COURSE STRUCTURE
& DETAILED SYLLABUS

(R19 Regulation) For

Bachelor of Technology

I, II, III & IV B. Tech. (CSE)

(Applicable for Batches Admitted from 2019-2020)

Department of

COMPUTER SCIENCE & ENGINEERING

(Applicable for Batches Admitted from 2019-2020)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
UNIVERSITY COLLEGE OF ENGINEERING VIZIANAGARAM
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
VIZIANAGARAM - 535003, Andhra Pradesh, India

Department of Computer Science and Engineering
University College of Engineering Vizianagaram
R19 Course Structure
Programme: B.Tech (Computer Science and Engineering)

I YEAR I SEMESTER							
S.No	**Course Code**	**Courses**	**PO's**	**L**	**T**	**P**	**C**
		Theory					
1	HS1101	Communicative English		3	0	0	3
2	BS1101	Calculus		3	0	0	3
3	BS1103	Applied Physics		3	0	0	3
4	ES1101	Essentials of Electrical & Electronics Engineering		3	0	0	3
5	ES1101	Fundamentals of Computer Science		3	0	0	3
		Labs					
6	HS1102	English Communication Skills Lab		0	0	3	1.5
7	BS1104	Applied Physics Lab		0	0	3	1.5
8	BS1105	Applied Physics Virtual Lab		0	0	2	0
9	ES1104	IT Workshop		0	0	2	1
10	ES1105	Essentials of Electrical & Electronics Engineering Lab		0	0	3	1.5
		Mandatory Courses					
11	MC1101	Professional Ethics & Human Values		3	0	0	0
			Total	18	0	13	20.5

I YEAR II SEMESTER							
S.No	**Course Code**	**Courses**	**PO's**	**L**	**T**	**P**	**C**
		Theory					
1	BS1201	Linear Algebra and Numerical Methods		3	0	0	3
2	ES1202	Digital Logic Design		3	0	0	3
3	BS1202	Applied Chemistry		3	0	0	3
4	ES1201	Problem Solving and Programming using C		3	0	0	3
5	ES1203	Engineering Drawing		1	0	3	2.5
		Labs					
6	HS1201	Advanced Communication Skills Lab		0	0	3	1.5
7	BS1203	Applied Chemistry Lab		0	0	3	1.5
8	ES1203	Problem Solving and Programming using C Lab		0	0	3	1.5
9	PR1201	Engineering Exploration Project - Design Thinking (15 Hrs per Sem.)		0	0	0	0.5
		Mandatory Courses					
10	MC1201	Constitution of India		3	0	0	0
11	MC1202	Physical Fitness Activities/Yoga		2	0	0	0
			Total	18	0	12	19.5

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II YEAR I SEMESTER							
S.No	**Course Code**	**Courses**	**PO's**	**L**	**T**	**P**	**C**
		Theory					
1	BS2101	Discrete Mathematical Structures		3	0	0	3
2	CS2102	Principles of Programming Languages		3	0	0	3
3	ES2101	Python Programming		2	1	0	3
4	CS2103	Data Structures		3	0	0	3
5	CS2104	Computer Organization and Architecture		3	0	0	3
6	HS2101	Managerial Economics and Financial Accountancy		3	0	0	3
		Labs					
7	ES2102	Python Programming Lab		0	0	2	1
8	CS2105	Data Structures Lab		0	0	3	1.5
		Mandatory Courses					
9	MC2101	Essence of Indian Traditional Knowledge		3	0	0	0
10	MC2101	IPR & Patents		3	0	0	0
11	MC2102	Employability Skills-I		3	0	0	0
			Total	26	01	06	20.5

II YEAR II SEMESTER							
S.No	**Course Code**	**Courses**	**PO's**	**L**	**T**	**P**	**C**
		Theory					
1	BS2202	Probability & Statistics		3	0	0	3
2	CS2201	Object Oriented Programming		2	1	0	3
3	CS2202	Operating Systems		3	0	0	3
4	CS2203	Data Base Management Systems		3	0	0	3
5	CS2204	Formal Languages and Automata Theory		3	0	0	3
		Lab					
6	CS2205	Java Programming Lab		0	0	3	1.5
7	CS2206	Operating Systems Lab		0	0	3	1.5
8	CS2207	Data Base Management Systems Lab		0	0	3	1.5
		Mandatory Courses					
9	MC2201	Professional Ethics & Human Values		3	0	0	0
10	MC2202	Environmental Science		3	0	0	0
			Total	20	01	09	19.5

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III YEAR I SEMESTER							
S.No	**Course Code**	**Courses**	**PO's**	**L**	**T**	**P**	**C**
1	CS3101	Design and Analysis of Algorithms		3	0	0	3
2	CS3102	Computer Networks		3	0	0	3
3	CS3103	Compiler Design		3	0	0	3
4	CS3104	Data Warehousing and Data Mining		3	0	0	3
5	PE3101	**Professional Elective-I** 1.Computer Graphics 2.Functional Programming 3.NoSql Data Bases 4.Advanced Data Structures 5.Advanced Computer Architecture 6. Mean Stack Technologies		3	0	0	3
6	CS3105	Computer Networks Lab		0	0	3	1.5
7	CS3106	Data Mining Lab		0	0	3	1.5
8	CS3107	Compiler Design Lab		0	0	2	1
9	MC3101	Employability Skills-II		3	0	0	0
10	PR3101	Socially Relevant Projects (15Hrs/Sem)		0	0	0	0.5
			Total	15	0	08	19.5

III YEAR II SEMESTER							
S.No	**Course Code**	**Courses**	**PO's**	**L**	**T**	**P**	**C**
1	CS3201	Web Essentials & Services		3	0	0	3
2	CS3201	Artificial Intelligence		3	0	0	3
3	CS3203	Software Engineering		3	0	0	3
4	HS3201	Management and Organizational Behavior		3	0	0	3
5	PE3201	**Professional Elective-II *** (MOOCS Using /NPTEL/SWAYAM) Duration:12 Weeks Minimum		3	0	0	3
6	OE3201	**Open Elective-I**(Inter Disciplinary)		3	0	0	3
7	CS3204	Web Essentials and Services Lab		0	0	3	1.5
8	CS3207	AI Tools & Techniques Lab		0	0	3	1.5
9	PR3201	Industrial Training/Internship/ Research Projects in National Laboratories/Academic Institutions		0	0	0	1.5
			Total	18	00	06	22.5

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IV YEAR I SEMESTER							
S.No	**Course Code**	**Courses**	**PO's**	**L**	**T**	**P**	**C**
1	CS4101	Cryptography and Network Security		3	0	0	3
2	CS4102	UML & Design Patterns		3	0	0	3
3	CS4103	Machine Learning		3	0	0	3
4	OE4101	**Open Elective-II** (Inter Disciplinary)		3	0	0	3
5	PE4101	**Professional Elective-III** 1.Mobile Computing 2.Data Science 3.Computer Vision 4.Internet of Things 5.Software Project Management 6. Program Analysis		3	0	0	3
6	PE4102	**Professional Elective-IV** 1.Software Testing Methodologies 2.Parallel Computing 3.Social Networks & Semantic Web 4.Ad-hoc and Sensor Networks 5.CyberSecurity & Forensics 6. Devops		3	0	0	3
7	CS4104	UML Lab		0	0	3	1.5
8	PR4101	Project-I		0	0	0	1.5
			Total	18	0	03	21

IV YEAR II SEMESTER							
S.No	**Course Code**	**Courses**	**PO's**	**L**	**T**	**P**	**C**
1	CS4201	Cloud Computing		3	0	0	3
2	OE4201	**Open Elective-III** (Inter Disciplinary)		3	0	0	3
3	PE4201	**Professional Elective-V** 1.Deep Learning 2. Big Data Analytics 3.Natural Language Processing 4.Block Chain Technologies 5.Distributed Systems 6. Quantum Computing		3	0	0	3
4	PR4201	Project-II		0	0	15	8
			Total	09	00	00	17

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Open Electives to be offered by CSE for Other Branches:

Open Elective I:	**Open Elective II:**
1. Data Structures 2 .C++Programming 3. Computer Organization 4. Python Programming 5.Scripting Languages 6. Program Analysis	1. Operating Systems 2. Computer Networks 3. Image Processing 4. UNIX & Shell Programming 5. Fundamentals of Cloud Computing 6.Fundamentals of Information Security
Open Elective III: 1.Big Data Analytics 2. Block Chain Technologies 3.Cyber Security 4.Web services 5. Quantum Computing 6. Mean Stack Technologies 7. Devops	

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Open Electives to be offered by other Departments for Computer Science & Engineering:

Civil Engineering 1. Environmental Pollution and Control 2. Disaster Management 3. Industrial Water & Waste Management 4. Environmental and Industrial Hygiene	**Mechanical Engineering** 1. Industrial Robotics
Electrical and Electronics Engineering 1. Control Systems 2. Power Electronics 3. Electric Drives 4. Renewable Energy Sources 5. Smart Grids 6. Programmable Logic Controller and Applications 7. Power Systems for Data Centers 8. Hybrid Electrical Vehicles	**Electronics & Communication Engineering** 1.Information Theory and Coding 2.VLSI Design 3.Signals & Systems 4.Digital Signal Processing 5.Electro Magnetic Interface/ Electro Magnetic Compatibility 6.Wireless Communication Networks

Information Technology **Open Elective I:** 1.Java Programming 2.Database Management Systems 3.Computer Graphics 4. Principle of Software Engineering 5.Web Technologies **Open Elective II:** 1. Soft Computing 2. Machine Learning 3. AI Tools & Techniques 4. Pattern Recognition 5 Mobile Application Development **Open Elective III:** 1. Data Science 2.Internet of Everything 3.Sensor Networks 4. R programming 5.Digital Marketing &Multimedia	

B. Tech (Computer Science and Engineering) - R19 Syllabus

University College of Engineering Vizianagaram
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

		L	T	P	C
I Year-I Semester		**3**	**0**	**0**	**3**
Communicative English					

Introduction

The course is designed to train students in receptive (listening and reading) as well as productive and interactive (speaking and writing) skills by incorporating a comprehensive, coherent and integrated approach that improves the learners' ability to effectively use English language in academic/ workplace contexts. The shift is from *learning about the language* to *using the language*. On successful completion of the compulsory English language course/s in B.Tech., learners would be confident of appearing for international language qualification/proficiency tests such as IELTS, TOEFL, or BEC, besides being able to express themselves clearly in speech and competently handle the writing tasks and verbal ability component of campus placement tests. Activity based teaching-learning methods would be adopted to ensure that learners would engage in actual use of language both in the classroom and laboratory sessions.

Course Objectives:

i. Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers
ii. Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
iii. Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations
iv. Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information
v. Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing

Syllabus:

Unit I:

Lesson-1: A Drawer full of happiness from "**Infotech English**", Maruthi Publications

Lesson-2: Deliverance by Premchand from "**The Individual Society",** Pearson Publications. (Non-detailed)

Listening: Listening to short audio texts and identifying the topic. Listening to short audio texts and identifying the context and specific pieces of information to answer a series of questions both in speaking and writing.

Speaking: Asking and answering general questions on familiar topics such as home, family, work, studies and interests. Self introductions and introducing others.

Reading: Skimming text to get the main idea. Scanning to look for specific pieces of information.

Reading for Writing: Paragraph writing (specific topics) using suitable cohesive devices; linkers, sign posts and transition signals; mechanics of writing - punctuation, capital letters.

Vocabulary: Technical vocabulary from across technical branches (20) GRE Vocabulary (20) (Antonyms and Synonyms, Word applications) Verbal reasoning and sequencing of words.
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.
Pronunciation: Vowels, Consonants, Plural markers and their realizations

Unit II:
Lesson-1: Nehru's letter to his daughter Indira on her birthday from "**Infotech English**", Maruthi Publications
Lesson-2: Bosom Friend by Hira Bansode from "**The Individual Society",** Pearson Publications. (Non-detailed)
Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts, both in speaking and writing.
Speaking: Discussion in pairs/ small groups on specific topics followed by short structured talks. Functional English: Greetings and leave takings.
Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.
Reading for Writing: Summarizing - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions.
Vocabulary: Technical vocabulary from across technical branches (20 words). GRE Vocabulary Analogies (20 words) (Antonyms and Synonyms, Word applications)
Grammar: Use of articles and zero article; prepositions.
Pronunciation: Past tense markers, word stress-di-syllabic words

Unit III:
Lesson-1: Stephen Hawking-Positivity 'Benchmark' from "**Infotech English**", Maruthi Publications
Lesson-2: Shakespeare's Sister by Virginia Woolf from "**The Individual Society",** Pearson Publications. (Non-detailed**)**
Listening: Listening for global comprehension and summarizing what is listened to, both in speaking and writing.
Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed. Functional English: Complaining and Apologizing.
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.
Reading for Writing: Summarizing - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions. Letter writing-types, format and principles of letter writing. E-mail etiquette, Writing CV's.
Vocabulary: Technical vocabulary from across technical branches (20 words). GRE Vocabulary (20 words) (Antonyms and Synonyms, Word applications) Association, sequencing of words
Grammar: Verbs - tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.
Pronunciation: word stress-poly-syllabic words

Unit IV:

Lesson-1: Liking a Tree, Unbowed: Wangari Maathai-biography from "**Infotech English**", Maruthi Publications

Lesson-2: Telephone Conversation-Wole Soyinka from "**The Individual Society",** Pearson Publications**.** (Non-detailed)

Listening: Making predictions while listening to conversations/ transactional dialogues without video (only audio); listening to audio-visual texts.

Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions. Functional English: Permissions, Requesting, Inviting.

Reading: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicative process or display complicated data.

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.

Vocabulary: Technical vocabulary from across technical branches (20 words) GRE Vocabulary (20 words) (Antonyms and Synonyms, Word applications) Cloze Encounters.

Grammar: Quantifying expressions - adjectives and adverbs; comparing and contrasting; degrees of comparison; use of antonyms

Pronunciation: Contrastive Stress

Unit V:

Lesson-1: Stay Hungry-Stay foolish from "**Infotech English**", Maruthi Publications

Lesson-2: Still I Rise by Maya Angelou from "**The Individual Society",** Pearson Publications. (Non-detailed)

Listening: Identifying key terms, understanding concepts and interpreting the concepts both in speaking and writing.

Speaking: Formal oral presentations on topics from academic contexts - without the use of PPT slides. Functional English: Suggesting/Opinion giving.

Reading: Reading for comprehension. RAP Strategy Intensive reading and Extensive reading techniques.

Reading for Writing: Writing academic proposals- writing research articles: format and style.

Vocabulary: Technical vocabulary from across technical branches (20 words) GRE Vocabulary (20 words) (Antonyms and Synonyms, Word applications) Coherence, matching emotions.

Grammar: Editing short texts – identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)

Pronunciation: Stress in compound words

Course Outcomes:

At the end of the module, the learners will be able to

i. understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information
ii. ask and answer general questions on familiar topics and introduce oneself/others
iii. employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information
iv. recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs form sentences using proper grammatical structures and correct word forms

Prescribed Text Books:

1. "Infotech English", Maruthi Publications. (Detailed)

2. "The Individual Society", Pearson Publications. (Non-detailed)

Prescribed text book for Laboratory for Semesters-I & II:

1. "Infotech English", Maruthi Publications. (with Compact Disc)

Reference Books

- Bailey, Stephen. *Academic writing: A handbook for international students*. Routledge, 2014.
- Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking.* Heinley ELT; 2nd Edition, 2018.
- Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
- Hewings, Martin. *Cambridge Academic English (B2)*. CUP, 2012.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

		L	T	P	C
I Year-I Semester		**3**	**0**	**0**	**3**
Calculus					

Course Objectives:

i. This course will illuminate the students in the concepts of calculus.
ii. To enlighten the learners in the concept of differential equations and multivariable calculus.
iii. 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.

Syllabus:

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

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.

UNIT II: Differential equations: (15 hrs)

Linear differential equations – Bernoulli's equations – Exact equations and equations reducible to exact form – Non-homogeneous 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

Applications: Orthogonal trajectories – Electrical circuits (RL, RC, RLC) – Simple Harmonic motion.

UNIT III: Partial differentiation: (10 hrs)

Introduction – Homogeneous function – Euler's theorem – Total derivative – Chain rule – Jacobian – Functional dependence – Taylor's and Mc Laurent's series expansion of functions of two variables.

Applications: Maxima and Minima of functions of two variables without constraints and Lagrange's method (with constraints).

UNIT IV: Multiple integrals: (8 hrs)

Double and Triple integrals – Change of order of integration – Change of variables.

Applications: Finding Areas and Volumes.

UNIT V: Special functions: (5 hrs)

Introduction to Improper Integrals-Beta and Gamma functions- Properties - Relation between Beta and Gamma functions- Evaluation of improper integrals.

Course Outcomes:

At the end of the course, the student will be able to

- utilize mean value theorems to real life problems
- solve the differential equations related to various engineering fields
- familiarize with functions of several variables which is useful in optimization
- apply double integration techniques in evaluating areas bounded by region
- students will also learn important tools of calculus in higher dimensions.
- Students will become familiar with 2- dimensional and 3-dimensional coordinate systems
- conclude the use of special function in multiple integrals

Text Books:

1. **B. S. Grewal,** Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2. **Erwin Kreyszig,** Advanced Engineering Mathematics, 10th Edition, Wiley-India.

Reference Books:

1. **B. V. Ramana,** Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.
2. **Joel Hass, Christopher Heil and Maurice D. Weir,** Thomas calculus, 14th Edition, Pearson.
3. **Lawrence Turyn,** Advanced Engineering Mathematics, CRC Press, 2013.
4. **Srimantha Pal, S C Bhunia,** Engineering Mathematics, Oxford University Press.

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		L	T	P	C
I Year-I Semester		**3**	**0**	**0**	**3**
Applied Physics					

The designed curriculum, encompassing the fundamental concepts of physical optics, electromagnetism and properties of materials, caters to the needs of ECE, CSE, EEE and IT students who require a basic understanding of the advanced courses in their respective branches.

Course Objectives:

i. To **impart** knowledge in basic concepts of physics like physical optics, electromagnetism and optical fibres to understand the wave properties in the communication system.
ii. To **impart** knowledge concerning the electrical behaviour of dielectric materials.
iii. To **demonstrate** the properties of magnets.
iv. To **introduce** semiconductor physics to understand the charge carrier transport mechanism.

Syllabus:

UNIT-I: Wave Optics **(10hrs)**

Interference: Principle of Superposition - Coherent Sources - Interference of Light - Interference in Thin Films (Reflected Geometry) - Newton's Rings.

Diffraction: Fraunhofer Diffraction - Fraunhofer Diffraction at a Single Slit (Qualitative) - Diffraction Grating - Grating Spectrum Analysis (Qualitative) - Resolving Power - Rayleigh's Criterion - Resolving Power of Grating.

Polarization: Polarization by Reflection - Double Refraction - Nicol Prism - Half Wave Plate and Quarter Wave Plate.

UNIT-II: Quantum Mechanics and Free Electron Theory **(9hrs)**

Quantum Mechanics: Introduction - de Broglie Hypothesis - Matter Waves and Properties - Interpretation of Wave Function - Schrödinger Time Independent and Time Dependent Wave Equations - Particle in a Box.

Free Electron Theory: Classical Free Electron Theory, Quantum Free Electron Theory and Band Theory of Solids (Postulates and Drawbacks) - Fermi Dirac Distribution Function and Temperature Dependence - Bloch's Theorem (Qualitative) - The Kronig – Penney Model (Qualitative) - Classification of Solids.

UNIT-III: Electromagnetism and Fibre Optics (9hrs)

Electromagnetism: Scalar and Vector Fields - Divergence and Curl of Electric and Magnetic fields - Gauss and Stokes Theorems (Statements) - Maxwell's Equations (Integral and Differential forms) - Electromagnetic Wave Propagation (Conducting and Non Conducting Media).

Fibre optics: Total Internal Reflection - Acceptance Angle - Numerical Aperture - Classification of Fibers Based on Refractive Index Profile and Modes - Block Diagram of Fiber Optic Communication.

UNIT-IV: Semiconductor Physics: (10hrs)

Intrinsic Semiconductors - Density of Charge Carriers - Electrical Conductivity - Extrinsic Semiconductors – P-type & N-type - Density of Charge Carriers - Dependence of Fermi Energy on Carrier Concentration and Temperature - Direct and Indirect Band Gap Semiconductors - Hall Effect - Hall Coefficient - Applications of Hall Effect - Drift and Diffusion Currents - Einstein's Relation.

UNIT-V: Magnetic and Dielectric Materials (10 hrs)

Magnetic Materials: Introduction - Magnetic Dipole Moment - Magnetization - Magnetic Susceptibility and Permeability - Origin of Permanent Magnetic Moment - Classification of Magnetic Materials - Domain Concept of Ferromagnetism - Hysteresis - Soft and Hard Magnetic Materials.

Dielectric Materials: Introduction - Dielectric Polarization - Dielectric Polarizability - Susceptibility and Dielectric Constant - Electronic and Ionic Polarizations (Quantitative) – Orientation Polarization (Qualitative) - Lorentz Field - Claussius–Mossotti Equation - Frequency Dependence of Polarization.

Course outcomes

The students will be able to

i. **understand** the concepts of physical optics through the wave nature of light
ii. **analyze** the phenomenal differences between interference and diffraction through applications
iii. **apply** the fundamental laws of electricity and magnetism to currents and propagation of EM waves in different media
iv. **identify** the mechanisms of polarization in dielectrics and magnetic materials, conduction in semiconductors and propagation of light in optical fibers
v. **explain** the principles of physics in dielectrics, magnetic materials and semiconductors useful to engineering applications
vi. **interpret** the effects of temperature on Fermi Dirac distribution function
vii. **summarize** various free electron theory models and classification of solids based on band theory

Text books

1. M.N. Avadhanulu, P.G.Kshirsagar "A Text book of Engineering Physics", 11th ed., S. Chand Publications, 2019
2. S.O. Pillai, Solid State Physics 8th ed., New Age International, 2018

Reference books

1. Ajoy Ghatak, "Optics", 6th Edition McGraw Hill Educaiton, 2017
2. David J. Griffiths, "Introduction to Electrodynamics"- 4/e, Pearson Education, 2014
3. Charles Kittel "Introduction to Solid State Physics", Wiley Publications, 2011
4. Gerd Keiser "Optical Fiber Communications"- 4/e, Tata Mc Graw Hill, 2008
5. S.M. Sze "Semiconductor devices-Physics and Technology" - Wiley, 2008

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		L	T	P	C
I Year-I Semester		**3**	**0**	**0**	**3**
Essentials of Electrical and Electronics Engineering					

Preamble:
This course covers the topics related to analysis of various electrical circuits, operation of various electrical machines and electronic components to perform well in their respective fields.

Course objectives:

i. To learn the basic principles of electrical circuital law's and analysis of networks.
ii. To understand principle of operation and construction details of DC machines & Transformers.
iii. To understand principle of operation and construction details of alternator and 3-Phase induction motor.
iv. To study operation of PN junction diode, half wave, full wave rectifiers and OP-AMPs.
v. To learn operation of PNP and NPN transistors and various amplifiers.

Syllabus:

Unit - I

Electrical Circuits

Basic definitions – types of network elements – Ohm's Law – Kirchhoff's Laws – inductive networks – capacitive networks – series – parallel circuits – star-delta and delta-star transformations-Numerical Problems.

Unit - II

DC Machines

Principle of operation of DC generator – EMF equation – types of DC machines – torque equation – applications – three point starter – speed control methods of DC motor – Swinburne's Test-Numerical Problems.

Unit - III

AC Machines:

Transformers

Principle of operation and construction of single phase transformers – EMF equation – Losses – OC & SC tests – efficiency and regulation-Numerical Problems.

AC Rotating Machines

Principle of operation and construction of alternators – types of alternators –Regulation of alternator by synchronous impedance method- principle of operation of synchronous motor – principle of operation of 3-Phase induction motor – slip-torque characteristics – efficiency – applications-Numerical Problems.

Unit IV

Rectifiers and Linear ICs and Transistors

PN junction diodes – diode applications (half wave and bridge rectifiers).Characteristics of operation amplifiers (OP-AMP) – application of OP-AMPs (inverting, non-inverting, integrator and differentiator) -Numerical Problems.

Unit V

Transistors

PNP and NPN junction transistor, transistor as an amplifier – transistor amplifier – frequency response of CE amplifier – concepts of feedback amplifier-Numerical Problems.

Course Outcomes:

The student should be able to:

i. Analyse various electrical networks.
ii. Understand operation of DC generators,3-point starter and DC machine testing by Swinburne's Test.
iii. Analyse performance of single-phase transformer.
iv. Explain operation of 3-phase alternator and 3-phase induction motors.
v. Analyse operation of half wave, full wave bridge rectifiers and OP-AMPs and Explain single stage CE amplifier and concept of feedback amplifier.

Text Books:

1. Electrical Technology by Surinder Pal Bali, Pearson Publications.
2. Electronic Devices and Circuits by R.L. Boylestad and Louis Nashelsky, 9th edition, PEI/PHI 2006.

Reference Books:

1. Electrical Circuit Theory and Technology by John Bird, Routledge Taylor &Francis Group
2. Basic Electrical Engineering by M.S.Naidu and S.Kamakshiah, TMH Publications
3. Fundamentals of Electrical Engineering by Rajendra Prasad, PHI Publications,2nd edition
4. Basic Electrical Engineering by Nagsarkar, Sukhija, Oxford Publications,2nd edition
5. Industrial Electronics by G.K. Mittal, PHI.

B. Tech (Computer Science and Engineering) - R19 Syllabus

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		L	T	P	C
I Year-I Semester		3	0	0	3
Fundamentals of Computer Science					

Course Objectives:

i. Understand how a computer works.
ii. An introduction to the fundamentals of Hardware, Software and Programming.
iii. Understand and apply basic programming concepts for solving real-world problems.
iv. Design animations and mobile applications through Visual Programming.

Syllabus:

UNIT-I :

Introduction to Computers

Characteristics of Computers, History of Computers, Generations of Computers, Classification of Computers, Components of Computer, Applications of Computer.

Basic Computer Hardware: CPU, Memory Unit, Instructions and Interconnections.

Computer Memory: Memory Hierarchy, Cache Memory, Primary Memory, Secondary Memory, Types of Storage Devices.

Input-Output devices: Human Data Entry Devices, Source Data Entry Devices, Output Devices.

UNIT-II:

Interaction of User and Computer

Types of Software, System Software, Operating Systems, Device Drivers, Utility Software, Application Software, Different Levels of Programming Languages, Translation Software, Linkers and Loaders.

Operating Systems: Objectives of OS, Types of OS, Functions of OS, User Interface.

Internet: History of Internet, Internet Architecture, Managing the Internet, IP Address, Internet Services and Uses.

UNIT-III:

Basics of Programming

Program Development Life Cycle, Algorithm, Control Structures, Flowchart, Pseudo Code, Programming Paradigms.

Scratch:

Introduction to Scratch, Stages, Sprites and Scripts, Motion Blocks, Customizing Sprites and Costumes, Sound Blocks.

UNIT-IV:

Programming with Scratch

Variables, Random Numbers, Arithmetic, Logical and Relational Operators, Iteration and Conditional Blocks, Cloning, Event Handling, Lists, Handling Multiple Sprites, Messages, Procedures, User Defines Blocks.

UNIT-V:

Mobile App Development

Introduction to App Inventor, Building Drawing and Animated Apps, Building Texting and Location Aware Apps, Building Information Apps.

Course Outcomes:

i. Understand the fundamental hardware components that make up a computer's hardware and the role of each of component.
ii. Understand the difference between an operating system and an application program, and manage them.
iii. Design simple animations and games using Scratch.
iv. Develop simple mobile applications using App Inventor.

Text Books:

1. Computer Fundamentals,1e, Anita Goel, Pearson Education.
2. Scratch Programming for Logic Building, 1e, Kamal Rawat, BPB Publications.
3. App Inventor 2: Create Your Own Android Apps, David Wolber, Hal Abelson, Ellen Spertus, Liz Looney, O'Reilly.

References:

1. Introduction to Computers, 6e, Peter Norton, Tata McGraw-Hill.
2. https://scratch.mit.edu/
3. https://csfirst.withgoogle.com
4. http://www.appinventor.org/ book2

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		L	T	P	C
I Year-I Semester		**0**	**0**	**3**	**1.5**
English Communicative Skills Lab-I					

UNIT I:

Pronunciation-Vowels, Consonants

Oral Activity: JAM

UNIT II:

Pronunciation: Consonants

Oral Activity: Past tense markers

UNIT III:

Pronunciation: Word Stress

Oral Activity: Hypothetical Situations

UNIT IV:

Pronunciation: Disyllabic words, polysyllabic words

Oral Activity: Self /Peer profile

UNIT V: Common Errors in Pronunciation
Neutralizing Accent

Prescribed text book: Phonetic Transcription

1. "**Infotech English**", Maruthi Publications.

References 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.

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		L	T	P	C
I Year-I Semester		**0**	**0**	**3**	**1.5**
Applied Physics Lab **(Any 10 of the following listed 15 experiments)**					

LIST OF EXPERIMENTS:

1. V-I Characteristics of a PN junction diode
2. Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus
3. Energy Band gap of a Semiconductor - PN junction diode
4. RC circuit – time constant
5. Newton's rings – Radius of Curvature of Plano - Convex Lens
6. V-I Characteristics of a Zener junction diode
7. Diffraction Grating - Normal Incidence
8. Dielectric Constant of different materials
9. Planck's constant using photocell
10. LCR- series resonance circuit
11. Thickness of a Spacer Using wedge Film and Parallel Interference Fringes
12. Resistivity of semiconductor by Four probe method
13. B-H curve
14. Dispersive power of diffraction grating
15. Hall Effect

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		L	T	P	C
I Year-I Semester		**0**	**0**	**2**	**0**
Applied Physics Virtual Lab					

LIST OF EXPERIMENTS:

1. Brewster's Angle
2. Stopping Potential using The Photo Electric Current
3. Hall Effect
4. Numerical Aperture and Acceptance Angle - Optical Fiber
5. Acoustic Grating
6. Resistivity of Semiconductors by Four Probe Method
7. To Understand The Barkhausen Effect
8. Reduction Factor of The Given Tangent Galvanometer
9. B-H Curve
10. Refractive Index of a Given Liquid using Newton’s Rings Experiment

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		L	T	P	C
I Year-I Semester		**0**	**0**	**2**	**1**
IT Workshop					

Course Objectives:

i. To Make the Students Aware of the Basic Hardware Components of a Computer and Installation of Operating System.
ii. Understand the Basic Components and Peripherals of a Computer.
iii. To Become Familiar in Configuring a System.
iv. To Demonstrate the Use of Office Tools.
v. To Introduce Raptor Tool.
vi. To Introduce Programming Through Visual Programming Tool – Scratch.
vii. To Build Mobile Applications.

List of Experiments:

Week1:
Inside a Computer Cabinet:

1. Demonstration of Hardware Components of a Computer.

Week2:
Demonstration of Operating System:

2. Working with Different Operating Systems (Windows 7/10, Ubuntu).
3. Managing Files and Directories.
4. Software Installation.

Week3:
Text Editing (MS-Word/Open Office/Latex)

5. Creating Bio-Data.
6. Sample Time Table creation.

Week4:
Presentations (Ms-PowerPoint/ Open Office/Latex)

7. Simple presentation about your family/Village.
8. Creating a Digital Story with Animations.
9. Finding IP address and connecting to the Internet.

Week5:
Spreadsheets (Ms-Excel/ Open Office)

10. Student Result data creation and Analysis.
11. Representation of student data using different charts.
12. Communicating with e-mail.

Week6:

Drawing Flowcharts (Raptor Tool)

13. Create flow charts for takeoff and landing of an Aeroplane.
14. Create flow chart for sieve of Eratosthenes.
15. Create a flowchart to validate an email id entered by user.

Week7:

Building Animations (Scratch)

16. Create an animation to make a sprite dance for music.
17. Create an animation for the fall of Humpty Dumpty.
18. Create an animation to move a sprite in rectangular path with sprite growing while moving horizontally and shrinking while moving vertically.

Week8:

Building Animations (Scratch)

19. Create an animation that draws a polygon of given number of sides.
20. Create a Scratch script to compute distance between two points taking input from the user (Pythagorean Theorem).
21. Create an animation to draw 100 random sized circles on screen at random positions.

Week9:

Building Animations (Scratch)

22. Create a music band animation with multiple instruments.
23. Create a flower garden animation with flowers of different colors.
24. Create an animation where a sprite displays 10 of your classmates' names and birthdays with delay of 10 seconds in between each name.

Week 10:

Building Animations (Scratch)

25. Create arrow shooting game with a moving target.
26. Create an animation with a balloon that moves away when mouse pointer approaches it.

Week11:

Building Animations (Scratch)

27. Create a multiuser game like Tic-Tac-Toe.

Week12:

Building Mobile Apps (App Inventor 2)

28. Develop a mobile application that allows user to draw over a photo.
29. Develop a mobile application for any arcade game of your choice.

Week13:

Building Mobile Apps (App Inventor 2)

30. Develop a mobile application that auto replies the sender of a text message while the recipient in driving.
31. Develop a mobile application to find a car based on its location.

Week14:

Building Mobile Apps (App Inventor 2)

32. Develop a mobile application to conduct Quiz for student.

Course Outcomes:

i. Assemble and De assembles Components of a PC.
ii. Experiment with Installation of Different Operating System.
iii. Creation of their own Digital Profile on Social Media.
iv. Prepare their own Presentation / Documentation using Office Tools and Latex.
v. Create Interactive Visual Programs Using Scratch.
vi. Develop Mobile Applications.

References:

1. Computer Fundamentals,1e, Anita Goel, Pearson Education.
2. https://scratch.mit.edu/ideas
3. https://appinventor.mit.edu/explore/ai2/tutorials

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		L	T	P	C
I Year-I Semester		**0**	**0**	**3**	**1.5**
Essentials of Electrical and Electronics Engineering Lab					

Course objectives:

i. To predetermine the efficiency of dc shunt machine using Swinburne's test.
ii. To predetermine the efficiency and regulation of 1-phase transformer with O.C and S.C tests.
iii. To obtain performance characteristics of DC shunt motor &3-phase induction motor.
iv. To find out regulation of an alternator with synchronous impedance method.
v. To control speed of dc shunt motor using Armature voltage and Field flux control methods.
vi. To find out the characteristics of PN junction diode & transistor
vii. To determine the ripple factor of half wave & full wave rectifiers.

Section A: Electrical Engineering:

The following experiments are required to be conducted as compulsory experiments:

1. Swinburne's test on D.C. Shunt machine (predetermination of efficiency of a given D.C. shunt machine working as motor and generator).
2. OC and SC tests on single phase transformer (predetermination of efficiency and regulation at given power factors).
3. Brake test on 3-phase Induction motor (determination of performance characteristics)
4. Regulation of alternator by Synchronous impedance method.
5. Speed control of D.C. Shunt motor by
   a) Armature Voltage control b) Field flux control method
6. Brake test on D.C. Shunt Motor.

Section B: Electronics Engineering:

The following experiments are required to be conducted as compulsory experiments:

1.PN junction diode characteristics a) Forward bias b) Reverse bias (Cut in voltage and resistance calculations)

2. Transistor CE characteristics (input and output)

3. Half wave rectifier with and without filters.

4. Full wave rectifier with and without filters.

5. CE amplifiers.

6. OP- amp applications (inverting, non- inverting, integrator and differentiator)

Course Outcomes:

The student should be able to:

- Compute the efficiency of DC shunt machine without actual loading of the machine.
- Estimate the efficiency and regulation at different load conditions and power factors for single phase transformer with OC and SC tests.
- Analyze the performance characteristics and to determine efficiency of DC shunt motor & 3-Phase induction motor.
- Pre-determine the regulation of an alternator by synchronous impedance method.
- Control the speed of dc shunt motor using Armature voltage and Field flux control methods.
- Draw the characteristics of PN junction diode & transistor
- Determine the ripple factor of half wave & full wave rectifiers.

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		L	T	P	C
I Year-I or II Semester		**3**	**0**	**0**	**0**
Professional Ethics & Human Values					

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

Syllabus:

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.

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.

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.

UNIT IV: Engineers Responsibility for Safety and Risk:
Safety and risk –Assessment of safety and risk –Risk benefit analysis and reducing risk-Safety and the Engineer-Designing for the safety-Intellectual Property rights (IPR).

UINIT V: 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.

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.

Text Books:

1. "Engineering Ethics includes Human Values" by M.Govindarajan, S.Natarajan and, V.S.SenthilKumar-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 McGraw-Hill–2003.
4. "Professional Ethics and Morals" by Prof.A.R.Aryasri, DharanikotaSuyodhana-Maruthi Publications.
5. "Professional Ethics and Human Values" by A.Alavudeen, R.Kalil Rahman and M. Jayakumaran-LaxmiPublications.
6. "Professional Ethics and Human Values" by Prof.D.R.Kiran-
7. "Indian Culture, Values and Professional Ethics" by PSR Murthy-BS Publication

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		L	T	P	C
I Year-II Semester		**3**	**0**	**0**	**3**
Linear Algebra and Numerical Methods					

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.

Unit I: Solving Systems of Linear Equations, Eigen Values and Eigen Vectors: (10 hrs)

Rank of a matrix by echelon form and normal form- Gauss Jordan method to find inverse – Solving system of homogeneous and non-homogeneous equations linear equations — Eigen values and Eigen vectors and their properties.
Applications: Free vibration of a two-mass system.

Unit-II: Cayley-Hamilton Theorem and Quadratic forms: (10 hrs)

Cayley-Hamilton theorem (without proof) – Finding 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 – Algebraic transcendental equations: Bisection method – Secant method – Method of false position – Iteration method – Newton-Raphson method (One variable and simultaneous Equations)
Solving system of linear equations: Gauss elimination- Diagonal dominance- Jacobi and Gauss-Seidel methods– Necessary and sufficient condition for convergence(only statement)- Power Method for finding Largest Eigenvalue –Eigenvector.

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 – Newton's divide difference formula.

UNIT V:Numerical Integration and Solution of Ordinary Differential Equations:

(10 hrs)

Trapezoidal rule – Simpson's $1/3^{rd}$ and $3/8^{th}$ rule – Solution of ordinary differential equations by Taylor's series – Picard's method of successive approximations – Euler's method – Runge-Kutta method (second and fourth order) – Milne's Predictor and Corrector Method.

Course Outcomes:

At the end of the course, the student will be able to

- develop the use of matrix algebra techniques that is needed by engineers for practical applications
- solve system of linear algebraic equations using Gauss elimination, Gauss Jordan, Gauss Seidel
- evaluate approximating the roots of polynomial and transcendental equations by different algorithms
- apply Newton's forward & backward interpolation and Lagrange's formulae for equal and unequal intervals
- apply different algorithms for approximating the solutions of ordinary differential equations to its analytical computations

Text Books:

1. **M. K. Jain, S. R. K. Iyengar and R. K. Jain,** Numerical Methods for Scientific and Engineering Computation, New Age International Publications.
2. **B. S. Grewal,** Higher Engineering Mathematics, 43^{rd} Edition, Khanna Publishers.

Reference Books:

1. **B. V. Ramana,** Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.
2. **David Poole,** Linear Algebra- A modern introduction, 4^{th} Edition, Cengage.
3. **Steven C. Chapra,** Applied Numerical Methods with MATLAB for Engineering and Science, Tata Mc. Graw Hill Education.
4. **Lawrence Turyn,** Advanced Engineering Mathematics, CRC Press.

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		L	T	P	C
I Year-II Semester		3	0	0	3
Digital Logic Design					

Course Objectives:

- To introduce the basic tools for design with combinational and sequential digital logic and state machines.
- To learn simple digital circuits in preparation for computer engineering.

Syllabus:

UNIT- I:
Digital Systems and Binary Numbers
Digital Systems, Binary Numbers, Binary Numbers, Octal and Hexadecimal Numbers, Complements of Numbers, Complements of Numbers, Signed Binary Numbers,Arithmetic addition and subtraction

UNIT -II:
Concept of Boolean algebra
Basic Theorems and Properties of Boolean algebra, Boolean Functions, Canonical and Standard Forms, Minterms and Maxterms,

UNIT- III:
Gate level Minimization
Map Method, Two-Variable K-Map, Three-Variable K-Map, Four Variable K-Maps. Products of Sum Simplification, Sum of Products Simplification, Don't – Care Conditions, Realisation of logic gates using universal gates, Exclusive-OR Function
Combinational Logic
Introduction, Analysis Procedure, Design Procedure, Binary Adder–Subtractor, Decimal Adder, Binary Multiplier, Decoders, Encoders, Multiplexers, HDL Models of Combinational Circuits

UNIT- IV:
Synchronous Sequential Logic
Introduction to Sequential Circuits, Storage Elements: Latches, Storage Elements: Flip-Flops, Analysis of Clocked **Sequential** Circuits, Mealy and Moore Models of Finite State Machines

UNIT -V:
Registers and Counters
Registers, Shift Registers, Ripple Counters, Synchronous Counters, Ring Counter, Johnson Counter, Ripple Counter

Course Outcomes:

A student who successfully fulfills the course requirements will have demonstrated:

- An ability to define different number systems, binary addition and subtraction, 2's complement representation and operations with this representation.
- An ability to understand the different switching algebra theorems and apply them for logic functions.
- An ability to define the Karnaugh map for a few variables and perform an algorithmic reduction of logic functions.
- An ability to define the other minimization methods for any number of variables

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.

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		L	T	P	C
I Year-II Semester		**3**	**0**	**0**	**3**
Applied Chemistry					

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

Course 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.
- ***Express*** the increase in demand as wide variety of advanced materials are introduced; which have excellent engineering properties.
- ***Explain*** the crystal structures, and the preparation of semiconductors. Magnetic properties are also studied.
- ***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.

Syllabus:

UNIT I: POLYMER TECHNOLOGY

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

Plastics: Compounding-fabrication (compression, injection, blown film, extrusion) - preparation, properties and applications of PVC, polycarbonates and Bakelite-mention some examples of plastic materials used in electronic gadgets, recycling of e-plastic waste.

Elastomers:- Natural rubber-drawbacks-vulcanization-preparation, properties and applications of synthetic rubbers (Buna S, thiokol and polyurethanes).

Composite materials: Fiber reinforced plastics-conducting polymers-biodegradable polymers-biopolymers-biomedical polymers.

UNIT II: ELECTROCHEMICAL CELLS AND CORROSION

Electrochemical Cells: Single electrode potential-Electrochemical series and uses of series-standard hydrogen electrode, calomel electrode-concentration cell-construction of glass electrode-Batteries: Dry cell, Ni-Cd cells, Ni-Metal hydride cells, Li ion battery, zinc air cells–Fuel cells: H_2-O_2, CH_3OH-O_2, phosphoric acid, molten carbonate.

Corrosion:-Definition-theories of corrosion (chemical and electrochemical)-galvanic corrosion, differential aeration corrosion, stress corrosion, waterline corrosion-passivity of metals-galvanic series-factors influencing rate of corrosion-corrosion control (proper designing, cathodic protection)-Protective coatings: Surface preparation, cathodic and anodic coatings, electroplating, electroless plating (nickel). Paints (constituents, functions, special paints).

UNIT III: MATERIAL CHEMISTRY

Part I *: Non-elemental semiconducting materials*:- Stoichiometric, controlled valency & chalcogen photo/semiconductors-preparation of semiconductors (distillation, zone refining, Czochralski crystal pulling, epitaxy, diffusion, ion implantation) - Semiconductor devices (p-n junction diode as rectifier, junction transistor).

Insulators & magnetic materials: electrical insulators-ferro and ferri magnetism-Hall effect and its applications.

Part II:

Nano materials:- Introduction-sol-gel method- characterization by BET, SEM and TEM methods-applications of graphene-carbon nanotubes and fullerenes: Types, preparation and applications

Liquid crystals:- Introduction-types-applications.

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

UNIT IV: ADVANCED CONCEPTS/TOPICS IN CHEMISTRY

Computational chemistry: Introduction, Ab Initio studies, DFT; TD-DFT calculations using Guassian software

***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

UNIT V: 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, intensity shifts, applications), FT-IR (instrumentation and IR of some organic compounds, applications)-magnetic resonance imaging and CT scan (procedure & applications).

Non Conventional Energy Sources: Design, working, schematic diagram, advantages and disadvantages of photovoltaic cell, organic photo-voltaics, hydropower, geothermal power, wind power, tidal and wave power, ocean thermal energy conversion.

Course Outcomes:

At the end of the Course, the students will be able to

- ***Outline*** preparation, properties and applications of some plastic materials and synthetic rubber explain the mechanism of conduction in conducting polymers.
- ***Explain*** the theory of construction of battery, fuel cells and categorize the reasons for corrosion and study some methods of corrosion control.
- ***Understand*** the importance of materials like nanomaterials and fullerenes and their uses, liquid crystals and superconductors.
- ***Obtain*** the knowledge of computational chemistry and understand the importance molecular machines, principles of different analytical instruments.
- **Explain** the different applications of analytical instruments and study the design sources of energy by different natural sources.

Text Books:

1. Engineering Chemistry by Jain and Jain; Dhanpat Rai Publicating Co. Latest edition
2. Engineering Chemistry by Shikha Agarwal; Cambridge University Press, 2019 edition

Reference Books:

1. A text book of engineering Chemistry by S. S. Dara; S. Chand & Co Ltd., Latest edition
2. Engineering Chemistry by Shashi Chawla; Dhanpat Rai Publicating Co. Latest edition

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		L	T	P	C
I Year II Semester		**3**	**0**	**0**	**3**
Problem Solving and Programming Using C					

Course Objectives:

- To impart adequate knowledge on the need of programming languages and problem solving techniques and develop programming skills.
- To enable effective usage of Control Structures and Implement different operations on arrays.
- To Demonstrate the use of Strings and Functions.
- To impart the knowledge of pointers and understand the principles of dynamic memory allocation.
- To understand structures and unions and illustrate the file concepts and its operations.
- To impart the Knowledge Searching and Sorting Techniques.

Syllabus:

UNIT-I

Introduction to Computer Problem Solving: Programs and Algorithms, Computer Problem Solving Requirements, Phases of Problem Solving, Problem Solving Strategies, Top-Down Approach, Algorithm Designing, Program Verification, Improving Efficiency, Algorithm Analysis and Notations.

UNIT-II

Introduction to C Programming: Introduction, Structure of a C Program, Comments, Keywords, Identifiers, Data Types, Variables, Constants, Input/output Statements, Operators, Type Conversion.

Control Flow, Relational Expressions: Conditional Branching Statements: if, if-else, if-else–if, switch. Basic Loop Structures: while, do-while loops, for loop, nested loops, The Break and Continue Statements, goto statement.

UNIT-III

Arrays: Introduction, Operations on Arrays, Arrays as Function Arguments, Two dimensional Arrays, Multi dimensional arrays.

Pointers: Concept of a Pointer, Declaring and Initializing Pointer Variables, Pointer Expressions and Address Arithmetic, Null Pointers, Generic Pointers, Pointers as Function Arguments, Pointers and Arrays, Pointer to Pointer, Dynamic Memory Allocation, Dangling Pointer, Command Line Arguments.

UNIT-IV

Functions: Introduction, Function Declaration, Function Definition, Function Call, Categories of Functions, Passing Parameters to Functions, Scope of Variables, Variable Storage Classes, Recursion.
Strings: String Fundamentals, String Processing with and without Library Functions, Pointers and Strings.

UNIT-V

Structures, Unions, Bit Fields: Introduction, Nested Structures, Arrays of Structures, Structures and Functions, Self-Referential Structures, Unions, Enumerated Data Type –enum variables, Using Typedef keyword, Bit Fields.
Data Files: Introduction to Files, Using Files in C, Reading from Text Files, Writing to Text Files, Random File Access.

Course Outcomes:

At the end of the Course, Student will be able to:

- Illustrate the Fundamental concepts of Computers and basics of computer programming.
- Use Control Structures and Arrays in solving complex problems.
- Develop modular program aspects and Strings fundamentals.
- Demonstrate the ideas of pointers usage.
- Solve real world problems using the concept of Structures, Unions and File operations.

Text Books:

1. How to solve it by Computer, R. G. Dromey, and Pearson Education.
2. Computer Programming, Reema Thareja, Oxford University Press.

Reference Books:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.
2. Programming In C A-Practial Approach, Ajay Mittal, Pearson.
3. C Programming – A Problem Solving Approach, Forouzan, Gilberg, Cengage.
4. The C Programming Language, Dennis Richie And Brian Kernighan, Pearson Education.
5. Programming In C, Ashok Kamthane, Second Edition, Pearson Publication.
6. Let us C , Yaswanth Kanetkar, 16th Edition,BPB Publication.

Web Links:

1. http://www.c4learn.com/
2. http://www.geeksforgeeks.org/c/
3. http://nptel.ac.in/courses/122104019/
4. http://www.learn-c.org/
5. https://www.tutorialspoint.com/cprogramming/

B. Tech (Computer Science & Engineering)- R19 Syllabus

University College of Engineering Vizianagaram

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

		L	T	P	C
I Year-II Semester		**0**	**0**	**3**	**1.5**
Problem Solving and Programming Using C Lab					

Course Objectives:

- To impart knowledge on basic Linux commands, various Editors, Raptor.
- To make the students understand the concepts of C programming.
- To nurture the students on Control Structures and develop different operations on arrays.
- To make use of String fundamentals and modular programming constructs.
- To implement programs using dynamic memory allocation.
- To explain the concepts of Structure, Unions and files for solving various problems.

List of Experiments:

1. Introduction to Algorithms and Flowcharts

1.1) Implement Algorithm Development for Exchange the values of Two numbers.

1.2) Given a set of n student's examination marks (in the range 0-100) make a count of the number of students that passed the examination. A Pass is awarded for all of 50 and above.

1.3) Given a set of n numbers design an algorithm that adds these numbers and returns the resultant sum. Assume N is greater than or equal to zero.

2. Introduction to C Programming

2.1) Basic Linux Commands.

2.2) Exposure to Turbo C, Vi, Emacs, Code Blocks IDE, Dev C++.

2.3) Writing simple programs using printf(), scanf() .

3. Raptor

3.1) Installation and Introduction to Raptor.

3.2) Draw a flow chart to find the Sum of 2 numbers.

3.3) Draw a flow chart to find Simple interest.

4. Basic Math

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

4.2) Write a C Program to find largest of three numbers using ternary operator.

4.3) Write a C Program to Calculate area of a Triangle using Heron's formula.

5. Control Flow- I

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

5.2) Write a C program to find the roots of a Quadratic Equation.

5.3) Write a C Program to make a simple Calculator to Add, Subtract, Multiply or Divide Using Switch…case.

6. Control Flow- II

6.1) Write a C Program to Find Whether the Given Number is Prime number or not.

6.2) Write a C Program to Find Whether the Given Number is Armstrong Number or not.

6.3) Write a C program to print Floyd Triangle.

7. Control Flow- III

7.1) Write a C program to find the sum of individual digits of a positive integer.

7.2) Write a C program to check whether given number is palindrome or not.

7.3) Write a C program to read two numbers, x and n, and then compute the sum of the geometric progression $1+x+x^2+x^3+\ldots\ldots\ldots\ldots+x^n$.

8. Arrays

8.1) Write a C program to search an element in the given array (Linear Search).

8.2) Write a C program to perform matrix addition.

8.3) Write a C program to perform matrix multiplication.

9. Pointers

9.1) Write a C Program to Perform Addition, Subtraction, Multiplication and Division of two numbers using Command line arguments.

9.2) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc () function.

9.3) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc () function.

10. Functions, Array & Pointers

10.1) Write a C Program to demonstrate parameter passing in Functions.

10.2) Write a C Program to find Fibonacci, Factorial of a number with Recursion and without recursion.

10.3) Write a C Program to find the sum of given numbers with arrays and pointers.

11. Strings

11.1) Implementation of string manipulation operations with library function:

a) copy
b) concatenate
c) length
d) compare

11.2) Implementation of string manipulation operations without library function:

a) copy
b) concatenate
c) length
d) compare

11.3) Verify whether the given string is a palindrome or not.

12. Structures

12.1) Write a C Program to Store Information of a book Using Structure.

12.2) Write a C Program to Add Two Complex Numbers by Passing Structure to a Function.

13. Files

13.1) Write a C program to open a file and to print the contents of the file on screen.
13.2) Write a C program to copy content of one file to another file.
13.3) Write a C program to merge two files and store content in another file.

14. Application

Creating structures to capture the student's details save them in file in proper record format, search and prints the student details requested by the user.

Note: Draw the flowcharts using Raptor from Experiment 3 to Experiment 6.

Course Outcomes:

- Implement basic programs in C and design flowcharts in Raptor.
- Use Conditional and Iterative statements to solve real time scenarios in C.
- Implement the concept of Arrays and Modularity and Strings.
- Apply the Dynamic Memory Allocation functions using pointers.
- Develop programs using structures, and Files.

Reference Books:

1. Let Us C Yashwanth Kanetkar, 16th edition, BPB Publications.
2. Programming in C A-Practial Approach Ajay Mittal. Pearson Education.
3. The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education.
4. Problem solving using C , K Venugopal,3rd Edition,TMG Publication.

Web Links:

1. https://www.hackerrank.com/
2. https://www.codechef.com/
3. https://www.topcoder.com/
4. https://code-cracker.github.io/
5. https://raptor.martincarlisle.com/
6. https://nptel.ac.in/courses/106105085/2

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University College of Engineering Vizianagaram

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

		L	T	P	C
I Year-II Semester		**3**	**0**	**0**	**0**
Constitution of India					

Course Objectives:

- To Enable the student to understand the importance of constitution
- To understand the structure of executive, legislature and judiciary
- To understand philosophy of fundamental rights and duties
- To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and election commission of India.
- To understand the central and state relation financial and administrative.

Syllabus:

UNIT-I

Introduction to Indian Constitution: Constitution meaning of the term, Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

UNIT-II

Union Government and its Administration Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, LokSabha, RajyaSabha, The Supreme Court and High Court: Powers and Functions;

UNIT-III

State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organisation, Structure and Functions.

UNIT-IV

Local Administration - District's Administration Head - Role and Importance, Municipalities – Mayor and role of Elected Representative - CEO of Municipal Corporation PachayatiRaj: Functions PRI: ZilaPanchayat, Elected officials and their roles, CEO ZilaPanchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy.

UNIT-V

Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission:, Functions of Commissions for the welfare of SC/ST/OBC and women.

Course Outcomes:

At the end of the semester/course, the student will be able to have a clear knowledge on the following:

- Understand historical background of the constitution making and its importance for building a democratic India.
- Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
- Understand the value of the fundamental rights and duties for becoming good citizen of India.
- Analyze the decentralization of power between central, state and local self-government.
- Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.

1. Know the sources, features and principles of Indian Constitution.
2. Learn about Union Government, State government and its administration.
3. Get acquainted with Local administration and Pachayati Raj.
4. Be aware of basic concepts and developments of Human Rights.
5. Gain knowledge on roles and functioning of Election Commission

References Books:

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd.. New Delhi
2. SubashKashyap, Indian Constitution, National Book Trust
3. J.A. Siwach, Dynamics of Indian Government & Politics
4. D.C. Gupta, Indian Government and Politics
5. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)
6. J.C. Johari, Indian Government andPolitics Hans
7. J. Raj IndianGovernment and Politics
8. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi
9. Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Right), Challenges to Civil Rights Guarantees in India, Oxford University Press 2012

E-resources:

1. nptel.ac.in/courses/109104074/8
2. nptel.ac.in/courses/109104045/
3. nptel.ac.in/courses/101104065/
4. www.hss.iitb.ac.in/en/lecture-details
5. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

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University College of Engineering Vizianagaram

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

		L	T	P	C
II Year-I Semester		**3**	**0**	**0**	**3**
Discrete Mathematical Structures					

Course Objectives:

- To introduce the students to the topics and techniques of discrete methods and combinatorial reasoning.
- To introduce a wide variety of applications. The algorithmic approach to the solution of

problems is fundamental in discrete mathematics, and this approach reinforces the close ties between this discipline and the area of computer science.

Syllabus:

UNIT -I: Mathematical Logic (10 hrs)

Propositional Calculus: Statements and Notations, Connectives, Well Formed Formulas, Truth Tables, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications, Normal Forms, Theory of Inference for Statement Calculus, Consistency of Premises, Indirect Method of Proof. Predicate Calculus: Predicative Logic, Statement Functions, Variables and Quantifiers, Free and Bound Variables, Inference Theory for Predicate Calculus.

UNIT -II: Functions & Relations (10 hrs)

Set Theory: Introduction, Operations on Binary Sets, Principle of Inclusion and Exclusion,
Relations: Properties of Binary Relations, Relation Matrix and Digraph, Operations on Relations, Partition and Covering, Transitive Closure, Equivalence, Compatibility and Partial Ordering Relations, Hasse Diagrams,
Functions: Bijective Functions, Composition of Functions, Inverse Functions, Permutation Functions, Recursive Functions, Lattice and its Properties

UNIT- III: Algebraic Structures and Number Theory (10 hrs)

Algebraic Structures: Algebraic Systems, Examples, General Properties, Semi Groups and
Monoids, Homomorphism of Semi Groups and Monoids, Group, Subgroup, Abelian Group, Homomorphism, Isomorphism

Number Theory: Properties of Integers, Division Theorem, The Greatest Common Divisor, Euclidean Algorithm, Least Common Multiple, Testing for Prime Numbers, The Fundamental Theorem of Arithmetic, Modular Arithmetic (Fermat's Theorem and Euler's Theorem)

UNIT -IV: Recurrence Relations (10 hrs)

Generating Functions, Function of Sequences, Partial Fractions, Calculating Coefficient of Generating Functions, Recurrence Relations, Formulation as Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, Method of Characteristic Roots, Solving Inhomogeneous Recurrence Relations

UNIT -V: Graph Theory (10 hrs)

Basic Concepts of Graphs, Sub graphs, Matrix Representation of Graphs: Adjacency Matrices, Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs, Multigraphs, Planar Graphs, Euler's Formula, Graph Colouring and Covering, Chromatic Number, Spanning Trees, Algorithms for Spanning Trees (Problems Only and Theorems without Proofs)

Course Outcomes: At the end of the course, the student will be able to

- demonstrate skills in solving mathematical problems
- comprehend mathematical principles and logic
- demonstrate knowledge of mathematical modeling and proficiency in using mathematical software
- manipulate and analyze data numerically and/or graphically using appropriate Software
- communicate effectively mathematical ideas/results verbally or in writing

Text Books:

1. Discrete Mathematical Structures with Applications to Computer Science, J. P. Tremblay and P. Manohar, Tata McGraw Hill.
2. Elements of Discrete Mathematics-A Computer Oriented Approach, C. L. Liu and D. P. Mohapatra, 3rd Edition, Tata McGraw Hill.
3. Discrete Mathematics and its Applications with Combinatorics and Graph Theory, K. H. Rosen, 7th Edition, Tata McGraw Hill.

Reference Books:

1. Discrete Mathematics for Computer Scientists and Mathematicians, J. L. Mott, A. Kandel, T. P. Baker, 2nd Edition, Prentice Hall of India.
2. Discrete Mathematical Structures, Bernand Kolman, Robert C. Busby, Sharon Cutler Ross, PHI.
3. Discrete Mathematics, S. K. Chakraborthy and B.K. Sarkar, Oxford, 2011

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

		L	T	P	C
II Year-I Semester		**3**	**0**	**0**	**3**
Principles of Programming Languages					

Course Objectives:

- To understand and describe syntax and semantics of programming languages.
- To understand data, data types, and basic statements.
- To understand call-return architecture and ways of implementing them.
- To understand object-orientation, concurrency, and event handling in programming Languages.
- To develop programs in non-procedural programming paradigms.

Syllabus:

UNIT I:

Syntax and Semantics: Evolution of Programming Languages, Describing Syntax, Context, Free Grammars, Attribute Grammars, Describing Semantics, Lexical Analysis, Parsing, Recursive - Decent Bottom - Up Parsing.

UNIT II:

Data, Data Types, and Basic Statements: Names, Variables, Binding, Type Checking, Scope, Scope Rules, Lifetime and Garbage Collection, Primitive Data Types, Strings, Array Types, Associative Arrays, Record Types, Union Types, Pointers and References, Arithmetic Expressions, Overloaded Operators, Type Conversions, Relational and Boolean Expressions, Assignment Statements , Mixed Mode Assignments, Control Structures – Selection, Iterations, Branching, Guarded Statements.

UNIT III:

Sub Programs and Implementations: Subprograms, Design Issues, Local Referencing, Parameter Passing, Overloaded Methods, Generic Methods, Design Issues for Functions, Semantics of Call and Return, Implementing Simple Subprograms, Stack And Dynamic Local Variables, Nested Subprograms, Blocks, Dynamic Scoping.

UNIT IV:

Object- Orientation, Concurrency, and Event Handling: Object – Orientation, Design Issues for OOP Languages, Implementation of Object, Oriented Constructs, Concurrency, Semaphores, Monitors, Message Passing, Threads, Statement Level Concurrency, Exception Handling, Event Handling.

UNIT V:

Functional Programming Languages: Introduction to Lambda Calculus, Fundamentals of Functional Programming Languages, Programming with Scheme, – Programming with ML.

Logic Programming Languages: Introduction to Logic and Logic Programming, Programming with Prolog, Multi - Paradigm Languages.

Course Outcomes:

- Describe syntax and semantics of programming languages.
- Explain data, data types, and basic statements of programming languages.
- Design and implement subprogram constructs, Apply object - oriented, concurrency, and event.
- Handling programming constructs.
- Develop programs in Scheme, ML, and Prolog.
- Understand and adopt new programming languages.

Text Books:

1. Robert W. Sebesta, "Concepts of Programming Languages", Tenth Edition, Addison Wesley,2012.
2. Programming Langugaes, Principles & Paradigms, 2ed, Allen B Tucker, Robert E Noonan,TMH.

Reference Books:

1. R. Kent Dybvig, "The Scheme programming language", Fourth Edition, MIT Press,2009.
2. Jeffrey D. Ullman, "Elements of ML programming", Second Edition, Prentice Hall,1998.Richard A. O'Keefe, "The craft of Prolog", MIT Press,2009.
3. W. F. Clocksin and C. S. Mellish, "Programming in Prolog: Using the ISO Standard", Fifth Edition.

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University College of Engineering Vizianagaram

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

		L	T	P	C
II Year-I Semester		**2**	**1**	**0**	**3**
Python Programming					

Course Objectives:

- Introduction to Scripting Language.
- Exposure to various problems solving approaches of computer science in various Domains.
- Introduction to various data structures using python.
- Introduce Python third- Party Tools for various domains.

Syllabus:

UNIT-I: Introduction To Python

Features and History of Python, Print and Input Functions, Variables, Keywords, Comments
Types: Numerical Types (int, float, complex), Strings, Boolean, Type Conversion Operators: Arithmetic, Relational, Logical, Bitwise, Assignment, Identity, Membership.
Control Flow: Indentation, if-elif-else, while, for, break, continue, pass, else-with loops.

UNIT-II: Functions and Object Oriented Programming

Functions: Introduction, Required Arguments, Default Arguments, Keyword Arguments, Variable Number of Arguments, Variable Scope and Lifetime, Global Variables, Lambda Functions, Command Line Arguments.
Object Oriented Programming: Classes and Objects, Built-In Class Methods and Attributes, 'Self', Constructor, Destructor, Inheritance, Data Hiding, Overriding Methods and Overloading Operators.

UNIT-III: Data Structures, Files and Exception Handling

Lists, Nested Lists, List Comprehensions, Tuples and Sequences, Sets, Dictionaries File I/O: Opening, Closing, Reading and Writing Handling Exceptions, Multiple Except Blocks, Multiple Exceptions in a Single Block, Except Block without Exception, The Else Clause, Raising Exceptions, Built-in and User-Defined Exceptions, The Finally Block.

UNIT-IV: Modules, Packages and Standard Library

Introduction Modules, Import and From-Import, Packages in Python, Used Defined Modules and Packages, PIP. The Python Standard Library: Numeric and Mathematical Modules, String Processing, Date & Time, Calendar, Operating System, Web Browser.

Python Third- Party Tools:

Survey of The Most Common 3rd Party Packages: Requests, Numpy/Scipy, Matplotlib/Pyplot, Pandas, Pillow, Flask/Django/Twisted, Pep8, Scikit-Learn/Nltk, Stanford-Corenlp, Bcrypt, Beautiful Soup, and More.

UNIT-V: GUI, Graphics and Applications

GUI Design with Tkinter: Button, Canvas, Check Button, Entry, Frame, Label, List Box, Menu, Menu Button, Message, Radio Button, Scale, Scrollbar, Text Graphics with Turtle: Motion Control, Pen, Colour, Fill, Multiple Turtles, Reset and Clear.

Course Outcomes:

- Experience with an interpreted language.
- Exposure to basics Python Programming.
- Be able to build software for real needs.
- Making Software easily right out of the box.

Text Books:

1. Python Programming using problem solving approach, Reema Thareja, Oxford University Press.
2. Learning Python, Mark Lutz, O'Rielly.

References:

1. Programming Python, Fourth Edition, Mark Lutz, O'Reilly Media.
2. Introduction to Computation and Programming Using Python with Application to Understanding, John V.Guttag, PHI.
3. Think Python: How to think like a Computer Scientist, Allen Downey, Green Tea Press.
4. Head First Python: A Brain-Friendly Guide, Second Edition, Paul Barry, O'Reilly.
5. The Python Standard Library, Python 3.6.5 documentation (Web Resource) https://docs.python.org/3/library/.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

		L	T	P	C
II Year-I Semester		**3**	**0**	**0**	**3**
Data Structures					

Course Objectives:

- Solve problems using data structures such as linear lists, stacks, queues, hash tables.
- To understand concepts about searching and sorting techniques.
- Be familiar with non-linear data structures such as Trees, Search Trees, Threaded trees and Graphs.
- Solve problems using data structures such as Efficient Search Structures.

Syllabus:

UNIT-I: Linear Data Structures:

Linked Lists: Linear List, Ordered and Unordered Lists, Singly Linked List, Doubly Linked List, Circular Linked List Implementations and List Applications.

Stacks: Stacks using Arrays and Linked List, Applications of Stacks.

Queues: Queues using Arrays and Linked List, Circular Queues, DeQueues, Applications of Queues.

UNIT-II:

Searching and Sorting:

Linear Search, Binary Search, Fibonacci Search, Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort, Radix Sort.

Dictionaries: Indexing, Hashing, and Hash Functions, Collision Resolution – Separate Chaining, Open Addressing, Hashing with Buckets.

UNIT-III: Trees

Trees: Basic Terminology, Applications, Types of Trees, Tree Representations, Binary Tree Traversals, Threaded Binary Trees.

Priority queues: Min/Max Heaps, Binomial Queues.

UNIT-IV: Efficient Search Structures

BSTs: Binary Search Tree, Skewed Trees, BST implementation and it's Applications.

AVL, B, B+ Trees: Self Balanced Trees, Height of an AVL Trees, AVL Tree Rotations and M-Way Search Trees.

UNIT-V: Graphs

Introduction to Graphs, Basic Terminology, and Types, Applications, Connectivity, Shortest Paths: Single Source Shortest Path Problem, Transitive Closure, All Pairs Shortest Path Problem, Spanning Trees: Prim's Algorithm and Kruskal's Algorithm.

Course Outcomes:

- Distinguish between procedure and object-oriented programming.
- Apply advanced data structure strategies for exploring complex data structures.
- Compare and contrast various data structures and design techniques in the area of Performance.
- Incorporate data structures into applications such as Binary Search Trees, Heaps.
- Implement all data structures like stacks, queues, trees, lists, and graphs and compare their Performance and trade-offs.

Text books:

1. Data structures and Algorithm Analysis in C, Mark Allen Weiss, Pearson Education. Ltd., Second Edition.
2. Data Structures & Algorithms, Alfred V Aho, John E Hopcraft, Jeffery D Ullman**,** Pearson Education. Ltd., First Edition.
3. Fundamentals of Data Structures in C, S.Sahni, Second Edition, Universities Press, Pvt. Ltd.

Reference Books:

1. Data Structures and Algorithms using C by R. S. Salari, Fifth Edition, KHANNA Publishing.
2. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
3. Data Structures and Algorithms Made Easy: Second Edition: Data Structure and Algorithmic Puzzles, Narasimha Karumanchi, Fifth Edition, Career Monk.
4. Data Structures Using C, Reema Thareja, Second Edition, Oxford.
5. Problem-solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

		L	T	P	C
II Year-I Semester		**3**	**0**	**0**	**3**
Computer Organization & Architecture					

Course Objectives:

- To understand the structure, function and characteristics of computer system.
- To understand the design of the various functional units and components of computers.
- To explain the function of each element of a memory hierarchy.
- Illustration of algorithms for basic arithmetic operations using binary and decimal representation.
- Illustration of data paths and control flow for sequencing in CPU's, Micro Programming of control unit of CPU.

Syllabus:

UNIT -I:

Basic Structure of Computers:

Functional unit, Basic Operational Concepts, Bus Structures, System Software, Performance, The History of Computer Development. Data Representation: Data Types, Complements, Fixed Point Representation, Floating Point Representation.

Basic Computer Organization and Design:

Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory – Reference Instructions, Interrupt, Design of Basic Computer, Design of Accumulator Logic.

UNIT -II:

Machine Instruction and Programs: Instruction and Instruction Sequencing: Register Transfer Notation, Assembly Language Notation, Addressing Modes, Basic Input/output Operations, Importance of Stacks and Queues in Computer Programming Equation. Component of Instructions: Logic Instructions, Shift and Rotate Instructions, Branch Instructions.

Computer Arithmetic: Addition, Subtraction, Multiplication and Division Algorithms .Floating point Arithmetic Operations and Decimal Arithmetic Operations.

UNIT -III:

The Memory System: Memory System Consideration RAM and ROM, Flash Memory, Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory and Virtual Memory, Secondary Storage: Magnetic Hard Disks, Optical Disks.

Pipeline Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline.

UNIT -IV:

Processing Unit: Fundamental Concepts: Register Transfers, Performing an Arithmetic or Logic Operation, Fetching a Word from Memory, Execution of Complete Instruction, Hardwired Control.

Micro Programmed Control: Microinstructions, Micro Program Sequencing, Wide Branch Addressing and Microinstructions with Next – Address Field.

UNIT -V:

Input / Output Organization:

Accessing I/O Devices, Interrupts: Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Direct Memory Access, Buses: Synchronous Bus, Asynchronous Bus, Interface Circuits, Standard I/O Interface: Peripheral Component Interconnect (PCI) Bus, Universal Serial Bus (USB).

Parallelism:

Instruction-Level-Parallelism – Parallel Processing Challenges – Flynn's Classification: SISD, MIMD, SIMD, SPMD and Vector Architectures, – Hardware Multithreading – Multi-Core Processors and Other Shared Memory Multiprocessors.

Course Outcomes:

- Students can understand the architecture of modern computer.
- They can analyze the Performance of a computer using performance equation.
- Understanding of different instruction types.
- Students can calculate the effective address of an operand by addressing modes.
- They can understand how computer stores positive and negative numbers.
- Understanding of how a computer performs arithmetic operation of positive and negative numbers.

Text Books:

1. Computer Organization, Carl Hamacher, Zvonks Vranesic, Safea Zaky, 6th Edition, McGraw Hill.
2. Computer Architecture and Organization, John P. Hayes, 3rd Edition, McGraw Hill.

Reference Books:

1. Computer Organization and Architecture – William Stallings tenth Edition, Pearson/PHI.
2. Computer System Architecture, M. Morris Mano, 3 rd Edition Pearson Education.
3. Structured Computer Organization – Andrew S.Tanenbaum, 4th Edition PHI/Pearson.
4. Fundamentals of Computer Organization and Design, Sivarama Dandamudi Springer Int.Edition.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

		L	T	P	C
II Year-I Semester		**3**	**0**	**0**	**3**
Managerial Economics and Financial Analysis					

Course Objectives:

- The Learning objectives of this paper is to understand the concept and nature of Managerial Economics and its relationship with other disciplines and also to understand the Concept of Demand and Demand forecasting, Production function, Input Output relationship, Cost-Output relationship and Cost-Volume-Profit Analysis.
- To understand the nature of markets, Methods of Pricing in the different market structures and to know the different forms of Business organization and the concept of Business Cycles.
- To learn different Accounting Systems, preparation of Financial Statement and uses of different tools for performance evaluation. Finally, it is also to understand the concept of Capital, Capital Budgeting and the techniques used to evaluate Capital Budgeting proposals.

Syllabus:

Unit-I

Introduction to Managerial Economics and demand Analysis:

Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects –Concept of Demand, Types of Demand, Determinants of Demand- Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting, Concept of Supply and Law of Supply.

Unit – II:

Theories of Production and Cost Analyses:

Theories of Production function- Law of Variable proportions-Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale-Different cost concepts: opportunity costs, explicit and implicit costs-Fixed costs, Variable Costs and Total costs –Cost –Volume-Profit analysis-Determination of Breakeven point(problems)-Managerial significance and limitations of Breakeven point.

Unit – III:

Introduction to Markets, Theories of the Firm & Pricing Policies:

Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features – Price and Output Determination – Managerial Theories of firm: Marris and Williamson's models – other Methods of Pricing: Business Cycles: Meaning and Features – Phases of a Business Cycle. Features and Evaluation of Sole Trader, Partnership, Joint Stock Company – State/Public Enterprises and their forms.

Unit – IV:

Introduction to Accounting & Financing Analysis:

Introduction to Double Entry System, Journal, Ledger, Trail Balance and Preparation of Final Accounts with adjustments – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis – Preparation of Funds flow and cash flow analysis (Problems)

Unit – V:

Capital and Capital Budgeting: Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Time value of money- Methods of appraising Project profitability: Traditional Methods(pay back period, accounting rate of return) and modern methods(Discounted cash flow method, Net Present Value method, Internal Rate of Return Method and Profitability Index)

Course Outcomes:

- The Learner is equipped with the knowledge of estimating the Demand and demand elasticities for a product and the knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs.
- One is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units.
- The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis and to evaluate various investment project proposals with the help of capital budgeting techniques for decision making.

Text Books:

1. Prof.J.V.Prabhakara Rao & Prof.P.Venkata Rao Maruthi Publications
2. S.A.Siddiqui & A.S.Siddiqui New Age International Publishers

References:

1. Varshney R.L, K.L Maheswari, Managerial Economics, S. Chand & Company Ltd,
2. JL Pappas and EF Brigham, Managerial Economics, Holt, R & W; New edition edition
3. N.P Srinivasn and M. SakthivelMurugan, Accounting for Management, S. Chand & Company Ltd,
4. Maheswari S.N, An Introduction to Accountancy, Vikas Publishing House Pvt Ltd
5. I.M Pandey, Financial Management , Vikas Publishing House Pvt Ltd
6. V. Maheswari, Managerial Economics, S. Chand & Company Ltd

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

		L	T	P	C
II Year-I Semester		**0**	**0**	**2**	**1**
Python Programming Lab					

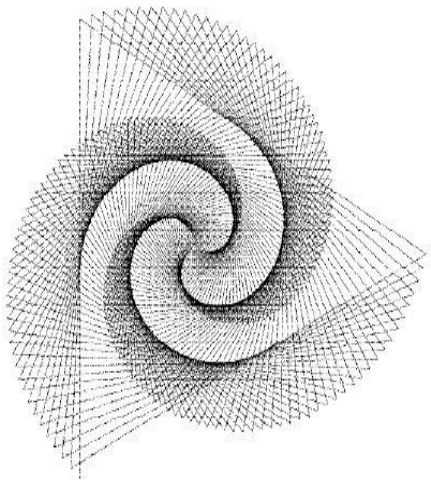
Course Objectives:

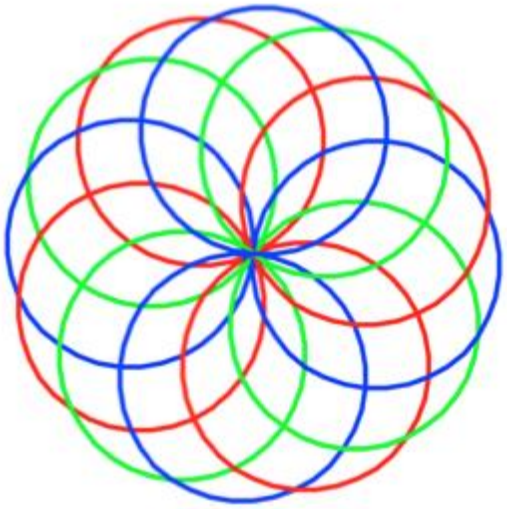
- Introduction to Scripting Language.
- Exposure to various problems solving approaches of computer science in various Domains.
- To acquire programming skills in python.
- To acquire object orientated skills using python.
- To acquire data structure implementation using python.
- To learn how to design and program Python applications.

List of Experiments:

1. Installing Python.
2. Running Python statements and scripts in REPL interpreter and IDLE.
3. Write a program to compute distance between two points taking input from the user (using Pythagorean Theorem).
4. Write a program to purposefully raise Indentation Error and correct it.
5. Write a Program for checking whether the given number is an even number or not.
6. Write a program using a while loop that asks the user for a number, and prints a Count down from that number to zero.
7. Using a for loop, write a program that prints out the decimal equivalents of 1/2, 1/3, 1/4, . . . ,1/10.
8. Write a function that takes in a string and a number and prints the string that number of times.
9. Write a script that prints prime numbers from 100 to 500.
10. Write a program that takes 2 numbers as command line arguments and prints its sum.
11. Design lambda functions to perform the following tasks:
    a. Take one parameter; return its square.
    b. Take two parameters; return the square root of the sums of their squares.
    c. Take any number of parameters; return their average.
    d. Take a string parameter; return a string which contains the unique letters in the input string (in any order).
12. Write a Python class to convert an integer to a roman numeral.
13. Create a Dog class, instantiate three new dogs, each with a different age. Then write a function called, get_biggest_number(), that takes any number of ages (*args) and returns the oldest one. Then output the age of the oldest dog.
14. Write a Python script to overload + operator for adding two objects of a user defined class.
15. Write a Python script to perform matrix multiplication (using multi dimensional lists).

16. Write a Python script that performs all basic set operations on two given sets.
17. Write a Python script that creates and manages a dictionary of student marks mapped to their roll numbers.
18. Find the most frequent words in a text read from a file.
19. Try to access the array element whose index is out of bound and handle the corresponding exception.
20. Write a Python script that demonstrates creation of user defined modules and packages.
21. Installing packages though PIP.
22. Write a program which randomly picks an integer from 1 to 100. Your program should prompt the user for guesses – if the user guesses incorrectly, it should print whether the guess is too high or too low. If the user guesses correctly, the program should print how many guesses the user took to guess the right answer.
23. Write a Python script to print ten dates, each two a week apart, starting from today, in the form YYYY-MM-DD.
24. Using tkinter, create a GUI for the guessing game in exercise 21.
25. Using tkinter, design a basic calculator.
26. Using turtle, create below graphics:





Course Outcomes:

- Experience with an interpreted language.
- Problem solving and programming capability.
- Exposure to basics Python Programming.
- Be able to build software for real needs.
- Making Software easily right out of the box.

References:

1. Python Programming using problem solving approach, Reema Thareja, Oxford University Press.
2. Learning Python, Mark Lutz, O'Rielly.
3. Programming Python, Fourth Edition, Mark Lutz, O'Reilly Media.
4. Introduction to Computation and Programming Using Python with Application to Understanding, John V.Guttag, PHI.
5. Think Python: How to think like a Computer Scientist, Allen Downey, Green Tea Press.
6. Head First Python: A Brain-Friendly Guide, Second Edition, Paul Barry, O'Reilly.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

		L	T	P	C
II Year-I Semester		**0**	**0**	**3**	**1.5**
Data Structures Lab					

Course Objectives:

- To develop skills to design and analyze simple linear and non-linear data structures.
- To Strengthen the ability to identify and apply the suitable data structure for the given real-world problem.
- To Gain knowledge in practical applications of data structures.

List of Experiments:

1. Implementation of the singly linked list.
2. Implementation of the Doubly linked list.
3. Implementation of Multistack in a Single Array.
4. Implementation of Circular Queue.
5. Implementation of Binary Search trees.
6. Implementation of AVL trees.
7. Implementation of Hash tables.
8. Implementation of Skip lists.
9. Implementation of Heaps.
10. Implementation of Priority queues using Heaps.
11. Implementation of Breadth-First Search Techniques.
12. Implementation of Depth- First Search Techniques.
13. Implementation of Prim's Algorithm.
14. Implementation of Dijkstra's Algorithm.
15. Implementation of Kruskal's Algorithm.

Course Outcomes:

- Be able to design and analyze the time and space efficiency of the data structure.
- Implement appropriate sorting and searching techniques for various problems.
- Be capable to identify the appropriate data structure for the given problem.
- Have practical knowledge on the application of data structures.
- Have practical knowledge on the application using graphs.

Text Books:

1. Data structures and Algorithm Analysis in C, Mark Allen Weiss, Pearson Education. Ltd., Second Edition.
2. Data Structures & Algorithms, Alfred V Aho, John E Hopcraft, Jeffery D Ullman**,** Pearson
3. Education. Ltd., First Edition.
4. Fundamentals of Data Structures in C, S.Sahni, Second Edition, Universities Press, Pvt. Ltd.

Reference Books:

1. Data Structures and Algorithms using C by R. S. Salari, Fifth Edition, Khanna Publishing.
2. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
3. Data Structures and Algorithms Made Easy: Second Edition: Data Structure and Algorithmic Puzzles, Narasimha Karumanchi, Fifth Edition, Career Monk.
4. Data Structures Using C,Reema Thareja, Second Edition, Oxford.
5. Problem-solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

		L	T	P	C
II Year-I Semester		**3**	**0**	**0**	**0**
Intellectual Property Rights and Patents					

Course Objectives:

- To know the importance of Intellectual property rights, which plays a vital role in advanced Technical and Scientific disciplines.
- Imparting IPR protections and regulations for further advancement, so that the students can familiarize with the latest developments.

Unit I: Introduction to Intellectual Property Rights (IPR)

Concept of Property - Introduction to IPR – International Instruments and IPR - WIPO - TRIPS – WTO -Laws Relating to IPR - IPR Tool Kit - Protection and Regulation - Copyrights and Neighboring Rights – Industrial Property – Patents - Agencies for IPR Registration – Traditional Knowledge –Emerging Areas of IPR - Layout Designs and Integrated Circuits – Use and Misuse of Intellectual Property Rights.

Unit II: Copyrights and Neighboring Rights

Introduction to Copyrights – Principles of Copyright Protection – Law Relating to Copyrights - Subject Matters of Copyright – Copyright Ownership – Transfer and Duration – Right to Prepare Derivative Works –Rights of Distribution – Rights of Performers – Copyright Registration – Limitations – Infringement of Copyright – Relief and Remedy – Case Law - Semiconductor Chip Protection Act.

UNIT III: Patents

Introduction to Patents - Laws Relating to Patents in India – Patent Requirements – Product Patent and Process Patent - Patent Search - Patent Registration and Granting of Patent - Exclusive Rights – Limitations - Ownership and Transfer — Revocation of Patent – Patent Appellate Board - Infringement of Patent – Compulsory Licensing — Patent Cooperation Treaty – New developments in Patents – Software Protection and Computer related Innovations.

UNIT IV: Trademarks

Introduction to Trademarks – Laws Relating to Trademarks – Functions of Trademark – Distinction between Trademark and Property Mark – Marks Covered under Trademark Law - Trade Mark Registration – Trade Mark Maintenance – Transfer of rights - Deceptive Similarities. Likelihood of Confusion - Dilution of Ownership – Trademarks Claims and Infringement – Remedies – Passing Off Action.

UNIT V: Trade Secrets & Cyber Law and Cyber Crime

Introduction to Trade Secrets – General Principles - Laws Relating to Trade Secrets –
Maintaining Trade Secret – Physical Security – Employee Access Limitation – Employee Confidentiality Agreements – Breach of Contract –Law of Unfair Competition – Trade Secret Litigation – Applying State Law.
Cyber Law – Information Technology Act 2000 - Protection of Online and Computer Transactions –
E-commerce - Data Security – Authentication and Confidentiality - Privacy - Digital Signatures – Certifying Authorities - Cyber Crimes - Prevention and Punishment – Liability of Network Providers.

Course Outcomes:

- IPR Laws and patents pave the way for innovative ideas which are instrumental for inventions to seek Patents.
- Student get an insight on Copyrights, Patents and Software patents which are instrumental for further advancements.

Reference Books :

1. Intellectual Property Rights (Patents & Cyber Law), Dr. A. Srinivas. Oxford University Press, New Delhi.
2. Deborah E. Bouchoux: Intellectual Property, Cengage Learning, New Delhi.
3. Prabhuddha Ganguli: Intellectual Property Rights, Tata Mc-Graw –Hill, New Delhi
4. Richard Stim: Intellectual Property, Cengage Learning, New Delhi.
5. Kompal Bansal &Parishit Bansal Fundamentals of IPR for Engineers, B. S. Publications (Press).
6. Cyber Law - Texts & Cases, South-Western's Special Topics Collections.
7. R.Radha Krishnan, S.Balasubramanian: Intellectual Property Rights, Excel Books. New Delhi.
8. M.Ashok Kumar and MohdIqbal Ali: Intellectual Property Rights, Serials Pub.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

		L	T	P	C
II Year-II Semester		**3**	**0**	**0**	**3**
Probability and Statistics					

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

Syllabus:

Unit – I: Descriptive Statistics and Methods for Data Science: (10 hrs)

Data science – Statistics Introduction – Population vs Sample – Collection of data – primary and secondary data – Type of variable: dependent and independent Categorical and Continuous variables – Data visualization – Measures of Central tendency – Measures of Variability (spread or variance) – Skewness Kurtosis.

UNIT – II: Correlation and Curve Fitting:

Correlation – correlation coefficient – rank correlation – regression coefficients and properties – regression lines – Method of least squares – Straight line – parabola – Exponential – Power curves.

UNIT – III: Probability and Distributions: (10 hrs)

Probability – Conditional probability and Baye's theorem – Random variables – Discrete and Continuous random variables – Distribution function – Mathematical Expectation and Variance – Binomial, Poisson, Uniform and Normal distributions.

UNIT – IV: Sampling Theory: (8 hrs)

Introduction – Population and samples – Sampling distribution of Means and Variance (definition only) – Central limit theorem (without proof) – Introduction to t, χ^2 and F-distributions – Point and Interval estimations – Maximum error of estimate.

UNIT – V: Tests of Hypothesis: (10 hrs)

Introduction – Hypothesis – Null and Alternative Hypothesis – Type I and Type II errors – Level of significance – One tail and two-tail tests – Tests concerning one mean and two means (Large and Small samples) – Tests on proportions.

Course Outcomes:

Upon successful completion of this course, the student should be able to

- classify the concepts of data science and its importance
- interpret the association of characteristics and through correlation and regression tools
- make use of the concepts of probability and their applications
- apply discrete and continuous probability distributions
- design the components of a classical hypothesis test
- infer the statistical inferential methods based on small and large sampling 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.

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		L	T	P	C
II Year-II Semester		**3**	**0**	**0**	**3**
Object Oriented Programming					

Course Objectives:

- Implementing programs for user interface and application development using core java principles.
- Focus on object oriented concepts and java program structure and its installation.
- Comprehension of java programming constructs, control structures in Java Programming Constructs.
- Implementing Object oriented constructs such as various class hierarchies, interfaces and exception handling.
- Understanding of Thread concepts and I/O in Java.
- Being able to build dynamic user interfaces using applets and Event handling in java.
- Understanding of Various Components of Java AWT and Swing and write Code Snippets using them.

Syllabus:

UNIT I:

Introduction to OOP

Introduction, Need of Object Oriented Programming, Principles of Object Oriented Languages, Procedural languages Vs OOP, Applications of OOP, History of JAVA, Java Virtual Machine, Java Features, Program Structures, Installation of JDK1.6.

UNIT II:

Variables, Primitive Data types, Identifiers- Naming Conventions, Keywords, Literals, Operators-Binary, Unary and Ternary, Expressions, Precedence rules and Associativity, Primitive Type Conversion and Casting, Flow of Control-Branching, Conditional Loops.

Classes and Objects- Classes, Objects, Creating Objects, Methods, Constructors-Constructor Overloading, Cleaning up Unused Objects-Garbage Collector, Class Variable and Methods-Static Keyword, this keyword, Arrays, Command Line Arguments.

UNIT III:

Inheritance: Types of Inheritance, Deriving Classes using Extends Keyword, Method Overloading, Super Keyword, Final Keyword, Abstract Class.

Interfaces, Packages and Enumeration: Interface-Extending Interface, Interface Vs Abstract Classes, Packages-Creating Packages, Using Packages, Access Protection, java.lang Package.

Exceptions & Assertions - Introduction, Exception Handling Techniques-try...catch, throw, throws, finally block, User Defined Exception, Exception Encapsulation and Enrichment, Assertions.

UNIT IV:

Multi-Threading: java.lang.Thread, The main Thread, Creation of New Threads, Thread Priority, Multithreading- Using isAlive() and join(), Synchronization, Suspending and Resuming Threads, Communication between Threads.

Input/Output: Reading and Writing data, java.io package.

Applet: Applet Class, Applet Structure, Applet Life Cycle, Sample Applet Programs.

UNIT V:

Event Handling: Event Delegation Model, Sources of Event, Event Listeners, Adapter Classes, Inner Classes.

Abstract Window Toolkit : Importance of AWT, Java.awt.package, Components and Containers, Button, Label, Check Box, Radio Buttons, List Boxes, Choice Boxes, Text Field and Text Area, Container Classes, LayOuts, Menu, Scroll bar.

Swings: Introduction, JFrame, JApplet, JPanel, Components in Swings, Layout Managers, List and JScroll Pane, SplitPane, JTabbedPane, JTree, DialogBox, Pluggable Look and Feel.

Course Outcomes:

- Understand Java programming concepts and utilize Java Graphical User Interface inProgram writing.
- Write, compile, execute and troubleshoot Java programming for networking concepts.
- Build Java Application for distributed environment.
- Design and Develop multi-tier applications.
- Identify and Analyze Enterprise applications.

Text Books:

1. The Complete Reference Java, 8ed, Herbert Schildt, TMH.
2. Programming in JAVA, Sachin Malhotra, Saurabh Choudhary, Oxford.
3. JAVA for Beginners, 4e, Joyce Farrell, Ankit R. Bhavsar, Cengage Learning.

Reference Books:

1. JAVA Programming, K.Rajkumar, Pearson.
2. Core JAVA, Black Book, Nageswara Rao, Wiley, Dream Tech.
3. Core JAVA for Beginners, Rashmi Kanta Das, Vikas.
4. Object Oriented Programming through JAVA , P Radha Krishna , University Press.
5. Object oriented programming with JAVA, Essentials and Applications, Raj Kumar Bhuyya, Selvi, Chu TMH.
6. Introduction to Java Programming, 7th ed, Y Daniel Liang, Pearson.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

		L	T	P	C
II Year-II Semester		**3**	**0**	**0**	**3**
Operating Systems					

Course Objectives:

- To understand the structure and functions of OS.
- To learn about Processes, Threads and Scheduling algorithms.
- To understand the principles of concurrency and Deadlocks.
- To learn various memory management schemes.
- To study file systems and mass storage structures.

Syllabus:

UNIT-I:

Computer System and Operating System Overview: Overview of Computer Operating Systems, Operating Systems Functions, Protection and Security, Distributed Systems, Special Purpose Systems, Operating Systems Structures and Systems Calls, Operating Systems Generation. Case Study: Linux.

UNIT-II:

Process Management – Process Concept- Process Scheduling, Operations, Inter Process Communication. Multi Thread Programming Models, Process Scheduling Criteria and Algorithms, and their Evaluation.

Concurrency: Process Synchronization, The Critical- Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization Examples, Case Study: Linux.

UNIT-III

Principles of Deadlock – System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery from Deadlock, Case Study: Linux.

UNIT-IV:

Memory Management: Swapping, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation, Case Study: Linux.

Virtual Memory Management:

Virtual Memory, Demand Paging, Page-Replacement, Algorithms, Allocation of Frames, Thrashing, Case Study: Linux.

UNIT-V:

File System Interface- The Concept of a File, Access Methods, Directory Structure, File System Mounting, Files Sharing, Protection.

File System Implementation- File System Structure, Allocation Methods, Free-Space Management.

Mass-Storage Structure -Overview of Mass-Storage Structure, Disk Structure, Disk Attachment, Disk Scheduling .Case Study: Linux.

Course Outcomes:

- Understand how to describe the general architecture of computers with various functions and how the system calls executed in the system.
- Understand the process concept and how processes and threads are scheduled for the execution by CPU with different scheduling algorithms.
- Understand and apply software and hardware synchronization concepts for solving various classical synchronization problems.
- Understand and apply various memory management techniques to manage main memory and virtual memory efficiently for the execution of multiple programs to increase the multi programming.
- Understand deadlock situations and deadlock handling methods to prevent, avoid and detecting deadlocks in the system.
- Understand various mass storage device structures and providing how to interface, implement mass storage devices through file system and applying various disk scheduling algorithms for fast access of disk to improve the system efficiency.

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.

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. http://nptel.iitm.ac.in/courses/Webcourse-contents/IISc-BANG/Operating%20Systems/New_index1.html.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

		L	T	P	C
II Year-II Semester		**3**	**0**	**0**	**3**
Database Management Systems					

Course Objectives:

- Train in the fundamental concepts of database management systems, database modeling and design, SQL, PL/SQL, and System implementation techniques.
- Enable students to model ER diagram for any customized applications.
- Provide knowledge on concurrency techniques.
- Understand normalization theory and apply such knowledge to the normalization of a database.
- To learn the principles of systematically designing and using large scale Database Management Systems for various applications.

Syllabus:

UNIT-I:

An Overview of Database Management: Introduction- Importance of Database System, Data Independence- Relation Systems and Others- Summary, Database system architecture, Introduction-The Three Levels of Architecture-The External Level- the Conceptual Level- the Internal Level-Mapping- the Database Administrator-The Database Management Systems- Client/Server Architecture.

UNIT-II:

The E/R Models: The Relational Model, Relational Calculus, Introduction to Database Design, Database Design and ER Diagrams-Entities Attributes, Entity Sets-Relationship and Relationship Sets-Conceptual Design with the ER Models.

The Relational Model: Integrity Constraints Over Relations- Key Constraints –Foreign Key Constraints-General Constraints, Relational Algebra and Calculus, Relational Algebra- Selection and Projection- Set Operation, Renaming – Joins- Division- More Examples of Queries, Relational Calculus - Tuple Relational Calculus, Domain Relational Calculus.

UNIT-III:

Queries, Constraints, Triggers: The Form of Basic SQL Query, Union, Intersect, and Except, Nested Queries, Aggregate Operators, Null Values, Complex Integrity Constraints in SQL, Triggers and Active Database.

Schema Refinement (Normalization) : Purpose of Normalization or Schema Refinement, Concept of Functional Dependency, Normal Forms Based on Functional Dependency(1NF, 2NF and3 NF), Concept of Surrogate Key, Boyce-Codd Normal Form(BCNF), Lossless Join and Dependency Preserving Decomposition, Fourth Normal Form(4NF).

UNIT-IV:

Transaction Management and Concurrency Control:

Transaction, Properties of Transactions, Transaction Log, Transaction Management with SQL using Commit Rollback and Save Point, Concurrency Control for Lost Updates, Uncommitted Data, Inconsistent Retrievals and the Scheduler.

Concurrency Control with Locking Methods : Lock Granularity, Lock Types, Two Phase Locking For Ensuring Serializability, Deadlocks, Concurrency Control with Time Stamp Ordering : Wait/Die and Wound/Wait Schemes, Database Recovery Management : Transaction Recovery.

UNIT-V:

Overview of Storages and Indexing: Data on External Storage- File Organization and Indexing – Clustered Indexing – Primary and Secondary Indexes, Index Data Structures, Hash-Based **Indexing** – Tree- Based Indexing, Comparison of File Organization.

Course Outcomes:

- Understand File System Vs Databases.
- Understand the usage of Key Constraints on Database.
- Create, maintain and manipulate a relational database using SQL.
- Describe ER model and normalization for database design.
- Understand efficient data storage and retrieval mechanism, recovery techniques.
- Design and build database system for a given real world problem.

Text Books:

1. Introduction to Database Systems, CJ Date, Pearson.
2. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, TATA McGraw Hill 3rd Edition.

References Books:

1. Data base Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate Pearson Education.
3. Database Systems - The Complete Book, H G Molina, J D Ullman, J Widom Pearson.
4. Data base System Concepts,5/e, Silberschatz, Korth, TMH.

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		L	T	P	C
II Year-II Semester		**3**	**0**	**0**	**3**
Formal Languages and Automata Theory					

Course Objectives:

- Introduce the student to the concepts of Theory of computation in computer science.
- The students should acquire insights into the relationship among formal languages, formal Grammars and automat.
- Classify machines by their power to recognize languages
- Understand the relationship between languages and their grammars.

Syllabus:

UNIT – I: Finite Automata

Introduction to Automata, Finite Automation, Transition Systems, Acceptance of a String by a Finite Automation, DFA, Design of DFAs, NFA, Design of NFA, Equivalence of DFA and NFA, Conversion of NFA into DFA, Finite Automata with E-Transition, Minimization of Finite Automata, Mealy and Moore Machines, Applications and Limitation of Finite Automata.

UNIT – II: Regular Expressions

Regular Expressions, Regular Sets, Identity Rules, Equivalence of two Regular Expressions, Manipulations of Regular Expressions, Finite Automata, and Regular Expressions, Inter Conversion, Equivalence between Finite Automata and Regular Expressions, Pumping Lemma, Closers Properties, Applications of Regular Expressions, Finite Automata and Regular Grammars, Regular Expressions and Regular Grammars.

UNIT – III: Context Free Grammars

Formal Languages, Grammars, Classification of Grammars, Chomsky Hierarchy Theorem, Context Free Grammar, Leftmost and Rightmost Derivations, Parse Trees, Ambiguous Grammars, Simplification of Context Free Grammars-Elimination of Useless Symbols, EProductions and Unit Productions, Normal Forms for Context Free Grammars-Chomsky Normal Form and Greibach Normal Form, Pumping Lemma, Closure Properties, Applications of Context Free Grammars.

Pushdown Automata

Pushdown Automata, Definition, Model, Graphical Notation, Instantaneous Description Language Acceptance of pushdown Automata, Design of Pushdown Automata, Deterministic and Non – Deterministic Pushdown Automata, Equivalence of Pushdown Automata and Context Free Grammars Conversion, Two Stack Pushdown Automata, Application of Pushdown Automata.

UNIT – IV: Turing Machine

Turing Machine, Definition, Model, Representation of Turing Machines-Instantaneous Descriptions, Transition Tables and Transition Diagrams, Language of a Turing Machine, Design of Turing Machines, Techniques for Turing Machine Construction, Types of Turing Machines, Church's Thesis, Universal Turing Machine, Restricted Turing Machine.

UNIT – V: Computability

Decidable and Un-decidable Problems, Halting Problem of Turing Machines, Post's Correspondence Problem, Modified Post's Correspondence Problem, Classes of P and NP, NP Hard and NP-Complete Problems.

Course Outcomes:

- Classify machines by their power to recognize languages.
- Employ finite state machines to solve problems in computing.
- Explain deterministic and non-deterministic machines.
- Comprehend the hierarchy of problems arising in the computer science.
- Design Push down Automata
- Design Turing Machines

Text Books:

1. Introduction to Automata Theory, Languages and Computation, J.E.Hopcroft, R.Motwani and J.D.Ullman, 3rd Edition, Pearson, 2008.
2. Theory of Computer Science-Automata, Languages and Computation, K.L.P.Mishra and N.Chandrasekharan, 3rd Edition, PHI, 2007.
3. Theory of Computer Science (Automata, Languages and Computation), 3rd ed. K.L.P. Mishra and N. Chandrasekaran , Thirty-fourth Printing (Third Edition) L L April, 2016.

Reference Books:

1. Formal Language and Automata Theory, K.V.N.Sunitha and N.Kalyani, Pearson, 2015.
2. Introduction to Automata Theory, Formal Languages and Computation, ShyamalenduKandar, Pearson, 2013.
3. Theory of Computation, V.Kulkarni, Oxford University Press, 2013.
4. Theory of Automata, Languages and Computation, Rajendra Kumar, McGraw Hill, 2014.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

		L	T	P	C
II Year-II Semester		**0**	**0**	**3**	**1.5**
Java Programming Lab					

Course Objectives:

- To understand the structure and environment of Java.
- To implement the relationship between objects.
- To apply data hiding strategy in objects.
- To implement text processing and error handling.
- To organize data using different data structures.
- To create multi-threaded graphical user interface applications.

List of Experiments:

Exercise - 1 (Basics)

a). Write a JAVA program to display default value of all primitive data type of JAVA.

b). Write a java program that display the roots of a quadratic equation $ax^2+bx=0$. Calculate the discriminate D and basing on value of D, describe the nature of root.

c). Five Bikers Compete in a race such that they drive at a constant speed which may or may not be the same as the other. To qualify the race, the speed of a racer must be more than the average speed of all 5 racers. Take as input the speed of each racer and print back the speed of qualifying racers.

d) Write a case study on **public static void main (250 words).**

Exercise - 2 (Operations, Expressions, Control-flow, Strings)

a) Write a JAVA program to search for an element in a given list of elements using binary search mechanism.

b) Write a JAVA program to sort for an element in a given list of elements using bubble sort.

c) Write a JAVA program to sort for an element in a given list of elements using merge sort.

d) Write a JAVA program using String Buffer to delete, remove character.

Exercise - 3 (Class, Objects)

a) Write a JAVA program to implement class mechanism. – Create a class, methods and invoke them inside main method.

b) Write a JAVA program to implement constructor.

Exercise - 4 (Methods)

a) Write a JAVA program to implement constructor overloading.

b) Write a JAVA program implement method overloading.

Exercise - 5 (Inheritance)

a) Write a JAVA program to implement Single Inheritance.
b) Write a JAVA program to implement multi level Inheritance.
c) Write a java program for abstract class to find areas of different shapes.

Exercise - 6 (Inheritance - Continued)

a) Write a JAVA program give example for "super" keyword.
b) Write a JAVA program to implement Interface. What kind of Inheritance can be achieved?

Exercise - 7 (Exception)

a) Write a JAVA program that describes exception handling mechanism.
b) Write a JAVA program Illustrating Multiple catch clauses.

Exercise – 8 (Runtime Polymorphism)

a) Write a JAVA program that implements Runtime polymorphism.
b) Write a Case study on run time polymorphism, inheritance that implement in above problem.

Exercise – 9 (User defined Exception)

a) Write a JAVA program for creation of illustrating throw.
b) Write a JAVA program for creation of Illustrating finally.
c) Write a JAVA program for creation of Java Built-in Exceptions.
d) Write a JAVA program for creation of User Defined Exception.

Exercise – 10 (Threads)

a) Write a JAVA program that creates threads by extending Thread class .First thread display "Good Morning "every 1 sec, the second thread displays "Hello "every 2 seconds and the third display "Welcome" every 3 seconds ,(Repeat the same by implementing Runnable).
b) Write a program illustrating **isAlive()** and **join ().**
c) Write a Program illustrating Daemon Threads.

Exercise - 11 (Threads continuity)

a) Write a JAVA program Producer Consumer Problem.
b) Write a case study on thread Synchronization after solving the above producer consumer problem.

Exercise – 12 (Packages)

a) Write a JAVA program illustrate class path.
b) Write a case study on including in class path in your OS environment of your package.
c) Write a JAVA program that import and use the defined your package in the previous Problem.

Exercise - 13 (Applet)

a) Write a JAVA program to paint like paint brush in applet.
b) Write a JAVA program to display analog clock using Applet.
c) Write a JAVA program to create different shapes and fill colours using Applet.

Exercise - 14 (Event Handling)

a) Write a JAVA program that display the x and y position of the cursor movement using Mouse.
b) Write a JAVA program that identifies key-up , key-down events when user entering text in an applet.

Exercise - 15 (Swings)

a) Write a JAVA program to build a Calculator in Swings.

b) Write a JAVA program to display the digital watch in swing tutorial.

Exercise – 16 (Swings - Continued)

a) Write a JAVA program that to create a single ball bouncing inside a JPanel.

b) Write a JAVA program JTree as displaying a real tree upside down.

Course Outcomes:

1. Create classes and objects for real world entities.
2. Implement polymorphic and abstract behavior in objects.
3. Implement the parent-child relationships between objects with access protection.
4. Create exceptions for handling runtime errors during text processing.
5. Implement generic data structures for iterating distinct objects.
6. Design thread-safe GUI applications for data communication between objects.

References:

1. The Complete Reference Java, 8ed, Herbert Schildt, TMH.
2. Java: How to Program, Harvey Deitel & Paul Deitel, 6/e, Prentice Hall.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

		L	T	P	C
II Year-II Semester		**0**	**0**	**3**	**1.5**
Operating Systems Lab					

Course Objectives:

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

Operating Systems:

List of Experiments:

1. Simulate the following CPU scheduling algorithms:
   a) Round Robin b) SJF c) FCFS d) Priority
2. Simulate the following
   a) Multiprogramming with a fixed number of tasks (MFT)
   b) Multiprogramming with a variable number of tasks (MVT)
3. Simulate Bankers Algorithm for Dead Lock Avoidance.
4. Simulate Bankers Algorithm for Dead Lock Detection.
5. Simulate the following page replacement algorithms:
   a) FIFO b) LRU c) Optimal
6. Simulate the following File allocation strategies:
   a) Sequenced b) Indexed c) Linked
7. Simulate Simple Paging technique.

Linux Programming:

List of Experiments:

1. a) Study of Unix/Linux general purpose utility command list
   man,who,cat, cd, cp, ps, ls, mv, rm, mkdir, rmdir, echo, more, date, time, kill, history, chmod, chown, finger, pwd, cal, logout, shutdown.
   b) Study of vi editor.
   c) Study of Bash shell, Bourne shell and C shell in Unix/Linux operating system.
   d) Study of Unix/Linux file system (tree structure).
   e) Study of .bashrc, /etc/bashrc and Environment variables.
2. Write a C program that makes a copy of a file using standard I/O, and system calls.
3. Write a C program to emulate the UNIX ls –l command.
4. Write a C program that illustrates how to execute two commands concurrently with a command pipe.Ex: - ls –l | sort .
5. Write a C program that illustrates two processes communicating using shared memory.
6. Write a C program to simulate producer and consumer problem using semaphores.
7. Write C program to create a thread using pthreads library and let it run its function.
8. Write a C program to illustrate concurrent execution of threads using pthreads library.

Course Outcomes:

1. implement various process scheduling programs.
2. implement various memory management algorithms.
3. Identify various solutions for critical section problems and also implement different algorithms that are applied in virtual memory .
4. implement various file allocation algorithms.
5. Describe and write shell scripts in order to perform basic shell programming.
6. Analyze various program editors and implement small program in linux environment.

References:

1. Operating System -Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley.
2. Unix & Shell Programming, Sumitabha das, TMH.
3. Unix & Shell Programming, N. B. Venkateswarlu.

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		L	T	P	C
II Year-II Semester		**0**	**0**	**3**	**1.5**
Database Management Systems Lab					

Course Objectives:

- To provide a sound introduction to the discipline of database management system.
- Subject in its own right, rather than as a compendium of techniques and product specific tools.
- To familiarize the participant with the nuances of database environments towards an information-oriented data-processing oriented framework.
- To give a good formal foundation on the relational model of data.
- To present SQL and procedural interfaces to SQL comprehensively.
- To give an introduction to systematic database design approaches covering conceptual design, logical design and an overview of physical design.

List of Experiments:

SQL:

1. Queries to facilitate acquaintance of Built-In Functions, String Functions, Numeric Functions, Date Functions and Conversion Functions.
2. Queries using operators in SQL.
3. Queries to Retrieve and Change Data: Select, Insert, Delete, and Update.
4. Queries using Group By, Order By, and Having Clauses.
5. Queries on Controlling Data: Commit, Rollback, and Save point.
6. Queries to Build Report in SQL *PLUS.
7. Queries for Creating, Dropping, and Altering Tables, Views, and Constraints.
8. Queries on Joins and Correlated Sub-Queries.
9. Queries on Working with Index, Sequence, Synonym, Controlling Access, and Locking Rows for Update, Creating Password and Security features.

PL/SQL:

10. Write a PL/SQL Code using Basic Variable, Anchored Declarations, and Usage of Assignment Operation.
11. Write a PL/SQL Code Bind and Substitution Variables. Printing in PL/SQL.
12. Write a PL/SQL block using SQL and Control Structures in PL/SQL.
13. Write a PL/SQL Code using Cursors, Exceptions and Composite Data Types.
14. Write a PL/SQL Code using Procedures, Functions, and Packages FORMS.
15. Write a PL/SQL Code Creation of forms for any Information System such as Student Information System, Employee Information System etc.

Course Outcomes:

- Understand, appreciate and effectively explain the underlying concepts of database technologies.
- Design and implement a database schema for a given problem-domain Normalize a database.
- Populate and query a database using SQL DML/DDL commands.
- Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS.
- Programming PL/SQL including stored procedures, stored functions, cursors, packages.
- Design and build a GUI application using a 4GL.

Note: The creation of sample database for the purpose of the experiments is expected to be pre-decided by the instructor.

Text Books/Suggested Reading:

1. Oracle: The Complete Reference by Oracle Press.
2. Rick F Vander Lans, “Introduction to SQL”, Fourth Edition, Pearson Education, 2007.
3. Oracle PL/SQL by example, Benjamin Rosenzweig, Elena Silvestrova, Pearson Education, 3/e.
4. Oracle Database Log PL/SQL Programming, Scott Urman, TMH.

References:

1. Nilesh Shah, "Database Systems Using Oracle”, PHI, 2007.
2. SQL & PL/SQL for Oracle 10g, Dr. P.S. Deshpande.
3. Database Management System, Oracle SQL and PL/SQL, Pranab Kumar Das Gupta, P Radha Krishna, PHI.

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		L	T	P	C
II Year-II Semester		**3**	**0**	**0**	**0**
Professional Ethics & Human Values					

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

Syllabus:

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.

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.

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.

UNIT IV: Engineers Responsibility for Safety and Risk:

Safety and risk –Assessment of safety and risk –Risk benefit analysis and reducing risk-Safety and the Engineer-Designing for the safety-Intellectual Property rights (IPR).

UINIT V: 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.

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.

Text Books:

1. "Engineering Ethics includes Human Values" by M.Govindarajan, S.Natarajan and, V.S.SenthilKumar-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 McGraw-Hill–2003.
4. "Professional Ethics and Morals" by Prof.A.R.Aryasri, DharanikotaSuyodhana-Maruthi Publications.
5. "Professional Ethics and Human Values" by A.Alavudeen, R.Kalil Rahman and M. Jayakumaran-LaxmiPublications.
6. "Professional Ethics and Human Values" by Prof.D.R.Kiran-

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		L	T	P	C
II Year-II Semester		**3**	**0**	**0**	**0**
Environmental Science					

Course Objectives:

- To make the students to get awareness on environment, to understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life to save earth from the inventions by the engineers.

Syllabus:

UNIT – I: Multidisciplinary Nature of Environmental Studies

Definition, Scope and Importance – Need for Public Awareness.

Natural Resources : Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources:

UNIT – II: Ecosystems, Biodiversity and its Conservation

Ecosystems: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the ecosystems: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity and its Conservation : Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-sports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT – III: Environmental Pollution and Solid Waste Management

Environmental Pollution: Definition, Cause, effects and control measures of : Air Pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards

Solid Waste Management: Causes**,** effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

UNIT – IV: Social Issues and the Environment

Social Issues and the Environment: From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

UNIT – V: Human Population and the Environment

Human Population and the Environment: Population growth, variation among nations. Population explosion – Family Welfare Programmed. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

Field Work: Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc..

Course Outcomes:

At the end of the course, the student will be able to:

- Gain a higher level of personal involvement and interest in understanding and solving environmental problems
- Comprehend environmental problems from multiple perspectives with emphasis on human modern lifestyles and developmental activities
- Demonstrate knowledge relating to the biological systems involved in the major global environmental problems of the 21st century
- Influence their society in proper utilization of goods and services
- Learn the management of environmental hazards and to mitigate disasters and have a clear understanding of environmental concerns and follow sustainable development practices.
- Recognize the interconnectedness of human dependence on the earth's ecosystems

Text Books :

1. Text book of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission, Universities Press.
2. Environmental Studies by Palaniswamy – Pearson education
3. Environmental Studies by Dr.S.Azeem Unnisa, Academic Publishing Company

Reference Books :

1. Textbook of Environmental Science by Deeksha Dave and E.Sai Baba Reddy, Cengage Publications.
2. Text book of Environmental Sciences and Technology by M.Anji Reddy, BS Publication.
3. Comprehensive Environmental studies by J.P.Sharma, Laxmi publications.
4. Environmental sciences and engineering – J. Glynn Henry and Gary W. Heinke – Prentice hall of India Private limited.
5. A Text Book of Environmental Studies by G.R.Chatwal, Himalaya Publishing House
6. Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Prentice hall of India Private limited.

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		L	T	P	C
III Year-I Semester		**3**	**0**	**0**	**3**
DESIGN AND ANALYSIS OF ALGORITHMS					

Course Objectives:
The objectives of this course is to acquire knowledge on the
i. Analyze the asymptotic performance of algorithms
ii. Write rigorous correctness proofs for algorithms
iii. Demonstrate a familiarity with major algorithms and data structures
iv. Apply important algorithmic design paradigms and methods of analysis
v. Synthesize efficient algorithms in common engineering design situations

UNIT - I:
Introduction: What is an Algorithm, Algorithm Specification, Pseudo code Conventions Recursive Algorithm, Performance Analysis, Space Complexity, Time Complexity, Amortized Complexity, Amortized Complexity, Asymptotic Notation, Practical Complexities' Performance Measurement.

UNIT - II:
Decrease-and-Conquer: Insertion Sort Algorithms for Generating Combinatorial Objects Decrease-by-a-Constant-Factor Algorithms Variable-Size-Decrease Algorithms
Dived and Conquer: Merge Sort, Quick Sort, Multiplication of Large Integers and Strassen's Matrix Multiplication
Transform and conquer: Pre-sorting Balanced Search Trees, Heaps and Heap sort

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

UNIT - IV:
Dynamic Programming: The General Method Multistage graph ,All - Pairs Shortest Paths, , String Edition, 0/1 Knapsack, Reliability Design, optimal binary search trees.

UNIT - V:
Backtracking: The General Method, The S-Queens Problem, Sum of Subsets, Graph Coloring Hamiltonian Cycles
Branch and Bound: The Method, Least cost (LC) Search, The 15-Puzzle: an Example, Control Abstraction for LC-Search, Bounding, FIFO Branch-and-Bound, LC Branch and Bound, 0/1 Knapsack problem, LC Branch-and Bound Solution, FIFO Branch-and-Bound Solution, Traveling Salesperson problem.

Course Outcomes:

The students should be able to:

i. Argue the correctness of algorithms using inductive proofs and invariants, Analyze worst-case running times of algorithms testing asymptotic analysis

ii. Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize divide-and conquer algorithms. Derive and solve recurrences describing the performance of divide-and-conquer algorithms

iii. Describe the greedy paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ these paradigm Synthesize greedy algorithms and analyse them.

Iv. Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize dynamic programming algorithms, and analyze them

v. Describe the Backtracking and branch and bound paradigms and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize Backtracking and branch and bound algorithms, and analyse them

Text Books:

i. Fundamentals of computer algorithms E. Horowitz S. Sahni, University Press

ii. Introduction to the design and analysis of Algorithms Anany Levitin pearson ,3rd edition

iii.Introduction to Algorithms Thomas H Cormen PHI Learning

Reference Books:

i. The Design and Analysis of Computer Algorithms, Alfred V Aho John E Hopcroft Jeffrey D Ullman
ii. Algorithm Design, Jon Kleinberg, Pearson
iii. Algorithms, by Dasgupta, Papadimitrou and Vazirani, McGraw-Hill Education, 2006.

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		L	T	P	C
III Year I Semester		**3**	**0**	**0**	**3**
COMPUTER NETWORKS					

Course Objectives:

i. To introduce the fundamental various types of computer networks.
ii. To understand state-of-the-art in network protocols, architectures, and applications.
iii. To explore the various layers of OSI Model.
iv. To introduce UDP and TCP Models.

UNIT-I:

Introduction: Network Hardware and software Reference models- The OSI Reference Model- the TCP/IP Reference Model - A Comparison of the OSI and TCP/IP Reference Models, Examples of Networks: Novell Networks, Arpanet, Internet, Network Topologies WAN, LAN, MAN.

Physical Layer: Guided Transmission Media, Digital Modulation and Multiplexing: frequency division multiplexing, wave length division multiplexing, synchronous time division multiplexing, statistical time division multiplexing.

UNIT-II:

The Data Link Layer - Design Issues, Services Provided to the Network Layer – Framing – Error Control – Flow Control, Error Detection and Correction – Error-Correcting Codes – Error Detecting Codes, Elementary Data Link Protocols, Sliding WindowProtocols.

Channel allocation methods: TDM, FDM, ALOHA, Carrier sense Multiple access protocols, Collision Free protocols – IEEE standard 802 for LANS – Ethernet, Token Bus, Token ring, Bridges and IEEE 802.11 and 802.16. Data link layer switching, virtualLANs.

UNIT-III:

Network layer Routing Algorithms: Design Issues, Routing Algorithms-Shortest path, Flooding, Flow based Distance vector, Link state, Hierarchical, Broadcast routing, Congestion Control algorithms-General principles of congestion control, Congestion prevention polices, Choke packets, Load shedding, and Jitter Control.

Internet Working : Tunnelling, internetworking, Fragmentation, Network layer in the internet – IP protocols, IP address, Subnets, Internet control protocols, OSPF, BGP, Internet multicasting, Mobile IP, IPV6.

UNIT IV:

The Transport Layer: Elements of transport protocols – addressing, establishing a connection, releasing connection, flow control and buffering and crash recovery, End to end protocols: UDP, Real Time Tran sport Protocol.

The Internet Transport Protocol: TCP- reliable Byte Stream (TCP) end to end format, segment format, connection establishment and termination, sliding window revisited, adaptive retransmission, TCP extension, Remote Procedure Call.

UNIT – V:

Application Layer: WWW and HTTP: Architecture- Client (Browser), Server, Uniform Resource Locator HTTP: HTTP Transaction, HTTP Operational Model and Client/Server Communication**,** HTTP Generic Message Format, HTTP Request Message Format, HTTP Response Message Format.

The Domain Name System: The DNS Name Space, Resource Records, Name Servers, Electronic Mail: Architecture and Services, The User Agent, Message Formats, Message Transfer, Final Delivery.

Course Outcomes:

The students are able to

i. Understand OSI and TCP/IP reference models with an emphasis to Physical Layer, Data Link Layer and NetworkLayer.
ii. Analyze the issues related to data link, medium access and transport layers by using channel allocation and connection management schemes.Analyze MAC layer protocols and LANtechnologies.
iii. Solve problems related to Flow control, Error control, Congestioncontroland Network Routing.
iv. Design and compute subnet masks and addresses for networkingrequirements.
v. Understand how internetworks,

Text Books:

i. Data Communications and Networks – Behrouz A. Forouzan, Third EditionTMH.
ii. Computer Networks, 5ed, David Patterson,Elsevier
iii. Computer Networks: Andrew S Tanenbaum, 4th Edition. PearsonEducation/PHI
iv.Computer Networks, Mayank Dave, CENGAGE

References:

i. Tanenbaum and David J Wetherall, Computer Networks, 5th Edition, Pearson Edu, 2010
ii. Computer Networks: A Top Down Approach, Behrouz A. Forouzan, FirouzMosharraf, McGraw Hill Education
iii. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, PearsonEducation
iv. Understanding communications and Networks, 3rd Edition, W.A. Shay, ThomsonThe TCP/IP Guide, by Charles M. Kozierok, Free online Resource,http://www.tcpipguide.com/free/index.htm

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		L	T	P	C
III Year-I Semester		**3**	**0**	**0**	**3**
COMPILER DESIGN					

Course Objectives:
The objectives of this course is to acquire knowledge on the
i. The phases of a compiler
ii. Design of lexical analyzers, Syntax analyzers, Intermediate code generators
iii. Usage of Lex/Bison tools in writing compilers
iv. Different optimizations and analyses required to do those optimizations
v. Issues in the code generation, code generation generation algorithms

UNIT - I:
Introduction and Lexical Analysis
Language Processors, the structure of a compiler, the science of building a compiler, phases of a compiler. Lexical Analysis: The role of the lexical analyzer, Identifying tokens, Transition diagrams for recognizing tokens, Input buffering, The lexical analyzer generator Lex, Finite automata, Conversion from regular expressions to automata, design of a lexical analyzer generator, Optimization of DFA-based pattern matchers.

UNIT - II:
Syntax Analysis
Introduction, Context-Free Grammars, BNF(Backus-Naur Form), EBNF(Extended Backus-Naur Form). Preprocessing of grammars: left recursion elimination, left factoring. Top-Down Parsing: Recursive-descent parsers, LL(1) parsers. Bottom-Up parsing: Introduction to LR parsers, Simple LR, Canonical LR, Lookahead LR. Extending parsers to handle ambiguous grammars, Parser generators Yacc/Bison.

UNIT – III:
Syntax-Directed Translation, Semantic Analysis, Intermediate Code Generation
Syntax-Directed Definitions, Evaluation orders for SDD's, Applications of Syntax-Directed Translation, Syntax-Directed Translation Schemes, and Implementing L-Attributed SDD's.
Intermediate code generation: Variants of Syntax trees, Three-address code, Types and declarations, Type checking, Control flow, Back patching, Switch-Statements, Intermediate Code for Procedures.

UNIT - IV:
Code Optimization, Run-time Environment
Run-Time Environments: Storage organization, Activation record, Stack allocation, Access to nonlocal data on the stack, Heap management, Introduction to garbage collection, Introduction to trace-based collection. Machine-Independent optimizations: The principal sources of optimization, Basic blocks and flow graphs, Introduction to data-flow analysis, Foundations of data-flow analysis, Constant propagation.

UNIT - V: Target Code Generation

Code Generation: Issues in the design of a Code Generator, The target language, Addresses in the target code, A simple code generator.

Machine-dependent Optimizations: Peephole optimization, Register allocation and assignment, Dynamic Programming code generation.

Course Outcomes:

The students should be able to:

i. Understand the basics of language processing and implement lexical analyzer for any language
ii. Understand the different types of parsing and implement parser for any language
iii. Understand the different intermediate code representations and use Syntax directed definitions to design a intermediate code generators for any language construct.
iv. Understand the basics of data flow analysis, optimizations, and run time environment required for handling recursive procedures
v. Understand the issues in the code generation and code generation algorithms.

Text Books:

i. Compilers: Principles, Techniques and Tools, Second Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffry D. Ullman, Pearson.
ii. Compiler Construction-Principles and Practice, Kenneth C Louden, Cengage Learning.

Reference Books:

i. Modern Compiler Implementation in C, Andrew W Appel, Revised edition, Cambridge University Press.
ii. The Theory and Practice of Compiler writing, J. P. Tremblay and P. G. Sorenson, TMH
iii. lex & yacc, 2nd Edition by John Levine, Doug Brown, Tony Mason

E-resources:

i. https://www.edx.org/course/compilers
ii. https://nptel.ac.in/courses/106/108/106108113/

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		L	T	P	C
III Year-I Semester		**3**	**0**	**0**	**3**
DATA WAREHOUSING AND DATA MINING					

Course Objectives:

Students undergoing this course are expected to:

i. Understand the concepts of Data Ware housing and Data Mining
ii. Understand various data mining functionalities and Extract knowledge using data mining techniques
iii. Characterize the kinds of patterns that can be discovered by classification, clustering and association rule mining.
iv. Master data mining techniques in various applications like social, scientific and environmental context.
v. Develop skill in selecting the appropriate data mining algorithm for solving practical problems.

UNIT –I: Data Mining Systems and Knowledge Discovery Process:

Data Warehouse and OLAP Technology: An Overview- What Is a Data Warehouse. A Multidimensional Data Model - Need for Online Analytical Processing - OLTP V/s OLAP -OLAP Operations in Multidimensional Data Model. Data Warehouse Architecture, Data Warehouse Implementation, From Data Warehousing to Data Mining.

Need and Usage of Data Mining Technologies - Overview of Knowledge Discovery Process from Databases–What Motivated Data Mining - Why Is It Important - Data Mining Functionalities—What Kinds of Patterns Can Be Mined? Are All of the Patterns Interesting Classification of Data Mining Systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or Data Warehouse System, Major Issues in Data Mining.

UNIT–II: Data Preprocessing:

Data Exploration: Data Objects and attribute types -Statistical description of data- Descriptive Data Summarization-Data Visualization - Data similarity and dissimilarity measures.

Data Pre-processing: Why Pre-process the Data -Data Cleaning-Data Integration-Data Reduction- Data Transformation and Data Discretization.

UNIT–III: Classification:

Basic issues regarding classification and predication - General Approach to solving a classification problem- Decision Tree Classification, Attribute Selection Measures, Tree Pruning-Bayesian Classification – Rule Based Classification – Support Vector Machines.

Classification Model Evaluation and Selection - Accuracy and Error measures, Holdout, Random Sampling, Cross Validation, Bootstrap, Comparing Classifier performance using ROC Curves.

UNIT–IV: Mining Frequent Patterns and Association Rules:

Basic Concepts-Problem Definition- Market Basket Analysis- Frequent Itemsets- Closed Itemsets and Association Rules - Frequent Pattern Mining - Efficient and Scalable Frequent Itemset Mining Methods- the Apriori Algorithm for finding Frequent Itemsets Using Candidate Generation - Generating Association Rules from Frequent Itemsets - A pattern growth approach for mining Frequent Itemsets- FP-Growth Algorithm

UNIT V: Cluster Analysis:

Basics and Importance of Cluster Analysis- Clustering techniques- Different Types of Clusters- Partitioning Methods (K-Means, K Medoids) -Strengths and Weaknesses. Hierarchical Methods (Agglomerative, Divisive) - Density-Based Methods (DBSCAN, OPTICS)-

Course Outcomes:

After completion of the course, students should be able to:

i. Understand Data Warehouse fundamentals, Data Mining concepts, principles and its functionalities
ii. Pre process the data using various Data Pre processing Techniques for mining applications
iii. Design and deploy appropriate classification techniques to solve real world problems and further be able to assess the strengths and weaknesses of various methods and algorithms to analyze their behavior.
iv. Demonstrate Association analysis techniques for generating association rules from data.
v. Use different Clustering techniques to cluster data and Cluster the high dimensional data for better organization of the data

Text Books:

i. Introduction to Data Mining: Pang-Ning Tan & Michael Steinbach, Vipin Kumar, Pearson.
ii. Data Mining concepts and Techniques, 3/e, Jiawei Han, Michel Kamber, Elsevier.

References:

i. Data Mining Techniques and Applications: An Introduction, Hongbo Du, Cengage Learning.
ii. Data Mining :VikramPudi and P. Radha Krishna, Oxford.
iii. Data Mining and Analysis - Fundamental Concepts and Algorithms; Mohammed J. Zaki, Wagner Meira, Jr, Oxford
iv. Data Warehousing Data Mining & OLAP, Alex Berson, Stephen Smith, TMH.

E-resources:

i. http://onlinecourses.nptel.ac.in/noc18_cs14/preview (NPTEL course by Prof.Pabitra Mitra)
ii. http://onlinecourses.nptel.ac.in/noc17_mg24/preview (NPTEL course by Dr. Nandan Sudarshanam & Dr. Balaraman Ravindran)
iii. http://www.saedsayad.com/data_mining_map.htm

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		L	T	P	C
III Year-I Semester	**Professional Elective – I**	**3**	**0**	**0**	**3**
COMPUTER GRAPHICS					

Course Objectives:
i. To develop, design and implement two and three dimensional graphical structures
ii. To learn Creation, Management and Transmission of Multimedia objects.

UNIT-I:
Introduction to Graphics: Application areas of Computer Graphics, overview of graphics systems, video-display devices, graphics monitors and work stations and input devices.
2D Primitives: Output primitives-Line, Circle and Ellipse drawing algorithms, Attributes of output primitives, Two dimensional Geometric transformations, Two dimensional viewing Line, Polygon, Curve and Text clipping algorithms.

UNIT-II:
3D Concepts: Parallel and Perspective projections - Three dimensional object representations – Polygons, Curved lines, Splines, Quadric Surfaces, - Visualization of data sets - 3D transformations – Viewing -Visible surface identification.

UNIT-III:
Illumination and Shading: Background, simple lighting model, shading models, intensity representation, color models, texture synthesis

UNIT-IV:
Graphics Hardware and Software:
Graphics programming using OPENGL-Basic graphics primitives, Drawing three dimensional objects, Drawing three dimensional scenes.
Rendering: Introduction to shading models, Flat and Smooth shading, Adding texture to faces, Adding shadows of objects, Building a camera in a program, Creating shaded objects.

UNIT V:
Fractals: Fractals and Self similarity, Peano curves, Creating image by iterated functions, Mandelbrot sets, Julia Sets, Random Fractals
Overview of Ray Tracing: Intersecting rays with other primitives, Adding Surface texture, Reflections and Transparency, Boolean operations on Objects.

Course Outcomes:

i. To learned various algorithms for drawing objects in 2D transformations like line, circle and ellipse.

ii. Apply projections and visible surface detection techniques for display of 3D scene on 2D screen.

iii. Able to select particular color model for lighting and shading of objects.

iv. To get an idea about the structure of OPENGL graphic software.

v. Able to create image using fractals and iterated functions

Text Books:

i. Donald Hearn, Pauline Baker, Computer Graphics – C Version, Pearson Education.

ii. F.S. Hill, Computer Graphics using OPENGL, Pearson Education.

Reference Books:

i. James D. Foley, Andries Van Dam, Steven K. Feiner, John F. Hughes, Computer Graphics Principles and practice in C, Pearson Education.

		L	T	P	C
III Year-I Semester	**Professional Elective – I**	**3**	**0**	**0**	**3**
FUNCTIONAL PROGRAMMING					

Course Objectives:

The objectives of this course is to acquire knowledge on the

i. basics of functional programming

ii. basic constructs of haskell.

ii. Lazy evaluation feature of haskell programs execution.

UNIT - I:

Introduction to functional programming, Haskell starting out: first function, lists, tuples

UNIT - II:

Types and Typeclasses: Type variables, Syntax in functions: Pattern matching, case expressions, Making own types and type classes

UNIT - III:

Recursive functions: Think recursively, List comprehensions, Lazy evaluation.

UNIT - IV:

Higher order functions: curried functions, function composition, Modules

UNIT - V:

Input and output, monoids

Course Outcomes:

The students should be able to:

i. Understand the basics of haskell

ii. Write basic functions and understand how haskell compiler infer types of variables

iii. Write recursive programs and reasoning programs using lazy evaluation

iv. Understand the higher order functions

v. Understand implemenation of side effects in functional programming

Text Books:

i. Learn you a haskell for a great good a beginner's guide, Miron lipovaca

Reference Books:

i. Programming in Haskell, 2nd Edition, Graham hutton

E-resources:

i. https://nptel.ac.in/courses/106/106/106106137/

ii. https://wiki.haskell.org/H-99:_Ninety-Nine_Haskell_Problems

iii. https://www.haskell.org/downloads/

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		L	T	P	C
III Year-I Semester	**Professional Elective - I**	**3**	**0**	**0**	**3**
NOSQL DATA BASES					

Course Objectives:

The objective of this course is to

i. Explore the emergence, requirements and benefits of a NoSQL database.

ii. Understand the basic architecture and data models of a NoSQL database (key-value stores, document databases, column-family stores, graph databases).

UNIT-I:

Introduction and Basic Concepts:

Overview, and History of NoSQL Databases, Definition of the Four Types of NoSQL Database, The Value of Relational Databases, Impedance Mismatch, Application and Integration Databases, Attack of the Clusters, The Emergence of NoSQL, Key Points, Comparison of relational databases to new NoSQL stores, MongoDB, Cassandra, HBASE, Neo4j use and deployment, Application, RDBMS approach, Challenges NoSQL approach, Key-Value and Document Data Models, Column-Family Stores, Aggregate-Oriented Databases.

UNIT-II:

NoSQL Key/Value databases using MongoDB:

Document Databases, What Is a Document Database? Features, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Web Analytics or Real-Time Analytics, E-Commerce Applications, When Not to Use, Complex Transactions Spanning Different Operations, Queries against Varying Aggregate Structure.

UNIT-III:

Column- oriented NoSQL databases using Apache HBASE:

Column-oriented NoSQL databases using Apache Cassandra, Architecture of HBASE, What Is a Column-Family Data Store? Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Counters, Expiring Usage, When Not to Use.

UNIT-IV:

NoSQL Key/Value databases using Riak:

Key-Value Databases, What Is a Key-Value Store, Key-Value Store Features, Consistency, Transactions, Query Features, Structure of Data, Scaling, Suitable Use Cases, Storing Session Information, User Profiles, Preferences, Shopping Cart Data, When Not to Use, Relationships among Data, Multioperation Transactions, Query by Data, Operations by Sets.

UNIT-V:

Graph NoSQL databases using Neo4:

NoSQL database development tools and programming languages, Graph Databases, What Is a Graph Database? Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Connected Data, Routing, Dispatch, and Location-Based Services, Recommendation Engines, When Not to Use.

Course Outcomes:

On completion of this course, the students will be able to

i. Differentiate between various non-relational (NoSQL) database.
ii. Create Documentoriented NoSQL databases using Mongo DB.
iii. Create Column- oriented NoSQL databases using Apache HBASE.
iv. Create NoSQL Key/Value databases using Riak.
v. Create Graph NoSQL databases using Neo4.

Text Books:

i. NoSQLDistilled: A Brief Guide to the Emerging World of Polyglot Persistence,Pramod J. Sadalage, Martin Fowler,Pearson Education, 2013.
ii. Shashank Tiwari. Professional NoSQL. John Wiley and Sons. ISBN: 978-0-470-94224-6.

Reference Books:

i. A Guide to Modern Databases and the NoSQL Movement Edition, Redmond, E. &Wilson

ii. Redmond, E. & Wilson, J. (2012). Seven Databases in Seven Weeks: A Guide to Modern Databases and the NoSQL Movement (1st Ed.). Raleigh, NC: The Pragmatic Programmers, LLC.

iii. Dan Sullivan. NoSQL for Mere Mortals. Addison-Wesley Professional. 2015.

iv. Guy Harrison. Next-Generation Databases. Apress. 2016.

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		L	T	P	C
III Year I Semester	**Professional Elective-I**	**3**	**0**	**0**	**3**
ADVANCED DATA STRUCTURES					

Course Objectives:

The objectives of this course is to acquire knowledge on the

i. Data Structures for Digital search trees.
ii. How to work with strings and patterns.
iii. Balanced search trees and their complexity analysis.
iv. External sorting Techniques.
v. Work with File structures

UNIT - I:

Digital Search Structures:

Digital Search Trees, Binary Tries, Compressed Binary Tries, Patricia, Multiway Tries, Xfast Trie, Yfast Trie

UNIT - II:

String Matching:

Exact String Matching, Straightforward Algorithms, Knuth-Morris-Pratt Algorithm, Boyer-Moore Algorithm, Multiple Searches, Bit-Oriented Approach, Matching Sets of Words, Regular Expression Matching, Suffix Tries and Trees, Suffix Arrays.

UNIT - III:

Advanced Search Structures

Red-Black Trees: Searching, Top-Down Insertion, Bottom-Up Insertion, Deletion
Splay Trees: Introduction, Searching, Splaying, Insertion and Deletion.
Skip Lists: Introduction, Representation, Insertion and Deletion, Assigning Levels

UNIT - IV:

External Sorting:

External Sorting, Introduction, K-way Merging, Buffer Handling for Parallel Operation, Run Generation, Optimal Merging of Runs.

UNIT - V:

File Structures:

Fundamental File Processing Operations-opening files, closing files, Reading and Writing file contents, Special characters in files. Fundamental File Structure Concepts- Field and record organization, Managing fixed-length, fixed-field buffers.

Course Outcomes:

The students should be able to:

i. Learn and understand advanced search trees.

ii. Learn to use different data structures for string processing and pattern matching related tasks.

iii. Learn and analyze different balanced search trees and their applications.

iv. Learn and analyze sorting techniques.

v. Understands the significance of file structures and operations.

Text Books:

i. Fundamentals of Data Structures in C: Second Edition, Horowitz, Sahani, Anderson Freed, Universities Press

ii. Data Structures, Algorithms and Applications in C++, Second Edition, Sartaj Sahani, Universities Press

iii. Data Structures and Algorithms in C++, Fourth Edition,Adam Drozdek, Cengage Learning

Reference Books:

i. Pat Morin, Open Data Structures(in C++), Edition 0.1 Gβ

ii. Peter Brass, Advanced Data Structures, Cambridge University Press

iii. M.A. Weiss, Data Structures and Algorithms Analysis in C++, Benjamin/Cummins, Redwood City, California, USA, 1994.

iv. File Structures :An Object oriented approach with C++, 3rd ed, Michel J Folk, Greg Riccardi, Bill Zoellick

III Year – I Semester	Professional Elective-I	L	T	P	C
		3	0	0	3
ADVANCED COMPUTER ARCHITECTURE					

Course Objectives:

i. To understand the concept of Parallel Processing and its applications.
ii. Implement the Hardware for Arithmetic Operations.
iii. Analyze the performance of different scalar Computers.
iv. To learn the Pipelining Concept for a given set of Instructions.
v. Distinguish the performance of pipelining and non-pipelining environment in a processor.

UNIT -I:

Fundamentals of Computer Design: Fundamentals of Computer design, Changing faces of computing and task of computer designer, Technology trends, Cost price and their trends, Measuring and reporting performance, Quantitative principles of computer design, Amdahl's law. **Instruction Set Principles and Examples**: Introduction, Classifying instruction set- Memory addressing- type and size of operands, Operations in the instruction set.

UNIT –II:

Pipelines: Introduction, Basic RISC instruction set, Simple implementation of RISC instruction set, Classic five stage pipe lined RISC processor, Basic performance issues in pipelining, Pipeline hazards, Reducing pipeline branch penalties. **Memory Hierarchy Design**: Introduction, Review of ABC of cache, Cache performance, Reducing cache miss penalty, Virtual memory.

UNIT -III:

Instruction Level Parallelism the Hardware Approach: Instruction-Level parallelism, Dynamic scheduling, Dynamic scheduling using Tomasulo's approach, Branch prediction, high performance instruction delivery- Hardware based speculation.

UNIT -IV:

ILP Software: Approach Basic compiler level techniques, Static branch prediction, VLIW approach, Exploiting ILP, Parallelism at compile time, Cross cutting issues - Hardware verses Software. **The Processor:** Introduction, Logic Design Conventions, Building a Datapath, A Simple Implementation Scheme, An Overview of Pipelining, Pipelined Datapath and Control, **Data Hazards:** Forwarding versus Stalling, Control Hazards, Exceptions, Parallelism via Instructions, The ARM Cortex-A8 and Intel Core i7 Pipelines.

UNIT –V:

Multi Processors and Thread level Parallelism- Introduction, Characteristics of application domain, Systematic shared memory architecture, Distributed shared – memory architecture, Synchronization, **Inter Connection and Networks:** Introduction, Interconnection network media, Practical issues in interconnecting networks, Static and Dynamic Networks, Linear Array, Ring, Star, Tree, Mesh, Systolic Array, Chordal ring, Completely connected network, Cube connected cycles, Torus, K-ary-n cube, Barrel shifter, Single stage interconnection network, Multistage Interconnection Networks, Control Structure, Node degree, Diameter, Bisection width, Symmetric, Functionality, Network Latency, Bandwidth, Scalability, Cluster, Designing of clusters.

Intel Architecture: Intel IA-64 ILP in embedded and mobile markets Fallacies and pit falls.

Course Outcomes:

After the completion of the course, student will be able to

i. Understand the types of computers, and new trends and developments in computer architecture.
ii. Develop pipelining, instruction set architectures, memory addressing.
iii. Apply ILP using dynamic scheduling, multiple issue, and speculation.
iv. Analyze the various techniques to enhance a processors ability to exploit Instruction-levelparallelism (ILP), and its challenges.
v. Determine the importance of multithreading by using ILP and supporting thread-level parallelism (TLP).

Text Books:

i. Computer Organization and Design: The hardware and Software Interface, David A Patterson, John L Hennessy, 5th edition, MK.
ii. Computer Architecture and Parallel Processing – Kai Hwang, Faye A.Brigs, Mc GrawHill.
iii. John L. Hennessy, David A. Patterson – Computer Architecture: A Quantitative Approach, 3rd Edition, An Imprint of Elsevier.

Reference Books:

i. Modern Processor Design: Fundamentals of Super Scalar Processors, John P. Shen and Miikko H. Lipasti, Mc Graw Hill.
ii. Advanced Computer Architecture – A Design Space Approach – Dezso Sima, Terence Fountain, Peter Kacsuk , Pearson.
iii. Computer Architecture and Parallel Processing – Kai Hwang, Faye A.Brigs., MC Graw Hill.
iv. Introduction to Parallel Computing, 2nd Edition, Pearson Education by Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar.

E-Resources:

i. https://nptel.ac.in/courses/106/105/106105163/

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III Year – I Semester	Professional Elective-I	L	T	P	C
		3	0	0	3
MEAN STACK TECHNOLOGIES					

Course Objectives:
From the course the student will learn

i. Translate user requirements into the overall architecture and implementation of new systems and Manage Project and coordinate with the Client
ii. Writing optimized front end code HTML and JavaScript
iii. Monitor the performance of web applications & infrastructure and Troubleshooting web application with a fast and accurate a resolution
iv. Design and implementation of Robust and Scalable Front End Applications

UNIT –I:
Introduction to Web: Internet and World Wide Web, Domain name service, Protocols: HTTP, FTP, SMTP. Html5 concepts, CSS3, Anatomy of a web page. XML: Document type Definition, XML schemas, Document object model, XSLT, DOM and SAX Approaches.

UNIT- II:
JavaScript: The Basic of JavaScript: Objects, Primitives Operations and Expressions, Control Statements, Arrays, Functions, Constructors, Pattern Matching using Regular Expressions. Angular Java Script Angular JS Expressions: ARRAY, Objects, $eval, Strings, Angular JS Form Validation & Form Submission, Single Page Application development using Angular JS.

UNIT –III:
Node.js: Introduction, Advantages, Node.js Process Model, Node JS Modules. Express.js: Introduction to Express Framework, Introduction to Nodejs , What is Nodejs, Getting Started with Express, Your first Express App, Express Routing, Implementing MVC in Express, Middleware, Using Template Engines, Error Handling , API Handling , Debugging, Developing Template Engines, Using Process Managers, Security & Deployment.

UNIT –IV:
RESTful Web Services: Using the Uniform Interface, Designing URIs,
Web Linking, Conditional Requests. React Js: Welcome to React, Obstacles and Roadblocks, React's Future, Keeping Up with the Changes, Working with the Files, Pure React, Page Setup, The Virtual DOM, React Elements, ReactDOM, Children, Constructing Elements with Data, React Components, DOM Rendering, Factories.

UNIT –V:
Mongo DB: Introduction, Architecture, Features, Examples, Database Creation & Collection in Mongo DB. Deploying Applications: Web hosting & Domains, Deployment Using Cloud Platforms.

Course Outcomes:

After the completion of the course, student will be able to

i. Enumerate the Basic Concepts of Web & Markup Languages
ii. Develop web Applications using Scripting Languages & Frameworks
iii. Make use of Express JS and Node JS frameworks
iv. Illustrate the uses of web services concepts like restful, react js
v. Apply Deployment Techniques & Working with cloud platform

Text Books:

i. Programming the World Wide Web, Robet W Sebesta, 7ed, Pearson.
ii. Web Technologies, Uttam K Roy, Oxford
iii. Pro Mean Stack Development, ELadElrom, Apress
iv. Restful Web Services Cookbook, Subbu Allamraju, O'Reilly
v. JavaScript & jQuery the missing manual, David sawyer mcfarland, O'Reilly
vi. Web Hosting for Dummies, Peter Pollock, John Wiley Brand

Reference Books:

i. Ruby on Rails up and Running, Lightning fast Web development, Bruce Tate, Curt Hibbs, Oreilly (2006).
ii. Programming Perl, 4ed, Tom Christiansen, Jonathan Orwant, Oreilly (2012).
iii. Web Technologies, HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech.
iv. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning.
v. Express.JS Guide,The Comprehensive Book on Express.js, Azat Mardan, Lean Publishing.

e-Resources:

i. http://www.upriss.org.uk/perl/PerlCourse.html

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		L	T	P	C
III Year I Semester		**0**	**0**	**3**	**1.5**
COMPUTER NETWORKS LAB					

Course Objectives:

i. Understand and apply different network commands
ii. Analyze different networking functions and features for implementing optimal solutions Apply different networking concepts for implementing network solution
iii. Implement different network protocols

Experiments:

1) Implement the data link layer framing methods such as character stuffing and bit stuffing.

2) Write a C program to develop a DNS client server to resolve the given hostname.

3) Implement on a data set of characters the three CRC polynomials – CRC-12, CRC-16 and CRC-CCIP.

4) Implement Dijkstra's algorithm to compute the Shortest path in a graph.

5) Take an example subnet graph with weights indicating delay between nodes. Now obtain Routing table art each node using distance vector routing algorithm

6) Take an example subnet of hosts. Obtain broadcast tree for it.

7) Write a client-server application for chat using UDP

8) Implement programs using raw sockets (like packet capturing and filtering)

9) Write a C program to perform sliding window protocol.

10) Get the MAC or Physical address of the system using Address Resolution Protocol.

11) Simulate the Implementing Routing Protocols using border gateway protocol(BGP)

12) Simulate the OPEN SHORTEST PATH FIRST routing protocol based on the cost assigned to the path.

13) Install Wireshark Tool on PC and use it to:
    a) Capture network traffic
    b) Determine default gateway address of your network
    c) Examine frame format and contents of Ethernet frames
    d) Filter and examine only ICMP traffic
    e) Run various network services like ping, ssh, dns ..etc and examine the traffic captured by Wireshark
14) Simulate a three nodes point-to-point network with duplex links between them. Set the queue size vary the bandwidth and find the number of packets dropped.
15) Simulate a four node point-to-point network, and connect the links as follows: n0-n2, n1-n2 and n2-n3. Apply TCP agent between n0-n3 and UDP between n1-n3. Apply relevant applications over TCP and UDP agents changing the parameter and determine the number of packets by TCP/UDP.
16) Simulate the transmission of ping messaged over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion.
17) Simulate an Ethernet LAN using N-nodes (6-10), change error rate and data rate and compare the throughput.
18) Simulate an Ethernet LAN using N nodes and set multiple traffic nodes and plot congestion window for different source/destination.

* ns2/ns3/CISCO Packet Tracet/OPNET/any other network simulator may be used for simulation experiments.

Course Outcomes:

i. Apply the basics of Physical layer in real time applications
ii. Apply data link layer concepts, design issues, and protocols
iii. Apply Network layer routing protocols and IP addressing
iv. Implement the functions of Application layer and Presentation layer paradigms and Protocols

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		L	T	P	C
III Year-I Semester		**0**	**0**	**3**	**1.5**
DATA MINING LAB					

Course Objectives:

i. Practical exposure on implementation of well known data mining tasks and their effective use in discovering interesting hidden patterns from large datasets.

ii . Exposure to real time data sets for analysis and prediction.

iii. Focus is on the main process of data mining such as data preparation, classification, clustering, association analysis, and pattern evaluation

Software Requirements: WEKA Tool and R Programming/Python Programming

LIST OF EXPERIMENTS:

1. Study of WEKA tool and applying data mining techniques on following data sets in ARFF or CSV file Format
2. Implementation / Usage of WEKA for classification of datasets such as customer's data, weather forecasting data, agricultural data etc.
3. Experiment to summarize and visualization of various datasets.
4. Experiment to demonstrate various data pre-processing techniques
5. Experiment to select prominent feature subsets of various datasets.
6. Experiment to Evaluate Information Gain of an attribute in the student database
7. Demonstration of classification rule process using j48 decision tree algorithm
8. Demonstration of classification rule process using ID3 decision tree algorithm
9. Experiment to predict the class using the Bayesian classification
10. Experiment to predict the class using the k-Nearest Neighbour classification
11. Experiment to implement weight & bias updating using the Back Propagation Neural Network
12. Demonstration of clustering process using k-means algorithm
13. Demonstration of mining frequent patterns using Apriori algorithm
14. Demonstration of mining frequent patterns using FP-Growth algorithm
15. Experiment to compare the performance of various data mining algorithms on the give data base.

Course Outcomes: After undergoing the course students will be able to:

i. Create summary statistics for the given datasets.

ii. Analyze various datasets and perform Data Pre-processing.

iii. Apply various data mining algorithms on the give data set to select the appropriate one.

iv. Develop skills and apply data mining tools for solving practical problems.

v. Handling a small data mining project for a given practical domain.

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		L	T	P	C
III Year-I Semester		**0**	**0**	**2**	**1**
COMPILER DESIGN LAB					

Course Objectives:

The objectives of this course is to acquire knowledge on the

i. Implementation of a compiler for a basic language

ii. Lex/Yacc specifications for designing frontend of a compiler

iii. MIPS instruction set

List of experiments

1. Check the ouput of different compilers gcc, g++, clang, clang++, javac, python etc by running respective language programs with different flags. (purpose to undetstand preprocessor, optimizations, linker)

2. The Language called TinyCStr is described as follows

a) EveryTinyCStr program has one or more functions and syntax of function declaration and function definition is similar to C, one function function must be main.

b) Every TinyCStr function has zero or statements

c) The possible statements are declaration, assignment, conditional statements (if,else, for, while) except switch.

d) TinyCStr supports primitive data types of C and a string data type

i. Implement a lexical analyser for TinyCStr using flex/lex

ii. Implement a parser for TinyCStr using bison/yacc and generate AST(Abstract Syntax Tree)

iii. Generate a 3-address code from the AST

iv. Generate MIPS instructions from 3-address code and run it on SPIM simulator

3. Write a program illustrating code optimization techniques:

i) Constant folding ii) Copy propagation iii) Common subexpression elimination
iv) Loop unrolling v) Dead code elimination

Course Outcomes:

The students should be able to:

i. Understand the different phases of compilation and the working of compilers like gcc, clang etc

ii. Implement lexical analyzer for any language

iii. Implement parser for any language

iv. Implement 3-address code generator for simple programming constructs

v. Implement MIPS code generator by considering simple programming constructs

Text Books:

i. flex & bison by John Levine Released August 2009 Publisher(s): O'Reilly Media, Inc.

ii. Compilers: Principles, Techniques and Tools, Second Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffry D. Ullman, Pearson.

Reference Books:

i. LLVM Cookbook, Mayur pandey

E-resources:

i. https://llvm.org/

ii. https://gcc.gnu.org/

iii. https://www.dsi.unive.it/~gasparetto/materials/MIPS_Instruction_Set.pdf

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		L	T	P	C
III Year-I Semester		**3**	**0**	**0**	0
EMPLOYABILITY SKILLS-II					

Course Objectives:
The main of this course is

i. To learn how to make effective presentations and impressive interviews
ii. To learn skills for discussing and resolving problems on the work site
iii. To assess and improve personal grooming
iv. To promote safety awareness including rules and procedures on the work site
v. To develop and practice self management skills for the work site

A list of vital employability skills from the standpoint of engineering students with discussion how to potentially develop such skills through campus life.

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 Resoultion.

UNIT -IV:

- Stress Management: Stress - Definition, Nature, Types, Symptoms and Causes; Stress Analysis Models and Impact of Stress; Measurement and Managemet of Stress
- Leadership and Assertiveness Skills: A Good Leader; Leaders and Managers; Leadership Theories; Types of Leaders; Leadership Behaviour; Assertivness Skills.

UNIT –V:

- Emotional Intelligence: Meaning, History, Features, Components, Intrapersonal and Management Excellence; Strategies to enhance Emotional Intelligence.

Course Outcomes:

By the end of this course, the student

i. Make presentations effectively with appropriate body language

ii. Recite the corporate etiquette, time management and Personality Development

iii. Be composed with Decision making and conflict management skills

iv. Apply their core competencies to succeed in professional and personal life

v. Understand the importance of Emotional Intelligence

Reference Books:

i. Barun K. Mitra, Personality Development and Soft Skills, Oxford University Press, 2011.

ii. S.P. Dhanavel, English and Soft Skills, Orient Blackswan, 2010.

iii. R.S.Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning, S.Chand & Company Ltd., 2018.

iv. Raman, Meenakshi & Sharma, Sangeeta, Technical Communication Principles and Practice, Oxford University Press, 2011.

v. Managing Soft Skills for Personality Development – edited by B.N.Ghosh, McGraw Hill India, 2012.

vi. English and Soft Skills – S.P.Dhanavel, Orient Blackswan India, 2010.

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		L	T	P	C
III Year-I Semester		**0**	**0**	**0**	**0.5**
SOCIALLY RELEVANT PROJECTS					

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		L	T	P	C
III Year-II Semester		**3**	**0**	**0**	**3**
WEB ESSENTIALS & SERVICES					

Course Objectives:
• This course is designed to introduce students with no programming experience to the programming languages and techniques associated with the World Wide Web. The course will introduce web-based media-rich programming tools for creating interactive web pages.

UNIT-I:
HTML, CSS
Basic Syntax, Standard HTML Document Structure, Basic Text Markup, Images, Hypertext Links, Lists, Tables, Forms, HTML5
CSS: Levels of Style Sheets, Style Specification Formats, Selector Forms, The Box Model, Conflict Resolution

UNIT-II:
Java script The Basic of Java script: Objects, Primitives Operations and Expressions, Screen Output and Keyboard Input, Control Statements, Object Creation and Modification, Arrays, Functions, Constructors, Pattern Matching using Regular Expressions
DHTML: Positioning Moving and Changing Elements.

UNIT-III:
XML: Document type Definition, XML schemas, Document object model, XSLT, DOM and SAX Approaches
AJAX A New Approach: Introduction to AJAX, Integrating PHP and AJAX.

UNIT-IV:
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,Control statements,Arrays,functions.Working with forms and Databases such as MySQL.

UNIT-V:
Web Services: JAX-RPC-Concepts-Writing a Java Web Service-Writing a Java Web Service Client- Describing Web Services: WSDL- Representing Data Types: XML Schema-Communicating Object Data: SOAP Related Technologies-Software Installation-Storing Java Objects as Files-Databases and Java Servlets.

Course Outcomes:

The students should be able to:

i. Analyze a web page and Create web pages using XHTML and Cascading Styles sheets.

ii. Build dynamic web pages.

iii. Write simple client-side scripts using AJAX .

iv. Build web applications using PHP.

v. Describe a java web services.

Text Books:

i. Programming the World Wide Web, Robet W Sebesta, 7ed, Pearson.

ii. Web Technologies, Uttam K Roy, Oxford

iii. The Web Warrior Guide to Web Programming, Bai, Ekedahl, Farrelll, Gosselin, Zak, Karparhi, Maclntyre, Morrissey, Cengage

iv. Web Services An Introduction, B.V.Kumar, S.V. Subrahmanya

Reference Books:

i. Ruby on Rails Up and Running, Lightning fast Web development, Bruce Tate, Curt Hibbs, Oreilly (2006)

ii. Programming Perl, 4ed, Tom Christiansen, Jonathan Orwant, Oreilly (2012)

iii. Web Technologies, HTML< JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech.

iv. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning 5. http://www.upriss.org.uk/perl/PerlCourse.html

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		L	T	P	C
III Year-II Semester		**3**	**0**	**0**	**3**
ARTIFICIAL INTELLIGENCE					

Course Objectives:

i. To have a basic proficiency in a traditional AI language including an ability to write simple to intermediate programs and an ability to understand code written in that language
ii. To have an understanding of the basic issues of knowledge representation and blind and heuristic search, as well as an understanding of other topics such as minimax, resolution, etc. that play an important role in AI programs
iii. To have a basic understanding of some of the more advanced topics of AI such as learning, natural language processing, agents and robotics, expert systems, and planning

UNIT- I:

Introduction: history, intelligent systems, foundations of AI, applications, tic-tac-toe game playing, development of AI languages, current trends.

UNIT -II:

Problem solving: state-space search and control strategies: Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative deepening A*, constraint satisfaction.

Problem reduction and game playing: Introduction, problem reduction, game playing, alpha beta pruning, two-player perfect information games.

UNIT –III:

Logic concepts: Introduction, propositional calculus, proportional logic, natural deduction system, axiomatic system, semantic tableau system in proportional logic, resolution refutation in proportional logic, predicate logic.

UNIT -IV:

Knowledge representation: Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames.

Advanced knowledge representation techniques: Introduction, conceptual dependency theory, script structure, CYC theory, case grammars, semantic web

UNIT –V:

Expert system and applications: Introduction phases in building expert systems, expert system versus traditional systems Uncertainty measure: probability theory: Introduction, probability theory, Bayesian belief networks, certainty factor theory, dempster-shafer theory ,Fuzzy sets and fuzzy logic: Introduction, fuzzy sets, fuzzy set operations, types of membership functions, multi valued logic, fuzzy logic, linguistic variables and hedges, fuzzy propositions, inference rules for fuzzy propositions, fuzzy systems.

Course Outcomes:

i. Outline problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem
ii. Apply the language/framework of different AI methods for a given problem
iii. Implement basic AI algorithms- standard search algorithms or dynamic programming
iv. Design and carry out an empirical evaluation of different algorithms on problem formalization, and state the conclusions that the evaluation supports
v. Design Expert Systems using fuzzy logic theory

Text Books:

i. Artificial Intelligence- Saroj Kaushik, CENGAGE Learning
ii. Artificial intelligence, A modern Approach , 2nded, Stuart Russel, Peter Norvig, PEA

Reference Books:

i. Artificial Intelligence- Deepak Khemani, TMH, 2013
ii. Introduction to Artificial Intelligence, Patterson, PHI
iii. Atificial intelligence, structures and Strategies for Complex problem solving, - George F Lugar, 5thed, PEA

e-Resources:

i. https://nptel.ac.in/courses/106/105/106105077/
ii. http://aima.cs.berkeley.edu/

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III Year-II Semester		L	T	P	C
		3	0	0	3
SOFTWARE ENGINEERING					

Course Objectives:

The objectives of this course is to acquire knowledge on the

i. To understand the software life cycle models.
ii. To understand the software requirements and SRS document.
iii. To understand the importance of modeling and modeling languages.
iv. To design and develop correct and robust software products.

UNIT – I:

Software and Software Engineering: The Nature of Software, The Unique Nature of WebApps, Software Engineering, Software Process, Software Engineering Practice, Software Myths.

Process Models: A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal and Team Process Models, Process Terminology, Product and Process.

UNIT - II:

Requirements Analysis And Specification: Requirements Gathering and Analysis, Software Requirement Specification (SRS), Formal System Specification.

Software Design: Overview of the Design Process, How to Characterize of a Design, Cohesion and Coupling, Layered Arrangement of Modules, Approaches to Software Design

UNIT – III:

Function-Oriented Software Design: Overview of SA/SD Methodology, Structured Analysis, Developing the DFD Model of a System, Structured Design, Detailed Design, Design Review, over view of Object Oriented design.

User Interface Design: Characteristics of Good User Interface, Basic Concepts, Types of User Interfaces, Fundamentals of Component-based GUI Development, A User Interface Design Methodology.

UNIT - IV:

Coding And Testing: Coding, Code Review, Software Documentation, Testing, Unit Testing, Black-Box Testing, White-Box Testing, Debugging, Program Analysis Tool, Integration Testing, Testing Object-Oriented Programs, System Testing, Some General Issues Associated with Testing

UNIT - V:

Software Reliability And Quality Management: Software Reliability, Statistical Testing, Software Quality, Software Quality Management System, ISO 9000, SEI Capability Maturity Model.

Software Maintenance: Software maintenance, Maintenance Process Models, Maintenance Cost, Software Configuration Management.

Software Reuse: what can be reused? Why almost No Reuse So Far? Basic Issues in Reuse Approach, Reuse at Organization Level

Course Outcomes

i. Define and develop a software project from requirement gathering to implementation.
ii. Obtain knowledge about principles and practices of software engineering.
iii. Focus on the fundamentals of modelling a software project.
iv. Obtain basic knowledge of coding
v. Obtain knowledge about estimation maintenance and reuse of software systems.

Text Books:

i. Software engineering A practitioner's Approach, Roger S. Pressman, Seventh Edition McGrawHill International Edition.
ii. Fundamentals of Software Engineering, Rajib Mall, Third Edition, PHI.
iii. Software Engineering, Ian Sommerville, Ninth edition, Pearson education

Reference Books:

i. Software Engineering : A Primer, Waman S Jawadekar, Tata McGraw-Hill, 2008
ii. Software Engineering, A Precise Approach, Pankaj Jalote, Wiley India, 2010.
iii. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.
iv. Software Engineering1: Abstraction and modeling, Diner Bjorner, Springer International edition, 2006.

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		L	T	P	C
III Year-II Semester		**3**	**0**	**0**	**3**
MANAGEMENT AND ORGANIZATIONAL BEHAVIOUR					

Course Objectives:

i. To familiarize with the process of management and to provide basic insight into select contemporary management practices
ii. To provide conceptual knowledge on functional management Human resource management, strategic management and Organizational Behavior.

Unit –I:

Introduction: Management and organizational concepts of management and organization- Nature and Importance of Management, Functions of Management, System approach to Management - Taylor's Scientific Management Theory, Fayol's Principles of Management, Leadership Styles, Social responsibilities of Management. Designing Organizational Structures: Basic concepts related to Organization - Departmentation and Decentralization, MBO, Process and concepts.

Unit -II:

Functional Management: Human Resource Management (HRM) Concepts of HRM, Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Wage and Salary Administration Performance Appraisal, Grievance Handling and Welfare Administration, Job Evaluation and Merit Rating. - Marketing Management: Concepts of Marketing, Marketing mix elements and marketing strategies.

Unit –III:

Strategic Management: Strategic Management and Contemporary Strategic Issues: Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning Process, Environmental Scanning, Value Chain Analysis, SWOT Analysis, Steps in Strategy Formulation and implementation, Generic Strategy alternatives. Bench Marking, Balanced Score Card and other Contemporary Business Strategies.

Unit -IV:

Individual Behavior: Perception-Perceptual process- Impression management- Personality development – Socialization – Attitude- Process- Formation- Positive attitude- Change – Learning – Learning organizations- Reinforcement Motivation – Process- Motives – Theories of Motivation: Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Herzberg's Two-Factor Theory of Motivation,

Unit –V:

Group Dynamics: Types of Groups, Stages of Group Development, Group Behaviour and Group Performance Factors, Organizational conflicts: Reasons for Conflicts, Consequences of Conflicts in Organization, Types of Conflicts, Strategies for Managing Conflicts, Organizational Climate and Culture, Stress, Causes and effects, coping strategies of stress.

Course Outcomes:

i. After completion of the Course the student will acquire the knowledge on management functions, global leadership and organizational behavior.
ii. Will familiarize with the concepts of functional management and strategic management.

Reference Books:

i. Subba Rao P., *Organizational Behaviour,* Himalaya Publishing House. Mumbai.
ii. Fred Luthans *Organizational Behaviour*, TMH, New Delhi.
iii. Robins, Stephen P., *Fundamentals of Management,* Pearson, India.
iv. Kotler Philip & Keller Kevin Lane: Marketing Mangement 12/e, PHI, 2007
v. Koontz & Weihrich: *Essentials of Management*, 6/e, TMH, 2007
vi. Kanishka Bedi, *Production and Operations Management*, Oxford University Press, 2007.

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		L	T	P	C
III Year-II Semester	**Professional Elective - II**	**3**	**0**	**0**	**3**
MOOCs using -NPTEL/SWAYAM					

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		L	T	P	C
III Year-II Semester		**0**	**0**	**3**	**2**
WEB ESSENTIALS AND SERVICES LAB					

Course Objectives:

The objectives of this course is to acquire knowledge on the

i. To acquire knowledge of XHTML, Java Script and XML to develop web applications.

ii. Ability to develop dynamic web content using Java Servlets and JSP.

iii. To understand JDBC connections and Java Mail API.

iv. To understand the design and development process of a complete web application.

List of experiments

1. Design the following static web pages required for an online book store web site.

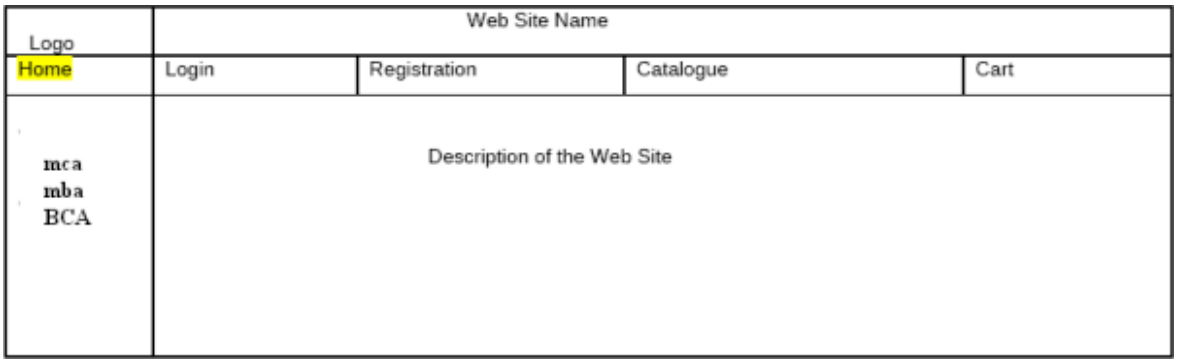
1) HOME PAGE:

The static home page must contain three frames.

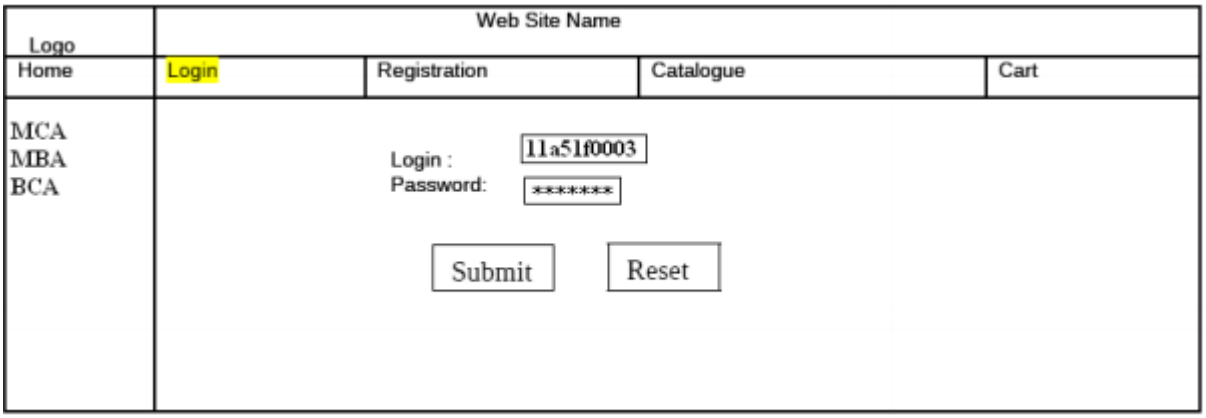
Top frame: Logo and the college name and links to Home page, Login page, Registration page, Catalogue page and Cart page (the description of these pages will be given below).

Left frame: At least four links for navigation, which will display the catalogue of respective links. For e.g.: When you click the link "MCA" the catalogue for MCABooks should be displayed in the Right frame.

Right frame: The pages to the links in the left frame must be loaded here. Initially this page contains description of the web site.

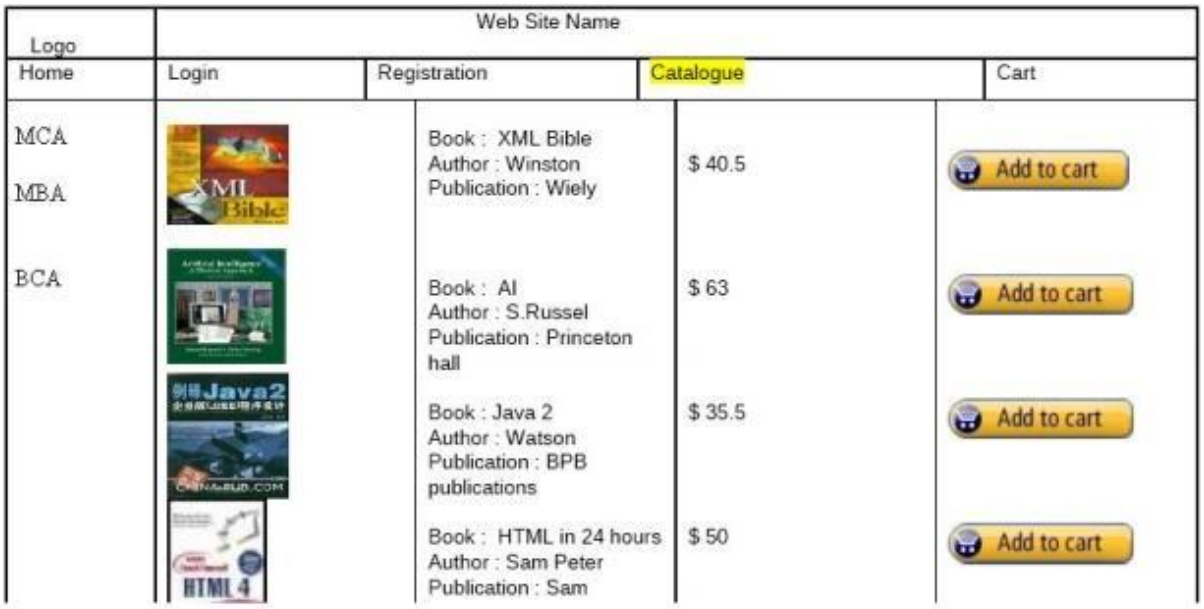


2)login page



3) CATOLOGUE PAGE: The catalogue page should contain the details of all the books available in the web site in a table. The details should contain the following:

1. Snap shot of Cover Page.
2. Author Name.
3. Publisher.
4. Price.
5. Add to cart button.



4. REGISTRATION PAGE:

Create a "registration form "with the following fields

1) Name (Text field)
2) Password (password field)
3) E-mail id (text field)
4) Phone number (text field)
5) Sex (radio button)
6) Date of birth (3 select boxes)
7) Languages known (check boxes – English, Telugu, Hindi, Tamil)
8) Address (text area)

5. Design a web page using CSS (Cascading Style Sheets) which includes the following:

1) Use different font, styles:

In the style definition you define how each selector should work (font, color etc.).
Then, in the body of your pages, you refer to these selectors to activate the styles

6. Write an XML file which will display the Book information which includes the following:

1) Title of the book
2) Author Name
3) ISBN number
4) Publisher name

5) Edition
6) Price
Write a Document Type Definition (DTD) to validate the above XML file.

7. Example PHP program for cotactus page.

8. User Authentication:
Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 and pwd4 respectively. Write a PHP for doing the following.
1. Create a Cookie and add these four user id's and passwords to this Cookie.
2. Read the user id and passwords entered in the Login form (week1) and authenticate with the values (user id and passwords) available in the cookies.
If he is a valid user (i.e., user-name and password match) you should welcome him by name (user-name) else you should display "You are not an authenticated user ''.
Use init-parameters to do this.

9. Example PHP program for registering users of a website and login.

10. Install a database(Mysql or Oracle).
Create a table which should contain at least the following fields: name, password, email-id, phone number(these should hold the data from the registration form).
Write a PHP program to connect to that database and extract data from the tables and display them. Experiment with various SQL queries.
Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page (week2)

11. Write a PHP which does the following job:
Insert the details of the 3 or 4 users who register with the web site (week9) by using registration form. Authenticate the user when he submits the login form using the user name and password from the database (similar to week8 instead of cookies).

12.Create tables in the database which contain the details of items (books in our case like Book name , Price, Quantity, Amount) of each category. Modify your catalogue page (week 2)in such a way that you should connect to the database and extract data from the tables and display them in the catalogue page using PHP

13.HTTP is a stateless protocol. Session is required to maintain the state. The user may add some items to cart from the catalog page. He can check the cart page for the selected items. He may visit the catalogue again and select some more items. Here our interest is the selected items should be added to the old cart rather than a new cart. Multiple users can do the same thing at a time(i.e., from different systems in the LAN using the ip-address instead of local host). This can be achieved through the use of sessions. Every user will have his own session which will be created after his successful login to the website. When the user logs out his session should get invalidated (by using the method session. Invalidate).
Modify your catalogue and cart PHP pages to achieve the above mentioned functionality using sessions.

14. case study 1: Implement web application using PHP and MySql.

15. case study 2: Implement web application using PHP and Oracle.

Course Outcomes:

The students should be able to:

1) Students will be able to develop static web sites using XHTML and Java Scripts
2) To implement XML and XSLT for web applications
3) To develop JDBC connections
4) Develop Dynamic web application using Php and Oracle.
5) To implement a complete Dynamic web application

TEXT BOOKS:

1. Programming the World Wide Web, Robet W Sebesta, 7ed, Pearson.
2. Web Technologies, Uttam K Roy, Oxford
3. The Web Warrior Guide to Web Programming, Bai, Ekedahl, Farrelll, Gosselin, Zak, Karparhi, Maclntyre, Morrissey, Cengage

REFERENCE BOOKS:

1. Ruby on Rails Up and Running, Lightning fast Web development, Bruce Tate, Curt Hibbs, Oreilly (2006)
2. Programming Perl, 4ed, Tom Christiansen, Jonathan Orwant, Oreilly (2012)
3. Web Technologies, HTML< JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech.
4. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning 5. http://www.upriss.org.uk/perl/PerlCourse.html

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		L	T	P	C
III Year II Semester		**0**	**0**	**3**	**1.5**
AI TOOLS AND TECHNIQUES LAB					

Course Objectives:

This course is introduced to

i. Learn the fundamentals of most widely used Python packages NumPy, Pandas and Matpotlib, and then apply them to Data Analysis and Data Visualization projects.
ii. To introduce the fundamental techniques and principles of Neural Networks
iii. Teach students the leading trends and systems in natural language processing

List Of Experiments:

1. **Numpy**: Illustrate the concepts multi-dimensional arrays and matrices, along with a large library of high-level mathematical functions to operate on these arrays using numpy

2. **Pandas:** Visualize New York Motor Vehicle Crash DataUsing Python, Pandas, andMatplotlib.

Datasets Details:

https://data.ny.gov/Transportation/Motor-Vehicle-Crashes-Case-Information-Three-Year-/e8ky-4vqe
https://data.ny.gov/Transportation/Motor-Vehicle-Crashes-Individual-Information-Three/ir4y-sesj
https://data.ny.gov/Transportation/Motor-Vehicle-Crashes-Violation-Information-Three-/abfj-y7uq
https://data.ny.gov/Transportation/Motor-Vehicle-Crashes-Vehicle-Information-Three-Ye/xe9x-a24f

3. **Tensor-Flow:**Learn simple data curation by creating a pickle with formatted datasets for training, development and testing in Tensor Flow and develop visualizations in tensor board.
4. Create convolutional neural networks in TensorFlow.
5. **Image recognition** (or image classification) : identifying images and categorizing them in one of several predefined distinct classes using neural network models.
6. **OpenCV:** Develop an online writing Whiteboard with minimal features for online classes
7. **Keras:**Recognize handwritten digits from MNIST using Keras
8. **Scikit-learn :**Write a Python program using Scikit-learn to split the iris dataset into 70% train data and 30% test data. Out of total 150 records, the training set will contain 120 records and the test set contains 30 of those records. Print both datasets
9. Design a perceptron classifier to classify handwritten numerical digits (0-9). Implement using scikit or Weka.
10. **NLP:** Program to illustrate the concepts sentence segmentation, word tokenization, stemming and lemmatization, Hidden markov model(HMM) for Parts of speech (PoS) Tagging

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

i. Apply the tools of AI in the field of Engineering.
ii. Identify the deep learning algorithms which are more appropriate for various types of learning tasks in various domains.
iii. design and implement solutions to classification, regression, and clustering problems
iv. Implement deep learning algorithms and solve real-world problems
v. Understand machine learning techniques used in NLP, including hidden Markov models and probabilistic context-free grammars, clustering and unsupervised methods

References:

i. Machine Learning: The art and Science of algorithms that make sense of data, Peter Flach, Cambridge University Press, 2012
ii. Tom M. Mitchell, Machine Learning, India Edition 2013, McGraw Hill Education
iii. Chris Albon : Machine Learning with Python Cookbook , O‟Reilly Media, Inc.2018

Web Resources:

i. https://scikit-learn.org/stable//_downloads/scikit-learn-docs.pdf
ii. docs.python.org › library
iii. https://opencv.org/
iv. https://matplotlib.org/

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		L	T	P	C
III Year-II Semester		**0**	**0**	**0**	**1.5**
Industrial Training / Internship/Research Projects in National Laboratories/Academic Institutions					

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		L	T	P	C
IV Year-I Semester		**3**	**0**	**0**	**3**
CRYPTOGRAPHY AND NETWORK SECURITY					

Course Objective:
This course aims at training students to master the:

i. The concepts of classical encryption techniques and concepts of finite fields and number theory
ii. Working principles and utilities of various cryptographic algorithms including secret key cryptography, hashes and message digests, and public key algorithms
iii. Design issues and working principles of various authentication protocols and PKI standards
iv. Various secure communication standards including Kerberos, IPsec, SSL/TLS, S/MIME and PGP

UNIT- I:
Introduction to Security: Security Attacks, Security Services, Security Mechanisms, Fundamental Security Design Principles, Attack Surfaces and Attack Trees, a Model for Network Security
Mathematics of Cryptography: Algebraic Structures (Groups, Rings, Fields and Galois Fields), Divisibility and the Division Algorithm, The Euclidean Algorithm, Modular Arithmetic, Prime Numbers, Fermat's and Euler's Theorems, Testing for Primality, The Chinese Remainder Theorem, Discrete Logarithms

UNIT- II:
Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Rotor Machines, Steganography
Block Ciphers: Traditional Block Cipher Structure, The Data Encryption Standard, The Strength of DES, Block Cipher Design Principles, Advanced Encryption Standard, AES Structure, AES Transformation Functions, AES Key Expansion, Multiple Encryption and Triple DES, Block Cipher Modes of Operation

UNIT- III:
Public-Key Cryptography: Principles of Public-Key Cryptosystems, The RSA Algorithm, Diffie- Hellman Key Exchange, Elgamal Cryptographic System, Elliptic Curve Cryptography
Cryptographic Hash Functions: Applications of Cryptographic Hash Functions, Requirements and Security, Secure Hash Algorithm (SHA)
Message Authentication Codes: Requirements for Message Authentication Codes, HMAC, CMAC

UNIT- IV:
Digital Signatures: Digital Signatures, Elgamal Digital Signature Scheme, Schnorr Digital Signature Scheme, NIST Digital Signature Algorithm, Elliptic Curve Digital Signature Algorithm
Key Management and Distribution: Symmetric Key Distribution Using Symmetric Encryption, Symmetric Key Distribution Using Asymmetric Encryption, Distribution of Public Keys, X.509 Certificates, Public-Key Infrastructure
User Authentication: Remote User-Authentication Principles, Remote User-Authentication Using Symmetric Encryption, Kerberos, Remote User-Authentication Using Asymmetric Encryption:

UNIT -V:

Transport-Level Security: Web Security Considerations, Transport Layer Security, Secure Shell (SSH)
Electronic Mail Security: S/MIME, Pretty Good Privacy
IP Security: IP Security Overview, Encapsulating Security Payload, Combining Security Associations, Internet Key Exchange

Course Outcomes:

Upon completion of the course, it is expected that student will be able to:

i. Identify information security goals and acquire fundamental knowledge on the concepts of finite fields and number theory
ii. Compare and apply different encryption and decryption techniques to solve problems related to confidentiality and authentication
iii. Apply the knowledge of cryptographic checksums and evaluate the performance of different message digest algorithms for verifying the integrity of varying message sizes.
iv. Apply different digital signature algorithms to achieve authentication and create secure applications
v. Apply network security basics, analyze different attacks on networks and evaluate the performance of security protocols like SSL, IPSec, and PGP

Text Book:

i. Cryptography and Network Security, William Stallings, 8th Edition, Pearson Education

Reference Books:

i. Cryptography, Network Security and Cyber Laws, Bernard L. Menezes, Ravinder Kumar, Cengage Learning.
ii. Cryptography and Network Security, Behrouz A Forouzan, Debdeep Mukhopadhyaya, 3rd Edition, Mc-GrawHill.
iii. Network Security Illustrated, Jason Albanese, Wes Sonnenreich, McGraw Hill.

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		L	T	P	C
IV Year-I Semester		**3**	**0**	**0**	**3**
UML & DESIGN PATTERNS					

Course Objectives:

i. Introducing the Unified Process and showing how UML can be used within the process.
ii. Presenting a comparison of the major UML tools for industrial-strength development.
iii. Demonstration of patterns related to object-oriented design.
iv. Describe the design patterns that are common in software applications.
v. Analyze a software development problem and express it.

UNIT-I:

Introduction to UML: Why we Model, Importance of modeling, Principles of modeling, Object-oriented modeling, Conceptual model of the UML, Architecture, Software Development Life Cycle.

Structural Modeling: Classes, Relationships, Common Mechanisms, and Diagrams, Advanced classes, advanced relationships, Object diagrams: Common modeling techniques.

UNIT-II:

Basic Behavioral Modeling: Interactions, Interaction diagrams, Use cases, Use case Diagrams, Activity Diagrams, Common modeling techniques for Interaction diagrams, Use case diagrams and Activity diagrams.

Advanced Behavioral Modeling: Events and Signals, State machines, Processes and Threads, Time and Space, State chart diagrams with Common modeling techniques.

Architectural Modeling: Component, Deployment, Component diagrams and Deployment diagrams. Common modeling techniques for Component and Deployment diagrams. Case Study: The Unified Library application.

UNIT-III:

Introduction: What is a Design Pattern? Design Patterns in Smalltalk MVC, Describing Design Patterns, The Catalog of Design Patterns, Organizing the Catalog, How Design Patterns Solve Design Problems, How to Select a Design Pattern, How to Use a Design Pattern.

UNIT-IV:

Creational Patterns: Abstract Factory, Builder, Factory Method, Prototype, Singleton.

Structural Pattern: Adapter, Bridge, Composite, Decorator, Façade, Flyweight, Proxy.

UNIT-V:

Behavioral Patterns: Chain of Responsibility, Command, Interpreter, Iterator, Mediator, Memento, Observer, Strategy, Template Method, What to expect from Design Patterns.

Course Outcomes:

At the end of the course, the students will be able to:

i. Ability to find solutions to the complex problems using UML approach.
ii. Understand design principles of behavioral modeling and architectural modeling.
iii. Distinguish between different categories of design patterns.
iv. Analyze and Apply appropriate patterns for design of given problem.
v. Design and Develop the software using Pattern Oriented Architectures.

Text Books:

i. "The Unified Modeling Language User Guide", Grady Booch, James Rumbaugh, Ivar Jacobson, 12th Impression, 2012, PEARSON.
ii. Design Patterns by Erich Gamma, Pearson Education.
iii. "Object- Oriented Analysis And Design with Applications", Grady BOOCH, RobertA. Maksimchuk, Michael W. ENGLE, Bobbi J. Young, Jim Conallen, KelliaHouston, 3rd edition, 2013, PEARSON.

Reference Books:

i. "The Unified modeling language Reference manual", James Rumbaugh, Ivar Jacobson, Grady Booch, Addison-Wesley.
ii. "Object-oriented analysis and design with the Unified process", John W. Satzinger, Robert B. Jackson, Stephen D. Burd, Cengage Learning.
iii. Patterns in JAVA Vol-I (or) Vol-II By Mark Grand, Wiley Dream Tech.
iv. Java Enterprise Design Patterns Vol-III By Mark Grand Wiley Dream Tech.
v. "Head first object-oriented analysis and design", Brett D. McLaughlin, Gary Pollice, Dave West, O"Reilly.
vi. "Object-oriented analysis and design using UML", Mahesh P. Matha, PHI.

E-Resources:

i. https://nptel.ac.in/courses/106/105/106105224/
ii. https://www.tutorialspoint.com/design_pattern/design_pattern_quick_guide.htm

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		L	T	P	C
IV Year-I Semester		**3**	**0**	**0**	**3**
MACHINE LEARNING					

Course Objectives:

The objective of this course is to

i. Introduce students to the basic concepts and techniques of Machine Learning.
ii. Provide understanding of techniques, mathematical concepts, and algorithms used in machine learning to facilitate further study in this area.
iii. Provide understanding of the limitations of various machine learning algorithms and the way to evaluate performance of machine learning algorithms.

UNIT –I:
Introduction:
Well -posed learning problems, designing a learning system, Perspectives and issues inmachine learning. Concept learning and the general to specific ordering – Introduction, A concept learning task, Concept learning as search, Find -S: finding a maximally specific hypothesis, Version spaces and the candidate elimination algorithm, Remarkson version spaces and candidate elimination, Inductive bias.

UNIT –II:
Decision Tree Learning:
Introduction, Decision Tree Representation, Decision tree learning algorithm, Inductive bias, Issues in Decision tree learning.
Evaluation Hypotheses:
Motivation, Estimation hypothesis accuracy, Basics of sampling theory, A general approach for deriving confidence intervals, Difference in error of two hypotheses, Comparing learning algorithms.

UNIT –III:
Artificial Neural Networks:
Introduction, Neural network representation, Appropriate problems for Neural Network Learning, Perceptions, Multilayer networks and the back propagation algorithm, Remarks on the back propagation algorithm, An illustrative example face recognition, Advanced topics in artificial neural networks.

UNIT –IV:

Bayesian Learning:

Bayes theorem, Concept learning, Bayes Optimal Classifier, Naïve Bayes classifier, Bayesian belief networks, EM algorithm.

Computational Learning Theory – Sample Complexity for Finite, Hypothesis spaces, Sample Complexity for Infinite Hypothesis spaces, The Mistake Bound Model of Learning.

UNIT –V:

Instance-Based Learning – k-Nearest Neighbor Learning, Locally Weighted Regression, Radial basis function networks, Case-based learning.

Genetic Algorithms – an illustrative example, Hypothesis space search, Genetic Programming, Models of Evolution and Learning; Learning first order rules-sequential covering algorithm.

Reinforcement Learning - The Learning Task, Q Learning.

Course Outcomes:

On completion of this course, the students will be able to

i. Recognize the characteristics of machine learning that make it useful to real-world problems.
ii. Design decision tree to solve classification problems.
iii. Design neural network to solve classification and function approximation problems.
iv. Comprehend probabilistic methods for learning.
v. Build optimal classifiers using genetic algorithms.

Text Books:

i. Tom.M.Mitchell, Machine Learning, McGraw Hill International Edition

Reference Books:

i. Christopher M. Bishop, "Pattern Recognition and Machine Learning", Springer, 2006
ii. Duda, Hart and Stork, "Pattern Classification" (2nd ed.), Wiley Interscience, 2000
iii. EthernAlpaydin, Introduction to Machine Learning. Eastern Economy Edition, Prentice Hall of India, 2005.
iv. Elements of Statistical Learning, T. Hastie, R. Tibshirani and J. Friedman, Springer, 2001.
v. Machine Learning: A Probabilistic Perspective, K. Murphy, MIT Press, 2012.

Online Resources:

i. AndrewNg,"MachineLearning",StanfordUniversityhttps://www.coursera.org/learn/machine-learning/home/info
ii. Sudeshna Sarkar, "Introduction to Machine Learning", IIT Kharagpur.https://nptel.ac.in/courses/106105152/1
iii. Prof. BalaramanRavindran, "Introduction to Machine Learning", IIT Madras.https://nptel.ac.in/courses/106106139/1

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IV Year-I Semester	Professional Elective-III	L	T	P	C
		3	0	0	3
MOBILE COMPUTING					

Course Objectives:

i. To make the student understand the concept of mobile computing paradigm, its novel applications and limitations.
ii. To understand the typical mobile networking infrastructure through a popular GSM protocol
iii. To understand the issues and solutions of various layers of mobile networks, namely MAC layer, Network Layer & Transport Layer
iv. To understand the database issues in mobile environments & data delivery models.
v. To understand the ad hoc networks and related concepts.
vi. To understand the platforms and protocols used in mobile environment.

UNIT-I:

Introduction: Mobile Communications, Mobile Computing – Paradigm, Promises/Novel Applications, Architecture, Mobile and Handheld Devices, Limitations of Mobile and Handheld Devices.

GSM and Other Networks: Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services, GPRS,Wireless Medium Access Control,3G and 4G communication networks.

UNIT-II:

Mobile Network Layer: IP: IPV4 and IPV6 and Mobile IP Network Layers, Packet Delivery Agent Discovery, Registration, Tunneling and Encapsulation, Route Optimization, DHCP.

Introduction to Mobile Adhoc network: fixed infrastructure architecture, MANET infrastructure

Architecture, MANET: properties, spectrum, applications, Security in Ad-hoc network, Wireless sensor networks, sensor network applications.

UNIT-III:

Mobile Transport Layer: Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Transport Layer Protocols for Mobile Networks.

Database Issues: Database Hoarding & Caching Techniques, Client-Server Computing & Adaptation, Transactional Models, Query processing, Data Recovery Process &QoS Issues.

UNIT-IV:

Data Dissemination and Synchronization: Communications Asymmetry, Classification of Data Delivery Mechanisms, Data Dissemination, Broadcast Models, Selective Tuning and Indexing Methods, Data Synchronization: Introduction, Software, and Protocols.

UNIT -V:

File Systems: Coda, Little work, Ficus, Mio-NFS and Rover

Protocols and Platforms for Mobile Computing: WAP, Bluetooth, XML, J2ME, Java Card, PalmOS, Windows CE, SymbianOS, Linux for Mobile Devices, Android.

Course Outcomes:

i. Understand the fundamentals of wireless communications.
ii. Able to develop new ad hoc network applications or algorithms or protocols.
iii. To solve various issues arises while transferring data from one device to another in the network.
iv. To know different data delivery methods and synchronization protocols .
v. Develop applications that are mobile-device specific and demonstrate current Practice in mobile computing contexts.

Text Books:

i. Jochen Schiller, “Mobile Communications”, Addison-Wesley.
ii. Raj Kamal, “Mobile Computing”, Oxford University Press.

Reference Books:

i. Asoke K Talukder and Roopa R Yavagal, Mobile Computing, Tata-McGraw-Hill.
ii. “Principles of Mobile Computing,”, UWE Hansmann, LotherMerk, Martin S. Nocklous, Thomas Stober, Springer.

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IV Year-I Semester	Professional Elective-III	L	T	P	C
		3	0	0	3
DATA SCIENCE					

Course Objectives:

i. Introduce PYTHON and R as a programming language
ii. Introduce the mathematical foundations required for data science
iii. Introduce the first level data science algorithms
iv. Introduce a data analytics problem solving framework
v. Introduce a practical capstone case study

UNIT –I:

Programming for Data Science:

Python Programming for Data Science: Writing functions, logic, control flow , aswell as common data analysis libraries like NumPy and pandas

R Programming for Data Science: Data Structures for Data Science

SQL programming: Querying databases using joins, aggregations, and subqueries

Comfortable with using the Terminal: version control in Git, and using GitHub

UNIT –II:

Probability and Statistics:

Descriptive Statistics: Calculating measures of center and spread, estimation distributions

Inferential Statistics: Sampling distributions, hypothesis testing

Probability: Probability theory, conditional probability

UNIT –III:

Data wrangling: Accessing database, CSV, and JSON data, Data cleaning and transformations using pandas and Sklearn, Data visualization with matplotlib, exploratory data analysis and visualization ,Explanatory data visualizations and dashboards

UNIT –IV:

Machine Learning

Feature Engineering, Supervised Learning: Regression, classification, decision trees, random forest, Unsupervised Learning: PCA, Clustering

UNIT –V:

Applications (Capstone Project)

Data Science Applications on Banking Domain, Telecommunication Domain, Healthcare Domain and Airline Domains.

Case Study 1: Predicting Bank-Loan Defaults with Logistic Regression Model Business Problem: To predict the probability of the bank-loan default.

Business Solution: To build the logistic regression model

Case Study 2: Predicting Customer Churn with Decision Tree Model Business Problem: To predict the probability of the customer churn.

Business Solution: To build the Decision tree model.

Case Study 3: Predicting Probability of Malignant and Benign Breast Cancer with Random Forest Model Business Problem: To predict the probability of malignant and benign breast cancer.

Business Solution: To build the Random Forest Model.

Case Study 4: Predicting Flight Delays with Multiple Linear Regression Model Business Problem: To predict the flight arrival delays.

Business Solution: To build the multiple linear regression model.

Course Outcomes:

As a graduate of this program, you will be able to:

i. Describe and Use Python and SQL to access and analyze data from several different data sources. Develop R codes for data science solutions .
ii. Use principles of statistics and probability to design and execute A/B tests and recommendation engines to assist businesses in making data-automated decisions.
iii. Apply and Access various data repositories and data cleaning and transformation and visualization methods to assist businesses in making data-automated decisions.
iv. Apply Feature Engineering techniques , Machine Learning Tools and Techniques
v. Construct use cases to validate approach and identify modifications required (Creating)

Text Books:

i. Elements of Statistical Learning, Machine Learning: A Probabilistic Perspective, Python Machine Learning
ii. INTRODUCTION TO LINEAR ALGEBRA - BY GILBERT STRANG
iii. APPLIED STATISTICS AND PROBABILITY FOR ENGINEERS – BY DOUGLAS MONTGOMERY
iv. Deepti Gupta," Applied Analytics through Case Studies Using SAS and R", Asia-Pacific Holdings Private Limited,2018

Reference Books:

i. Deborah Nolan, Duncan Temple Lang,"Data Science in R: A Case Studies Approach to Computational Reasoning and Problem Solving", CRC Press,2015
ii. Kerrie Mengersen,PierrePudlo,Christian Robert P.," Case Studies in Applied Bayesian DataScience", Springer International Publishing,2020.
iii. Danish Haroon,"Python Machine Learning Case Studies", Apress,2017
iv. Peter Haber,ThomasLampoltshammer, Manfred Mayr "Data Science – Analytics and Applications", Springer Vieweg,2019.

E-Resources:

i. https://link.springer.com/content/pdf/bfm%3A978-1-4842-3525-6%2F1.pdf
ii. Data Science for Engineers : By Prof. Raghunathan Rengasamy& Prof. Shankar Narasimhan IIT Madras
iii. https://www.coursera.org/learn/case-studies-business-analytics-accenture
iv. https://intellipaat.com/data-scientist-course-training/
v. http://www.millionlights.university/datascience

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IV Year-I Semester	Professional Elective-III	L	T	P	C
		3	0	0	3
COMPUTER VISION					

Course Objectives:

i. To understand the Fundamental Concepts Related to Multi-Dimensional Signal Processing.
ii. To understand Feature Extraction algorithms.
iii. To understand Visual Geometric Modeling and Stochastic Optimization.

UNIT - I:

Image Formation and Description: Fundamental steps of image processing, the image model and Image acquisition, Sampling and quantization, Relationship between pixels. Sampling & Quantization, Elements of Digital Image Processing Systems. Image Transforms: Digital Image Transforms - Fourier Transform, Extension to 2D. Properties of Fourier transformations.

UNIT -II:

Image Enhancements: Histogram Equalization, Image Smoothing, Image Sharpening, Edge Detection.
Segmentation: Active contours, Split and merge, Mean shift and mode finding, Normalized cuts. Feature-based alignment: 2D and 3D feature-based alignment, Pose estimation.

UNIT -III:

Structure from motion: Triangulation, Two-frame structure from motion, Factorization, Bundle adjustment, constrained structure and motion Dense motion estimation: Translational alignment, parametric motion, Spline based motion, Optical flow, Layered motion.

UNIT -IV:

Recognition: Object detection, Face recognition, Instance recognition, Category recognition, Context and scene understanding.

UNIT -V:

3D Reconstruction: Shape from X, Active range finding, Surface representations, Point-based representations, volumetric representations, Model-based reconstruction.

Course Outcomes:

After completion of the course, students will be able to

i. To develop algorithms and techniques to analyze and interpret the visible world around us.
ii. To implement boundary tracking techniques.
iii. To analyze Patterns in images
iv. To apply in the field of Biometrics, Medical diagnosis, document processing, mining of visual content, to surveillance, advanced rendering etc.
v. To explore and contribute to research and further developments in the field of computer vision.

Text Books:

i. R. C. Gonzalez and R. E. Woods “Digital Image Processing” , Fourth Edition,AddisonWesley 2018,
ii. E. R. Davies, Computer & Machine Vision, Fourth Edition, Academic Press, 2012
iii. Richard Szeliski “Computer Vision: Algorithms and Applications” Springer-Verlag London Limited 2011.

References:

i. “Pattern Recognition: Statistical. Structural and Neural Approaches”; Robert J. Schallkoff; John Wiley and Sons; 1992.
ii. “Computer Vision: A Modern Approach”; D. A. Forsyth and J. Ponce; Pearson Education; 2003.
iii. "Multiple View geometry". R. Hartley and A. "Zisserman. 2002 Cambridge university Press".
iv. Richard Hartley and Andrew Zisserman, Multiple View Geometry in Computer Vision, Second Edition, Cambridge University Press, March 2004.
v. K. Fukunaga; "Introduction to Statistical Pattern Recognition", Second Edition, Academic Press, Morgan Kaufmann, 1990.

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IV Year-I Semester	Professional Elective-III	L	T	P	C
		3	0	0	3
INTERNET OF THINGS					

Course Objectives:
The objectives of this course is to acquire knowledge on the
i. What IoT is and how it works today and to Understand the Architectural Overview of IoT
ii. To Understand the IoT Reference Architecture and RealWorld Design Constraints
iii. To Understand the various IoT Protocols.
iv. To understand and program IoT devices.

UNIT - I: Introduction to IOT
Understanding IoT fundamentals, IOT Architecture and protocols, Various Platforms for IoT, Real time Examples of IoT , Overview of IoT components and IoT Communication Technologies ,Challenges in IOT**.**

UNIT - II: Arduino Simulation Environment
Arduino Uno Architecture, Setup the IDE, Writing Arduino Software, ArduinoLibraries, Basics of Embedded C programming for Arduino, Interfacing LED, push button and buzzer with Arduino , Interfacing Arduino with LCD.
Sensor & Actuators with Arduino
Overview of Sensors working, Analog and Digital Sensors,Interfacing of Temperature, Humidity, Motion, Light and Gas Sensor with Arduino,Interfacing of Actuators with Arduino.Interfacing of Relay Switch and Servo Motor with Arduino.

UNIT - III: Raspberry Pi Programming
Installing and **Configuring** the Raspberry Pi,Getting Started with the Raspberry Pi,Using the Pi as a Media Centre, Productivity Machine and Web Server,Remote access to the Raspberry Pi. Preaparing
Raspberry Pi for IoT Projects.
Creating the Sensor Projects,Creating the actuator Projects, Creating a IoT controller, creating a camera and working with HTTP protocol.

UNIT - IV: Basic Networking with ESP8266 WiFi module
Basics of Wireless Networking ,Introduction to ESP8266 Wi-Fi Module ,Various Wi-Fi library , Web server- introduction, installation, configuration ,Posting sensor(s) data to web server .IoT Protocols ,M2M vs. IOT Communication Protocols.

UNIT - V: Cloud Platforms for IOT
Virtualization concepts and Cloud Architecture , Cloud computing, benefits ,Cloud services -- SaaS, PaaS, IaaS , Cloud providers & offerings ,Study of IOT Cloud platforms , ThingSpeak API and MQTT , interfacing ESP8266 with Web services

Course Outcomes:

The students should be able to:

i. Recognize the factors that contributed to the emergence of IoT
ii. Design and program IoT devices like Microcontrollers, sensors and actuators.
iii. Use real IoT protocols for communication.
iv. Define the infrastructure for supporting IoT deployment.
v. Design an IoT device to work with a Cloud Computing infrastructure and Transfer IoT data to the cloud and in between cloud providers.

Text Books:

i. Simon Monk, Programming Arduino: Getting Started with Sketches, Second Edition McGraw- Hill Education
ii. Peter Waher,Learning Internet of Things,Packt publishing.
iii.OvidiuVermesan,PeterFriess, IoT-From Research and Innovation to Market deployment,River Publishers

Reference Books:

i. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.
ii. Peter Waher, "Learning Internet of Things", PACKT publishing, BIRMINGHAM – MUMBAI
iii.Bernd Scholz-Reiter, Florian Michahelles, "Architecting the Internet of Things", ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer.

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IV Year-I Semester	Professional Elective-III	L	T	P	C
		3	0	0	3
SOFTWARE PROJECT MANAGEMENT					

Course Objectives:
The objectives of this course is to acquire knowledge on the
i. To study how to plan and manage projects at each stage of the software development life cycle (SDLC)
ii. To train software project managers and other individuals involved in software project planning and tracking and oversight in the implementation of the software project management process.
iii. To understand successful software projects that support organization's strategic goals.

UNIT-I:
Conventional Software Management: The Waterfall Model, Conventional Software Management Performance.
Evolution Of Software Economics: Software Economics, Pragmatic Software Cost Estimation.
Improving Software Economics: Reducing Software Product Size, Improving Software Processes, Improving Team Effectiveness, Improving Automation through Software Economics.

UNIT-II:
The Old Way and the New: The Principles of Conventional Software Engineering, The Principles of Modern Software Management, Transitioning to an Iterative Process.
Life Cycle Phases: Engineering and Production Stages, Inception Phase, Elaboration Phase, Construction Phase, Transition Phase.

UNIT-III:
Model Based Software Architectures: A Management Perspective, A Technical Perspective.
Workflows of the Process: Software Process Workflows, Iteration Workflows.
Iterative Process Planning: Work Breakdown Structures, Planning Guidelines, The Cost and Schedule Estimating Process, The Iteration Planning Process.

UNIT-IV:
Project Organization and Responsibilities: Line-Of-Business Organizations, Project Organizations, Evolution of Organizations.
Project Control and Process Instrumentation: The Seven Core Metrics, Management Indicators, Quality Indicators Modern Project Profiles. The COCOMO Cost Estimation Model: COCOMO.

UNIT-V:
Effort Estimation and Scheduling: Effort Estimation, Scheduling.
Quality Planning: Quality Concepts, Quantitative Quality Management Planning. RISK MANAGEMENT: Risk Assessment, Risk Control.

Course Outcomes:

The students should be able to:

i. Estimate overall cost of a software project.
ii. Explain software development process.
iii. Distinguish workflows of process.
iv. Design project organization structure & analyze quality.
v. Estimate effort and schedule needed for project.

Textbooks:

i. Walker Royce, "Software Project Management – A UnifiedFramework", 1stEdition, Pearson Education, 2002.
ii. PankajJalote, "Software Project Management in Practice", 1stEdition, Pearson Education, 2005.
iii. Software Project Management, Bob Hughes & Mike Cotterell, TATA Mcgraw-Hill.

References:

i. Bob Hughes, "Mike Cotterell, Rajib Mall, Software ProjectManagement", 5thEdition, McGraw-Hill Higher Education, 2011.
ii. Joel Henry, "Software Project Management", 1st Edition, Pearson Education, 2006.
iii. Norman E. Fenton,Shari Lawrence Pfleeger, "Software Metrics: A Rigorous and Practical Approach ", 1st Edition, PWS Publishing Company, 1997

		L	T	P	C
IV Year-I Semester	**Professional Elective-III**	3	0	0	3
PROGRAM ANALYSIS					

Course Objectives:

The objectives of this course is to acquire knowledge on the

i. Classical data flow analysis and its use

ii. Pointer analysis and applications of pointer analysis

iii. Static single assignment form and its application in compiler design

UNIT - I:

Data Flow Analysis: Available expressions analysis, Live variables analysis, Reaching definitions analysis, Anticipable expressions analysis, A taxonomy of data flow analysis, Iterative and worklist based data flow analysis

UNIT - II:

Theoretical Abstractions in Data Flow Analysis: Lattice, flow functions, monotone frameworks, confluence operators, MFP(Maximal Fixed Point)/MOP(Meet Over Paths) solution

UNIT - III:

Introduction to interprocedural data flow analysis, Call graph, Functional Approach, Call Strings base method, Value context based interprocedural analysis

UNIT - IV:

Pointer analysis:

Introduction, issues in different languages Flow insensitive: Anderson's and Steensgard's approaches,Flow sensitive pointer analysis, context-insensitive vs context sensitive pointer analysis, Generalized Points-to Graph(GPG) based points-to analysis

UNIT - V:

Static Single Assignment Form (SSA):

Definition of SSA, Standard SSA construction and destruction algorithms, sparse data flow analysis.

Course Outcomes:

The students should be able to:

i. Apply data flow analysis techniques to calculate various properties of small programs

ii. Understand the mathematical ideas used in data flow analysis techniques

iii. Apply data flow analysis techniques to calculate various properties of small programs with more than one function

iv. Understanding pointer analysis and its applications

v. Construct static single assignment form for any program

Text Books:

i. Data Flow Analysis: Theory and Practice, Khedker, Sanyal, Karkare, CRC Press 2009.

ii. Advanced Compiler Design and Implementation, Muchnick, Morgan Kaufmann 1997.

Reference Books:

i. Principles of Program Analysis: Nielson, Nielson, Hankin, Springer 2004

ii. Compilers: Principles, Techniques and Tools (2nd Edition), Aho, Lam, Sethi, Ullman, Addison Wesley 2006.

E-resources:

i. SSA-based compiler Design, http://ssabook.gforge.inria.fr/latest/book.pdf

ii. Generalized Points-to Graphs: A Precise and Scalable Abstraction for Points-to Analysis, https://dl.acm.org/doi/abs/10.1145/3382092

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IV Year-I Semester	Professional Elective-IV	L	T	P	C
		3	0	0	3
SOFTWARE TESTING METHODOLOGIES					

Course Objectives:

The objectives of this course is to acquire knowledge on the

i. Describe the principles and procedures for designing test cases.

ii. Provide supports to debugging methods.

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

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 and Achievable Paths, Path Sensitizing, Path Instrumentation, Application of Path Testing.

UNIT-II:

Transaction Flows 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 and Interfaces 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.

Based Testing: Overview,Decision Tables, Path Expressions, KV Charts, and Specifications.

UNIT-IV:

State, State Graphs And Transition Testing: State Graphs, Good & Bad State Graphs, State Testing, and Testability Tips.

Graph Matrices and Application:

Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm.

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, Selenium 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.

Course Outcomes:

The students should be able to:

i. Define Software testing terminology and methodology

ii. Discuss and Classify various testing techniques for conducting different types of software testing

iii. Apply different software testing techniques.

iv. Construct test cases by understanding test suite management and software quality management.

v. Demonstrate modern software testing tools and testing of Object Oriented Software and Web based software

Text Books:

i. Software testing techniques – Boris Beizer, Dreamtech, second edition.

ii. Software Testing- Yogesh Singh, Cambridge

Reference Books:

i. The Craft of software testing - Brian Marick, Pearson Education.

ii. Software Testing, 3rd edition, P.C. Jorgensen, Aurbach Publications (Dist.by SPD).

iii. Software Testing, N.Chauhan, Oxford University Press.

iv. Introduction to Software Testing, P.Ammann&J.Offutt, Cambridge Univ.Press.

v. Effective methods of Software Testing, Perry, John Wiley, 2nd Edition, 1999.

vi. Software Testing Concepts and Tools, P.NageswaraRao, dreamtech Press

vii. Win Runner in simple steps by Hakeem Shittu, Genixpress, 2007.

viii. Foundations of Software Testing, D.Graham& Others, Cengage Learning.

IV Year – I Semester	Professional Elective-IV	L	T	P	C
		3	0	0	3
PARALLEL COMPUTING					

Course Objective:

i. Demonstrate an understanding of concepts, algorithms, and design principles underlying parallel computing,
ii. Develop algorithm design and implementation skills
iii. Gain practical experience in programming large scale parallel machines.

UNIT -I:

Introduction to Parallel Computing: Scope of Parallel Computing, Implicit Parallelism: Trends in Microprocessor Architectures, Limitations of Memory System Performance, Dichotomy of Parallel Computing Platforms, Physical Organization of Parallel Platforms, Communication Costs in Parallel Machines, Routing Mechanisms for Interconnection Networks, Impact of Process-Processor Mapping and Mapping Techniques.
History: Introduction, Modern Scientific Method, Evolution of Super computing, Modem Parallel Computers, Seeking Concurrency, Data Clustering, Programming Parallel Computers.
Parallel Architectures: Introduction, Interconnection Networks, Processor Arrays, Multiprocessors, Multi computers, Flynn's Taxonomy.

UNIT -II:

Parallel Algorithm Design: Introduction, The Task/Channel Model, Foster's Design Methodology, Boundary Value Problem, Finding the Maximum, The n-Body Problem, Adding Data Input. **Message-Passing Programming:** Introduction, The Message-Passing Model, The Message-Passing Interface, Circuit Satisfiability, Introducing Collective Communication, Benchmarking Parallel Performance. **Basic Communication Operations:** One-to-All Broadcast and All-to-One Reduction, All-to-All Broadcast and Reduction, All-Reduce and Prefix-Sum Operations, Scatter and Gather, All-to-All Personalized Communication, Circular Shift, Improving the Speed of Some Communication Operations.

UNIT -III:

The Sieve of Eratosthenes: Introduction, Sequential Algorithm, Sources of Parallelism, Data Decomposition options, Developing the Paralle1 Algorithm, Analysis of Parallel Sieve Algorithm, Documenting the Parallel Program, Benchmarking, Improvements. **Performance Analysis**: Introduction, Speedup and Efficiency, Amdahl's Law, Gustafson-Barsis's Law, The Karp-Flatt Metric, The Iso-efficiency Metric.

UNIT -IV:

Matrix Multiplication: Introduction, Sequential Matrix Multiplication, Row wise Block-Striped Parallel Algorithm, Cannon's Algorithm, Solving Linear Systems, Back Substitution, Gaussian Elimination, Iterative Methods, **Sorting:** Introduction, Quick sort, A Parallel Quick sort Algorithm, Hyper Quick sort Algorithm, Parallel Sorting by Regular Sampling.

UNIT -V:

Shared-Memory Programming: Introduction, The Shared-Memory Model, Parallel for Loops, Declaring Private Variables, Critical section, Reductions, Performance Improvements, More General Data Parallelism, Functional Parallelism. **Combining MPI and OpenMP**: Introduction, Conjugate Gradient Method, Jacobi Method. **Analytical Modelling of Parallel Programs:** Sources of Overhead in Parallel Programs, Performance Metrics for Parallel Systems, The Effect of Granularity on Performance, Scalability of Parallel Systems, Minimum Execution Time and Minimum Cost-Optimal Execution Time, Asymptotic Analysis of Parallel Programs, Other Scalability Metrics.

Course Outcomes:

After the completion of the course, student will be able to

i. Describe different parallel architectures; inter-connect networks, programming models, and algorithms for common operations such as matrix-vector multiplication.
ii. Develop an efficient parallel algorithm to solve it.
iii. Apply and Analyze a parallel algorithm time complexity as a function of the problem size and number of processors.
iv. Analyze parallel code performance, determine computational bottlenecks, and optimize the performance of the code.
v. Implement parallel algorithm using MPI, OpenMP, pthreads, or a combination of MPI and OpenMP.

Text Books:

i. Parallel Programming in C with MPI and OpenMP Michael J, Quinn Oregon State University.
ii. Introduction to parallel computing by Ananth Grama, Anshul Gupta, Gorge Karypis, Vipin Kumar, Pearson.

Reference books:

i. Distributed and Cloud Computing: From Parallel Processing to the Internet of Things 1st Edition, Kai Hwang , Jack Dongarra, Geoffrey C. Fox.
ii. Programming Massively Parallel Processors by D.Kirk and W. Hwu.

E-Resources:

i. https://nptel.ac.in/courses/106/102/106102114/

University College of Engineering Vizianagaram
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

		L	T	P	C
IV Year-I Semester	**Professional Elective-IV**	**3**	**0**	**0**	**3**
SOCIAL NETWORKS & SEMANTIC WEB					

Course objectives:
This course will enable students to

i. Explain the fundamentals of Semantic Web technologies.
ii. Implementation of semantic web applications and the architectures of social networking
iii. Social network performance analysis

Unit -I:
Web Intelligence 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- II:
Knowledge Representation for the Semantic Web 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.

Unit- III:
Ontology Engineering, Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping, Logic, Rule and Inference Engines.

Unit -IV:
Semantic Web Applications, Services and Technology 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:
Social Network Analysis and semantic web 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.

Course Outcomes

The students should be able to:

i. Demonstrate the semantic web technologies like RDF Ontology and others
ii. Learn the various semantic web applications
iii. Identify the architectures and challenges in building social networks
iv. Analyze the performance of social networks using electronic sources
v. Learn and build Semantic web Applications

Text Books:

i. Thinking on the Web - Berners Lee, Godel and Turing, Wiley inter science, 2008. Social Networks and the Semantic Web, Peter Mika, Springer, 2007.

Reference Books:

i. Semantic Web Technologies, Trends and Research in Ontology Based Systems.
ii. Semantic Web and Semantic Web Services -Liyang Lu Chapman and Hall/CRC Publishers, (Taylor & Francis Group).
iii. Programming the Semantic Web, T.Segaran, C.Evans, J.Taylor, O'Reilly.

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		L	T	P	C
IV Year-I Semester	**Professional Elective-IV**	**3**	**0**	**0**	**3**
AD-HOC AND SENSOR NETWORKS					

Course Objectives:

i. To learn about the issues and challenges in the design of wireless ad hoc networks.
ii. To understand the working of MAC and Routing Protocols for ad hoc and sensor networks
iv. To learn about the Transport Layer protocols and their QoS for ad hoc and sensor networks.
iv. To understand various security issues in ad hoc and sensor networks and the corresponding solutions.

UNIT-I:
Routing:
Cellular and Ad hoc wireless networks, Issues of MAC layer and Routing, Proactive, Reactive and Hybrid Routing protocols, Multicast Routing, Tree based and Mesh based protocols, Multicast with Quality of Service Provision

UNIT-II:
Quality of Service:
Real-time traffic support , Issues and challenges in providing QoS , Classification of QoS Solutions ,MAC layer classifications ,QoS Aware Routing Protocols ,Ticket based and Predictive location based QoS Routing Protocols

UNIT-III:
Energy Management Ad Hoc Networks:
Need for Energy Management, Classification of Energy Management Schemes, Battery Management and Transmission Power Management Schemes, Network Layer and Data Link Layer Solutions, System power Management schemes

UNIT-IV:
Mesh Networks:
Necessity for Mesh Networks, MAC enhancements, IEEE 802.11s Architecture, Opportunistic Routing,
Self Configuration and Auto Configuration, Capacity Models, Fairness, Heterogeneous Mesh Networks, Vehicular Mesh Networks

UNIT -V:
Sensor Networks:
Introduction –,Sensor Network architecture , Data Dissemination ,Data Gathering ,MAC Protocols for sensor Networks, Location discovery, Quality of Sensor Networks ,Evolving Standards ,Other Issues, Recent trends in Infrastructure less Networks

Course Outcomes:

i. Know the basics of Ad hoc networks and Wireless Sensor Networks.
ii. Identify the issues and challenges in providing QoS.
iii. To know how the resources are managed in the network.
Iv . To get an idea about various types of mesh networks.
v. Specify and identify deficiencies in existing wireless protocols for MAC layer and Network layer, and then go onto formulate new and better protocols.

Text Books:

i. C.Siva Ram Murthy and B.S.Manoj, Ad Hoc Wireless Networks – Architectures and Protocols, Pearson Education.
ii. Holger Karl, Andreas Willing, Protocols and Architectures for Wireless Sensor Networks, John Wiley and Sons, Inc.

Reference Books:

i. Subir Kumar Sarkar, T G Basavaraju, C Puttamadappa, Ad Hoc Mobile Wireless Networks, Auerbach Publications.
ii. Carlos De Morais Cordeiro, Dharma Prakash Agrawal, Ad Hoc and Sensor Networks: Theory and Applications (2nd Edition), World Scientific Publishing.
iii. Waltenegus Dargie, Christian Poellabauer, Fundamentals of Wireless Sensor Networks Theory and Practice, John Wiley and Sons.

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IV Year I Semester	Professional Elective - IV	L	T	P	C
		3	0	0	3
CYBER SECURITY & FORENSICS					

Course Objectives:

i. Able to identify security risks and take preventive steps
ii. To understand the forensics fundamentals
iii. To understand the evidence capturing process
iv. To understand the preservation of digital evidence

UNIT –I:

Introduction to Cybercrime: Introduction, Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security, Cybercriminals, Classifications of Cybercrime, Cyberstalking, Cybercafe and Cybercrimes, Botnets. Attack Vector, Proliferation of Mobile and Wireless Devices, Security Challenges Posed by Mobile Devices, Attacks on Mobile/Cell Phones, Network and Computer Attacks.

UNIT –II:

Tools and Methods : Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares,Virus and Worms, Trojan Horses and Backdoors, Steganography, Sniffers, Spoofing, Session Hijacking Buffer over flow, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks, Identity Theft (ID Theft), Foot Printing and Social Engineering, Port Scanning, Enumeration.

UNIT –III:

Cyber Crime Investigation: Introduction, Investigation Tools, eDiscovery, Digital Evidence Collection, Evidence Preservation, E-Mail Investigation, E-Mail Tracking, IP Tracking, E-Mail Recovery, Hands on Case Studies. Encryption and Decryption Methods, Search and Seizure of Computers, Recovering Deleted Evidences, Password Cracking.

UNIT –IV:

Computer Forensics and Investigations: Understanding Computer Forensics, Preparing for Computer Investigations. Current Computer Forensics Tools: Evaluating Computer Forensics Tools, Computer Forensics Software Tools, Computer Forensics Hardware Tools, Validating and Testing Forensics Software, Face, Iris and Fingerprint Recognition, Audio Video Analysis, Windows System Forensics, Linux System Forensics, Graphics and Network Forensics, E-mail Investigations, Cell Phone and Mobile Device Forensics.

UNIT –V:

Cyber Crime Legal Perspectives: Introduction, Cybercrime and the Legal Landscape around the World, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Consequences of Not Addressing the Weakness in Information Technology Act, Digital Signatures and the Indian IT Act, Amendments to the Indian IT Act, Cybercrime and Punishment, Cyberlaw, Technology and Students: Indian Scenario.

Course Outcomes:

At the end of the course, student will be able to

i. Enumerate the computer forensics fundamentals
ii. Describe the types of computer forensics technology
iii. Analyze various computer forensics systems
iv. Illustrate the methods for data recovery, evidence collection and data seizure
v. Identify the Role of CERT-In Security

Text Books:

i. Sunit Belapure Nina Godbole "Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", WILEY, 2011.
ii. Nelson Phillips and Enfinger Steuart, "Computer Forensics and Investigations", Cengage Learning, New Delhi, 2009.

Reference Books:

i. Michael T. Simpson, Kent Backman and James E. Corley, "Hands on Ethical Hacking and Network Defence", Cengage, 2019.
ii. Computer Forensics, Computer Crime Investigation by John R. Vacca, Firewall Media, New Delhi.
iii. Alfred Basta, Nadine Basta,Mary Brown and Ravinder Kumar "Cyber Security and Cyber Laws" , Cengage,2018.

E-Resources:

i. CERT-In Guidelines- http://www.cert-in.org.in/
ii. https://www.coursera.org/learn/introduction-cybersecurity-cyber-attacks [Online Course]
iii. https://computersecurity.stanford.edu/free-online-videos [Free Online Videos]
iv. Nickolai Zeldovich. 6.858 Computer Systems Security. Fall 2014. Massachusetts Institute of Technology: MIT OpenCourseWare, https://ocw.mit.edu. License: Creative Commons BY-NC-SA.

B. Tech (Computer Science and Engineering) - R19 Syllabus

University College of Engineering Vizianagaram
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

		L	T	P	C
IV Year I Semester	**Professional Elective - IV**	**3**	**0**	**0**	**3**
DEVOPS					

Course Objectives:

- DevOps improves collaboration and productivity by automating infrastructure and workflows and continuously measuring applications performance.

UNIT- I:

Phases of Software Development life cycle. Values and principles of agile software development.

UNIT –II:

Fundamentals of DevOps: Architecture, Deployments, Orchestration, Need, Instance of applications, DevOps delivery pipeline, DevOps eco system.

UNIT –III:

DevOps adoption in projects: Technology aspects, Agiling capabilities, Tool stack implementation, People aspect, processes.

UNIT –IV:

CI/CD: Introduction to Continuous Integration, Continuous Delivery and Deployment , Benefits of CI/CD, Metrics to track CICD practices

UNIT -V:

Devops Maturity Model: Key factors of DevOps maturity model, stages of Devops maturity model, DevOps maturity Assessment

Course Outcomes:

At the end of the course, student will be able to

i. Enumerate the principles of continuous development and deployment, automation of configuration management, inter-team collaboration, and IT service agility
ii. Describe DevOps & DevSecOps methodologies and their key concepts
iii. Illustrate the types of version control systems, continuous integration tools, continuous monitoring tools, and cloud models
iv. Set up complete private infrastructure using version control systems and CI/CD tools
v. Know about DevOps maturity model.

Text Books:

i. The DevOps Handbook: How to Create World-Class Agility, Reliability, and Security in Technology Organizations, Gene Kim , John Willis , Patrick Debois , Jez Humb,1st Edition, O'Reilly publications, 2016.
ii. What is Devops? Infrastructure as code, 1st Edition, Mike Loukides ,O'Reilly publications, 2012.

Reference Books:

i. Building a DevOps Culture, 1st Edition, Mandi Walls, O'Reilly publications, 2013.
ii. The DevOps 2.0 Toolkit: Automating the Continuous Deployment Pipeline With Containerized Microservices, 1st Edition, Viktor Farcic, CreateSpace Independent Publishing Platform publications, 2016
iii. Continuous Delivery: Reliable Software Releases Through Build, Test, and Deployment Automation, 1st Edition, Jez Humble and David Farley, 2010.
iv. Achieving DevOps: A Novel About Delivering the Best of Agile, DevOps, and

IV Year – I Semester		L	T	P	C
		0	0	3	1.5
UML LAB					

Course Objectives:

i. Construct UML diagrams for static view and dynamic view of the system.
ii. Know the practical issues of the different Object-oriented analysis and design concepts.
iii. Carry out the analysis and design of a system in an object-oriented way.
iv. Apply forward and reverse engineering of a software system.
v. Inculcate the art of object-oriented software analysis design.

LAB EXPERIMENTS:

The UML diagrams should be drawn for the following case studies:

Experiment 1: College Information System
Experiment 2: Traffic Monitoring/Controlling System
Experiment 3: ATM Application
Experiment 4: Airline Reservation System
Experiment 5: Vacation Tracking System
Experiment 6: Inventory Management System
Experiment 7: Online Book Shopping
Experiment 8: POS System

Course Outcomes:

After the completion of the course, student will be able to

i. Understand the syntax of different UML diagrams. Sketch a Modeling with UML by Deploying Structural Modeling, Behavioral Modeling, Architectural Modeling.
ii. Recognize the difference between various object relationships: inheritance, association, whole-part, and dependency relationships.
iii. Show the role and function of each UML model in developing object-oriented software.
iv. Analyze and design a software system in an object oriented style using various tools .

Text Books:

i. **"**The Unified Modeling Language User Guide", Grady Booch, James Rumbaugh, Ivar Jacobson, 12th Impression, 2012, PEARSON.

ii. Design Patterns by Erich Gamma, Pearson Education.

iii. "Object- Oriented Analysis And Design with Applications", Grady BOOCH, Robert A. Maksimchuk, Michael W. ENGLE, Bobbi J. Young, Jim Conallen, Kellia Houston, 3rd edition, 2013, PEARSON.

Reference Books:

i. "The Unified modeling language Reference manual", James Rumbaugh, Ivar Jacobson, Grady Booch, Addison-Wesley.

ii. "Object-oriented analysis and design with the Unified process", John W. Satzinger, Robert B. Jackson, Stephen D. Burd, Cengage Learning.

iii. Patterns in JAVA Vol-I (or) Vol-II By Mark Grand, Wiley Dream Tech.

iv. Java Enterprise Design Patterns Vol-III By Mark Grand Wiley Dream Tech.

v. "Head first object-oriented analysis and design", Brett D. McLaughlin, Gary Pollice, Dave West, O"Reilly.

vi. "Object-oriented analysis and design using UML", Mahesh P. Matha, PHI.

E-Resources:

i. https://nptel.ac.in/courses/106/105/106105224/

ii. https://www.tutorialspoint.com/design_pattern/design_pattern_quick_guide.htm

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University College of Engineering Vizianagaram
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

		L	T	P	C
IV Year I Semester		**0**	**0**	**0**	**1.5**
PROJECT - I					

B. Tech (Computer Science and Engineering)- R19 Syllabus

University College of Engineering Vizianagaram
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

		L	T	P	C
IV Year-II Semester		**3**	**0**	**0**	**3**
CLOUD COMPUTING					

Course Objective:

i. To understand the concept of cloud computing.
ii. To appreciate the evolution of cloud from the existing technologies.
iii. To have knowledge on the various issues in cloud computing.
iv. To be familiar with the lead players in cloud.
v. To appreciate the emergence of cloud as the next generation computing paradigm.

UNIT-I:

Introduction: Introduction to Cloud Computing, Definition of Cloud, Evolution of Cloud Computing, Underlying Principles of Parallel and Distributed Computing, Cloud Characteristics, Elasticity in Cloud – On-Demand Provisioning.

UNIT-II:

Cloud Enabling Technologies: Service Oriented Architecture, REST and Systems of Systems, Web Services, Publish-Subscribe Model, Basics of Virtualization, Types of Virtualization, Implementation Levels of Virtualization, Virtualization Structures, Tools and Mechanisms, Virtualization of CPU, Memory, I/O Devices, Virtualization Support and Disaster Recovery.

UNIT-III:

Cloud Architecture, Services And Storage: Layered Cloud Architecture Design, NIST Cloud Computing Reference Architecture, Public, Private and Hybrid Clouds, laaS, PaaS, SaaS, Architectural Design Challenges, Cloud Storage, Storage-as-a-Service, Advantages of Cloud Storage, Cloud Storage Providers, S3.

UNIT-IV:

Resource Management And Security In Cloud: Inter Cloud Resource Management, Resource Provisioning and Resource Provisioning Methods, Global Exchange of Cloud Resources, Security Overview, Cloud Security Challenges, Software-as-a-Service Security, Security Governance, Virtual Machine Security, IAM, Security Standards.

UNIT-V:

Cloud Technologies And Advancements: Hadoop, MapReduce, Virtual Box, Google App Engine, Programming Environment for Google App Engine, Open Stack, Federation in the Cloud, Four Levels of Federation, Federated Services and Applications, Future of Federation.

Course Outcomes:

Upon completion of the course, it is expected that student will be able to:

i. Articulate the main concepts, key technologies, strengths and limitations of cloud computing.
ii. Learn the key and enabling technologies that help in the development of cloud.
iii. Develop the ability to understand and use the architecture of compute and storage cloud, service and delivery models.
iv. Explain the core issues of cloud computing such as resource management and security.
v. Evaluate and choose the appropriate technologies, algorithms and approaches for implementation and use of cloud.

Text Book:

i. Distributed and Cloud Computing, From Parallel Processing to the Internet of Things, Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, Morgan Kaufmann Publishers.
ii. Cloud Computing: Implementation, Management and Security, Rittinghouse, John W., and James F. Ransome, CRC Press.

Reference Books:

i. Mastering Cloud Computing, Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi, Tata Mcgraw Hill.
ii. Cloud Computing - A Practical Approach, Toby Velte, Anthony Velte, Robert Elsenpeter, Tata McGraw Hill.
iii. Cloud Application Architectures: Building Applications and Infrastructure in the Cloud: Transactional Systems for EC2 and Beyond (Theory in Practice), George Reese, O'Reilly.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

		L	T	P	C
IV Year-I Semester		**3**	**0**	**0**	**3**
DEEP LEARNING					

Course Objectives:

At the end of the course, the students will be expected to:

i. Learn deep learning methods for working with sequential data,
ii. Learn deep recurrent and memory networks,
iii. Learn deep Turing machines,
iv. Apply such deep learning mechanisms to various learning problems.
v. Know the open issues in deep learning, and have a grasp of the current research directions.

UNIT I:

Introduction: Various paradigms of learning problems, Perspectives and Issues in deep learning framework, review of fundamental learning techniques.

Feed forward neural network: Artificial Neural Network, activation function, multi-layer neural network.

UNIT II:

Training Neural Network: Risk minimization, loss function, back propagation, regularization, model selection, and optimization.

Conditional Random Fields: Linear chain, partition function, Markov network, Belief propagation, Training CRFs, Hidden Markov Model, Entropy.

UNIT III:

Deep Learning: Deep Feed Forward network, regularizations, training deep models, dropouts, Convolution Neural Network, Recurrent Neural Network, and Deep Belief Network.

UNIT IV:

Probabilistic Neural Network: Hopfield Net, Boltzmann machine, RBMs, Sigmoid net, Auto encoders.

Sequence Modeling: LSTM, Gated RNNs & Deep Generative Models

UNIT V:

Applications: Object recognition, sparse coding, computer vision, natural language processing.

Introduction to Deep Learning Tools: Caffe, Theano, Torch.

Course Outcomes:

After the completion of the course, student will be able to

i. Demonstrate the basic concepts fundamental learning techniques and layers.
ii. Discuss the Neural Network training, various random models**.**
iii. Explain different types of deep learning network models.
iv. Classify the Probabilistic Neural Networks and Sequence model neural networks.
v. Implement tools on Deep Learning techniques.

Text Books:

i. Goodfellow, I., Bengio,Y., and Courville, A., Deep Learning, MIT Press, 2016..
ii. Bishop, C. ,M., Pattern Recognition and Machine Learning, Springer, 2006.

Reference Books:

i. Artificial Neural Networks, Yegnanarayana, B., PHI Learning Pvt. Ltd, 2009.
ii. Matrix Computations, Golub, G.,H., and Van Loan,C.,F, JHU Press,2013.
iii. Neural Networks: A Classroom Approach, Satish Kumar, Tata McGraw-Hill Education, 2004.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

IV Year-II Semester	Professional Elective - V	L	T	P	C
		3	0	0	3
BIG DATA ANALYTICS					

Course Objectives:

The objectives of this course is to acquire knowledge on the

i. Necessisty of Big data analysis and challenges in Big data analysis
ii. Descriptive, Predictive, Rela time analysis of big data
iii. Programming tools PIG & HIVE in Hadoop echo system

UNIT - I: Introduction: Introduction to big data: Introduction to Big Data platform, Challenges of conventional systems, Intelligent data analysis, Nature of data, Analytic processes and tools, Analysis vs Reporting.

UNIT - II: Stream Processing: Mining data streams: 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.

UNIT - III: Introduction to Hadoop: Hadoop: History of Hadoop, the Hadoop Distributed File System, Components of Hadoop Analysing the Data with Hadoop, Scaling Out, Hadoop Streaming, Design of HDFS, Java interfaces to HDFS Basics, Developing a Map Reduce Application, How Map Reduce Works, Anatomy of a Map Reduce Job run, Failures, Job Scheduling, Shuffle and Sort, Task execution, Map Reduce Types and Formats, Map Reduce Features Hadoop environment.

UNIT - IV: Frameworks and Applications: Frameworks: Applications on Big Data Using Pig and Hive, Data processing operators in Pig, Hive services, HiveQL, Querying Data in Hive, fundamentals of HBase and ZooKeeper.

UNIT - V: Predictive Analytics and Visualizations: Predictive Analytics, Simple linear regression, Multiple linear regression, Interpretation of regression coefficients, Visualizations, Visual data analysis techniques, interaction techniques, Systems and application

Course Outcomes:

The students should be able to:

i. Understand and Illustrate characteristics of big data and big data challenges in different domains including social media, transportation, finance and medicine
ii. Demonstrate stream processing on real time applications
iii. Do Big data processing using Map reduce on Hadoop
iv. Do Big data processing using PIG scripts and HiveQL queries
v. Understand Predictive analysis of big data.

Text Books:

i. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'reilly Media, Fourth Edition, 2015.
ii. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data", McGrawHill Publishing, 2012.
iii. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", CUP, 2012

Reference Books:

i. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley& sons, 2012.
ii. Paul Zikopoulos, DirkdeRoos, Krishnan Parasuraman, Thomas Deutsch, James Giles, David Corrigan, "Harness the Power of Big Data:The IBM Big Data Platform", Tata McGraw Hill Publications, 2012.
iii. Arshdeep Bahga and Vijay Madisetti, "Big Data Science & Analytics: A Hands On Approach ", VPT, 2016.
iv. Bart Baesens, "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications (WILEY Big Data Series)", John Wiley & Sons, 2014.

E-resources:

i. https://www.edx.org/course/big-data-fundamentals
ii. https://hadoop.apache.org/
iii. https://pig.apache.org/
iv. https://hive.apache.org/

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

IV Year-II Semester	Professional Elective - V	L	T	P	C
		3	0	0	3
NATURAL LANGUAGE PROCESSING					

Course Objectives:
The objectives of this course is to acquire knowledge on the
i. Design and implementation of NLP systems
ii. Different ways of modeling natural languages
iii. Applications of Natural language processing

UNIT - I:
Finding the Structure of Words:
Words and Their Components, Issues and Challenges, Morphological Models
Finding the Structure of Documents:
Introduction, Methods, Complexity of the Approaches, Performances of the Approaches

UNIT - II:
Syntax Analysis:
Parsing Natural Language, Treebanks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms, Models for Ambiguity Resolution in Parsing, Multilingual Issues

UNIT - III:
Semantic Parsing:
Introduction, Semantic Interpretation, System Paradigms, Word Sense Systems, Software.

UNIT - IV:
Predicate-Argument Structure, Meaning Representation Systems, Software.
Discourse Processing:
Cohesion, Reference Resolution, Discourse Cohesion and Structure

UNIT - V:
Language Modeling:
Introduction, N-Gram Models, Language Model Evaluation, Parameter Estimation, Language Model Adaptation, Types of Language Models, Language-Specific Modeling Problems, Multilingual and Cross lingual Language Modeling

Course Outcomes:

The students should be able to:

i. Show sensitivity to linguistic phenomena and an ability to model them with formal grammars.

ii. Understand and carry out proper experimental methodology for training and evaluating empirical NLP systems

iii. Able to manipulate probabilities, construct statistical models over strings and trees, and estimate parameters using supervised and unsupervised training methods.

iv. Able to design, implement, and analyze NLP algorithms

v. Able to design different language modeling Techniques.

Text Books:

i. Multilingual natural Language Processing Applications: From Theory to Practice – Daniel M. Bikel and Imed Zitouni, Pearson Publication

ii. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary

Reference Books:

i. Speech and Natural Language Processing - Daniel Jurafsky & James H Martin, Pearson Publications

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IV Year-II Semester	Professional Elective - V	L	T	P	C
		3	0	0	3
BLOCK CHAIN TECHNOLOGIES					

Course Objective:

i. To provide conceptual understanding of the function of Blockchain as a method of securing distributed ledgers.
ii. To understand the structure of a Blockchain and why/when it is better than a simple distributed database
iii. To make students understand the technological underpinnings of Blockchain operations as distributed data structures and decision making systems.
iv. To understand a "smart" contract and its legal implications.

UNIT-I:

Introduction: History and basics, Types of Blockchain, Consensus, CAP Theorem.

Cryptographic Hash Functions: Properties of hash functions, Secure Hash Algorithm, Merkle trees, Patricia trees.

UNIT-II:

Decentralization: Decentralization using Blockchain, Methods of decentralization, decentralization framework, Blockchain and full ecosystem decentralization, Smart contracts, Decentralized Organizations, Platforms for decentralization.

UNIT-III:

Bitcoin: Introduction to Bitcoin, Digital keys and addresses, Transactions, Blockchain, The Bitcoin network, Bitcoin payments, Bitcoin Clients and APIs, Alternatives to Proof of Work, Bitcoin limitations.

UNIT-IV:

Etherium: Smart Contracts, Introduction to Ethereum, The Ethereum network, Components of the Ethereum ecosystem, Blocks and Blockchain, Fee schedule, Ethereum Development Environment, Solidity.

UNIT-V:

Hyperledger: Introduction, Hyperledger Projects, Protocol, Architecture, Hyperledger Fabric, Sawtooth Lake, Corda.

Challenges and Opportunities: Scalability, Privacy, Blockchain for IoT, Emerging trends

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Course Outcomes

Upon completion of the course, it is expected that student will be able to:

i. Define and explain the fundamentals of Blockchain.
ii. Understand decentralization and the role of Blockchain in it.
iii. Understand and analyze Bitcioin Cryptocurrency and underlying Blockchain network.
iv. Understand Etherium currency and platform, and develop applications using Solidity.
v. Understand Hyperledger project and its components; critically analyze the challenges and future opportunities in Blockchain technology.

Text Book:

i. Mastering Blockchain, Imran Bashir, Second Edition, Packt Publishing.

Reference Books:

i. Mastering Bitcoin: Unlocking Digital Cryptocurrencies, Andreas Antonopoulos, O'Reilly.
ii. Blockchain Blueprint for a New Economy, Melanie Swan, O'Reilly.
iii. Mastering Bitcoin: Programming the Open Blockchain, Antonopoulos, Andreas M. O'Reilly.
iv. Blockchain Technology: Cryptocurrency and Applications, S. Shukla, M. Dhawan, S. Sharma, S. Venkatesan, Oxford University Press.

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IV Year-II Semester	Professional Elective - V	L	T	P	C
		3	0	0	3
DISTRIBUTED SYSTEMS					

Course Objectives:

i. To understand the foundations of distributed systems.
ii. To learn issues related to clock Synchronization, the need for global state and remote invocation in distributedsystems.
iii. To learn distributed mutual exclusion and deadlock detection algorithms.
iv. To learn the characteristics of peer-to-peer, distributed shared memory systems and security.
v. To understand the significance of agreement, distributed transactions, fault tolerance and recovery protocols in Distributed Systems.

UNIT- I:

Characterization of Distributed Systems: Introduction, Examples of Distributed Systems, Resource Sharing and the Web, Challenges, Relation to Computer system Components, Motivation, Relation toParallel Systems, Message-Passing systems versus Shared Memory systems, Primitives for Distributed Communication, Synchronous versus Asynchronous executions, Design issues and Challenges. **A model of Distributed Computations:** A distributed program, A model of distributed executions, Models of communication networks, Global state, Cuts, Past and future cones of an event, Models of Process Communications. **Logical Time:** A framework for a system of logical clocks, Scalar time, Vector time, Physical clock synchronization: NTP.

UNIT –II:

Message Ordering and Group Communication: Message ordering paradigms, Asynchronous execution with synchronous communication, Synchronous program order on an asynchronous system, Group communication, Causal order (CO), Total order.

Global state and Snapshot Recording Algorithms: Introduction, System model and definitions, Snapshot algorithms for FIFO channels. **Remote Invocation:** Introduction, Design Issues for RMI, Implementation of RMI, Distributed Garbage Collection, Remote Procedure Call, Events and Notifications, Case Study: JAVA RMI.

UNIT- III:

Distributed Mutual Exclusion Algorithms: Introduction, Preliminaries, Lamport's algorithm, Ricart-Agrawala algorithm, Maekawa's algorithm, Suzuki–Kasami's broadcast algorithm. **Deadlock Detection in Distributed Systems:** Introduction, System model, Preliminaries, Models of deadlocks, Knapp's Classification, Algorithms for the Single Resource Model, the AND model and the OR model.

UNIT -IV:

Peer-to-Peer Computing and Overlay Graphs: Introduction, Data indexing and overlays, Chord distributed hash table, Content addressable networks**,** Tapestry. **Distributed Shared Memory:** Abstraction and advantages, Memory consistency models, Shared Memory Mutual Exclusion.

Security: Introduction, Overview of Security Techniques, Cryptographic Algorithms, Digital Signatures, Cryptography Pragmatics.

UNIT –V:

Distributed Transactions: Introduction, Flat and Nested Distributed Transactions, Atomic commit protocols, Concurrency control in distributed transactions. **Check Pointing and Rollback Recovery:** Introduction, Background and definitions, Issues in Failure recovery, Checkpoint-based recovery, Log-based rollback recovery, coordinated check pointing algorithm, Algorithms for asynchronous and synchronous check pointing and recovery. **Consensus and Agreement Algorithms:** Problem definition, Overview of results, Agreement in a Failure-Free system (synchronous or asynchronous).

Course Outcomes:

At the end of the course, the students will be able to:

i. Understand the foundations and issues of distributed systems.
ii. Illustrate the various synchronization issues, global state and remote invocation for distributed systems.
iii. Develop the Mutual Exclusion and Deadlock detection algorithms in distributed systems.
iv. Apply the features of peer-to-peer, distributed shared memory systems and security.
v. Analyze the distributed transactions, agreement protocols and fault tolerance mechanisms in distributed systems.

Text Books:

i Distributed computing: Principles, algorithms, and systems, Ajay D Kshemkalyani and Mukesh Singhal, Cambridge University Press, 2011.

i Distributed Systems Concepts and Design, George Coulouris, Jean Dollimore and TimKindberg, 5th Edition, Pearson Education, 2012.

Reference Books:

i. Distributed Operating Systems: Concepts and Design, Pradeep K Sinha, Prentice Hall ofIndia, 2007.
ii. Advanced concepts in operating systems. Mukesh Singhal and Niranjan G. Shivaratri,McGraw-Hill, 1994.
iii. Distributed Systems: Principles and Paradigms, Tanenbaum A.S., Van Steen M.,Pearson Education, 2007.

E-Resources:

i. https://nptel.ac.in/courses/106/106/106106168/

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		L	T	P	C
		3	0	0	3
QUANTUM COMPUTING					

Course Objectives:

i. This course teaches the fundamentals of quantum information processing, including quantum computation, quantum cryptography, and quantum information theory.

UNIT- I:

Introduction: Quantum Measurements Density Matrices, Positive-Operator Valued Measure, Fragility of quantum information: Decoherence, Quantum Superposition and Entanglement, Quantum Gates and Circuits.

UNIT -II:

Quantum Basics and Principles: No cloning theorem & Quantum Teleportation, Bell's inequality and its implications, Quantum Algorithms & Circuits.

UNIT -III:

Algorithms: Deutsch and Deutsch–Jozsa algorithms, Grover's Search Algorithm, Quantum Fourier Transform, Shore's Factorization Algorithm.

UNIT -IV:

Performance, Security and Scalability: Quantum Error Correction: Fault tolerance; Quantum Cryptography, Implementing Quantum Computing: issues of fidelity; Scalability in quantum computing.

UNIT -V:

Quantum Computing Models: NMR Quantum Computing, Spintronics and QED MODEL, Linear Optical MODEL, Nonlinear Optical Approaches; Limits of all the discussed approaches, Future of Quantum computing.

Course Outcomes:

By the end of this course, the student is able to

i. Analyze the behaviour of basic quantum algorithms
ii. Implement simple quantum algorithms and information channels in the quantum circuit model
iii. Simulate a simple quantum error-correcting code
iv. Prove basic facts about quantum information channels
v. Know about Quantum Computing Models

Text Books:

i. Eric R. Johnston, Nic Harrigan, Mercedes and Gimeno-Segovia "Programming Quantum Computers: Essential Algorithms And Code Samples, SHROFF/ O'Reilly.
ii. Dr. Christine Corbett Moran, Mastering Quantum Computing with IBM QX: Explore the world of quantum computing using the Quantum Composer and Qiskit, Kindle Edition Packt
iii. V.K Sahni, Quantum Computing (with CD), TATA McGrawHill.

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IV Year-II Semester		L	T	P	C
		0	0	15	8
PROJECT - II					

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		L	T	P	C
Open Elective - I		**3**	**0**	**0**	**3**
DATA STRUCTURES					

Course Objectives:

i. Solve problems using data structures such as linear lists, stacks, queues, hash tables.
ii. To understand concepts about searching and sorting techniques.
iii. Be familiar with non-linear data structures such as Trees, Search Trees, Threaded trees, and Graphs.
iv. Solve problems using data structures such as Efficient Search Structures.

UNIT-I: Linear Data Structures:
Linked Lists: Linear List, Ordered and Unordered Lists, Singly Linked List, Doubly Linked List, Circular Linked List Implementations and List Applications.
Stacks: Stacks using Arrays and Linked List, Applications of Stacks.
Queues: Queues using Arrays and Linked List, Circular Queues, DeQueues, Applications of Queues.

UNIT-II: Searching and Sorting:
Linear Search, Binary Search, Fibonacci Search, Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort, Radix Sort.
Dictionaries: Indexing, Hashing, and Hash Functions, Collision Resolution - Separate Chaining, Open Addressing, Hashing with Buckets.

UNIT-III: Trees:
Trees: Basic Terminology, Applications, Types of Trees, Tree Representations, Binary Tree Traversals, Threaded Binary Trees.
Priority queues: MinVMax Heaps, Binomial Queues.

UNIT-IV: Efficient Search Structures
BSTs: Binary Search Tree, Skewed Trees, BST implementation and its Applications.
AVL, B, B+ Trees: Sell'Balanced Trees, Height o1'an AVL Trees, AVL Tree Rotations and M-Way Search Trees.

UNIT-V: Graphs
Introduction to Graphs, Basic Terminology, and Types, Applications, Corurectivity, Shortest Paths: Single-Source Shortest Path Problem, Transitive Closure, All Pairs Shortest Path Problem, Spanning
Trees: Prim's Algorithm and Kruskal's Algorithm.

Course Outcomes:

i. Distinguish between Linear and Non-Linear Data structures.Apply advanced data structure strategies for exploring complex data structures.
ii. Compare and contrast various Sorting and searching techniques in the area of Performance.
iii. Exploring basic non-linear data structures and their applications
iv. Incorporate data structures into applications such as Binary Search Trees, Heaps.
v. Implement Graphs and applications and compare their Performance and trade-offs.

Text Books:

i. Data structures and Algorithm Analysis in C, Mark Allen Weiss, Pearson Education. Ltd., Second Edition.
ii. Data Structures & Algorithms, Alfred V Aho, John E Hopcraft, Jeffery D Ullman, PearsonEducation. Ltd., First Edition.
iii. Fundamentals of Data Structures in C, S.Sahni, Second Edition, Universities Press, Pvt. Ltd.

Reference Books:

i. Data Structures and Algorithms using C by R. S. Salari, Fifth Edition, KHANNA Publishing.
ii. Datastructures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
iii. Data Structures and Algorithms Made Easy: Second Edition: Data Structure and
iv. Algorithm c Puzzles, Narasimha Karumanchi, Fifth Edition, Career Monk.
v. Data Structures Using C, Reema Thareja, Second Edition, Oxford.
vi. Problem-solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

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		L	T	P	C
Open Elective - I		**3**	**0**	**0**	**3**
C++ PROGRAMMING					

Course Objectives:
The objectives of this course is to acquire knowledge on the

i. Understand the basic concept of C++ Programming, and its different modules that includes conditional and looping expressions, Arrays, Strings, Functions, Pointers,Structures and File programming.
ii. Acquire knowledge about the basic concepts of writing a programs using OOP principles.
iii. Role of Inheritance and ploymorphysm.
iv. Use of Templates and Exception handling.
v. Role of Standard Template Library in writing Generic programs.

UNIT-I: Introduction to C++
Difference between C and C++ - Evolution of C++ - The Object Oriented Technology- Disadvantage of Conventional Programming- Key Concepts of Object Oriented Programming- Advantage of OOP- Object Oriented Language.
Classes and Objects &Constructors and Destructor
Classes in C++-Declaring Objects- Access Specifiers and their Scope- Defining Member Function-Overloading Member Function- Nested class, Constructors and Destructors,Introduction- Constructors and Destructor- Characteristics of Constructor and Destructor-Application with Constructor- Constructor with Arguments (parameterized Constructor-Destructors- Anonymous Objects.

UNIT-II: Operator Overloading and Type Conversion & Inheritance
The Keyword Operator- Overloading Unary Operator- Operator Return Type- Overloading Assignment Operator (=)- Rules for Overloading Operators, Inheritance, Reusability- Types of Inheritance- Virtual Base Classes- Object as a Class Member- Abstract Classes- Advantages of Inheritance-Disadvantages of Inheritance.

UNIT-III: Pointers & Binding Polymorphisms and Virtual Functions
Pointer, Features of Pointers- Pointer Declaration- Pointer to Class- Pointer Object- The this Pointer- Pointer to Derived Classes and Base Class, Binding Polymorphisms and Virtual Functions, Introduction- Binding in C++- Virtual Functions- Rules for Virtual Function- Virtual Destructor.

UNIT-IV: Generic Programming with Templates & Exception Handling
Generic Programming with Templates, Need for Templates- Definition of class Templates- Normal Function Templates- Over Loading of Template Function-Bubble Sort Using Function Templates- Difference Between Templates and Macros- Linked Lists with Templates, Exception Handling- Principles of Exception Handling- The Keywords try throw and catch- Multiple Catch Statements –Specifying Exceptions.

UNIT-V: Overview of Standard Template Library

Overview of Standard Template Library- STL Programming Model- Containers- Sequence Containers- Associative Containers- Algorithms- Iterators- Vectors- Lists- Maps.

Course Outcomes:

The students should be able to:

i. Understand the basic terminology used in Object oriented programming and learn to use basic C++ language constructs.
ii. Write, compile and debug programs in C++ language. Use different features of C++.
iii. Design programs involving /Implementing Polymorphysm and Inheritance.
iv. Design and implement Generic programs using C++ templates.
v. Learn and Use Standard Template Library (STL).

Text Books:

i. A First Book of C++, Gary Bronson, Cengage Learing.
ii. The Complete Reference C++, Herbert Schildt, TMH.
iii. Programming in C++, Ashok N Kamathane, Pearson 2nd Edition.

Reference Books:

i. Object Oriented Programming C++, Joyce Farrell, Cengage.
ii. C++ Programming: from problem analysis to program design, DS Malik, Cengage Learing.

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Open Elective - I		L	T	P	C
		3	0	0	3
COMPUTER ORGANIZATION					

Course Objectives:

i. Gives a view of computer system from user's perspective, representation of data.
ii. Understand the architecture of a modern computer with its various processing units. Also the Performance measurement of the computer system.
iii. Describes the means of interaction devices with CPU, their characteristics, modes.
iv. Description of different parameters of a memory system, organization and mapping of various types of memories.
v. Illustration of data paths and control flow for sequencing in CPUs, Microprogramming of control unit of CPU.

UNIT -I:

Basic Structure of Computers: Functional unit, Basic Operational concepts, Bus structures, System Software, Performance, The history of computer development.
Data Representation: Data types, Complements, Fixed Point Representation, Floating – Point Representation, Other Binary Codes, Error Detection codes.

UNIT -II:

Machine Instruction and Programs:

Instruction and Instruction Sequencing: Register Transfer Notation, Assembly Language Notation, Basic Instruction Types, Addressing Modes, Basic Input/output Operations, The role of Stacks and Queues in computer programming equation. Component of Instructions: Logic Instructions, shift and Rotate Instructions.

UNIT -III:

Type of Instructions: Arithmetic and Logic Instructions, Branch Instructions, Addressing Modes, Input/output Operations.
Input/output Organization: Accessing I/O Devices, Interrupts: Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Direct Memory Access, Buses: Synchronous Bus, Asynchronous Bus, Interface Circuits, Standard I/O Interface: Peripheral Component Interconnect (PCI) Bus, Universal Serial Bus (USB).

UNIT -IV:

The Memory Systems: Basic memory circuits, Memory System Consideration, Read-Only Memory: ROM, PROM, EPROM, EEPROM, Flash Memory, Cache Memories: Mapping Functions, INTERLEAVING

Secondary Storage: Magnetic Hard Disks, Optical Disks.

UNIT -V:

Processing Unit: Fundamental Concepts: Register Transfers, Performing an Arithmetic or Logic Operation, Fetching a Word from Memory, Execution of Complete Instruction, Hardwired Control,

Micro programmed Control: Microinstructions, Micro program Sequencing, Wide Branch Addressing Microinstructions with next – Address Field.

Course Outcomes:

i. Understand the architecture of modern computer.
ii. Able to calculate the effective address of an operand by addressing modes.
iii. Apply different instruction types.
iv. Determine the importance of memory management system of computer.
v. Design the roles and functions of processing unit and micro programmed control.

Text Books:

i. Computer Organization, Carl Hamacher, Zvonks Vranesic, Safea Zaky, 5th Edition, McGraw Hill.
ii. Computer Architecture and Organization, John P. Hayes, 4th Edition, McGraw Hill.

Reference Books:

i. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI.
ii. Structured Computer Organization –Andrew S.Tanenbaum, 4th Edition PHI/Pearson.
iii. Fundamentals or Computer Organization and Design, - Sivaraama Dandamudi Springer Int. Edition.
iv. "Computer Organization and Design: The Hardware/Software Interface" by David A. Patterson and John L. Hennessy.
vi. J.P. Hayes, "Computer Architecture and Organization", McGraw-Hill, 1998.

E-Resources:

i. https://nptel.ac.in/courses/106/106/106106092/
ii. https://nptel.ac.in/courses/106/105/106105163/

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		L	T	P	C
Open Elective - I		**4**	**0**	**0**	**3**
PYTHON PROGRAMMING					

Course Objectives:

i. Introduction to Scripting Language
ii. Exposure to various problems solving approaches of computer science

UNIT-I: Introduction to Python
Features and History of Python, Print and Input functions, variables, keywords, comments Types: Numerical Types (int, float, complex), Strings, Boolean, Type Conversion Operators: Arithmetic, Relational, Logical, Bitwise, Assignment, Identity, Membership

UNIT-II: Control Flow and Functions
Indentation, if-elif-else, while, for, break, continue, pass, else-with loops
Functions: Introduction, Required Arguments, Default Arguments, Keyword Arguments, Variable Number of Arguments, Variable Scope and Lifetime, global variables, Lambda Functions, Command Line Arguments

UNIT-III: Object Oriented Programming
Classes and Objects, built-in class methods and attributes, 'self', constructor, destructor, inheritance, data hiding, overriding methods and overloading operators

UNIT-IV: Data Structures, Files and Exception Handling
Lists, Nested Lists, List Comprehensions, Tuples and Sequences, Sets, Dictionaries
File I/O: opening, closing, reading and writing Handling Exceptions, Multiple Except Blocks, Multiple Exceptions in a Single Block, Except Block Without Exception, The else Clause, Raising Exceptions, Built-in and User-defined Exceptions, The finally Block

UNIT-V: Modules, Packages and Standard Library
Introduction modules, import and from-import, Packages in Python, used defined modules and packages, PIP.The Python Standard Library: numeric and mathematical modules, string processing, date & time, calendar, operating system, web browser

GUI and Graphics:
GUI design with tkinter: Button, Canvas, Checkbutton, Entry, Frame, Label, Listbox, Menu, Menubutton, Message, Radiobutton, Scale, Scrollbar, Text Graphics with turtle: Motion Control, Pen, Colour, Fill, multiple turtles, reset and clear

Course Outcomes:

i. Understand the basic fundamentals of scripting language and its learning environment.
ii. Acquire the knowledge of data types, operators and control structures.
iii. Understand Object oriented concepts and apply the concepts of data structures to real world data.
iv. Apply the concept of modularity and implement different packages to solve complex problems. Understand Object oriented concepts and handle different errors through exceptions.
v. Develop multithreaded application using standard libraries.

Text Books:

i. Python Programming using problem solving approach, Reema Thareja, Oxford University Press.
ii. Learning Python, Mark Lutz, O'Rielly
iii. Programming Python, Fourth Edition, Mark Lutz, O'Reilly Media.

Reference Books:

i. Introduction to Computation and Programming Using Python with Application to Understanding, John V. Guttag, PHI.
ii. Think Python: How to think like a Computer Scientist, Allen Downey, Green Tea Press
iii. Head First Python: A Brain-Friendly Guide, Second Edition, Paul Barry, O'Reilly
iv. The Python Standard Library, Python 3.6.5 documentation (Web Resource) https://docs.python.org/3/library/

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Open Elective - I		L	T	P	C
		3	0	0	3
SCRIPTING LANGUAGES					

Course Objectives:

i. Introduces scripting languages such as Perl, Ruby, PHP and TCL.
ii. Design, code, and test applications using scripting languages.
iii. An ability to create PHP scripts to store and manipulate user data.

UNIT-I:

Introduction: Ruby, Rails, the structure and Execution of Ruby Programs, Package Management with RUBYGEMS.
Ruby and Web: Writing CGI scripts, cookies, Choice of Web servers, SOAP and web services
Ruby Tk: Simple Tk Application, widgets, Binding events, Canvas, scrolling

UNIT-II:

Introduction to PERL and Scripting:
Scripts and Programs, Origin of Scripting , Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL- Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines.

UNIT-III:

Advanced PERL:
Finer points of looping, pack and unpack, file system, eval, data structures, packages, modules, objects, interfacing to the operating system, Creating Internet ware applications, Dirty Hands Internet Programming, security Issues.
PHP Basics : PHP Basics- Features, Embedding PHP Code in your Web pages, Outputting the data to the browser, Data types, Variables, Constants, expressions, string interpolation, control structures, Function, Creating a Function, Function Libraries, Arrays, strings and Regular Expressions.

UNIT-IV:

Advanced PHP Programming: PHP and Web Forms, Files, PHP Authentication and Methodologies -Hard Coded, File Based, Database Based, IP Based, Login Administration, Uploading Files with PHP, Sending Email using PHP, PHP Encryption Functions, the Mcrypt package and Building Web sites for the World.

UNIT -V:

TCL: Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures, input/output, procedures , strings , patterns, files, Advance TCL, eval, source, exec and uplevel commands, Name spaces, trapping errors, event driven programs, making applications internet aware, Nuts and Bolts Internet Programming, Security Issues, C Interface.
Tk: Visual Tool Kits, Fundamental Concepts of Tk, Tk by example, Events and Binding, Perl-Tk.

Course Outcomes:

i. Acquire programming skills in RUBY scripting language.
ii. Ability to create and run scripts using PERL.
iii. To gain some fluency programming in Perl and PHP and related languages.
iv. To improve knowledge of advanced concepts in PHP.
v. Gain knowledge of the strengths and weakness of Perl, TCL and Ruby; and select an appropriate language for solving a given problem.

Text Books:

i. The World of Scripting Languages, David Barron, Wiley Publications.
ii. Ruby Programming language by David Flanagan and Yukihiro Matsumoto O'Reilly
iii. Beginning PHP and MySQL, 3rd Edition, Jason Gilmore, Apress Publications (Dream tech)

Reference Books:

i. Open Source Web Development with LAMP using Linux, Apache, MySQL, Perl and PHP, J.Lee and B.Ware (Addison Wesley) Pearson Education.
ii. Perl by Example, E.Quigley, Pearson Education.
iii. PHP 6 Fast and Easy Web Development, Julie Meloni and Matt Telles, Cengage Learning Publications.

Open Elective - I		L	T	P	C
		3	0	0	3
PROGRAM ANALYSIS					

Course Objectives:
The objectives of this course is to acquire knowledge on the
i. Classical data flow analysis and its use
ii. Pointer analysis and applications of pointer analysis
iii. Static single assignment form and its application in compiler design

UNIT - I:
Data Flow Analysis: Available expressions analysis, Live variables analysis, Reaching definitions analysis, Anticipable expressions analysis, A taxonomy of data flow analysis, Iterative and worklist based data flow analysis

UNIT - II:
Theoretical Abstractions in Data Flow Analysis: Lattice, flow functions, monotone frameworks, confluence operators, MFP (Maximal Fixed Point)/MOP (Meet over Paths) solution

UNIT - III:
Introduction to inter procedural data flow analysis, Call graph, Functional Approach, Call Strings base method, Value context based inter procedural analysis

UNIT - IV:
Pointer analysis: Introduction, issues in different languages Flow insensitive: Anderson's and Steensgard's approaches
Flow sensitive pointer analysis, context-insensitive vs context sensitive pointer analysis, Generalized Points-to Graph (GPG) based points-to analysis

UNIT - V:
Static Single Assignment Form(SSA):
Definition of SSA, Standard SSA construction and destruction algorithms, sparse data flow analysis.

Course Outcomes:
The students should be able to:
i. Apply data flow analysis techniques to calculate various properties of small programs
ii. Understand the mathematical ideas used in data flow analysis techniques
iii. Apply data flow analysis techniques to calculate various properties of small programs with more than one function
iv. Understanding pointer analysis and its applications
v. Construct static single assignment form for any program

Text Books:

i. Data Flow Analysis: Theory and Practice, Khedker, Sanyal, Karkare, CRC Press 2009.

ii. Advanced Compiler Design and Implementation, Muchnick, Morgan Kaufmann 1997.

Reference Books:

i. Principles of Program Analysis: Nielson, Nielson, Hankin, Springer 2004

ii. Compilers: Principles, Techniques and Tools (2nd Edition), Aho, Lam, Sethi, Ullman, Addison Wesley 2006.

E-resources:

i. SSA-based compiler Design, http://ssabook.gforge.inria.fr/latest/book.pdf

ii. Generalized Points-to Graphs: A Precise and Scalable Abstraction for Points-to Analysis, https://dl.acm.org/doi/abs/10.1145/3382092

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Open Elective - II		L	T	P	C
	OPERATING SYSTEMS	3	0	0	3

Course Objectives:

i. Provide knowledge about the services rendered by operating systems.
ii. Present detail discussion on processes, threads and scheduling algorithms.
iii. Expose the student with different techniques of process synchronization and handling deadlocks.
iv. Discuss various file-system implementation issues and memory management techniques.

Learn mass storage management.

UNIT-I: **Operating Systems Overview:**
Introduction: what is an operating system, Types of operating systems, operating systems concepts, operating systems services, Introduction to System call, System call types, Operating System Generation.

UNIT–II: Process Management:
Process concept: Process Concept, Process Scheduling, Operations on Processes, Inter process Communication.
Multithreaded Programming: Overview, Multithreading models, Threading Issues.

Process scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms.

UNIT-III: Synchronization:
Process Synchronization: The Critical-Section Problem, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization examples.
Principles of deadlock – System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery from Deadlock.

UNIT-IV: Memory Management:
Memory Management strategies: Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table.
Virtual Memory Management: Virtual Memory, Demand Paging, Page-Replacement Algorithms, Thrashing.

UNIT-V: File system Interface-
The concept of a file, Access Methods, Directory and Disk structure, File system mounting.
File System implementation: File system structure, allocation methods, free-space management.
Mass-storage structure: Overview of Mass-storage structure, Disk scheduling, Device drivers.

Course Outcomes:

i. Understand the importance of operating systems and different types of system calls.

ii. Analyze the communication between processes and various process scheduling algorithms.

iii. Understand the process synchronization, different ways for deadlocks handling.

iv. Analyze various memory mapping techniques and different page replacement methods.

v. Evaluate various file allocation and disk scheduling algorithms.

Text Books:

i. Silberschatz A, Galvin P B, and Gagne G, Operating System Concepts, 9th edition, Wiley, 2013.

ii. Tanenbaum A S, Modern Operating Systems, 3rd edition, Pearson Education, 2008. (for Interprocess Communication and File systems).

References:

i. Tanenbaum A S, Woodhull A S, Operating Systems Design and Implementation, 3rd edition, PHI, 2006.

ii. Dhamdhere D M, Operating Systems A Concept Based Approach, 3rd edition, Tata McGraw-Hill, 2012.

iii. Stallings W, Operating Systems -Internals and Design Principles, 6th edition, Pearson Education, 2009.

iv. Nutt G, Operating Systems, 3rd edition, Pearson Education, 2004.

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Open Elective - II		L	T	P	C
		3	0	0	3
COMPUTER NETWORKS					

Course Objectives:

v. To introduce the fundamental various types of computer networks.
vi. To understand state-of-the-art in network protocols, architectures, and applications.
vii. To explore the various layers of OSI Model.
viii. To introduce UDP and TCP Models.

UNIT-I:

Introduction: Network Hardware and software Reference models- The OSI Reference Model- the TCP/IP Reference Model - A Comparison of the OSI and TCP/IP Reference Models, Examples of Networks: Novell Networks, Arpanet, Internet, Network Topologies WAN, LAN, MAN.

Physical Layer: Guided Transmission Media, Digital Modulation and Multiplexing: frequency division multiplexing, wave length division multiplexing, synchronous time division multiplexing, statistical time division multiplexing.

UNIT-II:

The Data Link Layer - Design Issues, Services Provided to the Network Layer – Framing – Error Control – Flow Control, Error Detection and Correction – Error-Correcting Codes – Error Detecting Codes, Elementary Data Link Protocols, Sliding Window Protocols.

Channel allocation methods: TDM, FDM, ALOHA, Carrier sense Multiple access protocols, Collision Free protocols – IEEE standard 802 for LANS – Ethernet, Token Bus, Token ring, Bridges and IEEE 802.11 and 802.16. Data link layer switching, virtual LANs.

UNIT-III:

Network layer Routing Algorithms: Design Issues, Routing Algorithms-Shortest path, Flooding, Flow based Distance vector, Link state, Hierarchical, Broadcast routing, Congestion Control algorithms-General principles of congestion control, Congestion prevention polices, Choke packets, Load shedding, and Jitter Control.

Internet Working : Tunnelling, internetworking, Fragmentation, Network layer in the internet – IP protocols, IP address, Subnets, Internet control protocols, OSPF, BGP, Internet multicasting, Mobile IP, IPV6.

UNIT IV:

The Transport Layer: Elements of transport protocols – addressing, establishing a connection, releasing connection, flow control and buffering and crash recovery, End to end protocols: UDP, Real Time Tran sport Protocol.

The Internet Transport Protocol: TCP- reliable Byte Stream (TCP) end to end format, segment format, connection establishment and termination, sliding window revisited, adaptive retransmission, TCP extension, Remote Procedure Call.

UNIT – V:

Application Layer: WWW and HTTP: Architecture- Client (Browser), Server, Uniform Resource Locator HTTP: HTTP Transaction, HTTP Operational Model and Client/Server Communication**,** HTTP Generic Message Format, HTTP Request Message Format, HTTP Response Message Format.

The Domain Name System: The DNS Name Space, Resource Records, Name Servers, Electronic Mail: Architecture and Services, The User Agent, Message Formats, Message Transfer, Final Delivery.

Course Outcomes:

The students are able to

vi. Understand OSI and TCP/IP reference models with an emphasis to Physical Layer, Data Link Layer and Network Layer.

vii. Analyze the issues related to data link, medium access and transport layers by using channel allocation and connection management schemes.Analyze MAC layer protocols and LAN technologies.

viii. Solve problems related to Flow control, Error control, Congestion control and Network Routing.

ix. Design and compute subnet masks and addresses for networking requirements.

x. Understand how internet works,

Text Books:

i. Data Communications and Networks – Behrouz A. Forouzan, Third Edition TMH.

ii. Computer Networks, 5ed, David Patterson, Elsevier

iii. Computer Networks: Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI

iv.Computer Networks, Mayank Dave, CENGAGE

References:

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

ii. Computer Networks: A Top Down Approach, Behrouz A. Forouzan, FirouzMosharraf, McGraw Hill Education

iii. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education

iv. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson

v. The TCP/IP Guide, by Charles M. Kozierok, Free online Resource, http://www.tcpipguide.com/free/index.htm

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		L	T	P	C
Open Elective - II		**3**	**0**	**0**	**3**

IMAGE PROCESSING

Course Objectives:

i. To become familiar with digital image fundamentals
ii. To get exposed to simple image enhancement techniques in Spatial and Frequency domain
iii. To learn concepts of degradation function and restoration techniques
iv. To study the image segmentation and representation techniques
v. To become familiar with image compression and recognition methods

UNIT- I:
Digital Image Fundamentals: Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels.

UNIT -II:
Image Enhancement: Spatial Domain: Gray level transformations – Histogram processing – Basics of Spatial Filtering– Smoothing and Sharpening Spatial Filtering, Frequency Domain: Introduction to Fourier Transform– Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters, Homomorphic filtering.

UNIT –III:
Image Restoration: Image Restoration - degradation model, Properties, Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering.

UNIT -IV:
Image Segmentation: Edge detection, Edge linking via Hough transform – Thresholding - Region based segmentation – Region growing – Region splitting and merging – Morphological processing- erosion and dilation, Segmentation by morphological watersheds – basic concepts – Dam construction – Watershed segmentation algorithm.

UNIT –V:
Image Compression and Recognition: Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, JPEG standard, MPEG. Boundary representation, Boundary description, Fourier Descriptor, Regional Descriptors – Topological feature, Texture - Patterns and Pattern classes - Recognition based on matching.

Course Outcomes:

At the end of the course, the students will be able to:

i. Know and understand the basics and fundamentals of digital image processing, such as digitization, sampling, quantization, and 2D-transforms
ii. Operate on images using the techniques of smoothing, sharpening and enhancement.
iii. Use the restoration concepts and filtering techniques
iv. Illustrate the basics of segmentation
v. Understand Image Compression and Recognition techniques

Text Books:

i. Rafael C. Gonzalez, Richard E. Woods, Digital Image Processing, Pearson, Third Edition, 2010.

ii. Anil K. Jain, Fundamentals of Digital Image Processing, Pearson, 2002.

Reference Books:

i. Kenneth R. Castleman, Digital Image Processing, Pearson, 2006.
ii. D,E. Dudgeon and RM. Mersereau, Multidimensional Digital Signal Processing, Prentice Hall Professional Technical Reference, 1990.
iii. William K. Pratt, Digital Image Processing, John Wiley, New York, 2002.

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Open Elective-II		L	T	P	C
		3	0	0	3
UNIX & SHELL PROGRAMMING					

Course Objectives:

i. Written technical communication and effective use of concepts and terminology.
ii. Facility with UNIX command syntax and semantics.
iii. Ability to read and understand specifications, scripts and programs.
iv. Individual capability in problem solving using the tools presented within the class. Students will demonstrate a mastery of the course materials and concepts within in class discussions.

UNIT – I: Introduction to unix-Brief History-What is Unix-Unix Components-Using Unix-Commands in Unix-Some Basic Commands-Command Substitution-Giving Multiple Commands.

UNIT - II: Using the Shell-Command Line Structure-Meta characters-Creating New Commands-Command Arguments and Parameters-Program Output as Arguments-Shell Variables- -More on I/O Redirection-Looping in Shell Programs, Branching Control Structures-Loop Control Structures.

UNIT – III:

The File system –The Basics of Files-What's in a File-Directories and File Names-Permissions-I Nodes-The Directory Hierarchy, File Attributes and Permissions-The File Command knowing the File Type-The Chmod Command Changing File Permissions-The Chown Command Changing the Owner of a File-The Chgrp Command Changing the Group of a File.

UNIT – IV: Filters-The Grep Family-Other Filters-The Stream Editor Sed-The AWK Pattern Scanning and processing Language-Good Files and Good Filters.

The Process-Parent and Child Processes-Types of Processes-More about Foreground and Background processes-Internal and External Commands-Process Creation-The Trap Command-The Stty Command-The Kill Command-Job Control. BasicNetworking commands : ping,telnet,netstat,hostname,finger,ifconfig,traceboot

UNIT - V: The Export Command-The Profile File a Script Run During Starting-The First Shell Script-The read Command-Positional parameters-The $? Variable knowing the exit Status-More about the Set Command-The Exit Command-The Continue and Break Statement-The Expr Command: Performing Integer Arithmetic-Real Arithmetic in Shell Programs-The here Document(<<)-The Sleep Command-Debugging Scripts-The Script Command-The Eval Command-The Exec Command.

Course Outcomes:

i. Understand the architecture and features of Unix operating system and distinguish it from other operating system .

ii. Analyse a given problem and apply requisite facets of Shell programming in order to devise a shell script to solve the problem

iii. Apply Unix commands for File handling mechanism and illustrate the changing of File permissions and ownership.

iv. Able to understand the importance of Filters and their need in unix operating system

v. Develop various tasks by using Shell Scripting

Text Books:

i. Unix and shell programmingby **B.M. Harwani**, OXFORD university press.

ii. The Unix programming Environment by Brain W. Kernighan & Rob Pike, Pearson.

iii. Introduction to Unix Shell Programming by M.G.Venkateshmurthy, Pearson.

iv. Unix Network Programming by **Richards Stevens**

Reference Books:

i. Understanding The Linux Kernel(O'Reilly) by **Daniel P. Bovet, Marco Cesati**

ii. Design of UNIX Operating System by **Maurice J. Bach**

iii. Advanced Programming in the UNIX Environment by **Richards Stevens**

		L	T	P	C
Open Elective-II		**3**	**0**	**0**	**3**
FUNDAMENTALS OF CLOUD COMPUTING					

Course Objective:

Cloud Computing is a large scale distributed computing paradigm which has become a driving force for information technology over the past several years. This course introduce cloud computing technology to undergraduate engineering students, so they can learn, apply and use this technology in their future careers.

UNIT-I:

Computing Paradigms: High-Performance Computing, Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing, Bio computing, Mobile Computing, Quantum Computing, Optical Computing, Nano computing..

UNIT-II:

Cloud Computing Fundamentals: Motivation for Cloud Computing, The Need for Cloud Computing, Defining Cloud Computing, Definition of Cloud Computing, Cloud Computing is a Service, Cloud Computing is a Platform, Principles of Cloud computing, Five Essential Characteristics, Four Cloud Deployment Models

UNIT-III:

Cloud Computing Architecture and Management: Cloud architecture, Layer, Anatomy of the Cloud, Network Connectivity in Cloud Computing, Applications on the Cloud, Managing the Cloud, Managing the Cloud Infrastructure, Managing the Cloud Application, Migrating Application to Cloud, Phases of Cloud Migration Approaches for Cloud Migration.

UNIT-IV:

Cloud Service Models: Infrastructure as a Service, Characteristics of IaaS. Suitability of IaaS, Pros and Cons of IaaS, Summary of IaaS Providers, Platformas a Service, Characteristics of PaaS, Suitability of PaaS, Pros and Cons of PaaS, Summary of PaaS Providers, Software as a Service, Characteristics of SaaS, Suitability of SaaS, Pros and Cons of SaaS, Summary of SaaS Providers, Other Cloud Service Models.

UNIT-V:

Cloud Providers and Applications: EMC, EMC IT, Captiva Cloud Toolkit, Google Cloud Platform, Cloud Storage, Google Cloud Connect, Google Cloud Print, Google App Engine, Amazon Web Services, Amazon Elastic Compute Cloud, Amazon Simple Storage Service, Amazon Simple Queue service, Microsoft, Windows Azure, Microsoft Assessment and Planning Toolkit, SharePoint, IBM, Cloud Models, IBM Smart Cloud, SAP Labs, SAP HANA Cloud Platform, Virtualization Services Provided by SAP, Sales force, Sales Cloud, Service Cloud: Knowledge as a Service, Rackspace, VMware, Manjra soft, Aneka Platform**.**

Course Outcomes

Upon completion of the course, it is expected that student will be able to:

i. Understand and analyze different computing paradigms
ii. Understand the basics of cloud computing and different cloud deployment models.
iii. Understand different cloud implementation and management strategies.
iv. Understand and evaluate different cloud service models.
v. Identify, analyze and use different cloud services/applications/tools available from key cloud providers.

Text Book:

i. Essentials of Cloud Computing, K. Chandrasekhran, CRC press.

Reference Books:

i. Cloud Computing: Principles and Paradigms, Rajkumar Buyya, James Broberg and Andrzej M. Goscinski, Wiley.
ii. Distributed and Cloud Computing, Kai Hwang, Geoffery C. Fox, Jack J. Dongarra, Elsevier.
iii. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Tim Mather, SubraKumaraswamy, ShahedLatif, O'Reilly.

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		L	T	P	C
OPEN ELECTIVE- II		**3**	**0**	**0**	**3**
FUNDAMENTALS OF INFORMATION SECURITY					

Course Objective:
The objective of this course is to introduce information security concepts to undergraduate engineering students, so they can defend their personal and organizational information from probable security attacks and incidents.

UNIT-I:
Introduction to Security: Challenges of Securing Information, Definition of Information Security, Attackers, Attacks and Defenses.
Systems Threats and Risks: Software-Based Attacks, Hardware-Based Attacks, Attacks on Virtualized Systems, Hardening the Operating System, Preventing Attacks that Target the Web Browser, Hardening Web Servers, Protecting Systems from Communications-Based Attacks, Applying Software Security Applications.

UNIT-II:
Network Vulnerabilities and Attacks: Network Vulnerabilities, Categories of Attacks, Methods of Network Attacks.
Network Defences: Crafting a Secure Network, Applying Network Security Devices, Host and Network Intrusion Prevention Systems (HIPS/NIPS), Protocol Analyzers, Internet Content Filters, Integrated Network Security Hardware.

UNIT-III:
Access Control: Access Control Models and Practices, Logical Access Control Methods, Physical Access Control.
Authentication: Definition of Authentication, Authentication Credentials, Extended Authentication Protocols, Remote Authentication and Security.

UNIT-IV:
Vulnerability Assessment: Risk Management, Assessment, and Mitigation, Identifying Vulnerabilities.
Security Audit: Privilege Auditing, Usage Auditing, Monitoring Methodologies and Tools.

UNIT-V:
Cryptography: Introduction to Cryptography, Cryptographic Algorithms, Using Cryptography on Files and Disks, Digital Certificates, Public Key Infrastructure, Key Management.

Course Outcomes

Upon completion of the course, it is expected that student will be able to:

i. Understand the basics and need for information security

ii. Identify, analyze, and evaluate infrastructure and network vulnerabilities.

iii. Understand and analyze different access control and authentication methods.

iv. Identify and assess current and anticipated security risks and vulnerabilities with vulnerability assessment and auditing methods.

v. Learn the fundamentals of cryptography and how cryptography serves as the central language of information security..

Text Book:

Security+ Guide to Network Security Fundamentals, Third Edition, Mark Ciampa, Cengage Learning.

Reference Books:

i. Principles of Information Security, Michael E. Whitman and Herbert J. Mattord, Cengage Learning.

ii. Information Security: The Complete Reference, Rhodes-Ousley, Mark, Second Edition, McGraw-Hill.

iii. Information Security: Principles and Practices, Mark S. Merkow, Jim Breithaupt, 2nd Edition, Pearson Education

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Open Elective - III		L	T	P	C
		3	0	0	3
BIG DATA ANALYTICS					

COURSE OBJECTIVES:

i. Understand the Big Data Platform and its Use cases
ii. Provide an overview of Apache Hadoop
iii. Provide HDFS Concepts and Interfacing with HDFS
iv. Understand Map Reduce Jobs
v. Provide hands on Hodoop Eco System
vi. Apply analytics on Structured, Unstructured Data.

Pre- requisites : Should have knowledge of one Programming Language (Java preferably), Practice of SQL (queries and sub queries), exposure to Linux Environment.

UNIT -I : INTRODUCTION TO BIG DATA AND HADOOP:

Types of Digital Data, Introduction to Big Data, Big Data Analytics, History of Hadoop, Apache Hadoop, Analysing Data with Unix tools, Analysing Data with Hadoop, Hadoop Streaming, Hadoop Echo System, IBM Big Data Strategy, Introduction to Infosphere BigInsights and Big Sheets.

UNIT-II: Working with Big Data

Google File System, Hadoop Distributed File System (HDFS) – Building blocks of Hadoop (Namenode, Datanode, Secondary Namenode, JobTracker, TaskTracker), Introducing and Configuring Hadoop cluster (Local, Pseudo-distributed mode, Fully Distributed mode), Configuring XML files.

UNIT-III: Map Reduce

Writing MapReduce Programs: Anatomy of a Map Reduce Job Run ,A Weather Dataset,
Basic programs of Hadoop MapReduce: Driver code, Mapper code, Reducer code, RecordReader, Combiner, Partitioner

UNIT-IV: Pig
Hadoop Programming Made Easier

Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin

UNIT-V:

Applying Structure to Hadoop Data with Hive

Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data

Course Outcomes:

The students will be able to:

i. Identify Big Data and its Business Implications.
ii. List the components of Hadoop and Hadoop Eco-System
iii. Access and Process Data on Distributed File System and Manage Job Execution in Hadoop Environment
iv. Develop Big Data Solutions using Hadoop Eco System
v. Develop Big Data Solutions using Hadoop Eco System

Text Books:

i. Tom White " Hadoop: The Definitive Guide" Third Edit on, O'reily Media, 2012.
ii. Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015. References
iii. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.

Reference Books:

i. Jay Liebowitz, "Big Data and Business Analytics" Auerbach Publications, CRC press (2013)
ii. Tom Plunkett, Mark Hornick, "Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop", McGraw-Hill/Osborne Media (2013), Oracle press.
iii. Anand Rajaraman and Jef rey David Ulman, "Mining of Massive Datasets", Cambridge University Press, 2012.
iv. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons, 2012.
v. Glen J. Myat, "Making Sense of Data", John Wiley & Sons, 2007
vi. Pete Warden, "Big Data Glossary", O'Reily, 2011.
vii. Michael Mineli, Michele Chambers, Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley Publications, 2013.
viii. ArvindSathi, "BigDataAnalytics: Disruptive Technologies for Changing the Game", MC Press, 2012
ix. Paul Zikopoulos ,Dirk DeRoos , Krishnan Parasuraman , Thomas Deutsch , James Giles , David Corigan , "Harness the Power of Big Data The IBM Big Data Platform ", Tata McGraw Hill Publications, 2012.

		L	T	P	C
OPEN ELECTIVE-III		**3**	**0**	**0**	**3**
BLOCKCHAIN TECHNOLOGY					

Course Objectives:

i. To provide conceptual understanding of the function of Blockchain as a method of securing distributed ledgers.
ii. To understand the structure of a Blockchain and why/when it is better than a simple distributed database
iii. To make students understand the technological underpinnings of Blockchain operations as distributed data structures and decision making systems.
iv. To understand a "smart" contract and its legal implications.

UNIT-I:

Introduction: History and basics, Types of Blockchain, Consensus, CAP Theorem.
Cryptographic Hash Functions: Properties of hash functions, Secure Hash Algorithm, Merkle trees, Patricia trees.

UNIT-II:

Decentralization: Decentralization using Blockchain, Methods of decentralization, decentralization framework, Blockchain and full ecosystem decentralization, Smart contracts, Decentralized Organizations, Platforms for decentralization.

UNIT-III:

Bitcoin: Introduction to Bitcoin, Digital keys and addresses, Transactions, Blockchain, The Bitcoin network, Bitcoin payments, Bitcoin Clients and APIs, Alternatives to Proof of Work, Bitcoin limitations.

UNIT-IV:

Etherium: Smart Contracts, Introduction to Ethereum, The Ethereum network, Components of the Ethereum ecosystem, Blocks and Blockchain, Fee schedule, Ethereum Development Environment, Solidity.

UNIT-V:

Hyperledger: Introduction, Hyperledger Projects, Protocol, Architecture, Hyperledger Fabric, Sawtooth Lake, Corda.
Challenges and Opportunities: Scalability, Privacy, Blockchain for IoT, Emerging trends
.

Course Outcomes:
Upon completion of the course, it is expected that student will be able to:

i. Define and explain the fundamentals of Blockchain.
ii. Understand decentralization and the role of Blockchain in it.
iii. Understand and analyze Bitcioin Cryptocurrency and underlying Blockchain network.
iv. Understand Etherium currency and platform, and develop applications using Solidity.
v. Understand Hyperledger project and its components; critically analyze the challenges and future opportunities in Blockchain technology.

Text Book:

i. Mastering Blockchain, Imran Bashir, Second Edition, Packt Publishing.

Reference Books:

i. Mastering Bitcoin: Unlocking Digital Cryptocurrencies, Andreas Antonopoulos, O'Reilly.
ii. Blockchain Blueprint for a New Economy, Melanie Swan, O'Reilly.
iii. Mastering Bitcoin: Programming the Open Blockchain, Antonopoulos, Andreas M. O'Reilly.
iv. Blockchain Technology: Cryptocurrency and Applications, S. Shukla, M. Dhawan, S. Sharma, S. Venkatesan, Oxford University Press.

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Open Elective - III		L	T	P	C
		3	0	0	3
CYBER SECURITY					

Course Objectives:

In this course, the student will learn about the essential building blocks and basic concepts around cyber security such as Confidentiality, Integrity, Availability, Authentication, Authorization, Vulnerability, Threat & Risk and so on.

UNIT –I:

Introduction: Introduction to Computer Security, Threats, Harm, Vulnerabilities, Controls, Authentication, Access Control, and Cryptography, Authentication, Access Control, Cryptography.

Programs and Programming: Unintentional (Non-malicious) Programming Oversights, Malicious Code—Malware, Countermeasures.

UNIT –II:

Web Security: User Side, Browser Attacks, Web Attacks Targeting Users, Obtaining User or Website Data, Email Attacks.

Operating Systems Security: Security in Operating Systems, Security in the Design of Operating Systems, Rootkit.

UNIT -III:

Network Security: Network Concepts, Threats to Network Communications, Wireless Network Security, Denial of Service, Distributed Denial-of-Service Strategic Defenses: Security Countermeasures, Cryptography in Network Security, Firewalls, Intrusion Detection and Prevention Systems, Network Management .

Cloud Computing and Security: Cloud Computing Concepts, Moving to the Cloud, Cloud Security Tools and Techniques, Cloud Identity Management, Securing IaaS.

UNIT- IV:

Privacy: Privacy Concepts, Privacy Principles and Policies, Authentication and Privacy, Data Mining, Privacy on the Web, Email Security, Privacy Impacts of Emerging Technologies, Where the Field Is Headed.

Management and Incidents: Security Planning, Business Continuity Planning, Handling Incidents, Risk Analysis, Dealing with Disaster.

UNIT –V:

Legal Issues and Ethics: Protecting Programs and Data, Information and the Law, Rights of Employees and Employers, Redress for Software Failures, Computer Crime, Ethical Issues in Computer Security, Incident Analysis with Ethics Emerging Topics: The Internet of Things, Economics, Computerized Elections, Cyber Warfare.

Course Outcomes:

At the end of the course, the students will be able to:

i. Illustrate the broad set of technical, social & political aspects of Cyber Security and
ii. security management methods to maintain security protection
iii. Appreciate the vulnerabilities and threats posed by criminals, terrorist and nation states to national infrastructure
iv. Illustrate the nature of secure software development and operating systems
v. Demonstrate the role security management plays in cyber security defense and legal and social issues at play in developing solutions

Text Books:

i. Pfleeger, C.P., Security in Computing, Prentice Hall, 2010, 5th edition.
ii. Schneier, Bruce. Applied Cryptography, Second Edition, John Wiley & Sons, 1996

Reference Books:

i. Rhodes-Ousley, Mark. Information Security: The Complete Reference, Second Edition, Information Security Management: Concepts and Practice, McGraw-Hill, 2013.
ii. Whitman, Michael E. and Herbert J. Mattord. Roadmap to Information Security for IT and Infosec Managers. Boston, MA: Course Technology, 2011.

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Open Elective - III		**3**	**0**	**0**	**3**
WEB SERVICES					

Course Objective:

To understand the concept of XML and to implement Web services using XML based standards

UNIT-I:

INTRODUCTION TO HTML5: New HTML5 Form input Types, Introduction to Cascading Style Sheets: Part 1: Inline Styles, Embedded Style Sheets, Conflicting Styles, and Linking External Style Sheets (Text Book: 1)

JAVA SCRIPT: Introduction to scripting, Control Structures-I, Control Structures-II, Functions, Arrays, Objects. (Text Book: 1).

UNIT-II :

XML: Introduction, XML Basics, Structuring Data, XML Namespaces, Document Type Definitions (DTDs), W3C XML Schema Documents, XML Vocabularies, Extensible Style sheet Language and XSL Transformations, Document Object Model (DOM): Objects and Collections (Text Book : 1).

UNIT-III:

JDBC AND SERVLETS: DATABASE ACCESS: Overview of JDBC, JDBC Drivers, Connecting to a Database, theStatement Interfaces, Result Sets, Using Metadata (Text Book: 3)

SERVLETS: The Life Cycle of a Servlet, Using Tomcat for Servlet Development, A Simple Servlet, The Servlet API, The javax.servlet Package , Reading Servlet Parameters, The javax.servlet.http Package, Handling HTTP Requests and Responses, Cookies, Session Tracking. (Text Book : 2).

UNIT-IV: JSP:

JSP Overview, How JSP Works , A Basic Example, JSP Syntax and Semantics: The JSP Development Model, Components of a JSP Page: Directives, Comments, Expressions, Scriptlets, Declarations, implicit objects, Standard Actions, Tag Extensions, A Complete Example (Text Book: 3).

Expressions, Scriptlets, Expression and Scriptlet Handling by the JSP Container, Implicit Objects and the JSP Environment, Initialization Parameters, Request Dispatching: Anatomy of Request Processing, include Directive, The Action, Forwarding Requests, RequestDispatcherObject (Text Book:3).

UNIT-V: PHP:

Introduction, Simple PHP Program, Converting Between Data Types, Arithmetic Operators, Initializing and Manipulating Arrays, String Comparisons, String Processing with Regular Expressions, Form Processing and Business Logic, Reading from a Database (Text Book: 1)

AJAX: Traditional Web Applications vs. Ajax Applications, Rich Internet Applications (RIAs) with Ajax, History of Ajax, Ajax Example Using the XML, HttpRequest Object, Using XML and the DOM. (Reference Book: 6)

Course Outcomes: At the end of the Course, the Student will be able to:

i. Describe and explain the relationship among HTML, XHTML, CSS, JavaScript, XML and other web technologies.
ii. Create and publish advanced HTML pages with the help of frames, scripting languages, and CSS.
iii. Understand and use JavaScript variables, control structures, functions, arrays, and objects. Understand and develop XML Technologies such as XML Schemas, XSLT.
iv. Understand and develop Server-Side Programming using Servlets and JSP's.
v. Develop web pages using AJAX and PHP

Text Books:

i. Dietel and Dietel : "Internet and World Wide Web – How to Program", 5th Edition, PHI/Pearson Education, 2011
ii. Herbert Schildt, "The complete Reference Java 2", 9th Edition, TMH, 2014.
iii. Phil Hanna: "The Complete Reference JSP", 2nd Edition, TMH, 2008.

References:

i. Hans Bergsten : "Java Server Pages", 3rdEdition, O'Reillypublication, 2008.
ii. Raj Kamal, "Internet & Web technologies", 8th Edition, Tata McGraw-Hill, 2007.
iii. Chris Bates, "Web Programming, building internet applications", 2ndEdition, WILEY, Dreamtech, 2008.
iv. Xavier. C, "Web technology and design", 1stEdition, New Age International, 2011.
v. Marty Hall and Larry Brown, "Core servlets and java Server pages volume 1: core technologies", 2nd Edition, Pearson Education, 2007.
vi. Thomas A Powel, "The Complete Reference: AJAX", 1st Edition, Tata McGraw Hill, 2008.

Web References:

i. www.w3schools.com
ii. www.tutorialspoint.com

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Open Elective - III		**3**	**0**	**0**	**3**
QUANTUM COMPUTING					

Course Objectives:

This course teaches the fundamentals of quantum information processing, including quantum computation, quantum cryptography, and quantum information theory.

UNIT –I:
Introduction: Quantum Measurements Density Matrices, Positive-Operator Valued Measure, Fragility of quantum information: Decoherence, Quantum Superposition and Entanglement, Quantum Gates and Circuits.

UNIT –II:
Quantum Basics and Principles: No cloning theorem & Quantum Teleportation, Bell's inequality and its implications, Quantum Algorithms & Circuits.

UNIT -III:
Algorithms: Deutsch and Deutsch–Jozsa algorithms, Grover's Search Algorithm, Quantum Fourier Transform, Shore's Factorization Algorithm.

UNIT –IV:
Performance, Security and Scalability: Quantum Error Correction: Fault tolerance; Quantum Cryptography, Implementing Quantum Computing: issues of fidelity; Scalability in quantum computing.

UNIT -V:
Quantum Computing Models: NMR Quantum Computing, Spintronics and QED MODEL, Linear Optical MODEL, Nonlinear Optical Approaches; Limits of all the discussed approaches, Future of Quantum computing.

Course Outcomes:

By the end of this course, the student is able to

i. Analyze the behaviour of basic quantum algorithms
ii. Implement simple quantum algorithms and information channels in the quantum circuit model
iii. Simulate a simple quantum error-correcting code
iv. Prove basic facts about quantum information channels
v. Know about Quantum Computing Models

Text Books:

i. Eric R. Johnston, Nic Harrigan, Mercedes and Gimeno-Segovia "Programming Quantum Computers: Essential Algorithms And Code Samples, SHROFF/ O'Reilly.
ii. Dr. Christine Corbett Moran, Mastering Quantum Computing with IBM QX: Explore the world of quantum computing using the Quantum Composer and Qiskit, Kindle Edition Packt
iii. V.K Sahni, Quantum Computing (with CD), TATA McGrawHill.

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		L	T	P	C
Open Elective - III		**3**	**0**	**0**	**3**
MEAN STACK TECHNOLOGIES					

Course Objectives:
From the course the student will learn

i. Translate user requirements into the overall architecture and implementation of new systems and Manage Project and coordinate with the Client
ii. Writing optimized front end code HTML and JavaScript
iii. Monitor the performance of web applications & infrastructure and Troubleshooting web application with a fast and accurate a resolution
iv. Design and implementation of Robust and Scalable Front End Applications

UNIT- I:
Introduction to Web: Internet and World Wide Web, Domain name service, Protocols: HTTP, FTP, SMTP. Html5 concepts, CSS3, Anatomy of a web page. XML: Document type Definition, XML schemas, Document object model, XSLT, DOM and SAX Approaches.

UNIT -II:
JavaScript: The Basic of JavaScript: Objects, Primitives Operations and Expressions, Control Statements, Arrays, Functions, Constructors, Pattern Matching using Regular Expressions. Angular Java Script Angular JS Expressions: ARRAY, Objects, $eval, Strings, Angular JS Form Validation & Form Submission, Single Page Application development using Angular JS.

UNIT –III:
Node.js: Introduction, Advantages, Node.js Process Model, Node JS Modules. Express.js: Introduction to Express Framework, Introduction to Nodejs , What is Nodejs, Getting Started with Express, Your first Express App, Express Routing, Implementing MVC in Express, Middleware, Using Template Engines, Error Handling , API Handling , Debugging, Developing Template Engines, Using Process Managers, Security & Deployment.

UNIT -IV:
RESTful Web Services: Using the Uniform Interface, Designing URIs,
Web Linking, Conditional Requests. React Js: Welcome to React, Obstacles and Roadblocks, React's Future, Keeping Up with the Changes, Working with the Files, Pure React, Page Setup, The Virtual DOM, React Elements, ReactDOM, Children, Constructing Elements with Data, React Components, DOM Rendering, Factories.

UNIT –V:
Mongo DB: Introduction, Architecture, Features, Examples, Database Creation & Collection in Mongo DB. Deploying Applications: Web hosting & Domains, Deployment Using Cloud Platforms.

Course Outcomes:

After the completion of the course, student will be able to

i. Enumerate the Basic Concepts of Web & Markup Languages
ii. Develop web Applications using Scripting Languages & Frameworks
iii. Make use of Express JS and Node JS frameworks
iv. Illustrate the uses of web services concepts like restful, react js
v. Apply Deployment Techniques & Working with cloud platform

Text Books:

i. Programming the World Wide Web, Robet W Sebesta, 7ed, Pearson.
ii. Web Technologies, Uttam K Roy, Oxford
iii. Pro Mean Stack Development, ELadElrom, Apress
iv. Restful Web Services Cookbook, Subbu Allamraju, O'Reilly
v. JavaScript & jQuery the missing manual, David sawyer mcfarland, O'Reilly
vi. Web Hosting for Dummies, Peter Pollock, John Wiley Brand

Reference Books:

i. Ruby on Rails up and Running, Lightning fast Web development, Bruce Tate, Curt Hibbs, Oreilly (2006).
ii. Programming Perl, 4ed, Tom Christiansen, Jonathan Orwant, Oreilly (2012).
iii. Web Technologies, HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech.
iv. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning.
v. Express.JS Guide,The Comprehensive Book on Express.js, Azat Mardan, Lean Publishing.

e-Resources:

i. http://www.upriss.org.uk/perl/PerlCourse.html

B. Tech (Computer Science and Engineering) - R19 Syllabus

University College of Engineering Vizianagaram
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

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Open Elective - III		**3**	**0**	**0**	**3**
DEVOPS					

Course Objectives:

i. DevOps improves collaboration and productivity by automating infrastructure and workflows and continuously measuring applications performance.

UNIT –I:
Phases of Software Development life cycle. Values and principles of agile software development.

UNIT -II:
Fundamentals of DevOps: Architecture, Deployments, Orchestration, Need, Instance of applications, DevOps delivery pipeline, DevOps eco system.

UNIT –III:
DevOps adoption in projects: Technology aspects, Agiling capabilities, Tool stack implementation, People aspect, processes.

UNIT -IV:
CI/CD: Introduction to Continuous Integration, Continuous Delivery and Deployment , Benefits of CI/CD, Metrics to track CICD practices

UNIT –V:
Devops Maturity Model: Key factors of DevOps maturity model, stages of Devops maturity model, DevOps maturity Assessment

Course Outcomes:
At the end of the course, student will be able to

i. Enumerate the principles of continuous development and deployment, automation of configuration management, inter-team collaboration, and IT service agility
ii. Describe DevOps & DevSecOps methodologies and their key concepts
iii. Illustrate the types of version control systems, continuous integration tools, continuous monitoring tools, and cloud models
iv. Set up complete private infrastructure using version control systems and CI/CD tools
v. Know about DevOps maturity model.

Text Books:

i. The DevOps Handbook: How to Create World-Class Agility, Reliability, and Security in Technology Organizations, Gene Kim , John Willis , Patrick Debois , Jez Humb,1st Edition, O'Reilly publications, 2016.
ii. What is Devops? Infrastructure as code, 1st Edition, Mike Loukides ,O'Reilly publications, 2012.

Reference Books:

i. Building a DevOps Culture, 1st Edition, Mandi Walls, O'Reilly publications, 2013.
ii. The DevOps 2.0 Toolkit: Automating the Continuous Deployment Pipeline With Containerized Microservices, 1st Edition, Viktor Farcic, CreateSpace Independent Publishing Platform publications, 2016
iii. Continuous Delivery: Reliable Software Releases Through Build, Test, and Deployment Automation, 1st Edition, Jez Humble and David Farley, 2010.
iv. Achieving DevOps: A Novel About Delivering the Best of Agile, DevOps.