marks:**	15
Credits:	1.5	**External Marks:**	75

Prerequisites: Knowledge of C Programming, Basic commands of UNIX.

Knowledge of C Programming, Basic commands of UNIX

Course Objectives:

The object of this course is to provide hands-on practice on implementing different machine learning models and using different accuracy techniques to improve the prediction percentage.

Course Outcomes:

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

CO1	Should be able to do data cleaning and data preprocessing
CO2	Should be able to apply imbalanced data sets accuracy
CO3	Should be able to apply machine learning techniques to large data sets

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	-	-	-	-	-	-	-	-
CO2	-	2	2	-	-	-	-	-	-	-	2	2
CO3	3	-	-	2	2	-	-	-	-	-	2	2

List of Programs

1. Implement data cleaning techniques
2. Implement data preprocessing techniques.
3. Make your data ready for model training.
4. Train, validate and test KNN model using gridsearchcv
5. Train, validate and test naïve bayes model
6. Train Validate and test logistic regression model.
7. Train Validate and test SVM model.
8. Train Validate and test random forest ensemble.

TEXT BOOKS:

1) **Hands-On Machine Learning with Scikit-Learn, Keras and Tensor Flow: Concepts, Tools and Techniques to Build Intelligent Systems (Colour Edition) Paperback – 23 October 2019 by AurelienGeron(Author)**
2) **Introduction to Machine Learning with Python: A Guide for Data Scientists (Greyscale Indian Edition) Paperback – 1 January 2016 by Andreas Muller**

E-RESOURCES:

www.numpy.org
www.pandas.org

Course Code-R Programming Lab

Lecture – Tutorial-Practical::	0-0-3	**Internal Marks:**	15
Credits:	1.5	**External Marks:**	35

Prerequisites: C- Programming, Data Structures, Statistics fundamentals

Course Objectives:

1. Learn the fundamentals of 'R'.
2. Use of Sorting and Searching techniques.
3. Learn the basic Statistical functions.
4. Use of Classifications.
5. Applications of Regressions.

Course Outcomes:

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

CO1	Perform basic 'R' operations.
CO2	Understand the Sorting and Searching techniques.
CO3	Perform Statistical functions on datasets.
CO4	Apply Classification and Regression techniques.
CO5	Perform Clustering.

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	2	--	3	--	--	--	--	--	--	
CO2	3	2	3	--	2	--	--	--	--	--	--	--
CO3	2	2	3	--	--	--	--	--	--	--	--	
CO4	3	-3	2	2	2	--	--	--	--	--	--	--
CO5	2	3	3	3	2	--	--	--	--	--	--	

List of Experiments

1. Implementation of Data Frames and Lists.
2. Implementation of Matrix operations.
3. Implementation of Factors.
4. Implementation of Quick Sort, Merge Sort.
5. Implementation of Binary Search Tree.
6. Implementation of Reading and Writing files.
7. Implementation of Descriptive and Summary Statistics.
8. Implement Charts- Bar(Side by Side, Stacked), Line.
9. Implementation of Correlation, T-test, ANOVA.
10. Implementation of Decision tree, Support Vector Classifications.
11. Implementation of Linear, Random Forest Regressions.
12. Implementation of Clustering.

TEXT BOOKS:

1. The Art of R Programming, Norman Matloff, Cengage Learning.
2. R for Everyone, Lander, Pearson.

REFERENCE BOOKS:

1. R Cookbook, PaulTeetor, Oreilly.

2. R in Action,RobKabacoff, Manning

E-Resources:

1. https://onlinecourses.nptel.ac.in/noc19_ma33/preview
2. https://nptel.ac.in/courses/111104100.
3. https://ict.iitk.ac.in/courses/r-programming-a-practical-approach/

Course Code-Complier Design Lab

Lecture – Tutorial-Practical::	0-0-3	**Internal Marks:**	15
Credits:	1.5	**External Marks:**	35
Prerequisites: C- Programming, Data Structures, Statistics fundamentals			

Course Objectives:

1. To describe the design of a compiler including its phases and components and basic understanding of Grammars and language definition.
2. To Identify the similarities and differences among various parsing techniques and grammar transformation Techniques.
3. To Understand the syntax analysis, intermediate code generation, type checking, the role of symbol table and its organization.
4. To Understand, design code generation and optimization schemes.

Course Outcomes:

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

CO1	To use the knowledge of patterns, tokens & regular expressions for solving a problem.
CO2	To apply the knowledge of lex tool & yacc tool to develop a scanner & parser.
CO3	To write the new code optimization techniques to improve the performance of a program in terms of speed & space.
CO4	To employ the knowledge of modern compiler & its features.
CO5	To participate in GATE, PGECET and other competitive examinations

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	2	--	3	--	--	--	--	--	--	
CO2	3	2	3	--	2	--	--	--	--	--	--	--
CO3	2	2	3	--	--	--	--	--	--	--	--	
CO4	3	-3	2	2	2	--	--	--	--	--	--	--
CO5	2	3	3	3	2	--	--	--	--	--	--	

List of Experiments

1. Design a lexical analyzer for given language and the lexical analyzer should ignore redundant spaces, tabs and new lines. It should also ignore comments. Although the syntax specification states that identifiers can be arbitrarily long, you may restrict the length to some reasonable value. Simulate the same in C language.
2.

TEXT BOOKS:

3. The Art of R Programming, Norman Matloff, Cengage Learning.
4. R for Everyone, Lander, Pearson.

REFERENCE BOOKS:

1. R Cookbook, PaulTeetor, Oreilly.
2. R in Action,RobKabacoff, Manning

E-Resources:

4. https://onlinecourses.nptel.ac.in/noc19_ma33/preview
5. https://nptel.ac.in/courses/111104100.
6. https://ict.iitk.ac.in/courses/r-programming-a-practical-approach/

Course Title: MEAN STACK TECHNOLOGY -LAB

Lecture – Practical:	0-0-4	**Internal Marks:**	15
Credits	2	**External Marks:**	35

- **Prerequisites:**
- To have basic knowledge on developing web applications
- Knowing HTML and CSS web languages
- JavaScript, IDE or Text Editor, Command Line Interface (CLI)
- Server-side development with any programming language.

Course Objectives : The Objective of this course is to give a strong foundation of the Development and its Operations.

Course Outcomes

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

1.Understand the traditional software development.
2.Learn the rise of agile methodologies.
3.Define and design purpose of DevOps.

CO1	To code a MEAN Stack Application
CO2	Developing Single Page Applications (SPAs) via MEAN Stack
CO3	Setup routing within Angular & Express
CO4	Write Express Back-End Web Services with Express & Node
CO5	Employ Express Web Services
CO6	Understanding Mango DBMS

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	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	-	-	-						3	-	-	2
CO2	3	2	2	2	-	-							-	3	2
CO3	2	2	3	2	-	-						3	2	2	-
CO4	3	3	2	-	-	-							-	2	3
CO5	2	2	3	2	2	2							1	3	-
CO6		3		3	3	3						3	3	3	3

List of Experments

- Angular :
- Getting Started with Angular
- Introduction to Components
- Templates, Interpolation, and Directives
- Data Binding & Pipes
- More on Components
- Building Nested Components
- Forms
- Services and Dependency Injection
- Retrieving Data Using HTTP

Navigation and Routing Basics

- Node Js :
- Introduction
- Exploring language additions to the V8 JavaScript engine
- Understanding NodeJS
- HTTP and File System
- Buffers, Streams, and Events
- Using Express Framework
- Working with Models, Views, and Routes
- Database
- Working with MongoDB
- Working with RESTful web services

Angular With Node

Course Title: EMPLOYABILITY SKILLS –II

Lecture – Practical:	**2-0-0**	**Internal Marks:**	30
Credits	0	**External Marks:**	70*

Prerequisites: None

Course Objectives

- To learn skills for discussing and resolving problems on the work site
- To assess and improve personal grooming
- To promote safety awareness including rules and procedures on the work site
- To develop and practice self management skills for the work site

Course Outcomes

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

CO1	Recite the corporate etiquette.
CO2	Make presentations effectively with appropriate body language
CO3	Be composed with positive attitude
CO4	Apply their core competencies to succeed in professional and personal life

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**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2			3			2			2		2	2		
CO2				3					2						2
CO3		3				2				3				3	
CO4				3					2	3		2	2		

UNIT I:
Interview Skills: Interviewer and Interviewee – in-depth perspectives. Before, During and After the Interview. Tips for Success. Presentation Skills: Types, Content, Audience Analysis, Essential Tips – Before, During and After, Overcoming Nervousness

UNIT II:
Etiquette and Manners – Social and Business. Time Management – Concept, Essentials, Tips.
Personality Development – Meaning, Nature, Features, Stages, Models; Learning Skills; Adaptability Skills.

UNIT III:
Decision-Making and Problem-Solving Skills: Meaning, Types and Models, Group and Ethical Decision-Making, Problems and Dilemmas in application of these skills. Conflict Management: Conflict - Definition, Nature, Types and Causes; Methods of Conflict Resolution.

UNIT IV:
Stress Management: Stress - Definition, Nature, Types, Symptoms and Causes; Stress Analysis Models and Impact of Stress; Measurement and Management of Stress Leadership and Assertiveness Skills: A Good Leader; Leaders and Managers; Leadership Theories; Types of Leaders; Leadership Behavior; Assertiveness Skills.

UNIT V: Emotional Intelligence: Meaning, History, Features, Components, Intrapersonal and Management Excellence; Strategies to enhance Emotional Intelligence

Text Book:
1) Barun K. Mitra, Personality Development and Soft Skills, Oxford University Press, 2011.

REFERENCE BOOKS:
1) S.P. Dhanavel, English and Soft Skills, Orient Blackswan, 2010.
2) R.S.Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning, S.Chand & Company Ltd., 2018.
3) Raman, Meenakshi & Sharma, Sangeeta, Technical Communication Principles and Practice, Oxford University Press, 2011.
4) R.S.Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning, S.Chand & Company Ltd., 2018.
5) Raman, Meenakshi & Sharma, Sangeeta, Technical Communication Principles and Practice, Oxford University Press, 2011.

Course Code- Data Science

Lecture – Tutorial-Practical::	3-0-0	**Internal Marks:**	30
Credits:	3	**External Marks:**	70

Prerequisites: Linear algebra, Statistics fundamentals, Python

Course Objectives:

- To understand the fundamentals of Data Science.
- To learn the summary and descriptive statistics.
- To understand Statistical and Linear Algebra basics.
- To apply classification and regression techniques to predict the outcome.
- To understand Unsupervised and Reinforcement learning approaches.

Course Outcomes:

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

CO1	Understand the applications of Data Science.
CO2	Apply summary and descriptive statistics on various data sets.
CO3	Apply Statistical and Linear Algebra functions.
CO4	Apply Classification and Regressiontodecision-making Scenarios.
CO5	Develop Unsupervised and Reinforcement applications.

Contribution of Course Outcomes towards the 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	2	--	3	--	--	--	--	--	--	
CO2	3	2	3	--	2	--	--	--	--	--	--	--
CO3	2	2	3	--	--	--	--	--	--	--	--	
CO4	3	-3	2	2	2	--	--	--	--	--	--	--
CO5	2	3	3	3	2	--	--	--	--	--	--	

UNIT-1:Introduction: Introduction to Data Science – Evolution of Data Science – Data Science Roles – Stages in a Data Science Project – Applications of Data Science in various fields – Data Security Issues.

UNIT-2:Exploratory Data Analytics: Data Acquisition, Pre-Processing, Summary and Descriptive Statistics, Skewness, Kurtosis, Plots- Box Plots, Residual, Scatter, Distributed, Correlation Statistics,T-test, ANOVA.

UNIT-3:Statistical and Linear algebra: Developing Initial Hypotheses, testing hypotheses,least-squares principle, Matrices to represent relations between data, Linear algebraic operations on matrices – Matrix decomposition: Singular Value Decomposition (SVD) and Principal Component Analysis (PCA).

UNIT-4:Supervised Learning-Classification – Decision tree, Random Forest, Support Vector, Naive-Bayes, Ada and XG Boost, Logistic Regression, Confusion Matrix, Evaluation metrics.

Regression-Linear, Multiple, Decision tree, Random Forest, Support Vector, Gradient descent, LASSO, Ridge, Evaluation metrics.

Unit –V: **Unsupervised Learning:** Clustering, K-Means Clustering, Density-Based Clustering, Dimensionality Reduction, Collaborative Filtering.

Association Rule Learning and Reinforcement Learning: Association Rule Learning, Apriori, Eclat, Reinforcement Learning, Upper Confidence Bound, Thompson Sampling, Q-Learning.

TEXTBOOKS:

1. JojoMoolayil, “Smarter Decisions : The Intersection of IoT and Data Science,” PACKT, 2016.

2. Cathy O'Neil and Rachel Schutt , "Doing Data Science," O'Reilly, 2015.

3. David Dietrich, Barry Heller, Beibei Yang, "Data Science and Big data Analytics", EMC 2013.

4. Kevin P. Murphy, "Machine Learning: A Probabilistic Perspective", MIT Press, 2012.

5. EthemAlpaydin, "Introduction to Machine Learning", MIT Press, Third Edition, 2014.

6. Tom Mitchell, "Machine Learning," McGraw-Hill, 1997.

REFERENCE BOOKS:

1. David Dietrich, Barry Heller, Beibei Yang, "Data Science and Big data Analytics", EMC 2013
2. Raj, Pethuru, "Handbook of Research on Cloud Infrastructures for Big Data Analytics," IGI Global

e-Resources:

1. https://nptel.ac.in/courses/106106179

Course Code- BLOCKCHAIN TECHNOLOGY

Lecture – Tutorial-Practical::	3-0-0				**Internal Marks:**	30
Credits:	3				**External Marks:**	70

Prerequisites:

1. Knowledge in security and applied cryptography.
2. Knowledge in distributed databases.

Course Objectives:

- To Introduce block chain technology and Crypto currency
- Discuss the fundamental ideas of Bit coin MOOCs.
- Identify the different components of the block chain process.
- Recognize the differences between block chain and bit coin and other crypto currencies.

Course Outcomes:

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

CO1	ContentedlydiscussanddescribethehistorytypesandapplicationsofBlockchain
CO2	GainsfamiliaritywithcryptographyandConsensusalgorithms.
CO3	DemonstratetheblockchainservicestodevelopaNewParadigmofOrganizationalactivitie
CO4	Learn the limitations of the block-chain mechanism to develop an efficient organizational structure
CO5	Applying Bit-Coin protocols and how to develop the digital currency in the websites

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	PSO1	PSO2	PSO 3
CO1	3	3	2	-	1	1	-	-	1	1	-	3	2	3	-
CO2	3	3	3	2	2	2	-	-	1	2	-	3	2	3	-
CO3	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**3**	**-**	**-**	**2**	**-**	**-**
CO4	3	2	3	2	-	-	-	-	-	-	-	3	3	2	3
CO5	3	2	3	2	-	-	-	-	-	-	-	3	3	2	3

UNIT I :

IntroductionIntroduction to Block chain – History, Definition,DistributedLedger,BlockchainCategories– Public,Private,Consortium,BlockchainNetworkandNodes,Peer-to-Peer Network, Mining Mechanism, Generic elements of Blockchain, Features of Blockchain, andTypesof Blockchain.

UNIT II:

Operation of Bitcoin Blockchain, Blockchain Architecture – Block, Hash, Distributer P2P, Structure of Blockchain-Consensus mechanism: Proof of Work (PoW), Proof of Stake (PoS), Byzantine Fault Tolerance (BFT), Proof of Authority (PoA) and Proof of Elapsed Time (PoET)

UNIT III:

Extensibility of Blockchain concepts, Digital Identity verification, Block chain Neutrality, Digital art, Blockchain Environment

UNIT IV:

Blockchain Science: Gridcoin, Foldingcoin, Blockchain Genomics, Bitcoin MOOCs.Currency, Token, Tokenizing, Campuscoin, Coin drop as a strategy for Public adoption.Regulations

UNIT V:

Currency Multiplicity, Demurrage currency. Technical challenges, Business model challenges, Scandals and Public perception, Government Regulations
TEXT BOOKS:
1. Blockchain Blue print for Economy by Melanie Swan
REFERENCE BOOKS:
1. Blockchain Basics: A Non-Technical Introduction in 25 Steps 1st Edition, by Daniel Drescher
E-RESOURCES:
1. **Blockchain | Tools, Publications & Resources (ala.org)** 2. **Blockchain Learning Hub | UNICEF Office of Innovation**

Course Code-Cognitive Science and Analytics

Lecture – Tutorial-Practical::	3-0-0	**Internal Marks:**	30
Credits:	3	**External Marks:**	70

Prerequisites: Computer Science, Linguistics, Deep Learning.

Course Objectives:

- To understand how cognitive science is methodologically distinctive.
- To understand Psychology, Computer Science, Linguistics, a Neuroscience.
- To develop skills in analyzing, interpreting, and assessing empirical data.
- To develop research techniques that contribute to cognitive science.
- To understand central modeling techniques in cognitive science, including traditional computational, deep learning, and dynamical approaches.

Course Outcomes:

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

CO1	Understand the basic principles and processes of cognitive science.
CO2	Demonstrate qualitative and quantitative skills and critical thinking in cognitive science by applyinga suitable methodology to real-world applications.
CO3	Apply declarative and logical models.
CO4	Envisage the concept of cognitive learning.
CO5	Demonstration with the acquired inter-disciplinary knowledge in language processing and application of different research approaches with cognitive science

Contribution of Course Outcomes towards the 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	2	--	3	--	--	--	--	--	--	
CO2	3	2	3	--	2	--	--	--	--	--	--	--
CO3	2	2	3	--	--	--	--	--	--	--	--	
CO4	3	-3	2	2	2	--	--	--	--	--	--	--
CO5	2	3	3	3	2	--	--	--	--	--	--	

UNIT-1: Introduction to Cognitive Science:**Introduction to the study of cognitive sciences. Neural Network Models-language: definition Affordances Categories and concepts; Concept learning: Linguistic knowledge: Syntax, semantics, (and pragmatics) Direct perception, Logic; Machine learning**

UNIT-2: Concept Hierarchies: **A brief history of cognitive science. Processing of sensory information in the brain, Linguistic knowledge: Syntax, semantics (and pragmatics), Ecological Psychology, constructing memories, Methodological concerns in philosophy, Discretization and generating concept hierarchies, Data Mining System, Generative linguistics, Affordance learning in robotics, Explicit vs. implicit memory**

UNIT-3: Memory Models: **Brief history of neuroscience, PET, EEG Lateralization Child, and robotic development Sensory memory; Short term memory Mathematical models, Multisensory integration in the cortex, Lateralization, Attention, and related concepts, long term memory; Rationality.**

UNIT-4: Sensory Information Fusion: **Mathematical models Information fusion, the great past tense debate, Human visual attention, Bounded rationality; Prospect theory; Heuristics and biases Looking at brain signals.**

Modeling: From sensation to cognition, The great past tense debate, Computational models of attention, Reasoning in computers.

Unit –5: Information Processing: Processing of sensory information in the brain. From physics to meaning, Analog vs. Digital: Code duality. A robotic perspective, Applications of computational models of attentional Context and social judgment, Schemas,and social signals.

TEXTBOOKS:

1. Pradeep Kumar Mallick, Samarjeet Borah," Emerging Trends and Applications in Cognitive Computing," 2019, IGI Global Publishers.

REFERENCES:

1. Jose Luis Bermudez, "Cognitive Science: An Introduction to the Science of the Mind," 2020 Cambridge University Press, New York.**RENCE BOOKS:**

E-RESOURCES:

1.https://www.javatpoint.com/deep-learning

2. https://towardsdatascience.com

Course Code-Roboticprocessautomation&development

Lecture – Tutorial-Practical::	3-0-0	**Internal Marks:**	30
Credits:	3	**External Marks:**	70

Prerequisites:Basic Programming Concepts

Course Objectives:

- Understand the RPA and the ability to differentiate it from other types of automation.
- Model the sequences and the nesting of activities.(L3)
- Understand to handle the exceptions and will troubleshoot towards the solution (L2)
- Experiment with workflow in a manner to get the optimized output from a Bot. (L3)
- Demonstrate the facility for scheduling bots and specifying the time intervals (L2)
- Select the packages and to release them for the update of the bots. (L3)

Course Outcomes:

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

CO1	Describe RPA, where it can be applied and how it's implemented.
CO2	Describe the different types of variables, Control Flow and data manipulation techniques.
CO3	Identify and understand Image, Text and Data Tables Automation.
CO4	Describe how to handle the User Events and various types of Exceptions and strategies.
CO5	Understand the Deployment of the Robot and to maintain the connection.

Contribution of Course Outcomes towards the 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	2	--	3	--	--	--	--	--	--	
CO2	3	2	3	--	2	--	--	--	--	--	--	--
CO3	2	2	3	--	--	--	--	--	--	--	--	
CO4	3	-3	2	2	2	--	--	--	--	--	--	--
CO5	2	3	3	3	2	--	--	--	--	--	--	

UNIT-I

INTRODUCTION TO ROBOTIC PROCESS AUTOMATION:

Scope and techniques of automation, Robotic process automation - What can RPA do?, Benefits of RPA, Components of RPA, RPA platforms, The future of automation.

RPA BASICS:

History of Automation - What is RPA - RPA vs Automation - Processes & Flowcharts - Programming Constructs in RPA - What Processes can be Automated - Types of Bots - Workloads which can be automated - RPA Advanced Concepts - Standardization of processes - RPA Development methodologies - Difference from SDLC - Robotic control flow architecture - RPA business case - RPA Team - Process Design Document/Solution Design Document - Industries best suited for RPA - Risks & Challenges with RPA - RPA and emerging ecosystem.

UNIT-2:

RPA TOOL INTRODUCTION AND BASICS:

Introduction to RPA Tool - The User Interface - Variables - Managing Variables - Naming Best Practices - The Variables Panel - Generic Value Variables - Text Variables - True or False Variables - Number Variables - Array Variables - Date and Time Variables - Data Table Variables - Managing Arguments - Naming Best Practices - The Arguments Panel - Using Arguments - About Imported Namespaces - Importing New Namespaces- Control Flow - Control Flow Introduction - If Else Statements - Loops - Advanced Control Flow - Sequences - Flowcharts - About Control Flow - Control Flow Activities - The Assign Activity - The Delay Activity - The Do While Activity - The If Activity - The Switch Activity - The While Activity - The For Each Activity - The Break Activity - Data Manipulation

- Data Manipulation Introduction - Scalar variables, collections and Tables - Text Manipulation - Data Manipulation -

Gathering and Assembling Data

UNIT-3:ADVANCED AUTOMATION CONCEPTS & TECHNIQUES:
Recording Introduction - Basic and Desktop Recording - Web Recording - Input/Output Methods - Screen Scraping - Data Scraping - Scraping advanced techniques - Selectors - Defining and Assessing Selectors - Customization - Debugging - Dynamic Selectors - Partial Selectors - RPA Challenge - Image, Text & Advanced Citrix Automation - Introduction to Image & Text Automation - Image based automation - Keyboard based automation - Information Retrieval - Advanced Citrix Automation challenges - Best Practices - Using tab for Images - Starting Apps - Excel Data Tables & PDF - Data Tables in RPA - Excel and Data Table basics - Data Manipulation in excel - Extracting ***Data from PDF - Extracting a single piece of data - Anchors - Using anchors in PDF.***

UNIT-4:HANDLING USER EVENTS & ASSISTANT BOTS, EXCEPTION HANDLING:
What are assistant bots? - Monitoring system event triggers - Hotkey trigger - Mouse trigger - System trigger - Monitoring image and element triggers - An example of monitoring email - Example of monitoring a copying event and blocking it - Launching an assistant bot on a keyboard event.

Unit –V:DEPLOYING AND MAINTAINING THE BOT:
Publishing using publish utility - Creation of Server - Using Server to control the bots - Creating a provision Robot from the Server - Connecting a Robot to Server - Deploy the Robot to Server - Publishing and managing updates - Managing packages - Uploading packages - Deleting packages

TEXT BOOKS:
1. Alok Mani Tripathi, "*Learning Robotic Process Automation*", Packt Publishing, 2018.
REFERENCES:
1. Frank Casale , Rebecca Dilla, Heidi Jaynes , Lauren Livingston, "*Introduction to Robotic Process Automation: a Primer*", Institute of Robotic Process Automation,1st Edition 2015.

2. Richard Murdoch, *Robotic Process Automation: Guide To Building Software Robots, Automate Repetitive Tasks & Become An RPA Consultant"*, Independently Published, 1st Edition 2018.

3. Srikanth Merianda,"*Robotic Process Automation Tools, Process Automation and their benefits: Understanding RPA and Intelligent Automation"*, Consulting Opportunity Holdings LLC, 1st Edition 2018.

4. Lim Mei Ying, "*Robotic Process Automation with Blue Prism Quick Start Guide: Create software robots and* automate business process*es*", Packt Publishing, 1st Edition 2018.

E-RESOURCES
1. https://www.uipath.com/rpa/robotic-process-automation
2. https://www.academy.uipath.com
2. https://towardsdatascience.com

Course Code: **DEEP LEARNING AND ITS APPLICATIONS**

Lecture – Practical:	3-0-0	**Internal Marks:**	30
Credits	3	**External Marks:**	70

Prerequisites: None

Course Objectives:

1.To understand theoretical foundations, algorithms and methodologies of Neural Network

2.To design and develop an application using specific deep learning models

3.To provide the practical knowledge in handling and analyzing real world applications.

Course Outcomes

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

CO1	Recognize the characteristics of deep learning models that are useful to solve real-world problems
CO2	Understand different methodologies to create application using deepnets.
CO3	Identify and apply appropriate deep learning algorithms for analyzing the data for variety of problems.
CO4	Implement different deep learning algorithms
CO5	Design the test procedures to assess the efficacy of the developed model.
CO6	Combine several models into gain better results

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	PO12	PSO1	PSO2	PSO3
CO1	1														
CO2							2								
CO3			2												
CO4		1			3										
CO5			3			1									
CO6										2					

UNIT I:MACHINELEARNINGBASICS

Learningalgorithms,Maximumlikelihoodestimation,Buildingmachinelearningalgorithm,NeuralNetworksMultilayerPerceptron,Back-propagationalgorithm and itsvariantsStochasticgradientdecent, CurseofDimensionality

Unit 2: DEEPLEARNINGARCHITECTURES

MachineLearningandDeepLearning,RepresentationLearning,WidthandDepthofNeuralNetworks,ActivationFunctions:RELU,LRELU,ERELU,UnsupervisedTrainingofNeuralNetworks,RestrictedBoltzmannMachines,AutoEncoders,Deep LearningApplications,

UNIT III:CONVOLUTIONALNEURALNETWORKS& TRANSFER LEARNING TECHNIQUES

ArchitecturalOverview,Motivation,Layers,Filters,Parametersharing,Regularization,PopularCNNArchitectures:ResNet, AlexNet–Applications,Transfer learning techniques,variants of CNN:DenseNet,Pixel Net.

UNIT IV:SEQUENCE MODELLING – RECURRENT ANDRECURSIVENETS

Recurrent Neural Networks, Bidirectional RNNs, Encoder-decoder sequence to sequencearchitectures-BPTTfortrainingRNN,LongShortTermMemoryNetworks.

UNIT V:AUTOENCODERS&DEEPGENERATIVEMODELS

UndercompleteAutoencoder,RegularizedAutoencoder,stochasticEncodersandDecoders,Contractive Encoders, DeepBeliefnetworks,BoltzmannMachines,DeepBoltzmannMachine,GenerativeAdversialNetworks.

Text Book:1.Ian Goodfellow, YoshuaBengio and Aaron Courville, " Deep Learning", MIT Press, 2017

2.JoshPatterson,AdamGibson"DeepLearning:APractitioner'sApproach",O'ReillyMedia,2017

3.UmbertoMichelucci"AppliedDeepLearning.ACase-basedApproachtoUnderstandingDeepNeuralNetworks"Apress,2018.

REFERENCE BOOKS:

1.Kevin P. Murphy "Machine Learning: A Probabilistic Perspective", The MIT Press, 2012.
2.EthemAlpaydin,"IntroductiontoMachineLearning",MITPress,PrenticeHallofIndia,ThirdEdition2014.
3.Giancarlo Zaccone, Md. RezaulKarim, Ahmed Menshawy "Deep Learning with TensorFlow:
4.Explore neural networks withPython",PacktPublisher,2017.
AntonioGulli,SujitPal"DeepLearningwithKeras",PacktPublishers,2017.
FrancoisChollet"DeepLearningwithPython",ManningPublications,2017.

E-RESOURCES

https://www.javatpoint.com/deep-learning

Course Code: DesignThinking and Innovation

Lecture – Practical:	**3-0-0**	**Internal Marks:**	30
Credits	3	**External Marks:**	70
Prerequisites: None			
Course Objectives			
1.Study a problem from multiple perspectives 2. Learn how to frame the design challenge properly. 3. Learn how to ideate, prototype and Iterate solutions. 4. Learn from the overall design process how to create value as entrepreneurs			

5. Learn how to design successful products or enterprises

Course Outcomes

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

CO1	Explaintheprinciplesofdesignthinkinganditsapproaches.
CO2	Identifytheempathy, definephasesinhumancentereddesignproblems.
CO3	Developanidea,buildaprototypeandtestindesignthinkingcontext.
CO4	Applydesignthinkingtechniquesforproductinnovation.
CO5	Usedesignthinkinginbusinessprocess models.

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

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	3	3						-	2	2	--	--
CO2	2	3	3	2	2	2				2	2	3	2		3
CO3	3	3	3	3	3	2						2	--	3	3
CO4	3	2	3	2	3					2	2	2	2	--	--
CO5	3	3	3	1	-	2	1	1	-	2	-	2	--	3	--

UNIT-1
INTRODUCTIONTODESIGNTHINKING:
An insight into Design, origin of Design thinking, Design thinking Vs Engineeringthinking, importance of Design thinking, Design Vs Design thinking, understandingDesignthinkingand itsprocessmodels, applicationofDesignthinking

UNIT-2
EMPATHIZEINDESIGNTHINKING:
Human-Centered Design (HCD) process - Empathize, Define, Ideate, Prototype andTest and Iterate. Role of Empathy in design thinking, methods and tools of empathy,understandingempathytools.Exploredefinephasestateusers'needsandproblems usingempathymethods

UNIT-3
IDEATION,PROTOTYPINGANDTESTING:
Ideation methods, brain storming, advantages of brain storming, methods and tools ofideations, prototyping and methods of prototyping, user testing methods, Advantagesand disadvantagesofuserTesting/Validation

UNIT-4
PRODUCTINNOVATION:
Design thinking for strategic innovation, Definition of innovation,art of innovation,teams for innovation, materials and innovation in materials, definition of product anditsclassification. Innovationtowardsproduct designCasestudies

UNIT-5
DESIGNTHINKINGINBUSINESSPROCESSES:
Design thinking and Agile process model, Better Together, Agile vs design thinking: key differences, Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design, thinking to meet corporate needs**.**

TextBooks
1. DesignThinkingforStrategicInnovation,IdrisMootee, 2013,JohnWiley&Sons.

2. Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School – Idris Mootee.
3. Changebydesign,TimBrown,2009,Harper Collins.
4. DesignThinking-TheGuideBook–Facilitated bytheRoyalCivilserviceCommission,Bhutan Engineeringdesign,GeorgeEDieter,4thRevisededition,2009McGrawHill.

ReferenceBooks

1. DesignMethods:AStructuredApproachforDrivingInnovationinYourOrganization,VijayKumar,FirstEdition, 2012,Wiley.
2. Human-CenteredDesignToolkit:AnOpen-SourceToolkittoInspireNewSolutionsinthe DevelopingWorld,IDEO,SecondEdition,2011,IDEO.

E-RESOURCES

1. https://www.interaction-desiqn.ora/literature/topics/desiqn-thinking
2. https://www.interaction-desiqn.prq/literature/article/how-tq-<eve'op-an-empath\capproach-in-design-thinking

Course Code: Industrial IOT for SMART Cities

Lecture – Tutorial-Practical::	3-0-0				**Internal Marks:**	30
Credits:	3				**External Marks:**	70

Prerequisites:

Internet of Things

Course Objectives:

- The objective of this course is to explore the interconnection and integration of the physical world and the cyber space. Understand the design concepts in setting up IOT Devices. Study about the setup, configuration and installation of equipment for IOT.

Course Outcomes:

Upon successful completion of the course, the student will be able to:	
CO1	Identify different IoT smart cities applications with IoT architecture
CO2	Establish IoT connectivity of smart devices to cloud having multiple communication medium, protocols, device management and monitoring.
CO3	Summarize different learning methods and their application in smart cities.
CO4	Apply machine learning techniques on IOT systems
CO5	Implement Programming models for IoT Cloud Environment

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**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	
CO2	2	--	2	--	--	--	1	--	--	--	--	--	--	2	
CO3	2	--	2	2	--	--	--	--	--	--	---	--	--	2	
CO4	2	2	3	--	2	2	--	--	--	--	2	3	2	2	2
CO5	3	3	3	--	2	3	--	--	--	--	2	2	2	2	2

UNIT I :Introduction & Industry 4.0

IoT in smart city& their distinctive advantages like smart environment, smart streetlight, smart water management, Smart Road & Traffic, Smart Parking & waste management. The Fourth Revolution, LEAN Production Systems, Smart and Connected Business Perspective, Smart Factories.

UNIT II:IoT Smart City Sensing and Power Management

Smart Sensors and actuators as per requirement for Smart Cities, air quality, noise pollution measured using Electrochemical Sensors, Ultrasonic Sensors, IR, Obstacle, Proximity. IoT Data Acquisition System, Energy harvesting, Battery based systems, Power management.

UNIT III:Interoperability for Smart City IoT systems

Wireless communication modules and topology such as Zigbee, Bluetooth, GSM module, Wi-fi module &Things speak (IoT Platform) cloud, Ethernet, M2M Wireless Sensor Network (WSN).

UNIT IV:Software Defined Network

Arduino Programming, Integration of Sensors and Actuators with Arduino, Raspberry Pi, Implementation of IoT with Raspberry Pi.

UNIT V:Smart mobility

Smart cities concept and services, traffic congestion, city energy consumption, IoT in carriage, solution,

opportunities and threats.
TEXT BOOKS:
1.Vangelis Angelakis, Designing, Developing, and Facilitating Smart Cities Urban Design to IoT Solutions, Springer, 2019. 2. S. Misra, A. Mukherjee, and A. Roy, 2020. Introduction to IoT, Cambridge University Press, 2018.
ReferenceBooks: Research papers

Course Code-NATURAL LANGUAGE PROCESSING

Lecture – Tutorial-Practical::	3-0-0				**Internal Marks:**	30
Credits:	3				**External Marks:**	70

Prerequisites: :

Data structures, finite automata and probability theory

Course Objectives:

Introduce to some of the problems and solutions of NLP and their relation to linguistics and statistics.

Course Outcomes:

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

CO1	Show sensitivity to linguistic phenomena and an ability to model them with formal grammars.
CO2	Understand and carry out proper experimental methodology for training and evaluating empirical NLP systems
CO3	Able to manipulate probabilities, construct statistical models over strings and trees, and estimate parameters using supervised and unsupervised training methods.
CO4	Able to design, implement, and analyze NLP algorithms
CO5	Able to design different language modeling Techniques.

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	PSO 1	PS O2	PS O3
CO1	2	2	3	-	2	-	-	-	-	-	-	-	3	3	2
CO2	2	3	3	-	2	-	-	-	-	-	-	-	2	-	3
CO3	-	2	2	2	3	-	-	-	-	-	-	-	2	-	2
CO4	2	3	3	3	3	-	-	-	-	-	-	-	2	2	2
CO5	-	2	2	3	3	-	-	-	-	-	-	-	2	2	2

UNIT I :

Introduction to Natural Language Processing: The study of Language, Applications of NLP, Evaluating Language Understanding Systems, Different levels of Language Analysis ,Representations and Understanding, Organization of Natural language Understanding Systems

UNIT II:, Linguistic Background: An outline of English syntax, Words, The Elements of Simple Noun Phrases, Verb Phrases and Simple Sentences, Noun Phrases Revisited, Adjective Phrases, Adverbial Phrases

UNIT III:

Grammars and Parsing: Grammars and sentence Structure, Top-Down and Bottom-Up Parsers, Transition Network Grammars, Top-Down Chart Parsing. Finite State Models and Morphological Processing, Grammars and Logic Programming., Augmented Transition Networks.

UNIT IV:

Semantics and Logical Form: Word senses and Ambiguity, Encoding Ambiguity in the Logical Form, Verbs and States in Logical Form, Speech Acts and Embedded Sentences, Defining Semantic Structure: Model Theory

UNIT V:

Language Modeling: Introduction, N-Gram Models, Language Model Evaluation, Parameter Estimation, Language Model Adaptation, Types of Language Models, Language-Specific Modeling Problems

TEXT BOOKS:

1.James Allen, “Natural Language Understanding”, Pearson Education

2. Multilingual natural Language Processing Applications: From Theory to Practice – Daniel M.Bikel and ImedZitouni, Pearson Publication

3. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary

REFERENCE BOOKS:

1. Speech and Natural Language Processing - Daniel Jurafsky& James H Martin, Pearson

Publications

2. Christopher D Manning and HinrichSchutze, “Foundations of Statistical Natural Language Processing” MIT Press, 1999.

3. Akshar Bharti, Vineet Chaitanya and Rajeev Sangal, “NLP: A Paninian Perspective”, Prentice

E-RESOURCES:
1. https://towardsdatascience.com/your-guide-to-natural-language-processing-nlp-48ea2511f6e1 2. . http://www.nptelvideos.in/2012/11/natural-language-processing.html

Course Code-IOT Design for connected Healthcare

Lecture – Tutorial-Practical::	4-0-0				**Internal Marks:**	30
Credits:	3				**External Marks:**	70

Prerequisites:	
Inernet of things	
Course Objectives:	
To learn the concepts of multidisciplinary approach for design, development, simulation, and implementation of IoT health care systems.	
Course Outcomes:	
Upon successful completion of the course, the student will be able to:	
CO1	Understand and design multidisciplinary approach for design, development, simulation, and implementation of IoT health care systems.
CO2	Apply the monitored health parameter sensor output data for further computing, analyzation and visualization.
CO3	Identify and summarize remote health monitoring and Tele-health.
CO4	Students should be able to perform experiments on different development boards.
CO5	Students should be able to perform experiments on different development boards.

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**	PSO1	PSO2	PSO3
CO1	3				2								3		
CO2			2									3			2
CO3									1					1	
CO4	3				2									1	

CO5		2							2				3		
CO6					2							3			1

UNIT I :Introduction to IoT based Health Care

Introduction to IoT applications in smart healthcare& their distinctive advantages - Patient Health Monitoring System (PHMS), Tele-Health, TeleMedicine, Tele-Monitoring, Mobile Health Things (m-health).

UNIT II: Module II IoT Smart Sensing Heath Care and Power challenge

Concept of Generic Biomedical sensors, Smart Sensors: Monitor health parameters, Wearable ECG sensors, IoT Data Acquisition System, Energy harvesting, Battery based systems, Power management.

UNIT III: Interoperability in IoT

IoT protocols –Interfacing of Zigbee module to create Wireless sensor network, M2M Wireless Sensor Network, MQTT, COAP, Principle of operation & Application of IoT Gateway Using Wi-Fi and Ethernet.

UNIT IV: Software Defined Network

Arduino Programming, Integration of Sensors and Actuators with Arduino, Raspberry Pi, Implementation of IoT with Raspberry Pi.

UNIT V: Internet of Medical Things

Data Confidentially, Data Integrity, Data Protection, Security awareness, Emergent threats: Autonomous, IoT heterogeneity and ubiquity, Physical environment.

TEXT BOOKS:

1. Dac-Nhuong Le, Emerging Technologies for Health and Medicine: Virtual Reality, Augmented Reality, Artificial Intelligence, Internet of Things, Robotics, Industry 4.0, Wiley, 2019

2. S. Misra, A. Mukherjee, and A. Roy “Introduction to IoT”. Cambridge University Press, 2017

REFERENCES: Research papers

Course Code-Predictive Analytics

Lecture – Tutorial-Practical::		3	0	0	**Internal Marks:**	30
Credits:	3				**External Marks:**	70

Prerequisites:

A strong mathematical background in probability and statistics, Proficiency with algorithms

Course Objectives:

- To learn the fundamental principles of analytics for business
- To visualize and explore data to better understand relationships among variables
- To understand the principles and techniques for predictive modeling
- To examine how predictive analytics can be used in decision making
- To apply predictive models to generate predictions for new data

Course Outcomes:

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

CO1	Understand the importance of predictive analytics
CO2	Able to prepare and process data for the models
CO3	Learn about statistical analysis techniques used in predictive models
CO4	Apply regression and classification model on applications for decision making and evaluate the performance
CO5	Build and apply time series forecasting models in a variety of business contexts

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**	PSO1	PSO2	PSO3
CO1	3	2	2	-		-	-	-	-	-	-	-	3	-	-
CO2	3	3	2	2		-	-	-	-	-	-	-	3	-	-
CO3	3	3	2	2		-	-	-	-	-	-	-	3	3	-
CO4	3	3	2	2		-	-	-	-	-	-	-	2	3	-
CO5	3	2	2	2		-	-	-	-	-	-	-	3	2	-

UNIT I :

Introduction: Introduction to predictive analytics –Business analytics: types, applications-Models: predictive models –descriptive models –decision models -applications -analytical techniques

Understanding Data: Data types and associated techniques –complexities of data –data preparation, pre-processing –exploratory data analysis

UNIT II:

Principles and Techniques: Predictive modeling: Propensity models, cluster models, collaborative filtering, applications and limitations - Statistical analysis: Uni-variate Statistical analysis, Multivariate Statistical analysis

UNIT III:

Model Selection: Preparing to modelthe data: supervised versus unsupervised methods, statistical and data mining methodology, cross-validation, overfitting, bias-variance trade-off, balancing the training dataset, establishing baseline performance.

UNIT IV:

Regression Models: Measuring Performance in Regression Models -Linear Regression and Its Cousins -Non-Linear Regression Models - Regression Trees and Rule-Based Models Case Study: Compressive Strength of Concrete Mixtures

UNIT V:

Classification Models: Measuring Performance in Classification Models -Discriminant Analysis and Other Linear Classification Models - Non-Linear Classification Models - Classification Trees and Rule-Based Models – Model Evaluation Techniques

Time Series Analysis: Time series Model: ARMA, ARIMA, ARFIMA -Temporal mining -Box Jenkinson method, temporal reasoning, temporal constraint networks

TEXT BOOKS:

1. Jeffrey Strickland, Predictive analytics using R, Simulation educators, Colorado Springs, 2015

2. Max Kuhn and Kjell Johnson, Applied Predictive Modeling, 1st edition Springer, 2013

REFERENCE BOOKS:

1. Anasse Bari, Mohamed Chaouchi, Tommy Jung, Predictive analytics for dummies, 2ndedition Wiley, 2016
2. Dinov, ID., Data Science and Predictive Analytics: Biomedical and Health Applications using R, Springer, 2018.
3. Daniel T.Larose and Chantal D.Larose, Data Mining and Predictive analytics, 2ndedition Wiley, 2015.

E-RESOURCES:

Course Code: Edge Computing

Lecture **Tutorial**	3 0	**Internal Marks:**	30
Credits	3	**External Marks:**	70

Course Objectives:

The main goal of edge computing is to reduce latency requirements while processing data and saving network costs. The edge can be the router, ISP, routing switches, integrated access devices (IADs), multiplexers, etc.

Course Outcomes:

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

CO1	Comprehend concepts Edge Computing based on sensing and Internet connectivity
CO2	Identify and describe the key architectural features of Edge Computing and their network.
CO3	Conceptualize applications implementing edge computing

CO4	Students should get introduced with an application of edge computing.
CO5	Can explain what edge computing is and devise mechanisms for distributing information and processing in an edge-cloud-environment.

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

	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO1	1	_	_	_	_	_	_	_	_	_	_	_
CO2	2	_	_	_	_	_	_	_	_	_	_	_
CO3	2	_	2	_	_	_	_	_	_	_	_	_
CO4	2	2	2	_	_	_	_	_	_	_	_	2
CO5	2	_	_	_	2	_	_	_	_	_	_	2

UNIT I

IoT and Edge Computing Definition: History and potential of IoT, IoT and Edge Computing use cases and deployment: Smart city IoT, Government and military IoT, Industry and manufacturing, Energy, Healthcare.

UNIT II

Secure Fog-Cloud of Things: Architectures, Opportunities &Challenges: IoT Architecture and Core IoT, Collaborative and Integrated Edge Security Architecture, A connected ecosystem, Threat and security in IoT.

UNIT III

Sensors, Endpoints, and Power Systems: A Systemic IoT–Fog–Cloud Architecture for Big-Data Analytics and Cyber Security Systems. Functional examples

UNIT IV

Communications theory and Information theory and the radio spectrum, Limitations of Wireless Communication.

UNIT: V

Non-IP and IP Protocols: Non-IP Based WPAN ;802.15 standards, Zigbee, Z-wave, Bluetooth. IP-Based WPAN and WLAN, TCP/IP, WPAN with IP – 6LoWPAN, IEEE 802.11 protocols and WLAN, Edge to Cloud Protocols, MQTT, Constrained Application Protocol.

TEXT BOOKS:

1. Perry Lea," IoT and Edge Computing for Architects"-second edition, Packt, March,2020.
2. Mohiuddin Ahmed (Editor), Paul Haskell-Dowland (Editor), "Secure Edge Computing: Applications, Techniques and Challenges", CRC press, first edition, August 2021.

REFERENCE BOOKS:

1. Research Articles/Papers

Course Code- Social Networking and Semantics

Lecture-Tutorial- Practical::	**3-0-0**				**Internal Marks:**	**30**
Credits:	**3**				**External Marks:**	**70**

1. Knowledge in Networks

2. Knowledge in distributed databases.

Course Objectives:

- **To learn Web Intelligence**
- **To learn Knowledge Representation for the Semantic Web**
- **To learn Ontology Engineering**
- **To learn Semantic Web Applications, Services and Technology**

Course Outcomes:

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

CO1	Understand the basics of Semantic Web and Social Networks.
CO2	Ability to understand and knowledge representation for the semantic web.
CO3	Learn the various semantic web applications.

CO4	Ability to create ontology.
CO5	Ability to build a blogs and social networks.

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**	**PS O1**	**PS O2**	**P S O 3**
CO1	3	3	2	2	-	-	-	-	-	-					
CO2	3	3	2	2	-	-	-	-	-	-	-	3	3	3	2
CO3	3	2	3	2	-	-	-	-	-	-	-	3	3	2	3
CO4	3	2	3	2	-	-	-	-	-	-	-	3	3	2	3
CO5	3	2	3	2	-	-	-	-	-	-	-	3	3	2	3

UNIT I :

Introduction to the Semantic Web and Social Networks:

The Semantic Web- Limitations of the current Web, The semantic solution, Development of the Semantic Web, The emergence of the social web.

Social Network Analysis- What is network analysis, Development of Social Network Analysis, Key concepts and measures in network analysis.

UNIT II:

Thinking and Intelligent Web Applications, The Information Age, The World Wide Web, Limitations of Today's

Web, The Next Generation Web. Machine Intelligence, Artificial Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee www, Semantic Road Map, Logic on the semantic Web.

UNIT III:

Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web –Resource Description Framework(RDF) / RDF Schema, Ontology Web Language(OWL),UML,XML/XML Schema. Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping.

UNIT IV:

Logic, Rule and Inference Engines. Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base .

XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods.

UNIT V:

What is social Networks analysis, development of the social networks analysis, Electronic Sources for Network Analysis – Electronic Discussion networks.

Blogs and Online Communities, Web Based Networks. Building Semantic Web Applications with social network features

TEXT BOOKS:

1. Thinking on the Web - Berners Lee, Godel and Turing, Wiley interscience,2008.
2. Social Networks and the Semantic Web, Peter Mika,Springer,2007

REFERENCE BOOKS:

1.Semantic Web Technologies, Trends and Research in Ontology Based Systems, J.Davies, Rudi Studer, Paul Warren, John Wiley & Sons.

2.Semantic Web and Semantic Web Services -Liyang Lu Chapman and Hall/CRC Publishers,(Taylor & Francis Group)

3.Information Sharing on the semantic Web - Heiner Stuckenschmidt; Frank Van Harmelen, Springer Publications.

4.Programming the Semantic W eb, T.Segaran, C.Evans, J.Taylor,O'Reilly, SPD.

E-RESOURCES:

1. **https://www.semanticscholar.org/**
2. **https://info.sice.indiana.edu/**

IT B.TECH. IV YEAR NRIA20 REGULATIONS SYLLABUS

Course Code-Data visualization Techniques

Lecture – Tutorial-Practical::	3-0-0	**Internal Marks:**	30
Credits:	3	**External Marks:**	70

Prerequisites: Computer Graphics, and Image Processing

Course Objectives:

- To develop skills to both design and critique visualizations.
- To introduce visual perception and core skills for visual analysis.
- To understand visualization for time-series analysis.
- To understand visualization for ranking analysis.
- To understand visualization for deviation analysis.
- To understand visualization for distribution analysis.
- To understand visualization for correlation analysis.
- To understand visualization for multivariate analysis.

Course Outcomes:

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

CO1	Able to Identify and recognize visual perception and representation of data
CO2	Able to Illustrate about projections of different views of objects.
CO3	Apply various Interaction and visualization techniques
CO4	Analyze various groups for visualization.
CO5	Able to visualizations
CO6	Able to understand the importance and applications of data visualization

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	-	-	-	-	-	-	-
CO2	-	-	-	2	-	-	-	-	-	-	-	-
CO3	-	2	3	2	2	-	-	-	-	-	-	-
CO4	2	3	2	2	2	-	-	-	-	-	-	2
CO5	2	2	-	3	3	-	-	-	-	-	-	-
CO6	-	2	3	3	-	-	-	-	-	-	-	2

UNIT I: INTRODUCTION TO DATA VISUALIZATIONS AND PERCEPTION:

Introduction of visual perception, visual representation of data, Gestalt principles, Information overload..

UNIT II : VISUAL REPRESENTATIONS.

Creating visual representations, visualization reference model, visual mapping,visual analytics, Design of visualization applications

UNIT III : CLASSIFICATION OF VISUALIZATION SYSTEMS

Classification of visualization systems, Interaction and visualization techniques misleading, Visualization of one, two and multi-dimensional data, text and text documents.

UNIT IV: VISUALIZATION OF GROUPS:

Visualization of groups, trees, graphs, clusters, networks, software, Metaphorical visualization. Various visualization techniques, data structures used in data visualization.

UNIT V : VISUALIZATION OF VOLUMETRIC DATA AND EVALUATION OF VISUALIZATIONS

Visualization of volumetric data, vector fields, processes and simulations,Visualization of maps, geographic information, GIS systems, collaborative visualizations, Evaluating visualizations

TEXT BOOKS:

1.Ward, Grinstein, Keim, Interactive Data Visualization: Foundations, Techniques, and Applications. Natick, 2nd edition,A K Peters, Ltd 2015

2. Edward R. Tufte, "The visual display of quantitative information", Second Edition, Graphics Press, 2001.

1. TamaraMunzner, visualization analysis & design ,1st edition,ak peters visualization series 2014
2. Scott Murray,interactive data visualization for the web ,2nd edition, 2017

E-RESOURCES:

1. https://online.hbs.edu/blog/post/data-visualization-techniques
2.https://www.datapine.com/blog/data-visualization-techniques-concepts-and-methods/

Course Code- Universal Human Values

Lecture – Tutorial-Practical::	3-0-0	**Internal Marks:**	30
Credits:	3	**External Marks:**	70

Prerequisites: NIL

Course Objectives:

To help the student to see the need for developing a holistic perspective of life.

To sensitise the student about the scope of life – individual, family (inter-personal relationship), society and nature/existence Strengthening self-reflection.

To develop more confidence and commitment to understand, learn and act accordingly.

Course Outcomes:

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

CO1	Describe more aware of themselves, and their surroundings (family, society, nature)
CO2	Illustrate more responsibility in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind
CO3	Show better critical ability
CO4	Exhibit sensitivity to their commitment towards what they have understood (human values, human relationship and human society)
CO5	Apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

Contribution of Course Outcomes towards the 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	--	--	--	--
CO2	--	--	--	--	--	2	--	2	--	--	--	--
CO3	--	--	--	--	--	2	--	2	--	--	--	--
CO4	--	--	--	--	--	2	--	2	--	--	--	--
CO5	--	--	--	--	--	2	--	2	--	--	--	--

UNIT-1: Introduction - Need, Basic Guidelines, Content and Process for Value Education: pose and motivation for the course, recapitulation from Universal Human Values-I, Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self- exploration, Continuous Happiness and Prosperity- A look at basic Human Aspirations, Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority, Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario, Method to fulfil the above human aspirations: understanding and living in harmony at various levels

UNIT-2: Understanding Harmony in the Human Being - Harmony in Myself! Understanding human being as a co-existence of the sentient 'I' and the material 'Body', Understanding the needs of Self ('I') and 'Body' - happiness and physical facility, Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer),Understanding the characteristics and activities of 'I' and harmony in 'I', Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure Sanyam and Health

UNIT-3: Understanding Harmony in the Family and Society- Harmony in HumanHuman Relationship: Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship. Understanding the meaning of Trust; Difference between intention and competence, Understanding the meaning of Respect,Difference between respect and differentiation; the other salient values in relationship, Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co- existence as comprehensive Human Goals, Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family

UNIT-4: Understanding Harmony in the Nature and Existence - Whole existence as Coexistence: Understanding the harmony in the Nature, Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self regulation in nature, Understanding Existence as Co-existence of mutually interacting units in all- pervasive space, Holistic perception of harmony at all levels of existence

Unit –V: Implications of the above Holistic Understanding of Harmony on Professional Ethics: Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order, Competence in professional ethics: Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems. Case studies of typical holistic technologies, management models and production systems, Strategy for transition fromthe present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and

organizations

TEXTBOOKS:

Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books,New Delhi, 2010

REFERENCE BOOKS:

JeevanVidya: EkParichaya by ANagaraj, JeevanVidyaPrakashan, Amarkantak, 1999. 2. HumanValues by A.N.Tripathi,NewAgeIntl.Publishers,NewDelhi,2004.

The Story of Stuff(Book).

4.TheStoryofMyExperimentswithTruth – byMohandas Karamchand Gandhi

FUNCTIONAL ENGLISH FOR 21st CENTURY LEARNING

UNIT – I

NATURE OF TECHNICAL COMMUNICATION – Introduction – The Process of Communication – Levels of Communication – The Flow of Communication – Importance of Technical Communication – Skills required for Communication – Barriers to Communication – Style in Technical Communication

UNIT – II

FUNCTIONAL GRAMMAR – MajorTense forms – Active & Passive Voice – Reported Speech – Concord – Types of Sentences based on Clauses – Transformation of Sentences – Tag Questions – Connectives

UNIT – III

VERBAL COMMUNICATION – Basics of Verbal Communication – Working with Customers – Formal Communication Skills – Informal Communication – Making Formal Presentations – Interviews – Group Discussions

WRITTEN COMMUNIATION – Techniques of Clear Writing – E-mail & Memo Writing, Developing Reports & Proposals, Writing for Employment, Professional Communication

UNIT – IV

21st CENTURTY LEARNING SKILLS – Critical Thinking – Creativity – Collaboration – Lateral Thinking – Disruptive Thinking – Decision Making

UNIT – V

21st CENTURY LITERACY AND LIFE SKILLS – Information Literacy – Media Literacy – Technology Literacy **–** Flexibility – Leadership – Initiative – Productivity – Self Management

Books for Reference:

1. Technical Communication – Principles and Practice, Meenakshi Raman & Sangeeta Sharma, Oxford University Press
2. Effective Communication Skills, Kulbhushan Kumar, Khanna Publishing House, Delhi
3. Communication Skills, Pushpalata, Sanjay Kumar, Oxford University Press
4. Effective Technical Communication by M. Ashraf Rizvi
5. 21st Century Skills and Education, Rajak Anupam, LAP Lambert Academic Publishing
6. The Seven Habits of Highly Effective People, Stephen Covey, Robert Publishers

Course Code-Data Visualization Lab

Lecture – Tutorial-Practical::	0-1-2	**Internal Marks:**	15
Credits:	1	**External Marks:**	35

Prerequisites: SQL, Excel and programming languages like Python/R etc

Course Objectives:

To develop skills to both design and critique visualizations, visual perception and core skills for visual analysis and correlation analysis.To understand issues and best practices in information dashboard design.

Course Outcomes:

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

CO1	Able to apply different data visualization techniques on real time data
CO2	Able to understand the importance and applications of data visualization
CO3	Design information dashboard

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	-	-	-	-	-	-	-	-
CO2	-	2	2	-	-	-	-	-	-	-	2	2
CO3	3	-	-	2	2	-	-	-	-	-	2	2

List of Programs

Experiment – 1: Visualization of Spreadsheet Models.

Experiment – 2: Oracle Database Connectivity using Python.

Experiment – 3: Visualization of Semi-Structured Data.

Experiment – 4: Introduction to Tableau and Aggregation Methods in Tableau.

Experiment – 5: Visual Encodings and Basic Dashboards in Tableau.

Experiment – 6: Interactive Plots in Python

Experiment – 6: Data Visualization using WEKA TOOL

TEXT BOOKS:

1.Stephen Few, "Information dashboard design: Displaying data for at-a-glance monitoring", second edition, Analytics Press, 2013.

2.Stephen Few, "Now you see it: Simple Visualization techniques for quantitative analysis", Analytics Press, 2009.

3.Tamara Munzner, Visualization Analysis and Design, AK Peters Visualization Series, CRC Press, Nov. 2014

E-RESOURCES:

1. https://online.hbs.edu/blog/post/data-visualization-techniques

2.https://www.datapine.com/blog/data-visualization-techniques-concepts-and-methods/