COURSE STRUCTURE FOR INFORMATION TECHNOLOGY

(Applicable for batches admitted from 2020 - 2021)

UNIVERSITY COLLEGE OF ENGINEERING VIZIANAGARAM (A)
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA - 533 003, Andhra Pradesh, India

UNIVERSITY COLLEGE OF ENGINEERING VIZIANAGARAM
JAWAHARLAL NEHRU TECHNOLOGIAL UNIVERSITY KAKINADA

INFORMATION TECHNOLOGY (IT)

R 20 Course Structure

I B. Tech I Semester

S. No	Course Code	Course Title	L	T	P	C
1	R2011BS01	Calculus and Differential Equations	3	0	0	3
2	R2011BS04	Applied Physics	3	0	0	3
3	R2011ES15	Problem solving and Programming using C	3	0	0	3
4	R2011ES16	Computer Engineering Workshop	1	0	4	3
5	R2011HS01	Communicative English	3	0	0	3
6	R2011HS01A	English Communication Skills Lab	0	0	3	1.5
7	R2011BS04A	Applied Physics lab	0	0	3	1.5
8	R2011ES15A	Problem solving and Programming using C Lab	0	0	3	1.5
9	R2011MC01	Environmental Science	2	0	0	0

Total = 19.5

Category	Credits
Basic Science Course	7.5
Engineering Science Courses	7.5
Humanities & Social Science	4.5
Total Credits	19.5

I B. Tech II Semester

S. No	Course Code	Course Title	L	T	P	C
1	R2012BS02	Linear Algebra and Numerical Methods	3	0	0	3
2	R2012BS06	Applied Chemistry	3	0	0	3
3	R2012ES20	Computer Organization & Architecture	3	0	0	3
4	R2012ES21	Data Structures	3	0	0	3
5	R2012ES22	Python Programming	1	0	4	3
6	R2012BS06A	Applied Chemistry Lab	0	0	3	1.5
7	R2012ES21A	Data Structures Lab	0	0	3	1.5
8	R2012ES20A	Digital Systems Lab	0	0	3	1.5

Total= 19.5

Category	Credits
Basic Science Course	7.5
Engineering Science Courses	7.5+4.5=12
Humanities & Social Science	00
	19.5

II YEAR – I SEMESTER COURSE STRUCTURE:

II YEAR –I SEMESTER						
S.No	**Course Code**	**Courses**	**L**	**T**	**P**	**C**
1	R2021BS02	Mathematical Foundations of Computer Science	3	0	0	3
2	R202112PC01	Java Programming	3	0	0	3
3	R202112PC02	Advanced Data Structures	3	0	0	3
4	R202112PC03	Database Management Systems	3	0	0	3
5	R202112PC04	Principles of Programming Languages	3	0	0	3
6	R202112PC01A	Java Programming LAB	0	0	3	1.5
7	R202112PC02A	Advanced Data Structures LAB	0	0	3	1.5
8	R202112PC03A	Database Management Systems Lab	0	0	3	1.5
9	R202112SC01	Web Designing (Skill Oriented Lab)	1	0	2	2
10	R2021MC01	Constitution of India	2	0	0	0
		Total				21.5

Category	**CREDITS**
Basic Science course	3
Professional core Courses	16.5
Skill oriented course*	2
TOTAL CREDITS	**21.5**

II YEAR –II SEMESTER						
S.No	**Course Code**	**Courses**	**L**	**T**	**P**	**C**
1	R202212BS01	Probability and Statistics	3	0	0	3
2	R202212ES01	Principles of Software Engineering	3	0	0	3
3	R202212PC01	Computer Networks	3	0	0	3
4	R202212PC02	Operating Systems	3	0	0	3
5	R2022HS01	Managerial economics and financial analysis	3	0	0	3
6	R202212ES01A	Software Engineering Lab	0	0	3	1.5
7	R202212PC01A	Computer Networks LAB	0	0	3	1.5
8	R202212PC02A	Operating Systems Lab	0	0	3	1.5
9	R202212SC01	Data Exploration(Skill Oriented Lab)	1	0	2	2
		Total				21.5
Internship 2 Months (Mandatory) during summer vacation						
Honors courses (The hours distribution can be 3-0-2 or 3-1-0 also) **1.Data Communication** **2.Ethical Hacking** **3.Biometric Systems** **4.Data Visualization** **5. 02 MOOCS courses @ 2credits each** **(Any CSE/IT related Program Core subject from NPTEL/ SWAYAM course of 8 weeks (2 credits) other than the courses listed above needs to be taken)**			**3**	**1**	**0**	**4**
Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also) **1.Java Programming** **2.Database Management Systems** **3.Principles of Software Engineering** **4.Web Designing** **5. 02 MOOCS courses @ 2credits each** **(Any CSE/IT related Program Core subject from NPTEL/ SWAYAM course of 8 weeks (2 credits) other than the courses listed above needs to be taken)**			**3**	**1**	**0**	**4**

Category	**CREDITS**
Basic Science Courses	3
Professional core Courses	9
Engineering Science Courses	4.5
Skill oriented course*	2
Humanities and Social Sciences	3
TOTAL CREDITS	**21.5**

III YEAR I SEMESTER						
S.No	**Course Code**	**Courses**	**L**	**T**	**P**	**C**
1	R203112PC01	Design And Analysis of Algorithms	3	0	0	3
2	R203112PC02	Data Warehousing & Data Mining	3	0	0	3
3	R203112PC03	Artificial Intelligence	3	0	0	3
4	R203112OE01	**Open Elective Course/Job oriented elective:** 1. Full Stack Technologies 2. R-Programming 3. Scripting Languages	2	0	2	3
5	R203112PE01	**Professional Elective courses:** 1. Principles of Cyber Security 2. Virtual Reality 3. Parallel Programming	3	0	0	3
6	R203112PC01A	Data Mining Lab with R/Python/OCTAVE	0	0	3	1.5
7	R203112PC02A	AI Tools & Techniques Lab	0	0	3	1.5
8	R203112SC01	Unified Modeling Language (UML) Lab(Skill Oriented Lab)	1	0	2	2
9	R2031MC01	Professional Ethics and Human Values	2	0	0	0
Summer Internship 2 Months (Mandatory) after second year (to be evaluated during V semester				0	0	1.5
Total						**21.5**
Honors courses (The hours distribution can be 3-0-2 or 3-1-0 also) **1.TCP/IP Protocol Suite** **2.Information Security** **3.Pattern Recognition** **4.Data Analytics** **5. 02 MOOCS courses @ 2credits each** **(Any CSE/IT related Program Core subject from NPTEL/ SWAYAM course of 8 weeks (2 credits) other than the courses listed above needs to be taken)**			3	1	0	4
Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also) **1. Multimedia & Animation** **2. Mobile Application Development** **3. R Programming** **4. Python Programming** **5. 02 MOOCS courses @ 2credits each** **(Any CSE/IT related Program Core subject from NPTEL/ SWAYAM course of 8 weeks (2 credits) other than the courses listed above needs to be taken)**			**3**	**1**	**0**	**4**

Category	**CREDITS**
Professional core Courses	12
Professional Elective courses	3
Open Elective Course/Job oriented elective	3
Skill advanced course/ soft skill course*	2
Summer Internship	1.5
TOTAL CREDITS	**21.5**

III YEAR II SEMESTER						
S.No	**Course Code**	**Courses**	**L**	**T**	**P**	**C**
1	R203212PC01	Advanced Java Programming	3	1	0	3
2	R203212PC02	Automata & Compiler Design	3	0	0	3
3	R203212PC03	Cryptography & Network Security	3	0	0	3
4	R203212OE01	**Professional Elective courses:** 1.Machine Learning 2.Wireless Sensor Based Networks 3.Human Computer Interaction	3	0	0	3
5	R203212PE01	**Open Elective Course/Job oriented elective:** 1.Basics of AWS Framework 2.Mobile Application Development 3.NoSQL Databases	2	0	2	3
6	R203212PC01A	Advanced Java Programming Lab	0	0	3	1.5
7	R203212PC02A	Multimedia & Animation Lab	0	0	3	1.5
8	R203212PC03A	Cryptography & Network Security Lab	0	0	3	1.5
9	R203212SC01	Advanced Communication Skills Lab	**1**	**0**	**2**	**2**
10	R2032MC01	Intellectual Property Rights and Patents	2	0	0	0
Total Credits						**21.5**
Honors courses (The hours distribution can be 3-0-2 or 3-1-0 also) **1.Embedded Systems** **2.Internet Technologies/Block chain Technologies** **3.Speech Processing** **4.Information Retrieval Systems** **5. 02 MOOCS courses @ 2credits each** **(Any CSE/IT related Program Core subject from NPTEL/ SWAYAM course of 8 weeks (2 credits) other than the courses listed above needs to be taken)**			**3**	1	0	**4**
Industrial/Research Internship (Mandatory) 2 Months during summer vacation						
Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also) **1.Soft Computing** **2.Machine Learning** **3.Python Programming** **4. Neural Networks** **5. 02 MOOCS courses @ 2credits each** **(Any CSE/IT related Program Core subject from NPTEL/ SWAYAM course of 8 weeks (2 credits) other than the courses listed above needs to be taken)**			**3**	**1**	**0**	**4**

Category	**CREDITS**
Professional core courses	13.5
Professional Elective courses	3
Open Elective Course/Job oriented elective	3
Skill advanced course/ soft skill course*	2
Mandatory course (AICTE)	0
Industrial/Research Internship (Mandatory) 2 Months	-
TOTAL CREDITS	**21.5**

S.No	Course Code	Courses	L	T	P	C
1	R204112PE01	**Professional Elective courses** 1. Social Media Analytics 2. Block Chain Technologies 3. Software Project Management & Quality Assurance	3	0	0	3
2	R204112PE02	**Professional Elective courses** 1. Internet Of Things 2. Distributed Systems 3. Image Processing	3	0	0	3
3	R204112PE03	**Professional Elective courses** 1.Cloud Computing 2. Recommender Systems 3.Soft Computing	3	0	0	3
4	R204112OE01	**Open Elective Courses/ Job oriented elective(theory+lab)** 1.Advanced python Programming 2. Deep Learning 3. Web Technologies	2	0	2	3
5	R204112OE02	**Open Elective Courses/ Job oriented elective(theory+lab)** 1. Network Programming 2.Big Data Technologies 3. Data Science	2	0	2	3
6	R204112HS01	Management and Organization Behavior	**3**	**0**	**0**	**3**
7	R204112SC01	Employability Skills	1	0	2	2
Industrial/Research Internship 2 Months (Mandatory) after third year (to be evaluated during VII semester			0	0	0	3
		Total credits				**23**
Honors courses (The hours distribution can be 3-0-2 or 3-1-0 also) **1.Wireless Network Technologies** **2.Digital Forensics** **3.Computer Vision** **4. Natural Language Processing** **5. 02 MOOCS courses @ 2credits each** **(Any CSE/IT related Program Core subject from NPTEL/ SWAYAM course of 8 weeks (2 credits) other than the courses listed above needs to be taken)** **Minors courses (The hours distribution can be 3-0-2 or 3-1-0 also)** **Honors courses (The hours distribution can be 3-0-2 or 3-1-0 also)** **1.Data Science** **2.Internet of Everything** **3.Sensor Networks/ Pattern Recognition** **4.Digital Marketing** **5. 02 MOOCS courses @ 2credits each** **(Any CSE/IT related Program Core subject from NPTEL/ SWAYAM course of 8 weeks (2 credits) other than the courses listed above needs to be taken)** **5. 02 MOOCS courses @ 2credits each** **(Any CSE/IT related Program Core subject from NPTEL/ SWAYAM course of 8 weeks (2 credits) other than the courses listed above needs to be taken)**			**3**	1	**0**	**4**

Category	**CREDITS**
Professional Elective courses	9
Open Elective Course/Job oriented elective	6
Humanities and Social Science Elective	3
Skill advanced course/ soft skill course*	2
Industrial/Research Internship	3
TOTAL CREDITS	**23**

IV YEAR II SEMESTER							
Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
1	Major Project	R204212PR01	Project Project work, seminar and internship in industry	0	0	0	12
	INTERNSHIP (6 MONTHS)						
Total credits							**12**

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		L	T	P	C
I Year-I Semester		**3**	**0**	**0**	**3**
Name of the Subject: Calculus and Differential Equations					

(Common to all branches)

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.

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

Sequences and Series: Convergence 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- Euler-Cauchy equation and Legender's equation

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 Mac Laurin'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 integrals – Change of order of integration - Double integrals in polar coordinates- Areas enclosed by plane curves- Triple integrals – Volume of solids – Change of variables to polar, spherical and cylindrical co-ordinates.

Applications: Finding Areas and Volumes.

UNIT V: Beta and Gamma 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

(i) Utilize mean value theorems to real life problems (L3)

(ii) Solve the differential equations related to various engineering fields (L3).

(iii) Familiarize with functions of several variables which are useful in optimization (L3)

(iv) Apply double and triple integration techniques in evaluating areas and volumes bounded by region (L3)

(v) Conclude the use of Beta and Gamma functions in evaluating improper integrals (L4)

Text Books:

1. **B. S. Grewal,** Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2. **B. V. Ramana,** Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.

Reference Books:

1. **Erwin Kreyszig,** Advanced Engineering Mathematics, 10th Edition, Wiley-India.
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 / II Semester		**3**	**0**	**0**	**3**
APPLIED PHYSICS					

(Common to CSE, ECE, EEE & IT)

Course Objectives:
The objectives of this course is to acquire knowledge on the

i. To identify the importance of the optical phenomenon i.e. interference, diffraction and polarization related to its Engineering applications.
ii. Understand the mechanism of emission of light, utilization of lasers as coherent light sources for low and high energy applications, study of propagation of light through optical fibers and their implications in optical communications.
iii. Enlightenment of the concepts of Quantum Mechanics and to provide fundamentals of deBroglie matter waves, quantum mechanical wave equation and its application, the importance of free electron theory for metals and band theory for crystalline solids. Metals-Semiconductors-Insulators concepts utilization of transport phenomenon of charge carriers in semiconductors.
iv. To explain the significant concepts of dielectric and magnetic materials that leads to potential applications in the emerging micro devices.
v. To Understand the physics of Semiconductors and their working mechanism. To give an impetus on the subtle mechanism of superconductors using the concept of BCS theory and their fascinating applications.

UNIT - I: Wave Optics **12 hrs**

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

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

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

UNIT - II: Lasers and Fib **8hrs**

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

Fiber optics: Introduction –Principle of optical fiber- Acceptance Angle - Numerical Aperture - Classification of optical fibers based on refractive index profile and modes –Block diagram of fiber optic communication

UNIT - III: Quantum Mechanics, Free Electron Theory and Band theory **10hrs**

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

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

UNIT - IV: Dielectric and Magnetic Materials 8hrs

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

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

UNIT - V: Semiconductors and Superconductors 10hrs

Semiconductors: Introduction-Classification of solids - Intrinsic semiconductors – Density of charge carriers – Electrical conductivity – Fermi level – extrinsic semiconductors – density of charge carriers –Drift and diffusion currents – Einstein's equation- Hall effect – Hall coefficient – Applications of Hall effect.

Superconductors: Introduction – Properties of superconductors – Meissner effect – Type I and Type II superconductors – BCS theory (Qualitative) – Josephson effects (AC and DC) – SQUIDs.

Course Outcomes:

The students should be able to:

i. **understand** the concepts of physical optics through the wave nature of light and **discuss** the phenomenal differences between interference, diffraction and polarization.
ii. **Describe** the basic laser physics, working of lasers, and principle of propagation of light in optical fibers.
iii. **Apply** the knowledge of basic quantum mechanics, to set up onedimensional Schrodinger's wave equation and **summarize** the importance of free electrons in determining the properties of metals.
iv. **explain** the basics of dielectric and magnetic materials to synthesize new materials as per needs of engineering applications.
v. gain the **knowledge** of semiconductor bonding, semiconductor carrier properties and phenomenological **describe** the phenomenon of superconduction

Text books:

1. M. N. Avadhanulu, P.G.Kshirsagar & TVS Arun Murthy" A Text book of Engineering Physics"- S.Chand Publications, 11th Edition 2019.
2. Engineering Physics" by D.K.Bhattacharya and Poonam Tandon, Oxford press (2015).
3. Applied Physics by P.K.Palanisamy SciTech publications.

Reference Books:

1. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley &Sons
2. Engineering Physics by M.R.Srinivasan, New Age international publishers (2009).
3. Shatendra Sharma, Jyotsna Sharma, " Engineering Physics", Pearson Education, 2018
4. Engineering Physics - Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press
5. Semiconductor physics and devices- Basic principle – Donald A, Neamen, Mc Graw Hill
6. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning

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		L	T	P	C
I Year-I Semester		**3**	**0**	**0**	**3**
PROBLEM SOLVING AND PROGRAMMING USING C					

(Common to ALL)

Course Objectives:

The objectives of this course is to acquire knowledge on the

(i) To impart adequate knowledge on the need of programming languages and problem-solving techniques and develop programming skills.

(ii) To enable effective usage of Control Structures and Implement different operations on arrays.

(iii) To demonstrate the use of Strings and Functions.

(iv) To impart the knowledge of pointers and understand the principles of dynamic memory allocation.

(v) To understand structures and unions and illustrate the file concepts and its operations.

(vi) To impart the Knowledge Searching and Sorting Techniques.

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 should be able to:

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

Text Books:

(i) How to solve it by Computer, R. G. Dromey, and Pearson Education.
(ii) Computer Programming. Reema Thareja, Oxford University Press
(iii)Let us C , Yaswanth Kanetkar, 16th Edition,BPB Publication.

Reference Books:

(i) Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.
(ii) Programming In C A-Practia1 Approach. Ajay Mittal, Pearson.
(iii) C Programming — A Problem Solving Approach, Forouzan, Gilberg, Cengage.
(iv)The C Programming Language, Dennis Richie And Brian Kernighan, Pearson Education.
(v) Programming In C, Ashok Kamthane, Second Edition, Pearson Publication.

Web Links:

(i) http://www.c4learn.com/
(ii) http://www.geeksforgeeks.org/c/
(iii) http://nptel.ac.in/courses/122104019/
(iv) http://www.learn-c.org/

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		L	T	P	C
I Year-I Semester		**1**	**0**	**4**	**3**
COMPUTER ENGINEERING WORKSHOP					

(Common to CSE & IT)

Course Objectives:

(i) To make the students aware of the basic hardware components of a computer and installation of operating system.
(ii) Demonstrate the techniques of writing algorithms, pseudo codes and schematic flow of logic in software development process.
(iii) To introduce programming through Visual Programming tool using scratch.
(iv) To introduce the usage of Productivity tools in crafting professional word documents, excel spreadsheets and power point presentations using open office tools.

UNIT-I:

Introduction to Computers:

Characteristics of Computers, History of Computers, Generations of Computers, Classifications of Computers, Components of Computers, Applications of Computers, Computer Memory, Input and Output devices.

Case Studies:

1. Every student should identify the peripherals of a computer, components in a CPU and its functions.

2. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

3. Every student should disassemble and assemble the PC back to working condition.

UNIT-II:

Interaction of User and Computer:

Types of Software, System Software, Application Software, Different Levels of Programming Languages, Compilers, Assemblers, Linkers, Loaders and Interpreter, Internet Access in the Computer, Online Conference tools like Zoom, Google Meet, Go To Meeting

Case Studies:

1. Install operating system like Linux or MS windows on the personal computer. The system should be configured as dual boot with both windows and Linux.

2. In Hardware Troubleshooting Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition.

3. In Software Troubleshooting Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition.

4. To create a Resume using MS-Word.

5. To create and analyze student result data using MS-Excel.

6. To create a presentation of your own using MS-PowerPoint.

UNIT-III:

Problem Solving and Programming:

Program Development Life Cycle, Algorithm, Flowchart, Pseudo Code, Control Structures, Programming Paradigms, Raptor open source software

Case Studies:

1. Create flowcharts for take-off landing of an Aeroplane.
2. Create a flowchart to validate an email id entered by user.
3. Create flowchart to print first 50 prime numbers.

UNIT-IV:

Scratch Programming:

Introduction to Scratch, Motion Blocks , Sound Blocks, Variables, Random Variables, Arithmetic, logical and Relational Operators, Lists, Messages, User Defined Blocks

Case Studies:

1. Create an Animation to make a sprite dance for music.
2. Create an Animation that draws a polygon of given number of sides.
3. Create an Animation to draw 20 randomized circles at random positions.
4. Create a music band Animation with multiple instruments.

UNIT-V:

Network Types and Elements:

Bus Topology, Star Topology, Ring Topology, Mesh Topology, Hybrid Topology, Local Area Network, Metropolitan Area Networks, Wide Area Networks, Router, Hub, Switch, Repeater, Bridge, Gateway.

Case Studies:

1. Finding IP Address and connect to the internet.
2. Identify the best topology of connection in the network.

Course Outcomes:

The students should be able to:

(i) Apply knowledge for computer assembling and software installation.
(ii) Understand the difference between system software and application software and that manages the computer resources.
(iii) Productivity tools module would enable the students in crafting professional word documents, excel spread sheets and power point presentations using the Microsoft suite of office tools.
(iv) Create interactive visual programming using scratch.
(v) Identify the type of networks and topologies used in the computer network.

Text Books:

(i) Computer Fundamentals, l e, Anita Goel, Person Education.
(ii) Fundamentals of Computers –Reema Thareja-Oxford higher education
(iii) Scratch Programming for Logic Building, 1e, Kamal Rawat, BPB Publications.
(iv) Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.

Reference Books:

(i) IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. – CISCO Press, Pearson Education.
(ii) https:// scratch.mit.edu/ideas

Department of Information Technology
University College of Engineering Vizianagaram
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

I Year-I / II Semester		L	T	P	C
		3	0	0	3
COMMUNICATIVE ENGLISH					

(Common to all branches)

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

Unit 1:

A Drawer full of happiness

Listening: Listening to short audio texts and identifying the topic. Listening to prose, prose and conversation.
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: countable and uncountable; singular and plural basic sentence structures; simple question form - wh-questions; word order in sentences.
Pronunciation: Vowels, Consonants, Plural markers and their realizations

Unit 2:

Nehru's letter to his daughter Indira on her birthday

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 3:

Stephen Hawking-Positivity 'Benchmark'

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 4:

Liking a Tree, Unbowed: Wangari Maathai-biography

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 5:

Stay Hungry-Stay foolish

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
(v) Form sentences using proper grammatical structures and correct word forms

Prescribed text books:

(i) "**Infotech English**", Maruthi Publications. (Detailed)

Reference Books

1. Bailey, Stephen. *Academic writing: A handbook for international students*. Routledge, 2014.
2. Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking.* Heinley ELT; 2nd Edition, 2018.
3. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
4. Hewings, Martin. *Cambridge Academic English (B2)*. CUP, 2012
5. Martin Hewings , Advanced English Grammar, Cambridge university press
6. William Strunk JR. and E B White, Elements of Style, 4th Edition, Pearson
7. *Language and Life: A Skills Approach* Board of Editors, Orient Black Swan Publishers, India. 2018.
8. *Practical English Usage*, Michael Swan. OUP. 1995.
9. *Remedial English Grammar*, F.T. Wood. Macmillan.2007
10. *On Writing Well*, William Zinsser. Harper Resource Book. 2001
11. *Study Writing*, Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
12. *Communication Skills*, Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.
13. *Exercises in Spoken English*, Parts. I-III. CIEFL, Hyderabad. Oxford University Press.
14. *Advanced English Grammar*, Martin Hewings. Cambridge University Press. 2016
15. *Elements of Style*, William Strunk and EB White. Pearson. 1999.

B. Tech - R20 Syllabus APPENDIX – 2

Department of Information Technology

University College of Engineering Vizianagaram

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

I Year-I / II Semester		L	T	P	C
		0	0	3	1.5
ENGLISH COMMUNICATION SKILLS LAB					

(Common to all branches)

Course Objectives

(i) To impart grammar as well as communication through pronunciation. By introduction, pure vowels, consonants, diphthongs, phonetic transcription, common errors in pronunciation.
(ii) To impart better knowledge on Stress. Stress of kinds- mono syllabic, di syllabic, poly syllabic, strong and weak forms of stress along with contrastive stress.
(iii) To impart learner grammar as well as communication through compound words, rhythm, intonation and accent neutralization
(iv) To impart learner grammar as well as communication through listening, by identifying the context and specific pieces of information to answer a series of questions in speaking
(v) To improve the spoken skills of students by making them read news papers in order to understand and identify key terms context they read .

UNIT I:

Vowels, Consonants, Pronunciation, Phonetic Transcription, Common Errors in Pronunciation,

UNIT II:

Word stress-di-syllabic words, poly-syllabic words, weak and strong forms, contrastive stress (Homographs)

UNIT III:

Stress in compound words, rhythm, intonation, accent neutralization.

UNIT IV:

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

UNIT V:

Newspapers reading; Understanding and identifying key terms and structures useful for writing reports.

Course Outcomes:

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

(i) The learner will improve phonetic understanding, transcription, common errors both in pronunciation and written English.
(ii) The learner will improve syllabic division, and how to use right stress in their pronunciation.
(iii) The learner will improve speaking skills with right intonation and rhythm and intonation and how to reduce mother tongue influence in English.
(iv) The learner will Improve speaking skills as well as listening skills by listening through the audio clips prescribed.
(v) The learner will Improve speaking skills along with reading skills.

Prescribed text book:

(i) "**InfoTech English**", Maruthi Publications.

References:

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.

B. Tech - R20 Syllabus APPENDIX – 3
Department of Information Technology
University College of Engineering Vizianagaram
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

		L	T	P	C
I Year-I / II Semester		**0**	**0**	**3**	**1.5**
APPLIED PHYSICS LAB					

(Common to CSE, ECE, EEE & IT)

Course Objectives:

The objectives of this course is to acquire knowledge on the

i. To **impart skills** in measurements with accurate error propagation.
ii. To **plan** the experimental procedure, **design** and to record and **analysis** results.
iii. To reach non trivial conclusions of significant of the experiments.
iv. To **develop** the skills to handle different instruments without taking erroneous readings and ability to enhance the skills to fabricate engineering and technical equipment's.

List of experiments:

1. Determination of thickness of thin object by wedge method.
2. Determination of radius of curvature of a given plano convex lens by Newton's rings.
3. Determination of wavelengths of different spectral lines in mercury spectrum using diffraction grating in normal incidence configuration.
4. V-I Characteristics of a P-N Junction diode.
5. Determination of dielectric constant for different materials.
6. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
7. Determination of numerical aperture and acceptance angle of an optical fiber.
8. Determination of wavelength of Laser light using diffraction grating.
9. Estimation of Planck's constant using reverse photoelectric effect.
10. V-I Characteristics of a zener diode.
11. To determine the energy gap of a semiconductor using p-n junction diode.
12. Magnetic field along the axis of a current carrying circular coil by Stewart & Gee's Method.
13. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall Effect.
14. Measurement of resistance of a semiconductor with varying temperature.
15. Resistivity of a Superconductor using four probe method & Meissner effect.

Course Outcomes:

The students should be able to:

i. **Describe** the methodology of science and the relationship between observation and theory.
ii. **Develop** scientific problem solving skills, including organization of given information, identification and application of pertinent principles, quantitative solutions, interpreting results, and evaluating the validity of results.
iii. **Discover** of physics concepts in other disciplines such as mathematics, computer science, engineering, and chemistry.
iv. **Learn** to minimize contributing variables and recognize the limitations of equipment.
v. **Apply** conceptual understanding of the physics to general real-world situations.
vi. **Develop** interpersonal and communication skills including communicating in small groups, writing, working effectively with peers.

Reference Books:

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

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Department of Information Technology
University College of Engineering Vizianagaram
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

		L	T	P	C
I YEAR-I SEMESTER		0	0	3	1.5
PROBLEM SOLVING AND PROGRAMMING USING C LAB					

(Common to ALL)

Course Objectives:

The objectives of this course is to acquire knowledge on the

(i) To impart knowledge on basic Linux commands, various Editors, Raptor.
(ii) To make the students understand the concepts of C programming.
(iii) To nurture the students on Control Structures and develop different operations on arrays.
(iv) To make use of String fundamentals and modular programming constructs.
(v) To implement programs using dynamic memory allocation.
(vi) 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

UsingSwitch...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.

10.4)

11. Strings

11.1) Implementation of string manipulation operations with library function:

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

I 1.2) Implementation of string manipulation operations without library function:

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

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:

(i) Implement basic programs in C and design flowcharts in Raptor.

(ii) Use Conditional and Iterative statements to solve real time scenarios in C.

(iii) Implement the concept of Arrays and Modularity and Strings.

(iv) Apply the Dynamic Memory Allocation functions using pointers.

(v) Develop programs using structures, and Files.

Text Books:

(i) Let us C , Yaswanth Kanetkar, 16th Edition,BPB Publication.

(ii) How to solve it by Computer, R. G. Dromey, and Pearson Education.

(iii)Computer Programming. Reema Thareja, Oxford University Press

Reference Books:

(i) Programming in C A-Practical Approach Ajay Mittal. Pearson Education.

(ii) The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education.

(iii)Problem solving using C , K Venugopal,3'd Edition,TMG Publication.

Web Links:

(i) https://www.hackerrank.com/

(ii) https://www.codechef.com/

(iii)https://www.topcoder.com/

(iv)https://code-cracker.github.io/

(v) https://raptor.martincar1is1e.com/

(vi)httos://npte1.ac.in/courses/106105055/2

B. Tech - R20 Syllabus APPENDIX – 3
Department of Information Technology
University College of Engineering Vizianagaram
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

		L	T	P	C
I Year-I/II Semester		**2**	**0**	**0**	**0**
Name of the Subject: Environmental Science					

(Common to All branches)

Course Objectives:

The objectives of this course is to acquire knowledge on the

(i) The natural resources and their sustenance of the life and recognize the need to conserve the natural resources.
(ii) The concepts of ecosystem and its functions in the environment. The need for protecting the producers and consumers and their role in the food web.
(iii) The biodiversity of India and the threats to biodiversity, and the conservation practices to protect the biodiversity.
(iv) Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management.
(v) Social issues both rural and urban environment and the possible means to combat the challenges.

UNIT - I: MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES 7hrs

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,– Timber extraction - Mining, dams and other effects on forest and tribal people - Water resources - Use and over utilization of surface and ground water -dams – benefits and problems - Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modem agriculture, fertilizer-pesticide problems, water logging, salinity.

UNIT - II: ECOSYSTEMS, BIODIVERSITY AND ITS CONSERVATION 7hrs

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.

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 6hrs

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

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

UNIT - IV: SOCIAL ISSUES AND THE ENVIRONMENT 6hrs

Social Issues and the Environment: From Unsustainable to Sustainable development - Urban problems related to energy - Water conservation, rain water harvesting, Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions - Climate change, global warming, acid rain and ozone layer depletion, 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.

UNIT - V: HUMAN POPULATION AND THE ENVIRONMENT 6hrs

Human population and the Environment: Population growth, variation among nations' Population explosion - Family Welfare programme. - Environment and human health - Human Rights - Value Education - HIV/AIDS - Women and Child Welfare - Role of information Technology in Environment and human health.

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.

Course Outcomes:

The students should be able to:

(i)Gain a higher level of personal involvement and interest in understanding and solving environmental problems.

(ii)Comprehend environmental problems from multiple perspectives with emphasis on human modern lifestyles and developmental activities.

(iii)Demonstrate knowledge relating to the biological systems involved in the major global environmental problems of the 2lst century.

(iv) Influence their society in proper utilization of goods and services, Recognize the interconnectedness of human dependence on the earth's ecosystems.

(v)Learn the management of environmental hazards and to mitigate disasters and have a clear understanding of environmental concerns and follow sustainable development practices.

Text Books:

(i)Text book of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission, Universities Press.

(ii)Environmental Studies by Palaniswamy - Pearson education.

(iii)Environmental Studies by Dr.S.Azeem Unnisa, Academic Publishing Company.

Reference Books:

(i)Textbook of Environmental Science by Deeksha Dave and E.Sai Baba Reddy, Cengage Publications.

(ii)Text book of Environmental Sciences and Technology by M.Anji Reddy, BS Publication.

(iii)Comprehensive Environmental studies by J.P.Sharma, Laxmi publications.

(iv) Environmental sciences and engineering - J. Glynn Henry and Gary W. Heinke – Prentice hall India Private limited.

(v) A Text Book of Environmental Studies by G.R.Chatwal, Himalaya Publishing House.

(vi) Introduction to Environmental engineering and science by Gilberl M. Masters and Wendell P.Ela - Prentice hall of India Private limited.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

		L	T	P	C
I Year-II Semester		**3**	**0**	**0**	**3**
Name of the Subject: Linear algebra and Numerical Methods					

(Common to all branches)

Course Objectives:

The objectives of this course is to acquire knowledge on the

(i) To instruct the concept of Matrices in solving linear algebraic equations
(ii) To elucidate the different numerical methods to solve nonlinear algebraic equations
(iii) To disseminate the use of different numerical techniques for carrying out numerical integration.
(iv) 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: Systems of linear equations, Eigen values and Eigen vectors: (10 hrs)

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

Singular values of a matrix, singular value decomposition (Ref. Book – 1).

UNIT – III: Iterative methods: (8 hrs)

Introduction– Solutions of algebraic and transcendental equations : Bisection method–Secant method – Method of false position– Iteration method – Newton-Raphson method (One variable and simultaneous Equations)

Solutions of system of equations - Jacobi and Gauss-Seidel methods

Evaluation of largest eigenvalue –eigenvector using Power Method.

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 differential equations with initial conditions: (10 hrs)

Trapezoidal rule– Simpson's $1/3^{rd}$ and $3/8^{th}$ rule– Solution of differential equations with initial conditions 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: The student will be able to

(i) Develop the use of matrix algebra techniques that is needed by engineers for practical applications (L6)

(ii) Solve system of linear algebraic equations using Gauss elimination, Gauss Jordan, Gauss Seidel (L3)

(iii) Evaluate approximating the roots of polynomial and transcendental equations by different algorithms (L5)

(iv) Apply Newton's forward & backward interpolation and Lagrange's formulae for equal and unequal intervals (L3)

(v) Apply different algorithms for approximating the solutions of ordinary differential equations to its analytical computations (L3)

Text Books:

(i) **B. S. Grewal,** Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.

(ii) **B. V. Ramana,** Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.

Reference Books:

(i) **David Poole,** Linear Algebra- A modern introduction, 4th Edition, Cengage.

(ii) **Steven C. Chapra,** Applied Numerical Methods with MATLAB for Engineering and Science, Tata Mc. Graw Hill Education.

(iii) **M. K. Jain, S. R. K. Iyengar and R. K. Jain,** Numerical Methods for Scientific and Engineering Computation, New Age International Publications.

(iv) **Lawrence Turyn,** Advanced Engineering Mathematics, CRC Press.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

		L	T	P	C
I Year-I / II Semester		**3**	**0**	**0**	**3**
Name of the Subject: APPLIED CHEMISTRY					

(Common to EEE,ECE,CSE,IT)

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.
- ***Explain*** the preparation of semiconductors and nanomaterials, engineering applications of nanomaterials, superconductors and liquid crystals.
- ***Recall*** the increase in demand for power and hence alternative sources of power are studied due to depleting sources of fossil fuels. Advanced instrumental techniques are introduced.
- ***Outline*** the basics of computational chemistry and molecular switches

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UNIT I: POLYMER TECHNOLOGY **8 hrs**

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

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

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

Composite materials: Fiber reinforced plastics, conducting polymers, biodegradable polymers, biopolymers, biomedical polymers

UNIT II: ELECTROCHEMICAL CELLS AND CORROSION **10 hrs**

Single electrode potential, electrochemical series and uses of series, standard hydrogen electrode, calomel electrode, construction of glass electrode, batteries (Dry cell, Li ion battery and zinc air cells), fuel cells (H_2-O_2, CH_3OH-O_2, phosphoric acid and molten carbonate).

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

UNIT III: MATERIAL CHEMISTRY **10 hrs**

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 (Brunauer Emmet Teller [BET]), (scanning electron microscopy [SEM]) and (transmission electron microscopy [TEM]), applications of graphene and fullerenes, carbon nanotubes (types, preparation and applications)

Liquid crystals:- Introduction-types-applications.

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

UNIT IV: SPECTROSCOPIC TECHNIQUES & NON-CONVENTIONAL ENERGY SOURCES 10 hrs

Part A: **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 differentiation of sp, sp^2, sp^3 and IR stretching of functional groups (alcohols, carbonyls, amines) applications], magnetic resonance imaging and CT scan (procedure & applications).

Part B*:* NON-CONVENTIONAL ENERGY SOURCES

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

UNIT V: ADVANCED CONCEPTS/TOPICS IN CHEMISTRY 8 hrs

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

***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

Course Outcomes

At the end of this unit, the students will be able to

(i) ***Analyze*** the different types of composite plastic materials and ***interpret*** the mechanism of conduction in conducting polymers.

(ii) ***Utilize*** the theory of construction of electrodes, batteries and fuel cells in redesigning new engineering products and categorize the reasons for corrosion and study methods to control corrosion.

(iii)***Synthesize*** nanomaterials for modern advances of engineering technology. Summarize the preparation of semiconductors; analyze the applications of liquid crystals and superconductors.

(iv)***Analyze*** the principles of different analytical instruments and their applications. Design models for energy by different natural sources.

(v) ***Obtain*** the knowledge of computational chemistry and molecular machines

Text Books:

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

Reference Books:

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

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Department of Information Technology

University College of Engineering Vizianagaram

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

I Year-II Semester	COMPUTER ORGANIZATION & ARCHITECTURE	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- Comprehensive knowledge of computer system including the analysis and design of components of the system
- Understanding Micro operations, Types of instructions, Microprogramming of control unit of CPU.
- Understanding ALU, design of basic components of the system.
- Illustration of algorithms for basic arithmetic operations.
- Description of different parameters of a memory system, organization and mapping of various types of memories.
- Describes the means of interaction devices with CPU, their characteristics, modes

COURSE OUTCOMES:

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

1. Identify functional units, bus structure and understand data representation
2. Understand the instruction code and micro-programmed control units.
3. Design Arithmetic Logic Unit.
4. Implement computer arithmetic operations.
5. Analyze performance of memory and I/O devices

Unit-I:

Data representation: signed number representation, fixed and floating point representations, character representation, Error Detection codes.

Basic functional blocks of a computer: Functional Units, Bus structure**,** Register Transfer Language, Register Transfer, Bus and Memory Transfers.

Unit-II:

Central Processing Unit: Instruction codes, instruction set, instruction execution cycle, Input-output Interrupts, instruction formats, addressing modes.

Microprogramed control unit: Control Memory, Address sequencing, and microprogram example.

Unit-III:

Design of Arithmetic and Logic Unit: Digital logic gates, Boolean algebra, Simplification of Boolean Expressions-K-Map, Sum of Products, Product of Sums, Don’t Cares, Combinational logic circuits – Half Adder, Full Adder, Encoder, Decoder, Multiplexer and Demultiplexer.

Unit-IV:

Computer Arithmetic–signed magnitude addition and subtraction, carry look-ahead adder. multiplication - Hardware Implementation for Signed Magnitude ,Hardware Algorithm, Booth multiplication, Division – Hardware Implementation for Signed Magnitude data, Divide Overflow, Hardware Algorithm, Floating Point Arithmetic.

Unit-V:

Memory system: Basic Concepts, semiconductor memory technologies -Internal organization of memory chips, Static Memories, Asynchronous and Synchronous DRAMs, ROM, Speed, size and cost, cache memory, Performance considerations

Peripheral devices and their characteristics: Peripheral Devices, Input Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, DMA, IOP.

Textbooks

1. M Morris Mano, "Computer System Architecture", 3rd edition, Tata Mc-Graw Hill.
2. Carl Hamacher, Zvonko Vranesic and SafwatZaky, "Computer Organization", 5thEdition, Tata Mc-Graw Hill, 2002.
3. M Morris Mano ,Michael D. Ciletti, "Digital Design- With an Introduction to the Verilog HDL", 5thedition, Pearson Education.

References

1. Hayes, J.P., "Computer Architecture and Organization", 3rdEdition, Tata Mc-Graw Hill, 1998.
2. Patterson, D. A., and Hennessy, J.L., "Computer Organization and Design: The Hardware/Software Interface", 3rdEdition, Elsevier, 2005.
3. William Stallings, "Computer Organization and Architecture – Designing for Performance", 6thEdition, Pearson Education, 20

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

I Year-II Semester	DATA STRUCTURES	L	T	P	C
		3	0	0	3

Course Objectives:

The objective of the course is to

- Introduce the fundamental concept of data structures and abstract data types.
- Emphasize the importance of data structures in developing and implementing efficient algorithms.
- Describe how arrays, records, linked structures, stacks, queues, trees, and graphs are represented in memory and used by algorithms.

UNIT I

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

UNIT II

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

UNIT III

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

UNIT IV

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

UNIT V

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

Course Outcomes:

After completing this course a student will be able to:

- Summarize the properties, interfaces, and behaviors of basic abstract data types.
- Discuss the computational efficiency of the principal algorithms for sorting & searching.
- Correlate fundamental data structures like lists, queues and stacks with their applications.
- Use arrays, records, linked structures, stacks, queues, trees, and Graphs in writing programs.
- Demonstrate different methods for traversing trees & graphs.

Text Books:

1) Data Structures and algorithm analysis in C, 2nded, Mark Allen Weiss.
2) Fundamentals of Data Structures in C, 2nd Edition, Horowitz, Sahni, Universities Press.

Reference Books:

1) Data Structures Using C. 2nd Edition.Reema Thareja, Oxford.

2) Data Structures: A PseudoCode Approach, 2/e, Richard F.Gilberg, Behrouz A. Forouzon, Cengage.

3) Data Structures with C, Seymour Lipschutz TMH,1/e

e-Resources:

1) http://algs4.cs.princeton.edu/home/

2) https://faculty.washington.edu/jstraub/dsa/Master_2_7a.pdf

3) NPTEL video lectures by Dr.Naveen Garg,IIT Delhi.

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Department of Information Technology

University College of Engineering Vizianagaram

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

I Year-II Semester	Python Programming	L	T	P	C
		1	0	4	3

Course Objectives:

The objectives of this course is to acquire knowledge on the

i. Introduction to Scripting Language.
ii. Exposure to various problems solving approaches of computer science in various Domains.
iii. Understand structure and data types of python script.
iv. Implement iterations and functions in python.
v. Implement modules and data structures using mutable & immutable objects.
vi. Understand object oriented concepts on real world scenarios.
vii. Understand packages for statistics and gaming.

UNIT - I:

Introduction: History of Python, Need of Python Programming, Applications, Basics of Python Programming Using the REPL(Shell), Running Python Scripts, Variables, Assignment, Keywords, Input-Output, Indentation.

Operators and Type Conversion: Types-Integers, Strings, Booleans; Operators-Arithmetic Operators, Comparison(Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations, type conversion.

UNIT - II:

Control Flow: Control Flow- if, if-elif-else, for, while, break, continue, pass.

Functions: Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Fruitful Functions (Function Returning Values), Scope of the Variables in a Function - Global and Local Variables, Anonymous Functions, Lambdas, map, reduce and filter.

UNIT - III:

Modules: Creating modules, import statement, from. Import statement, name spacing, builtin modules- os, random, math, cmath, pprint, json, request, date, RegEx.

Strings & Data Structures: String, String Formatting, List, Tuples, Sets, Dictionaries, Sequences, List Comprehension, itertools, built-in functions of all Objects.

UNIT - IV:

Object Oriented Programming OOP in Python: Classes, 'self variable', Methods, Constructor Method, Inheritance, Overriding Methods, Data hiding, Duck Typing and Decorators.

Error and Exceptions: Difference between an error and Exception, Handling Exception, try except block, Raising Exceptions, User Defined Exceptions.

UNIT - V:

Python Turtle Module: Directions, Positions, Colors, Drawing States and Shapes, Filling, Visibility

Packages: Introduction to PIP, Installing packages using PIP. Mathematical Libraries: NumPy, SciPy, Sympy, Pandas, StatsModels, Matplotlib and Gnuplot.

Course Outcomes:

The students should be able to:

1. Understand the environment of python.
2. Create and run simple scripts in python.
3. Understand data types and their conversions.
4. Understand operators for doing operations on different expressions.

Text Books:

i. Python Programming: A Modern Approach, VamsiKurama, Pearson.,1/e
ii. Learning Python, Mark Lutz, Orielly,5/e
iii. Core Python Programming, W.Chun, Pearson,2/e.

Reference Books:

1. Think Python, Allen Downey, Green Tea Press. 1/e

Introduction to Python, Kenneth A. Lambert, Cengage,2/e

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University College of Engineering Vizianagaram

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

		L	T	P	C
I Year-I/II Semester		**0**	**0**	**3**	**1.5**
Name of the Subject: APPLIED CHEMISTRY LAB					

(Common to EEE,ECE,CSE,IT)

Course Objectives:

The objectives of this course is to acquire knowledge on the

(i) Normality , molaritiy ,theory of indicators used in different volumetric and chemical analysis.

(ii) Alkalinity and hardness of water by E DTA method.

(iii)Volumetric analysis-Red-Ox titrations of different chemical compounds.

(iv)Determination of concentration of acids and bases using conductometer and potentiometer

(v) Determination of P^H and color metric analysis

Introduction to Chemistry laboratory – Molarities, normality, primary, secondary standard solutions,

Volumetric titrations, quantitative analysis

1. Determination of HCl using standard Na_2CO_3 solution.
2. Determination of alkalinity of a sample containing Na_2CO_3 and NaOH.
3. Determination of Mn^{+2} using standard oxalic acid solution.
4. Determination of ferrous iron using standard $K_2Cr_2O_7$ solution.
5. Determination of Cu^{+2} using standard hypo solution.
6. Determination of temporary and permanent hardness of water using standard EDTA solution.
7. Determination of Fe^{+3} by a colorimetric method.
8. Determination of the concentration of acetic acid using sodium hydroxide (pH-metry method).
9. Determination of iso-electric point of amino acids using pH-metry method/conductometric method.
10. Determination of the concentration of strong acid vs strong base (by conductometric method).
11. Determination of strong acid vs strong base (by potentiometric method).
12. Determination of Mg^{+2} present in an antacid.
13. Determination of $CaCO_3$ present in an eggshell.
14. Estimation of Vitamin C.
15. Determination of phosphoric content in soft drinks.
16. Adsorption of acetic acid by charcoal.
17. Preparation of nylon-6, 6 and Bakelite (demonstration only).
18. Determination of Lead in drinking water.
19. Determination of percentage of copper in Brass.

Of the above experiments at-least 10 assessment experiments should be completed in a semester.

Course Outcomes:

(i) Student is exposed to volumetric titrations acquires some volumetric skills.

(ii) Student is able to analyze hard and soft water.

(iii)Student is exposed to volumetric skills of red-ox titrations with different indicators

(iv)Students can handle the instruments like conductometer, potentiometer in determinening the concentrations of acids and bases.

(v) Student is able to analyze the different chemical concentrations using colorimeter and P^H meter.

Reference Books

1. A Textbook of Quantitative Analysis, Arthur J. Vogel.
2. Engineering Chemistry by Jain and Jain; Dhanpat Rai Publicating Co. Latest editio

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

I Year-II Semester	DATA STRUCTURES LAB	L	T	P	C
		0	0	3	1.5

Course Objectives:

The objective of this lab is to

- Demonstrate the different data structures implementation.
- Demonstrate and analyze the computational complexity of various implementations.
- Understand dynamic memory management techniques using pointers, constructors, destructors, etc.

List of Programs:

1. Write a Program for Singly linked list.
2. Write a Program for Doubly linked list.
3. Write a Program for Multitask in a Single Array.
4. Write a Program for Circular Queue.
5. Write a Program for Binary Search trees.
6. Write a Program for Heaps.
7. Write a Program for Breadth First Search Techniques.
8. Write a Program for Depth First Search Techniques.
9. Write a Program for Prim's Algorithm.
10. Write a Program for Dijkstra's Algorithm.
11. Write a Program for Kruskal's Algorithm.
12. Write a Program for Merge Sort.
13. Write a Program for Quick Sort.
14. Write a Program for Data Searching using divide and conquer technique.

Course Outcomes:

By the end of this lab the student is able to

- Use basic data structures such as arrays and linked list.
- Programs to demonstrate fundamental algorithmic problems including Tree Traversals, Graph traversals, and shortest paths.
- Use various searching and sorting algorithms.

Text Books:

1) The C Programming Language - 2nded,Brain W Kernighan and Dennis Ritchie, Prentice Hall.
2) The C++ Programming Language-Fourth Edition, Bjarne Stroustrup, Addison-Wesley.
3) Data Structures and algorithm analysis in C, 2nded, Mark Allen Weiss.
4) Fundamentals of Data Structures in C, 2nd Edition, Horowitz, Sahni, Universities Press.
5) Data Structures Using C,E.BalaGuruswamy,Tata McgrawHill,17/e

Reference Books:

1) Data Structures Using C. 2nd Edition.Reema Thareja, Oxford.
2) Data Structures: A PseudoCode Approach, 2/e, Richard F.Gilberg, Behrouz A. Forouzon, Cengage.
3) Data Structures with C, Seymour Lipschutz TMH,1/e

e-Resources:

1) http://algs4.cs.princeton.edu/home/
2) https://faculty.washington.edu/jstraub/dsa/Master_2_7a.pdf
3) NPTEL video lectures by Dr.Naveen Garg,

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Department of Information Technology

University College of Engineering Vizianagaram

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

I Year-II Semester	DIGITAL SYSTEMS LAB	L	T	P	C
		0	0	3	1.5

COURSE OBJECTIVES:

The objectives of this course are to:

- Introduce the concept of digital and binary systems.
- To know the concepts of Combinational circuits.
- Be able to design and analyze sequential logic circuits.
- To understand the concepts of flipflops, registers and counters.
- Students will learn and understand the basics of logic gatesand circuits..

COURSE OUTCOMES:

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

1. To learn about the basics of gates.
2. To understand the basic digital circuits and to verify their operation.
3. Construct basic combinational circuits and verify their functionalities.
4. Apply the design procedures to design basic sequential circuits.
5. An ability to design and troubleshoot a simple state machine.
6. An ability to measure and record the experimental data, analyze the results, and prepare a formal laboratory report.
7. Design and analyze any digital design in real time applications.

List of Programs:

1. Verification of Basic Logic Gates.
2. Implementing all individual gates with Universal Gates NAND & NOR.
3. Design a circuit for the given Canonical form, draw the circuit diagram and verify the De-Morgan laws.
4. Design a Combinational Logic circuit for 8x1 MUX and verify the truth table.
5. Verify the data read and data write operations for the IC 74189.
6. Construct Half Adder and Full Adder using Half Adder and verify the truth table.
7. Design a 4-bit Adder/Subtractor.
8. Design and realization of 4-bit comparator.
9. Design and implement a 3 to 8 decoder using gates.
10. Design and realization of a 4-bit Gray to Binary and Binary to Grayconverter
11. Implementation of Master Slave Flip-Flop with J-K Flip- Flop and verify the truth table for race around condition.
12. Design a Decade Counter and verify the truth table.
13. Design and implement a 4-bit shift register using Flip flops.
14. Design and Verify the 4-bit synchronous
15. Design and verify 4-bit ripple counter(Asynchronous)

TEXT BOOKS

1. Digital Design ,4/e, M.Morris Mano, Michael D Ciletti, PEA.
2. Fundamentals of Logic Design, 5/e, Roth, Cengage.

REFERENCES

2. Switching and Finite Automata Theory,3/e,Kohavi, Jha, Cambridge.
3. Digital Logic Design, Leach, Malvino, Saha,TMH,8th ed.
4. Verilog HDL primer, Jaya Bhaskar, PEA.3/e
5. Digital Fundamentals, Thomas L. Floyd, Pearson Education, ISBN:9788131734483.9/e 5.Modern Digital Electronics, R.P. Jain

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

		L	T	P	C
I Year-II Semester		**3**	**0**	**0**	**3**
NAME OF THE SUBJECT: LINEAR ALGEBRA AND NUMERICAL METHODS					

(Common to all branches)

Course Objectives:
The objectives of this course is to acquire knowledge on the

(v) To instruct the concept of Matrices in solving linear algebraic equations
(vi) To elucidate the different numerical methods to solve nonlinear algebraic equations
(vii) To disseminate the use of different numerical techniques for carrying out numerical integration.
(viii) 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: Systems of linear equations, Eigen values and Eigen vectors: (10 hrs)

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

Singular values of a matrix, singular value decomposition (Ref. Book – 1).

UNIT – III: Iterative methods: (8 hrs)

Introduction– Solutions of algebraic and transcendental equations : Bisection method–Secant method – Method of false position– Iteration method – Newton-Raphson method (One variable and simultaneous Equations)
Solutions of system of equations - Jacobi and Gauss-Seidel methods
Evaluation of largest eigenvalue –eigenvector using Power Method.

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 differential equations with initial conditions: (10 hrs)

Trapezoidal rule– Simpson's $1/3^{rd}$ and $3/8^{th}$ rule– Solution of differential equations with initial conditions 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: The student will be able to

(vi) Develop the use of matrix algebra techniques that is needed by engineers for practical applications (L6)

(vii) Solve system of linear algebraic equations using Gauss elimination, Gauss Jordan, Gauss Seidel (L3)

(viii) Evaluate approximating the roots of polynomial and transcendental equations by different algorithms (L5)

(ix) Apply Newton's forward & backward interpolation and Lagrange's formulae for equal and unequal intervals (L3)

(x) Apply different algorithms for approximating the solutions of ordinary differential equations to its analytical computations (L3)

Text Books:

(iii) **B. S. Grewal,** Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.

(iv) **B. V. Ramana,** Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.

Reference Books:

(v) **David Poole,** Linear Algebra- A modern introduction, 4th Edition, Cengage.

(vi) **Steven C. Chapra,** Applied Numerical Methods with MATLAB for Engineering and Science, Tata Mc. Graw Hill Education.

(vii) **M. K. Jain, S. R. K. Iyengar and R. K. Jain,** Numerical Methods for Scientific and Engineering Computation, New Age International Publications.

(viii) **Lawrence Turyn,** Advanced Engineering Mathematics, CRC Press.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

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

NAME OF THE SUBJECT: APPLIED CHEMISTRY

(Common to EEE,ECE,CSE,IT)

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.
- ***Explain*** the preparation of semiconductors and nanomaterials, engineering applications of nanomaterials, superconductors and liquid crystals.
- ***Recall*** the increase in demand for power and hence alternative sources of power are studied due to depleting sources of fossil fuels. Advanced instrumental techniques are introduced.
- ***Outline*** the basics of computational chemistry and molecular switches

.

UNIT I: POLYMER TECHNOLOGY **8 hrs**

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

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

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

Composite materials: Fiber reinforced plastics, conducting polymers, biodegradable polymers, biopolymers, biomedical polymers

UNIT II: ELECTROCHEMICAL CELLS AND CORROSION **10 hrs**

Single electrode potential, electrochemical series and uses of series, standard hydrogen electrode, calomel electrode, construction of glass electrode, batteries (Dry cell, Li ion battery and zinc air cells), fuel cells (H_2-O_2, CH_3OH-O_2, phosphoric acid and molten carbonate).

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

UNIT III: MATERIAL CHEMISTRY **10 hrs**

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 (Brunauer Emmet Teller [BET]), (scanning electron microscopy [SEM]) and (transmission electron microscopy [TEM]), applications of graphene and fullerenes, carbon nanotubes (types, preparation and applications)

Liquid crystals:- Introduction-types-applications.

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

UNIT IV: SPECTROSCOPIC TECHNIQUES & NON-CONVENTIONAL ENERGY SOURCES 10 hrs

Part A: **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 differentiation of sp, sp^2, sp^3 and IR stretching of functional groups (alcohols, carbonyls, amines) applications], magnetic resonance imaging and CT scan (procedure & applications).

Part B*:* NON-CONVENTIONAL ENERGY SOURCES

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

UNIT V: ADVANCED CONCEPTS/TOPICS IN CHEMISTRY 8 hrs

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

***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

Course Outcomes

At the end of this unit, the students will be able to

(vi) ***Analyze*** the different types of composite plastic materials and ***interpret*** the mechanism of conduction in conducting polymers.

(vii) ***Utilize*** the theory of construction of electrodes, batteries and fuel cells in redesigning new engineering products and categorize the reasons for corrosion and study methods to control corrosion.

(viii) ***Synthesize*** nanomaterials for modern advances of engineering technology. Summarize the preparation of semiconductors; analyze the applications of liquid crystals and superconductors.

(ix) ***Analyze*** the principles of different analytical instruments and their applications. Design models for energy by different natural sources.

(x) ***Obtain*** the knowledge of computational chemistry and molecular machines

Text Books:

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

Reference Books:

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

University College of Engineering Vizianagaram

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

I Year-II Semester		L	T	P	C
		3	0	0	3
NAME OF THE SUBJECT: COMPUTER ORGANIZATION & ARCHITECTURE					

COURSE OBJECTIVES:

- Comprehensive knowledge of computer system including the analysis and design of components of the system
- Understanding Micro operations, Types of instructions, Microprogramming of control unit of CPU.
- Understanding ALU, design of basic components of the system.
- Illustration of algorithms for basic arithmetic operations.
- Description of different parameters of a memory system, organization and mapping of various types of memories.
- Describes the means of interaction devices with CPU, their characteristics, modes

COURSE OUTCOMES:

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

6. Identify functional units, bus structure and understand data representation
7. Understand the instruction code and micro-programmed control units.
8. Design Arithmetic Logic Unit.
9. Implement computer arithmetic operations.
10. Analyze performance of memory and I/O devices

Unit-I:

Data representation: signed number representation, fixed and floating point representations, character representation, Error Detection codes.

Basic functional blocks of a computer: Functional Units, Bus structure**,** Register Transfer Language, Register Transfer, Bus and Memory Transfers.

Unit-II:

Central Processing Unit: Instruction codes, instruction set, instruction execution cycle, Input-output Interrupts, instruction formats, addressing modes.

Microprogramed control unit: Control Memory, Address sequencing, and microprogram example.

Unit-III:

Design of Arithmetic and Logic Unit: Digital logic gates, Boolean algebra, Simplification of Boolean Expressions-K-Map, Sum of Products, Product of Sums, Don’t Cares, Combinational logic circuits – Half Adder, Full Adder, Encoder, Decoder, Multiplexer and Demultiplexer.

Unit-IV:

Computer Arithmetic–signed magnitude addition and subtraction, carry look-ahead adder. multiplication - Hardware Implementation for Signed Magnitude, Hardware Algorithm, Booth multiplication, Division – Hardware Implementation for Signed Magnitude data, Divide Overflow, Hardware Algorithm, Floating Point Arithmetic.

Unit-V:

Memory system: Basic Concepts, semiconductor memory technologies -Internal organization of memory chips, Static Memories, Asynchronous and Synchronous DRAMs, ROM, Speed, size and cost, cache memory, Performance considerations

Peripheral devices and their characteristics: Peripheral Devices, Input Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, DMA, IOP.

Textbooks

4. M Morris Mano, "Computer System Architecture", 3rd edition, Tata Mc-Graw Hill.
5. Carl Hamacher, Zvonko Vranesic and SafwatZaky, "Computer Organization", 5thEdition, Tata Mc-Graw Hill, 2002.
6. M Morris Mano ,Michael D. Ciletti, "Digital Design- With an Introduction to the Verilog HDL", 5thedition, Pearson Education.

References

4. Hayes, J.P., "Computer Architecture and Organization", 3rdEdition, Tata Mc-Graw Hill, 1998.
5. Patterson, D. A., and Hennessy, J.L., "Computer Organization and Design: The Hardware/Software Interface", 3rdEdition, Elsevier, 2005.
6. William Stallings, "Computer Organization and Architecture – Designing for Performance", 6thEdition, Pearson Education, 20

University College of Engineering Vizianagaram
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

I Year-II Semester		L	T	P	C
		3	0	0	3
NAME OF THE SUBJECT: DATA STRUCTURES					

Course Objectives:

The objective of the course is to

- Introduce the fundamental concept of data structures and abstract data types.
- Emphasize the importance of data structures in developing and implementing efficient algorithms.
- Describe how arrays, records, linked structures, stacks, queues, trees, and graphs are represented in memory and used by algorithms.

UNIT I

Data Structures - Definition, Classification of Data Structures, Operations on Data Structures, Abstract Data Type (ADT), Preliminaries of algorithms. Time and Space complexity.

Searching - Linear search, Binary search, Fibonacci search.

Sorting- Insertion sort, Selection sort, Exchange (Bubble sort, quick sort), distribution (radix sort), merging (Merge sort) algorithms.

UNIT II

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

UNIT III

Queues: Introduction to Queues, Representation of Queues-using Arrays and using Linked list, Implementation of Queues-using Arrays and using Linked list, Application of Queues-Circular Queues, Deques, Priority Queues, Multiple Queues.

Stacks: Introduction to Stacks, Array Representation of Stacks, Operations on Stacks, Linked list Representation of Stacks, Operations on Linked Stack, Applications-Reversing list, Factorial Calculation, Infix to Postfix Conversion, Evaluating Postfix Expressions.

UNIT IV

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

UNIT V

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

Course Outcomes:

After completing this course a student will be able to:

- Summarize the properties, interfaces, and behaviors of basic abstract data types.
- Discuss the computational efficiency of the principal algorithms for sorting & searching.
- Correlate fundamental data structures like lists, queues and stacks with their applications.
- Use arrays, records, linked structures, stacks, queues, trees, and Graphs in writing programs.
- Demonstrate different methods for traversing trees & graphs.

Text Books:

3) Data Structures and algorithm analysis in C, 2nded, Mark Allen Weiss.
4) Fundamentals of Data Structures in C, 2nd Edition, Horowitz, Sahni, Universities Press.

Reference Books:

4) Data Structures Using C. 2nd Edition.Reema Thareja, Oxford.

5) Data Structures: A PseudoCode Approach, 2/e, Richard F.Gilberg, Behrouz A. Forouzon, Cengage.

6) Data Structures with C, Seymour Lipschutz TMH,1/e

e-Resources:

4) http://algs4.cs.princeton.edu/home/

5) https://faculty.washington.edu/jstraub/dsa/Master_2_7a.pdf

6) NPTEL video lectures by Dr.Naveen Garg,IIT Delhi.

B. Tech - R20 Syllabus APPENDIX – 1

University College of Engineering Vizianagaram
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

		L	T	P	C
I Year-II Semester		**1**	**0**	**4**	**3**
NAME OF THE SUBJECT: PYTHON PROGRAMMING					

Course Objectives:

The objectives of this course is to acquire knowledge on the

viii. Introduction to Scripting Language.
ix. Exposure to various problems solving approaches of computer science in various Domains.
x. Understand structure and data types of python script.
xi. Implement iterations and functions in python.
xii. Implement modules and data structures using mutable & immutable objects.
xiii. Understand object oriented concepts on real world scenarios.
xiv. Understand packages for statistics and gaming.

UNIT - I:

Introduction: History of Python, Need of Python Programming, Applications, Basics of Python Programming Using the REPL(Shell), Running Python Scripts, Variables, Assignment, Keywords, Input-Output, Indentation.

Operators and Type Conversion: Types-Integers, Strings, Booleans; Operators- Arithmetic Operators, Comparison(Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations, type conversion.

UNIT II:

Control Flow: Control Flow- if, if-elif-else, for, while, break, continue, pass.

Functions: Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Fruitful Functions (Function Returning Values), Scope of the Variables in a Function - Global and Local Variables, Anonymous Functions, Lambdas, map, reduce and filter.

UNIT - III:

Modules: Creating modules, import statement, from. Import statement, name spacing, builtin modules- os, random, math, cmath, pprint, json, request, date, RegEx.

Strings & Data Structures: String, String Formatting, List, Tuples, Sets, Dictionaries, Sequences, List Comprehension, itertools, built-in functions of all Objects.

UNIT - IV:

Object Oriented Programming OOP in Python: Classes, 'self variable', Methods, Constructor Method, Inheritance, Overriding Methods, Data hiding, Duck Typing and Decorators.

Error and Exceptions: Difference between an error and Exception, Handling Exception, try except block, Raising Exceptions, User Defined Exceptions.

UNIT - V:

Python Turtle Module: Directions, Positions, Colors, Drawing States and Shapes, Filling, Visibility

Packages: Introduction to PIP, Installing packages using PIP. Mathematical Libraries: NumPy, SciPy, Sympy, Pandas, StatsModels, Matplotlib and Gnuplot.

Course Outcomes:

The students should be able to:

5. Understand the environment of python.
6. Create and run simple scripts in python.
7. Understand data types and their conversions.
8. Understand operators for doing operations on different expressions.

Text Books:

i. Python Programming: A Modern Approach, VamsiKurama, Pearson.,1/e
ii. Learning Python, Mark Lutz, Orielly,5/e
iii. Core Python Programming, W.Chun, Pearson,2/e.

Reference Books:

2. Think Python, Allen Downey, Green Tea Press. 1/e

Introduction to Python, Kenneth A. Lambert, Cengage,2/e

B. Tech - R20 Syllabus APPENDIX – 4

University College of Engineering Vizianagaram
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

		L	T	P	C
I Year-I/II Semester		**0**	**0**	**3**	**1.5**
NAME OF THE SUBJECT: APPLIED CHEMISTRY LAB					

(Common to EEE,ECE,CSE,IT)

Course Objectives:

The objectives of this course is to acquire knowledge on the

(vi) Normality , molaritiy ,theory of indicators used in different volumetric and chemical analysis.
(vii) Alkalinity and hardness of water by E DTA method.
(viii) Volumetric analysis-Red-Ox titrations of different chemical compounds.
(ix) Determination of concentration of acids and bases using conductometer and potentiometer
(x) Determination of P^H and color metric analysis

Introduction to Chemistry laboratory – Molarities, normality, primary, secondary standard solutions,

Volumetric titrations, quantitative analysis

20. Determination of HCl using standard Na_2CO_3 solution.
21. Determination of alkalinity of a sample containing Na_2CO_3 and NaOH.
22. Determination of Mn^{+2} using standard oxalic acid solution.
23. Determination of ferrous iron using standard $K_2Cr_2O_7$ solution.
24. Determination of Cu^{+2} using standard hypo solution.
25. Determination of temporary and permanent hardness of water using standard EDTA solution.
26. Determination of Fe^{+3} by a colorimetric method.
27. Determination of the concentration of acetic acid using sodium hydroxide (pH-metry method).
28. Determination of iso-electric point of amino acids using pH-metry method/conductometric method.
29. Determination of the concentration of strong acid vs strong base (by conductometric method).
30. Determination of strong acid vs strong base (by potentiometric method).
31. Determination of Mg^{+2} present in an antacid.
32. Determination of $CaCO_3$ present in an eggshell.
33. Estimation of Vitamin C.
34. Determination of phosphoric content in soft drinks.
35. Adsorption of acetic acid by charcoal.
36. Preparation of nylon-6, 6 and Bakelite (demonstration only).
37. Determination of Lead in drinking water.
38. Determination of percentage of copper in Brass.

Of the above experiments at-least 10 assessment experiments should be completed in a semester.

Course Outcomes:

(vi) Student is exposed to volumetric titrations acquires some volumetric skills.
(vii) Student is able to analyze hard and soft water.
(viii) Student is exposed to volumetric skills of red-ox titrations with different indicators
(ix) Students can handle the instruments like conductometer, potentiometer in determinening the concentrations of acids and bases.

(x) Student is able to analyze the different chemical concentrations using colorimeter and P^H meter.

Reference Books

3. A Textbook of Quantitative Analysis, Arthur J. Vogel.
4. Engineering Chemistry by Jain and Jain; Dhanpat Rai Publicating Co. Latest edition

B. Tech - R20 Syllabus APPENDIX – 1

University College of Engineering Vizianagaram
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

		L	T	P	C
I Year-II Semester		**0**	**0**	**3**	**1.5**
NAME OF THE SUBJECT: DATA STRUCTURES LAB					

Course Objectives:

The objective of this lab is to

- Demonstrate the different data structures implementation.
- Demonstrate and analyze the computational complexity of various implementations.
- Understand dynamic memory management techniques using pointers, constructors, destructors, etc.

List of Programs:

15. Write a Program for Singly linked list.
16. Write a Program for Doubly linked list.
17. Write a Program for Multitask in a Single Array.
18. Write a Program for Circular Queue.
19. Write a Program for Binary Search trees.
20. Write a Program for Heaps.
21. Write a Program for Breadth First Search Techniques.
22. Write a Program for Depth First Search Techniques.
23. Write a Program for Prim's Algorithm.
24. Write a Program for Dijkstra's Algorithm.
25. Write a Program for Kruskal's Algorithm.
26. Write a Program for Merge Sort.
27. Write a Program for Quick Sort.
28. Write a Program for Data Searching using divide and conquer technique.

Course Outcomes:

By the end of this lab the student is able to

- Use basic data structures such as arrays and linked list.
- Programs to demonstrate fundamental algorithmic problems including Tree Traversals, Graph traversals, and shortest paths.
- Use various searching and sorting algorithms.

Text Books:

6) The C Programming Language - 2nded,Brain W Kernighan and Dennis Ritchie, Prentice Hall.
7) The C++ Programming Language-Fourth Edition, Bjarne Stroustrup, Addison-Wesley.
8) Data Structures and algorithm analysis in C, 2nded, Mark Allen Weiss.
9) Fundamentals of Data Structures in C, 2nd Edition, Horowitz, Sahni, Universities Press.
10) Data Structures Using C,E.BalaGuruswamy,Tata McgrawHill,17/e

Reference Books:

4) Data Structures Using C. 2nd Edition.Reema Thareja, Oxford.
5) Data Structures: A PseudoCode Approach, 2/e, Richard F.Gilberg, Behrouz A. Forouzon, Cengage.
6) Data Structures with C, Seymour Lipschutz TMH,1/e

e-Resources:

4) http://algs4.cs.princeton.edu/home/
5) https://faculty.washington.edu/jstraub/dsa/Master_2_7a.pdf
6) NPTEL video lectures by Dr.Naveen Garg,

B. Tech - R20 Syllabus APPENDIX – 1

University College of Engineering Vizianagaram
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

I Year-II Semester		L	T	P	C
		0	0	3	1.5
NAME OF THE SUBJECT: DIGITAL SYSTEMS LAB					

COURSE OBJECTIVES:

The objectives of this course are to:

- Introduce the concept of digital and binary systems.
- To know the concepts of Combinational circuits.
- Be able to design and analyze sequential logic circuits.
- To understand the concepts of flipflops, registers and counters.
- Students will learn and understand the basics of logic gatesand circuits..

COURSE OUTCOMES:

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

8. To learn about the basics of gates.
9. To understand the basic digital circuits and to verify their operation.
10. Construct basic combinational circuits and verify their functionalities.
11. Apply the design procedures to design basic sequential circuits.
12. An ability to design and troubleshoot a simple state machine.
13. An ability to measure and record the experimental data, analyze the results, and prepare a formal laboratory report.
14. Design and analyze any digital design in real time applications.

List of Programs:

16. Verification of Basic Logic Gates.
17. Implementing all individual gates with Universal Gates NAND & NOR.
18. Design a circuit for the given Canonical form, draw the circuit diagram and verify the De-Morgan laws.
19. Design a Combinational Logic circuit for 8x1 MUX and verify the truth table.
20. Verify the data read and data write operations for the IC 74189.
21. Construct Half Adder and Full Adder using Half Adder and verify the truth table.
22. Design a 4-bit Adder/Subtractor.
23. Design and realization of 4-bit comparator.
24. Design and implement a 3 to 8 decoder using gates.
25. Design and realization of a 4-bit Gray to Binary and Binary to Grayconverter.

26. Implementation of Master Slave Flip-Flop with J-K Flip- Flop and verify the truth table for race around condition.
27. Design a Decade Counter and verify the truth table.
28. Design and implement a 4-bit shift register using Flip flops.
29. Design and Verify the 4-bit synchronous
30. Design and verify 4-bit ripple counter(Asynchronous)

TEXT BOOKS

3. Digital Design ,4/e, M.Morris Mano, Michael D Ciletti, PEA.
4. Fundamentals of Logic Design, 5/e, Roth, Cengage.

REFERENCES

6. Switching and Finite Automata Theory,3/e,Kohavi, Jha, Cambridge.
7. Digital Logic Design, Leach, Malvino, Saha,TMH,8th ed.
8. Verilog HDL primer, Jaya Bhaskar, PEA.3/e
9. Digital Fundamentals, Thomas L. Floyd, Pearson Education, ISBN:9788131734483.9/e
5.Modern Digital Electronics, R.P. Jain

II Year - I Semester

L	T	P	C
3	0	0	3

MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE

OBJECTIVES:

- Introduce the students to the topics and techniques of discrete me thods and combinatorial reasoning.
- Acquaintance with the basic mathematical implication for computer science, applications of mathematicsin computer science
- To introduce a wide variety of applications of 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.

OUTCOMES:

- Student will be able to demonstrate skills in solving mathematical problems
- Student will be able to comprehend mathematical principles and logic
- Student will be able to demonstrate knowledge of mathematical mode ling and proficiency in using mathematical software
- Student will be able to manipulate and analyze data numerically and/or graphically using appropriate Software
- Student will be able to communicate effectively mathematical ideas/results verbally or in writing

UNIT -I: Mathematical Logic: 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: 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: AlgebraicStructuresandNumberTheory: 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: 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: 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 witho*ut* Proofs).

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, 3rdEdition, 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, BernandKolman, Robert C. Busby, Sharon Cutler Ross, PHI.
3. Discrete Mathematics, S. K. Chakraborthy and B.K. Sarkar, Oxford, 2011.

II YEAR I SEMESTER **L T P C**
3 0 0 3

JAVA PROGRAMMING

COURSE OBJECTIVES:

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

- To introduce the object oriented programming concepts.
- To understand object oriented programming concepts,and apply them in solving the Problems.
- To introduce the principles of inheritance and polymorphism; and demonstrate how they relate to the design of abstract classes.
- To introduce the implementation of packages and interfaces
- To introduce the concepts of exception handling and multithreading.
- To introduce the concepts of Collection Framework.
- To introduce the design of Graphical User Interface using applets and swing controls.

UNIT-I:
INTRODUCTION TO OOP CONCEPTS:

Introduction to OOP, procedural programming language and object oriented language, principles of OOP, applications of OOP, history of java, java features, JVM, program structure. Variables, primitive data types, identifiers, literals, operators, expressions, precedence rules and associativity, primitive type conversion and casting, the flow of control.

UNIT-II:
CLASSES AND OBJECTS:

Classes and objects, class declaration, creating objects, methods, constructors and constructor overloading, garbage collector, the importance of static keyword and examples, this keyword, arrays, command-line arguments, nested classes.

UNIT-III:
INHERITANCE AND EXCEPTION HANDLING:

Inheritance, types of inheritance, super keyword, final keyword, overriding and abstract class. Interfaces, creating the packages, using packages, the importance of CLASSPATH and java.lang package. Exception handling, the importance of try, catch, throw throws and finally block, user-defined exceptions, Assertions.

UNIT-IV:
THREADS AND SYNCHRONIZATION:

Introduction, thread life cycle, creation of threads, thread priorities, thread synchronization, communication between threads. Reading data from files and writing data to files, random access file.

UNIT-V:
GUI PROGRAMMING WITH SWINGS AND AWT:

Introduction, limitations of AWT, MVC architecture, components, containers. Understanding Layout Managers, Flow Layout, Border Layout, Grid Layout, Card Layout, Grid Bag Layout.

Event Handling- The Delegation event model- Events, Event sources, Event Listeners, Event classes, Handling mouse and keyboard events, Adapter classes, Inner classes, Anonymous Inner classes.
A Simple Swing Application, Applets – Applets and HTML, Security Issues, Applets and Applications, passing parameters to applets. Creating a Swing Applet, Painting in Swing, A Paint example, Exploring Swing Controls- JLabel and Image Icon, Jtext Field, The Swing Buttons- Jbutton, Jtoggle Button, Jcheck Box, Jradio Button, Jtabbed Pane, Jscroll Pane, Jlist, Jcombo Box, Swing Menus, Dialogs.

COURSE OUTCOMES:

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

TEXT BOOKS:

1. The complete Reference Java, 9th edition, Herbert Schildt, TMH.
2. Programming in JAVA, Sachin Malhotra, Saurabh Choudary, Oxford.
3. Introduction to java programming, 7th edition by Y Daniel Liang, Pearson.

REFERENCE BOOKS:

1. An Introduction to programming and OO design using Java, J. Nino, and F.A. Hosch, John Wiley & sons.
2. Object Oriented Programming through Java, P. Radha Krishna, Universities Press.
3. Java Programming and Object oriented Application Development, R. A. Johnson, Cengage Learning.

II Year - I Semester

L	T	P	C
3	0	0	3

ADVANCED DATA STRUCTURES

Course Objectives:

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

UNIT-I: Algorithm Analysis and Hashing

Introduction to Algorithm Analysis, Step Counts, Asymptotic Notations, Amortized Analysis (Text Book 2)
Dictionaries, Hashing, Hash Functions, Open Hashing, Closed Hashing, Extendible Hashing (Text Book 1 & Reference 1)

UNIT-II: Priority Queues and Tournament Trees

Introduction to Priority Queues and ADT, implementation with Lists, Binary He aps: Operations, Build Heap, Performance Analysis, Binomial Queues: Operations, Amortized Analysis, Lazy Binomial Queues (Text Book 2 & Reference 5)
Tournament Trees: Winner Trees and Loser Trees (Text Book 2)

UNIT-III: Efficient Binary Search Trees (Text Book 1)
AVL Trees, Red-Black Trees and Splay Trees: Introduction, Operations, Maximum Height, Performance Analysis

UNIT-IV: Multiway and Digital Search Trees and External Sorting
(Text Book 1) Multiway Search Trees: B-Trees and B^+-Trees
Digital Search Trees: Digital Search Trees, Binary Tries, PARTRICA and Multiway Tries introduction, k-way merging, buffer handling, run generation, optimal merging of runs

UNIT-V: String Matching (Text Book 3)
Exact String Matching: Straightforward Algorithms, The Knuth-Morris-Pratt Algorithm, The Boyer-Moore Algorithm, Multiple Searches, Bit-Oriented Approach, Matching Sets of Words, Regular Expression Matching, Suffix Tries and Trees, Suffix Arrays

Course Outcomes:

- Be able to understand and apply asymptotic analysis on data structures, including search trees, heaps, and dictionaries.
- Understand the implementation and complexity analysis of external sorting and

string matching algorithms.
- Have an idea of applications of data structures and algorithms in a variety of areas, including linear programming and duality, string matching, game -theory.

TEXT BOOKS:

1. Fundamentals of Data Structures in C: Second Edition, Horowitz, Sahani, Anderson Freed, Universities Press.
2. Data Structures, Algorithms and Applications in C++, Second Edition, Sartaj Sahani, Universities Press.

REFERENCE BOOKS:

1. Data structures and Algorithm Analysis in C, 2nd edition, Mark Allen Weiss, Pearson
2. "Introduction to Algorithms", T. Cormen, R.Rivest, C. Stein, C. Leiserson, PHI publication, Second Edition, 2004, ISBN 81-203-2141-3.
3. Data Structures, a Pseudo code Approach, Richard F Gilberg, Behrouz A Forouzan, Cengage.

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

II YEAR – I SEMESTER **L T P C**

3 0 0 3

DATA BASE MANAGEMENT SYSTEMS

COURSE OBJECTIVES:

To learn the principles of systematically designing and using large scale Database Management Systems for various applications.

UNIT-I:

An Overview of Database Management, Introduction- What is Database System. What is Database-Why Database- 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. The E/R Models, The Relational Model, Relational Calculus, Introduction to Database Design, Database Design and ER Diagrams-Entities Attributes, and Entity Sets-Relationship and Relationship Sets-Conceptual Design With the ER Models, The Relational Model Integrity Constraints

UNIT-II:

Overview 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.

UNIT-IV:

Schema Refinement (Normalization) : Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency(1NF, 2NF and 3 NF), concept of surrogate key, Boyce-codd normal form(BCNF), Lossless join and dependency preserving decomposition, Fourth normal form(4NF).

UNIT-V:

Transaction Management and Concurrency Control: Transaction, properties of transactions, transaction log, and 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.

COURSE OUTCOMES:

- Describe a relational database and object-oriented database.
- Create, maintain and manipulate a relational database using SQL
- Describe ER model and normalization for database design. Examine issues in data storage and query processing and can
- formulate appropriate solutions.
- Understand the role and issues in management of data such as efficiency, privacy, security, ethical responsibility, and strategic advantage.
- 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
3. Database Systems - The Complete Book, H G Molina, J D Ullman, J Widom Pearson

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

II YEAR I SEMESTER **L T P C**
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

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:
SUBPROGRAMS 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:
PROGRAMMING LANGUAGES:
Functional: Introduction to lambda calculus, fundamentals of functional programming languages, Programming with Scheme, Programming with ML.
Logic: 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, Pearson Education
2. Programming Languages, 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.
3. Richard A. O'Keefe, "The craft of Prolog", MIT Press, 2009.
4. W. F. Clocksin and C. S. Mellish, "Programming in Prolog: Using the ISO Standard", Fifth Edition, Springer, 2003

II YEAR I SEMESTER **L T P C**
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JAVA PROGRAMMING LAB

COURSE OBJECTIVES:

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

- To introduce the object oriented programming concepts.
- To understand object oriented programming concepts,and apply them in solving the Problems.
- To introduce the implementation of packages and interfaces
- To introduce the concepts of exception handling and multithreading.
- To introduce the concepts of Collection Framework.

EXERCISE – 1: (Basics)

a)Write a JAVA program to display default value of all primitive data type of JAVA
b) Write a java program that display the roots of a quadratic equation ax2+bx=0. Calculate the discriminate D and basing on value of D, describe the nature of root.
c) Five Bikers Compete in a race such that they drive at a constant speed which may or may not be the same as the other. To qualify the race, the speed of a racer must be more than the average speed of all 5 racers. Take as input the speed of each racer and print back the speed of qualifying racers.
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 a given list of elements using bubble sort
c) Write a JAVA program to sort 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 implements in above problem.

EXERCISE – 9: (User defined Exception)

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

EXERCISE – 10: (Threads)

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

EXERCISE – 11: (Threads continuity)

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

EXERCISE – 12: (Packages)

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

EXERCISE – 13: (Applet)

a).Write a JAVA program to paint like paint brush in applet.
b) Write a JAVA program to display analogy 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 event user entering text in a Applet.

EXERCISE – 15: (Swings)

a).Write a JAVA programto 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:

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

II Year - I Semester	**L**	**T**	**P**	**C**
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ADVANCED DATA STRUCTURES LAB

OBJECTIVES:

- Describe and implement a variety of advanced data structures (hash tables, priority queues, and balanced and digital search trees).
- Analyze the space and time complexity of the algorithms studied in the course.

OUTCOMES:

- Be able to implement different hashing technique and study clustering problems exhibited.
- Be able to implement Priority Queues, Heaps and Efficient Search trees.
- Understand the implementation and complexity analysis of external sorting and string matching algorithms.

W rite C programs to perform the below set of tasks:

Week-1: To implement Open Hashing.

Week-2: To implement Closed Hashing with:

a. Linear Probing
b. Linear Probing with steps
c. Pseudo Random Probing
d. Quadratic Probing
e. Double Hashing

(Also identify the type of clustering exhibited by each of the above methods)

Week-3: To implement Priority Queues with:

f. Ordered Lists
g. Unordered Lists
h. Binary Heaps

Week-4: To construct a binary heap using build_heap algorithm.

Week-5: To simulate AVL tree rotations.

Week-6: To identify whether a given tree is Red-Black Tree or not.

Week-7: To implement k-way merging of runs.

Week-8: To implement Knuth-Morris-Pratt algorithm

W eek-9: To implement Boyer-Moore Algorithm

Week-10: To implement bit-oriented string matching.

II YEAR - I SEMESTER **L T P C**
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DATA BASE MANAGEMENT SYSTEMS LAB

COURSE OBJECTIVES:

- To provide a sound introduction to the discipline of database management as a 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. 18

16. Demonstration of database connectivity

CASE STUDY:

1. Building Data Base Systems for following Case Studies
    - Online Library Information Systems
    - ATM Application
    - Reservation Systems

COURSE OUTCOMES:

- Understand, appreciate and effectively explain the underlying concepts of database technologies
- Design and implement a database schema for a given problem-domain

II YEAR I SEMESTER

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WEB DESIGNING LAB

COURSE OBJECTIVES:

- To provide knowledge on Internet and its related concepts.
- To enrich the knowledge of scripting languages.
- To introduce advance HTML tags.
- To enable the learner to become a Web Designer.

Course Outcomes:

- Be able to use the HTML programming language.
- Resolves written HTML codes.
- Runs the page he/she has designed using HTML codes.
- Be able to use the **Design** Programs.
- Uses Microsoft Expression **Web** 4 programme.
- Designs site and page via Microsoft Expression **Web** 4 programme.
- Uses the program **Web** Page Maker.

Task1: Design a page having suitable background colour and text colour with title "My First Web Page" using all the attributes of the Font tag.

Task 2: Create a HTML document giving details of your [Name, Age], [Address, Phone] and [Register Number, Class] aligned in proper order using alignment attributes of Paragraph tag.

Task3: Write HTML code to design a page containing some text in a paragraph by giving suitable heading style.

Task4: Create a page to show different character formatting (B, I, U, SUB, SUP) tags.

Task5: Write HTML code to create a Web Page that contains an Image at its centre.

Task6: Create a web page with an appropriate image towards the left hand side of the page, when user clicks on the image another web page should open.

Task7: Create web Pages using Anchor tag with its attributes for external links.

Task8: Create a web page for internal links; when the user clicks on different links on the web page it should go to the appropriate locations/sections in the same page.

Task9: Write a HTML code to create a web page with pink colour background and display moving message in red colour.

Task10: Create a web page, showing an ordered list of all second semester courses (Subjects).

Task11: Create a web page, showing an unordered list of names of all the B.Tech Programmes (Branches) in your institution.

Task12: Create a HTML document containing a nested list showing a content page of any book.

Task13: Create the following table in HTML with Dummy Data: Reg. Number Student Name Year/Semester .

TEXT BOOK :

1. Deven N. Shah , A Complete Guide to Internet and Web Programming, DreamTech Press, New Delhi (For 1 to 5 units).

REFERENCES:

1. Raj Kamal , Internet and Web Technologies, TataMcGraw Hill, New Delhi.
2. Margaret Levine Young , Internet: The Complete Reference, TataMcGraw Hill, New Delhi

II Year-I Semester

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MANDATORY COURSE(AICTE Suggested)
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.

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

A.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:

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

II YEAR – II SEMESTER **L T P C**
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PROBABILITY AND STATISTICS

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II Year-II Semester		**3**	**0**	**0**	**3**
PROBABILITY AND STATISTICS					

Course Objectives:

(i) To familiarize the students with the foundations of probability and statistical methods

(ii) To impart probability concepts and statistical methods in various applications Engineering

Unit – I: Descriptive statistics and methods for data science:

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: Probability and Distributions:

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 – III: Sampling Theory:

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 –Standard error and Maximum error of estimate.

UNIT – IV: Tests of Hypothesis:

Introduction – Hypothesis – Null and Alternative Hypothesis – Type I and Type II errors – Level of significance- Confidence limits-Test of significance for large samples-single and two means – single and two proportions- Student's t- distribution- significance test of a sample mean – significance test of difference between sample means.F-test, chi-square test (χ^2) and test of goodness of fit.

UNIT – V: Regression analysis:
Method of least squares – Straight line – Parabola – Exponential – Power curves.
Regression - Regression coefficients and properties **–** Curvilinear Regression, Multiple Regression - Correlation – Correlation coefficient – Rank correlation

Course Outcomes:

The student should be able to

(i) Classify the concepts of data science and its importance

(ii) Interpret the association of characteristics and through correlation and regression tools

(iii) Make use of the concepts of probability and their applications and Apply discrete and continuous probability distributions

(iv) Infer the statistical inferential methods based on small and large sampling tests

(v) Design the components of a classical hypothesis test

Text Books:

(i) **Miller and Freund's**, Probability and Statistics for Engineers,7/e, Pearson, 2008.

(ii) **S. C. Gupta and V.K. Kapoor**, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012.

Reference Books:

(i) **Shron L. Myers, Keying Ye, Ronald E Walpole,** Probability and Statistics Engineers and the Scientists,8th Edition, Pearson 2007.

(ii) **Jay l. Devore,** Probability and Statistics for Engineering and the Sciences, 8th Edition, Cengage.

(iii) **Sheldon M. Ross**, Introduction to probability and statistics Engineers and the Scientists, 4th Edition, Academic Foundation, 2011.

(iv) **Johannes Ledolter and Robert V. Hogg**, Applied statistics for Engineers and Physical Scientists, 3rd Edition, Pearson, 2010.

II YEAR II SEMESTER **L T P C**
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PRINCIPLES OF SOFTWARE ENGINEERING

COURSE OBJECTIVES:

- Graduates are effective team members, aware of cultural diversity, who conduct themselves ethically and professionally.
- Graduates use effective communication skills and technical skills to assure production of quality software, on time and within budget.
- Graduates build upon and adapt knowledge of science, mathematics, and engineering to take on more expansive tasks that require an increased level of self-reliance, technical expertise, and leadership.

UNIT–I:
INTRODUCTION:
Evolution-From An Art Form to an Engineering Discipline, Evaluation of an Art into an Engineering Discipline, Evaluation Patterns for Engineering Discipline, A Solution to the Software Crisis. Software Development Projects-Types of Software Development Projects, Software Projects Being Undertaken by Indian Companies. Exploration Style of Software Development-Perceived Problem Complexity, Principles Deployed by Software Engineering to Overcome Human Cognitive Limitations.

SOFTWARE LIFE CYCLE MODELS:
Waterfall model and its extensions-Classical Waterfall Model, Iterative Waterfall Model, V-Model, Prototyping Model, Incremental Development Model, Evolutionary Model .Rapid Application Development-Working of RAD, Applicability of RAD Model, Comparison Of RAD With Other Models. Agile Development Model-Essential Idea Behind Agile Models, Agile Verses Other Models, Extreme Programming Model, Scrum Model. Spiral Model-Phases Of The Spiral Models.
A Comparisons Of Different Models-Selecting An Appropriate Life Cycle Model For A Project.

UNIT–II:
SOFTWARE REQUIREMENT ANALYSIS AND SPECIFICATION:
Value of good SRS, requirement process, requirement specification, functional specifications with use-cases, other approaches for analysis, validation .
Planning a software project: Effort estimation, project schedule and staffing, quality planning ,risk management planning, project monitoring plan, detailed scheduling.

UNIT- III:
SOFTWARE DESIGN:
Overview of design process, Cohesion and coupling, Layered arrangement of modules, Approaches to software design.
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 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:

- knowledge of basic SW engineering methods and practices, and their appropriate application;
- General understanding of software process models such as the waterfall and evolutionary models.
- Understanding of the role of project management including planning, scheduling, risk management, etc.
- Understanding of software requirements and the SRS document.
- Understanding of different software architectural styles.
- Understanding of implementation issues such as modularity and coding standards.
- Understanding of approaches to verification and validation including static analysis, and reviews.
- Understanding of software testing approaches such as unit testing and integration testing.
- Understanding of software evolution and related issues such as version management.
- Understanding on quality control and how to ensure good quality software.
- Development of significant teamwork and project based experience.

TEXTBOOKS:

1. Software Engineering, Ian Sommerville, 11th edition, Pearson education.
2. Fundamentals of Software Engineering, Rajib Mall, Fifth Edition, PHI.
3. Software Engineering, 3/e, & 7e Roger S.Pressman, TMH

REFERENCEBOOKS:

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

II Year - II Semester

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COMPUTER NETWORKS

OBJECTIVE:

- To educate basic knowledge of networking technologies and network management concepts
- To interpret the layering concepts in computer networks.
- To analyze the functions of each layer and gain knowledge in different applications that use computer networks.
- To emphasize the hand-on experience of network topology in a laboratory environment
- To be familiar with contemporary issues in networking technologies

OUTCOMES:

- To understand the organization of computer networks, factors influencing computer network development and the reasons for having variety of different types of networks.
- To contrast the protocol architectures such as OSI and TCP/IP
- To explain how a collision occurs and how to solve it.
- To demonstrate proper placement of different layers of ISO model and illuminate its function.
- To be familiar with network tools and network programming.
- To determine proper usage of the IP address, subnet mask and default gateway in a routed network.
- To understand internals of main protocols such as HTTP, FTP, SMTP, TCP, UDP, IP
- To impart basic concepts and basic skills for setting up routers

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

UNIT – II : Physical Layer and overview of Physical Layer Switching:
Transmission Modes-Transmission media (Guided and Unguided Media).Multiplexing: frequency division multiplexing, wave length division multiplexing, synchronous time division multiplexing, statistical time division multiplexing, introduction to switching: Circuit Switched Networks, Datagram Networks, Virtual Circuit Networks

UNIT-III: Data link layer: Design issues: Framing, Flow control, Error control, CRC, Checksum: idea, one's complement internet checksum, services provided to Network Layer, Elementary Data Link Layer protocols: simplex protocol, Simplex stop and wait, Simplex protocol for Noisy Channel .**Sliding window**

protocol: One bit, Go back N, Selective repeat-Stop and wait protocol, Data link layer in HDLC: configuration and transfer modes, frames, control field.

UNIT-IV: Random Access: ALOHA, MAC addresses, Carrier sense multiple access (CSMA), CSMA /CD, CSMA/CA, Controlled Access: Reservation, Polling, Token Passing, Channelization: frequency division multiple access(FDMA), time division multiple access(TDMA), code division multiple access(CDMA).
Network Layer: IP Addresses – Ipv4&IPv6 – Internetworking, Routing algorithm shortest path routing, Flooding, Hierarchical routing, Broadcast, Multicast, distance vector routing. IEEE Standards: – Standard Ethernet: MAC sub layer, physical layer, Fast Ethernet: MAC sub layer, physical layer, IEEE-802.11: Architecture, MAC sub layer, addressing mechanism, frame **structure.**

UNIT-V: Transport Layer & Application Layer: Process to Process Delivery - User Datagram - Protocol (UDP) - Transmission Control Protocol (TCP) - Congestion Control- Quality of services (QOS) - Integrated Services - Domain Name Space (DNS) - FTP – HTTP- WWW & HTTP.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Larry L. Peterson and Bruce S. Davie, "Computer Networks - A Systems Approach" (5^{th} edition)
2. Computer Networks, Mayank Dave, CENGAGE Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson

II YEAR II SEMESTER **L T P C**
3 0 0 3

OPERATING SYSTEMS

COURSE OBJECTIVES:

- Understand the fundamental principles of the operating system, its services and functionalities.
- Illustrate the concepts of processes, inter-process communication, synchronization and scheduling.
- Understand different types of memory management viz. virtual memory, paging and segmentation.
- Identify the reasons for deadlock and understand the techniques for deadlock detection, prevention and recovery.
- Understand the need of protection and security mechanisms in computer systems.

UNIT I:
OPERATING SYSTEMS OBJECTIVES AND FUNCTIONS:

Computer system architecture, operating systems structure, operating systems operations; Evolution of operating systems: Simple batch, multi programmed, time shared, personal computer, parallel distributed systems, real time systems, special purpose systems, operating system services, user operating systems interface; Systems calls: Types of systems calls, system programs, protection and security, operating system design and implementation.

UNIT II:
PROCESS CONCEPTS:

The process, process state, process control block, threads; Process scheduling: Scheduling queues, schedulers, context switch, pre-emptive scheduling, dispatcher, scheduling criteria, scheduling algorithms, multiple processor scheduling; Real time scheduling; Thread scheduling; Case studies Linux windows; Process synchronization, the critical section problem; Peterson‘s solution, synchronization hardware, semaphores and classic problems of synchronization, monitors.

UNIT III:
SYSTEM MODEL:
Deadlock characterization, methods of handling deadlocks, deadlock prevention, dead lock avoidance, dead lock detection and recovery form deadlock system protection, goals of protection.

UNIT IV:
LOGICAL AND PHYSICAL ADDRESS SPACE:

Swapping, contiguous memory allocation, paging, structure of page table. Segmentation: Segmentation with paging, virtual memory, demand paging; Performance of demand paging: Page replacement, page replacement algorithms, allocation of frames, thrashing.

UNIT V:
FILE SYSTEM IMPLEMENTATION AND DISK SCHEDULING:

The concept of a file, access methods, directory structure, file system mounting, file sharing, protection, file system structure, file system implementation, allocation methods, free space management, directory implementation, efficiency and performance; Overview of mass storage structure: Disk structure, disk attachment, disk scheduling, disk management, swap space management; Dynamic memory allocation: Basic concepts.

COURSE OUTCOMES:

- Describe the structure of operating system and basic architectural components involved in operating system design.
- Understand the objectives and functions of modern operating systems.
- Analyze and design the applications to run in parallel either using process or thread models of different operating system.
- Understand and analyze implementation of virtual memory.
- Describe the mutual exclusion, deadlock detection in operating system.
- Describe the common algorithms used for both pre-emptive and non-pre-emptive scheduling of tasks in operating systems, such a priority and performance comparison.
- Understand issues related to file system interface and implementation, disk management.
- Understand the concepts of Storage Management, disk management and disk scheduling.
- Understand the concept of deadlock in operating systems and how they can be implemented in multiprogramming system.

TEXT BOOK:

1. Operating System Concepts,Abraham Silberschatz, Peter Baer Galvin and Greg Gagne 9th Edition, John Wiley and Sons Inc., 2012.
2.William Stallings, Operating Systems: Internals and Design Principles, 8thedition Pearson Education Limited, 2014 ISBN: 1292061944, 9781292061948
3. Operating Systems-S Halder, Alex A Aravind Pearson Education Second Edition 2016 .

REFERENCE BOOKS:

1.D.M Dhamdhere: Operating systems –A concept based Approach, 3rd Edition, Tata McGraw-Hill,2012.
2.P.C.P. Bhatt: Introduction to Operating Systems Concepts and Practice, 3rd Edition, PHI, 2010.
3.Harvey M Deital: Operating systems, 3rd Edition, Pearson Education, 2011.

		L	T	P	C
II Year-II Semester		**3**	**0**	**0**	**3**
MANAGERIAL ECONOMICS AND FINANCIAL ACCOUNTANCY					

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.

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 elasticity for a product
- 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
- 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
7. Mr. Kashi Reddy and Sarawathi, Managerial Economics and Financial Analysis, PHI, 2010 Edition.

II YEAR II SEMESTER

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0	0	3	1.5

SOFTWARE ENGINEERING LAB

COURSE OBJECTIVE:

The Software Engineering lab will facilitate the students to develop a preliminary yet practical understanding of the software development process and tools

List of Experiments:

Take any real-time problem and do the following experiments

1. Do the Requirement Analysis and Prepare SRS
2. Design all UML Diagrams
3. Using COCOMO model estimate effort.
4. Calculate effort using FP oriented estimation model.
5. Develop a Timeline chart and project table using PERT or CPM project scheduling methods.
6. Draw E-R diagrams, DFD, CFD, and structured charts for the project.
7. Design of Test cases based on requirements and design.
8. Prepare Version control and change control for software configuration items

COURSE OUTCOMES:

Students completing this course will be able to:

- Identify the purpose and methods of use of common object-oriented design patterns
- Select and apply these patterns in their designs for simple programs
- Represent the data dependencies of a simple program using UML
- Represent user and programmatic interactions using UML
- Create design documentation outlining the testable and complete design of a simple program
- Produce and present documents for the purpose of capturing software requirements and specification
- Produce plans to limit risks specific to software designed for use in a particular social context

II YEAR II SEMESTER

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COMPUTER NETWORKS LAB

Course Objectives:

- Understand and apply different network commands
- Analyze different networking functions and features for implementing optimal solutions
- Apply different networking concepts for implementing network solution
- Implement different network protocols

Course Outcomes:

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

II YEAR II SEMESTER

L	T	P	C
0	0	3	1.5

OPERATING SYSTEMS LAB

COURSE OBJECTIVES:

- To familiarize students with UNIX/LINUX environment
- To learn fundamentals of Shell Scripting/Programming
- Design and implement common System Automation tasks using Shell Scripts
- Build 'C' program for process and file system management using system calls
- Choose the best CPU scheduling algorithm for a given problem instance
- Identify the performance of various page replacement algorithms
- Develop algorithm for deadlock avoidance and detection
- Simulate various file allocation strategies

LIST OF EXPERIMENTS:

1. Simulate the following CPU scheduling algorithms
a)Round Robin b) SJF c) FCFS d)Priority

2.Multiprogramming-Memory management- Implementation of fork (), wait (), exec() and exit () System Calls

3 Simulate the following:
a)MVT b)MFT

4. Simulate Bankers Algorithm for Dead Lock Avoidance

5. Simulate Bankers Algorithm for Dead Lock Prevention.

6. Simulate the following page replacement algorithms.
a) FIFO b) LRU c) LFU

7.Simulate the following File allocation strategies
a) Sequenced b) Indexed c) Linked

COURSE OUTCOMES:

- After the Completion of the course the student will be able to:
- Have hands-on-knowledge on basic commands and shell scripting/programming
- Have hands-on-knowledge of basic principles of Unix file system and System calls
- Can easily be able to write shell scripts to automate various applications
- Can easily evaluate the performance of various CPU scheduling algorithms.
- the deadlock Avoidance and Prevention.

II YEAR II SEMESTER

L	T	P	C
1	0	2	2

DATA EXPLORATION

1. *Introduction to the Data Exploration Components (Series and Data Frames) using Pandas in python*
   a. *Import Pandas*
   b. *Loading the data various formats (.XLS, .TXT, .CSV, JSON) using Pandas*
   c. *Describe Data, Modify Data, Grouping Data, Filtering Data*
   d. *Converting a variable to a different data type back to a CSV, JSON, or SQL*

2. *Reading and writing files*
   a. Reading a CSV File
   b. Writing content of data frames to CSV File
   c. Reading an Excel File
   d. Writing content of data frames to Excel File

3. *Getting the Dataset*

a. Viewing your data
b. Data Set Description
c. Describe as category
d. Handling duplicates
e. Number of observations Per Category
f. Column cleanup

4. *Getting the Dataset continuation*

a. Removing null values
b. Understanding your variables
c. Relationships between continuous variables
d. DataFrame slicing, selecting, extracting
e. Conditional selections

5. *Getting Preview of DataFrame*

a. Creating DataFrames from scratch
b. Looking at top n records
   c. Looking at bottom n records
   d. View columns names

6. *Creating New Columns, Rename Columns of Data Frames*
   a. Rename method helps to rename column of data frame
   b. To rename the column of existing data frame set inplace=True

7. *Selecting Columns or Rows*
    a. Accessing sub data frames
    b. Filtering Records

8. *Handling Missing Values*
    a. Dropna
    b. Fillna
    c. Recognize and Treat missing values and outliers in Pandas
9. *Aggregate*
    a. Groupby
        I. Splitting the data into groups
        II. Applying a function to each group individually
        III. Combining the result into a data structure
    b. Pivot thable
    c. Cross tab

10. *Operations on Data Frames*
a. Mearging/Concatenating Data Frames
b. Transpose a Data set or dataframe using Pandas
c. To sort a Pandas DataFrame
d. Remove duplicate values of a variable in a Pandas Dataframe

11. *Applying Function to element, column or data frame*
    a. Map
    b. Apply
    c. ApplyMap

12. *Basic Stats*
    a. Describe
    b. Convariance
    c. Correlation

13. create plots
a. Histogram
b. Scatter Plot
c. Area Plot
d. Line Plot
e. Kernel Density Estimation plot (KDE)

HONORS COURSES

II YEAR II SEMESTER **L T P C**
3 1 0 4

DATA COMMUNICATION

Course Objectives

- To have a detailed study of various analog and digital modulation and demodulation techniques
- To have a thorough knowledge of various multiplexing schemes and Data communication protocols
- To know about the standards and mechanisms of television systems.

Syllabus

Unit I

INTRODUCTION TO DATA COMMUNICATIONS AND NETWORKING:Standards Organizations for Data Communications, Layered Network Architecture, Open Systems Interconnection, Data Communications Circuits, Serial and parallel Data Transmission, Data communications Networks, Alternate Protocol Suites.
SIGNALS, NOISE, MODULATION, AND DEMODULATION: Signal Analysis, Electrical Noise and Signal-to-Noise Ratio, Analog Modulation Systems, Information Capacity, Bits, Bit Rate, Baud, and M-ary Encoding, Digital Modulation.

Unit II

METALLIC CABLE TRANSMISSION MEDIA:Metallic Transmission Lines, Transverse Electromagnetic Waves, Characteristics of Electromagnetic Waves
OPTICAL FIBER TRANSMISSION MEDIA:Advantages of Optical Fiber cables, Disadvantages of Optical Fiber Cables, Electromagnetic spectrum, Optical Fiber Communications System Block Diagram, Optical Fiber construction, Propagation of Light Through an Optical fiber Cable, Optical Fiber Modes and Classifications, Optical Fiber Comparison, Losses in Optical Fiber Cables, Light sources, Light Detectors, Lasers.

Unit III

DIGITAL TRANSMISSION:Pulse Modulation, Pulse code Modulation, Dynamic Range, Signal Voltage to- Quantization Noise Voltage Ratio, Linear Versus Nonlinear PCM Codes, Companding, PCM Line Speed, Delta Modulation PCM and Differential PCM.
MULTIPLEXING AND T CARRIERS: Time- Division Multiplexing, T1 Digital Carrier System, Digital Line Encoding, T Carrier systems, Frequency- Division Multiplexing, Wavelength- Division Multiplexing, Synchronous Optical Network.

Unit IV

WIRELESS COMMUNICATIONS SYSTEMS: Electromagnetic Polarization, Electromagnetic Radiation, Optical Properties of Radio Waves, Terrestrial Propagation of Electromagnetic Waves, Skip Distance, Free-Space Path Loss, Microwave Communications Systems, Satellite Communications Systems.

Unit V

TELEPHONE INSTRUMENTS AND SIGNALS: The Subscriber Loop, Standard Telephone Set, Basic Telephone Call Procedures, Call Progress Tones and Signals, Cordless Telephones, Caller ID, Electronic Telephones, Paging systems.

CELLULAR TELEPHONE SYSTEMS: First- Generation Analog Cellular Telephone, Personal Communications system, Second-Generation Cellular Telephone Systems, N-AMPS, Digital Cellular Telephone, Interim Standard, Global system for Mobile Communications.

Course Outcomes:

- Knowledge of working of basic communication systems
- Ability to evaluate alternative models of communication system design

TEXT BOOKS

- Introduction to Data Communications and Networking, Wayne Tomasi, Pearson Education.

Reference Books

- Data Communications and Networking, Behrouz A Forouzan, Fourth Edition.TMH.
- Data and Computer communications, 8/e, William Stallings, PHI.
- Computer Communications and Networking Technologies, Gallow, Second Edition Thomson
- Computer Networking and Internet, Fred Halsll, Lingana Gouda Kulkarni, Fifth Edition, Pearson Education.

II YEAR II SEMESTER **L T P C**
3 1 0 4

ETHICAL HACKING

Course Objectives:

- The main objective of this course is to render every database-based transaction safe, secure and simple.
- We aim to transform the internet security industry by infusing professionalism and a never-before-seen efficiency.

SYLLABUS :

UNIT-I

Hacking Windows: BIOS Passwords, Windows Login Passwords, Changing Windows Visuals, Cleaning Your Tracks, Internet Explorer Users, Cookies, URL Address Bar, Netscape Communicator, Cookies, URL History, The Registry, Baby Sitter Programs.

UNIT-II

Advanced Windows Hacking: Editing your Operating Systems by editing Explorer.exe, The Registry, The Registry Editor, Description of .reg file, Command Line Registry Arguments, Other System Files, Some Windows & DOS Tricks, Customize DOS, Clearing the CMOS without opening your PC, The Untold Windows Tips and Tricks Manual, Exiting Windows the Cool and Quick Way, Ban Shutdowns: A Trick to Play, Disabling Display of Drives in My Computer, Take Over the Screen Saver, Pop a Banner each time Windows Boots, Change the Default Locations, Secure your Desktop Icons and Settings.

UNIT-III

Getting Past the Password: Passwords: An Introduction, Password Cracking, Cracking the Windows Login Password, The Glide Code, Windows Screen Saver Password, XOR, Internet Connection Password, Sam Attacks, Cracking Unix Password Files, HTTP Basic Authentication, BIOS Passwords, Cracking Other Passwords.

UNIT-IV

The Perl Manual: Perl: The Basics, Scalars, Interacting with User by getting Input, Chomp() and Chop(), Operators, Binary Arithmetic Operators, The Exponentiation Operator(**), The Unary Arithmetic Operators, Other General Operators, Conditional Statements, Assignment Operators. The?: Operator, Loops, The While Loop, The For Loop, Arrays, THE FOR EACH LOOP: Moving through an Array, Functions Associated with Arrays, Push() and Pop(), Unshift() and Shift(), Splice(), Default Variables, $_, @ARGV, Input Output, Opening Files for Reading, Another Special VariableS.

UNIT-V

How does a Virus Work? What is a Virus? Boot Sector Viruses (MBR or Master Boot Record), File or Program Viruses, Multipartite Viruses, Stealth Viruses, Polymorphic Viruses, Macro Viruses, Blocking Direct Disk Access, Recognizing Master Boot Record (MBR) Modifications, Identifying Unknown Device Drivers, How do I make my own Virus?, Macro Viruses, Using Assembly to Create your own Virus, How to Modify a Virus so Scan won‟t Catch it, How to Create New Virus Strains,

Simple Encryption Methods.

Course Outcomes:

By the end of the course students will

- Learn various hacking methods.
- Perform system security vulnerability testing.
- Perform system vulnerability exploit attacks.
- Produce a security assessment report
- Learn various issues related to hacking.

TEXT BOOKS:

1. Patrick Engbreston: "The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy",1st Edition, Syngress publication,2011.
2. Ankit Fadia : "Unofficial Guide to Ethical Hacking", 3rd Edition , McMillan India Ltd,2006.

REFERENCES:

1. Simpson/backman/corley, "HandsOn Ethical Hacking & Network Defense International", 2nd Edition,Cengageint,2011.

II YEAR – II SEMESTER **L T P C**
3 1 0 4

BIOMETRIC SYSTEMS

Course Objectives

1. To develop fundamental knowledge in the phases of biometric systems for identification and verification tasks.

2. To quantitatively and qualitatively evaluate the strength and weaknesses of several biometric modalities from measures, such as error metrics, usability, and public perception, and apply these skills to emerging biometric technologies.

3. To assess the boundaries between privacy, security, and ethics and the impacts on large- scale implementations of biometric systems.

Unit 1

Introduction - Biometric fundamentals – Biometric technologies – Biometrics vs. traditional techniques – Characteristics of a good biometric system – Benefits of biometrics – Key biometric processes: verification, identification and biometric matching – Performance measures in biometric systems.

Unit 2

Physiological Biometrics - Leading technologies: Finger-scan – Facial-scan – Irisscan – Voice- scan – components, working principles, competing technologies, strengths, and weaknesses – Other physiological biometrics: Hand-scan, Retinascan – components, working principles, competing technologies, strengths, and weaknesses – Automated fingerprint identification systems. Behavioural Biometrics: Leading technologies: Signature-scan – Keystrokescan – components, working principles, strengths, and weaknesses.

Unit 3

Standards in Biometrics - Assessing the Privacy Risks of Biometrics – Designing Privacy - Sympathetic Biometric Systems – Need for standards – different biometric standards - Categorizing biometric applications.

Unit 4

MULTIBIOMETRICS, Multi-sensor systems, Multi-algorithm systems, Multi-instance systems, Multi-sample systems, Multimodal systems, Acquisition and Processing Architecture, Fusion Levels.

Unit 5

SECURITY OF BIOMETRIC SYSTEMS, Adversary Attacks, Insider attacks, Infrastructure attacks, Attacks at the User Interface, Impersonation, Obfuscation, Spoofing, Countermeasure: spoof detection, Attacks on Biometric Processing, Attacks on the system modules, Attacks at **the interconnections, Attacks on the Template Database.**

Course Outcomes:

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

- Identify the various Biometric technologies.
- Design of biometric recognition for the organization.
- Develop simple applications for privacy.
- Understand the research on biometric techniques.
- Understand the need for biometric in society.

Text Books:

1. Anil K. Jain, Patrick Flynn, and Arun A. Ross, "Handbook of Biometrics," Springer, 2008.
2. Jain, A. K., Ross, A. A., & Nandakumar, K. (2011). Introduction to biometrics. Springer Science & Business Media.

Reference Books:

1. Paul Reid, Samir Nanavati, Michael Thieme and Raj Nanavati, "Biometrics – Identity Verification in a Networked World," Wiley-Dream Tech India Private Limited, New Delhi, 2003.

2. John R. Vacca, "Biometric Technologies and Verification Systems," Elsevier Inc, 2007

II YEAR – II SEMESTER **L T P C**
3 1 0 4

DATA VISUALIZATION

COURSE OBJECTIVES:

- This course is all about data visualization, the art and science of turning data into readable graphics. Will explore how to design and create data visualizations based on data available and tasks to be achieved.
- This process includes data modeling, data processing (such as aggregation and filtering), mapping data attributes to graphical attributes, and strategic visual encoding based on known properties of visual perception as well as the task(s) at hand.
- Students will also learn to evaluate the effectiveness of visualization designs, and think critically about each design decision, such as choice of color and choice of visual encoding.
- Students will create their own data visualizations, and learn to use Open Source data visualization tools, especially D3.js.
- Students will also read papers from the current and past visualization literature and create video presentations of their findings.

Unit 1: INTRODUCTION TO VISUALIZATION

Visualizing Data-Mapping Data onto Aesthetics, Aesthetics and Types of Data, Scales Map Data Values onto Aesthetics, Coordinate Systems and Axes- Cartesian Coordinates, Nonlinear Axes, Coordinate Systems with Curved Axes, Color Scales-Color as a Tool to Distinguish, Color to Represent Data Values, Color as a Tool to Highlight, Directory of Visualizations- Amounts, Distributions, Proportions, x–y relationships, Geospatial Data

UNIT 2: VISUALIZING DISTRIBUTIONS

Visualizing Amounts-Bar Plots, Grouped and Stacked Bars, Dot Plots and Heatmaps, Visualizing Distributions: Histograms and Density Plots- Visualizing a Single Distribution, Visualizing Multiple Distributions at the Same Time, Visualizing Distributions: Empirical Cumulative Distribution Functions and Q-Q Plots-Empirical Cumulative Distribution Functions, Highly Skewed Distributions, Quantile Quantile Plots, Visualizing Many Distributions at Once-Visualizing Distributions Along the Vertical Axis, Visualizing Distributions Along the Horizontal Axis

UNIT 3: VISUALIZING ASSOCIATIONS & TIME SERIES

Visualizing Proportions-A Case for Pie Charts, A Case for Side-by-Side Bars, A Case for Stacked Bars and Stacked Densities, Visualizing Proportions Separately as Parts of the Total, Visualizing Nested Proportions- Nested Proportions Gone Wrong, Mosaic Plots and Treemaps, Nested Pies, Parallel Sets. Visualizing Associations Among Two or More Quantitative Variables-Scatterplots, Correlograms, Dimension Reduction, Paired Data. Visualizing Time Series and Other Functions of an Independent Variable-Individual Time Series, Multiple Time Series and Dose-Response Curves, Time Series of Two or More Response Variable

UNIT 4: VISUALIZING UNCERTAINTY

Visualizing Trends-Smoothing, Showing Trends with a Defined Functional Form, Detrending and Time-Series Decomposition, Visualizing Geospatial Data-Projections, Layers, Choropleth

Mapping, Cartograms, Visualizing Uncertainty-Framing Probabilities as Frequencies, Visualizing the Uncertainty of Point Estimates, Visualizing the Uncertainty of Curve Fits, Hypothetical Outcome Plots

UNIT 5: PRINCIPLE OF PROPORTIONAL INK

The Principle of Proportional Ink-Visualizations Along Linear Axes, Visualizations Along Logarithmic Axes, Direct Area Visualizations, Handling Overlapping Points-Partial Transparency and Jittering, 2D Histograms, Contour Lines, Common Pitfalls of Color Use- Encoding Too Much or Irrelevant Information, Using Nonmonotonic Color Scales to Encode Data Values, Not Designing for Color-Vision Deficiency

COURSE OUTCOMES

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

- **Understand basics of Data Visualization**
- Implement visualization of distributions
- Write programs on visualization of time series, proportions & associations
- Apply visualization on Trends and uncertainty
- Explain principles of proportions

TEXTBOOKS

1. Claus Wilke, "Fundamentals of Data Visualization: A Primer on Making Informative and Compelling Figures," 1st edition, O'Reilly Media Inc, 2019.

REFERENCE BOOKS

1 Tony Fischetti, Brett Lantz, R: Data Analysis and Visualization, O'Reilly,2016

2 Ossama Embarak, Data Analysis, and Visualization Using Python: Analyze Data to Create Visualizations for BI Systems, Apress, 2018

EBOOKS

1. https://www.netquest.com/hubfs/docs/ebook-data-visualization-EN.pdf

MOOC

2. https://www.coursera.org/learn/data-visualization
3. https://www.coursera.org/learn/python-for-data-visualization#syllabus

MINOR COURSES

II YEAR - II SEMESTER **L T P C**
3 1 0 4

JAVA PROGRAMMING

COURSE OBJECTIVES:

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

- To introduce the object oriented programming concepts.
- To understand object oriented programming concepts,and apply them in solving the Problems.
- To introduce the principles of inheritance and polymorphism; and demonstrate how they relate to the design of abstract classes.
- To introduce the implementation of packages and interfaces
- To introduce the concepts of exception handling and multithreading.
- To introduce the concepts of Collection Framework.
- To introduce the design of Graphical User Interface using applets and swing controls.

UNIT-I:
INTRODUCTION TO OOP CONCEPTS:

Introduction to OOP, procedural programming language and object oriented language, principles of OOP, applications of OOP, history of java, java features, JVM, program structure. Variables, primitive data types, identifiers, literals, operators, expressions, precedence rules and associativity, primitive type conversion and casting, the flow of control.

UNIT-II:
CLASSES AND OBJECTS:

Classes and objects, class declaration, creating objects, methods, constructors and constructor overloading, garbage collector, the importance of static keyword and examples, this keyword, arrays, command-line arguments, nested classes.

UNIT-III:
INHERITANCE AND EXCEPTION HANDLING:

Inheritance, types of inheritance, super keyword, final keyword, overriding and abstract class. Interfaces, creating the packages, using packages, the importance of CLASSPATH and java.lang package. Exception handling, the importance of try, catch, throw throws and finally block, user-defined exceptions, Assertions.

UNIT-IV:
THREADS AND SYNCHRONIZATION:

Introduction, thread life cycle, creation of threads, thread priorities, thread synchronization, communication between threads. Reading data from files and writing data to files, random access file.

UNIT-V:
GUI PROGRAMMING WITH SWINGS AND AWT:

Introduction, limitations of AWT, MVC architecture, components, containers. Understanding Layout Managers, Flow Layout, Border Layout, Grid Layout, Card Layout, Grid Bag Layout.

Event Handling- The Delegation event model- Events, Event sources, Event Listeners, Event classes, Handling mouse and keyboard events, Adapter classes, Inner classes, Anonymous Inner classes.
A Simple Swing Application, Applets – Applets and HTML, Security Issues, Applets and Applications, passing parameters to applets. Creating a Swing Applet, Painting in Swing, A Paint example, Exploring Swing Controls- JLabel and Image Icon, Jtext Field, The Swing Buttons- Jbutton, Jtoggle Button, Jcheck Box, Jradio Button, Jtabbed Pane, Jscroll Pane, Jlist, Jcombo Box, Swing Menus, Dialogs.

COURSE OUTCOMES:

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

TEXT BOOKS:

4. The complete Reference Java, 9th edition, Herbert Schildt, TMH.
5. Programming in JAVA, Sachin Malhotra, Saurabh Choudary, Oxford.
6. Introduction to java programming, 7th edition by Y Daniel Liang, Pearson.

REFERENCE BOOKS:

4. An Introduction to programming and OO design using Java, J. Nino, and F.A. Hosch, John Wiley & sons.
5. Object Oriented Programming through Java, P. Radha Krishna, Universities Press.
6. Java Programming and Object oriented Application Development, R. A. Johnson, Cengage Learning.

II YEAR – II SEMESTER **L T P C**

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DATA BASE MANAGEMENT SYSTEMS

COURSE OBJECTIVES:

To learn the principles of systematically designing and using large scale Database Management Systems for various applications.

UNIT-I:

An Overview of Database Management, Introduction- What is Database System What is Database-Why Database- 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. The E/R Models, The Relational Model, Relational Calculus, Introduction to Database Design, Database Design and ER Diagrams-Entities Attributes, and Entity Sets-Relationship and Relationship Sets-Conceptual Design With the ER Models, The Relational Model Integrity Constraints

UNIT-II:

Overview 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.

UNIT-IV:

Schema Refinement (Normalization) : Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency(1NF, 2NF and 3 NF), concept of surrogate key, Boyce-codd normal form(BCNF), Lossless join and dependency preserving decomposition, Fourth normal form(4NF).

UNIT-V:

Transaction Management and Concurrency Control: Transaction, properties of transactions, transaction log, and 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.

COURSE OUTCOMES:

- Describe a relational database and object-oriented database.
- Create, maintain and manipulate a relational database using SQL
- Describe ER model and normalization for database design. Examine issues in data storage and query processing and can
- formulate appropriate solutions.
- Understand the role and issues in management of data such as efficiency, privacy, security, ethical responsibility, and strategic advantage.
- 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
3. Database Systems - The Complete Book, H G Molina, J D Ullman, J Widom Pearson

REFERENCE BOOKS:

1. Data base Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate Pearson Education

II YEAR – II SEMESTER

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PRINCIPLES OF SOFTWARE ENGINEERING

COURSE OBJECTIVES:

- The aim of the course is to provide an understanding of the working knowledge of the techniques for estimation, design, testing and quality management of large software development projects.
- Topics include process models, software requirements, software design, software testing, software process/product metrics, risk management, quality management and UML diagrams

UNIT - I

Introduction to Software Engineering: The evolving role of software, changing nature of software, software myths. A Generic view of process: Software engineering- a layered technology, a process framework, the capability maturity model integration (CMMI), process patterns, process assessment, personal and team process models. Process models: The waterfall model, incremental process models, evolutionary process models, the unified process.

UNIT - II

Software Requirements: Functional and non-functional requirements, user requirements, system requirements, interface specification, the software requirements document. Requirements engineering process: Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management. System models: Context models, behavioral models, data models, object models, structured methods.

UNIT - III

Design Engineering: Design process and design quality, design concepts, the design model. Creating an architectural design: software architecture, data design, architectural styles and patterns, architectural design, conceptual model of UML, basic structural modeling, class diagrams, sequence diagrams, collaboration diagrams, use case diagrams, component diagrams.

UNIT - IV

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, black-box and white-box testing, validation testing, system testing, the art of debugging. Product metrics: Software quality, metrics for analysis model, metrics for design model, metrics for source code, metrics for testing, metrics for maintenance.

UNIT - V

Metrics for Process and Products: Software measurement, metrics for software quality. Risk management: Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM, RMMM plan. Quality Management: Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.

COURSE OUTCOMES:

- Ability to translate end-user requirements into system and software requirements, using e.g. UML, and structure the requirements in a Software Requirements Document (SRD).
- Identify and apply appropriate software architectures and patterns to carry out high level design of a system and be able to critically compare alternative choices.
- Will have experience and/or awareness of testing problems and will be able to develop a simple testing report

TEXT BOOKS:

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, Mc Graw Hill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson Education.
3. The unified modeling language user guide Grady Booch, James Rambaugh, Ivar Jacobson, Pearson Education.

REFERENCE BOOKS:

1. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiley.
2. Software Engineering principles and practice- Waman S Jawadekar, The Mc Graw-Hill Companies.
3. Fundamentals of object-oriented design using UML Meiler page-Jones: Pearson Education.

II YEAR – II SEMESTER

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WEB DESIGNING

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.

SYLLABUS

UNIT-I
HTML tags, Lists, Tables, Images, forms, Frames. Cascading style sheets. Introduction to Java script. Objects in Java Script. Dynamic HTML with Java Script

UNIT-II
Working with XML: Document type Definition, XML schemas, Document object model, XSLT, DOM and SAX.

UNIT-III
AJAX A New Approach: Introduction to AJAX, Integrating PHP and AJAX. Consuming WEB services in AJAX: (SOAP, WSDL,UDDI)

UNIT-IV
PHP Programming: Introducing PHP: Creating PHP script, Running PHP script. Working with variables and constants: Using variables, Using constants, Data types, Operators. program flow: Conditional statements, Control statements, Arrays, functions. Working with forms and Databases such as mySql, Oracle, SQL Sever.

UNIT-V
Introduction to PERL, Perl language elements, Interface with CGI- A form to mail program, Simple page search

COURSE OUTCOMES

- Analyze a web page and identify its elements and attributes.
- Create web pages using XHTML and Cascading Styles sheets.
- Build dynamic web pages .
- Build web applications using PHP.
- Programming through PERL and Ruby
- write simple client-side scripts using AJAX

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

III Year – I Semester **L T P C**

3 0 0 3

DESIGN AND ANALYSIS OF ALGORITHIMS

Course Objectives:

- Upon completion of this course, students will be able to do the following:
- Analyze the asymptotic performance of algorithms.
- Write rigorous correctness proofs for algorithms.
- Demonstrate a familiarity with major algorithms and data structures.
- Apply important algorithmic design paradigms and methods of analysis and synthesize efficient algorithms in common engineering design situations.

UNIT-I: Introduction: Algorithm, Psuedo code for expressing algorithms, performance Analysis-Space complexity, Time complexity, Asymptotic Notation- Big oh notation, Omega notation, Theta notation and Little oh notation, probabilistic analysis, Amortized analysis.

UNIT-II: Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort, Stassen's matrix multiplication, Performance Measurement, Randomized Sorting Algorithms

UNIT-III: Greedy method: General method, applications-Job sequencing with deadlines, knapsack problem, spanning trees, Minimum cost spanning trees, Single source shortest path problem.

UNIT-IV: Dynamic Programming: General method, applications-Matrix chain multiplication, Optimal binary search trees, 0/1knapsack problem, All pairs shortest path problem, Travelling sales person problem, Reliability design.
Backtracking: General method, applications-n-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles.

UNIT-V: Branch and Bound: General method, applications - Travelling sales person problem,0/1 knapsack problem- LC Branch and Bound solution, FIFO Branch and Bound solution.
NP-Hard and NP-Complete problems: Basic concepts, non deterministic algorithms, NP - Hard and NP Complete classes, Cook's theorem.

Course Outcomes:

Students who complete the course will have demonstrated the ability to do the following:

- Analyze worst-case running times of algorithms using asymptotic analysis.
- Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls forit.

- Describe the dynamic-programming paradigm and explain when an algorithmic design situation callsfor it.
- Describe the greedy paradigm and explain when an algorithmic design situation calls for it.
- Explain the major graph algorithms and their analyses. Employ graphs to model engineering problems, when appropriate.
- Synthesize new graph algorithms and algorithms that employ graph

TEXT BOOKS:

1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharam, Universities Press.
2. Introduction to Algorithms, second edition, T.H.Cormen, C.E.Leiserson, R.L.Rivest and C.Stein,PHI Pvt.Ltd.
3. Introduction to the Design and Analysis of Algorithms, Anany Levitin, PEA

REFERENCE BOOKS:

1. Design and Analysis of algorithms, Aho, Ullman and Hopcroft,Pearson education.
2. Algorithm Design, Foundation, Analysis and internet Examples, Michel T Goodrich, Roberto Tamassia,Wiley
3. Design and Analysis of Algorithms , S Sridhar, Oxford
4. Design and Analysis of Algorithms, Parag Himanshu Dave, Himansu BAlachandra Dave, 2ed,Pearson Education.

III Year – I Semester

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DATA WAREHOUSING AND DATA MINING

Course Objectives

- Students will be enabled to understand and implement classical models and algorithms in datamining.
- They will learn how to analyze the data, identify the problems, and choose the relevant models and algorithms to apply.
- They will further be able to assess the strengths and weaknesses of various methods and algorithms and to analyze their behavior.

UNIT–I: Introduction: Why Data Mining? What Is Data Mining. What Kinds of Data Can Be Mined, What Kinds of Patterns Can Be Mined? Which Technologies Are Used? Which Kinds of Applications Are Targeted? Major Issues in Data Mining. Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Data Visualization, Measuring Data Similarity and Dissimilarity

UNIT–II: Data Pre-processing:Data Preprocessing: An Overview, Data Exploration and Visualization techniques, Data Cleaning, Data Integration, Data Reduction, Data Transformation and DataDiscretization. DataWarehouseandOLAPTechnology - AnOverview:WhatIsaData Warehouse? A Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, From Data Warehousing to Data Mining.

UNIT–III: Classification: Basic Concepts, General Approach to solving a classification problem, Decision Tree Induction: Working of Decision Tree, building a decision tree, methods for expressing an attribute test conditions, measures for selecting the best split, Algorithm for decision tree induction. Alterative Techniques, Bayes' Theorem, Naïve Bayesian Classification, Bayesian Belief Networks

UNIT–IV:AssociationAnalysis:BasicConceptsandAlgorithms:ProblemDefecation, Frequent Item Set generation, Rule generation, compact representation of frequent item sets, FP-Growth Algorithm.

UNIT–V: Cluster Analysis: Basic Concepts and Algorithms:Overview: What Is Cluster Analysis? Different Types of Clustering, Different Types of Clusters; K-means: The Basic

K-means Algorithm, K-means Additional Issues, Bisecting K-means, Strengths and Weaknesses; Agglomerative Hierarchical Clustering: BasicAgglomerative Hierarchical Clustering Algorithm DBSCAN: Traditional Density Center- Based Approach, DBSCAN Algorithm, Strengths and Weaknesses.

Course Outcomes:

- Understand stages in building a DataWarehouse
- Understand the need and importance of preprocessingtechniques
- Understand the need and importanceof Similarity and dissimilarity techniques
- Analyze and evaluate performance of algorithms for AssociationRules.
- Analyze Classification and Clusteringalgorithms

TEXT BOOKS:

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

REFERENCE BOOKS:

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

III Year – I Semester **L T P C**
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ARTIFICIAL INTELLIGENCE

Course Objectives:

- 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.
- 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 minmax, resolution, etc. that play an important role in AI programs.
- 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 to artificial intelligence: Introduction ,history, intelligent systems, foundations of AI, applications, tic-tac-tie game playing, development of ai languages, current trends in AI

UNIT-II:

Problem solving: state: space search and control strategies : Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative deepening a*, constraint satisfaction. **Problem reduction and game playing:** Introduction, problem reduction, game playing, alphabeta 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, Theorem Proving.

UNIT-IV:

Knowledge representation: Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames advanced knowledge representation techniques: Introduction, conceptual dependency theory, script structure, cyc theory, case grammars, semantic web

UNIT-V:

Expert system and applications: Introduction phases in building expert systems, expert system versus traditional systems, rule-based expert systems blackboard systems truth maintenance systems, application of expert systems, list of shells and tools

Course Outcomes:

- Identify problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem.
- Formalize a given problem in the language/framework of different AI methods (e.g., as a search problem, as a constraint satisfaction problem, as a planning problem, as a Markov decision process, etc).
- Implement basic AI algorithms (e.g., standard search algorithms or dynamic programming).
- Design and carry out an empirical evaluation of different algorithms on a problem formalization, and state the conclusions that the evaluation supports.

TEXT BOOKS:

1. Artificial Intelligence- Saroj Kaushik, CENGAGE Learning,
2. Artificial intelligence, A modern Approach , 2nd ed, Stuart Russel, Peter Norvig, PEA
3. Artificial Intelligence- Rich, Kevin Knight, Shiv Shankar B Nair, 3rd ed, TMH
4. Introduction to Artificial Intelligence, Patterson, PHI

REFERNCE BOOKS:

1. Artificial intelligence, structures and Strategies for Complex problem solving, - George F Lugar, 5th ed, PEA
2. Introduction to Artificial Intelligence, Ertel, Wolf Gang, Springer
3. Artificial Intelligence, A new Synthesis, Nils J Nilsson, Elsevier

Open Elective/Job Oriented Elective

III Year – I Semester **L T P C**

2 0 2 3

FULL STACK TECHNOLOGIES

Course Objectives:

From the course the student will learn

- Translate user requirements into the overall architecture and implementation of new systems and Manage Project and coordinate with the Client.
- Write backend code in Python/Java, PHP languages and Writing optimized front end code HTML and JavaScript.
- Understand, create and debug database related queries and Create test code to validate the applications against client requirement.
- Monitor the performance of web applications & infrastructure and Troubleshooting web application with a fast and accurate a resolution.

Syllabus:

UNIT – I: HTML

Web Essentials: Clients, Servers, and Communication. The Internet-Basic Internet Protocols - The World Wide Web-HTTP request message-response message-Web Clients Web Servers. Markup Languages: XHTML an Introduction to HTML, History, Versions, Basic, XHTML Syntax and Semantics Some Fundamental HTML Elements-Relative URLs-Lists-tables-Frames-Forms- HTML 5.0.

UNIT – II: Cascading Style Sheets (CSS)

Style Sheets: CSS-Introduction to Cascading Style Sheets-Features-Core Syntax-Style Sheets and HTML- Style Rule Cascading and Inheritance-Text Properties-Box Model Normal Flow Box Layout beyond the Normal Flow-CSS3.0, Boot strap basics, Boot strap CSS3, Introduction to Java Script, Jscript basics, JScripts objects, JSON, Don.

UNIT – III: Jscript

Separating Programming and Presentation: JSP Technology, Introduction to JSP and Servlets-Running JSP Applications, Basic JSP-JavaBeans Classes and JSP-Tag Libraries and Files-Support for the Model-View-Controller Paradigm- Mongo DB, JQuery, Mean stack Fundamentals

UNIT – IV: Angular Js

Introducing AngularJS, Starting Out with AngularJS, Basic AngularJS, Directives and Controllers, AngularJS Modules, Creating First Controller, working with and Displaying, Arrays, more Directives, working with ng-repeat, Unit Testing in AngularJS, Forms, Inputs, and Services, Working with ng-model, Working with Forms, Leverage Data-Binding and Models, Form Validation and States, Error Handling with Forms, ngModelOptions, Nested Forms with ng-form, Other Form Controls.

UNIT – V: React JS

Introduction to React, Obstacles and Roadblocks, 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

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

- Identify the Basic Concepts of Web & Markup Languages
- Develop web Applications using Scripting Languages & Frameworks
- Creating & Running Applications using JSP libraries
- Creating Our First Controller Working with and Displaying in Angular Js and Nested Forms with ng-form
- Working with the Files in React JS and Constructing Elements with Data

Text Books:

1. Jeffrey C. Jackson, "Web Technologies--A Computer Science Perspective", Pearson Education, 2006
2. Robert. W. Sebesta, "Programming the World Wide Web", Fourth Edition, Pearson Education, 2007
3. AngularJS: Up and Running Enhanced Productivity with Structured Web Apps By Brad Green, Shyam Seshadri Publisher: O'Reilly Media

Reference Books:

1. Learning React Functional Web Development with React and Redux By Alex Banks, Eve Porcello Publisher: O'Reilly Media
2. Head First Java, 2nd Edition by Bert Bates, Kathy Sierra Publisher: O'Reilly Media, Inc

Full Stack Technologies Lab

Course Objectives:

From the course the student will

- Learn the core concepts of both the frontend and backend programming course.
- Get familiar with the latest web development technologies.
- Learn all about SQL and Mongo databases.
- Learn complete web development process.

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

- Identify the Basic Concepts of Web & Markup Languages
- Develop web Applications using Scripting Languages & Frameworks
- Creating & Running Applications using JSP libraries
- Creating Our First Controller Working with and Displaying in Angular Js and Nested Forms with ng-form
- Working with the Files in React JS and Constructing Elements with Data

List of Experiments:

1. Implementation of 'get' and 'post' methods.
2. CSS implementation in colors, boarder padding.
3. CSS3 implementation button frames tables, navigation bars.
4. Create registration and login forms with validations using Jscript query.
5. Jscript to retrieve student information from student database using database connectivity.
6. Angular Js data binding
7. Angular JS directives and Events
8. Using angular Js fetching data from MySQL.
9. Using React Js creating constructs data elements.
10. Using React Js implementations DoM
11. Invoking data using Jscript from Mongo DB.
12. Create an Online fee payment form using JSCript and MangoDB

Reference/ Preferred Text Books:

1. Jeffrey C. Jackson, "Web Technologies--A Computer Science Perspective", Pearson Education, 2006
2. Robert. W. Sebesta, "Programming the World Wide Web", Fourth Edition, Pearson Education, 2007
3. Angular JS: Up and Running Enhanced Productivity with Structured Web Apps By Brad Green, Shyam Seshadri Publisher: O'Reilly Media
4. Learning React Functional Web Development with React and Redux By Alex Banks, Eve Porcello Publisher: O'Reilly Media
5. Head First Java, 2nd Edition by Bert Bates, Kathy Sierra Publisher: O'Reilly Media, Inc

III Year – I Semester

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R-PROGRAMMING

COURSE OBJECTIVES:

- Use R for statistical programming, computation, graphics, and modeling,
- Write functions and use R in an efficient way,
- Fit some basic types of statistical models
- Use R in their own research,
- Be able to expand their knowledge of R on their own.

UNIT-I:

Introduction, How to run R, R Sessions and Functions, Basic Math, Variables, Data Types, Vectors, Conclusion, Advanced Data Structures, Data Frames, Lists, Matrices, Arrays, Classes**.**

UNIT-II:

R Programming Structures, Control Statements, Loops, - Looping Over Nonvector Sets,- If-Else, Arithmetic and Boolean Operators and values, Default Values for Argument, Return Values, Deciding Whether to explicitly call return- Returning Complex Objects, Functions are Objective, No Pointers in R, Recursion, A Quicksort Implementation-Extended Extended Example: A Binary Search Tree.

UNIT-III:

Doing Math and Simulation in R, Math Function, Extended Example Calculating Probability- Cumulative Sums and Products-Minima and Maxima- Calculus, Functions Fir Statistical Distribution, Sorting, Linear Algebra Operation on Vectors and Matrices, Extended Example: Vector cross Product- Extended Example: Finding Stationary Distribution of Markov Chains, Set Operation, Input /out put, Accessing the Keyboard and Monitor, Reading and writer Files,

UNIT-IV:

Graphics, Creating Graphs, The Workhorse of R Base Graphics, the plot() Function – Customizing Graphs, Saving Graphs to Files.

UNIT-V:

Probability Distributions, Normal Distribution- Binomial Distribution- Poisson Distributions Other Distribution, Basic Statistics, Correlation and Covariance, T-Tests,-ANOVA.

Linear Models, Simple Linear Regression, -Multiple Regression Generalized Linear Models, Logistic Regression, - Poisson Regression- other Generalized Linear Models-Survival Analysis, Nonlinear Models, Splines- Decision- Random Forests,

COURSE OUTCOMES:

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

- List motivation for learning a programming language
- Access online resources for R and import new function packages into the R workspace
- Import, review, manipulate and summarize data-sets in R
- Explore data-sets to create testable hypotheses and identify appropriate statistical tests
- Perform appropriate statistical tests using R Create and edit visualizations with

TEXT BOOKS:

1) The Art of R Programming, Norman Matloff, Cengage Learning
2) R for Everyone, Lander, Pearson

REFERENCE BOOKS:

1) R Cookbook, PaulTeetor, Oreilly.
2) R in Action,Rob Kabacoff, Manning

PROGRAMMING WITH R LAB

1. Write a program to illustrate basic Arithmetic in R
2. Write a program to illustrate Variable assignment in R
3. Write a program to illustrate data types in R
4. Write a program to illustrate creating and naming a vector in R
5. Write a program to illustrate create a matrix and naming matrix in R
6. Write a program to illustrate Add column and Add a Row in Matrix in R
7. Write a program to illustrate Selection of elements in Matrixes in R
8. Write a program to illustrate Performing Arithmetic of Matrices
9. Write a program to illustrate Factors in R
10. Case study of why you need use a Factor in R
11. Write a program to illustrate Ordered Factors in R
12. Write a program to illustrate Data Frame Selection of elements in a Data frame
13. Write a program to illustrate Sorting a Data frame
14. Write a program to illustrate List ? Why would you need a List
15. Write a program to illustrate Adding more elements into a List
16. Write a program to illustrate if-else-else if in R
17. Write a Program to illustrate While and For loops in R
18. Write a program to illustrate Compare and Matrices and Compare vectors
19. Write a program to illustrate Logical & and Logical | operators in R.
20. Write a program to illustrate Functions in Quick sort implementation in R
21. Write a program to illustrate Function inside function in R
22. Write a program to illustrate to create graphs and usage of plot() function in R
23. Write a program to illustrate Customising and Saving to Graphs in R.
24. Write a program to illustrate some built in Mathematical Functions

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SCRIPTING LANGUAGES

(Open Elective)

Course Objectives:
The goal of the course is to study:

- The principles of scripting languages.
- Motivation for and applications of scripting.
- Difference between scripting languages and non- scripting languages.
- Types of scripting languages.
- Scripting languages such as PERL, TCL/TK, python and BASH.
- Creation of programs in the Linux environment.
- Usage of scripting languages in IC design flow.

Course Outcomes:
Upon learning the course, the student will have the:

- Ability to create and run scripts using PERL/TCl/Python in IC design flow.
- Ability to use Linux environment and write programs for automation of scripts in VLSI tool design flow.

UNIT –I:
Linux Basics:
Introduction to Linux , File System of the Linux, General usage of Linux kernel & basic commands, Linux users and group, Permissions for file, directory and users, searching a file & directory, zipping and unzipping concepts.

UNIT –II :
Linux Networking:
Introduction to Networking in Linux, Network basics & Tools, File Transfer Protocol in Linux, Network file system, Domain Naming Services, Dynamic hosting configuration Protocol & Network information Services.

UNIT –III :
Perl Scripting:
Introduction to Perl Scripting, working with simple values, Lists and Hashes, Loops and Decisions, Regular Expressions, Files and Data in Perl Scripting, References & Subroutines, Running and Debugging Perl, Modules, Object – Oriented Perl.

UNIT –IV:
Tcl / Tk Scripting:

Tcl Fundamentals, String and Pattern Matching, Tcl Data Structures, Control Flow Commands, Procedures and Scope, Evel, Working with Unix, Reflection and Debugging, Script Libraries, Tk Fundamentals, Tk by examples, The Pack Geometry Manager, Binding Commands to X Events, Buttons and Menus, Simple Tk Widgets, Entry and List box Widgets Focus, Grabs and Dialogs.

UNIT –V : Python Scripting: Introduction to Python, using the Python Interpreter, More Control Flow Tools, Data Structures, Modules, Input and Output, Errors and Exceptions, Classes, Brief Tour of the Standard Library.

TEXT BOOKS:

1. Python Tutorial by Guido Van Rossum, Fred L. Drake Jr. editor , Release 2.6.4
2. Practical Programming in Tcl and Tk by Brent Welch, Updated for Tcl 7.4 and Tk 4.0.
3. Teach Yorself Perl in 21 days by David Till.
4. Red Hat Enterprise Linux 4 : System Administration Guide Copyright, 2005 Red Hat Inc

REFERENCE BOOKS:

1. Learning Python – 2
nd Ed., Mark Lutz and David Ascher, 2003, O'Reilly.
2. Perl in 24 Hours – 3
rd Ed., Clinton Pierce, 2005, Sams Publishing.
3. Learning Perl – 4
th Ed. Randal Schwartz, Tom Phoenix and Brain d foy. 2005.
4. Jython Essentials – Samuele Pedroni and Noel Pappin.2002. O'Reilly.
5. Programming Perl – Larry Wall, Tom Christiansen and John Orwant, 3rd Edition, O'Reilly, 2000. (ISBN 0596000278)

SCRIPTING LANGUAGES LAB

Course Objectives

- To Understand the concepts of scripting languages for developing web-based projects
- To understand the applications the of Ruby, TCL, Perl scripting languages

Course Outcomes

- Ability to understand the differences between Scripting languages and programming languages
- Able to gain some fluency programming in Ruby, Perl, TCL

List of Experiments

1. Write a Ruby script to create a new string which is n copies of a given string where n is a non-negative integer
2. Write a Ruby script which accept the radius of a circle from the user and compute the parameter and area.
3. Write a Ruby script which accept the user's first and last name and print them in reverse order with a space between them
4. Write a Ruby script to accept a filename from the user print the extension of that
5. Write a Ruby script to find the greatest of three numbers
6. Write a Ruby script to print odd numbers from 10 to 1
7. Write a Ruby scirpt to check two integers and return true if one of them is 20 otherwise return their sum
8. Write a Ruby script to check two temperatures and return true if one is less than 0 and the other is greater than 100
9. Write a Ruby script to print the elements of a given array
10. Write a Ruby program to retrieve the total marks where subject name and marks of a student stored in a hash
11. Write a TCL script to find the factorial of a number
12. Write a TCL script that multiplies the numbers from 1 to 10
13. Write a TCL script for Sorting a list using a comparison function
14. Write a TCL script to (i)create a list (ii)append elements to the list (iii)Traverse the list (iv)Concatenate the list
15. Write a TCL script to comparing the file modified times.
16. Write a TCL script to Copy a file and translate to native format.
17. a) Write a Perl script to find the largest number among three numbers.
b) Write a Perl script to print the multiplication tables from 1-10 using subroutines.
18. Write a Perl program to implement the following list of manipulating functions
a) Shift
b) Unshift
c) Push
19. a) Write a Perl script to substitute a word, with another word in a string.
b) Write a Perl script to validate IP address and email address.
20. Write a Perl script to print the file in reverse order using command line arguments

Professional Elective courses

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

PRINCIPLES OF CYBER SECURITY

COURSE OBJECTIVES:

- To learn threats and risks within context of the cyber security architecture.
- Student should learn and Identify security tools and hardening techniques.
- To learn types of incidents including categories, responses and timelines for response.

UNIT–I:

Introduction to Cyber security- Cyber security objectives, Cyber security roles, Differences between Information Security & Cyber security, Cyber security Principles Confidentiality, integrity, &availability Authentication & non- repudiation.

UNIT–II:

Information Security (IS) within Lifecycle Management-Lifecycle management landscape, Security architecture processes, Security architecture tools, Intermediate lifecycle management concepts, Risks & Vulnerabilities-Basics of risk management, Operational threat environments, Classes of attacks.

UNIT–III:

Incident Response- Incident categories, Incident response Incident recovery, and Operational security protection: Digital and data assets, ports and protocols, Protection technologies, Identity and access Management, configuration management.

UNIT–IV:

Threat Detection and Evaluation (DE): Monitoring- Vulnerability Management, Security Logs and Alerts, Monitoring Tools and Appliances. Analysis- Network traffic Analysis, packet capture and analysis

UNIT–V:

Introduction to backdoor System and security-Introduction to metasploit, Backdoor, demilitarized zone(DMZ),Digital Signature, Brief study on Harding of operating system.

COURSE OUTCOMES:

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

- Apply cyber security architecture principles.
- Describe risk management processes and practices.
- Appraise cyber security incidents to apply appropriate response
- Distinguish system and application security threats and vulnerabilities.

- Identify security tools and hardening techniques.

TEXT BOOKS:

1. NASSCOM: Security Analyst Student Hand Book.
2. Information Security Management Principles Updated Edition by David Alexander, Amanda Finch, David Sutton ,Published by BCS.

REFERENCE BOOKS:

1. CSX- cyber security fundamentals , Published by ISACA, Cyber security, Network Security, Data

Governance Security.

III Year – I Semester **L T P C**
3 0 0 3

VIRTUAL REALITY

COURSE OBJECTIVES:

- Design a virtual environment and compelling virtual reality experience.
- Create compelling virtual experiences.
- Comprehend and analyze the fundamental issues of virtual reality.
- Comprehend the IEEE VR proceedings

UNIT-I
Introduction : The three I's of virtual reality, commercial VR technology and the five classic components of a VR system. (1.1, 1.3 and 1.5 of Text Book (1))

UNIT - II
Input Devices : (Trackers, Navigation, and Gesture Interfaces): Three-dimensional position trackers, navigation and manipulation, interfaces and gesture interfaces. (2.1, 2.2 and 2.3 of Text Book (1)).

UNIT - III
Output Devices: Graphics displays, sound displays & haptic feedback. (3.1,3.2 & 3.3 of Text Book (1))
Modeling : Geometric modeling, kinematics modeling, physical modeling, behaviour modeling, model management. (5.1, 5.2 and 5.3, 5.4 and 5.5 of Text Book (1)).

UNIT - IV
Human Factors: Methodology and terminology, user performance studies, VR health and safety issues. (7.1, 7.2 and 7.3 of Text Book (1)).
Applications: Medical applications, military applications, robotics applications. (8.1, 8.3 and 9.2 of Text Book (1)).

UNIT - V
VR Programming-I : Introducing Java 3D, loading and manipulating external models, using a lathe to make shapes. (Chapters 14, 16 and 17 of Text Book (2))
VR Programming-II : 3D Sprites, animated 3D sprites, particle systems. (Chapters 18, 19 and 21 of Text Book (2))

COURSE OUTCOMES:

- Demonstrate an understanding of techniques, processes, technologies and equipment used in immersive virtual reality;

- Exploit the characteristics of materials and processes in an individual and conceptually developed way;
- Show critical awareness of historical and theoretical contexts relevant to immersive virtual reality;
- Apply critical, analytical and self-reflective practice; and
- Identify and develop personal topics for individual research in immersive virtual reality.

TEXT BOOKS :

1. Virtual Reality Technology, Second Edition, Gregory C. Burdea & Philippe Coiffet, John Wiley & Sons, Inc.,
2. Killer Game Programming in Java, Andrew Davison, Oreilly-SPD, 2005.

REFERENCES :

1. Understanding Virtual Reality, interface, Application and Design, William R.Sherman, Alan Craig, Elsevier(Morgan Kaufmann).
2. 3D Modeling and surfacing, Bill Fleming, Elsevier(Morgan Kauffman).
3. 3D Game Engine Design, David H.Eberly, Elsevier.
4. Virtual Reality Systems, John Vince, Pearson Education.

III Year – I Semester

L	T	P	C
3	0	0	3

PARALLEL PROGRAMMING

COURSE OBJECTIVES :

- To design the parallel algorithms for real world problems.
- To understand a wide variety of parallel architectures.
- To implement the parallel algorithms on available parallel systems.
- To design algorithms suited for multiprocessor systems using MPI and OpenMP.
- To analyze the parallel algorithms.

UNIT- I Introduction, Modern Scientific Method, Evolution of Supercomputing, Modern 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, The Sieve of Eratosthenes- Introduction, Sequential Algorithm, Sources of Parallelism, Data decomposition options, Developing Parallel Algorithm, Analysis of Parallel Sieve algorithm, Documenting the Parallel program, Benchmarking, Improvements.

UNIT- III Floyd's Algorithm- Introduction , The All-Pairs Shortest –Path Problem, Creating arrays at run time, Designing the parallel algorithm, Point-to-Point Communication, Documenting the Parallel program, Analysis and Benchmarking, Performance Analysis - Introduction, Speedup and efficiency, Amdahl's law, Gustafson Barsis's law, The Karp-Flatt metric, The isoefficiency metric, Matrix-Vector multiplication Introduction, Sequential algorithm, Data decomposition options, Row wise block-striped decomposition, Column wise block-striped decomposition, Checkerboard block decomposition.

UNIT- IV Document Classification- Introduction, Parallel algorithm design, Nonblocking Communication, Documenting the Parallel program, Enhancements, Monte Carlo methods Introduction, Sequential Random number generators, Parallel Random number generators, Other Random number distributions, Case studies, Matrix multiplication- Introduction, Sequential Matrix multiplication, Row wise block-striped parallel algorithm, Canon's algorithm, Solving Linear systems- Introduction, terminology, Back substitution, Gaussian elimination, Iterative methods, The Conjugate gradient method, Sorting- Introduction, Quick sort, Parallel Quick sort Algorithm , Hyper Quick sort, Parallel sorting by regular sampling.

UNIT- V Shared-memory programming- Introduction, The Shared-memory model, Parallel for loops, Declaring private variables, Critical sections, Reductions, Performance improvements, more general data parallelism, Functional parallelism, Combining MPI and OpenMP- Introduction, Conjugate gradient method, Jacobi method.

COURSE OUTCOMES:

- Ability to design the parallel algorithms for real world problems.
- Ability to understand a wide variety of parallel architectures.
- Able to implement the parallel algorithms on available parallel systems.
- Able to design algorithms suited for multiprocessor systems using MPI and OpenMP.
- Able to analyze the parallel algorithms.

TEXT BOOKS:

1. Parallel Programming in C with MPI and OpenMP, Michael J. Quinn, McGraw Hill Education(India) Pvt. Ltd, 2003, sixteenth reprint 2016.

REFERENCE BOOKS:

1. Parallel computing ,Theory and Practice,2nd edition,M.J.Quinn, McGraw Hill Education(India) Pvt Ltd 2. Introduction to Parallel computing , W.P. Petersen and P.Arbenz, Oxford Univ. Press
3. Introduction to Parallel computing ,Ananth Grama, Anshul Gupta,G .Karypis, and V.Kumar, Pearson Education.
4. Algorithms ,Sequential and Parallel, 3rd edition, Russ Miller,L Boxer, Cengage Learning.
5. Computer Architecture, 4th edition, John L. Hennessy and David A. Patterson, ELSEVIER.

III Year – I Semester **L T P C**

0 0 3 1.5

Data Mining Lab with R/Python/OCTAVE

Course Objectives:

- Practical exposure on implementation of well known data mining tasks.
- Exposure to real life data sets for analysis and prediction.
- Learningperformanceevaluationofdataminingalgorithmsinasupervisedand an unsupervised setting.
- Handling a Small datamining project for a given practical domain.

System/Software Requirements:

· Intel based desktop PC
· WEKA TOOL, RTOOL, PYTHON, OCTAVE

Week-1: Demonstration of preprocessing on datasets student.arff and labor.arff

Week-2: Demonstration of Association rule process on dataset contactlenses.arff using apriori algorithm

Week-3: Demonstration of Association rule process on dataset supermarket.arff using apriori algorithm

Week-4: Demonstration of classification rule process on dataset student.arff and employee.arff using j48 algorithm

Week-5: Demonstration of classification ruleprocess on dataset employee.arff using id3Algorithm

Week-6: Demonstration of classification rule process on dataset employee.arff using naïve bayes algorithm

Week-7: Demonstration of clustering rule process on datasets iris.arff and student.arff using simple k- means

Week-8: Implement Statisticalanalysis and Inferential statistics and Hypothesis Testing for Kaggle competition andData.Gov data sets using R(Perform Batch wise with casestudies).

Week-9: Perform Classification task whether the loan applicant will repay the loan Or not on Bank loan dataset using R

III Year – I Semester

L	T	P	C
0	0	3	1.5

AI TOOLS & TECHNIQUES LAB

Course Objectives:

- Study the concepts of Artificial Intelligence.
- Learn the methods of solving problems using Artificial Intelligence.
- Introduce the concepts of machine learning.

List of Experiments:

1. Study of Prolog.
2. Write simple fact for the statements using PROLOG.
3. Write predicates One converts centigrade temperatures to Fahrenheit, the other checks if a temperature is below freezing
4. Write a program to solve the Monkey Banana problem.
5. Write a program in turbo prolog for medical diagnosis and show the advantage and disadvantage of green and red cuts
6. Write a program to implement factorial, Fibonacci of a given number
7. Write a program to solve 4-Queen and 8-puzzle problem.
8. Write a program to solve traveling salesman problem.
9. Write a program to solve water jug problem using LISP
10. Implementation of A* Algorithm using LISP /PROLOG
11. Implementation of Hill Climbing Algorithm using LISP /PROLOG
12. Implementation of DFS and BFS for water jug problem using LISP /PROLOG
13. Implementation of Towers of Hanoi Problem using LISP /PROLOG

Course Outcomes:

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

- Identify problems that are amenable to solution by AI methods.
- Identify appropriate AI methods to solve a given problem.
- Formalize a given problem in the language/framework of different AI methods.
- Implement basic AI algorithms.

Design and carry out an empirical evaluation of different algorithms on problem formalization, and state the conclusions that the evaluation supports

III Year – I Semester

L	T	P	C
1	0	2	2

UNIFIED MODELLING LANGUAGES LAB

Course Objectives:

- Construct UML diagrams for static view and dynamic view of the system.
- Generate creational patterns by applicable patterns for given context.
- Create refined model for given Scenario using structural patterns.
- Construct behavioral patterns for given applications.

Take any real-time case studies and work on the following weeks

Week 1: Familiarization with Rational Rose or Umbrello

Week 2, 3 & 4:

For each case study:

a) Identify and analyze events

b) Identify Use cases

c) Develop event table

d) Identify & analyze domain classes

e) Represent use cases and a domain class diagram using Rational Rose

f) Develop CRUD matrix to represent relationships between use cases and problem domain classes

Week 5 & 6:

For each case study:

a) Develop Use case diagrams

b) Develop elaborate Use case descriptions & scenarios

c) Develop prototypes (without functionality)

d) Develop system sequence diagrams

Week 7, 8, 9 & 10:

For each case study:

a) Develop high-level sequence diagrams for each use case

b) Identify MVC classes / objects for each use case

c) Develop Detailed Sequence Diagrams / Communication diagrams for each use case showing interactions among all the three-layer objects

d) Develop detailed design class model (use GRASP patterns for responsibility assignment)

e) Develop three-layer package diagrams for each case study

Week 11 & 12:

For each case study:

a) Develop Use case Packages

b) Develop component diagrams

c) Identify relationships between use cases and represent them

d) Refine domain class model by showing all the associations among classes

Week 13 onwards:

For each case study:

a) Develop sample diagrams for other UML diagrams

b) State chart diagrams

c) Activity diagrams

d) Deployment diagrams

Course Outcomes

Students successfully completing this course will be able to:

- Understand the Case studies and design the Model.
- Understand how design patterns solve design problems.
- Develop design solutions using creational patterns.

Construct design solutions by using structural and behavioral pattern

		L	T	P	C
III Year-I Semester	**Mandatory Course (AICTE)**	**2**	**0**	**0**	**0**
PROFESSIONAL ETHICS AND HUMAN VALUES					

Course Objectives:

i. To create an awareness on Engineering Ethics and Human Values.
ii. To instill Moral and Social Values and Loyalty
iii. To appreciate the rights of others.
iv. To create awareness on assessment of safety and risk
v. Provide depth knowledge on framing of the problem and determining the facts, provide depth knowledge on codes of ethics.

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

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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:

i. Identify and analyze an ethical issue in the subject matter under investigation or in a relevant field, Articulate what makes a particular course of action ethically defensible
ii. Identify the multiple ethical interests at stake in a real-world situation or practice,Assess their own ethical values and the social context of problems
iii. 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
iv. Demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships, and field work
v. 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

HONOR COURSES

III Year – I Semester **L T P C**
3 1 0 4

TCP/IP PROTOCOL SUITE

Course Objectives:

At the end of the course, the students will be able to:
1. Build an understanding of the fundamental concepts of data communication and computer networking.
2. Understand how errors detected and corrected that occur in transmission
3. How collisions to be handled when many stations share a single channel
4. Know about routing mechanisms and different routing protocols
5. Understand transport layer functions 6. Know about different application layer protocols

SYLLABUS:

UNIT I
Network Models: Layered Tasks, The OSI Model, Layers in OSI Model, TCP/IP Protocol suite,Addressing. Connecting devices: Passive Hubs, Repeaters, Active Hubs, Bridges, Two Layer Switches, Routers, Three Layer Switches, Gateway, Backbone Networks.

UNIT II
Internetworking Concepts: Principles of Internetworking, Connectionless Interconnection, Application Level Interconnection, Network Level Interconnection, Properties of the Internet, Internet Architecture, Interconnection through IP Routers TCP, UDP & IP: TCP Services, TCP Features, Segment, A TCP Connection, Flow Control, Error Control, Congestion Control, Process to Process Communication, User Datagram, Checksum, UDP Operation, IP Datagram, Fragmentation, Options, IP Addressing: Classful Addressing, IPV6.

UNIT III
Congestion and Quality of Service: Data Traffic, Congestion, Congestion Control, Congestion Control in TCP, Congestion Control in Frame Relay, Source Based Congestion Avoidance, DEC Bit Scheme, Quality of Service, Techniques to Improve QOS: Scheduling, Traffic Shaping, Admission Control, Resource Reservation, Integrated Services and Differentiated Services.

UNIT IV
Queue Management: Concepts of Buffer Management, Drop Tail, Drop Front, Random Drop, Passive Buffer Management Schemes, Drawbacks of PQM, Active Queue Management: Early Random Drop, RED Algorithm.

UNIT V
Stream Control Transmission Protocol: SCTP Services, SCTP Features, Packet Format, Flow,Control, Error Control, Congestion Control. Mobile Network Layer: Entities and Terminology, IP Packet Delivery, Agents, Addressing, Agent Discovery, Registration, Tunneling and Encapsulating, Inefficiency in Mobile IP. Mobile Transport Layer : Classical TCP Improvements, Indirect TCP, Snooping TCP, Mobile TCP, Fast Retransmit/Fast \ Recovery, Transmission, Timeout Freezing, Selective Retransmission, Transaction Oriented TCP.

Course Outcomes:

After completing this course the student must demonstrate the knowledge and ability to:

- Describe the basis and structure of an abstract layered protocol model
- Independently understand basic computer network technology.
- Identify the different types of network topologies and protocols.
- Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
- Identify the different types of network devices and their functions within a network
- Understand and building the skills of subnetting and routing mechanisms.
- Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation
- Understand how the Internet works today.
- Conversant with primitives of network application programming.

TEXT BOOKS:

1. Behrouz A Forouzan, "TCP/IP Protocol Suite", TMH, 3rd Edition
2. B.A. Forouzan, "Data communication & Networking", TMH, 4th Edition.

REFERENCE BOOKS:

1. Mahbub Hasan & Raj Jain, " High performance TCP/IP Networking", PHI -2005
2. Douglas. E.Comer, "Internetworking with TCP/IP ", Volume I PHI
3. Larry L. Perterson and Bruce S. Davie , "Computer Networks- A Systems Approach", 2011, Morgan Kaufmann
4. JochenSchiiler, "Mobile Communications", Pearson, 2nd Edition.

III Year – I Semester **L T P C**
3 1 0 4

INFORMATION SECURITY

Course objectives:

- The learner will gain knowledge about securing both clean and corrupted systems, protect personal data, and secure computer networks.
- The learner will understand key terms and concepts in cyber law, intellectual property and cyber crimes, trademarks and domain theft.
- The learner will be able to examine secure software development practices.
- The learner will understand principles of web security.
- The learner will be able to incorporate approaches for incident analysis and response.
- The learner will be able to incorporate approaches for risk management and best practices.
- The learner will gain an understanding of cryptography, how it has evolved, and some key encryption techniques used today.
- The learner will develop an understanding of security policies (such as confidentiality, integrity, and availability), as well as protocols to implement such policies.
- The learner will gain familiarity with prevalent network and distributed system

SYLLABUS

UNIT- I

Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

UNIT-II

Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC.

UNIT-III

Public key cryptography principles, public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service.

UNIT-IV

Email privacy: Pretty Good Privacy (PGP) and S/MIME.
IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

UNIT-V

Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET).Basic concepts of SNMP, SNMPv1 Community facility and SNMPv3.Intruders, Viruses and related threats.Firewall Design principles, Trusted Systems. Intrusion Detection Systems.

Course **outcomes**:

After studying this course, you should be able to:

- define what information is
- appreciate the value of information to the modern organisation
- understand the CIA triad of Confidentiality, Integrity and Availability
- appreciate the difficulties that arise when valuable information needs to be shared
- identify the five leading-edge resources that have up-to-date information on information security.

TEXT BOOKS :

1. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education.
2. Hack Proofing your network by Ryan Russell, Dan Kaminsky, Rain Forest Puppy, Joe Grand, David Ahmad, Hal Flynn IdoDubrawsky, Steve W.Manzuik and Ryan Permeh, wileyDreamtech

REFERENCE BOOKS :

1. Fundamentals of Network Security by Eric Maiwald (Dreamtech press)
2. Network Security – Private Communication in a Public World by Charlie Kaufman, Radia Perlman and Mike Speciner, Pearson/PHI.
3. Cryptography and network Security, Third edition, Stallings, PHI/Pearson
4. Principles of Information Security, Whitman, Thomson.
5. Network Security: The complete reference, Robert Bragg, Mark Rhodes, TMH
6. Introduction to Cryptography, Buchmann, Springer.

III Year – I Semester **L T P C**
3 1 0 4

PATTERN RECOGNITION

Course Objectives :
The course is designed to introduce students to theoretical concepts and practical issues associated with pattern recognition

Syllabus

UNITI

Introduction: Machine perception, pattern recognition example, pattern recognition systems, the Design cycle, learning and adaptation, Bayesian Decision Theory: Introduction, continuous features – two categories classifications, minimum error-rate classification-zero–one loss function, classifiers, discriminant functions, and decision surfaces.

UNITII

Normal density: Univariate and multivariate density, discriminant functions for the normal Density different cases, Bayes decision theory – discrete features, compound Bayesian decision theory and context

UNITIII

Maximum likelihood and Bayesian parameter estimation: Introduction, maximum likelihood Estimation, Bayesian estimation, Bayesian parameter estimation–Gaussian case

UNITIV

Un-supervised learning and clustering: Introduction, mixture densities and identifiability, maximum likelihood estimates, application to normal mixtures, K-means clustering. Date description and clustering – similarity measures, criteria function for clustering

UNIT V

Pattern recognition using discrete hidden Markov models: Discrete-time Markov process, Extensions to hidden Markov models, three basic problems of HMMs, types of HMMs , Continuous hidden Markov models :Continuous observation densities, multiple mixtures per state, speech recognition applications.

CourseOutcomes :
Design systems and algorithms for pattern recognition (signal classification), with focus on sequences of patterns that are analyzed using, e.g., hidden Markov models (HMM),

- Analyse classification problems probabilistically and estimate classifier performance,
- Understand and analyse methods for automatic training of classification systems,

- Apply Maximum-likelihood parameter estimation in relatively complex probabilistic models, such as mixture density models and hidden Markov models,
- Understand the principles of Bayesian parameter estimation and apply them in relatively simple probabilistic models

Text Books:

1. Pattern classifications, Richard O. Duda, Peter E. Hart, David G. Stroke. Wiley student edition, Second Edition.
2. Pattern Recognition, An Introduction, V Susheela Devi, M Narsimha Murthy, Universiy Press

Reference Books:

1. O.Duda, P.E.Hart and D.G.Stork, Pattern Classification, John Wiley, 2001
2. S.Theodoridis and K.Koutroumbas, Pattern Recognition, 4th Ed., Academic Press, 2009
3. C.M.Bishop, Pattern Recognition and Machine Learning, Springer, 2006

III Year – I Semester **L T P C**
3 1 0 4

DATA ANALYTICS

COURSE OBJECTIVES :
- Understand the Big Data Platform and its Use cases
- Provide an overview of Apache Hadoop
- Provide HDFS Concepts and Interfacing with HDFS
- Understand Map Reduce Jobs
- Provide hands on Hodoop Eco System
- Apply analytics on Structured, Unstructured Data.
- Exposure to Data Analytics with R.

SYLLABUS:

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 InfosphereBigInsights and Big Sheets.

UNIT II

HDFS(Hadoop Distributed File System) The Design of HDFS, HDFS Concepts, Command Line Interface, Hadoop file system interfaces, Data flow, Data Ingest with Flume and Scoop and Hadoop archives, Hadoop I/O: Compression, Serialization, Avro and File-Based Data structures.

UNIT III

Map Reduce Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce Features.

UNIT IV

Hadoop Eco System Pig : Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, Pig Latin, User Defined Functions, Data Processing operators. Hive : Hive Shell, Hive Services, Hive Metastore, Comparison with Traditional Databases, HiveQL, Tables, Querying Data and User Defined Functions. Hbase : HBasics, Concepts, Clients, Example, Hbase Versus RDBMS. Big SQL : Introduction

UNIT V

Data Analytics with R Machine Learning : Introduction, Supervised Learning, Unsupervised Learning, Collaborative Filtering. Big Data Analytics with BigR.

COURSE OUTCOMES:

The students will be able to:
- Identify Big Data and its Business Implications.
- List the components of Hadoop and Hadoop Eco-System
- Access and Process Data on Distributed File System
- Manage Job Execution in Hadoop Environment
- Develop Big Data Solutions using Hadoop Eco System
- AnalyzeInfosphereBigInsights Big Data Recommendations.
- Apply Machine Learning Techniques using R.

Text Books:

1. Tom White " Hadoop: The Definitive Guide" Third Edit on, O'reily Media, 2012.
2. Seema Acharya, SubhasiniChellappan, "Big Data Analytics" Wiley 2015. References
3. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
4. Jay Liebowitz, "Big Data and Business Analytics" Auerbach Publications, CRC press (2013)
5. 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.
6. AnandRajaraman and Jefrey David Ulman, "Mining of Massive Datasets", Cambridge University Press, 2012.

Reference Books:

1. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons, 2012.
2. Glen J. Myat, "Making Sense of Data", John Wiley & Sons, 2007
3. Pete Warden, "Big Data Glossary", O'Reily, 2011.
4. Michael Mineli, Michele Chambers, Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley Publications, 2013.
5. ArvindSathi, "BigDataAnalytics: Disruptive Technologies for Changing the Game", MC Press, 2012
6. 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.

MINOR COURSES

III Year – I Semester **L T P C**
3 1 0 4

MULTIMEDIA & ANIMATION

Course Objectives:

- The aim of this course is to give fundamental knowledge about the various fields related to multimedia technology.
- Understanding, need and type of compression will also be discussed in this subject. Understanding multimedia technology is very important for students, because this will provide them knowledge about all the aspects of multimedia
- The objective of this course is to teach the students very fundamentals of Animation.
- The student will get to learn all the principles which will help them to learn and understand how actual animation works.
- Learning principles also help them in many other fields of the animation.

SYLLABUS

Unit 1:

Introduction to Multimedia: History of Multimedia, Multimedia Definition, Properties of a Multimedia System, Multimedia Building Blocks, Modes of data transmission, Asynchronous Transmission Mode, Synchronous Transmission Mode, Isochronous, Transmission Mode.

Discrete Media: Types of Media, Time Independent Media, Time dependent Media, Text, Unformatted Text, Formatted Text, Hyper Text, Essential Features of HTML, Graphics and Images, Creation of Computer Graphics, Digitised documents, Digitised Pictures, Digitised Cameras, Raster Scan Principles, Image Analysis, Image Transmission.

Unit 2:

Continuous Media: Audio, Speech Signals, Analog Signals, PCM Speech, CD- Quality audio, Synthesised audio, Types of Synthesizers, Characteristics of Synthesizers, Streaming Video, File Formats, Streaming Methods, Sound Fundamentals, Music, MIDI Basic concepts, MIDI Devices, MIDI Messages, Video, Broadcast Television, Digital Video – Format, 0 Format, HDTV Format, SIF, CIF, QCIF, PC Video and Video Content.

Unit 3:

Text Representation and Compression: Compression Principles, Source Encoders and destination decoders, Lossless and Lossy Compression, Entropy Encoding, Source Encoding, Text Compression, Static Huffman coding, Arithmetic Coding.

Image Storage and Compression: Introduction to images, Digital image representation, Vector Graphics and Bitmapped images, History and advantages, Bitmap concept, Stored Images, Bitmap versus Vector Graphics, Captured Image Format, Stored Image Format, Graphics Interchange Format (GIF), GIF Coding Standard, Tagged Image File Format (TIFF), Joint Photographic Experts Group (JPEG), Image/Block Preparation, Forward DCT, Quantization, Entropy Encoding, Frame building, JPEG decoding.

Unit 4:

Audio Representation and Compression: Introduction to Audio Compression, Differential pulse code modulation, Adaptive differential PCM, Adaptive Predictive Coding, Linear Predictive Coding, Code- excited LPG, Perceptual Coding, Sensitivity of the ear, Frequency marking, Temporal marking, G series Voice coding standards, MPEG audio Coders.

Video Representation and Compression: Video Compression Principles, Frame types, Motion estimation and Compression, Implementation Issues, Performance, Characteristics of Digital Video, Streaming Video, Combining sound and Pictures, H.261 Video Compression Standard, H.263, Digitisation Formats, Motion Pictures Experts Group (MPEG), MPEG-1, MPEG-2, MPEG-4, Audio and Video Compression.

Unit 5:

Basics of Animation:

Why we need Animation? Creating Animation in Flash 3D Animation & its Concepts. Motion Caption Concept Development. Key frames and the Graph Editor Path animation, Inverse kinematics, Smooth skinning ,Polygon Texturing, Rendering Shading surfaces, Rigid bodies and constraints Expressions.

Course Outcomes:

Students will

- Get knowledge about various terms like, images, text, fonts, file formats. Understanding these things is very necessary.
- Understand the basic concepts of multimedia technology which will help them to get started easily in multimedia.
- Know about the various compression techniques, types of compressions etc.
- will be able to understand design process, image processing and adobe premiere.
- Learn animation fundamentals and Understand how animation works.
- Gain Knowledge about using animation principles

Text Books:

1. A Text Book of Multimedia, Vishnu Priya Singh, Computech Publications, 2006
2. Computer Graphics, Multimedia and Animation. 2010,MK Phakira,PHI, 978-8120341272

Reference Books:

1. Multimedia Animation, Clarence Lamb, Kirk Keller, Pearson; Pap/Cdr edition
2. Guide to Computer Animation, 2002, Marcia Kuperberg

III Year – I Semester **L T P C**
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MOBILE APPLICATION DEVELOPMENT

Course Objectives:

- To introduce the Android technology and its application.
- Design & program real working education based mobile application projects.
- Become familiar with common mobile application technologies and platforms; open files, save files, create and program original material, integrate separate files into a mobile application project, create and edit audio sound effects & music.

SYLLABUS:

UNIT I

J2ME Overview: Java 2 Micro Edition and the World of Java, Inside J2ME, J2ME and Wireless Devices. Small computing Technology: Wireless Technology, Radio Data Networks, Microwave Technology, Mobile Radio Networks, Messaging, Personal Digital Assistants.
J2ME Architecture and Development Environment: J2ME Architecture, Small Computing Device Requirements, Run – Time Environment, MIDlet programming, Java Language for J2ME, J2ME Software Development Kits, Hello World J2ME Style, Multiple MIDlets in a MIDlet Suite, J2ME wireless Toolkit.

UNIT II

J2ME Best Practices and Patterns: The Reality of Working in a J2ME World, Best Practices, **Commands, Items, and Event Processing:** J2ME User Interfaces, Display Class, The Palm OS Emulator, Command Class, Item Class, Exception Handling.
High – Level Display: Screens, Screen Class, Alert Class, Form Class, Item Class, List Class, Text Box Class, Ticker Class.

UNIT III

Low Level Display: The Canvas, User Interactions, Graphics, Clipping Regions, Animation. **Record Management System:** Record Storage, Writing and Reading Records, Record Enumeration, Sorting Records, Searching Records, Record Listener.

UNIT IV

JDBC Objects: The Concept of JDBC, JDBC Driver Types, JDBC Packages. Overview of the JDBC process, Database Connection, Statement Objects, Result Set, Transaction Processing, Metadata, Data Types, Exceptions.
JDBC and Embedded SQL: Model programs, Tables, Indexing, Inserting Data into Tables, Selecting Data from a Table, Updating Tables, Deleting Data from a table.
Introduction Android Programming: What is Android, Activities, Linking Activities Using Intents, Fragments, Calling Built – in Applications using Intents, Displaying Notifications

UNIT V

Android User Interface: Understanding the Components of a Screen, Adapting to Display Orientation, Managing Changes to Screen Orientation, Utilizing the Action Bar, Listening for UI Notifications.
Designing User Interface with Views: Basic Views, Picker Views, Using List Views to Display Long Lists.

Course Outcomes:
At the end of the course students will be assessed to determine whether they are able to

- Describe the limitations and challenges of working in a mobile and wireless environment as well as the commercial and research opportunities presented by these technologies
- Describe and apply the different types of application models/architectures used to develop mobile software applications
- Describe the components and structure of a mobile development frameworks (Android SDK and Eclipse Android Development Tools (ADT)) and learn how and when to apply the different components to develop a working system
- Describe and apply software patterns for the development of the application models described above
- Describe and work within the capabilities and limitations of a range of mobile computing devices
- Design, implement and deploy mobile applications using an appropriate software development environment

Text Books :

1. J2ME: The Complete Reference, James Keogh, TMH.
2. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India

Reference Books :

1. Enterprise J2ME: Developing Mobile Java Applications, Michael Juntao Yuan, Pearson Education, 2004.
2. Android Application Development for Java programming by James C. Sheusi, Cengage Learning
3. Android A Programmers Guide by Jerome DiMargio, TMH.

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R PROGRAMMING

COURSE OBJECTIVES

- Master the use of the **R** and RStudio interactive environment.
- Expand **R** by installing **R** packages.
- Explore and understand how to use the **R** documentation.
- Read Structured Data into **R** from various sources.
- Understand the different data types in **R**.
- Understand the different data structures in **R**.

SYLLABUS:

Unit - I

Introduction, How to run R, R Sessions and Functions, Basic Math, Variables, Data Types, Vectors, Conclusion, Advanced Data Structures, Data Frames, Lists, Matrices, Arrays, Classes.

Unit - II

R Programming Structures, Control Statements, Loops, - Looping Over Nonvector Sets,- If-Else, Arithmetic and Boolean Operators and values, Default Values for Argument, Return Values, Deciding Whether to explicitly call return- Returning Complex Objects, Functions are Objective, No Pointers in R, Recursion, A Quicksort Implementation-Extended Extended Example: A Binary Search Tree.

Unit - III

Doing Math and Simulation in R, Math Function, Extended Example Calculating Probability- Cumulative Sums and Products-Minima and Maxima- Calculus, Functions Fir Statistical Distribution, Sorting, Linear Algebra Operation on Vectors and Matrices, Extended Example: Vector cross Product- Extended Example: Finding Stationary Distribution of Markov Chains, Set Operation, Input /out put, Accessing the Keyboard and Monitor, Reading and writer Files,

Unit - IV

Graphics, Creating Graphs, The Workhorse of R Base Graphics, the plot() Function – Customizing Graphs, Saving Graphs to Files.

Unit - V

Probability Distributions, Normal Distribution- Binomial Distribution- Poisson Distributions Other Distribution, Basic Statistics, Correlation and Covariance, T-Tests,-ANOVA.Linear Models, Simple Linear Regression, -Multiple Regression Generalized Linear Models, Logistic Regression, - Poisson Regression- other Generalized Linear Models-Survival Analysis, Nonlinear Models, Splines- Decision- Random Forests,

COURSE OUTCOMES

By the end of this course, you should be able to:

- download and install R and RStudio
- navigate and optimise the R integrated development environment (IDE) RStudio
- install and load add-in packages
- import external data into R for data processing and statistical analysis
- learn the main R data structures – vector and data frame
- compute basic summary statistics
- produce data visualisations with the ggplot package
- solve fundamental error problems.

Text Books

1. The Art of R Programming, Norman Matloff, Cengage Learning
2. R for Everyone, Lander, Pearson

Reference Books

1. R Cookbook, PaulTeetor, Oreilly.
2. R in Action,RobKabacoff, Manning

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PYTHON PROGRAMMING

COURSE OBJECTIVES:

- Introduction to Scripting Language.
- Exposure to various problems solving approaches of computer science.

UNIT-I:
INTRODUCTION TO PYTHON:

Features and History of Python, Python2 v. Python3
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, DATA STRUCTURES:

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
Lists, Nested Lists, List Comprehensions, Tuples and Sequences, Sets, Dictionaries
File I/O: opening, closing, reading and writing

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
Files and Exception Handling
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 Data Exploration in python using Pandas, Numpy, matplotlib The Python Standard Library: numeric and mathematical modules, string processing, date & time, calendar, operating system, web browser

UNIT-V:
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:

- 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

REFERENCE BOOKS:

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 (WebResource) https://docs.python.org/3/library/

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ADVANCED JAVA PROGRAMMING

OBJECTIVES:

To understand the concepts of Hypertext Markup Language and Cascading Style Sheets.

- To acquire knowledge on creation of software components using JAVA Beans.
- To learn Server-Side Programming using Servlets and Java Server Pages.
- To learn the creation of pure Dynamic Web Application using JDBC and PHP.

OUTCOMES:

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

- Implement web based applications using features of HTML and CSS.
- Able to develop dynamic programming on web using Java Script and Perl Language.
- Develop reusable component for Graphical User Interface applications.
- Apply the concepts of server side technologies for dynamic web applications using Servlets and JSPs.
- Implement the web based applications using effective data base access with rich client Interaction with JDBC Connectivity.

UNIT- I: Java Beans: Introduction to Java Beans, Advantages of Java Beans, BDK, Introspection, Using Bound properties, Bean Info Interface, Constrained properties, Persistence, Customizers, Java Beans API.

UNIT-II: Introduction to Servlets: Lifecycle of a Servlet, JSDK, The Servlet API,The javax.servlet Package, Reading Servlet parameters, Reading Initialization Parameters, The javax.servlet.HTTP package, Handling, Http Request & responses, Using Cookies, Session Tracking, Security Issues.

UNIT- III:Introduction to JSP: The Problem with Servelets, The Anatomy of a JSP Page, JSP Processing, JSP Application Design with MVC.

Setting Up the JSP Environment: Installing the Java Software Development Kit, Tomcat Server & Testing Tomcat.

UNIT- IV:

JSP Application Development: Generating Dynamic Content, Using Scripting Elements, Implicit JSP Objects, Conditional Processing – Displaying Values, Using an Expression to Set an Attribute, Declaring Variables and Methods,

Error Handling and Debugging, Sharing Data Between JSP Pages, Requests, and Users, Passing Control and Data Between Pages – Sharing Session and Application Data Memory Usage Considerations.

UNIT-V:

Database Access: Database Programming using JDBC, Studying Javax.sql.* package. Accessing a Database from a JSP Page, Application – Specific Database Actions Deploying JAVA Beans in a JSP Page.

TEXT BOOKS:

1. Internet and World Wide Web: How to program,6/e, Dietel, Dietel, Pearson.
2. Programming world wide web, Sebesta, PEA
3. The Complete Reference Java2, 8/e, Patrick Naughton, Herbert Schildt, TMH.
4. Java Server Faces, Hans Bergstan, O'reilly.

REFERENCE BOOKS:

1. Web Programming, building internet applications, 2/e, Chris Bates, Wiley Dreamtech
2. Web Tehnologies, 2/e, Godbole, kahate, TMH
3. An Introduction to web Design , Programming ,Wang,Thomson

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AUTOMATA & COMPILER DESIGN

Objectives:

- Automata and compiler Design mainly deals with the languages which are formal and regular and also deals with grammar present in the machine.
- An compiler is a program that accepts a program in source language and converts into a machine understandable format.
- The push down automata is the major one it's a five tuple set containing states, alphabets, transition function and accept states.

UNIT - I:

Formal Language and Regular Expressions : Languages, Definition Languages regular expressions, Finite Automata – DFA, NFA. Conversion of regular expression to NFA, NFA to DFA. Applications of Finite Automata to lexical analysis, lex tools.

Context Free grammars and parsing : Context free grammars, derivation, parse trees, ambiguity LL(K) grammars and LL(1) parsing

UNIT - II:

Bottom up parsing handle pruning LR Grammar Parsing, LALR parsing, parsing ambiguous grammars, YACC programming specification.

Semantics : Syntax directed translation, S-attributed and L-attributed grammars, Intermediate code – abstract syntax tree, translation of simple statements and control flow statements.

UNIT - III:

Context Sensitive features – Chomsky hierarchy of languages and recognizers. Type checking, type conversions, equivalence of type expressions, overloading of functions and operations.

UNIT - IV:

Run time storage : Storage organization, storage allocation strategies scope access to now local names, parameters, language facilities for dynamics storage allocation.

Code optimization : Principal sources of optimization, optimization of basic blocks, peephole optimization, flow graphs, Data flow analysis of flow graphs.

UNIT - V:

Code generation : Machine dependent code generation, object code forms, generic code generation algorithm, Register allocation and assignment. Using DAG representation of Block.

TEXT BOOKS:

1. Introduction to Theory of computation.Sipser, 2nd Edition, Thomson.
2. Compilers Principles, Techniques and Tools Aho, Ullman, Ravisethi, Pearson Education.

REFERENCES:

1. Modern Compiler Construction in C , Andrew W.Appel Cambridge University Press.
2. Compiler Construction, LOUDEN, Thomson.
3. Elements of Compiler Design, A. Meduna, Auerbach Publications, Taylor and Francis Group.
4. Principles of Compiler Design, V. Raghavan, TMH.
5. Engineering a Compiler, K. D. Cooper, L. Torczon, ELSEVIER.

Outcomes:

- Graduate should be able to understand the concept of abstract machines and their power to recognize the languages.
- Attainsthe knowledge of language classes & grammars relationship among them with the help of chomsky hierarchy.
- Ability to understand the design of a compiler given features of the languages.

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CRYPTOGRAPHY AND NETWORK SECURITY

Course Objectives

In this course, the following principles and practice of cryptography and network security are covered:

- Classical systems, symmetric block ciphers (DES, AES, other contemporary symmetricciphers)
- Public-key cryptosystems (RSA, El Gamal, and ECC),
- Algorithms for factoring and discrete logarithms, cryptographic protocols, hash functions,authentication,keymanagement,keyexchange,signatureschemes.
- The fundamental aspects of Email and web security ,viruses, firewalls, cyberlaws, and other topics are discussed.

UNIT-I: Introduction and Mathematical Background

Security Goals, Attacks, Services and Mechanisms, Model for Network Security, Cryptography and Cryptanalysis, Symmetric vs. Asymmetric Ciphers, Substitution vs. Transposition Ciphers, Stream vs. Block ciphers. Number Theory: Primes, Coprimes, Primality Test, GCD (Euclid's algorithm), Groups and Fields, Discrete Logarithmic Problem .Modular Arithmetic: Basics, Congruence, Fermat's little theorem, Euler's theorem, Computing Inverse, Chinese Remainder Theorem

UNIT-II: Symmetric Ciphers

Classic Ciphers, Confusion, and Diffusion, Feistel Structure, DES, Modes of operation, Triple DES, IDEA, Blowfish, AES

UNIT-III: Public Key Cryptography

RSA(algorithm, performance, and attacks), Diffie Hellman Key Exchange, El Gamal (encryption and signatures), Elliptic Curve Cryptography (Elliptic Curves, encryption, key exchange, and signatures)

UNIT-IV: Key Management and Authentication

Cryptographic Hash, Message Authentication Codes, Digital Signatures, X.509 certificates, PKI, One Way Authentication, Mutual Authentication, Centralised Authentication, Kerberos

UNIT-V: Network Security and Malware

IPsec (Transport vs. Tunnel, AH, ESP, Security Associations, IKE), SSL, Firewalls and Intrusion Detection Systems, DoS and DDoS, Buffer Overflow, Format Sting Vulnerabilities, The IT Act 2000: Aim and Objectives, Scope, Offences and Punishments

Course Outcomes

- To be familiar with information security awareness and a clear understanding of its importance.
- To master fundamentals of secret-key and public-key cryptographic systems.
- To master protocols that provide security and authentication services.
- To be familiar with network security threats and countermeasures.
- To be familiar with different types of cyber crimes and cyberlaws.

TEXTBOOKS:

1. Cryptography and Network Security: Principles and Practice, Sixth Edition, William Stallings,Pearson,7th edition.
2. CryptographyandNetworkSecurity,ThirdEdition,BehrouzAForouzan, DebdeepMukhopadhyay, Mc Graw Hill.
3. Cryptography, Network Security and Cyber Laws, Bernard L. Menezes, Ravinder Kumar,Cengage.

REFERENCES BOOKS:

1. Introduction to Computer Networks & Cyber Security, Chwan Hwa Wu, J.DavidIrwin, CRCpress.
2. Hack Proofing your Network, Russell, Kaminsky, Forest Puppy, WileyDreamtech.
3. Everyday Cryptography, Fundamental Principles & Applications, Keith Martin, Oxford.

Professional Elective courses

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MACHINE LEARNING

COURSE OBJECTIVES:

- To learn well-known machine learning algorithms
- To evaluate and compare the performance of various machine learning algorithms
- Able to differentiate regression models and distance based models and ANNS.

UNIT I: **Introduction:** Well-posed learning problems, designing a learning system, Perspectives and issues in machine 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 e limination algorithm, Remarks on version spaces and candidate elimination, Inductive bias.

UNIT II: Linear Regression & Logistic Regression: Predicting Numeric Values: Regression - Finding the best fit lines with linear regression, locally weighted linear regression, Shrinking Coefficients, The bias / Variance tradeoff. **LOGISTIC REGRESSION:** Classification with logistic regression and the sigmoid function, Using optimization to find the best regression coefficients.

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: 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. **Evolutionary Learning:** Genetic Algorithms, Genetic Operators. Genetic Programming Ensemble learning: Boosting, Bagging, swarm intelligence, PSO.

UNIT V: Support Vector Machines: Separating data with the maximum margin, finding the maximum margin, efficient optimization with SMO algorithm, speeding up optimization with full platt SMO, Using Kernels for more Complex data. **Dimensionality Reduction Techniques:** Principal Component analysis, Example. Instance-Based Learning- Introduction, k -Nearest Neighbor Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks on Lazy and Eager Learning**.**

COURSE OUTCOMES:

- Recognize the characteristics of machine learning algorithms and their applications to real world problems
- Able to differentiate linear and logistic regressions.
- Able to write and evaluate hypothesis
- Understand the concepts of Artificial neural networks
- Can apply kernel methods to solve real world problems.
- Learn eager and lazy learners.

TEXT BOOKS:

1. Machine Learning ,Tom M. Mitchell, MGH.
2. Machine Learning in Action, Peter Harington, 2012, Cengage.`

REFERENCE BOOKS:

1. Introduction to Machine Learning, Ethem Alpaydin, PHI, 2004.
2. A course in Machine Learning , Hall Daum'e III

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Wireless Sensor Based Networks

COURSE OBJECTIVES:

- Understand the state-of-the-art in network protocols, architectures and applications.
- Analyze existing network simulator to working environment.
- Understand the medium access control protocols and Markov chain properties.
- Learn key routing protocols for sensor networks and main design issues
- Understand the routing protocols for wireless sensor networks and advancedprotocols.

Unit I:

Introduction to Wireless Sensor Networks: Course Information, Motivations, Applications, Performance metrics, History and Design factors.
Network Architecture: Traditional layered stack, Cross-layer designs, Sensor Network Architecture. Hardware Platforms: Motes, Hardware parameters

Unit II:

Introduction to ns-3: Introduction to Network Simulator 3 (ns-3), Description of the ns-3 core Unit and simulation example.

Unit III:

Medium Access Control Protocol design: Fixed Access, Random Access, WSN protocols: synchronized, duty-cycled
Introduction to Markov Chain: Discrete time Markov Chain definition, properties, classification and analysis
MAC Protocol Analysis: Asynchronous duty-cycled X-MAC Analysis (Markov Chain)

Unit IV:

Security: Possible attacks, countermeasures, SPINS, Static and dynamic key distribution

Unit V:

Routing protocols: Introduction, MANET protocols, Routing protocols for WSN:
Resource-aware routing, Data-centric, Geographic Routing, Broadcast, Multicast.
Opportunistic Routing Analysis: Analysis of opportunistic routing (Markov Chain)
Advanced topics in wireless sensor networks.
Advanced Topics: Recent development in WSN standards, software applications.

COURSE OUTCOMES:

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

- explain the basics concepts of wireless sensor networks.understand of

network simulator 3 to implement protocols of wsn .

- use of medium access control protocol design issues.
- knowledge of different security concepts and attacks.
- gain working of different routing protocols.
- learnt advanced topics and make use of real time environment

TEXT BOOK(S):

1. W. Dargie and C. Poellabauer, "Fundamentals of Wireless Sensor Networks –Theory and Practice",Wiley 2010.
2. KazemSohraby, Daniel Minoli and TaiebZnati, "wireless sensor networks - Technology, Protocols,and Applications", Wiley Interscience 2007.
3. Takahiro Hara,Vladimir I. Zadorozhny, and Erik Buchmann, "Wireless SensorNetwork Technologies for the Information Explosion Era", springer 2010.

REFERENCE BOOKS:

1.K. Akkaya and M. Younis, "A survey of routing protocols in wireless sensor networks", Elsevier Ad Hoc Network Journal, Vol. 3, no. 3, pp. 325--349
2.Philip Levis, " TinyOS Programming"
3.Anna Ha´c, "Wireless Sensor Network Designs", John Wiley & Sons Ltd,

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Human Computer Interaction

COURSE OBJECTIVES:

- Demonstrate an understanding of guidelines, principles, and theories influencing human Computer interaction.
- Recognize how a computer system may be modified to include human diversity.
- Select an effective style for a specific application.
- Design mock ups and carry out user and expert evaluation of interfaces.
- Carry out the steps of experimental design, usability and experimental testing, and evaluation of human computer interaction systems.
- Use the information sources available, and be aware of the methodologies and technologies supporting advances in HCI.

UNIT-I:

The User Interface: Introduction, Importance of the User Interface, Importance and benefits of Good Design History of Human Computer Interface. Characteristics of Graphical and Web User Interface: Graphical User Interface, popularity of graphics, concepts of Direct Manipulation, Graphical System advantage and disadvantage, Characteristics of GUI. Web User Interface, popularity of web, Characteristics of Web Interface, Merging of Graphical Business systems& the Web, Principles of User Interface Design

UNIT-II:

The User Interface Design Process: Obstacles and Pitfall in the development Process, Usability, The Design Team, Human Interaction with Computers, Important Human Characteristics in Design, Human Consideration in Design, Human Interaction Speeds, Performance versus Preference, Methods for Gaining and Understanding of Users

UNIT-III:

Understanding Business Functions: Business Definitions & Requirement analysis, Determining Business Functions, Design standards or Style Guides, System Training and Documentation

UNIT-IV:

Principles of Good Screen Design: Human considerations in screen Design, interface design goals, test for a good design, screen meaning and purpose, Technological considerations in Interface Design System Menus and Navigation Schemes: Structure, Functions, Context, Formatting, Phrasing and Selecting, Navigating of Menus, Kinds of Graphical Menus Windows Interface: Windows characteristic, Components of Window, Windows Presentation Styles, Types of Windows, Window

Management, Web systems

UNIT-V:

Device and Screen-Based Control: Device based controls, Operable Controls, Text entry/read-Only Controls, Section Controls, Combining Entry/Selection Controls, Other Operable Controls and Presentation Controls, Selecting proper controls

Effective Feedback Guidance and Assistance: Providing the Proper Feedback, Guidance and Assistance Effective Internationalization and Accessibility- International consideration, Accessibility, Create meaningful Graphics, Icons and Images, Colors-uses, possible problems with colors, choosing colors

OUTCOMES:

- Students are assessed on their ability to communicate and apply UCD methods in the capstone project course. Assessment includes examination of team reports and how HCI students can discuss challenges and solutions for adapting UCD methods to fit the practical needs of an actual project

TEXT BOOKS:

- Wilbert O. Galitz, "The Essential Guide to User Interface Design", Wiley India Edition
- Prece, Rogers, "Sharps Interaction Design", Wiley India.
- Ben Shneidermann,"Designing the user interfaces". 3rd Edition, Pearson Education Asia.

REFERENCES BOOKS:

- Soren Lauesen, "User Interface Design" , Pearson Education
- Alan Cooper, Robert Riemann, David Cronin, "Essentials of Interaction Design", Wiley
- Alan Dix, Janet Fincay, GreGoryd, Abowd, Russell, Bealg,"HumanComputer Interaction", Pearson Education.

Open Elective Course/Job oriented elective

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BASICS OF AWS FRAMEWORK

Course Objectives:

- Make architectural decisions based on AWS architectural principles and best practices
- Leverage AWS services to make your infrastructure scalable, reliable, and highly available
- Leverage AWS Managed Services to enable greater flexibility and resiliency in an infrastructure
- Make an AWS-based infrastructure more efficient to increase performance and reduce costs

Unit I: Fundamentals of Cloud Computing: Introduction to Cloud Computing, Cloud Environment Architecture, Cloud Computing Models. Infrastructure & Networking: Introduction to Amazon Web Services, AWS Global Infrastructure, Introduction to Network Switches & Virtual Private Cloud, IP Addressing in AWS, Understanding AWS Security Groups.

Unit II: Storage: Introduction to Block & Object storage mechanism, Introduction to Block & Object storage mechanism, EBS Snapshots, EBS Volume Types, Instance Store Volumes, Introduction to Simple Storage Service (S3), Features of S3.

Unit III: Identity & Access Management: Understanding the IAM Policies, IAM User, IAM Policy and IAM Role. Relational Databases: Introduction to Relational Databases, Creating our first database structure in MySQL, Getting started with DynamoDB.

Unit IV: Domain Name System: Introduction to DNS, Understanding DNS Records, Introduction to Route53. Aws Lambda and API: Aws Lambda and API, Introduction to API, Introduction to API, Building our API with API Gateway.

Unit V: Building Scalable Applications: Introduction to Message Brokers, Understanding SQS, Understanding Simple Notification Service (SNS). The DevOps Section. Monitoring - Understanding CloudWatch, Auditing AWS environment with CloudTrail.

Course outcomes:

- Effectively demonstrate knowledge of how to architect and deploy secure and robust applications on AWS technologies.
- Define a solution using architectural design principles based on customer requirements.
- Provide implementation guidance based on best practices to the organization throughout the life cycle of the project.

Textbooks

1. Learning Amazon Web Services (AWS): A Hands-On Guide to the Fundamentals of AWS Cloud
2. Amazon Web Services in Action 2nd Edition
3. Programming AWS Lambda: Build and Deploy Serverless Applications with Java 1st Edition, Kindle Edition

Reference books

1. AWS Certified Advanced Networking Official Study Guide: Specialty Exam 1st Edition
2. Amazon Web Services For Dummies

BASICS OF AWS FRAMEWORK LAB

1. Introduction to cloud computing models
2.Creation Amazon Free tier account
3.Enablingg Multi Factor Authentication to secure your Access
4.Creating First Linux instance
5.Creating Amazon Machine Image
6.Creating your First EC2 Instance
7.Assigning Elatsic IP addressses to Insatnce (Static IP Address)
8.Introduction to Amazon web services-S3 Bucket
9.creating Amazon web services S3 bucket
10.Amazon web services S3 Life Cycle Management
11.S3 Bucket Replication to cross region
12.Amazon web services elastic load balance

III Year – II Semester **L T P C**

2 0 2 3

MOBILE APPLICATION DEVELOPMENT

Course Objectives:

- To demonstrate the introduction and characteristics of mobile applications
- Application models of mobile application frameworks. Managing application data and User-interface design for mobile applications
- Integrating networking, the OS and hardware into mobile-applications
- Addressing enterprise requirements in mobile applications – performance, scalability, modifiability, availability and security
- Testing methodologies for mobile applications– Publishing, deployment, maintenance and management. To demonstrate their skills of using Android software development tools
- To demonstrate their ability to deploy software to mobile devices

UNIT I

Introduction to mobile devices: Introduction to Mobile Computing, Introduction to Android Development Environment, Mobile devices vs. desktop devices, ARM and Intel architectures, Screen resolution, Touch interfaces, Application deployment, App Store, Google Play, Windows Store.
Development environments: XCode, Eclipse, VS2012, PhoneGAP, etc.; Native vs. web applications.
Factors in Developing Mobile Applications:Mobile Software Engineering, Frameworks and Tools, Generic UI Development, Android User.

UNIT II

Android User Interface:Measurements – Device and pixel density independent measuring units User Interface (UI) Components – Editable and non editable Text Views, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers Fragments – Creating fragments, Lifecycle of fragments, Fragment states, Adding fragments to Activity, adding, removing and replacing fragments with fragment transactions, interfacing between fragments and Activities, Multi-screen Activities.

UNIT III

Back Ground Running Process, Networking And Telephony Services: Services: Introduction to services – local service, remote service and binding the service, the communication between service and activity, Intent Service.
MultiThreading: Handlers, AsyncTask.
Android network programming: Http Url Connection, Connecting to REST-based and SOAP based Web services.
Broad cast receivers: Local Broadcast Manager, Dynamic broadcast receiver, System Broadcast. Pending Intent, Notifications.

UNIT IV

Android: Introduction – Establishing the development environment – Android architecture – Activities and views – Interacting with UI – Persisting data using SQLite – Packaging and deployment – Interaction with server side applications – Using Google Maps, GPS and Wifi –

Integration with social media applications.

UNIT V

Advanced Topics: Power Management: Wake locks and assertions, Low-level OS support, Writing power-smart applications.

Augmented Reality via GPS and other sensors: GPS, Accelerometer, Camera.

Mobile device security in depth: Mobile malware, Device protections, iOS "Jailbreaking", Android "rooting" and Windows' "defenestration"; Security and Hacking: Active Transactions, More on Security, Hacking Android.

Course Outcomes:

Upon completion of the course students should be able to:

- Install and configure Android application development tools.
- Design and develop user Interfaces for the Android platform.
- Save state information across important operating system events.
- Apply Java programming concepts to Android application development.

Text Books:

1) Bill Phillips, Chris Stewart, Brian Hardy, and Kristin Marsicano, Android Programming: The Big Nerd
2) Ranch Guide, Big Nerd Ranch LLC, 2nd edition, 2015.
3) Valentino Lee, Heather Schneider, and Robbie Schell, Mobile Applications: Architecture, Design and Development, Prentice Hall, 2004.
4) Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox) , 2012
5) Android Application Development for Java Programmers, James C Sheusi, Cengage Learning, 2013
6) Dawn Griffiths, David Griffiths,*"Head First: Android Development" ,OReilly2015,ISBN*: 9781449362188
7) http://developer.android.com/develop/index.html
8) Jeff McWherter and Scott Gowell, "Professional Mobile Application Development", Wrox, 2012

Reference Books:

1) Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 2013
2) Tomasz Nurkiewicz and Ben Christensen, Reactive Programming with RxJava, O'Reilly Media, 2016.
3) Brian Fling, Mobile Design and Development, O'Reilly Media, Inc., 2009.
4) Maximiliano Firtman, Programming the Mobile Web, O'Reilly Media, Inc., 2nd ed., 2013.
5) Cristian Crumlish and Erin Malone, Designing Social Interfaces, 2nd ed., O'Reilly Media, Inc., 2014.
6) Suzanne Ginsburg, Designing the iPhone User Experience: A User-Centered Approach to Sketching and Prototyping iPhone Apps, Addison-Wesley Professional, 2010.

Mobile Application Development Lab

1. Write a J2ME program to show how to change the font size and colour.
2. Write a J2ME program which creates the following kind of menu.
    - cut
    - copy
    - past
    - delete
    - select all
    - unselect all
3. Create a J2ME menu which has the following options (Event Handling):
        - cut - can be on/off
        - copy - can be on/off
        - paste - can be on/off
        - delete - can be on/off
        - select all - put all 4 options on
        - unselect all - put all
4. Create a MIDP application, which draws a bar graph to the display. Data values can be given at int[]
array. You can enter four data (integer) values to the input text field.
5. Create an MIDP application which examine, that a phone number, which a user has entered is in the given format (Input checking):
* Area code should be one of the following: 040, 041, 050, 0400, 044
* There should 6-8 numbers in telephone number (+ area code)
6. Write a sample program to show how to make a SOCKET Connection from J2ME phone. This J2ME
sample program shows how to how to make a SOCKET Connection from a J2ME Phone. Many a times
there is a need to connect backend HTTP server from the J2ME application. Show how to make a SOCKET connection from the phone to port 80.
7. Login to HTTP Server from a J2ME Program. This J2ME sample program shows how to display a simple
LOGIN SCREEN on the J2ME phone and how to authenticate to a HTTP server. Many J2ME applications
for security reasons require the authentication of the user. This free J2ME sample program, shows how a J2ME application can do authentication to the backend server. Note: Use Apache Tomcat Server as Web Server and MySQL as Database Server.
8. The following should be carried out with respect to the given set of application domains: (Assume that the Server is connected to the well-maintained database of the given domain. Mobile Client is to be connected to the Server and fetch the required data value/information)
• Students Marks Enquiry
• Town/City Movie Enquiry
• Railway/Road/Air (For example PNR) Enquiry/Status

• Sports (say, Cricket) Update
• Town/City Weather Update
• Public Exams (say Intermediate or SSC)/ Entrance (Say EAMCET) Results Enquiry

Divide Student into Batches and suggest them to design database according to their domains and render
information according the requests.

9. Write an Android application program that displays Hello World using Terminal.
10. Write an Android application program that displays Hello World using Eclipse.
11. Write an Android application program that accepts a name from the user and displays the hello name to the user in response as output using Eclipse.
12. Write an Android application program that demonstrates the following:
(i) LinearLayout
(ii) RelativeLayout
(iii) TableLayout
(iv) GridView layout
13. Write an Android application program that converts the temperature in Celsius to Fahrenheit.
14. Write an Android application program that demonstrates intent in mobile application development.

III Year – II Semester **L T P C**

2 0 2 3

NOSQL DATABASES

Course Objectives:
From the course the student will

- To understand the basic concepts and the applications of database systems. To master the basics of SQL and construct queries using SQL.
- To understand the relational database design principles.
- To become familiar with the basic issues of transaction processing and concurrencycontrol.
- To become familiar with database storage structures and access techniques.

UNIT I
Introduction to NoSQL: Definition And Introduction, Sorted Ordered Column-Oriented Stores, Key/Value Stores, Document Databases, Graph Databases, Examining Two Simple Examples, Location Preferences Store, Car Make And Model Database, Working With Language Bindings.

UNIT II
Interacting with NoSQL: If NoSql Then What, Language Bindings For NoSQL Data Stores, Performing Crud Operations, Creating Records, Accessing Data, Updating And Deleting Data

UNIT III
NoSQL Storage Architecture : Working With Column-Oriented Databases, Hbase Distributed Storage Architecture, Document Store Internals, Understanding Key/Value Stores In Memcached And Redis, Eventually Consistent Non-Relational Databases.

UNIT IV
NoSQL Stores : Similarities Between Sql And Mongodb Query Features, Accessing Data From Column-Oriented Databases Like Hbase, Querying Redis Data Stores, Changing Document Databases, Schema Evolution In Column-Oriented Databases, Hbase Data Import And Export, Data Evolution In Key/Value Stores.

UNIT V
Indexing and Ordering Data Sets : Essential Concepts Behind A Database Index, Indexing And Ordering In Mongodb, Creating and Using Indexes In Mongodb, Indexing And Ordering In Couchdb, Indexing In Apache Cassandra.

Course Outcomes:

After the completion of the course, student will be able to do the following.

- Define, compare and use the four types of NoSQL Databases (Document-oriented, Key Value Pairs, Column oriented and Graph).
- Demonstrate an understanding of the detailed architecture, define objects, load data, query data and performance tune Column-oriented NoSQL databases.
- Explain the detailed architecture, define objects, load data, query data and performance tune Document oriented NoSQL databases.
- Ability to design entity relationship model and convert entity relationship diagrams into RDBMS and formulate SQL queries on the data

Text Books:

1) Pramod Sadalage and Martin Fowler, NoSQL Distilled, Addison-Wesley Professional, 2012.
2) Dan McCreary and Ann Kelly, Making Sense of NoSQL, Manning Publications, 2013.

Reference Books:

1) Shashank Tiwari, Professional NoSQL, Wrox Press, Wiley, 2011, ISBN: 978-0-470-94224-6
Gaurav Vaish, Getting Started with NoSQL, Packt Publishing, 2013.

NOSQL DATABASES LAB

1. Write a MongoDB query to display all the documents in the collectionrestaurants.
2. Write a MongoDB query to display the fields restaurant_id, name, boroughand cuisine for all the documents in the collection restaurant.

3. Write a MongoDB query to display the fields restaurant_id, name, borough and cuisine, but exclude the field _id for all the documents in the collection restaurant.
4. Write a MongoDB query to display the fields restaurant_id, name, borough
5. and zipcode, but exclude the field _id for all the documents in the collection restaurant.

6. Write a MongoDB query to display the entire restaurant which is in theborough Bronx.
7. Write a MongoDB query to display the first 5 restaurant which is in theborough Bronx.

8. Write a MongoDB query to display the next 5 restaurants after skipping first5 which are in the borough Bronx.
9. Write a MongoDB query to find the restaurants who achieved a score morethan 9

10. Write a MongoDB query to find the restaurant Id, name, borough and cuisine for those restaurants which prepared dish except 'American' and 'Chinees' orrestaurant's name begins with letter 'Wil'.
11. Write a MongoDB query to find the restaurant Id, name, and grades for those Restaurants which achieved a grade of "A" and scored 11 on an ISO Date "2014-08- 11T00:00:00Z" among many of survey dates.
12. Write a MongoDB query which will select all documents in the restaurantscollection where the coord field value is Double.
13. Write a MongoDB query which will select the restaurant Id, name and grades for those restaurants which returns 0 as a remainder after dividing the scoreby 7.

III YEAR –II SEMESTER

L	T	P	C
0	0	3	1.5

ADVANCED JAVA PROGRAMMING LAB

OBJECTIVES:

- To develop skills in students in developing applications using advanced concepts of advanced Java programming concepts like JDBC, Servlets, JSP, Java Beans, etc.

PROGRAMS LIST:

1. Write a program to prompt the user for a hostname and then looks up the IP address for the hostname and displays the results.

2. Write a program to read the webpage from a website and display the contents of the webpage.

3. Write programs for TCP server and Client interaction as per given below.

i). A program to create TCP server to send a message to client.
ii). A program to create TCP client to receive the message sent by the server.

4. Write programs for Datagram server and Client interaction as per given below.

i). A program to create Datagram server to send a message to client.
ii). A program to create Datagram client to receive the message sent by the server

5. Write a program by using JDBC to execute a SQL query for a database and display the results.

6. Write a program by using JDBC to execute an update query without using Prepared Statement and display the results.

7. Write a program by using JDBC to execute an update query by using Prepared Statement and display the results.

8. Write a program to execute a stored procedure in the database by using Callable Statement and display the results.

9. Write a program to display a greeting message in the browser by using Http Servlet.

10. Write a program to receive two numbers from a HTML form and display their sum in the browser by using Http Servlet.

11. Write a program to display a list of five websites in a HTML form and visit to the selected website by using Response redirection.

12. Write a program to store the user information into Cookies. Write another program to display the above stored information by retrieving from Cookies.

13. Write a program in Java Beans to add a Button to the Bean and display the number of times the button has been clicked.

14. Write a program for Java Bean with Simple property by using SimpleBeanInfo class.

15. Write a program for Java Bean with Indexed Property by using SimpleBeanInfo class.

16. Write a program to develop a Enterprise Java Bean of "Session Bean" type.

OUTCOMES:

After successful completion of course, students will be able appreciate and apply the advanced concepts of Java including JDBC, Servlets, JSP, Java Beans, etc.

III YEAR –II SEMESTER

L	T	P	C
0	0	3	1.5

MULTIMEDIA & ANIMATION LAB

Course objectives:

- Animation Technology. To develop competencies and skills needed for becoming an effective Animator.
- digital tools to produce stills and moving images. Exploring different approaches in computer animation.
- Product creation. To train students in applying laws of human motion and psychology in 2-D or 3-D
- To apply Audio and Video Production Techniques to an Animation Project.

Task 1: Write a program to justify a text entered by the user on both left and right hand side.forexample the test " An architect may have a graphics program to draw an entire building but be interested in only ground floor",can be justified in 30 columns. An architect may have a graphics programs draw an entire building but interested in ground floor.

Task 2: Study the notes of a piano and stimulate them using the keyboard and store them in file

Task 3: Write a program to read a paragraph and store it to a file name suggested by the author

Task 4: Devise a routine to produce the animation effect of a square transforming to a triangle and then to a circle.

Task 5: Write a program to show a bitmap image on your computer screen.

Task 6: Create a web page for a clothing company which contains all the details of that company and at least five links to other web pages.

Task 7: Write a program by which we can split mpeg video into smaller pieces for the purpose of sending it over the web or by small capacity floppy diskettes and then joining them at the destination.

Task 8: Write a program to simulate the game of pool table

Task 9: Write a program to simulate the game mine sweeper

Task 10: Write a program to play "wave" or "midi" format sound files.

Course Outcomes:

- This course will offer skill development in the use of software to develop storyboards and 2-dimentional animation including creating, importing and sequencing media elements to create multi-media presentations.

- Understand the formal elements of art and/or design through art analysis and develop competency in their application through studio practice.
- Understand and apply the basic principles, techniques, and algorithms for generating and interacting with simple graphical objects on a display screen.

Text Books:

1. The Illusion of Life: Disney Animation - Frank Thomas and Ollie Johnston
2. Cartoon Animation - Preston Blair
3. The Animator's Survival Kit - Richard Williams

Online References :

4. History of Animation - https://en.wikipedia.org/wiki/History_of_animation
5. Principles of Animation - https://en.wikipedia.org/wiki/12_basic_principles_of_animation

III Year – II Semester

L	T	P	C
0	0	3	1.5

CRYPTOGRAPHY AND NETWORKING SECURITY LAB

W eek-1:

i. Write a Cprogram that contain sastring (charpointer)with the value 'Hello world.' TheprogramshouldXOReachcharacterinthisstringwith0and displays the result.

ii. Write a Cprogram that contain sastring(charpointer)with avalue' Hello world'.The program should ANDorandXO Reach character in this string with 127 and display the result.

W eek-2:

i. Encrypt the message "PAY" using hill cipherwith the following keymatrix and show the decryption to formulate original plaintext K= $\begin{bmatrix} 17 & 17 & 5 \\ 21 & 18 & 21 \\ 2 & 2 & 19 \end{bmatrix}$

W eek-3:

i.Write a Java program to perform encryption and decryption using the following algorithms
a. Ceaser cipher b. Substitution cipher c. Hill Cipher
ii.Write a C/JAVA program to implement Ceaser Cipher
iii.Write a C/JAVA program to Affine Cipher with equation c=3x+12
iv.Write a C/JAVA program to implement Playfair Cipher with key ldrp
v.Write a C/JAVA program to implement polyalphabetic Cipher
vi.Write a C/JAVA program to implement AutoKey Cipher
vii.Write a C/JAVA program to implement Hill Cipher. (Use any matrix but find the inverse yourself)
viii.Write a C/JAVA program to implement the Rail fence technique
ix.Write a C/JAVA program to implement the Simple Columnar Transposition technique
x.Write a C/JAVA program to implement the Advanced Columnar Transposition technique

W eek-4:

i. Write a C/JAVA program to implementthe DES algorithm logic.

ii. Write a C/JAVA program to implement the Blowfish algorithm logic. Generation subkey and S Box from the given 32-bit key by Blowfish.

W eek-5:

i. WriteaC/JAVAprogramtoimplementtheRijndaelalgorithmlogic.
ii. Write the RC4 logic in Java Using Java cryptography; encrypt the text "Hello world" using Blowfish. Create your own key using Java keytool.

W eek-6:

i. Write a C/JAVA program to implementEuclidean Algorithm
ii. WriteaC/JAVAprogramtoimplementAdvancedEuclideanAlgorithm
iii. WriteaC/JAVAprogramtoimplementSimpleRSAAlgorithmwithsmallnumbers
iv. Write a Java program to implement RSA algorithm.Implement the Diffie-Hellman Key Exchange mechanism using HTML andJavaScript.

W eek-7:

i. Calculate the message digest of a text using the SHA-1 algorithm inJAVA.
ii. Calculate the message digest of a text using the MD5 algorithm inJAVA.

III Year-II Semester	Skill Advanced Course/Soft skill Course	L	T	P	C
		1	0	2	2
ADVANCED COMMUNICATION SKILLS LAB					

Course Objectives:

The objectives of this course are:
i. To enable the students develop advanced communication skills in English for academic and social purposes.
ii. To make the students to understand the significance of group discussion and various modalities of a group discussion.
iii. To make the students to excel in opinion giving and argue confidently and logically during Debates.
iv. To expose the students to the nuances involved in oral presentation skills and Public Speaking skills.
V. To train the students in job interviews by exposing them to the prerequisites, types, FAQ's and various preparatory techniques in job interviews.

UNIT - I: JAM: Do's and Don'ts of JAM, speaking practice with various topics

UNIT - II: Group Discussion: Importance, modalities, types, do's and don'ts of a GD

UNIT - III: Debate: Importance of a Debate, General rules for participation in debate, Useful phrases, Sample debates-Activities

UNIT - IV: Oral Presentation & public Speaking:
- Make Effective presentations using posters, Flash cards and PPTs
- Tips for making a presentation
- Do's and Don'ts of a presentation
- Dealing with nerves
- Simulated topics/situations for public speaking

UNIT - V: Interview Skills:
- Significance of job interviews
- Understanding preparatory techniques for job interviews
- Know and answer frequently asked questions (FAQs) at job interviews
- Mock interviews

Course Outcomes:

The students should be able to:

i. improve their speaking ability by using context -specific vocabulary.
ii. Learn how to communicate in a group discussion confidently and fluently by using appropriate expressions.

iii. Expose the learners to various speaking activities and enable them to argue logically and develop critical thinking skills.

iv. Apply various techniques for making effective oral presentation skills and improve public speaking skills.

v. acquire employability skills by integrating communication skills and to excel in job interviews

Reference Books:

1. *Effective Technical Communication* | 2nd Edition Paperback – 27 July 2017. by M. *Ashraf Rizvi* (Author).
2. Sanjay Kumar and Pushp Lata. ―*Communications Skills*‖. Oxford University. Press. 2011.
3. Video /you tube links:

Muniba Mazari, Malala Yousuf Zahi, Abdul Kalam, Steve Jobs, Mark Zuckerberg…

		L	T	P	C
III Year-II Semester	**Mandatory Course (AICTE)**	**2**	**0**	**0**	**0**
INTELLECTUAL PROPERTY RIGHTS AND PATENTS					

Objectives:

- This course is aimed at familiarizing researchers with the nuances of Intellectual Property Rights (IPR) so as to help them integrate the IPR process in their research activities.
- internalisation process to help the researchers to set targeted objectives in their research project and also to design and implement their research to clearly differentiate their work vis-a-vis the existing state of knowledge/ prior art.
- To give the PhD Students "hands- on –training" in literature, including patent search and documentation of research activities that would aid an IPR expert to draft, apply and prosecute IPR applications.
- To make the PhD students familiar with basics of IPR and their implications in Research, development and commercialization.
- Facilitate the students to explore career options in IPR.

Unit I: Introduction to Intellectual Property Rights (IPR)

Introduction of IPR - Importance - 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.

Outcomes:

- IPR Laws and patents pave the way for innovative ideas which are instrumental for inventions to seek Patents.
- Student gets an insight on Copyrights, Patents and Software patents which are instrumental for further advancements.
- Apply intellectual property law principles (including copyright, patents, designs and trademarks) to real problems and analyse the social impact of intellectual property law and policy
- Analyse ethical and professional issues which arise in the intellectual property law context
- students should be able to Write reports on project work and critical reflect on their own learning.

References:

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. PrabhuddhaGanguli: 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. Ashok Kumar and MohdIqbal Ali: Intellectual Property Rights, Serials Pub.

HONORS COURSES

III Year – II Semester **L T P C**
3 1 0 4

EMBEDDED SYSTEMS

Course Objectives:

- Develop an understanding of the technologies behind embedded computing systems.
- Introduce students to the various software components invloved in embedded system design and development.
- Expose students to the recent trends in embedded system design.

SYLLABUS:

UNIT-I:
Introduction to Embedded System: Understanding the Basic Concepts, The Typical Embedded System – Characteristics and Quality attributes

UNIT-II:
Hardware Software Co-Design and Program Modelling – Fundamental Issues, Computational Models-Data Flow Graph, Control Data Flow Graph, State Machine, Sequential Model, Concurrent Model, Object oriented model, UML

UNIT-III:
Design and Development of Embedded Product – Firmware Design and Development – Design Approaches, Firmware Development Languages

UNIT-IV:
Integration and Testing of Embedded Hardware and Firmware- Integration of Hardware and Firmware. Embedded System Development Environment – IDEs, Cross Compilers, Disassemblers, Decompilers, Simulators, Emulators and Debuggers.

UNIT-V:
RTOS based Design – Basic operating system services. Interrupt handling in RTOS environment. Design Principles. Task scheduling models. How to Choose an RTOS. Embedded Product Development Life Cycle – Description – Objectives -Phases – Approaches. Recent Trends in Embedded Computing.

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

- Demonstrate the role of individual components involved in a typical embedded system.
- Analyze the characteristics of different computing elements and select the most appropriate one for an embedded system.
- Model the operation of a given embedded system.
- Substantiate the role of different software modules in the development of an embedded system.
- Develop simple tasks to run on an RTOS.. Examine the latest trends prevalent in embedded system design.

Text Books:
1. Shibu K.V., Introduction to Embedded Systems, McGraw Hill Education (India), 2009.
2. Raj Kamal, Embedded Systems: Architecture, Programming and Design, Third Edition, McGraw Hill Education (India).

Reference Books:

1. Jean J. Labrose, MicroC OS II: The Real Time Kernel, Second Edition, CRC Press.
2. Steave Heath, Embedded System Design, Second Edition, Elsevier.
3. J Staunstrup and Wayne Wolf, Hardware / Software Co-Design: Principles and Practice,

III Year – II Semester **L T P C**
3 1 0 4

INTERNET TECHNOLOGIES

Course Objectives:

- Understand basic network models and Different transmission used for data communication.
- Understand different routing algorithms used for data transmission from source to destination in a network layer.
- Know how internet address is installed and how internet protocols are used in connecting internet.
- Can design own web pages and communicate through server.
- Can Learn the issues raised on internet and to provide security.

SYLLABUS:

UNIT-I
Networking Protocols and Internet: Introduction, Protocols in Computer Communications, the OSI Model, OSI Layer Functions. Why Internet Working?, Problems in Internet Working, Dealing with Incompatibility Issues, A Virtual Network, Internet Working Devices, Repeaters, Bridges, Routers, Gateways, A Brief History of the Internet, Growth of the Internet, TCP/IP protocol, addressing and routing.

UNIT-II
WWW, HTTP, TELNET: Introduction, Brief History of WWW, the Basics of WWW and Browsing, Hyper Text Markup Language, Common Gateway Interface, Remote Login.

UNIT III
Internet applications: FTP, Telnet, Email, Chat. World Wide Web: HTTP protocol.
Designing web pages: HTML, forms, CGI scripts and clickable maps, JAVA applets, JAVA script, JAVA servlets, Perl. DHTML, XML.

UNIT IV:
E-Commerce and security issues: E-Commerce and security issues including symmetric and asymmetric key, encryption and digital signature, authentication.

UNIT V:
Advanced Concepts: Emerging trends, Internet telephony, virtual reality over the web, Intranet and extranet, firewall design issues.

Course Outcomes:

- Suggest appropriate network model for data communication.
- Propose appropriate routing algorithm for data routing.
- Connect internet to the system and knowledge of trouble shooting.
- Student will be able to create web pages that communicate with databases
- Students be able to resolve issues on internet and can learn the emerging technologies with internet.

TEXT BOOKS:

1. Achyut Godbole,Atul Kahate"Web Technologies:TCP/IP,Web/Java Programming, and Cloud Computing",Third Edition,McGraw Hill Education.
2. Robert w Sebesta, "Introduction to World Wide Web", edition-8, Pearson education
3. Web Technolgies, Uttam Roy, OXFORD University press
4. Web programming with HTML, XHTML and CSS, 2e, Jon Duckett, Wiley India

Reference Books:

1. Deitel, Deitel, Goldberg, "Internet & World Wide Web How to Program", Third Edition, Pearson Education, 2006.
2. Raj Kamal, “Internet and Web Technologies”, Tata McGraw-Hill.
3. Web programming Bai, Michael Ekedahl, CENAGE Learning , India edition.
4. An Introduction to Web Design + Programming, Paul S.Wang, India Edition

III Year – II Semester **L T P C**
3 1 0 4

BLOCK CHAIN TECHNOLOGIES

Course Objectives:

By the end of the course, students will be able to

- Understand how block chain systems (mainly Bit coin and Ethereum) work and to securely interact with them,
- Design, build, and deploy smart contracts and distributed applications,
- Integrate ideas from block chain technology into their own projects.

SYLLABUS:

UNIT I

Introduction, Scenarios, Challenges Articulated, Blockchain, Blockchain Characteristics, Opportunities Using Blockchain, History of Blockchain. Evolution of Blockchain : Evolution of Computer Applications, Centralized Applications, Decentralized Applications, Stages in Blockchain Evolution, Consortia, Forks, Public Blockchain Environments, Type of Players in Blockchain Ecosystem, Players in Market.

UNIT II

Blockchain Concepts: Introduction, Changing of Blocks, Hashing, Merkle-Tree, Consensus, Mining and Finalizing Blocks, Currency aka tokens, security on blockchain, data storage on blockchain, wallets, coding on blockchain: smart contracts, peer-to-peer network, types of blockchain nodes, risk associated with blockchain solutions, life cycle of blockchain transaction.

UNIT III

Architecting Blockchain solutions: Introduction, Obstacles for Use of Blockchain, Blockchain Relevance Evaluation Framework, Blockchain Solutions Reference Architecture, Types of Blockchain Applications. Cryptographic Tokens, Typical Solution Architecture for Enterprise Use Cases, Types of Blockchain Solutions, Architecture Considerations, Architecture with Blockchain Platforms, Approach for Designing Blockchain Applications.

UNIT IV

Ethereum Blockchain Implementation: Introduction, Tuna Fish Tracking Use Case, Ethereum Ecosystem, Ethereum Development, Ethereum Tool Stack, Ethereum Virtual Machine, Smart Contract Programming, Integrated Development Environment, Truffle Framework, Ganache, Unit Testing, Ethereum Accounts, MyEtherWallet, Ethereum Networks/Environments, Infura, Etherscan, Ethereum Clients, Decentralized Application, Metamask, Tuna Fish Use Case Implementation, OpenZeppelin Contracts

UNIT V

Hyperledger Blockchain Implementation, Introduction, Use Case – Car Ownership Tracking, Hyperledger Fabric, Hyperledger Fabric Transaction Flow, FabCar Use Case Implementation, Invoking Chaincode Functions Using Client Application Advanced Concepts in Blockchain: Introduction, InterPlanetary File System (IPFS), Zero-Knowledge Proofs, Oracles, Self-Sovereign Identity, Blockchain with IoT and AI/ML Quantum Computing and Blockchain, Initial Coin Offering, Blockchain Cloud Offerings, Blockchain and its Future Potential.

Course Outcomes:

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

- Demonstrate the foundation of the Block chain technology and understand the processes in payment and funding.
- Identify the risks involved in building Block chain applications.

- Review of legal implications using smart contracts.
- Choose the present landscape of Blockchain implementations and Understand Crypto currency markets
- Examine how to profit from trading crypto currencies.

Text Books:

1) Ambadas, Arshad Sarfarz Ariff, Sham "Blockchain for Enterprise Application Developers", Wiley
2) Andreas M. Antonpoulos, "Mastering Bitcoin: Programming the Open Blockchain" , O'Reilly

Reference Books:

1) Blockchain: A Practical Guide to Developing Business, Law, and Technology Solutions, Joseph Bambara, Paul R. Allen, Mc Graw Hill.
2) Blockchain: Blueprint for a New Economy, Melanie Swan, O'Reilly

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III Year – II Semester **L T P C**
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SPEECH PROCESSING

COURSE OBJECTIVES:

- To introduce the models of speech production and acoustic phonetics
- To teach time and frequency domain techniques for estimating speech parameters
- To teach predictive techniques for speech coding
- To introduce speech recognition and speech synthesis applications

SYLLABUS

UNIT –I:

Fundamentals of Digital Speech Processing:Anatomy & Physiology of Speech Organs, The process of Speech Production, Acoustic Phonetics, Articulatory Phonetics, The Acoustic Theory of Speech Production- Uniform lossless tube model, effect of losses in vocal tract, effect of radiation at lips, Digital models for speech signals.

UNIT –II:

Time Domain Models for Speech Processing:Introduction- Window considerations, Short time energy and average magnitude Short time average zero crossing rate, Speech Vs Silence discrimination using energy and zero crossing, Pitch period estimation using a parallel processing approach, The short time autocorrelation function, The short time average magnitude difference function, Pitch period estimation using the autocorrelation function.

UNIT –III:

Linear Predictive Coding (LPC) Analysis:Basic principles of Linear Predictive Analysis: The Autocorrelation Method, The Covariance Method, Solution of LPC Equations: Cholesky Decomposition Solution for Covariance Method, Durbin'sRecursive Solution for the Autocorrelation Equations, Comparison between the Methods of Solution of the LPC Analysis Equations, Applications of LPC Parameters: Pitch Detection using LPC Parameters, Formant Analysis using LPC Parameters.

UNIT –IV:

Homomorphic Speech Processing:Introduction, Homomorphic Systems for Convolution: Properties of the Complex Cepstrum, Computational Considerations, The Complex Cepstrum of Speech, Pitch Detection, Formant Estimation, The Homomorphic Vocoder.

UNIT-V :

Speech Enhancement:Nature of interfering sounds, Speech enhancement techniques: Single Microphone Approach : spectral subtraction, Enhancement by re-synthesis, Comb filter, Wiener filter, Multi microphone Approach.

COURSE OUTCOMES:

- Demonstrate basic knowledge in speech production mechanism, phoneme classification, digital models for speech production, Homomorphic speech processing and LPC analysis
- Demonstrate applications of signal processing theory for estimation of speech parameters in time and frequency domain including pitch and formants
- 3.Analyze application of speech processing in speech compression, speech recognition, and speech synthesis
- Enhance their written and oral technical communication skills related to speech processing subject and will be better prepared for higher study and lifelong learning

TEXT BOOKS

- Digital Processing of Speech Signals – L.R. Rabiner and S. W. Schafer. Pearson Education.
- Speech Communications: Human & Machine – Douglas O'Shaughnessy, 2nd Ed., Wiley India, 2000.
- Digital Processing of Speech Signals. L.R Rabinar and R W Jhaung, 1978, Pearson Education.

REFERENCE BOOKS

- Discrete Time Speech Signal Processing: Principles and Practice – Thomas F. Quateri, 1st Ed., PE.
- Speech & Audio Signal Processing- Ben Gold & Nelson Morgan, 1st Ed., Wiley

III Year – II Semester **L T P C**
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INFORMATION RETRIEVAL SYSTEMS

Course Objectives:
- Learn to write code for text indexing and retrieval.
- Learn to evaluate information retrieval systems
- Learn to analyze textual and semi-structured data sets
- Learn to evaluate information retrieval systems
- Learn about text similarity measure
- Understanding about search engine
- Text Classification

SYLLABUS:

Unit- I

Overview of text retrieval systems , Boolean retrieval , The term vocabulary and postings lists , Dictionaries and tolerant retrieval ,Index construction and compression

Unit-II

Retrieval models and implementation: Vector Space Models , Vector Space Model ,TF-IDF Weight , Evaluation in information retrieval

Unit-III

Query expansion and feedback , Relevance feedback , pseudo relevance feedback , Query Reformulation

Unit-IV

Probabilistic models; statistical language models , Okapi/BM25; Language models , KL-divergence , Smoothing

Unit-V

Text classification & Text clustering , The text classification problem , Naive Bayes text classification , k- nearest neighbors , Support vector Machine ,Feature Selection , Vector-space clustering; K-means algorithm , Hierarchical clustering , DBSCAN algorithm ,PAM and PAMK EM algorithm

Course Outcomes:
- To Understand Document as Vector
- Performance evolution metric for IR
- To understand search Engine functionality
- Various Supervised and Unsupervised learning Method

Text Books:

1. Christopher D. Manning, Prabhakar Raghavan and Hinrich Schütze, Introduction to Information Retrieval, Cambridge University Press. 2008. http://nlp.stanford.edu/IR-book/information-retrieval-book.html
2. ChengXiang Zhai, Statistical Language Models for Information Retrieval (Synthesis Lectures Series on Human Language Technologies), Morgan & Claypool Publishers, 2008.

E-Link:

1. http://www.morganclaypool.com/doi/abs/10.2200/S00158ED1V01Y200811HLT001

Reference Books:

1.Gerald J Kowalski, Mark T Maybury Information Storage and Retrieval Systems: Theory and Implementation, Springer, 2004.
2. SoumenChakrabarti, Mining the Web : Discovering Knowledge from Hypertext Data, Morgan – Kaufmann Publishers, 2002.
3. Christopher D Manning, PrabhakarRaghavan, HinrichSchutze, An Introduction to Information Retrieval By Cambridge University Press, England, 2009

MINORS COURSES

III Year – II Semester **L T P C**
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SOFT COMPUTING

Course Objectives:
This course will cover fundamental concepts used in Soft computing:

- The concepts of Fuzzy logic (FL) will be covered first, followed by Artificial Neural Networks (ANNs) and optimization techniques using Genetic Algorithm (GA).
- Applications of Soft Computing techniques to solve a number of real life problems will be covered to have hands on practices.
- The course will provide exposure to theory as well as practical systems and software used in soft computing.

SYLLABUS:
UNIT I

Introduction to Soft Computing : Concept of computing systems."Soft" compiting versus "Hard" computing Characteristics of Soft computingSome applications of Soft computing techniques

UNIT II
Fuzzy logic : Introduction to Fuzzy logic.Fuzzy sets and membership functions.Operations on Fuzzy sets.Fuzzy relations, rules, propositions, implications and inferences.Defuzzification techniques.Fuzzy logic controller design.Some applications of Fuzzy logic.

UNIT III
Genetic Algorithms: **Concept of "Genetics" and "Evolution" and its application to probabilistic search techniques ,Basic GA framework and different GA architectures.GA operators: Encoding, Crossover, Selection, Mutation, etc. Solving single-objective optimization problems using GAs.**

UNIT IV
Multi-objective Optimization Problem Solving :**Concept of multi-objective optimization problems (MOOPs) and issues of solving them.Multi-Objective Evolutionary Algorithm (MOEA).Non-Pareto approaches to solve MOOPs,Pareto-based approaches to solve MOOPs,Some applications with MOEAs.**
UNIT V

Artificila Neural Networks :

Biological neurons and its working.Simulation of biolgical neurons to problem soloving.Different ANNs architectures.Trainging techniques for ANNs.Applications of ANNs to solve some real life problems.

Course Outcomes:

After completing this course, you will be able to learn:

- Fuzzy logic and its applications.
- Artificial neural networks and its applications.
- Solving single-objective optimization problmes using GAs.
- Soloving multi-objectiove optimization problerms using Evolutionary algorithms(MOEAs).

- Applications of Soft computing to solve problmes in varieties of application domains.

Text Books:

1. Fuzzy Logic: A Pratical approach, F. Martin, Mc neill, and Ellen Thro, AP Professional, 2000.
2. Fuzzy Logic with Engineering Applications (3rd Edn.), Timothy J. Ross, Willey, 2010.

Reference Books:

1. Foundations of Neural Networks, Fuzzy Systems, and Knowldge Engineering, Nikola K. Kasabov, MIT Press, 1998.
2. Fuzzy Logic for Embedded Systems Applications, Ahmed M. Ibrahim, Elesvier Press, 2004.

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MACHINE LEARNING

Course Objectives:

- Identify problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem.
- Analyze a given problem in the language/framework of different AI methods (e.g., as a search problem, as a constraint satisfaction problem, as a planning problem, as a Markov decision process, etc).
- Implement basic AI algorithms (e.g., standard search algorithms or dynamic programming).
- Design and carry out an empirical evaluation of different algorithms on problem formalization, and state the conclusions that the evaluation supports.

Syllabus:

Unit-I:

Introduction-Towards Intelligent Machines, Well posed Problems, Example of Applications in diverse fields, Data Representation, Domain Knowledge for Productive use of Machine Learning, Diversity of Data: Structured / Unstructured, Forms of Learning, Machine Learning and Data Mining, Basic Linear Algebra in Machine Learning Techniques.

Unit-II:

Supervised Learning- Rationale and Basics: Learning from Observations, Bias and Why Learning Works: Computational Learning Theory, Occam's Razor Principle and Over fitting Avoidance Heuristic Search in inductive Learning, Estimating Generalization Errors, Metrics for assessing regression, Metris for assessing classification.

Unit-III:

Statistical Learning- Machine Learning and Inferential Statistical Analysis, Descriptive Statistics in learning techniques, Bayesian Reasoning: A probabilistic approach to inference, K-Nearest Neighbor Classifier. Discriminant functions and regression functions, Linear Regression with Least Square Error Criterion, Logistic Regression for Classification Tasks, Fisher's Linear Discriminant and Thresholding for Classification, Minimum Description Length Principle.

Unit-IV:

Support Vector Machines (SVM)- Introduction, Linear Discriminant Functions for Binary Classification, Perceptron Algorithm, Large Margin Classifier for linearly seperable data, Linear Soft Margin Classifier for Overlapping Classes, Kernel Induced Feature Spaces, Nonlinear Classifier, Regression by Support vector Machines. Learning with Neural Networks: Towards Cognitive Machine, Neuron Models, Network Architectures, Perceptrons, Linear neuron and the Widrow-Hoff Learning Rule, The error correction delta rule.

Unit -V:

Multilayer Perceptron Networks and error back propagation algorithm, Radial Basis Functions Networks. Decision Tree Learning: Introduction, Example of classification decision tree, measures of impurity for evaluating splits in decision trees, ID3, C4.5, and CART decision trees, pruning the tree, strengths and weakness of decision tree approach.

Course Outcomes:

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

- Explain the definition and usage of the term 'the internet of things' in different contexts.
- Demonstrate on various network protocols used in IoT.
- Analyze on various key wireless technologies used in IoT systems, such as WiFi, 6LoWPAN, Bluetooth and ZigBee.
- Illustrate on the role of big data, cloud computing and data analytics in IoT system.

- Design a simple IoT system made up of sensors, wireless network connection, data analytics and display/actuators, and write the necessary control software.

Textbooks:

1. Applied Machine Learning, M. Gopal, McGraw Hill Education
2. Machine Learning: A Probabilistic Perspective, Kevin Murphy, MIT Press,2012
3. The Elements of Statistical Learning, Trevor Hastie, Robert Tibshirani, Jerome Friedman, Springer 2009 (freely available online)

Reference Books:

1. Pattern Recognition and Machine Learning, Christopher Bishop, Springer,2007
2. Programming Collective Intelligence: Building Smart Web 2.0 Applications - Toby Segaran
3. Building Machine Learning Systems with Python - WilliRichert, Luis Pedro Coelho

III Year – II Semester **L T P C**
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PYTHON PROGRAMMING

Course Objectives:
- To acquire programming skills in core Python.
- To acquire Object Oriented Skills in Python.
- To develop the skill of designing Graphical user Interfaces in Python.
- To develop the ability to write database applications in Python.

SYLLABUS:

UNIT – I:
Introduction: History of Python, Need of Python Programming, Applications Basics of Python Programming Using the REPL(Shell), Running Python Scripts, Variables, Assignment, Keywords, Input-Output, Indentation.

UNIT – II:
Types, Operators and Expressions: Types - Integers, Strings, Booleans; Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations Control Flow- if, if-elif-else, for, while, break, continue, pass

UNIT – III:
Data Structures-Lists- Operations, Slicing, Methods, Tuples, Sets, Dictionaries, Sequences, Comprehensions.

UNIT – IV:
Functions - Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions (Function Returning Values), Scope of the Variables in a Function - Global and Local Variables, Modules: Creating modules, import statement, from. Import statement, name spacing, Python packages, Introduction to PIP, Installing Packages via PIP, Using Python Packages

UNIT – V:
Object Oriented Programming OOP in Python: Classes, 'self variable', Methods, Constructor Method, Inheritance, Overriding Methods, Data hiding, Error and Exceptions: Difference between an error and Exception, Handling Exception, try except block, Raising Exceptions, User defined Exceptions, Brief Tour of the Standard Library - Operating System Interface - String Pattern Matching, Mathematics, Internet Access, Dates and Times, Data Compression, Multithreading, GUI Programming, Turtle Graphics, Testing: Why testing is required ?, Basic concepts of testing, Unit testing in Python, Writing Test cases, Running Tests.

Course Outcomes:
At the end of the course, student will be able to
- Understand and comprehend the basics of python programming.
- Demonstrate the principles of structured programming and be able to describe, design, implement, and test structured programs using currently accepted methodology.
- Explain the use of the built-in data structures list, sets, tuples and dictionary.
- Make use of functions and its applications.
- Identify real-world applications using oops, files and exception handling provided by python.

Text books

1. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
2. Learning Python, Mark Lutz, Orielly

Reference Books:

1. Think Python, Allen Downey, Green Tea Press
2. Core Python Programming, W.Chun, Pearson
3. Introduction to Python, Kenneth A. Lambert, Cengage

III Year – II Semester

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NEURAL NETWORKS

Course Objectives:

- The main objective of this course is to provide the student with the basic understandingof neural networks fundamentals, Program the related algorithms and Design the required and related systems

SYLLABUS:

UNIT-I:

Introduction and ANN Structure, Biological neurons and artificial neurons. Model of an ANN. Activation functions used in ANNs. Typical classes of network architectures.

UNIT-II:

Mathematical Foundations and Learning mechanisms.Re-visiting vector and matrixalgebra, State-space concepts, Concepts of optimization, Error-correction learning. Memory-based learning, Hebbian learning. Competitive learning.

UNIT-III:

Single layer perceptrons, Structure and learning of perceptrons, Pattern classifier,introduction and Bayes' classifiers, Perceptron as a pattern classifier, Perceptron convergence.Limitations of a perceptrons.

UNIT-IV:

Feed forward ANN, Structures of Multi-layer feed forward networks. Back propagation algorithm, Back propagation - training and convergence, Functional approximation with back propagation. Practical and design issues of back propagation learning.

UNIT-V:

Radial Basis Function Networks, Pattern separability and interpolation, Regularization Theor Regularization and RBF networks .RBF network design and training. Approximation properties of RBF.

Course Outcomes:

- Demonstrate ANN structure and activation Functions Define foundations and learning mechanisms and state-space concepts.
- Identify structure and learning of perceptions Explain Feed forward, multi-layer feed forward networks and Back propagationalgorithms.
- Analyze Radial Basis Function Networks, Theor Regularization and RBF networks

Text Books:

1. Simon Haykin, "Neural Networks: A comprehensive foundation", Second Edition, PearsonEducation Asia.
2. Satish Kumar, "Neural Networks: A classroom approach", Tata McGraw Hill, 2004.

Reference Books:

1. Robert J. Schalkoff, "Artificial Neural Networks", McGraw-Hill International Editions, 1997.

IV YEAR – I SEMESTER SYLLABUS

PROFESSIONAL ELECTIVE COURSES

IV Year – I Semester

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SOCIAL MEDIA ANALYTICS

Course Objectives:

By the end of this course, students will be able to:

1. Understand and apply key concepts in social media metrics.
2. Understand and apply social media analytics tools.
3. Collect social media data.
4. Monitor consumers and competitors and glean deeper consumer insights based on advanced social media data modeling.
5. Develop social media strategy and measure social media campaign effectiveness.
6. Make better business decisions by leveraging social media data.

Unit-I

Introduction to Social Media Analytics (SMA): Social media landscape, Need for SMA; SMA in Small organizations; SMA in large organizations; Application of SMA in different areas

Network Fundamentals and Models: The social networks perspective - nodes, ties and influencers, Social network and web data and methods. Graphs and Matrices- Basic measures for individuals and networks. Information visualization.

Unit-II

Making Connections: Link analysis. Random graphs and network evolution. Social contexts: Affiliation and identity.

Web Analytics Tools: Clickstream analysis, A/B testing, online surveys, Web crawling and Indexing. Natural Language Processing Techniques for Micro-text Analysis

Unit-III

Facebook Analytics: Introduction, parameters, demographics. Analyzing page audience. Reach and Engagement analysis. Post- performance on FB. Social campaigns. Measuring and Analyzing social campaigns, defining goals and evaluating outcomes, Network Analysis. (LinkedIn, Instagram, YouTube, Twitter etc.

Unit-IV

Google Analytics: Introduction. (Websites) Processing and Visualizing Data, Influence Maximization, Link Prediction, Collective Classification, Applications in Advertising and Game Analytics Introduction to Python Programming, Collecting and analyzing social media data; visualization and exploration

Unit-V

Practical: Students should analyze the social media of any ongoing campaigns and present the findings.

Course Outcomes:

- Familiarize the learners with the concept of social media analytics and understand its significance.
- Familiarize the learners with the tools of social media analytics.
- Enable the learners to develop skills required for analyzing the effectiveness of social media for business purposes.

TextBooks:

1. Social Media Analytics: Techniques and Insights for Extracting Business Value Out of Social Media, Matthew Ganis, Avinash Kohirkar, Pearson-2016 edition.
2. Social Media Metrics: How to Measure and Optimize Your Marketing Investment, Jim Sterne, Wiley publisher, Latest edition.

Reference Books:

1. Social Media ROI: Managing and Measuring Social Media Efforts in Your Organization (Que Biz-Tech), Oliver Blanchard, Que Publishing, Latest edition.
2. Social Media Analytics, Marshall Sponder, McGraw Hill, Latest edition.
3. Social Media Marketing, Tracy L. Tuten, Michael R. Solomon, Sage, Latest edition.

IV Year – I Semester

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BLOCK CHAIN TECHNOLOGIES

COURSE OBJECTIVES:

By the end of the course, students will be able to

- Understand how block chain systems (mainly Bit coin and Ethereum) work and to securely interact with them,
- Design, build, and deploy smart contracts and distributed applications,
- Integrate ideas from block chain technology into their own projects.

SYLLABUS:

UNIT I

Introduction, Scenarios, Challenges Articulated, Blockchain, Blockchain Characteristics, Opportunities Using Blockchain, History of Blockchain. Evolution of Blockchain : Evolution of Computer Applications, Centralized Applications, Decentralized Applications, Stages in Blockchain Evolution, Consortia, Forks, Public Blockchain Environments, Type of Players in Blockchain Ecosystem, Players in Market.

UNIT II

Blockchain Concepts: Introduction, Changing of Blocks, Hashing, Merkle-Tree, Consensus, Mining and Finalizing Blocks, Currency aka tokens, security on blockchain, data storage on blockchain, wallets, coding on blockchain: smart contracts, peer-to-peer network, types of blockchain nodes, risk associated with blockchain solutions, life cycle of blockchain transaction.

UNIT III

Architecting Blockchain solutions: Introduction, Obstacles for Use of Blockchain, Blockchain Relevance Evaluation Framework, Blockchain Solutions Reference Architecture, Types of Blockchain Applications. Cryptographic Tokens, Typical Solution Architecture for Enterprise Use Cases, Types of Blockchain Solutions, Architecture Considerations, Architecture with Blockchain Platforms, Approach for Designing Blockchain Applications.

UNIT IV

Ethereum Blockchain Implementation: Introduction, Tuna Fish Tracking Use Case, Ethereum Ecosystem, Ethereum Development, Ethereum Tool Stack, Ethereum Virtual Machine, Smart Contract Programming, Integrated Development Environment, Truffle Framework, Ganache, Unit Testing, Ethereum Accounts, MyEtherWallet, Ethereum Networks/Environments, Infura, Etherscan, Ethereum Clients, Decentralized Application, Metamask, Tuna Fish Use Case Implementation, OpenZeppelin Contracts

UNIT V

Hyperledger Blockchain Implementation, Introduction, Use Case – Car Ownership Tracking, Hyperledger Fabric, Hyperledger Fabric Transaction Flow, FabCar Use Case Implementation, Invoking Chaincode Functions Using Client Application Advanced Concepts in Blockchain: Introduction, InterPlanetary File System (IPFS), Zero-Knowledge Proofs, Oracles, Self-Sovereign Identity, Blockchain with IoT and AI/ML Quantum Computing and Blockchain, Initial Coin Offering, Blockchain Cloud Offerings, Blockchain and its Future Potential.

COURSE OUTCOMES:

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

- Demonstrate the foundation of the Block chain technology and understand the processes in payment and funding.
- Identify the risks involved in building Block chain applications.

- Review of legal implications using smart contracts.
- Choose the present landscape of Blockchain implementations and Understand Crypto currency markets
- Examine how to profit from trading crypto currencies.

TEXT BOOKS:

1) Ambadas, Arshad Sarfarz Ariff, Sham "Blockchain for Enterprise Application Developers", Wiley
2) Andreas M. Antonpoulos, "Mastering Bitcoin: Programming the Open Blockchain" , O'Reilly

REFERENCE BOOKS:

1) Blockchain: A Practical Guide to Developing Business, Law, and Technology Solutions, Joseph Bambara, Paul R. Allen, Mc Graw Hill.
2) Blockchain: Blueprint for a New Economy, Melanie Swan, O'Reilly

IV Year – I Semester

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SOFTWARE PROJECT MANAGEMENT & QUALITY ASSURANCE

COURSE OBJECTIVES

- To study how to plan and manage projects at each stage of the software development life cycle (SDLC)
- 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.
- To understand successful software projects that support organization's strategic goals

UNIT -I:

Introduction Project, Management, Software Project Management activities, Challenges in software projects, Stakeholders, Objectives & goals Project Planning: Step-wise planning, Project Scope, Project Products & deliverables, Project activities, Effort estimation, Infrastructure

UNIT -II:

Project Approach Lifecycle models, Choosing Technology, Prototyping Iterative & incremental Process Framework: Lifecycle phases, Process Artifacts, Process workflows (Book 2)

UNIT -III:

Effort estimation & activity Planning Estimation techniques, Function Point analysis, SLOC, COCOMO, Use case-based estimation , Activity Identification Approaches, Network planning models, Critical path analysis

Risk Management Risk categories, Identification, Assessment, Planning and management, PERT technique, Monte Carlo approach

UNIT -IV:

Project Monitoring & Control, Resource Allocation Creating a framework for monitoring & control, Progress monitoring, Cost monitoring, Earned value Analysis, Defects Tracking, Issues Tracking, Status reports, Types of Resources, Identifying resource requirements, Resource scheduling

UNIT -V:

Software Quality Planning Quality, Defining Quality - ISO 9016, Quality Measures, Quantitative Quality Management Planning, Product Quality & Process Quality Metrics, Statistical Process Control Capability Maturity Model, Enhancing software Quality (Book3)

TEXT BOOKS:

1. Software Project Management, Bob Hughes & Mike Cotterell, TATA McGraw-Hill
2. Software Project Management, Walker Royce: Pearson Education, 2005.
3. Software Project Management in practice, Pankaj Jalote, Pearson.

REFERENCE BOOKS:

1. Software Project Management, Joel Henry, Pearson Education.

PROFESSIONAL ELECTIVE COURSES

IV Year – I Semester

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INTERNET OF THINGS

COURSE OBJECTIVES

- Learns about various types of sensors, actuators and different network protocols.
- Construction of wireless sensor networks and communication using different connectivity technologies
- To Know about how m2M communication performs and communication between user and the device
- To Know about programming platforms to implement IOT
- Learns about how data is handled generated by IOT application
- how IoT is used for industrial purpose , able to buils viors IoT applications

UNIT- I: Introduction to IOT: Sensing: Sensors, Transducers, Sensor Classes and sensor types. Actuation: Actuator, Actuator Types: Hydraulic Actuators, Pneumatic Actuators, Electric Actuators, Thermal or Magnetic Actuators, Mechanical Actuators, Soft Actuators.

Basic of Networking: IoT Components, IoT Categories, N/w Protocols: MQTT(Message Queue Telemetry Transport), CoAP(Constrained Application Protocol), XMPP(Exte nsible Messaging and Presence Protocol), AMQP(Advanced Message Queuing Protocol).

UNIT- II: Communication protocols: Zigbee, 6LoWPAN, Z-Wave, NFC, RFID, IEEE 802.15.4.

Sensor Networks: Wireless Sensor Networks (WSNs), Sensor Nodes, Basic Components of a Sensor Node,Challanges, Node Behavior in WSNs, Applications of WSNs,Types of sensor networks: Static WSN's and Dynmaic WSN's.

UNIT- III: Machine to Machine communication: Introduction, M2M Overview, M2M Applications, M2M Features, M2M Node Types

Interoperability in IOT: Definition, Types of Interoperability: User Interoperability, Device Interoperability

IoT Platforms: Introduction to Arduino Programming, Integration of Sensors and Actuators with Arduino.

UNIT- IV:

Introduction to Python programming, Introduction to Raspberry Pi: Specifications, Basic Architecture, Raspberry Pi OS Setup, Implementation of IoT with Raspberry Pi.

Software-Defined Networking: Overview of Current Network, Current Network to SDN, SDN Architecture, Basic Concepts of SDN, Components/Attributes of SDN, Challenges

Platforms for data collection and storage:

Cloud Computing: Characteristics, Components of Cloud Computing, Service Models, Deployment Models and sensor clouds: Introduction, Actors in Sensor-cloud, Architecture, and Work Flow of Sensor-Cloud. Introduction to fog computing.

UNIT-V:

Introduction to IOE: Sensing & actuation, Communication-Part I, Part II, Networking-Part I, Part II, Industry 4.0: Globalization and Emerging Issues, The Fourth Revolution, LEAN Production Systems, Smart and Connected Business Perspective, Smart Factories.

COURSE OUTCOMES:

- Aware about how sensors and actuators are connected by using different ne twork protocols
- node behavior in wireless sensor networks and known about which connectivity technology was used according to the application.
- Knows about Arduino boards and their connection with sensors and actuators
- Learns about how Pi os is installed and how code is embedded into the board
- Came to know about how data is stored using cloud computing and knows about sensor clouds.
- Construction various IOT applications using various sensors and Actuators

TEXT BOOKS:

1. "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", by Pethuru Raj and Anupama C. Raman (CRC Press)
2. "Internet of Things: A Hands-on Approach", by Arshdeep Bahga and Vijay Madisetti (Universities Press)
3. Internet of Things, A.Bahgya and V.Madisetti, Univesity Press, 2015

REFERENCE BOOKS:

1. Designing the Internet of Things, Adrian McEwen and Hakim Cassimally, Wiley
2. Getting Started with the Internet of Things CunoPfister , Oreilly
3. Industry 4.0: The Industrial Internet of Things", by Alasdair Gilchrist (Apress)
4. "Industrial Internet of Things: Cybermanufacturing Systems "by Sabina Jeschke, Christian Brecher, Houbing Song, Danda B. Rawat (Springer).

IV Year – I Semester

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DISTRIBUTED SYSTEMS
(Professional Elective- IV)

COURSE OBJECTIVES

- Provides an introduction to the fundamentals of distributed computer systems, assuming the availability of facilities for data transmission, IPC mechanisms in distributed systems, Remote procedure calls.
- Expose students to current technology used to build architectures to enhance distributed Computing infrastructures with various computing principles

UNIT-I:

Characterization of Distributed Systems: Introduction, Examples of Distributed Systems, Resource Sharing and the Web, Challenges.
System Models: Introduction, Architectural Models- Software Layers, System Architecture, Variations, Interface and Objects, Design Requirements for Distributed Architectures, Fundamental Models- Interaction Model, Failure Model, Security Model.

UNIT-II:

Interprocess Communication: Introduction, The API for the Internet Protocols- The Characteristics of Interprocess communication, Sockets, UDP Datagram Communication, TCP Stream Communication; External Data Representation and Marshalling; Client Server Communication; Group Communication- IP Multicast- an implementation of group communication, Reliability and Ordering of Multicast.

UNIT-III:

Distributed Objects and Remote Invocation: Introduction, Communication between Distributed Objects- Object Model, Distributed Object Modal, Design Issues for RMI, Implementation of RMI, Distributed Garbage Collection; Remote Procedure Call, Events and Notifications, Case Study: JAVA RMI

UNIT-IV:

Operating System Support: Introduction, The Operating System Layer, Protection, Processes and Threads –Address Space, Creation of a New Process, Threads.

UNIT-V:

Distributed File Systems: Introduction, File Service Architecture; Peer-to-Peer Systems: Introduction, Napster and its Legacy, Peer-to-Peer Middleware, Routing Overlays.**Coordination and Agreement:** Introduction, Distributed Mutual Exclusion, Elections, Multicast Communication.**Transactions & Replications:** Introduction, System Model and Group Communication, Concurrency Control in Distributed Transactions, Distributed Dead Locks, Transaction Recovery; Replication-Introduction, Passive (Primary) Replication, Active Replication.

COURSE OUTCOMES:

- Develop a familiarity with distributed file systems.
- Describe important characteristics of distributed systems and the salient architectural features of such systems.
- Describe the features and applications of important standard protocols which are used in distributed systems.
- Gaining practical experience of inter-process communication in a distributed environment

TEXT BOOKS:

1. Ajay D Kshemkalyani, Mukesh Sighal, "Distributed Computing, Principles, Algorithms and Systems", Cambridge
2. George Coulouris, Jean Dollimore, Tim Kindberg, "Distributed Systems-Concepts and Design", Fourth Edition, Pearson Publication

REFERENCE BOOKS

1. Distributed-Systems-Principles-Paradigms-Tanenbaum PHI

IV Year – I Semester

L	T	P	C
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IMAGE PROCESSING

COURSE OBJECTIVES:

- To introduce the concepts of image processing and basic analytical methods to be used in image processing.
- To familiarize students with image enhancement and restoration techniques
- To explain different image compression techniques.
- To introduce segmentation and morphological processing techniques.

Course Outcomes:

- Understand the need for image transforms different types of image transforms and their properties
- Develop any image processing application.
- Understand the need for image compression and to learn the spatial and frequency domain techniques of image compression.

UNIT I:

Introduction : Examples of fields that use digital image processing, fundamental steps in digital image processing, components of image processing system.. Digital Image Fundamentals: A simple image formation model, image sampling and quantization, basic relationships between pixels.

UNIT II:

Image enhancement in the spatial domain : Basic gray-level transformation, histogram processing, enhancement using arithmetic and logic operators, basic spatial filtering, smoothing and sharpening spatial filters, combining the spatial enhancement methods.

UNIT III:

Image restoration : A model of the image degradation/restoration process, noise models, restoration in the presence of noise–only spatial filtering, Weiner filtering, constrained least squares filtering, geometric transforms; Introduction to the Fourier transform and the frequency domain, estimating the degradation function.

UNIT IV:

Color Image Processing : Color fundamentals, color models, pseudo color image processing, basics of full–color image processing, color transforms, smoothing and sharpening, color segmentation.

UNIT V:

Image Compression : Fundamentals, image compression models, error-free compression, lossypredictive coding, image compression standards.

Image Segmentation : Detection of discontinuous, edge linking and boundary detection, thresholding, region–based segmentation.

TEXT BOOKS:

1. Digital Image Processing, Rafeal C.Gonzalez, Richard E.Woods, Second Edition, Pearson Education/PHI.

REFERENCE BOOKS:

1. Image Processing, Analysis, and Machine Vision, Milan Sonka, Vaclav Hlavac and Roger Boyle, Second Edition, Thomson Learning.
2. Introduction to Digital Image Processing with Matlab, Alasdair McAndrew, Thomson Course Technology
3. Computer Vision and Image Processing, Adrian Low, Second Edition, B.S.Publications
4. Digital Image Processing using Matlab, Rafeal C.Gonzalez, Richard E.Woods, Steven L. Eddins, Pearson Education.

PROFESSIONAL ELECTIVE COURSES

IV Year – I Semester	L	T	P	C
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CLOUD COMPUTING

Course Objectives:

- To provide students with the fundamentals and essentials of Cloud Computing.
- To provide students a sound foundation of the Cloud Computing so that they are able to start using and adopting Cloud Computing services and tools in their real life scenarios.
- To enable students exploring some important cloud computing driven commercial systems and applications.
- To expose the students to frontier areas of Cloud Computing and information systems, while providing sufficient foundations to enable further study and research.

UNIT I:

Introduction: Network centric computing, Network centric content, peer-to –peer systems, cloud computing delivery models and services, Ethical issues, Vulnerabilities, Major challenges for cloud computing

Parallel and Distributed Systems: introduction, architecture, distributed systems, communication protocols, logical clocks, message delivery rules, concurrency, and model concurrency with Petri Nets.

UNIT II:

Cloud Infrastructure: At Amazon, The Google Perspective, Microsoft Windows Azure, Open Source Software Platforms, Cloud storage diversity, Inter cloud, energy use and ecological impact, responsibility sharing, user experience, Software licensing

Cloud Computing : Applications and Paradigms: Challenges for cloud, existing cloud applications and new opportunities, architectural styles, workflows, The Zookeeper, The Map Reduce Program model, HPC on cloud, biological research

UNIT III:

Cloud Resource virtualization: Virtualization, layering and virtualization, virtual machine monitors, virtual machines, virtualization- full and para, performance and security isolation, hardware support for virtualization, Case Study: Xen, vBlades

Cloud Resource Management and Scheduling: Policies and Mechanisms, Applications of control theory to task scheduling, Stability of a two-level resource allocation architecture, feed back control based on dynamic thresholds, coordination, resource bundling, scheduling algorithms, fair queuing, start time fair queuing, cloud scheduling subject to deadlines, Scheduling Map Reduce applications, Resource management and dynamic application scaling

UNIT IV:

Storage Systems: Evolution of storage technology, storage models, file systems and database, distributed file systems, general parallel file systems. Google file system., Apache Hadoop, Big Table, Megastore (text book 1), Amazon Simple Storage Service(S3) (Text book 2)

Cloud Security: Cloud security risks, security – atop concern for cloud users, privacy and privacy impact assessment, trust, OS security, Virtual machine security, Security risks

UNIT V:

Cloud Application Development: Amazon Web Services : EC2 – instances, connecting clients, security rules, launching, usage of S3 in Java, Installing Simple Notification Service on Ubuntu 10.04, Installing Hadoop on Eclipse, Cloud based simulation of a Distributed trust algorithm, Cloud service for adaptive data streaming (Text Book 1)

Google: Google App Engine, Google Web Toolkit (Text Book 2)

Microsoft: Azure Services Platform, Windows live, Exchange Online, Share Point Services, Microsoft Dynamics CRM (Text Book 2)

Course Outcomes:

After successful completion of this course, student will be able to

- Explain the core concepts of the cloud computing paradigm: how and why this paradigm shift came about, the characteristics, advantages and challenges brought about by the various models and services in cloud computing.
- Apply the fundamental concepts in datacenters to understand the tradeoffs in power, efficiency and cost.
- Identify resource management fundamentals, i.e. resource abstraction, sharing and sandboxing and outline their role in managing infrastructure in cloud computing.
- Analyze various cloud programming models and apply them to solve problems on the cloud.

TEXT BOOKS:

1. Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier
2. Cloud Computing, A Practical Approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH

REFERNCE BOOK:

1. Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christen vecctiola, S Tammarai selvi, TMH

IV Year – I Semester

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RECOMMENDER SYSTEMS

COURSE OBJECTIVE

- To learn techniques for making recommendations, including non-personalized, content-based, and collaborativefiltering
- To automate a variety of choice-making strategies with the goal of providing affordable, personal, and high-quality recommendations

Unit 1:

Introduction: Overview of Information Retrieval, Retrieval Models, Search and Filtering Techniques: Relevance Feedback, User Profiles, Recommender system functions, Matrix operations, covariance matrices, Understanding ratings, Applications of recommendation systems, Issues with recommender system.

Unit 2:

Content-based Filtering: High level architecture of content-based systems, Advantages and drawbacks of content based filtering, Item profiles, Discovering features of documents, pre-processing and feature extraction, Obtaining item features from tags, Methods for learning user profiles, Similarity based retrieval, Classification algorithms.

Unit 3:

Collaborative Filtering: User-based recommendation, Item-based recommendation, Model based approaches, Matrix factorization, Attacks on collaborative recommender systems.

Unit 4:

Hybrid approaches: Opportunities for hybridization, Monolithic hybridization design: Feature combination, Feature augmentation, Parallelized hybridization design: Weighted, Switching, Mixed, Pipelined hybridization design: Cascade Meta-level, Limitations of hybridization strategies

Unit 5:

Evaluating Recommender System: Introduction, General properties of evaluation research, Evaluation designs: Accuracy, Coverage, confidence, novelty, diversity, scalability, serendipity, Evaluation on historical datasets, Offline evaluations.**Types of Recommender Systems:** Recommender systems in personalized web search, knowledge-based recommender system, Social tagging recommender systems, Trust-centric recommendations, Group recommender systems.

COURSE OUTCOMES

After completion of course, students would be able to:

- Design recommendation system for a particular application domain.
- Evaluate recommender systems on the basis of metrics such as accuracy, rank accuracy, diversity, product coverage, and serendipity

TEXT BOOKS:

1. Jannach D., Zanker M. and FelFering A., Recommender Systems: AnIntroduction, Cambridge University Press (2011), 1sted.
2. Charu C. Aggarwal, Recommender Systems: The Textbook, Springer (2016), 1sted.

REFERENCES:

1. Ricci F., Rokach L., Shapira D., Kantor B.P., Recommender SystemsHandbook, Springer(2011), 1sted.
2. Manouselis N., Drachsler H., Verbert K., Duval E., Recommender Systems For Learning, Springer

IV Year – I Semester

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SOFT COMPUTING

COURSE OBJECTIVES:

- The main objective of the Soft Computing Techniques to Improve Data Analysis Solutions is to strengthen the dialogue between the statistics and soft computing research communities in order to cross-pollinate both fields and generate mutual improvement activities.
- Soft Computing is a consortia of methodologies which collectively provide a body of concepts and techniques for designing intelligent systems.

UNIT-I

Soft Computing : Introduction of soft computing, soft computing vs. hard computing, various types of soft computing techniques, applications of soft computing.

UNIT-II

Artificial Intelligence : Introduction, Various types of production systems, characteristics of production systems, breadth first search, depth first search techniques, other Se arch Techniques like hill Climbing, Best first Search, A* algorithm, AO* Algorithms and various types of control strategies. Knowledge representation issues, Prepositional and predicate logic, monotonic and non monotonic reasoning, forward Reasoning, backward reasoning, Weak & Strong Slot & filler structures, NLP.

UNIT-III

Genetic algorithm : Fundamentals, basic concepts, working principle, encoding, fitness function, reproduction, Genetic modeling: Inheritance ope rator, cross over, inversion & deletion, mutation operator, Bitwise operator, Generational Cycle, Convergence of GA, Applications & advances in GA, Differences & similarities between GA & other traditional method.

UNIT-IV

Genetic Algorithms-1: Motivation, Genetic Algorithms, An Illustrative Example, Hypothesis Space Search (Chapter-9 from Machine Learning, Tom M. Mitchell, MGH).

UNIT-V

Genetic Algorithms-2: Genetic Programming, Models of Evolution and Learning, Parallelizing Genetic Algorithms (Chapter-9 from Machine Learning, Tom M. Mitchell, MGH).

Course Outcomes:

- Learn about soft computing techniques and their applications
- Analyze various neural network architectures
- Understand perceptrons and counter propagation networks.

- Define the fuzzy systems
- Analyze the genetic algorithms and their applications.

Text Books:

1. Machine Learning ,Tom M. Mitchell, MGH
2. E. Goldberg,Genetic Algorithms: Search and Optimization, Addision-Wesley
3. 1. S.N. Sivanandam& S.N. Deepa, Principles of Soft Computing, Wiley Publications, 2nd Edition, 2011.
4. 2. S, Rajasekaran& G.A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & applications, PHI Publication, 1st Edition, 2009.

Reference Books:

1. N.K.Bose, Ping Liang, Neural Network fundamental with Graph, Algorithms & Applications, TMH, 1st Edition, 1998.
2. Bart Kosko, Neural Network & Fuzzy System, PHI Publication, 1st Edition, 2009.
3. Rich E, Knight K, Artificial Intelligence, TMH, 3rd Edition, 2012.
4. George J Klir, Bo Yuan, Fuzzy sets & Fuzzy Logic,Theory& Applications, PHI Publication, 1st Edition, 2009. 5. Martin T Hagen, Neural Network Design, Nelson Candad, 2nd Edition, 2008.

OPEN ELECTIVE COURSES/JOB ORIENTED ELECTIVE COURSES

IV YEAR I SEMSETER **L T P C**

2 0 2 3

ADVANCED PYTHON PROGRAMMING

COURSE OBJECTIVES:

Python is next generation multi-purpose programming language, that allows different users to create applications of various domains. Students will be able to learn primary fundamentals of python programming and potential of python is to achieve modern computing requirements

UNIT I:

File handling in python:Introduction to Files,Types of Files,Opening and Closing a Text File,Opening a file using "with" clause,Writing to a Text File,Reading from a Text File,Setting Offsets in a File:seek(),tell() methods,Creating and Traversing a Text File,The Pickle Module

UNIT II:

GUI Programming: Graphical User Interface - Python gui development options, Adding Widgets, GUI Coding Techniques, Customizing Widgets; Internet Programming - network Scripting, Client-Side scripting, Pymailgui client, server-side scripting, Pymailcgi server; Tools and Techniques - databases and persistence, data structures, text and language, python/c integration

UNIT III:

Pandas and NumPy: Numpy Basics - Fast Element wise array functions, Multidimensional Array, Data Processing using arrays, file i/o with arrays; Pandas - Data Structures, Essential Functionality, Summarizing and Computing Descriptive Statistics, Handling Missing Data, Hierarchical Indexing

UNIT IV:

Data Preprocessing: Data Loading, Storage, and File Formats - Reading and Writing data in text format, binary data formats, interacting with html and web apis, interacting with databases; Data Wrangling: Clean, Transform, Merge, Reshape - Combining and Merging Data Sets, Reshaping and Pivoting, Data Transformation, String Manipulation; Data Aggregation and Group Operations – Group by Mechanics, Data Aggregation, Group by Operations and Transformations, Pivot Tables and Cross- Tabulation

UNIT V:

Data Visualization: A Brief matplotlib API Primer, Plotting Functions in pandas, Time Series, Financial and Economic Data Applications

COURSE OUTCOMES:

- To learn basics of Python
- To develop console application in python
- To develop database application in python
- To develop basic machine learning application

TEXT BOOKS:

1. Learning Python, 5th Edition, MarkLutz, OReilly, 2013.
2. Python Programming: A Modern Approach, VamsiKurama, Pearson.,1/e
3. Programming Python, 4th Edition, MarkLutz, OReilly, 2010.
4. Python For Data Analysis, 2nd Edition, WesMckinney, O Reilly, 2017.

REFERENCE BOOKS:

1. Python: The Complete Reference, 1st Edition, Martin C. Brown, McGraw Hill Education, 2018.
2. Head First Python,nd Edition, Paul Barry, O′Reilly, 2016

ADVANCED PYTHON PROGRAMMING LAB

Experiment 1:
Write a program to enter the following records in a binary file:
Item No integer
Item_Name string
Qty integer
Price float
Number of records to be entered should be accepted from the user. Read the file to display the records in the following format:
Item No:
Item Name :
Quantity:
Price per item:
Amount: (to be calculated as Price * Qty)

Experiment 2:
Write a Python Program to Count the Number of Words in a Text File

Experiment 3:
Write a Python Program to Read the Contents of a File in Reverse Order

Experiment 4:
Write a program to implement Merge and Join Data Frames with Python Pandas

Experiment 5:
Write a Python Program to Append the Contents of One File to Another File

Experiment 6:
How to install and Load CSV files to Python Pandas

Experiment 7:
Write a program to implement Data analysis and Visualization with Python using pandas.

Experiment 8:
Write a program to Implement Plotting Functions in python pandas.

Text Books:
1. Learning Python, 5th Edition, MarkLutz, OReilly, 2013.
2. Programming Python, 4th Edition, MarkLutz, OReilly, 2010.
3. Python for Data Analysis, 2nd Edition, WesMckinney, O Reilly, 2017.

IV YEAR I SEMSETER **L T P C**
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DEEP LEARNING

Course Objectives:

- To acquire knowledge on the basics of neural networks.
- To implement neural networks using computational tools for variety of problems.
- To explore various deep learning algorithms.

Unit1: Introduction to Deep Learning, Bayesian Learning, Decision Surfaces
Linear Classifiers, Linear Machines with Hinge Loss, Optimization Techniques, Gradient Descent, Batch Optimization

Unit2: Introduction to Neural Network, Multilayer Perceptron, Back Propagation Learning Unsupervised Learning with Deep Network, Autoencoders, Convolutional Neural Network, Building blocks of CNN, Transfer Learning

Unit 3: Revisiting Gradient Descent, Momentum Optimizer, RMSProp, Adam
Effective training in Deep Net- early stopping, Dropout, Batch Normalization, Instance Normalization, Group Normalization

Unit 4: Recent Trends in Deep Learning Architectures, Residual Network, Skip Connection Network, Fully Connected CNN etc. Classical Supervised Tasks with Deep Learning, Image Denoising, Semantic Segmentation, Object Detection etc.

Unit 5: LSTM Networks, Generative Modelling with DL, Variational Autoencoder, Generative Adversarial Network Revisiting Gradient Descent

Course Outcomes:
Students will be able to:

- Develop algorithms simulating human brain.
- Implement Neural Networks in Tensor Flow for solving problems.
- Explore the essentials of Deep Learning and Deep Network architectures.
- Define, train and use a Deep Neural Network for solving real world problems that require artificial Intelligence based solutions.

Text Books:

1) ”Deep Learning (Adaptive Computation and Machine Learning series”, Ian Goodfellow, Yoshua Bengio, Aaron Courville, MIT Press, 2017.
2) Pattern Classification- Richard O. Duda, Peter E. Hart, David G. Stork, John Wiley & Sons Inc.
3) “Fundamentals of Deep Learning: Designing Next-Generation Machine Intelligence Algorithms”, Nikhil Buduma, Nicholas Locascio, O'Reilly Media, 2017.

Reference Books:

1) Deep learning from first principle,2nd edition, tinniam v Ganesh,2018
2) Introduction to Deep Learning ,1st edition, by Eugene charniak, The MIT Press,2019

DEEP LEARNING LAB

COURSE OUTCOMES:

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

- Implement deep neural networks to solve real world problems.
- Choose appropriate pre-trained model to solve real time problem.
- Interpret the results of two different deep learning models.

Software Packages required:

- Keras
- Tensorflow
- PyTorch

List of Experiments:

1. Implement multilayer perceptron algorithm for MNIST Hand written Digit Classification.
2. Design a neural network for classifying movie reviews (Binary Classification) using IMDB dataset.
3. Design a neural Network for classifying news wires (Multi class classification) using Reuters dataset.
4. Design a neural network for predicting house prices using Boston Housing Price dataset.
5. Build a Convolution Neural Network for MNIST Hand written Digit Classification.
6. Build a Convolution Neural Network for simple image (dogs and Cats) Classification
7. Use a pre-trained convolution neural network (VGG16) for image classification.
8. Implement one hot encoding of words or characters.
9. Implement word embedding for IMDB dataset.
10. Implement a Recurrent Neural Network for IMDB movie review classification problem.

Text Books:

Reza Zadeh and BharathRamsundar, “Tensorflow for Deep Learning”, O’Reilly publishers, 2018

References:

https://github.com/fchollet/deep-learning-with-python-notebooks

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IV YEAR I SEMSETER **L T P C**
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WEB TECHNOLOGIES

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.

Course Outcomes:
1. Analyze a web page and identify its elements and attributes.
2. Create web pages using XHTML and Cascading Styles sheets.
3. Build dynamic web pages .
4. Build web applications using PHP.
5. Programming through PERL and Ruby
6. write simple client-side scripts using AJAX

Syllabus:
UNIT-I:
HTML tags, Lists, Tables, Images, forms, Frames. Cascading style sheets. Introduction to Java script. Objects in Java Script. Dynamic HTML with Java Script
UNIT-II:
Working with XML: Document type Definition, XML schemas, Document object model, XSLT, DOM and SAX.

UNIT-III:
AJAX A New Approach: Introduction to AJAX, Integrating PHP and AJAX. Consuming WEB services in AJAX**:** (SOAP, WSDL,UDDI)

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, Oracle, SQL Sever.

UNIT-V:
Introduction to PERL, Perl language elements, Interface with CGI- A form to mail program, Simple page search
UNIT-VI:
Introduction to Ruby, variables, types, simple I/O, Control, Arrays, Hashes, Methods, Classes, Iterators, Pattern Matching, Practical Web Applications

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)

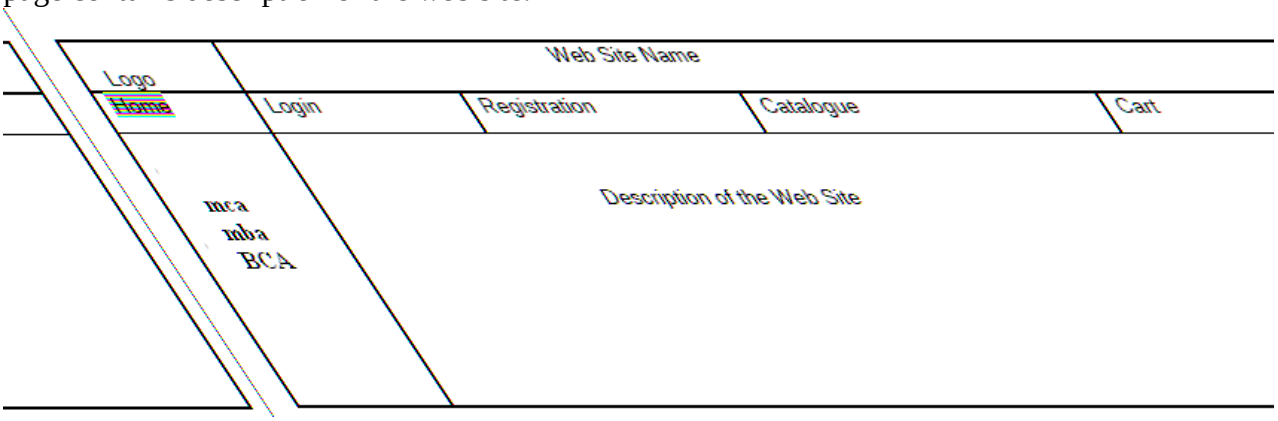
2. Programming Perl, 4ed, Tom Christiansen, Jonathan Orwant, Oreilly (2012)
3. Web Technologies, HTML< JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech.
4. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage

WEB TECHNOLOGIES LAB

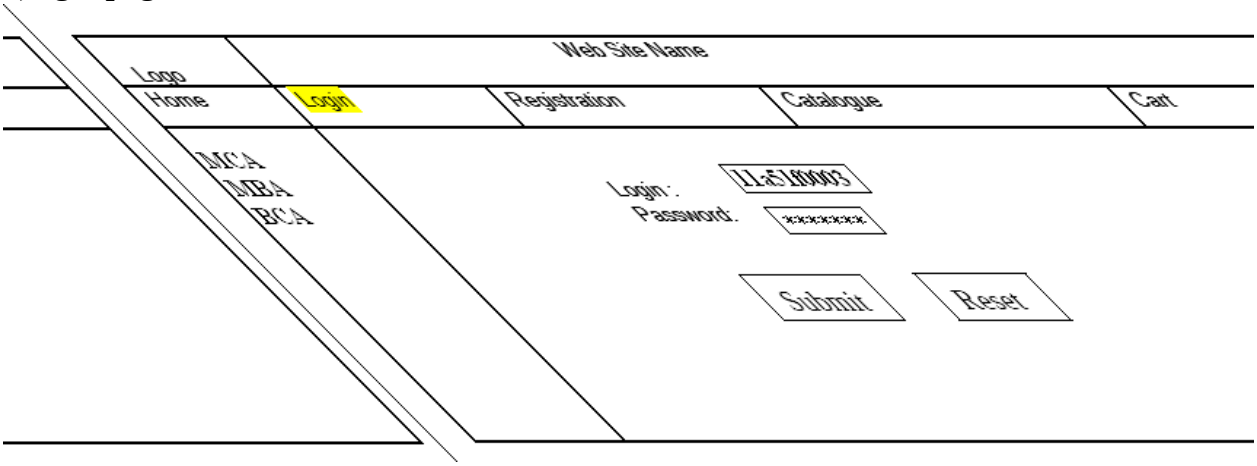
1. Design the following static web pages required for an online book store web site.

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 MCA Books 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.

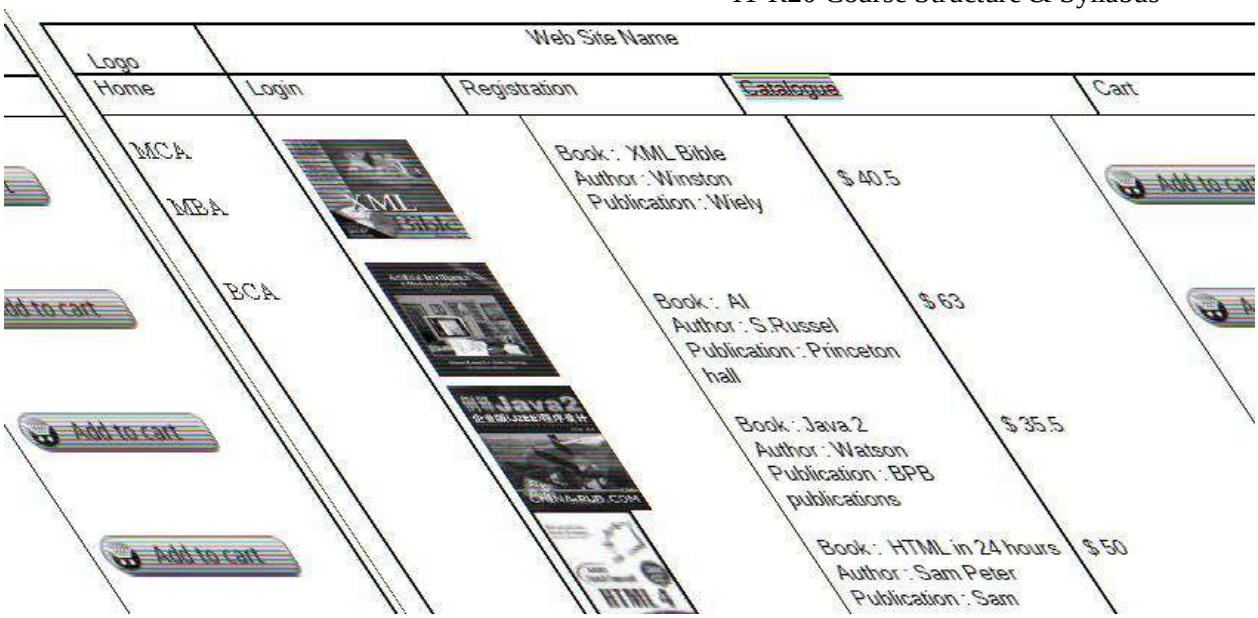


2)login page



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 (C**ascading **S**tyle **S**heets**)** 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. Write Ruby program reads a number and calculates the factorial value of it and prints the same.

8. Write a Ruby program which counts number of lines in a text file using its regular expressions facility.

9. Write a Ruby program that uses iterator to find out the length of a string.

10. Write simple Ruby programs that uses arrays in Ruby.

11. Write programs which uses associative arrays concept of Ruby.

12. Write Ruby program which uses Math module to find area of a triangle.

13. Write Ruby program which uses tk module to display a window

14. Define complex class in Ruby and do write methods to carry operations on complex objects.

15. Write a program which illustrates the use of associative arrays in perl.

16. Write perl program takes a set names along the command line and prints whether they are regular files or special files

17. Write a perl program to implement UNIX `passwd' program

18. An example perl program to connect to a MySQl database table and executing simple commands.

19. Example PHP program for cotactus page.

20. 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.

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

22. 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).

23. 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).

24. 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

25. **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 localhost). 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.

OPEN ELECTIVE COURSES/JOB ORIENTED ELECTIVE COURSES

IV YEAR I SEMSETER **L T P C**
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NETWORK PROGRAMMING

COURSE OBJECTIVES:

Having successfully completed this course, the student will be able to:

- Demonstrate mastery of main protocols comprising the Internet.
- Develop skills in network programming techniques.
- Implement network services that communicate through the Internet.
- Apply the client-server model in networking applications.
- Practice networking commands available through the operating systems

UNIT-I: Introduction to Network Programming: OSI model, Unix standards, TCP and UDP & TCP connection establishment and Format, Buffer sizes and limitation, standard internet services, Protocol usage by common internet application.

UNIT-II: TCP client server: Introduction, TCP Echo server functions, Normal startup, terminate and signal handling server process termination, Crashing and Rebooting of server host shutdown of server host.

UNIT-III: Sockets: Address structures, value – result arguments, Byte ordering and manipulation function and related functions Elementary TCP sockets – Socket, connect, bind, listen, accept, fork and exec function, concurrent servers. Close function and related function. I/O Multiplexing and socket options: I/O Models, select function, Batch input, shutdown function, poll function, TCP Echo server, getsockopt and setsockopt functions. Socket states, Generic socket option IPV6 socket option ICMPV6 socket option IPV6 socket option and TCP socket options.

UNIT-IV: Elementary UDP sockets: Introduction UDP Echo server function, lost datagram, summary of UDP example, Lack of flow control with UDP, determining outgoing interface with UDP. Elementary name and Address conversions: DNS, gethost by Name function, Resolver option, Function and IPV6 support, uname function, other networking information.

UNIT-V: IPC : Introduction, File and record locking, Pipes, FIFOs streams and messages, Name spaces, system IPC, Message queues, Semaphores. Remote Login: Terminal line disciplines, PseudoTerminals, Terminal modes, Control Terminals, rlogin Overview, RPC Transparency Issues.

Course Outcomes:

- Be able to create sockets and analyze different (client/server) models.
- Be able to create processes, threads, semaphores and Bluetooth programming.
- Be able to analyze different protocols.

TEXTBOOKS:

1. UNIX Network Programming, Vol. I, SocketsAPI, 2nd Edition. - W.Richard Stevens, Pearson Edn. Asia.
2. UNIX Network Programming, 1st Edition, - W.Richard Stevens. PHI.

REFERENCES:

1. UNIX Systems Programming using C++ T CHAN, PHI.
2. UNIX for Programmers and Users, 3rd Edition Graham GLASS, King abls, Pearson Education
3. Advanced UNIX Programming 2nd Edition M. J. ROCHKIND, Pearson Education

NETWORK PROGRAMMING LAB

1. Write a shell script that accepts a file name, starting and ending line numbers as arguments and displays all the lines between the given line numbers.

2. Write a shell script that deletes all lines containing a specified word in one or more files supplied as arguments to it.

3. Write a shell script that displays a list of all the files in the current directory to which the user has read, write and execute permissions.

4. Write a shell script that receives any number of file names as arguments checks if every argument supplied is a file or a directory and reports accordingly. Whenever the argument is a file, the number of lines on it is also reported.

5. Write a shell script that accepts a list of file names as its arguments, counts and reports the occurrence of each word that is present in the first argument file on other argument files.

6. Write a shell script that accepts any number of arguments and prints them in the reverse order.

7. Write a shell script that determines the period for which a specified user is working on the system.

8. Write a shell script to list all of the directory files in a directory.

9. Write an interactive file-handling shell program- Let it offer the user the choice of copying, removing or linking files. Once the user has made a choice, have the program ask him for the necessary information such as the file name, new name and so on.

10. Write a shell script to find factorial of a given integer.

11. Write a shell script to find the G.C.D. of two integers.

12. Write a shell script to generate a multiplication table.

13. Write a shell script that copies multiple files to a directory.

14. Write a shell script that counts the number of lines and words present in a given file.

IV YEAR I SEMSETER **L T P C**
2 0 2 3

BIG DATA TECHNOLOGIES

COURSE OBJECTIVES:

- Optimize business decisions and create competitive advantage with Big Data analytics
- Introducing Java concepts required for developing map reduce programs
- Derive business benefit from unstructured data
- Imparting the architectural concepts of Hadoop and introducing map reduce paradigm
- To introduce programming tools PIG & HIVE in Hadoop echo system.

UNIT-I: Working with Big Data: Google File System, Hadoop Distribute d File System (HDFS) – Building blocks of Hadoop (Namenode, Datanode, Secondary Namenode, Job Tracker, Task Tracker), Introducing and Configuring Hadoop cluster (Local, Pseudo- distributed mode, Fully Distributed mode), Configuring XML files.

UNIT-II: Writing MapReduce Programs: A Weather Dataset, Understanding Hadoop API for MapReduce Framework (Old and New), Basic programs of Hadoop MapReduce: Driver code, Mapper code, Reducer code, Record Reader, Combiner, Partitioner

UNIT-III: Hadoop I/O: The Writable Interface, Writable Comparable and comparators, Writable Classes: Writable wrappers for Java primitives, Text, Bytes Writable, Null Writable, Object Writable and Generic Writable, Writable collections, Imple menting a Custom Writable: Implementing a Raw Comparator for speed, Custom comparators

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 Database s and Table s, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data

COURSE OUTCOMES:

- Preparing for data summarization, query, and analysis.
- Applying data modeling techniques to large data sets
- Creating applications for Big Data analytics

- Building a complete business data analytic solution

TEXT BOOKS:

1. Big Java 4th Edition, Cay Horstmann, Wiley John Wiley & Sons, INC
2. Hadoop: The Definitive Guide by Tom White, 3rd Edition, O'reilly
3. Hadoop in Action by Chuck Lam, MANNING Publ.
4. Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk,Bruce Brown, Rafael Coss

REFERENCE BOOKS:

1. Hadoop in Practice by Alex Holmes, MANNING Publ.
2. Hadoop MapReduce Cookbook, Srinath Perera, Thilina Gunarathne
3. "Map Reduce: Simplified Data Processing on Large Clusters", Jeffry Deon and Sanjay ghemawat

SOFTWARE LINKS:

1. Hadoop:http://hadoop.apache.org/
2. Hive: https://cwiki.apache.org/confluence/display/Hive/Home Piglatin: http://pig.apache.org/docs/r0.7.0/tutorial.html

BIG DATA TECHNOLOGIES LAB

Course Objectives:

The objectives of this course are to

- Introduce the tools required to manage and analyze big data like Hadoop.
- Impart knowledge of Map reduce paradigm to solve complex problems Map-Reduce

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

- Demonstrate the setup of Big Data in distributed environment
- Efficiently Work with Big Data Platform.
- Have Hands-on experience on developing applications using MapReduce
- Identify the need of interfaces to perform I/O operations in Hadoop and analyze big data
- Demonstrate the understanding of storing and managing Big Data using HDFS, Pig andHive tools
- Design and implement algorithms for Big Data Mining for various real time applications

Experiment 1:

Implement the following Data structures in Java
a)Linked Lists b) Stacks c) Queues d) Set e) Map

Experiment 2:

(i) Perform setting up and Installing Hadoop in its three operating modes: Standalone, Pseudo distributed and
Fully distributed(ii)Use web based tools to
monitor your Hadoop setup.

Experiment 3:

Implement the following file management tasks in Hadoop:

- Adding files and directories
- Retrieving files
- Deleting files

Hint: A typical Hadoop workflow creates data files (such as log files) elsewhere and copies theminto HDFS using one of the above command line utilities.

Experiment 4:

Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm.

Experiment 5:

Write a Map Reduce program that mines weather data.
Weather sensors collecting data every hour at many locations across the
globe gather a large volume of log data, which is a good candidate for analysis with MapReduce,since it is semi structured and record oriented.

Experiment 6:

Implement Matrix Multiplication with Hadoop Map Reduce

Experiment 7:

Install and Run Pig then write Pig Latin scripts to sort, group, join, project, and filter your data.

Experiment 8:

Install and Run Hive then use Hive to create, alter, and drop databases, tables, views,

functions,and indexes

Text Books:

1. Big Java 4th Edition, Cay Horstmann, Wiley John Wiley & Sons, INC
2. Hadoop: The Definitive Guide by Tom White, 3rd Edition, O'reilly
3. Hadoop in Action by Chuck Lam, MANNING Publ
4. Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk, Bruce Brown,Rafael Coss

Reference Books:

1. Hadoop in Practice by Alex Holmes, MANNING Publ
2. Hadoop MapReduce Cookbook, Srinath Perera, Thilina Gunarathne

IV YEAR I SEMSETER **L T P C**
2 0 2 3

DATA SCIENCE

COURSE OBJECTIVES:
From the course the student will learn

- Provide you with the knowledge and expertise to become a proficient data scientist.
- Demonstrate an understanding of statistics and machine learning concepts that are vital for data science;
- Learn to statistically analyze a dataset;
- Explain the significance of exploratory data analysis (EDA) in data science.
- Critically evaluate data visualizations based on their design and use for communicating stories from data

UNIT I
Introduction, The Ascendance of Data, Motivating Hypothetical: Data Sciencester, Finding Key Connectors, The Zen of Python, Getting Python, Virtual Environments, Whitespace Formatting, Modules, Functions, Strings, Exceptions, Lists, Tuples, Dictionaries defaultdict, Counters, Sets, Control Flow, Truthiness, Sorting, List Comprehensions, Automated Testing and assert, Object-Oriented Programming, Iterables and Generators, Randomness, Regular Expressions, Functional Programming, zip and Argument Unpacking, args and kwargs, Type Annotations, How to Write Type Annotations.

UNIT II
Visualizing Data: matplotlib, Bar Charts, Line Charts, Scatterplots. Linear Algebra: Vectors, Matrices, Statistics: Describing a Single Set of Data, Correlation, Simpson's Paradox, Some Other Correlational Caveats, Correlation and Causation.
Gradient Descent: The Idea Behind Gradient Descent, Estimating the Gradient, Using the Gradient, Choosing the Right Step Size, Using Gradient Descent to Fit Models, Minibatch and Stochastic Gradient Descent.

UNIT III
Getting Data: stdin and stdout, Reading Files, Scraping the Web, Using APIs,
Working with Data: Exploring Your DataUsing NamedTuples
Dataclasses, Cleaning and Munging, Manipulating Data, Rescaling, Dimensionality Reduction.
Probability: Dependence and Independence, Conditional Probability, Bayes's Theorem, Random Variables, Continuous Distributions, The Normal Distribution, The Central Limit Theorem

UNIT IV
Machine Learning: Modeling, Overfitting and Underfitting, Correctness, The Bias-Variance Tradeoff, Feature Extraction and Selection, k-Nearest Neighbors, Naive Bayes, Simple Linear Regression, Multiple Regression, Digression, Logistic Regression

UNIT V
Support Vector Machines, Decision Trees, Neural Networks: Perceptrons, Feed-Forward Neural Networks, Backpropagation. Clustering: The Idea, The Model, Choosing k, Bottom-Up Hierarchical Clustering. Recommender Systems: Manual Curation, Recommending What's Popular, User-Based Collaborative Filtering, Item-Based Collaborative Filtering, Matrix Factorization Data Ethics, Building Bad Data Products, Trading Off Accuracy and

Fairness, Collaboration, Interpretability, Recommendations, Biased Data, Data Protection IPython, Mathematics, NumPy, pandas, scikit-learn, Visualization, R

Course Outcomes:

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

- Describe what Data Science is and the skill sets needed to be a data scientist.
- Explain in basic terms what Statistical Inference means. Identify probability distributions
  commonly used as foundations for statistical modeling. Fit a model to data.
- Use R to carry out basic statistical modeling and analysis.
- Apply basic tools (plots, graphs, summary statistics) to carry out EDA.
- Describe the Data Science Process and how its components interact.
- Use APIs and other tools to scrap the Web and collect data.
- Apply EDA and the Data Science process in a case study.

Textbooks:

2) Joel Grus, "Data Science From Scratch", OReilly.
3) Allen B.Downey, "Think Stats", OReilly.

Reference Books:

1) Doing Data Science: Straight Talk From The Frontline, 1st Edition, Cathy O'Neil and Rachel Schutt, O'Reilly, 2013
2) Mining of Massive Datasets, 2nd Edition, Jure Leskovek, Anand Rajaraman and Jeffrey Ullman, v2.1, Cambridge University Press, 2014
3) "The Art of Data Science", 1st Edition, Roger D. Peng and Elizabeth matsui, Lean Publications, 2015
4) "Algorithms for Data Science", 1st Edition, Steele, Brian, Chandler, John, Reddy, Swarna, springers Publications, 2016

e-Resources:

1) https://github.com/joelgrus/data-science-from-scratch

DATA SCIENCE LAB

Course Objectives:

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

- Implement data science operations like data collection, management andstoring.
- Apply Python programming concepts in data science, including their real-worldapplications.
- Implement data collection and management scripts using PythonPandas.

List of Experiments:

Experiment 1:
Installation of anaconda.
Write a Python Program to Find the Sum of the Series: 1 + 1/2 + 1/3 + .. + 1/N

Experiment2:
Write a Python Program to Split the array and add the first part to the end

Experiment 3:
Write a Python Program to Create a List of Tuples with the First Element as the Number and Second Element as the Square of the Number

Experiment 4:
Write a Python program to count number of vowels using sets in given string

Experiment 5:
Write a program to implement permutation of a given string using inbuilt function

Experiment 6:
Write a python program to sort list of dictionaries by values in Python – Using lambda function.

Experiment 7:
Write a Python Program for following sorting:

i. Quick Sort
ii. HeapSort

Experiment 8:
Write a Python Program to Reverse a String Using Recursion

Experiment 9:
Write a Python Program to Count the Number of Words in a Text File

Experiment 10:
Write a Python Program to Read the Contents of a File in Reverse Order

Experiment 11:
Write a program to Merge and Join Data Frames with Pandas in Python

Experiment 12:

Write a program to implement Merge and Join Data Frames with Python Pandas

Experiment 13:

Write a Python Program to Append the Contents of One File to Another File

Experiment 14:

How to install and Load CSV files to Python Pandas

Experiment 15:

Write a program to implement Data analysis and Visualization with Python using pandas.

Experiment 16:

Write a program to Implement Plotting Functions in python pandas.

Text Books:

1. Learning Python, 5th Edition, MarkLutz, OReilly, 2013.
2. Programming Python, 4th Edition, MarkLutz, OReilly, 2010.
3. Python for Data Analysis, 2nd Edition, WesMckinney, O Reilly, 2017.

IV Year-I Semester	OPEN ELECTIVE/ JOB ORIENTED ELECTIVE	L	T	P	C
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MANAGEMENT AND ORGANIZATIONAL BEHAVIOR					

Course Objectives:

- To familiarize with the process of management, principles, leadership styles and basic concepts on Organisation.
- To know how to apply basic knowledge of statistics in quality control and to study about the inventory management.
- To provide conceptual knowledge on functional management that is on Human resource management and Marketing management.
- To provide basic insight into Strategic Management and corporate planning with SWOT analysis.
- To know about the contemporary management practices in the globalised era.

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:

- To familiarize with the process of management, principles, leadership styles and basic concepts on Organization.
- To know how to apply basic knowledge of statistics in quality control and to study about the inventory management.
- To provide conceptual knowledge on functional management that is on Human resource management and Marketing management.
- To provide basic insight into Strategic Management and Corporate planning with SWOT analysis.
- To know about the contemporary management practices in the globalised era.

Reference Books:

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

IV Year-I Semester	OPEN ELECTIVE/ JOB ORIENTED ELECTIVE	L	T	P	C
		1	0	2	2
EMPLOYABILITY SKILLS					

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.

HONORS COURSES

IV Year – I Semester **L T P C**

3 1 0 4

WIRELESS NETWORK TECHNOLOGIES

Course Objectives:

- To study the evolving wireless technologies and standards
- To understand the architectures of various access technologies such as 3G, 4G, WiFi etc.
- To understand various protocols and services provided by next generation networks.

SYLLABUS:

UNIT-I

OVERVIEW OF WIRELESS SENSOR NETWORKS: Key definitions of sensor networks, Advantages of sensor Networks, Unique constraints an challenges, Driving Applications, Enabling Technologies for Wireless Sensor Networks. ARCHITECTURES: Single-Node Architecture – Hardware Components, Energy Consumption of Sensor Nodes, Operating Systems and Execution Environments, Network Architecture -Sensor Network Scenarios, Optimization Goals and Figures of Merit, Gateway Concepts.

UNIT-II

NETWORKING Technologies: Physical Layer and Transceiver Design Considerations, Personal area networks (PANs), hidden node and exposed node problem, Topologies of PANs, MANETs, WANETs.

UNIT-III

MAC Protocols for Wireless Sensor Networks: Issues in Designing a MAC protocol for Ad Hoc Wireless Networks, Design goals of a MAC Protocol for Ad Hoc Wireless Networks, Classifications of MAC Protocols, Contention – Based Protocols, Contention – Based Protocols with reservation Mechanisms, Contention – Based MAC Protocols with Scheduling Mechanisms, MAC Protocols that use Directional Antennas, Other MAC Protocols.

UNIT-IV

ROUTING PROTOCOLS: Introduction, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classification of Routing Protocols, Table –Driven Routing Protocols, On – Demand Routing Protocols, Hybrid Routing Protocols, Routing Protocols with Efficient Flooding Mechanisms, Hierarchical Routing Protocols, Power – Aware Routing Protocols, Proactive Routing

UNIT-V

TRANSPORT LAYER AND SECURITY PROTOCOLS: Introduction, Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks, Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer Solutions, TCP Over Ad Hoc Wireless Networks, Other Transport Layer Protocol for Ad Hoc Wireless Networks

Course Outcomes:

After successfully completing the course student will be able to

- Keep himself updated on latest wireless technologies and trends in the communication
- Understand the transmission of voice and data through various networks

TEXT BOOKS:

1. Ad Hoc Wireless Networks: Architectures and Protocols – C. Siva Ram Murthy and B.S.Manoj, 2004, PHI
2. Wireless Ad- hoc and Sensor Networks: Protocols, Performance and Control – Jagannathan Sarangapani, CRC Press
3. Holger Karl & Andreas Willig, "Protocols And Architectures for Wireless Sensor Networks", John Wiley, 2005.

REFERENCE BOOKS:

1. Kazem Sohraby, Daniel Minoli, & Taieb Znati, "Wireless Sensor Networks- Technology, Protocols, and Applications", John Wiley, 2007.
2. Feng Zhao & Leonidas J. Guibas, "Wireless Sensor Networks- An Information Processing Approach", Elsevier, 2007.
3. Ad- Hoc Mobile Wireless Networks: Protocols & Systems, C.K. Toh ,1 ed. Pearson Education.
4. Wireless Sensor Networks – C. S. Raghavendra, Krishna M. Sivalingam, 2004, Springer
5. Wireless Sensor Networks – S Anandamurugan , Lakshmi Publications

IV Year – I Semester **L T P C**

3 1 0 4

DIGITAL FORENSICS

Course Objectives:

- To understand the basic digital forensics and techniques for conducting the forensic examination on different digital devices.
- To understand how to examine digital evidences such as the data acquisition, identification analysis.

Unit - I

Computer Forensics and Investigations: Understanding Computer Forensics, Preparing for Computer Investigations, Taking A Systematic Approach, Procedure for Corporate High-Tech Investigations, Understanding Data Recovery Workstations and Software, Investor's Office and Laboratory: Understanding Forensics Lab Certification Requirements, Determining the Physical Requirements for a Computer Forensics Lab, Selecting a Basic Forensic Workstation.

Unit - II

Data Acquisition: Understanding Storage Formats for Digital Evidence, Determining the Best Acquisition Method, Contingency Planning for Image Acquisitions, Using Acquisition Tools, Validating Data Acquisition, Performing RAID Data Acquisition, Using Remote Network Acquisition Tools, Using Other Forensics Acquisition Tools

Unit - III

Processing Crime and Incident Scenes: Identifying Digital Evidence, Collecting the Evidence in Private-Sector Incident Scenes, Processing law Enforcement Crime Scenes, Preparing for a Search, Securing a Computer Incident or Crime Scene, Sizing Digital evidence at the Scene, Storing Digital evidence, obtaining a Digital Hash.

Unit - IV

Current Computer Forensics Tools: Evaluating Computer Forensics Toll Needs, Computer Forensics Software Tools, Computer Forensics Hardware Tools, Validating and Testing Forensics Software Computer Forensics Analysis and Validation: Determining What Data to Collect and Anlyze, Validating Forensic Data, Addressing Data-Hiding Techniques, Performing Remote Acquisition

Unit - V

Recovering Graphics and Network Forensics: Recognizing a Graphics File, Understanding Data Compression, Locating and Recovering Graphics Files, Understanding Copyright Issues with Graphics, Network Forensic, Developing Standard Procedure for Network Forensics, Using Network Tools, Examining Hiney Project

Course Outcomes:

- Know how to apply forensic analysis tools to recover important evidence for identifying computer crime.
- To be well-trained as next-generation computer crime investigators.

Text Books

1. Nelson, Phillips Enfinger,Steuart, " Computer Forensics and Investigations, Cengage Learning".
2. Warren G. Kruse II and Jay G. Heiser, "Computer Forensics: Incident Response Essentials", Addison Wesley, 2002.
3. "Guide to Computer Forensics and Investigations, 2nd ed., Thomson Course Technology, 2006, ISBN: 0-619-21706-5.

Reference Books:

1. Vacca, J, *Computer Forensics, Computer Crime Scene Investigation*, 2nd Ed, Charles River Media, 2005, ISBN: 1-58450-389.

IV Year – I Semester **L T P C**

3 1 0 4

Computer Vision

Course Objective:
To Recognize and describe both the theoretical and practical aspects of computing with images and to Connect issues from Computer Vision to Human Vision

SYLLABUS:

UNIT-I
Introduction: What is computer vision, A brief history, Image Formation, Geometric primitives and transformations, Photometric image formation, The digital camera.

UNIT-II
Feature detection and matching: Points and patches, Feature detectors, Feature descriptors, Feature matching, Feature tracking, Application: Performance-driven animation, Edges, Application: Edge editing and enhancement, Lines, Application: Rectangle detection.

UNIT-III
Segmentation: Active contours, Split and merge, Mean shift and mode finding, Normalized cuts, Graph cuts and energy-based methods, Application: Medical image segmentation.

UNIT-IV
Feature-based alignment: 2D and 3D feature-based alignment, Pose estimation, Geometric intrinsic calibration, Calibration patterns, Vanishing points, Application: Single view metrology, Rotational motion, Radial distortion.

UNIT-V
Recognition: Object detection, Face detection, Pedestrian detection, Face recognition, Eigenfaces, Active appearance and 3D shape models, Application: Personal photo collections, Instance recognition, Category recognition, Context and scene understanding.

Course Outcomes:
- Provide an introduction to computer vision including fundamentals of image formation
- Enumerate the concepts of Feature detection and Matching
- Discuss about Image Segmentation Techniques
- Discuss applications of Feature based alignment like pose estimation
- Discuss different recognition techniques.

Text Books:
1. Richard Szeliski,"Computer Vision: Algorithms and Applications", Springer, 2010.
2. Rafael C. Gonzalez "Digital Image Processing", Pearson Education; Fourth edition (2018)

Reference Books:
1. Forsyth /Ponce, "Computer Vision: A Modern Approach", Pearson Education India; 2nd edition (2015)
2. S.Nagabhushana, "Computer Vision and Image Processing", New Age International Pvt Ltd; First edition (2005)

IV Year – I Semester **L T P C**

3 1 0 4

NATURAL LANGUAGE PROCESSING

COURSE OBJECTIVES:

- Teach students the leading trends and systems in natural language processing.
- Make them understand the concepts of morphology, syntax, semantics and pragmatics of the language and that they are able to give the appropriate examples that will illustrate the above mentioned concepts.
- Teach them to recognize the significance of pragmatics for natural language understanding.
- Enable students to be capable to describe the application based on natural language processing and to show the points of syntactic, semantic and pragmatic processing.

SYLLABUS:

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

Predicate-Argument Structure, Meaning Representation Systems, Software.

Unit-V

Discourse Processing: Cohension, Reference Resolution, Discourse Cohension and Structure**Language Modeling:**Introduction, N-Gram Models, Language Model Evaluation, Parameter Estimation, Language Model Adaptation, Types of Language Models, Language-Specific Modeling Problems, Multilingual and Crosslingual Language Modeling

COURSE OUTCOMES:

1. Show sensitivity to linguistic phenomena and an ability to model them with formal grammars.

2. Understand and carry out proper experimental methodology for training and evaluating empirical NLP systems

3. Able to manipulate probabilities, construct statistical models over strings and trees, and estimate parameters using supervised and unsupervised training methods.

4. Able to design, implement, and analyze NLP algorithms

5. Able to design different language modeling Techniques.

TEXT BOOKS:

1. Multilingual natural Language Processing Applications: From Theory to Practice – Daniel M.Bikel and Imed Zitouni, Pearson Publication

2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary

REFERENCE BOOKS:

1. Speech and Natural Language Processing - Daniel Jurafsky & James H Martin, Pearson Publications

MINOR COURSES

IV Year – I Semester **L T P C**

3 1 0 4

DATA SCIENCE

Course Objectives:

- Provide you with the knowledge and expertise to become a proficient data scientist.
- Demonstrate an understanding of statistics and machine learning concepts that are vital for data science.
- Produce Python code to statistically analyze a dataset.
- Critically evaluate data visualizations based on their design and use for communicating stories from data.

SYLLABUS:

UNIT I:

PYTHON Basics and Programming Concepts: Introducing Python, Types and Operations - Numbers, Strings, Lists, Tuples, Dictionaries, Files, Numeric Types, Dynamic Typing; Statements and Syntax - Assignments, Expressions, Statements, Loops, iterations, comprehensions; Functions - Function Basics, Scopes, Arguments, Advanced Functions; Modules - Module Coding Basics, Module Packages, Advanced Module Topics; Classes and OOP - Class, Operator Overloading, Class Designing; Exceptions and Tools - Exception Basics, Exception Coding Details, Exception Objects, Designing With Exceptions, Parallel System Tools

UNIT II:

GUI Programming: Graphical User Interface - Python gui development options, Adding Widgets, GUI Coding Techniques, Customizing Widgets; Internet Programming - Network Scripting, Client-Side scripting, Pymailgui client, server-side scripting, Pymailcgi server; Tools and Techniques - databases and persistence, data structures, text and language, python/c integration

UNIT III:

Pandas and NumPy: Numpy Basics - Fast Element wise array functions, Multidimensional Array, Data Processing using arrays, file i/o with arrays; Pandas - Data Structures, Essential Functionality, Summarizing and Computing Descriptive Statistics, Handling Missing Data, Hierarchical Indexing

UNIT IV:

Data Preprocessing: Data Loading, Storage, and File Formats - Reading and Writing data in text format, binary data formats, interacting with html and web apis, interacting with databases; Data Wrangling: Clean, Transform, Merge, Reshape - Combining and Merging Data Sets, Reshaping and Pivoting, Data Transformation, String Manipulation; Data Aggregation and Group Operations – Group by Mechanics, Data Aggregation, Group by Operations and Transformations, Pivot Tables and Cross- Tabulation

UNIT V:

Data Visualization: A Brief matplotlib API Primer, Plotting Functions in pandas, Time Series, Financial and Economic Data Applications

Course Outcomes:

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

- Explain how data is collected, managed and stored for data science.
- Understand the key concepts in data science, including their real-world applications and the

toolkit used by data scientists.

- Implement data collection and management scripts using Python Pandas.

TEXT BOOKS:

1. Learning Python, 5th Edition, MarkLutz, OReilly, 2013.
2. Python Programming: A Modern Approach, VamsiKurama, Pearson.,1/e
3. Programming Python, 4th Edition, MarkLutz, OReilly, 2010.
4. Python For Data Analysis, 2nd Edition, WesMckinney, O Reilly, 2017.

REFERENCE BOOKS:

1. Python: The Complete Reference, 1st Edition, Martin C. Brown, McGraw Hill Education, 2018.
2. Head First Python, 2nd Edition, Paul Barry, O′Reilly, 2016.

IV Year – I Semester **L T P C**

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INTERNET OF EVERYTHING

Course Objectives:

- Learns about various types of sensors, actuators and different network protocols.
- Construction of wireless sensor networks and communication using different connectivity technologies
- To Know about how m2M communication performs and communication between user and the device
- To Know about programming platforms to implement IOT
- Learns about how data is handled generated by IOT application
- how IoT is used for industrial purpose , able to builds viors IoT applications

SYLLABUS:

UNIT I: Introduction: Sensing & actuation, Communication-Part I, Part II, Networking-Part I, Part II, Industry 4.0: Globalization and Emerging Issues, The Fourth Revolution, LEAN Production Systems, Smart and Connected Business Perspective, Smart Factories.

UNIT II: Industry 4.0: Cyber Physical Systems and Next Generation Sensors, Collaborative Platform and Product Lifecycle Management, Augmented Reality and Virtual Reality, Artificial Intelligence, Big Data and Advanced Analysis

UNIT III: Cybersecurity in Industry 4.0, Basics of Industrial IoT: Industrial Processes-Part I, Part II, Industrial Sensing & Actuation, Industrial Internet Systems. IIoT-Introduction, Industrial IoT: Business Model and Reference Architecture: IIoT-Business Models, IIoT Reference Architecture

UNIT IV : *Industrial IoT- Layers: IIoT Sensing, IIoT Processing, IIoT Communication , IIoT Networking, Industrial IoT: Big Data Analytics and Software Defined Networks: IIoT Analytics – Introduction*

UNIT V : *Industrial IoT- Application Domains: Healthcare, Power Plants, Inventory Management & Quality Control, Plant Safety and Security (Including AR and VR safety applications), Facility Management. Industrial IoT- Application Domains: Oil, chemical and pharmaceutical industry, Applications of UAVs in Industries.*

Course Outcomes:

- Aware about how sensors and actuators are connected by using different network protocols
- Node behavior in wireless sensor networks and known about which connectivity technology was used according to the application.
- Knows about Arduino boards and their connection with sensors and actuators
- Learns about how Pi os is installed and how code is embedded into the board

- Came to know about how data is stored using cloud computing and knows about sensor clouds.
- Construction various IOT applications using various sensors and Actuators

Text Books:

1. **.Industry 4.0: The Industrial Internet of Things", by Alasdair Gilchrist (Apress)**
2. **"Industrial Internet of Things: Cybermanufacturing Systems"by Sabina Jeschke, Christian Brecher, Houbing Song, Danda B. Rawat (Springer).**
3. Internet of Things: Architecture, Design Principles And Applications, Raj kamal, McGraw Hill Higher Education
4. Internet of Things, A.Bahgya and V.Madisetti, Univesity Press, 2015.

Reference Books:

1. Designing the Internet of Things, Adrian McEwen and Hakim Cassimally, Wiley, 2013
2. Getting Started with the Internet of Things (Make: Projects), CunoPfister , Oreilly, 2011

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SENSOR NETWORKS

Course Objectives:

- Understand the state-of-the-art in network protocols, architectures and applications.
- Analyze existing network simulator to working environment.
- Understand the medium access control protocols and Markov chain properties.
- Learn key routing protocols for sensor networks and main design issues
- Understand the routing protocols for wireless sensor networks and advancedprotocols.

Unit I

Introduction to Wireless Sensor Networks: Course Information, Motivations,Applications, Performance metrics, History and Design factors.
Network Architecture: Traditional layered stack, Cross-layer designs, Sensor NetworkArchitecture
Hardware Platforms: Motes, Hardware parameters

Unit II

Introduction to ns-3: Introduction to Network Simulator 3 (ns-3), Description of the ns-3 core Unit and simulation example.

Unit III

Medium Access Control Protocol design: Fixed Access, Random Access, WSNprotocols: synchronized, duty-cycled
Introduction to Markov Chain: Discrete time Markov Chain definition, properties,classification and analysis
MAC Protocol Analysis: Asynchronous duty-cycled X-MAC Analysis (Markov Chain)

Unit IV

Security: Possible attacks, countermeasures, SPINS, Static and dynamic key distribution

Unit V

Routing protocols: Introduction, MANET protocols
Routing protocols for WSN: Resource-aware routing, Data-centric, Geographic Routing,Broadcast, Multicast
Opportunistic Routing Analysis: Analysis of opportunistic routing (Markov Chain)Advanced topics in wireless sensor networks.
Advanced Topics: Recent development in WSN standards, software applications.

Course Outcomes:

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

- explain the basics concepts of wireless sensor networks. understand of network simulator 3 to implement protocols of wsn .
- use of medium access control protocol design issues.
- knowledge of different security concepts and attacks.
- gain working of different routing protocols.
- learnt advanced topics and make use of real time environment

Text Book(s):

4. W. Dargie and C. Poellabauer, "Fundamentals of Wireless Sensor Networks – Theory and Practice",Wiley 2010.
5. KazemSohraby, Daniel Minoli and TaiebZnati, "wireless sensor networks - Technology, Protocols,and Applications", Wiley Interscience 2007.
6. Takahiro Hara,Vladimir I. Zadorozhny, and Erik Buchmann, "Wireless Sensor Network Technologies for the Information Explosion Era", springer 2010.

Reference Books:

1. Takahiro Hara,Vladimir I. Zadorozhny, and Erik Buchmann, "Wireless Sensor Network Technologies for the Information Explosion Era", springer 2010.

IV Year – I Semester **L T P C**

3 1 0 4

PATTERN RECOGNITION

Course Objectives :

- The course is designed to introduce students to theoretical concepts and practical issues associated with pattern recognition

Syllabus:

UNITI

Introduction:Machine perception, pattern recognition example, pattern recognition systems, the Design cycle, learning and adaptation,Bayesian Decision Theory: Introduction, continuous features – two categories classifications, minimum error-rate classification-zero–one loss function, classifiers, discriminant functions, and decision surfaces.

UNITII

Normal density:Univariate and multivariate density, discriminant functions for the normal Density different cases, Bayes decision theory – discrete features, compound Bayesian decision theory and context

UNITIII

Maximum likelihood and Bayesian parameter estimation:Introduction, maximum likelihood Estimation, Bayesian estimation, Bayesian parameter estimation–Gaussian case

UNITIV

Un-supervised learning and clustering: Introduction, mixture densities and identifiability, maximum likelihood estimates, application to normal mixtures, K-means clustering. Date description and clustering – similarity measures, criteria function for clustering

UNIT V

Pattern recognition using discrete hidden Markov models: Discrete-time Markov process, Extensions to hidden Markov models, three basic problems of HMMs, types of HMMs , Continuous hidden Markov models :Continuous observation densities, multiple mixtures per state, speech recognition applications.

Course Outcomes :
Design systems and algorithms for pattern recognition (signal classification), with focus on sequences of patterns that are analyzed using, e.g., hidden Markov models (HMM),

- Analyse classification problems probabilistically and estimate classifier performance,
- Understand and analyse methods for automatic training of classification systems,

- Apply Maximum-likelihood parameter estimation in relatively complex probabilistic models, such as mixture density models and hidden Markov models,
- Understand the principles of Bayesian parameter estimation and apply them in relatively simple probabilistic models

Text Books:

1. Pattern classifications, Richard O. Duda, Peter E. Hart, David G. Stroke. Wiley student edition, Second Edition.
2. Pattern Recognition, An Introduction, V Susheela Devi, M Narsimha Murthy, University Press

Reference Books:

1. C.M.Bishop, Pattern Recognition and Machine Learning, Springer, 2006
2. S.Theodoridis and K.Koutroumbas, Pattern Recognition, 4th Ed., Academic Press, 2009

IV Year – I Semester **L T P C**

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DIGITAL MARKETING

COURSE OBJECTIVES:

This course aims to offer a structured approach to planning, implementing and assessing digital marketing strategies in business. The specific aims are:

- to investigate the key issues and themes in the adoption and application of digital marketing to business;
- to explore tactical and operational challenges facing firms in implementing digital marketing strategies;
- to develop skills in digital marketing and social media marketing;
- to develop reflective skills on learnings and experiences from a practical implementation of a digital marketing strategy.

SYLLABUS

UNIT - I

Understanding Digital MarketingConcept, Components of Digital Marketing, Need and Scope of Digital Marketing, Benefits of Digital Marketing, Digital Marketing Platforms and Strategies, Comparison of Marketing and Digital Marketing, Digital MarketingTrends.

UNIT - II

Channels of Digital MarketingDigital Marketing, Website Marketing, Search Engine Marketing, Online Advertising, Email Marketing, BlogMarketing, Social Media Marketing, Audio, Video and Interactive Marketing, Online Public Relations, MobileMarketing, Migrating from Traditional Channels to Digital Channels.Marketing in the Digital EraSegmentation – Importance of Audience Segmentation, How different segments use Digital Media –Organizational Characteristics, Purchasing Characteristics, Using Digital Media to Reach, Acquisition andRetention of new customers, Digital Media for Customer Loyalty.

UNIT - III

Digital Marketing PlanNeed of a Digital Marketing Plan, Elements of a Digital Marketing Plan – Marketing Plan, Executive Summary,Mission, Situational Analysis, Opportunities and Issues, Goals and Objectives, Marketing Strategy, Action Plan,Budget, Writing the Marketing Plan and Implementing the Plan.

UNIT - IV

Search Engine Marketing and Online Advertising Importance of SEM, understanding Web Search – keywords, HTML tags, Inbound Links, Online Advertising vs. Traditional Advertising, Payment Methods of Online Advertising – CPM (Cost-per-Thousand) and CPC (Costper-click), Display Ads - choosing a Display Ad Format, Landing Page and its importance.

UNIT - V

Social Media Marketing Understanding Social Media, Social Networking with Facebook, LinkedIn, Blogging as a social medium, Microblogging with Twitter, Social Sharing with YouTube, Social Media for Customer Reach, Acquisition and Retention. Measurement of Digital Media: Analyzing Digital Media Performance, Analyzing Website Performance, Analyzing Advertising Performance.

COURSE OUTCOMES:

By the end of this course students will be able to:

1. Evaluate and apply key concepts related to digital marketing including consumer behaviour, online marketing communications, and social media marketing.
2. Critically assess role that digital marketing can play in business strategy.
3. Plan and compose tactical marketing decisions as a group considering effective product, pricing, distribution and promotion decisions

TEXT BOOKS:

1. *Digital Marketing For Dummies, Author: Ryan Deiss & Russ Henneberry Publisher: John Wiley & Sons, Inc.,*

Reference Books:

2. Understanding Digital Marketing, Damian Ryan, Calvin Jones, Kogan Page