BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE

ODALAREVU – 533 210, Andhra Pradesh, India

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE STRUCTURE AND SYLLABUS

For UG – BR20

B. Tech - COMPUTER SCIENCE AND ENGINEERING – Branch Code: 05

(Applicable for batches admitted from 2020-2021)

BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE

ODALAREVU - 533 210, Andhra Pradesh, India

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE STRUCTURE – BR20

For UG - B.Tech: Computer Science and Engineering

I Year – I SEMESTER

S. No	Course Code	Subjects	L	T	P	Credits
1	20ES1T01	Basic Electrical and Electronics Engineering	3	0	0	3
2	20BS1T01	Linear Algebra & Differential Equations	3	0	0	3
3	20BS1T07	Applied Chemistry	3	0	0	3
4	20ES1T05	Programming for Problem Solving1	3	0	0	3
5	20ES1L07	Computer Engineering Workshop Lab	2	0	2	3
6	20ES1L 01	Basic Electrical and Electronics Engineering Lab	0	1	2	1.5
7	20BS1L03	Applied Chemistry Lab	0	0	3	1.5
8	20ES1L08	Programming for Problem Solving1 Lab	0	0	3	1.5
	20HS1M01	*Induction Training	3	0	0	0
Total Credits			**16**	**1**		**19.5**

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE STRUCTURE – BR20

For UG - B.Tech: Computer Science and Engineering

I Year – II SEMESTER

S. No	Course Code	Subjects	L	T	P	Credits
1	20HS2T01	English	3	0	0	3
2	20BS2T02	Integral Transforms and Calculus	3	0	0	3
3	20ES2T04	Engineering Drawing	2	0	2	3
4	20BS2T05	Applied Physics	3	0	0	3
5	20ES2T06	Programming for Problem Solving 2	3	0	0	3
6	20BS2L01	Applied Physics Lab	0	0	3	1.5
7	20ES2L09	Programming for Problem Solving 2 Lab	0	0	3	1.5
8	20HS2L01	English Communication Skills Lab	0	0	3	1.5
	20HS2M02	* Indian Constitution	2	0	0	0

Total Credits	17	1	8	19.5

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE STRUCTURE – BR20

For UG - B.Tech: Computer Science and Engineering

II Year – I SEMESTER

S.No	Course Code	Courses	L	T	P	Credits
1	20BS3T03	Probability and Statistics	3	0	0	3
2	20CS3T02	Unified Modeling Language & DP	3	0	0	3
3	20CS3T03	Advanced Data Structure	3	0	0	3
4	20ES3T04	Python Programming	3	0	0	3
5	20CS3T05	Digital Logic Design	3	0	0	3
6	20CS3L06	Advanced Data Structure Lab	0	0	3	1.5
7	20ES3L07	Python & R Programming Lab	0	0	3	1.5
8	20CS3L08	Unified Modeling Language & DP Lab	0	0	3	1.5
9	20CS3S01	Employability Skills (Java Script/JSON)	1	0	2	2
MC	20BS3M03	*Environmental Science	2	0	0	0
		Total	21	0	8	21.5

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE STRUCTURE – BR20

For UG - B.Tech: Computer Science and Engineering

II Year – II SEMESTER

S.No	Course Code	Courses	L	T	P	Credits
1	20BS4T04	Numerical Methods and Complex Variables	3	0	0	3
2	20CS4T06	Java Programming	3	0	0	3
3	20HS4T02	Managerial Economics and Financial Analysis	3	0	0	3
4	20CS4T07	Operating Systems	3	0	0	3
5	20CS4T08	Mathematical Foundations of Computer Science	3	0	0	3
6	20CS4L07	Java Programming Lab	0	0	3	1.5
7	20CS4L09	Operating System Lab	0	0	3	1.5
8	20CS4L10	UNIX Lab	0	0	3	1.5
9	20CS4S02	Skill Oriented Course - Mongo Data Base	1	0	2	2
		Total	16	0	11	21.5

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE STRUCTURE – BR20

For UG - B.Tech: Computer Science and Engineering

III Year – I SEMESTER

S.No	Course Code	Courses	L	T	P	Credits
1	20CS5T09	Computer Networks	3	0	0	3
2	20CS5T10	Formal Language and Automata Theory	3	0	0	3
3	20CS5T11	Data Base Management System	3	0	0	3
4	20CS5E01 20CS5E02 20CE5E01 20ME5E01	**Open Elective- I** 1. Computer Organization 2. Object Oriented Programming 3. Interior Space Design 4. Industrial Automation and Robotics	3	0	0	3
5	20CS5D01 20CS5D02 20CS5D03 20CS5D04	**Professional Elective- I** 1. Data Communications. 2. Principles of Programming Languages 3. Software Engineering 4. Advanced Computer Architecture/**MOOCs-1**	3	0	0	3
6	20CS5L11	Computer Networks Lab	0	0	3	1.5
7	20CS5L12	DBMS Lab	0	0	3	1.5
8	20HS5M04	Foreign Language	2	0	0	0
9	20CS5S03	Skill Advanced Course :APP Development	1	0	2	2
10	20CS5P01	Summer Internship	0	0	3	1.5
		Total	21	0	11	21.5

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE STRUCTURE – BR20

For UG - B.Tech: Computer Science and Engineering

III Year – II SEMESTER

S.No	Course Code	Courses	L	T	P	Credits
1	20CS6T12	Compiler Design	3	0	0	3
2	20CS6T13	Data mining and Data warehousing	3	0	0	3
3	20CS6T14	Design and Analysis of Algorithms	3	0	0	3
4	20CS6D05 20CS6D06 20CS6D07 20CS6D08	**Professional Elective -II** 1.Machine Learning 2.Big Data Analytics 3. Distributed Systems 4.Network Programming/**MOOCS-2**	3	0	0	3
5	20CS6E03 20ME6E02 20CE6E02 20EC6E02	**Open Elective- II** (Inter Disciplinary) **1.** Mean Stack Development **2.** Operations Research **3.** Green Building **4.** Internet of Things	2	0	2	3
6	20CS6L13	Compiler Design Lab	0	0	3	1.5
7	20CS6L14	Data Mining Lab(Python Implementation)	0	0	3	1.5
8	20CS6L15	Web Technology Lab	0	0	3	1.5
9	20CS6S04	Skill Advanced course: Game Development	1	0	2	2
10	20HS6M05	Universal Human Values	2	0	0	0
		Total	17	0	13	21.5

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
COURSE STRUCTURE – BR20
For UG - B.Tech: Computer Science and Engineering

IV Year I Semester

S.No	Course Code	Courses	L	T	P	Credits
1	20CS7D09 20CS7D10 20CS7D11 20CS7D12	**Professional Elective -III** 1. Cryptography and Network Security 2. Neural Networks 3. Ad-hoc and Sensor Networks 4. Cyber Security & Forensics/**MOOCs-3**	3	0	0	3
2	20CS7D13 20CS7D14 20CS7D15 20CS7D16	**Professional Elective -IV** 1. Software Testing Methodologies 2. Deep Learning Techniques 3. Social Networks & Semantic Web 4. Computer Vision	3	0	0	3
3	20CS7D17 20CS7D18 20CS7D19 20CS7D20	**Professional Elective -V** 1. Mobile Computing 2. Block-Chain Technologies 3. Wireless Network Security 4. Ethical Hacking	3	0	0	3
4	20CS7E04 20CE7E03 20EC7E03 20EE7E03	**Open Elective -III** 1. Nature Inspired Computing Techniques 2. Disaster Management 3. Embedded Systems 4. Electrical Distribution Systems	2	0	2	3
5	20CS7E05 20EC7E04 20ME7E04 20CE7E04	**Open Elective- IV** 1. Secure Coding Techniques 2. 5G Communications 3. 3D Printing Technologies 4. Project Management	2	0	2	3
6	20HS7E01	**Humanity and Social Science Elective** 1.Resource Management 2. Industrial Management 3. Management Science 4. IPR and Patents	3	0	0	3
7	20HS7S01	English for Employability	1	0	2	2
8	20CS7P02	Industrial/Research Internship 2 months after III_I Evaluated during IV_I	0	0	6	3
		Total	17	0	12	23

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE STRUCTURE – BR20

For UG - B.Tech: Computer Science and Engineering

IV Year II Semester

S.No	Course Code	Courses	L	T	P	Credits
1	20CS8P03	Major Project Work	0	0	24	12
		Total	0	0	24	12

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DETAILED SYLLABUS FOR

UG: B.Tech CSE

I Year – I SEMESTER

1	20ES1T01	Basic Electrical and Electronics Engineering	3	0	0	3
2	20BS1T01	Linear Algebra & Differential Equations	3	0	0	3
3	20BS1T07	Applied Chemistry	3	0	0	3
4	20ES1T05	Programming for Problem Solving 1	3	0	0	3
5	20ES1L07	Computer Engineering Workshop Lab	2	0	2	3
6	20ES1L01	Basic Electrical and Electronics Engineering Lab	0	1	2	1.5
7	20BS1L03	Applied Chemistry Lab	0	0	3	1.5
8	20ES1L08	Programming for Problem Solving 1 Lab	0	0	3	1.5
	20HS1M01	*Induction Training	3	0	0	0
Total Credits			**16**	**1**		**19.5**

I Year – II SEMESTER

S. No	Course Code	Subjects	L	T	P	Credits
1	20HS2T01	English	3	0	0	3
2	20BS2T02	Integral Transforms and Calculus	3	0	0	3
3	20ES2T04	Engineering Drawing	2	0	2	3
4	20BS2T05	Applied Physics	3	0	0	3
5	20ES2T 06	Programming for Problem Solving 2	3	0	0	3
6	20BS2L01	Applied Physics Lab	0	0	3	1.5
7	20ES2L09	Programming for Problem Solving 2 Lab	0	0	3	1.5
8	20HS2L01	English Communication Skills Lab	0	0	3	1.5
	20HS2M02	* Indian Constitution	2	0	0	0
Total Credits			**17**	**1**	**8**	**19.5**

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING (20ES1T01)

UNIT – I Electrical Circuits:
Basic definitions - Types of network elements - Ohm's Law - Kirchhoff's Laws - Inductive networks - Capacitive networks – Series - Parallel circuits - Star-delta and delta-star transformations.

UNIT - II
Dc Machines:
Principle of operation of DC generator – EMF equation - Types of DC machine – Applications – Three point starter - Speed control methods of DC motor – Swinburne's Test.

UNIT – III
Transformers & **Machines**
Principle of operation and construction of single phase transformers – EMF equation – Losses – OC & SC tests – Efficiency- Applications.

Principle of operation and construction of alternators– Types of alternators – Principle of operation of synchronous motor – Applications.

UNIT IV
Rectifiers & Linear ICs:
PN junction diodes - Diode applications (Half wave and bridge rectifiers). Characteristics of operation amplifiers (OP-AMP) - applications of OP-AMPs (inverting, non-inverting).

UNIT V
Transistors:
PNP and NPN junction transistor, transistor as an amplifier- Transistor amplifier - Frequency response of CE amplifier

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

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

LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS

Course Code: 20BS1T01

L	T	P	C
3	0	0	3

Course Objectives:

COB 1: To develop the basic mathematical skills those are imperative for effective Understanding of engineering subjects

COB 2: To equip the students with the methods of solving system of linear equations and the Concepts of Eigen values and Eigen vectors.

COB 3: To familiarize students with analytical methods to solve Ordinary differential equations.

Course Outcomes:

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

CO 1: Determine rank of the given matrix and is able to find the solution of given system of linear equations.(L3)

CO 2: Illustrate Eigen values, Eigen vectors and is able to understand their applications. (L4)

CO 3: Apply differential calculus to model rate of change in time of any physical phenomena and solve it.(L3)

CO 4: Apply appropriate analytical technique to model and solving higher order differential equations.(L3)

CO 5: Understand partial differentiation and able to apply in finding maxima and minima. (L2)

CO6: Find the solution of one-dimensional wave equation and heat equation(L3)

Unit I:- Matrices and Linear systems of equations

Rank of a Matrix-Echelon form-Normal form – Solution of linear system of equations homogenous and non-homogenous equations – Gauss elimination -Gauss Jordon- Gauss Seidal methods.

Applications: Finding the current in electrical circuits.

Unit II:- Eigen values - Eigen vectors

Eigen values - Eigen vectors– Properties – Cayley-Hamilton theorem (statement only) - Inverse and powers of a matrix by using Cayley-Hamilton theorem- Reduction to Diagonal form(symmetric) – Quadratic forms and nature of the quadratic forms – Reduction of quadratic form to canonical forms by orthogonal transformation

Unit III:- Differential equations of first order and first degree

Formation of D.E-Linear-Bernoulli-Exact-Reducible to exact differential equations

Applications: - Newton's Law of cooling-Law of natural growth and decay-Orthogonal trajectories

Unit IV:-Linear differential equations of higher order

Non-homogeneous equations of higher order with constant coefficients with Non homogeneous terms of the type e^{ax}, $\sin ax, \cos ax, polynomials\ in\ x, e^{ax}V(x), xV(x)$- Method of Variation of parameters.

APPLIED CHEMESTRY

Course Code: 20BS1T07

L	T	P	C
3	0	0	3

Course objectives

COB:1 Recognize the relative energies of bonding and anti bonding molecular orbitals and crystal field stabilization energy.
COB:2 Understand the basic principles of spectroscopy where electromagnetic radiation interacts with Chemical substances.
COB:3 To impart the knowledge of water treatment, setting of cement and repair of concrete structures, Nano materials.

course outcomes

CO:1 Analyze microscopic chemistry in terms of atomic and molecular orbitals.
CO:2 Distinguish the range of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.

CO:3 Solve the numerical problems on hardness of water and explain water treatment methods and Principles.

CO:4 Outline galvanic cells, reference electrodes, electrochemical series, analyze the corrosion of metals and apply a suitable method of corrosion prevention.

CO:5 Summarize the methods of synthesis, properties and applications of nano materials.

CO:6 Understand the preparation, properties and applications of some polymers and elastomers.

UNIT-I **8 - HOURS**

Molecular Orbital Theory and Coordination Compounds:
Linear Combination Of Atomic Orbitals – Molecular orbital theory – homo nuclear diatomic molecules (H_2,He_2,He_2^+,Li_2,Be_2,B_2,C_2,N_2,O_2,O_2^+,O_2^-,F_2 and Ne_2). Application of Molecular orbital theory for bonding in metals.
Introduction to coordination compounds- crystal field theory and splitting of d-orbitals in octahedral, tetrahedral and square planar complexes, factors effecting crystal field splitting**.**

UNIT-II **10 - HOURS**

Spectroscopic techniques and applications:
UV: Introduction - electronic energy levels-electronic transitions-absorption laws-chromophores and auxochromes - bathochromic shift - hypsochromic shift- hyper chromic shift – hypochromic shift-Applications.
IR: Introduction - basic theory - selection rules - absorption of infrared radiation and molecular vibrations-Applications.
NMR: Introduction-spin active nuclei behaving as nuclear magnets- energy absorption and resonance-relaxation phenomenon-commonly used NMR solvents – chemical shift-factors influencing the chemical shift shielding and deshielding-Applications.

UNIT-III **9 - HOURS**

Water Technology:
Introduction - hardness of water - calcium carbonate equivalents - units of hardness - causes of hardness - types of hardness, disadvantages of hard water. Determination of hardness by EDTA.
Boiler troubles - priming and foaming, scale and sludge formation, boiler corrosion, caustic embrittlement - softening of hard water: lime - soda process, zeolite process and ion exchange process. Water purification by Reverse Osmosis for drinking and Industry.

UNIT-V **9 - HOURS**

Electrochemistry and Corrosion:
Introduction to electrochemistry galvanic cells, single electrode potential, standard electrode potential, electro chemical series, E.M.F of cell and its measurements, Nernst equation, electrolyte concentration cells, reference electrodes- Standard Hydrogen Electrode & Standard Calomel Electrode. Reversible and irreversible cells. Lithium Batteries for Electric Vehicles and electronic devices.

Corrosion:-
Chemical and electro chemical corrosion – mechanism - Galvanic corrosion, pitting corrosion –passivity - Factors influencing corrosion- Electrochemical Principles to control corrosion.

UNIT-V 19 - HOURS

Chemistry of Engineering Materials:
Components of Portland cement, their chemical Composition and Properties, setting and hardening of cement, Cements for special purpose- Repair of concrete structures using special additives.

Nano Materials:- Introduction – sol-gel method - characterization by Brunauer –Emmett- Teller,Transmission Electron Microscopic methods-properties and applications of Nano materials, Fullerenes and Nanotubes**.**Preparation of Nanotubes.

High Polymers:
Introduction - addition and condensation polymerization - effect of polymer structure on properties. Thermoplastics and Thermosetting plastics - Preparation, Properties and Applications of PVC, Polycarbonates and Bakelite. Biodegradable Polymers. Advantages of plastics and how to reuse, recycle and manage/dispose of plastic waste.

Elastomers:-
Natural rubber - vulcanization of rubber - preparation, properties and applications of Buna-S, Buna-N, Thiokol and Polyurethanes**.**

Text Books:

i) Engineering chemistry by jain and jain: Dhanpat Rai publishing company

ii) Engineering chemistry –foundamentals and applications by SHIKHA AGARWAL-Cambridge University press

iii) Engineering chemistry by R.P.Mani,K.N.Mishra,B.Ramadevi,V.R.reddy Cengage Learning

Reference books:

i) University chemistry by B.H. Mahan

ii) Engineering chemistry by K.Sesha Maheswaramma mridula chugh pearson publications

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I Year - I Semester

L	T	P	C
4	0	0	3

Course Code:20ES1T05

Common for CSE &CAD

PROGRAMMING FOR PROBLEM SOLVING 1

UNIT-I:

Introduction to C Programming- History, evolution of C**,** The Software Development Process, Development of C Algorithms.
C Tokens, The main() Function, The printf() Function, Data Types**,** Operators, evaluation of Expression, Variable , Declarations and Initializations. Operator Precedence and Associativity.
Assignment - Implicit Type Conversions, Explicit Type Conversions (Casts), Assignment Variations, Mathematical Library Functions, Interactive Input, Formatted Output, Format Modifiers.

UNIT -II:

Flow of Control:

Selection: if-else Statement, nested if, examples, Multi-way selection: switch, else-if, examples.

Repetition: Basic Loop Structures, Pretest and Posttest Loops, Counter-Controlled and Condition-Controlled Loops, The while Statement, The for Statement, Nested Loops, The do-while Statement.

UNIT-III

Arrays & Pointers:
Arrays: One-Dimensional Arrays, Input and Output of Array Values, Array Initialization, Arrays as Function Arguments,
Two-Dimensional Arrays, Matrices, Larger Dimensional Arrays, basics of searching and sorting.
Pointers: Concept of a Pointer, Initialization of pointer variables, pointers as function arguments, passing by address, Dangling memory, address arithmetic, character pointers and functions, pointers to pointers, Dynamic memory management functions, command line argu
.

UNIT-IV:

Functions & **Strings**:
Functions: Parameter Declarations, Returning a Value, Functions with Empty Parameter Lists, Variable Scope, Variable Storage Class, Local Variable Storage Classes, Global Variable Storage Classes, Pass by Reference, Passing Addresses to a Function, Storing Addresses, Using Addresses, Declaring and Using Pointers, Passing Addresses to a Function.
Case Study: Swapping Values, Recursion - Mathematical Recursion, Recursion versus Iteration.
Strings: String Fundamentals, String Input and Output, String Processing, Library Functions
Ments

UNIT-V:

Structures & Files:

Structures: Derived types, Structures declaration, Initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions,

Pointers to structures, self referential structures.

Unions, declaration, Initialization of Unions, difference between Structures and Unions-memory allocations, type def, bit-fields.

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

Text Books:

1. The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education.
2. Pointers in C by Yaswant Kanetkar.
3. C Programming-A Problem Solving Approach, Forouzan, Gilberg, Cengage

Reference Books:

1. Programming with C, Balguruswamy.
2. Programming in C, Reema Thareja, OXFORD.
3. C by Example, Noel Kalicharan, Cambridge.

I Year – I SEMESTER

L	T	P	C
4	1	0	3

COMPUTER ENGINEERING WORKSHOP LAB

Course Code: 20ES1L07

Common for CSE &CAD

Theory

Unit 1

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

Unit 2

Linux Operating System commands:

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

Unit 3

Networking and internet:

Networking Commands:

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

Unit 4

Audio players, recording using Mic, editing, podcast preparation

- video players, recording using webcam/camcorder, editing
- podcast, screencast, vodcast, webcasting

Practicals

1. Installation of Operating System Windows 10
2. Installation of Ubuntu 18.0.4 LTS
3. Dual OS installation Ubuntu on Windows 10
4. Installation of Adv Server Windows
5. Demonstration and practice on Microsoft Word, Power Point presentation, scanning, word to pdf. Creating email id
6. Demonstration and practice on Microsoft Excel.
7. Demonstration and practice on LaTeX and produce professional pdf documents.
8. Preparing paper, textbook certificate template using Latex

9. Cloud based productivity enhancement and collaboration tools: AWS
    - Store, sync, and share files with ease in the cloud using Google Drive
    - Document creation and editing text documents in your web browser using Google docs
    - Handle task lists, create project plans, analyze data with charts and filters using Google Sheets
    - Create pitch decks, project presentations, training modules using Google Slides
    - Manage event registrations, create quizzes, analyze responses using Google Forms o Build public sites, internal project hubs using Google Sites
    - Online collaboration through cross-platform support using Jamboard
    - Keep track of important events, sharing one's schedule, and create multiple calendars using Google Calenda
10. Virtual Machine setup:
    - Setting up and configuring a new Virtual Machine
    - Setting up and configuring an existing Virtual Machine
    - Exporting and packaging an existing Virtual Machine into a portable format
11. Network connectivity, RJ 45 clipping and color code.
12. Hardware repair Fault detection,
13. Formatting, software installation
14. VM Ware, antivirus installation updation and system maintenance.
15. Creating and maintaining Git hub account, Google form creation

ADDITIONAL EXPERIMENTS

1. Creating Blogs
2. Becoming Youtuber

Text Books:

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

References Books:

1) Essential Computer and IT Fundamentals for Engineering and Science Students,

   Dr.N.B.Vekateswarlu, S.Chand

e-Resources:

1) https://explorersposts.grc.nasa.gov/post631/2006-2007/computer_basics/ComputerPorts.doc
2) https://explorersposts.grc.nasa.gov/post631/2006-2007/bitsnbyte/Digital_Storage_Basics.doc
3) https://www.thegeekstuff.com/2009/07/linux-ls-command-examples

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB
(20ES1L01)

Section A: Electrical Engineering:

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

1. Verification of Kirchhoff's laws
2. Swinburne's test on D.C. Shunt machine (Predetermination of efficiency of a given D.C.Shunt machine working as motor and generator).
3. OC and SC tests on single phase transformer (Predetermination of efficiency for different loads).
4. Brake test on 3-phase Induction motor (Determination of performance characteristics)
5. Speed control of D.C. Shunt motor by a) Armature Voltage control b) Field flux control method
6. Brake test on D.C. Shunt Motor.

Section B: Electronics Engineering.

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

1. Identification of Resistor values using color coding
2. PN junction diode characteristics a) Forward bias b) Reverse bias (Cut in voltage and resistance calculations)
3. Half wave rectifier with and without filters.
4. Full wave rectifier with and without filters.
5. CE amplifiers.
6. OP- Amp applications (Inverting, Non inverting)

APPLIED CHEMISTRY LAB

Course code: 20BS1L03 (CSE&CAD)

L	T	P	C
-	-	2	1

COURSE OBJECTIVE: The purpose of the titration is the detection of the equivalence point at which chemically equivalent amount of the reactants have been mixed.

Outcomes: The students entering into the professional course have practically very little exposure to lab classes. The experiments introduce volumetric analysis; redox titrations with different indicators. EDTA titrations; then they are exposed to a few instrumental methods of chemical analysis. Thus at the end of lab course, the student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.

Experiments

1. Introduction to chemistry laboratory-Molarity,Normality,primary,secondary standard solutions, Volumatric titrations,Qualitative analysis,Quantitative analysis etc.

2. Determination of alkalinity of a sample containing Na_2CO_3 and $NaHCO_3$.

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

4. Determination of Ferrous iron using standard $K_2Cr_2O_7$ solution.

5. Determination of Copper Using standard $K_2Cr_2O_7$ solution.

6. Determination of temporary and permanent hardness of water using standard EDTA solution.

7. Determination of copper using standard EDTA solution.

8. Determination of pH of the given sample solution using pH meter.

9. Conductomeric titration between strong acid and strong base.

10. Conductomeric titration between strong acid and weak base.

11. Determination of zinc using standard EDTA solution.

12. Potentiometric titration between strong acid and strong base.

13. To determine available chlorine in bleaching powder.

14. Preparing a Printed Circuit Board using Ferric Chloride Solution.

I Year - I Semester

L	T	P	C
0	0	2	1

PROGRAMMING FOR PROBLEM SOLVING 1 LAB

Course Code:20ES1L08

Common for CSE &CAD

COURSE OBJECTIVES:

Exercise - 1

a) Demonstrate basic Linux command to write C program , compile and Run
b) Write a program to print your details
c) Write a program for addition, subtraction, multiplication and division

Exercise - 2

a) Write a C Program to convert Celsius to Fahrenheit and vice versa
b) Calculate simple and compound Interest

Exercise - 3 Control Flow - I

a) Write a C Program to Find Whether the Given Year is a Leap Year or not.
b) Write a C Program to decide a number is even or odd

Exercise – 4 Control Flow - II

a) Write a C Program to Find Whether the Given Number is Prime Number Armstrong Number
b) Write a C program to print Floyd Triangle
c) Write a C Program to print Pascal Triangle

Exercise – 5 Control Flow - III

a) Write a C Program to make a simple Calculator to Add, Subtract, Multiply or Divide Using switch…case
b) Write a C Program to grade a student based on his percentage.

Exercise – 6 Functions

a) Write a C Program demonstrating of parameter passing in Functions and returning values.
b) Write a C Program illustrating Fibonacci, Factorial with Recursion without Recursion
c) Write a C Program FOR Towers of Hanoi

Exercise – 7 Arrays

Demonstration of arrays
a) Search-Linear.
b) Sorting-Bubble, Selection.
c) Operations on Matrix.

Exercise – 8 Strings

a) Implementation of string manipulation operations **with** library function.
i) Copy ,
ii) concatenate

iii) length
iv) compare

b) Implementation of string manipulation operations **without** library function.

i) copy
ii) concatenate
iii) length
iv) compare

Exercise – 9 Arrays and Pointers

a) Write a C Program to Access Elements of an Array Using Pointer
b) Write a C Program to find the sum of numbers with arrays and pointers

Exercises - 10 Structures

a) Write a C Program to Store Information of a Book Using Structure
b) Write a C Program to Store Information Using Structures with Dynamically Memory Allocation
c) Write a C Program to Add Two Complex Numbers by Passing Structure to a Function

Exercise – 11 Unions

a) Write a C Program to print the student details by using Unions
b) Write a C Program to demonstrate bit fields

Exercise – 12 Dynamic Memory Allocations

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

b) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc () function. Understand the difference between the above two programs

Exercise -13 Files

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

Exercise - 14 Files Continued

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

PBS

1. Write a C Program to convert decimal to binary and hex (using switch call function the function)
2. Write a C program using self referential structures

I Year II Semester

ENGLISH – I (20HS2T01)
(Common to all branches)

L	T	P	C
2	-	-	2

Introduction

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training the students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competence of the students of Engineering.

As far as the detailed textbooks are concerned, the focus should be on the skills of listening, speaking, reading and writing. The non-detailed textbook is meant for extensive reading for pleasure and profit. Thus the stress in the syllabus is primarily on the development of communicative skills and fostering of ideas.

Course Objectives:

COB 1: To improve the language proficiency of the students in English with emphasis on LSRW skills.

COB 2: To enable the students to study and comprehend the prescribed lessons and subjects more effectively relating to their theoretical and practical components.

COB 3: To develop the communication skills of the students in both formal and informal situations.

COB 4: To develop the ways to overcome fear and use of words for irony.

COB 5: To make the learners understand the development conditions and the core competences of the State of prioritize education system.

COB 6: To discuss that water is the world's most precious natural resources.

COB 7: To discuss how human sensitivity changes in accordance to times and situations in life.

COB 8: To inform the learner that all men can come together to abolish the war.

LISTENING SKILLS:

Objectives:

1. To enable the students to appreciate the role of listening skill and improve their pronunciation.
2. To enable the students to comprehend the speech of people belonging to different backgrounds and regions.
3. To enable the students to listen for general content, to fill up information and for specific information.

SPEAKING SKILLS:

Objectives:

1. To make the students aware of the importance of speaking for their personal and professional

communication.
2. To enable the students to express themselves fluently and accurately in social and professional success.
3. To help the students describe objects, situations and people.
4. To make the students participate in group activities like role-plays, discussions and debates.
5. To make the students participate in just a minute talks.

READING SKILLS:

Objectives:
1. To enable the students to comprehend a text through silent reading.
2. To enable the students to guess the meanings of words, messages and inferences of texts in given contexts.
3. To enable the students to skim and scan a text.
4. To enable the students to identify the topic sentence.
5. To enable the students to identify discourse features.
6. To enable the students to make intensive and extensive reading.

WRITING SKILLS:

Objectives:
1. To make the students understand that writing is an exact formal skills.
2. To enable the students to write sentences, paragraphs, e-mails and essays.
3. To make the students identify and use appropriate vocabulary.
4. To enable the students to narrate and describe.
5. To enable the students to write coherently and cohesively.

Course Outcomes:

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

CO 1: Identify the ways to overcome fear and use of words for irony.
CO 2: Interpret the development conditions and the core competences of the state to prioritize education system.
CO 3: Analyze water as the world's most precious natural resources.
CO 4: Illustrate human sensitivity to the changing times and situations in life.
CO 5: Predict that war causes destruction and calling for peace establishment.
CO 6: Illustrate biographies for motivating readers and strengthening communicative grammar skills

Methodology:

1. The class is to be learner-centred where the learners are to read the texts to get a comprehensive idea of those texts on their own with the help of the peer group and the teacher.
2. Integrated skill development methodology has to be adopted with focus on individual language skills as per the tasks/exercise.
3. The tasks/exercises at the end of each unit should be completed by the learners only and the teacher intervention is permitted as per the complexity of the task/exercise.
4. The teacher is expected to use supplementary material wherever necessary and also generate activities/tasks as per the requirement.
5. The teacher is permitted to use lecture method when a completely new concept is introduced in the class.

Recommended Topics:

UNIT-I:

1. AN ASTROLOGERS'S DAY - R.K. NARAYAN (Detailed)

2. G.D. NAIDU (Non-Detailed)

UNIT-II:

1. BUILDING A NEW STATE - A. P. J. ABDUL KALAM (Detailed)

2. G.R. GOPINATH (Non-Detailed)

UNIT-III:

1. WATER: THE ELIXER OF LIFE- C. V. RAMAN (Detailed)

2. SUDHA MURTHY (Non-Detailed)

UNIT-IV:

1. THE WOODROSE-ABBURI CHAYA DEVI (Detailed)

2. JAGADIS CHANDRA BOSE (Non-Detailed)

UNIT-V:

1. PROGRESS- ST. JOHN ERVINE (Detailed)

2. HOMI JEHANGIR BHABHA(Non-Detailed)

Textbooks:

Detailed Text Book: **USING ENGLISH** by Orient Black Swan.

Non-Detailed Text Book: **Trailblazers** by Orient black Swan.

INTEGRAL TRANSFORMS AND CALCULAS

(Common to all Branches)

Subject code: 20BS2T02

L	T	P	C
3	0	0	3

Course Objectives:

COB 1: To equip the students with the necessary mathematical skills and techniques those are Essential for an engineering course.
COB 2: To help the students acquire a necessary base of Multiple Integrals.
COB 3: Making the student capable of creating vector differentiation and integration for real life Situation.

Course Outcomes:

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

CO 1: Apply the Laplace transform for solving differential equations.(L3)
CO 2: Determine Fourier series, Fourier Transforms of the given functions.(L3)
CO 3: Compute the Z- transforms for certain functions and apply the properties of Z- transforms to solve difference equations.()
CO 4: Apply multiple integrals to find area, volume center of mass, center of gravity of given Region/object. (L3)
CO 5: Assess the information with their identities regarding physical perception by Gradient, divergence and curl. (L5)
CO 6: Evaluate integrals of function or vector related quantities over curves, surfaces, and domains in two- and three – dimensional space.(L5)

UNIT I: - Laplace transforms

Laplace transforms of standard functions-Shifting theorems - Transforms of derivatives and integrals – Unit step function –Dirac's delta function- Inverse Laplace transforms– Convolution theorem (with out proof). ROC of Laplace transforms

Applications: Solving ordinary differential equations (initial value problems) using Laplace transforms.

Unit II:- Fourier series and Fourier Transforms

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

Fourier Transforms: Fourier integral theorem (without proof) – Fourier sine and cosine integrals – Fourier Sine and cosine transforms – Properties – inverse transforms – Finite Fourier transforms. Convolution Theorem (with out proof).

UNIT III:- Z-transforms

Z-transform – properties – Damping rule – Shifting rule – Initial and final value theorems -Inverse z- transform - Convolution theorem(with out proof) – Solution of difference equation by z-transforms. ROC of Z-transforms

UNIT IV: Multiple Integrals:

Evaluation of Double Integrals (Cartesian and polar coordinates)-change of order of integration (only Cartesian form)-Evaluation of Triple Integrals-Change of variables (Cartesian to polar) for double integrals only.

Applications: Finding Areas and Volumes.

Unit V:- Vector Differentiation& Vector Integration

Line, Surface and volume integrals, Vector integral theorems: Green's-Gauss divergence-Stokes Theorem (statements only) and related problems.
Gradient- Divergence- Curl - Laplacian and second order operators -Vector identities.
Applications: Potential surfaces
Vector Integration

Line, Surface and volume integrals, Vector integral theorems: Green's-Gauss divergence-Stokes Theorem (statements only) and related problems.
Applications: work done by force.

Text Books:

1. **B. S. Grewal**, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2. **Dr T K V Iyengar**, **Dr B.Krishna Gandhi**, **S.Ranhanatham** and Dr. **M.V.S.S.N Prasad**, Engineering Mathematics, S.Chand & Company Ltd.
3. **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. **Dean. G. Duffy**, Advanced Engineering Mathematics with MATLAB, 3rd Edition, CRC Press.
3. **Peter O' Neil**, Advanced Engineering Mathematics, Cengage.
4. **N.P.Bali & Manish Goyal**, A Text book of Engineering Mathematics, Lakshmi Publications.

L	T	P	C
1	0	4	3

ENGINEERING DRAWING
(Common to EEE, ECE, CSE & CAD)

Course Objectives:

COB1: To provide basic concepts in engineering drawing
COB2: To impart knowledge about standard principles of orthographic projections of objects
COB3: To visualize and represent the pictorial views with proper dimensioning and scaling

Course Outcomes:

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

CO1: Construct polygons and engineering curves
CO2: Draw orthographic projections of points and lines inclined to one reference plane
CO3: Draw projections lines inclined to both the reference planes and traces
CO4: Draw projections of planes
CO5: Draw projections of solids
CO6: Convert the isometric views to orthographic views and vice-versa

UNIT I

Objective: To introduce the students to use drawing instruments and to draw polygons, Engg. curves and scales.

Lines, Lettering and Dimensioning: Types of lines, Lettering, Dimensioning

Polygons: Constructing regular polygons by general methods, inscribing and describing polygons on circles.

Curves: Parabola, Ellipse and Hyperbola by general methods, cycloids, involutes, tangents & normals for the curves.

UNIT II

Objective: To introduce orthographic projections, projections of points & Line inclined both the planes

Orthographic Projections: Horizontal plane, vertical plane, profile plane, importance of reference lines, projections of points in various quadrants, projections of line inclined to one plane and both the planes, determination of true lengths, angles of inclination

UNIT-III

Objective: The objective is to make the students draw the projections of the various types of Planes in different simple positions and inclined to one plane and both the planes.

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

UNIT IV

Objective: The objective is to make the students draw the projections of the various types of solids in different simple positions and inclined to one plane.

Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to both the Planes.

UNIT V

Objective: The objective is to represent the object in 3D view through isometric views and convert the isometric view to orthographic view and vice versa.

Principles of Isometric Projections - Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple Solids, Conversion of Isometric Views to Orthographic Views and Vice-versa

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Engineering Drawing, K. Venugopal, V. Prabhu Raja and G. Sreekanjana, New Age International Publications
2. Engineering Drawing, K.L.Narayana & P. Kannaiah, SciTech Publishers.
3. Engineering Drawing, Dhananjay V. Jolhe, Tata McGraw Hill Publishers
4. Engineering Graphics for Degree, K.C. John, PHI Publishers.

APPLIED PHYSICS

(common to ECE,EEE, CSE CAD)

Course Code : 20BS2T05

L	T	P	C
3	0	0	3

Objective

The objective of this course is to develop scientific temper and analytical capability through learning physical concepts and their applications in science and technology.

Course Outcomes:

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

CO 1- Understand the principles of interference and diffraction to design and enhance the resolving Power of various optical instruments.(BL2)
CO 2 - Understand the basics of modern technologies in lasers and optical fibers and their applications in Various fields.(BL2)
CO 3 - Identify the magnetic and dielectric materials from their basic behavior and Learn their applications.(BL3)
CO 4 - Summarise the basic concepts of Quantum Theory.(BL2)
CO 5 - Interpret the effects of temperature on Fermi Dirac distribution function and classification of Solids based on band theory (BL5)
CO 6 - Analyze the principles of carrier concentration in semiconductors.(BL4)

UNIT I Wave Optics 8 hrs

Interference: Introduction- Principle of superposition –Interference of light -Interference in thin films (Reflection Geometry) -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) –Rayleigh criterion for resolving power-Diffraction Grating -Resolving power of Grating(Qualitative)-Introduction to polarization.

Unit II Lasers & Fiber Optics 10 hrs

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

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

Unit III Dielectric & Magnetic Materials 8 hrs

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-Piezoelectricity.

Magnetic Materials :Introduction -Magnetic dipole moment -Magnetization-Magnetic susceptibility and permeability -Origin of permanent magnetic moment –Classification of magnetic materials: Dia, para, Ferro, antiferro & Ferrimagnetic materials -Domain concept for Ferromagnetism & Domain walls (Qualitative) -Hysteresis -soft and hard magnetic materials-Eddy currents-Engineering applications.

Unit IV Quantum Mechanics& Free Electron Theory 5 hrs

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

Free Electron Theory: Classical free electron theory (Qualitative with discussion of merits and demerits) –Quantum free electron theory–Equation for electrical conductivity based on quantum free electron theory-Fermi-Dirac distribution-Density of states (3D) -Fermi energy.

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

UNIT V: Band theory of Solids& Semiconductor Physics **9 hrs**

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

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

Textbooks

1. **Pillai, S. O**., Solid State Physics,5th edition, New Age International (P) Ltd., New Delhi,2004.
2. Solid State Physics by **A.J. Dekker** (Mc Millan India Ltd).
3. Principles of electronics by **V.K Mehta** S .Chand Publishers.
4. Applied Physics' by **MN Avadhanulu** & **TVS Arun Murthy** (S.CHAND).
5. **RK Gaur** & **SL Gupta**, Engineering physics , Dhanapati rai publications.
6. **Applied Physics by palanasamy (Scitech publications)**

References

1. Engineering Physics' by **Sanjay D Jain** and **Girish G Sahasrabudhe** (University Press),
2. Engineering Physics' by **Mani Naidu S** (Pearson Publications)).
3. Applied Physics' by **T. Bhimasankaram** (BSP BH Publications)).
4. Physics' by **Palanisamy** (Scitech Publishers)
5. Engineering Physics' by **B.K.Pandey** & **S. Chaturvedi** (Cengage Learning)

I Year – II SEMESTER

L	T	P	C
3	0	0	3

PROGRAMMING FOR PROBLEM SOLVING 2

Course Code:20ES2T06

Common for CSE &CAD

Course Objectives:

UNIT I:

Data structure-Definition, types of data structures
Recursion: Definition, Design Methodology and Implementation of recursive algorithms, Linear and binary recursion, recursive algorithms for factorial function, GAD computation, Fibonacci sequence, Towers of Hanoi, Tail recursion List Searches using Linear Search, Binary Search, Fibonacci Search
Sorting Techniques: Basic concepts, Sorting by:
Insertion sort, selection-heap sort, exchange-bubble sort, quick sort, distribution-radix sort and merging-merge sort Algorithms.

UNIT II:

Stacks and Queues: Basic Stack Operations, Representation of a Stack using Arrays, Stack Applications: Reversing list, Factorial Calculation, Infix to postfix Transformation, Evaluating Arithmetic Expressions.
Queues: Basic Queues Operations, Representation of a Queue using array, Implementation of Queue Operations using Stack, Queues.
Applications of Queues-Round robin Algorithm, Circular Queues, Priority Queues

UNIT III:

Linked Lists: Introduction, single linked list, representation of a linked list in memory, Operations on a single linked list, Reversing a single linked list, applications of single linked list to represent polynomial expressions and sparse matrix manipulation, Advantages and disadvantages of single linked list, Double linked list, Circular linked list.

UNIT IV:

Trees: Basic tree concepts, Binary Trees: Properties, Representation of Binary Trees using arrays and linked lists, operations on a Binary tree, Binary Tree Traversals (recursive), Creation of binary tree from inorder , preorder and post order traversals

Advanced concepts of Trees: Tree Traversal using stack (**non recursive**), Threaded Binary Trees. Binary search tree, Basic concepts, BST operations: insertion, deletion, balanced binary trees–need, basics and applications in computer science (No operations).

UNIT V:

Graphs: Basic concepts, Representations of Graphs: using Linked list and adjacency matrix, Graph

algorithms Graph Traversals (**BFS & DFS**), applications: Dijkstra's shortest path, Transitive closure, Minimum Spanning Tree using Prim's Algorithm, Warshall's Algorithm (**Algorithmic Concepts Only, No Programs required**).

TEXTBOOKS:

1. Data Structure with C, Seymour Lipschutz, TMH
2. DataStructures,2/e, Richard F, Gilberg, Forouzan, Aengage
3. C & Data structures 5th Edn. by Balagurusamy
4. Data Structures using C, Reema Thareja, Oxford

Reference Book

1. Data Structures and Algorithm Analysis in C,2nded, Mark Allenweiss

APPLIED PHYSICS LAB
(Common to ECE,EEE, CSE,CAD)

Course Code: 20BS1L01(ECE,EEE) **L T P C**
20BS2L01(CSE,CAD) **0 0 3 1.5**

Objective: To train the Engineering students to handle instruments and their design methods to improve the accuracy of measurements.
Outcome: Physics lab curriculum gives fundamental understanding of design of an instrument with targeted accuracy for physical measurements.

APPLIED PHYSICS LAB

(Any 10 of the following listed 15 experiments)

- 8 experiments to be performed in regular mode
- 2 experiments to be performed in online mode (virtual lab)

List of Experiments:

1. Determination of wavelength of a source-Diffraction Grating-Normal incidence
2. Newton's rings –Radius of Curvature of Plano convex Lens.
3. Determination of Acceleration due to Gravity and Radius of Gyration- Compound Pendulum
4. Energy Band gap of a Semiconductor p - n junction diode
5. Study of LED I/V Characteristics
6. I/V characteristics of Photodiode
7. Determination of Planck's constant using photocell
8. Determine the rigidity modulus of a material – Torsional pendulum
9. Thermistor characteristics – Temperature Coefficient
10. Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus
11. Study the variation of B versus H by magnetizing the magnetic material(B-H curve)
12. Verification of the laws of vibrations in stretched stings - Sonometer.
13. Determine the time constant for R-C circuit.
14. Determination of Hall voltage and Hall coefficients of a given semiconductor using Hall effect
15. Study of I/V Characteristics of Semiconductor p - n junction diode.

REFERENCES:

1. Engineering Physics Lab Manual by Dr.Y. Aparna & Dr.K.Venkateswarao (V.G.S.Book links)
2. Physics practical manual, Lorven Publications.

Web link:

URL: www.vlab.amrita.edu/index.php

I Year – II SEMESTER

L T P C

0 0 2 1

PROGRAMMING FOR PROBLEM SOLVING 2 LABORATORY

Course Code:20ES2L09

Common for CSE &CAD

Exercise1:

Write recursive program which computes the n^{th} Fibonacci number, for appropriate values of n. Analyze behavior of the program obtain the frequency count of the statement for various values of n.

Exercise2:

Write recursive program for the following

a) Write recursive and non recursive C program for calculation of Factorial of an integer
b) Write recursive and non recursive C program for calculation of GAD(n, m)
c) Write recursive and non recursive C program for Towers of Hanoi: N disks are to be transferred from peg S to peg D with Peg I as the intermediate peg.

Exercise3:

a) Write C program that use both recursive and non recursive functions to perform Linear search for a Key value in a given list.
b) Write C program that use both recursive and non recursive functions to perform Binary search for a Key value in a given list.
c) Write C program that use both recursive and non recursive functions to perform Fibonacci search for a Key value in a given list.

Exercise4:

a) Write C program that implement Bubble sort, to sort a given list of integers in ascending order
b) Write C program that implement Quick sort, to sort a given list of integers in ascending order
c) Write C program that implement Insertion sort, to sort a given list of integers in ascending order

Exercise5:

a) Write C program that implement heap sort ,to sort a given list of integers in ascending order
b) Write C program that implement radix sort, to sort a given list of integers in ascending order
c) Write C program that implement merge sort, to sort a given list of integers in ascending order

Exercise6:

a) Write C program that implement stack(its operations)using arrays
b) Write C program that implement stack(its operations)using Linked list

Exercise7:

a) Write a C program that uses Stack operations to convert infix expression into postfix expression
a) Write C program that implement Queue (its operations) using arrays.
b) Write C program that implement Queue(its operations)using linked lists

Exercise8:

a) Write a C program that uses functions to create a singly linked list
b) Write a C program that uses functions to perform insertion operation on a singly linked list
c) Write a C program that uses functions to perform deletion operation on a singly linked list

Exercise9:

a) Adding two large integers which are represented in linked list fashion.
b) Write a C program to reverse elements of a single linked list.
c) Write a C program to store a polynomial expression in memory using linked list
d) Write a C program to representation the given sparse matrix using arrays.
e) Write a C program to representation the given sparse matrix using linked list

Exercise10:

a) Write a C program to Create a Binary Tree of integers
b) Write a recursive C program for traversing a binary tree in preorder, in order and post order.
c) Write a non recursive C program for traversing a binary tree in preorder, in order and post order.
d) Program to check balance property of a tree.

Exercise11:

a) Write a C program to create a BST
b) Write a C program to insert an ode in to a BST.
c) Write a C program to delete an ode from a BST.

(Common to all branches)

Course Code 20HS1L01 (EEE & ECE)
20HS2LO1 (CIV, MECH, CSE &CAD)

L	T	P	C
-	-	2	1.5

OUT COMES

Co.1. Prepare the learners to improve speech production and confidence levels avoiding stage fright.

Co.2. Build the ability of qualifying IELTS, TOFEL, GRE and the other competitive exams.

Co.3. Develop the technical and professional skills in writing emerged to corporate needs.

Co.4. Apply to use the language devices and connectors while writing and speaking.

Co.5. Generate the interest among the learners to read all texts intensively and extensively.

Co.6. Identify the different speeches in life through active and focused listening.

SYLLABUS

Unit I: Communication Skills

- **a.** Body Language
- **b.** JAM
- **c.** Introduce yourself
- **d.** Role-play

Unit. II: Vocabulary Development

a. Synonyms and Antonyms
b. Cloze Test
c. Interchange of Words
d. Sentence Matching
e. One Word Substitutions
f. Commonly Confused Words
g. Verbal Analogy
h. Sentence Fillers
i. Idioms & Phrases

Unit III: Writing Strategies

a. Paragraph Writing
b. Report Writing
b. Essay Writing and Picture composition
c. Letter Writing: Business Letters,
d. Job Application Letters: Opening, Body and Closing
e. Resume Design and Parts of a Resume
f. E-mail Writing

Unit IV: Communicative Grammar

a. Error Identification/ Error Location
b. Sentence Improvement
c. Identifying Correct Alternative
d. Incomplete Sentence
e. Para Jumbles
f. Phrase/Connectors (Starters)

Unit V: Reading Comprehension

a. Reading Process
b. Reading Strategies
c. Tips to Answering Questions

Unit VI: Listening Skills

a. Listening to audio lectures/stories/biographies
b. Listening to announcements/Radio

Lab Software: Globarena Technologies Ltd.,

Prescribed Text Books:

1.**Communicative English for Engineers and Professionals** by Nitin Bhatnagar & Mamata Bhatnagar, Pearson Publications, 2010, New Delhi
2. **English for Technical Communication for Engineering students**, Aysha Vishwamohan, TataMc Graw Hill, 2009
3. **Effective Technical Communication** by M.A. Sharif Rizvi, Tata MacGrawhill, 2005, New Delhi
4. **Soft Skills – Key to Success in workplace and life** by Meenakshi Raman & Shalini Upadhayay; Cengage Publications

Reference Books:

1. Business Communication by Meenakshi Raman (II edition), Oxford Publications.

2. Technical Communication Principles and Practice. Raman, Meenakshi and Sharma, Sangeeta Third Edition. New Delhi: Oxford University Press. 2015. Print.

3. Technical Communication by Meenakshi Raman & Sangeetha Sarma, OU Press, 3 rd edition, 2014

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DETAILED SYLLABUS FOR

UG: B.Tech CSE

II Year – I SEMESTER

S.No	Course Code	Courses	L	T	P	Credits
1	20BS3T03	Probability and Statistics	3	0	0	3
2	20CS3T02	Unified Modeling Language & DP	3	0	0	3
3	20CS3T03	Advanced Data Structure	3	0	0	3
4	20ES3T04	Python Programming	3	0	0	3
5	20CS3T05	Digital Logic Design	3	0	0	3
6	20CS3L06	Advanced Data Structure Lab	0	0	3	1.5
7	20ES3L07	Python & R Programming Lab	0	0	3	1.5
8	20CS3L08	Unified Modeling Language & DP Lab	0	0	3	1.5
9	20CS3S01	Employability Skills (Java Script/JSON)	1	0	2	2
MC	20BS3M03	*Environmental Science	2	0	0	0
		Total	21	0	8	21.5

II Year – II SEMESTER

S.No	Course Code	Courses	L	T	P	Credits
1	20BS4T04	Numerical Methods and Complex Variables	3	0	0	3
2	20CS4T06	Java Programming	3	0	0	3
3	20HS4T02	Managerial Economics and Financial Analysis	3	0	0	3
4	20CS4T07	Operating Systems	3	0	0	3
5	20CS4T08	Mathematical Foundations of Computer Science	3	0	0	3
6	20CS4L07	Java Programming Lab	0	0	3	1.5
7	20CS4L09	Operating System Lab	0	0	3	1.5
8	20CS4L10	UNIX Lab	0	0	3	1.5
9	20CS4S02	Skill Oriented Course - Mongo Data Base	1	0	2	2
		Total	16	0	11	21.5

II Year - I Semester

L T P C 3 0 0 3

PROBABILITY AND STATISTICS
(Common to all Branches)

Subject code: 20BS3T03

Course Objectives:

COB 1: Know the importance of usage of Probability and Statistics.
COB 2: To help the students acquire a necessary base of Correlation, Quality Checking.
COB 3**:** Use R for statistical programming, computation, graphics, and modeling

Course Outcomes:

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

CO 1: Use the knowledge of Probability and Statistics in various situations. (L3)
CO 2: Analyze the concepts, Random variables and Probability distributions. (L4)
CO 3: Measure Correlation between variables and obtain lines of regression. (L5)
CO 4: Design quality control charts for quality checking. (L6)
CO 5: Use R for statistical programming, computation, graphics, and modeling. (L3)
CO 6: Classify Functions and use R in an efficient way. (L4)

UNIT I:-Introduction to Probability and Statistics

Probability-Addition law of Probability-Independent Events-Conditional Probability-Bayes Theorem (with out proof).

Statistics-Measures of Central Tendency-mean, mode, median, Measures of Dispersion-Variance, standard deviation, Skewness, Kurtosis.

UNIT II:-Random variables and Distributions

Introduction- Random variables- Distribution function- Discrete distributions (Binomial and Poisson distributions only) Continuous distributions: Normal, Normal approximation to Binomial distribution, Gamma and Weibull distributions.

UNIT III: - Curve fitting and Correlation

Introduction - Fitting a straight line –Second degree curve-exponential curve - power curve by method of least squares, Simple Correlation and Regression

UNIT IV: - Statistical Quality Control Methods

Introduction - Methods for preparing control charts – Problems using $\overline{x}$, p, R charts and attribute charts

UNIT V: - Introduction of R

Basic Math, Variables, Data Types, Vectors, Arrays , Lists, Data Frames Matrices, , Classes**.** R Programming Structures, Control Statements, Loops, - Looping Over Non vector Sets,If-Else, Arithmetic and Boolean Operators and values.
Math Function Extended Example Functions Sorting, Linear Algebra Operation on Vectors and Matrices. Graphics, Creating Graphs, Histogram, the plot() Function –Customizing Graphs, Saving Graphs to Files. Regression. Create R

Pie, Bar Charts using R, Create Histogram and Line graph, Calculate mean, median and mode using R Analyze Linear Regression using R.

Text Books:

1. **B.S.GREWAL,** Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2. **N.P.Bali**, Engineering Mathematics, Lakshmi Publications.
3. Probability and Statistics, **Dr T K V Iyengar**, **Dr B.Krishna Gandhi**, **S.Ranhanatham** and Dr. **M.V.S.S.N Prasad**, S.Chand & Company Ltd.
4. The Art of R Programming, **Norman Matloff**, Cengage Learning
5. R for Everyone, **Lander**, Pearson

Reference Books:

1. Fundamentals of Mathematical Statistics, **S.C .Gupta , V.K .Kapoor**, S.Chand & Company Ltd
2. **B.V.Ramana**, Engineering Mathematics: 4th Edition, Tata McGraw Hill, 2009, New Delhi
3. **ERWIN KREYSZIG,** Advanced Engineering Mathematics, 10th Edition, Wiley-India
4. R Cookbook, **PaulTeetor, Oreilly**.
5. R in Action, **Rob Kabacoff**, Manning

II Year – I SEMESTER

L	T	P	C
3	0	0	3

PYTHON PROGRAMMING

Course Code:20ES3T04

Course Objectives:

- This course introduces core programming basics—including data types, control structures, program design with functions—via the Python programming language.
- The course discusses the fundamental principles of Object-Oriented Programming, as well as in-depth data and information processing techniques.
- Students will solve problems, explore real-world software development challenges, and create practical and contemporary applications.

UNIT I:

OVERVIEW: History of Python, Python Feature, Installing Python, Setting up PATH, Setting path at Unix/Linux, Setting path at Windows, Running Python scripts

BASIC SYNTAX: First Python Program, Python Identifiers, Python Keywords, Lines and Indentation, Multi-Line Statements, Quotation in Python

UNIT II:

VARIABLE TYPES: Assigning Values to Variables, Multiple Assignment, Standard Data Types, Data Type Conversion

BASIC OPERATORS: Types of Operators, Python Arithmetic Operators, Python Comparison Operators, Python Assignment Operators, Python Bitwise Operators, Python Logical Operators, Python Membership Operators , Python Identity Operators, Python Operators Precedence

UNIT III:

DECISION MAKING: If Statement, If…else Statement, The *elif* Statement

LOOPS: While Loop, The Infinite Loop, Using else Statement with Loops, For Loop, Iterating by Sequence Index, Using else Statement with Loops, Nested Loops.

Loop Control Statements: Break Statement, Continue Statement, Pass Statement

UNIT IV:

Data Structures: Lists - Operations, Slicing, Methods; Tuples, Sets, Dictionaries, Strings and Comprehensions.

UNIT V:

FUNCTIONS: Defining a Function, Calling a Function, Passing by Reference versus Passing by Value, Function Arguments, Required Arguments, Keyword Arguments, Default Arguments, Variable Length Arguments, The Anonymous Functions, The return Statement, Scope of Variables, Global vs. Local variables

CLASSES AND OBJECTS: Overview of OOP Terminology, Creating Classes, Creating Instance Objects, Accessing Attributes, Built-In Class Attributes, Destroying Objects (Garbage Collection), Class Inheritance

OUTCOMES:

- Master an understanding of scripting and the contributions of scripting languages.
- Master an understanding of Python especially the object oriented concepts.
- Master an understanding of the built-in objects of python
- Experience with an interpreted Language.
- To build software for real needs.

TEXT BOOKS:

1. Python Programming, A Modern approach vamsi kurama, Pearson
2. Python Programming by Reema Thereja 1st Edition by OXFORD
3. Python Programming, Ashok Namdev Kamthane, Amit Ashok Kamthane.

REFERENCE BOOK:

1. Python Programming, CH Satyanaraya, M Radhika Mani, B N Jagadeesh
2. Fundamentals of Python, KENNETH A.LAMBERT, B L JUNEJA
3. Python Programming, K Nageswara Rao, Shaik Akbar

II Year – I SEMESTER

L	T	P	C
3	0	0	3

DIGITAL LOGIC DESIGN

Course Code:20CS3T05

OBJECTIVE:

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

UNIT I:

Number Systems

Binary, Octal, Decimal, Hexadecimal Number Systems. Conversion of Numbers From One Radix To Another Radix,r's Complement and(r-1)'s Complement Subtraction of Unsigned Numbers, Problems, Signed Binary Numbers, Weighted and Non weighted codes

UNITII:

Logic Gates and Boolean Algebra

Basic Gates NOT, AND, OR, Boolean Theorems, Complement And Dual of Logical Expressions, Universal Gates, Ex-Or And Ex-or Gates, SOP, POS, Minimizations of Logic Functions Using Boolean Theorems.

UNIT III:

Gate Level Minimization: Karnaugh Map Method (K-Map): Minimization of Boolean Functions maximum up to Four Variables, POS and SOP, Simplifications withDon't care conditions Using K-Map, NAND and NOR Implementation.

UNIT IV:

Combinational Logic Circuits

Design of Half Adder, Full Adder, Half Subtractor, Full Subtractor, Ripple Adders and Subtractor, Design of Decoders, Encoders, Multiplexers, Priority Encoder, Code Converters.

UNIT V:

Introduction to Sequential Logic Circuits

Classification of Sequential Circuits, Basic Sequential Logic Circuits: Latch and Flip-Flop, RS-Latch Using NAND and NOR Gates, Truth Tables. RS, JK, T and D FlipFlops, Truth and Excitation Tables, Conversion of FlipFlops. FlipFlops with Asynchronous Inputs (Preset and Clear).

Registers and Counters

Design of Registers, Buffer Register, Control Buffer Registers, Bidirectional Shift Registers, Universal Shift Register, Design of Ripple Counters, Ring Counter, Johnson Counter.

OUTCOMES:

- A student who successfully fulfills the course requirements will have demonstrated:
- An ability to define different number systems, binary addition and subtraction, 2's complement representation and operations with this representation.
- An ability to understand the different switching algebra theorems and apply them for logic functions.
- An ability to define the Karnaugh map for a few variables and perform an algorithmic reduction of logic functions.
- An ability to define the other minimization methods for any number of variables Variable Entered Mapping (VEM) and Quine-MeCluskey (QM) Techniques and perform an algorithmic reduction of logic functions.

TEXT BOOKS:

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

REFERENCE BOOKS:

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

II Year – I SEMESTER

L	T	P	C
0	0	3	1.5

PYTHON PROGRAMMING LAB: 20ES3L07

Python Programming

Week 1

Exercise 1 – Basics of Python Programming

a) Running instructions in Interactive interpreter and a Python Script

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

Exercise 2 - Operations

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

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

Week 2

Exercise - 3 Control Flow

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

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

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

d) Write a program using a while loop that asks the user for a number, and prints a count down from that number to zero.

Exercise 4 - Control Flow - Continued

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

Each new term in the Fibonacci sequence is generated by adding the previous two terms. By starting with 1 and 2, the first 10 terms will be: 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, .

b) By considering the terms in the Fibonacci sequence whose values do not exceed four million, find the sum of the even-valued terms.

Exercise - 5 - DS

a) Write a program to count the numbers of characters in the string and store them in a dictionary data structure

b) Write a program to use split and join methods in the string and trace a birthday with a dictionary data structure.

Exercise - 6 Files

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

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

Exercise - 7 Functions

a) Write a function ball collide that takes two balls as parameters and computes if they are colliding. Your function should return a Boolean representing whether or not the balls are colliding.

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

Exercise - 8 Functions - Continued

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

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

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

II Year – I SEMESTER

L	T	P	C
0	0	3	1.5

R-programming Laboratory (20CS3L08)

Week 1: Overview of R, R data types and objects, reading and writing data
Week 2: Control structures, functions, scoping rules, dates and times
Week 3: Loop functions, debugging tools
Week 4: R vector, matrix, arrays
Week 5: R Charts, graphs, histogram, Simulation, code profiling

1. Install and run R Program on RScript
2. Create vector. List, Array , matrix using R
3. Factor, Data Frames in R
4. Variable assignment in R Finding variable and removing them
5. Arithmetic Operators
6. R Decision making and Loop
7. Functions in R
8. Create, access and manipulate vector in R
9. Create, access and manipulate List in R
10. Create, access and make Matrix computations in R
11. Create, access and manipulate Array in R
12. Create R Pie, Bar Charts using R
13. Create Histogram and Line graph
14. Calculate mean, median and mode using R
15. Analyze Linear Regression using R

II Year – I SEMESTER

L	T	P	C
1	0	2	2

EMPLOYABILITY SKILLS

Course Code: 20CS3S01

Unit I

An introduction: An Introduction to JavaScript,Code editors, Developer console JavaScript Fundamentals: Hello, world!, Code structure, Variables, Data types, Interaction: alert, prompt, confirm, Type Conversions

Unit II

Basic operators, maths, Comparisons, Conditional branching: if, '?', Logical operators, Loops: while and for The "switch" statement

Unit III

Functions, Function expressions, Arrow functions, the basics JavaScript specials

Unit IV

Objects: the basics: Objects, Number, Boolean, Strings, Math, Reg Exp, HTML DOM Date and time.

Unit V

JSON

II Year – I SEMESTER

L	T	P	C
2	0	0	0

ENVIRONMENTAL SCIENCE

Course Code: 20BS3M03

Syllabus:
UNIT – I Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance – Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, Carbon Credits, acid rains, ozone layer depletion, population growth and explosion, effects. Role of information Technology in Environment and human health. Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. – Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

UNIT – II Natural Resources: Natural resources and associated problems Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems
Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, Sustainable mining of Granite, Literate, Coal, Sea and River sands.
Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity
Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources Vs Oil and Natural Gas Extraction.
Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

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

UNIT – IV Environmental Pollution: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies, Sustainable Life Studies. Impact of
Fire Crackers on Men and his well being. Solid Waste Management: Sources, Classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products, Biomedical, Hazardous and e – waste management.

UNIT – V Social Issues and the Environment: 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. Environmental Protection Act - Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act
-Wildlife Protection Act -Forest Conservation Act-Issues involved in enforcement of environmental legislation. -Public awareness.

UNIT – VI Environmental Management: Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Ecotourism, Green Campus – Green business and Green politics.
The student should Visit an Industry / Ecosystem and submit a report individually on any issues related to Environmental Studies course and make a power point presentation.

Text Books:

1. Environmental Studies, K. V. S. G. Murali Krishna, VGS Publishers, Vijayawada
2. Environmental Studies, R. Rajagopalan, 2nd Edition, 2011, Oxford University Press.
3. Environmental Studies, P. N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai

Reference:

1. Text Book of Environmental Studies, Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.
2. A Textbook of Environmental Studies, Shaashi Chawla, TMH, New Delhi
3. Environmental Studies, Benny Joseph, Tata McGraw Hill Co, New Delhi
4. Perspectives in Environment Studies, Anubha Kaushik, C P Kaushik, New Age International Publishers, 2014

II Year II Semester

Numerical Methods and Complex Variable

(Common to all Branches)

Subject code: 20BS4T04

L	T	P	C
3	0	0	3

Course Objectives:

COB 1: To help the student Understand the numerical way of solving equations and integration.
COB 2: To become familiar with the concepts of Complex Functions.

Course Outcomes:

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

CO 1: Use Numerical Methods in Solving Equations. (L3)
CO 2: Calculate function value and its integration value by using different numerical methods. (L3)
CO 3: Understand Methods of finding numerical solution of differential equations. (L2)
CO 4: Use the knowledge of Beta and Gamma functions in evaluating improper integrals(L2).
CO 5: Understand Functions of complex variables and will be able to find analytic Function. (L2)
CO 6: Evaluate definite integral of given complex function using Cauchy's theorem and residues. (L5)

Unit I: - Solution of Algebraic and Transcendental Equations

Introduction- Bisection method – Method of false position (Regula-False Method) – Iteration method – Newton-Raphson method (One Variable)

Unit II: - Interpolation and Numerical Integration

Introduction- Errors in polynomial interpolation – Finite differences- Forward differences- Backward Differences – Central differences – Symbolic relations and separation of symbols - Differences of a Polynomial-Newton's formulae for interpolation – Interpolation with unequal intervals - Lagrange's Interpolation formula-Trapezoidal rule-Simpson's 1/3rd and 3/8th rule.

Unit III: - Numerical solution of Ordinary Differential Equations with initial conditions

Solution of ordinary differential equations with initial conditions by Taylor's series Method - Picard Method of successive Approximations Euler's method, Modified Euler's Method – Runge-Kutta method (second and fourth order).

UNIT IV: Special functions

Def of improper integral, Beta and Gamma functions- Properties - Relation between Beta and Gamma functions-Evaluation of improper integrals

Unit-V: - Functions of Complex variable & Complex Integration

Complex function, Real and Imaginary parts of Complex function, Limit**,** Continuity and Derivative of Complex function, Cauchy-Riemann equations, Analytic function, Entire function, singular point, conjugate Function**,** *C -R* equations in polar form, Harmonic functions, Milne-Thomson method**.**

Line integral of a complex function, Cauchy's theorem (only statement) -Cauchy's Integral Formula (only statement), Taylor's series(only statement),Laurent's series (only statement)-Zeros of an analytic function- Types of Singularities-pole of order m, simple pole- Residues, Residue theorem (only statement).
Evaluation of integrals of the type

(a) Improper real integrals $\int_{-\infty}^{\infty} f(x)dx$ (b) $\int_{0}^{2\pi} f(\cos\theta, \sin\theta)d\theta$

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.
3. **Dr T K V Iyengar**, **Dr B.Krishna Gandhi**, **S.Ranhanatham** and Dr. **M.V.S.S.N Prasad**, Engineering Mathematics, S.Chand & Company Ltd.

Reference Books:

1. **N.P.Bali & Manish Goyal**, A Text book of Engineering Mathematics, Lakshmi Publications.
2. **James ward brown, Ruel V.Churchill**, Complex variable and Applications, Mc.Graw Hill Publications
3. **ERWIN KREYSZIG,** Advanced Engineering Mathematics, 10th Edition, Wiley-India
4. **Steven C. Chapra**, Applied Numerical Methods with MATLAB for Engineering and Science, Tata Mc. Graw Hill Education

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II Year – II SEMESTER

L	T	P	C
3	0	0	3

JAVA PROGRAMMING 20CS4T06

OUTCOMES:

- Understanding the OOP's concepts, classes and objects, threads, files, applets, swings and act.
- This course introduces computer programming using the JAVA programming language with object-oriented programming principles.
- Emphasis is placed on event-driven programming methods, including creating and manipulating objects, classes, and using Java for network level programming and middleware development

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 distributed environment.
- Design and Develop multi-tier applications.
- Identify and Analyze Enterprise applications.

UNIT-I:

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

UNIT-II:

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

UNIT-III:

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

UNIT-IV:

Multithreading: 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:

Introduction to Java FX, AWT: introduction, components and containers, Button, Label, Checkbox, Radio Buttons, List Boxes, Choice Boxes, Container class, Layouts, Menu and Scrollbar.

TEXT BOOKS:

1. The complete Reference Java, 8th edition, Herbert Schildt, TMH.
2. Programming in JAVA, Sachin Malhotra, SaurabhChoudary, Oxford.
3. Introduction to java programming, 7th edition by Y Daniel Liang, Pearson.

REFERENCE BOOKS:

1. Swing: Introduction, JFrame, JApplet, JPanel, Componets in Swings, Layout Managers in
2. Swings, JList and JScrollPane, Split Pane, JTabbedPane, JTree, JTable, Dialog Box.

II Year – II SEMESTER

L	T	P	C
3	0	0	3

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Course Code:20HS3T02

Unit – I:

Introduction to Managerial Economics and demand Analysis:
Definition of Managerial Economics and Scope-Managerial Economics and its relation with other subjects-Concepts of Demand-Types-Determents-Law of Demand its Exception-Elasticity of Demand-Types and Measurement-Demand forecasting and its Methods.

Unit – II:

Production and Cost Analyses:
Production function-Isoquants and Isocosts-Law of Variable proportions-Cobb-Douglas Production function-Economics of Sale-Cost Concepts-Opportunity Cost-Fixed vs Variable Costs-Explicit Costs vs Implicit Costs-Out of Pocket Costs vs Imputed Costs-Cost Volume Profit analysis-Determination of Break-Even Point (Simple Problem)

Unit – III:

Introduction to Markets, Theories of the Firm & Pricing Policies:
Market Structures: Perfect Competition, Monopoly and Monopolistic and Oligopoly – Features – Price, Output Determination – Managerial Theories of firm: Maris and Williamson's models – Methods of Pricing: Limit Pricing, Market Skimming Pricing, Internet Pricing: Flat Rate Pricing, Usage sensitive, Transaction based pricing, Priority Pricing.

Unit – IV:

Types of Business Organization and Business Cycles:
Features and Evaluation of Sole Trader – Partnership – Joint Stock Company – State/Public Enterprises and their forms – Business Cycles – Meaning and Features – Phases of Business Cycle.

Unit – V:

Introduction to Accounting & Financing Analysis:
Introduction to Double Entry Systems – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis – Preparation of Funds flow cash flow statements (Simple Problems)

Capital and Capital Budgeting: Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Need for Capital Budgeting-Techniques of Capital Budgeting-Traditional and Modern Methods.

TEXT BOOKS

1. Dr. N. Appa Rao, Dr. P. Vijay Kumar: 'Managerial Economics and Financial Analysis', Cengage Publications, New Delhi – 2011
2. Dr. A. R. Aryasri – Managerial Economics and Financial Analysis, TMH 2011
3. Prof. J.V.Prabhakara rao, Prof. P. Venkatarao. 'Managerial Economics and Financial Analysis', Ravindra Publication.

REFERENCES:

1. V. Maheswari: Managerial Economics, Sultan Chand.
2. Suma Damodaran: Managerial Economics, Oxford 2011.

II Year – II SEMESTER

L	T	P	C
3	0	0	3

OPERATING SYSTEMS

Course Code: 20CS4T07

Course Objectives:

The objectives of this course is to

- Introduce to the internal operation of modern operating systems
- Define, explain, processes and threads, mutual exclusion, CPU scheduling, deadlock, memory management, and file systems
- Understand File Systems in Operating System like UNIX/Linux and Windows
- Understand Input Output Management and use of Device Driver and Secondary Storage (Disk) Mechanism
- Analyze Security and Protection Mechanism in Operating System

UNIT I

Operating Systems Overview: Operating system functions, Operating system structure, Operating systems operations, Computing environments, Open-Source Operating Systems. System Structures: Operating System Services, User and Operating-System Interface, systems calls, Types of System Calls, system programs, operating system structure.

UNIT II

Process Concept: Process scheduling, Operations on processes, Inter-process communication. Multithreaded Programming: Multithreading models, Thread libraries, Threading issues. Process Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms. Inter-process Communication: Critical Regions, Semaphores, Monitors, Message passing, Classical IPC Problems - Dining philosophers problem,

UNIT III

Memory-Management Strategies: Introduction, Swapping, Contiguous memory allocation, Paging, Segmentation. Virtual Memory Management: Introduction, Demand paging, Page replacement, Thrashing.

UNIT IV

Deadlocks: Resources, Conditions for deadlocks, Deadlock detection and recovery, Deadlock avoidance, Deadlock prevention.

UNIT V

File Systems: Files, Directories, File system implementation. Secondary-Storage Structure: Overview of disk structure, and attachment, Disk scheduling, RAID structure.

Text Books:

1) Silberschatz A, Galvin P B, and Gagne G, Operating System Concepts, 9th edition, Wiley, 2013.
2) Tanenbaum A S, Modern Operating Systems, 3rd edition, Pearson Education, 2008. (for Interprocess Communication and File systems.)

Reference Books:

1) Dhamdhere D M, Operating Systems A Concept Based Approach, 3rd edition, Tata McGraw-Hill, 2012.
2) Stallings W, Operating Systems -Internals and Design Principles, 6th edition, Pearson Education, 2009
3) Nutt G, Operating Systems, 3rd edition, Pearson Education, 2004.

II Year – II SEMESTER

L	T	P	C
3	0	0	3

MATHEMATICAL FOUNDATIONS FOR COMPUTER SCIENCE

Course Code: 20CS4T08

OBJECTIVES:

- To introduce the students to the topics and techniques of discrete methods and combinatorial reasoning.
- To introduce a wide variety of applications. The algorithmic approach to the solution of problems is fundamental in discrete mathematics, and this approach reinforces the close ties between this discipline and the area of computer science.

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 MaTriex and Digraph, Operations on Relations,

Partition and Covering, Transitive Closure, Equivalence, Compatibility and Partial Ordering Relations, Hasse Diagrams

UNIT -III:

Functions: Bi-jective Functions, Composition of Functions, Inverse Functions, Permutation Functions, Recursive Functions, Lattice and its Properties.

UNIT- IV:

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

UNIT -V:

Recurence Relations: Generating functions,function of sequences,Partial fractions,Calculating coefficient of generating functions,Reccurence Relations,Formulation as Reccurence relations,Solving Reccurence relation by substitution ad generating functions,Method of Characteristic roots,Solving homogeneous reccurence relations

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 – II SEMESTER

L	T	P	C
0	0	3	1.5

JAVA PROGRAMMING LAB (20CS4L07)

Exercise - 1 (Basics)
a). Write a JAVA program to display default value of all primitive data type of JAVA
b) 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 using StringBuffer 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 multi level Inheritance
b). 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.
c). Write a JAVA program that implements Runtime polymorphism
Exercise – 8 (User defined Exception)
a). Write a JAVA program to Illustrate try, catch.
b). Write a JAVA program to Illustrate finally
c).Write a JAVA program for creation of User Defined Exception

Exercise – 9 (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.
d).Write a JAVA program Producer Consumer Problem
Exercise – 10 (Packages)
a). Write a JAVA program illustrate class path
b). Write a JAVA program to create an import a package.
Exercise - 11 (Applet)
a).Write a JAVA program to demonstrate applet life cycle.
b). Write a JAVA program to create different shapes and fill colors using Applet.
Exercise - 12 (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.

II Year – II SEMESTER

L	T	P	C
0	0	3	1.5

OPERATING SYSTEM AND UNIX LAB

Course code:20CS4L09

Objective:

· To provide an understanding of the design aspects of operating system

Recommended Systems/Software Requirements:

Intel based desktop PC with minimum of 166 MHZ or faster processor with atleast 64 MB RAM and 100 MB free disk space

Lab Experiments:

1. Simulate the following CPU scheduling algorithms
a) Round Robin b) SJF c) FCFS d) Priority
2. Loading executable programs into memory and execute System Call implementation-read(), write(), open () and close()
3. Multiprogramming-Memory management- Implementation of Fork(), Wait(), Exec() and Exit() System calls
4. Simulate all File allocation strategies
a) Sequenced, b)Indexed, c) Linked
5. Simulate MVT and MFT
6. Simulate all File Organization Techniques
a) Single level directory b) Two level c) Hierarchical d) DAG
7. Simulate Bankers Algorithm for Dead Lock Avoidance
8. Simulate Bankers Algorithm for Dead Lock Prevention.
9. Simulate all page replacement algorithms.
a) FIFO b) LRU c) LFU etc….
10. Simulate Paging Technique of memory management.

UNIX LAB

Course Code:20CS4L09

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

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Detailed Syllabus – BR20

For UG - B.Tech: Computer Science and Engineering

III Year – I SEMESTER

S.No	Course Code	Courses	L	T	P	Credits
1	20CS5T09	Computer Networks	3	0	0	3
2	20CS5T10	Formal Language and Automata Theory	3	0	0	3
3	20CS5T11	Data Base Management System	3	0	0	3
4	20CS5E01 20CS5E02 20CE5E01 20ME5E01	**Open Elective- I** 5. Computer Organization 6. Object Oriented Programming 7. Interior Space Design 8. Industrial Automation and Robotics	3	0	0	3
5	20CS5D01 20CS5D02 20CS5D03 20CS5D04	**Professional Elective- I** 5. Data Communications 6. Principles of Programming Languages 7. Software Engineering 8. Advanced Computer Architecture/NPTEL	3	0	0	3
6	20CS5L11	Computer Networks Lab	0	0	3	1.5
7	20CS5L12	DBMS Lab	0	0	3	1.5
8	20HS5M04	Foreign Language	2	0	0	0
9	20CS5S03	Skill Advanced Course :APP Development	1	0	2	2
10	20CS5P01	Summer Internship	0	0	3	1.5
		Total	21	0	11	21.5

III Year - I Semester	Code: 20CS5T09	L	T	P	C
		3	0	0	3

COMPUTER NETWORKS

Course Outcomes:

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

1. Independently understand basic computer network technology and identify the different types of network topologies and protocols.
2. Understand Network models and Physical layer
3. Study the techniques used in data link layer.
4. Understand the routing strategies for an IP based networking
5. Understand the Importance of MAC sub layer and addressing mechanism
6. Understand the Importance of Application layer and the wireless web.

UNIT I

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

UNIT II

Physical Layer – Guided Transmission Media, Digital Modulation and Multiplexing: Frequency Division Multiplexing, Time Division Multiplexing, Code Division Multiplexing.

UNIT III

The Data Link Layer - Services Provided to the Network Layer – Framing – Error Control Flow Control, Error Detection and Correction, Elementary Data Link Protocols, Sliding Window Protocols. **Random Access**: ALOHA, MAC addresses, carrier sense multiple access (CSMA), CSMA/CD, CSMA/CA, controlled Access: Reservation, Polling, Token Passing, channelization: FDMA, TDMA, CDMA.

UNIT IV

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

Transport Layer: The transport service, elements of transport protocols, congestion control, the internet transport protocols.

UNIT V

Application Layer –The Domain Name System: The DNS Name Space, Resource Records, Name Servers, Electronic Mail: Architecture and Services, The User Agent, Message Formats, Message Transfer, Final Delivery, The wireless web: WAP—The Wireless Application Protocol

Text Books:

1. Computer Networks—Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI
2. Data Communications and Networks–Behrouz A. Forouzan. Third Edition TMH.

Reference Books:

1.An Engineering Approach to Computer Networks- S. Keshav, 2ndEdition, Pearson Education
2.Understanding communications and Networks, 3rd Edition, W.A.Shay, Thomson
3.Computer Networks, 5ed, David Patterson, Elsevier

III Year - I Semester	Code: 20CS5T10	L	T	P	C
		3	0	0	3

FORMAL LANGUAGE AND AUTOMATA THEORY

Course Objectives:

- To learn fundamentals of Regular and Context Free Grammars and Languages
- To understand the relation between Regular Language and Finite Automata and machines
- To learn how to design Automata's and machines as Acceptors, Verifiers and Translators
- To understand the relation between Contexts free Languages, PDA and TM
- To learn how to design PDA as acceptor and TM as Calculators

Course Outcomes:

By the end of the course students can

- Classify machines by their power to recognize languages.
- Summarize language classes & grammars relationship among them with the help of Chomsky hierarchy
- Employ finite state machines to solve problems in computing

UNIT I

Finite Automata: Need of Automata theory, Central Concepts of Automata Theory, Automation, Finite Automation, Transition Systems, Acceptance of a String, DFA, Design of DFAs, NFA, Design of NFA, Equivalence of DFA and NFA, Conversion of NFA into DFA, Finite Automata with Є-Transitions, Minimization of Finite Automata, Finite Automata with output-Mealy and Moore Machines, Applications and Limitation of Finite Automata.

UNIT II

Regular Expressions, Regular Sets, Identity Rules, Equivalence of two RE, Manipulations of REs, Finite Automata and Regular Expressions, Inter Conversion, Equivalence between FA and RE, Pumping Lemma of Regular Sets, Closure Properties of Regular Sets, Grammars, Classification of Grammars, Chomsky Hierarchy Theorem, Right and Left Linear Regular Grammars, Equivalence between RG and FA, Inter Conversion.

UNIT III

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

UNIT IV

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

UNIT V

Turning Machine: Definition, Model, Representation of TMs-Instantaneous Descriptions, Transition Tables and Transition Diagrams, Language of a TM, Design of TMs, Types of TMs, Church's Thesis, Universal and Restricted TM, Decidable and Un-decidable Problems, Halting Problem of TMs, Post's Correspondence Problem, Modified PCP, Classes of P and NP, NP-Hard and NP-Complete Problems.

Text Books:

1) Introduction to Automata Theory, Languages and Computation, J. E. Hopcroft, R. Motwani and J. D. Ullman, 3rd Edition, Pearson, 2008

2) Theory of Computer Science-Automata, Languages and Computation, K. L. P. Mishra and N. Chandrasekharan, 3rd Edition, PHI, 2007

Reference Books:

1) Elements of Theory of Computation, Lewis H.P. & Papadimition C.H., Pearson /PHI

2) Theory of Computation, V. Kulkarni, Oxford University Press, 2013

3) Theory of Automata, Languages and Computation, Rajendra Kumar, McGraw Hill, 2014

III Year - I Semester	Code: 20CS5T11	L	T	P	C
		3	0	0	3

DATA BASE MANAGEMENT SYSTEM

Course Objectives:

1. To introduce about database management systems
2. To give a good formal foundation on the relational model
3. To introduce the concepts of basic SQL as a universal Database language

Course Outcomes:

1. Describe fundamental concepts a relational database 2. Create, maintain and manipulate a relational database using SQL
3. Apply Conceptual and Logical database design 4. Apply normalization for database design
5. Illustrate Storage management and Transaction management techniques.

UNIT I

Introduction: Database system, Characteristics (Database Vs File System), Database Users (Actors on Scene, Workers behind the scene), Advantages of Database systems, Database applications. Brief introduction of different Data Models; Concepts of Schema, Instance and data independence; Three tier schema architecture for data independence; Database system structure, environment, Centralized and Client Server architecture for the database.

UNIT II

Relational Model: Introduction to relational model, concepts of domain, attribute, tuple, relation, importance of null values, constraints (Domain, Key constraints, integrity constraints) and their importance.

BASIC SQL: Simple Database schema, data types, table definitions (create, alter), different DML operations (insert, delete, update), basic SQL querying (select and project) using where clause, arithmetic & logical operations, SQL functions (Date and Time, Numeric, String conversion).

UNIT III

Entity Relationship Model: Introduction, Basic features of ER model, Representation of entities, attributes, entity set, relationship, relationship set, constraints, ER diagrams Generalization/specialization and Aggregation.

SQL: Creating tables with relationships, implementation of key and integrity constraints, nested queries, sub queries, grouping, aggregation, ordering, implementation of different types of joins, views(updatable and non-updatable), relational set operations.

UNIT IV

Schema Refinement (Normalization): Purpose of Normalization or schema refinement, concept of functional dependency, Closure of functional dependency and attribute closure, 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), Fifth Normal Form (5NF).

UNIT V

TRANSACTION MANAGEMENT Transaction, properties of transactions, transaction log, and transaction management with SQL using commit rollback and save point. Concurrency control for lost updates, uncommitted data, in consistent 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.

Text Books:

1.Database System Concepts by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, 7th Edition, McGraw-Hill Education, 2019.
2. Database Management Systems by Raghu Ramakrishnan, Johannes Gehrke, 3rd Edition., McGraw-Hill Education (India), 2014.

Reference Books:

1.Database Principles: Fundamentals of Design, Implementation, and Management by Steven Morris, Keeley Crockett, Carlos Coronel, Craig Blewett, Cengage, 2020.
2. Fundamentals of Database Systems by RamezElmasri, Shamkant B. Navathe, 7th Edition, Pearson Education India, 2015.
3. Introduction to Database Systems by C J Date, 8th Edition, Pearson Education, 2009.

III Year - I Semester	Code: 20CS5E01	L	T	P	C
		3	0	0	3

COMPUTER ORGANIZATION

Course Objectives:

The course objectives of Computer Organization are to discuss and make student familiar with the

- Principles and the Implementation of Computer Arithmetic
- Operation of CPUs including RTL, ALU, Instruction Cycle and Busses
- Fundamentals of different Instruction Set Architectures and their relationship to the CPU Design

Course Outcomes:

By the end of the course, the student will

- Develop a detailed understanding of computer systems
- Cite different number systems, binary addition and subtraction, standard, floating-point, and micro operations
- Develop a detailed understanding of architecture and functionality of central processing unit

UNIT I

Basic Structure of Computers: Basic Organization of Computers, Historical Perspective, Bus Structures, Data Representation: Data types, Complements, Fixed Point Representation. Floating, Point Representation. Other Binary Codes, Error Detection Codes. Computer Arithmetic: Addition and Subtraction, Multiplication Algorithms, Division Algorithms.

UNIT II

Register Transfer Language and Micro operations: Register Transfer language. Register Transfer Bus and Memory Transfers, Arithmetic Micro operations, Logic Micro Operations, Shift Micro Operations, Arithmetic Logic Shift Unit. Basic Computer Organization and Design: Instruction Codes, Computer Register, Computer Instructions, Instruction Cycle, Memory – Reference Instructions. Input –Output and Interrupt, Complete Computer Description.

UNIT III

Central Processing Unit: General Register Organization, STACK Organization. Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer. Microprogrammed Control: Control Memory, Address Sequencing, Micro Program example, Design of Control Unit.

UNIT IV

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory. Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupts, Direct Memory Access.

UNIT V

Multi Processors: Introduction, Characteristics of Multiprocessors, Interconnection Structures, Inter Processor Arbitration. Pipeline: Parallel Processing, Pipelining, Instruction Pipeline, RISC Pipeline, Array Processor.

Text Books:

1) Computer System Architecture, M. Morris Mano, Third Edition, Pearson, 2008.
2) Computer Organization, Carl Hamacher, Zvonko Vranesic, Safwat Zaky, 5/e, McGraw Hill, 2002.

Reference Books:

1) Computer Organization and Architecture, William Stallings, 6/e, Pearson, 2006.
2) Structured Computer Organization, Andrew S. Tanenbaum, 4/e, Pearson, 2005.
3) Fundamentals of Computer Organization and Design, Sivarama P. Dandamudi, Springer, 2006.

III Year - I Semester	Code : 20CS5E02	L	T	P	C
		3	0	0	3

OBJECT ORIENTED PROGRAMMING

Course Objectives:

1. Understanding the OOP's concepts, classes and objects, threads, files, applets, swings and act.
2. This course introduces computer programming using the JAVA programming language with object-oriented programming principles.

Course Outcomes:

1. Understand Java programming concepts and utilize Java Graphical User Interface in Program writing.
2. Write, compile, execute and troubleshoot Java programming for networking concepts.
3. Build Java Application for distributed environment.

UNIT I

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

UNIT II

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

UNIT III

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

UNIT IV

Multithreading: 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

Introduction to Java FX, AWT: introduction, components and containers, Button, Label, Checkbox, Radio Buttons, List Boxes, Choice Boxes, Container class, Layouts, Menu and Scrollbar.

Text Books:

1. The complete Reference Java, 8th edition, Herbert Schildt, TMH.
2. Programming in JAVA, Sachin Malhotra, SaurabhChoudary, Oxford.
3. Introduction to java programming, 7th edition by Y Daniel Liang, Pearson.

Reference Books:

1. Swing: Introduction, JFrame, JApplet, JPanel, Componets in Swings, Layout Managers in
2. Swings, JList and JScrollPane, Split Pane, JTabbedPane, JTree, JTable, Dialog Box.

III Year - I Semester	Code: 20CS5D01	L	T	P	C
		3	0	0	3

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.

Course Outcomes:

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

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, 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.

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.

UNIT V

Data Communications Character Codes, Bar Codes, Error Control, Error Detection and Correction, Character Synchronization. Digital Service Unit and Channel Service Unit, Voice- Band Data Communication Modems, Bell Systems-Compatible Voice- Band Modems.

Text Books:

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

Reference Books:

1.Data Communications and Networking, Behrouz A Forouzan, Fourth Edition.TMH.
2.Data and Computer communications, 8/e, William Stallings, PHI.
3.Computer Communications and Networking Technologies, Gallow, Second Edition.

III Year - I Semester	Code: 20CS5D02	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

Course Outcomes:

- Describe the syntax and semantics of programming languages and gain practical knowledge in lexical analysis and parsing phases of a compiler
- Make use of different constructs in programming languages with merits and demerits
- Design and implement sub programs in various programming languages

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

Functional programming languages: Introduction to lambda calculus, fundamentals of functional programming languages, Programming with Scheme, Programming with ML

Logic programming languages: Introduction to logic and logic programming, Programming with Prolog, multi - paradigm languages.

Text Books:

1) Robert W. Sebesta, “Concepts of Programming Languages”, Tenth Edition, Addison Wesley, 2012.
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.

III Year - I Semester	Code: 20CS5D03	L	T	P	C
		3	0	0	3

SOFTWARE ENGINEERING

Course Objectives:

This course is designed to:

- ✓ Give exposure to phases of Software Development, common process models including Waterfall, and the Unified Process, and hands-on experience with elements of the agile process
- ✓ Give exposure to a variety of Software Engineering practices such as requirements analysis and specification, code analysis, code debugging, testing, traceability, and version control
- ✓ Give exposure to Software Design techniques

Course Outcomes:

Students taking this subject will gain software engineering skills in the following areas:

- ✓ Ability to transform an Object-Oriented Design into high quality, executable code
- ✓ Skills to design, implement, and execute test cases at the Unit and Integration level
- ✓ Compare conventional and agile software methods

UNIT I

The Nature of Software, The Unique Nature of WebApps, Software Engineering, The Software Process, Software Engineering Practice, Software Myths. A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal and Team Process Models, Process Technology.

UNIT II

Agility, Agility and the Cost of Change, Agile Process, Extreme Programming (XP), Other Agile Process Models, A Tool Set for the Agile Process, Software Engineering Knowledge, Core Principles, Principles That Guide Each Framework Activity, Requirements Engineering, Establishing the Groundwork, Eliciting Requirements, Developing Use Cases, Building the Requirements Model, Negotiating Requirements, Validating Requirements.

UNIT III

Requirements Analysis, Scenario-Based Modeling, UML Models That Supplement the Use Case, Data Modeling Concepts, Class-Based Modeling, Requirements Modeling Strategies, Flow-Oriented Modeling, Creating a Behavioral Model, Patterns for Requirements Modelling, Requirements Modeling for WebApps.

UNIT IV

Design within the Context of Software Engineering, The Design Process, Design Concepts, The Design Model, Software Architecture, Architectural Genres, Architectural Styles, Assessing Alternative Architectural Designs, Architectural Mapping Using Data Flow, Components, Designing Class-Based Components, Conducting Component-Level Design, Component-Level Design for WebApps, Designing Traditional Components, Component-Based Development.

UNIT V

The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps, WebApp Interface Design, Design Evaluation, Elements of Software Qualtiy Assurance, SQA Tasks, Goals & Metrics, Statistical SQA, Software Reliability, A Strategic Approach to Software Testing, Strategic Issues, Test Strategies for Conventional Software, Test Strategies for Object-Oriented Software, Test Strategies for WebApps, Validation Testing, System Testing, The Art of Debugging, Software Testing Fundamentals, Internal and External Views of Testing, White-Box Testing, Basis Path Testing.

Text Books:

1) Software Engineering a practitioner's approach, Roger S. Pressman, Seventh Edition, McGraw Hill Higher Education.

2) Software Engineering, Ian Sommerville, Ninth Edition, Pearson.

Reference Books:

1) Software Engineering, A Precise Approach, PankajJalote, Wiley India, 2010.

2) Software Engineering, Ugrasen Suman, Cengage.

III Year - I Semester	Code: 20CS5D04	L	T	P	C
		3	0	0	3

ADVANCED COMPUTER ARCHITECTURE

Course Outcomes:

Gain knowledge of

1. Computational models and Computer Architectures.
2. Concepts of parallel computer models.
3. Scalable Architectures, Pipelining, Superscalar processors, multiprocessors

UNIT I

Theory of Parallelism, Parallel computer models, The State of Computing, Multiprocessors and Multicomputers, Multivector and SIMD Computers, PRAM and VLSI models, Architectural development tracks, Program and network properties, Conditions of parallelism.

UNIT II

Principals of Scalable performance, Performance metrics and measures, Parallel Processing applications, Speed up performance laws, Scalability Analysis and Approaches, Hardware Technologies, Processes and Memory Hierarchy, Advanced Processor Technology.

UNIT III

Bus Cache and Shared memory, Backplane bus systems, Cache Memory organizations, Shared- Memory Organizations, Sequential and weak consistency models, Pipelining and superscalar techniques, Linear Pipeline Processors, Non-Linear Pipeline Processors, Instruction Pipeline design, Arithmetic pipeline design, superscalar pipeline design.

UNIT IV

Parallel and Scalable Architectures, Multiprocessors and Multicomputers, Multiprocessor system interconnects, cache coherence and synchronization mechanism, Three Generations of Multicomputers, Message-passing Mechanisms, Multivetor and SIMD computers, Vector Processing Principals, Multivector Multiprocessors, Compound Vector processing, SIMD computer Organizations.

UNIT V

Scalable, Multithreaded and Dataflow Architectures, Latency-hiding techniques, Principals of Multithreading, Fine-Grain Multicomputers, Scalable and multithreaded Architectures, Dataflow and hybrid Architectures.

Text Books:

1. Advanced Computer Architecture Second Edition, Kai Hwang, Tata McGraw Hill.

Reference Books:

1. Computer Architecture, Fourth edition, J. L. Hennessy and D.A. Patterson. ELSEVIER.
2.Advanced Computer Architecture, D. Sima, T. Fountain, P. Kacsuk, Pearson education
3. Computer Architecture, B. Parhami, Oxford Univ. Press

III Year - I Semester	Code: 20CS55L11	L	T	P	C
		3	0	0	3

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.

III Year - I Semester	Code : 20CS5L12	L	T	P	C
		0	0	3	1.5

DBMS LAB

Course Objectives:

1. Populate and query a database using SQL DDL/DML Commands
2. Declare and enforce integrity constraints on a database
3. Writing Queries using advanced concepts of SQL
4. Programming PL/SQL including procedures, functions, cursors and triggers

Course Outcomes:

1. Utilize SQL to execute queries for creating database and performing data manipulation operations
2. Apply Queries using SQL
3. Build PL/SQL programs including stored procedures, functions, cursors and triggers

Experiments

1 Creation, altering and dropping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECT command.

2 Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints. Example:- Select the roll number and name of the student who secured fourth rank in the class.

3 Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.

4 Queries using Conversion functions (to_char, to_number and to_date), string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), date functions (Sysdate, next_day, add_months, last_day, months_between, least, greatest, trunc, round, to_char, to_date)

5 i. Create a simple PL/SQL program which includes declaration section, executable section and exception – Handling section (Ex. Student marks can be selected from the table and printed for those who secured first class and an exception can be raised if no records were found) ii. Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.

6 Develop a program that includes the features NESTED IF, CASE and CASE expression. The program can be extended using the NULLIF and COALESCE functions.

7 Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT –IN Exceptions, User defined Exceptions, RAISE APPLICATION ERROR.

8 Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES.

9 Program development using creation of stored functions, invoke functions in SQL Statements and write complex functions.

10 Develop programs using features parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of clause and CURSOR variables.

11 Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers

III Year - I Semester	Code: 20CS5S03	L	T	P	C
		3	0	0	3

SKILL ADVANCED COURSE :APP DEVELOPMENT

Course Outcomes:

A student will be able

- Understand android application development platform
- Explore Android architecture and ADT.
- Illustrate user interface components.

UNIT I

Introduction to Android App, Tools/environment setup & troubleshooting, Create 1st Android App – HelloWorld. Features & Architecture of Android, Android Devices in the Market, The Android Developer Community, Obtaining the Required Tools , Android SDK, Installing the Android SDK Tools, Configuring the Android SDK Manager. Eclipse, Android Development Tools (ADT), Creating Android Virtual Devices (AVDs) , Creating Your First Android Application , Anatomy of an Android Application

UNIT II

Understanding Activities , Applying Styles and Themes to an Activity , Hiding the Activity Title, Displaying a Dialog Window , Displaying a Progress Dialog , Displaying a More Sophisticated Progress Dialog , Linking Activities Using Intents , Resolving Intent Filter Collision , Returning Results from an Intent , Passing Data Using an Intent Object , Fragments

UNIT III

Working with the User Interface, Development tools, Applications App manifest, Resources, Application types, Activities, Activity Life Cycle Introduction to UI, Layouts, Fragments, Adapters, Action bar, Dialogs, Notifications UI best practices

UNIT IV

Intents and Broadcast Receivers, Intents, Pending intents, Intent resolution, Native broadcast intents, Preferences and saving state, Content Providers, Background processing Services, Intent Service, AsyncTask, Alarms

Creating Your Own Services, Performing Long-Running Tasks in a Service, Performing Repeated Tasks in a Service Executing Asynchronous Tasks on Separate Threads Using Intent Service , Establishing Communication between a Service and an Activity Preparing for Publishing , Versioning Your Application , Digitally Signing Your Android Applications, Deploying APK Files , Using the adb.exe Tool, Using a Web Server , Publishing on the Android Market

UNIT V

Displaying Maps , Creating the Project, Obtaining the Maps API Key, Displaying the Map, Displaying the Zoom Control, Changing Views , Navigating to a Specific Location, Adding Markers , Getting the Location That Was Touched , Geo-coding and Reverse Geo-coding , Getting Location Data , Monitoring a Location.

Text Books:

1.Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 201
2.Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox) , 2012

Reference Books:

1.Android Application Development for Java Programmers, James C Sheusi, Cengage Learning, 2013

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Detailed Syllabus – BR20

For UG - B.Tech: Computer Science and Engineering

III Year – II SEMESTER

S.No	Course Code	Courses	L	T	P	Credits
1	20CS6T12	Compiler Design	3	0	0	3
2	20CS6T13	Data mining and Data warehousing	3	0	0	3
3	20CS6T14	Design and Analysis of Algorithms	3	0	0	3
4	 20CS6D05 20CS6D06 20CS6D07 20CS6D08	**Professional Elective -II** 1.Mobile Computing 2.Big Data Analytics 3. Distributed Systems 4.Network Programming	3	0	0	3
5	 20CS6E03 20ME6E02 20CE6E02 20EC6E02	**Open Elective- II** (Inter Disciplinary) **5.** Mean Stack Development **6.** Operations Research **7.** Green Building **8.** Digital Signal Processing	2	0	2	3
6	20CS6L13	Compiler Design Lab	0	0	3	1.5
7	20CS6L14	Data Mining Lab(Python Implementation)	0	0	3	1.5
8	20CS6L15	Web Technology Lab	0	0	3	1.5
9	20CS6S04	Skill Advanced course: Game Development	1	0	2	2
10	20HS6M05	Universal Human Values	2	0	0	0
		Total	17	0	13	21.5

III YEAR II SEM	Code: 20CS6T12	L	T	P	C
		3	0	0	3

COMPILER DESIGN

Course Objectives:

1. To study the various phases in the design of a compiler
2. To understand the design of top-down and bottom-up parsers
3. To understand syntax directed translation schemes

Course Outcomes:

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

1. Design, develop, and implement a compiler for any language
2. Use LEX and YACC tools for developing a scanner and a parser
3. Design and implement LL and LR parsers

UNIT I

Language Processors, the structure of a compiler, the science of building a compiler, programming language basics. Lexical Analysis: The Role of the Lexical Analyzer, Input Buffering, Recognition of Tokens, The Lexical-Analyzer Generator Lex, Finite Automata, From Regular Expressions to Automata, Design of a Lexical-Analyzer Generator, Optimization of DFA-Based Pattern Matchers.

UNIT II

Syntax Analysis: Introduction, Context-Free Grammars, Writing a Grammar, Top-Down Parsing, Recursive and Non recursive top down parsers, Bottom-Up Parsing, Introduction to LR Parsing: Simple LR, More Powerful LR Parsers, Using Ambiguous Grammars, Parser Generators.

UNIT III

Syntax-Directed Definitions, Evaluation Orders for SDD's, Applications of Syntax-Directed Translation, Syntax-Directed Translation Schemes, and Implementing L-Attributed SDD's. Intermediate-Code Generation: Variants of Syntax Trees, Three-Address Code, Types and Declarations, Type Checking, Control Flow, Back patching, Switch-Statements, Intermediate Code for Procedures.

UNIT IV

Run-Time Environments: Storage organization, Stack Allocation of Space, Access to Nonlocal Data on the Stack, Heap Management, Introduction to Garbage Collection, Introduction to Trace-Based Collection.

Machine-Independent Optimizations: The Principal Sources of Optimization, Introduction to Data-Flow Analysis, Foundations of Data-Flow Analysis, Constant Propagation, Partial-Redundancy Elimination, Loops in Flow Graphs.

UNIT V

Code Generation: Issues in the Design of a Code Generator, The Target Language, Addresses in the Target Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, A Simple Code Generator.

Machine-dependent Optimizations: Peephole Optimization, Register Allocation and Assignment, Dynamic Programming Code-Generation.

Text Books:

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

2) Compiler Construction-Principles and Practice, Kenneth C Louden, Cengage Learning.

Reference Books:

1) Modern compiler implementation in C, Andrew W Appel, Revised edition, Cambridge University Press.

2) The Theory and Practice of Compiler writing, J. P. Tremblay and P. G. Sorenson, TMH

3) Writing compilers and interpreters, R. Mak, 3rd edition, Wiley student edition.

e-Resources:

1) https://nptel.ac.in/courses/106/104/106104123/

III YEAR II SEM	Code: 20CS6013	L	T	P	C
		3	0	0	3

DATA MINING AND DATA WAREHOUSING

Course Objectives:

To Understand about Data Warehouse and Data Mining to extract knowledge from data repository for data analysis, frequent pattern, classification, Clustering and prediction.

Course Outcomes:

1. Understand Importance of extraction of Knowledge from huge data and Data mining functionalities.
2. Understand the data pre-processing techniques aggregation, sampling, dimensionality reduction.
3. Understand multi-dimensional data model like OLAP and Architecture of Data Warehouse
4. Understand Classification algorithms for Extraction of data to get potential Knowledge

UNIT I

Data Warehousing and Online Analytical Processing: Data Warehouse: Basic concepts, Data Warehouse Modelling: Data Cube and OLAP, Data Warehouse Design and Usage, Data Warehouse Implementation, Introduction: Why and What is data mining, What kinds of data need to be mined and patterns can be mined, Which technologies are used, Which kinds of applications are targeted.

UNIT II

Data Pre-processing: An Overview, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization.

UNIT III

Classification: Basic Concepts, General Approach to solving a classification problem, Decision Tree Induction: Attribute Selection Measures, Tree Pruning, Scalability and Decision Tree Induction, Visual Mining for Decision Tree Induction

UNIT IV

Association Analysis: Problem Definition, Frequent Item set Generation, Rule Generation: Confident Based Pruning, Rule Generation in Apriori Algorithm, Compact Representation of frequent item sets, FP-Growth Algorithm

UNIT V

Cluster Analysis: Overview, Basics and Importance of Cluster Analysis, Clustering techniques, Different Types of Clusters; K-means: The Basic K-means Algorithm, K-means Additional Issues, Bi-secting K Means.

Text Books:

1. Data Mining concepts and Techniques, 3/e, Jiawei Han, Michel Kamber, Elsevier,2011.
2. Introduction to Data Mining: Pang-Ning Tan & Michael Steinbach, Vipin Kumar, Pearson,2012.

Reference Books:

1. Data Mining Techniques and Applications: An Introduction, Hongbo Du, Cengage Learning.
2. Data Mining :Introductory and Advanced topics: Dunham, Pearson.
3. Data Warehousing Data Mining & OLAP, Alex Berson, Stephen Smith, TMH.
4. Data Mining Techniques, Arun K Pujari, Universities Press.

III YEAR II SEM	Subject Code: 20CS6T14	L	T	P	C
		3	0	0	3

DESIGN AND ANALYSIS OF ALGORITHMS

Course Objectives:

1. To provide an introduction to formalisms to understand, analyze and denote time complexities of algorithms
2. To introduce the different algorithmic approaches for problem solving through numerous example problems
3. To provide some theoretical grounding in terms of finding the lower bounds of algorithms and the NP-completeness

Course Outcomes:

1. Describe asymptotic notation used for denoting performance of algorithms
2. Analyze the performance of a given algorithm and denote its time complexity using the asymptotic notation for recursive and non-recursive algorithms
3. List and describe various algorithmic approaches
4. Solve problems using divide and conquer, greedy, dynamic programming, backtracking and branch and bound algorithmic approaches

UNIT I

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

UNIT II

Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort, Defective Chess board

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 tree, String Edition Problem, 0/1 knapsack problem, All pairs shortest path problem, Optimal Merge Pattern,

UNIT V

Backtracking: General method, applications-n-queen problem, sum of sub sets problem, graph coloring, Hamiltonian cycles.

Text Books:

1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharam, Universities Press.
2.Design and Analysis of Algorithms , S Sridhar, Oxford
3. Design and Analysis of Algorithms, Parag Himanshu Dave, Himansu Balachandra Dave, 2nd ed, Pearson Education.

Reference Books:

1. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson education.
2.Introduction to Algorithms, second edition, T. H. Cormen, C.E. Leiserson, R. L. Rivest and. Stein, PHI Pvt. Ltd.

III Year - II Semester	Code: 20CS6D05	L	T	P	C
		3	0	0	3

MACHINE LEARNING

Course Objectives:

The course is introduced for students to

- Gain knowledge about basic concepts of Machine Learning
- Study about different learning algorithms

Course Outcomes:

- Identify machine learning techniques suitable for a given problem
- Solve the problems using various machine learning techniques
- Apply Dimensionality reduction techniques
- Design application using machine learning techniques

UNIT I

Introduction: Definition of learning systems, Goals and applications of machine learning, Aspects of developing a learning system: training data, concept representation, function approximation. Inductive Classification: The concept learning task, Concept learning as search through a hypothesis space, General-to-specific ordering of hypotheses, Finding maximally specific hypotheses, Version spaces and the candidate elimination algorithm, Learning conjunctive concepts, The importance of inductive bias.

UNIT II

Decision Tree Learning: Representing concepts as decision trees, Recursive induction of decision trees, Picking the best splitting attribute: entropy and information gain, Searching for simple trees and computational complexity, Occam's razor, Over fitting, noisy data, and pruning. Experimental Evaluation of Learning Algorithms: Measuring the accuracy of learned hypotheses. Comparing learning algorithms: cross-validation, learning curves, and statistical hypothesis testing.

UNIT III

Computational Learning Theory: Models of learn ability: learning in the limit; probably approximately correct (PAC) learning. Sample complexity for infinite hypothesis spaces, Vapnik-Chervonenkis dimension. Rule Learning: Propositional and First-Order, Translating decision trees into rules, Heuristic rule induction using separate and conquer and information gain, First-order Horn-clause induction (Inductive Logic Programming) and Foil, Learning recursive rules, Inverse resolution, Golem, and Progol.

UNIT IV

Support Vector Machines: Maximum margin linear separators. Quadractic programming solution to finding maximum margin separators. Kernels for learning non-linear functions.

UNIT V

Bayesian Learning: Probability theory and Bayes rule. Naive Bayes learning algorithm. Parameter smoothing. Generative vs. discriminative training. Logisitic regression. Bayes nets and Markov nets for representing dependencies. Instance-Based Learning: Constructing explicit generalizations versus comparing to past specific examples. K-Nearest-neighbor algorithm. Case-based learning.

Text Books:

1) T.M. Mitchell, “Machine Learning”, McGraw-Hill, 1997.
2) Machine Learning, Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das, Pearson, 2019.

Reference Books:

1) Ethern Alpaydin, “Introduction to Machine Learning”, MIT Press, 2004.
2) Stephen Marsland, “Machine Learning -An Algorithmic Perspective”, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.

III YEAR II SEM	Code: 20CS6D06	L	T	P	C
		4	1	0	3

BIG DATA ANALYTICS

Course Objectives:

1. To provide students with the fundamentals and essentials of Big Data and Hadoop.
2. Demonstrate various challenges in processing Big Data.
3. Demonstrate various concepts of Big Data and Hadoop.

Course Outcomes:

1. Understand about the HDFS and Hadoop architecture.
2. Identify appropriate techniques and tools to solve actual Big Data problems.
3. Understand and analyze the knowledge about the Pig and HIVE.
4. Obtaining the knowledge about the MongoDB and Spark.

UNIT I

Data structures in Java: Linked List, Stacks, Queues, Sets, Maps; Generics: Generic classes and Type parameters, Implementing Generic Types, Generic Methods, Wrapper Classes, Concept of Serialization

UNIT II

Working with Big Data: Google File System, Hadoop Distributed File System (HDFS) – Building blocks of Hadoop (Name node, Data node, Secondary Name node, Job Tracker, Task Tracker), Introducing and Configuring Hadoop cluster (Local, Pseudo-distributed mode, Fully Distributed mode), Configuring XML files.

UNIT III

Writing Map Reduce Programs: A Weather Dataset, Understanding Hadoop API for MapReduce Framework (Old and New), Basic programs of Hadoop Map Reduce: Driver code, Mapper code, Reducer code, Record Reader, Combiner, Partitioner.

UNIT IV

Hadoop I/O: The Writable Interface, Writable Comparable and comparators, Writable Classes: Writable wrappers for Java primitives, Text, Bytes Writable, Null Writable, Object Writable and Generic Writable, Writable collections. **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.

UNIT V

Applying Structure to Hadoop Data with Hive: Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables. **MongoDB**: What is MongoDB, use of MongoDB, difference of RDBMS and MongoDB, data types, MongoDB Query Language. **SPARK**: Introduction to Spark - Getting started, Resilient Distributed Dataset and Data Frames

Text Books:

1. ”BigData and Analytics” by SeemaArcharya and SubhashiniChellappan, Wiley publications.
2. “Learning Spark: Lightning-Fast Big Data Analysis” by Holden Karau, Oreilly publications.

Reference Books:

1. Hadoop in Practice by Alex Holmes, MANNING Publication.
2. Hadoop Map Reduce Cook book, SrinathPerera, ThilinaGunarathne

III YEAR II SEM	Code: 20CS6D07	L	T	P	C
		3	0	0	3

DISTRIBUTED SYSTEMS

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

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

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.

Text Books:

1. Ajay D Kshemkalyani, MukeshSighal, “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

III YEAR II SEM	Code: 20CS6D08	L	T	P	C
		3	0	0	3

NETWORK PROGRAMMING

Course Outcomes:

- After completion of the subject a student will be
- able to explore basics networking concepts
- able to demonstrate TCP socket programming
- able to illustrate UDP socket programming.
- able to demonstrate inter process communication.

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.

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.

UNIT V

IPC : Introduction, File and record locking, Pipes, FIFOs streams and messages, Name spaces, system IPC, Message queues, Semaphores.

Text Books:

1. UNIX Network Programming, Vol. I, Sockets API, 2nd Edition. - W.Richard Stevens, Pearson Edn. Asia.
2. UNIX Network Programming, 1st Edition, - W.Richard Stevens. PHI.

Reference Books:

1. UNIX Systems Programming using C++ T CHAN, PHI.
2. UNIX for Programmers and Users, 3rd Edition Graham GLASS, Kingabls, Pearson Education
3. Advanced UNIX Programming 2nd Edition M. J. ROCHKIND, Pearson Education

III Year - II Semester	Code: 20CS6E03	L	T	P	C
		3	0	0	3

MEAN STACK DEVELOPMENT

Course Outcomes:

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

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

UNIT I

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

UNIT II

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

UNIT III

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

UNIT IV

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

UNIT V

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

Text Books:

1) Programming the World Wide Web, Robet W Sebesta, 7ed, Pearson.
2) Web Technologies, Uttam K Roy, Oxford
3) Pro Mean Stack Development, ELadElrom, Apress
4) Restful Web Services Cookbook, Subbu Allamraju, O'Reilly
5) JavaScript & jQuery the missing manual, David sawyer mcfarland, O'Reilly
6) Web Hosting for Dummies, Peter Pollock, John Wiley Brand

Reference Books:

1) Ruby on Rails up and Running, Lightning fast Web development, Bruce Tate, Curt Hibbs, Oreilly (2006).
2) Programming Perl, 4ed, Tom Christiansen, Jonathan Orwant, Oreilly (2012).
3) Web Technologies, HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech.
4) An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning.

III YEAR II SEM	Code : 20CS6E05	L	T	P	C
		3	0	0	3

CLOUD COMPUTING

Course Objectives:

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

Course Outcomes:

1. Understanding the key dimensions of the challenge of Cloud Computing
2. Assessment of the economics, financial, and technological implications for selecting cloud computing for own organization

UNIT I

Systems modeling, Clustering and virtualization:

Scalable Computing over the Internet, Technologies for Network based systems, System models for Distributed and Cloud Computing, Software environments for distributed systems and clouds, Performance, Security And Energy Efficiency.

UNIT II

Virtual Machines and Virtualization of Clusters and Data Centers:

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

UNIT III

Cloud Platform Architecture:

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

UNIT IV

Cloud Programming and Software Environments:

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

UNIT V

Storage Systems:

Evolution of storage technology, storage models, file systems and database, distributed file Systems, general parallel file systems. Google file system. Apache Hadoop, BigTable, Megastore, Amazon Simple Storage Service (S3).

Text Books:

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

Reference Books:

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

III YEAR II SEM	Code: 20CS6L13	L	T	P	C
		0	0	3	1.5

COMPILER DESIGN LAB

1	Design a lexical analyzer for given language .the lexical analyzer should ignore redundant spaces, tabs and new lines.
2	Implement the lexical analyzer using JLex, flex or other lexical analyzer generating tool
3	Design predictive parser for the given language
4	Design a LALR bottom up parser for the given language
5	Convert the BNF rules into Yacc form and write code to generate abstract syntax tree.
6	Write program to generate machine code from the abstract syntax tree generated by the Parser .The following instruction set may considered as target code.
	Additional Experiments
1	Design Non Recursive predictive parser for the given language
2	Write a program to compute FIRST()& FOLLOW(A)
3	Operator Precedence Parsing

III YEAR II SEM	Code: 20CS6L14	L	T	P	C
		0	0	3	1.5

DATA MINING LAB

Course Objectives:

1. To understand the mathematical basics quickly and covers each and every condition of data mining in order to prepare for real-world problems
2. The various classes of algorithms will be covered to give a foundation to further apply knowledge to dive deeper into the different flavors of algorithms
3. Students should aware of packages and libraries of R and also familiar with functions used in R for visualization
4. To enable students to use R to conduct analytics on large real life datasets
5. To familiarize students with how various statistics like mean median etc and data can be collected for data exploration in R

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

1. Extend the functionality of R by using add-on packages
2. Examine data from files and other sources and perform various data manipulation tasks on them
3. Code statistical functions in R
4. Use R Graphics and Tables to visualize results of various statistical operations on data
5. Apply the knowledge of R gained to data Analytics for real life applications

List of Experiments:

1	Implement all basic R commands.
2	Interact data through .csv files (Import from and export to .csv files).
3	Get and Clean data using swirl exercises. (Use 'swirl' package, library and install that topic from swirl).
4	Visualize all Statistical measures (Mean, Mode, Median, Range, Inter Quartile Range etc., using Histograms, Boxplots and Scatter Plots).
5	Create a data frame with the following structure. EMP ID EMP NAME SALARY START DATE 1 Satish 5000 01-11-2013 2 Vani 7500 05-06-2011 3 Ramesh 10000 21-09-1999 4 Praveen 9500 13-09-2005 5 Pallavi 4500 23-10-2000 a. Extract two column names using column name. b. Extract the first two rows and then all columns. c. Extract 3rd and 5th row with 2nd and 4th column.
6	Write R Program using 'apply' group of functions to create and apply normalization function on each of the numeric variables/columns of iris dataset to transform them into i. 0 to 1 range with min-max normalization. ii. a value around 0 with z-score normalization.
7	Create a data frame with 10 observations and 3 variables and add new rows and columns to it using 'rbind' and 'cbind' function.
8	Write R program to implement linear and multiple regression on 'mtcars' dataset to estimate the value of 'mpg' variable, with best R2 and plot the original values in 'green' and predicted values in 'red'.

9	Implement k-means clustering using R.
10	Implement k-medoids clustering using R.
11	Implement density based clustering on iris dataset.
12	Implement decision trees using 'reading Skills' dataset.
13	Implement decision trees using 'iris' dataset using package party and 'rpart'.
14	Use a Corpus() function to create a data corpus then Build a term Matrix and Reveal word frequencies.

Text Books:

1) R and Data Mining: Examples and Case Studies, 1st ed, Yanchang Zhao, Sprnger, 2012.
2) R for Everyone, Advanced Analytics and Graphics, 2nd ed, Jared Lander, Pearson, 2018.

e-Resources:

1) www.r-tutor.com

III YEAR II SEM	Code : 20CS6L15	L	T	P	C
		0	0	3	1.5

WEB TECHNOLOGIES LAB

Course Objectives:

From the course the student will

1. Learn the core concepts of both the frontend and backend programming course
2. Get familiar with the latest web development technologies
3. Learn all about PHP and SQL databases
4. Learn complete web development process

Course Outcomes:

By the end of the course the student will be able to

5. Analyze and apply the role of languages like HTML, CSS, XML
6. Review JavaScript, PHP and protocols in the workings of the web and web applications
7. Apply Web Application Terminologies, Internet Tools, E – Commerce and other web services
8. Develop and Analyze dynamic Web Applications using PHP & MySql
9. Install & Use Frameworks

List of Experiments:

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

(a) **HOME PAGE:**

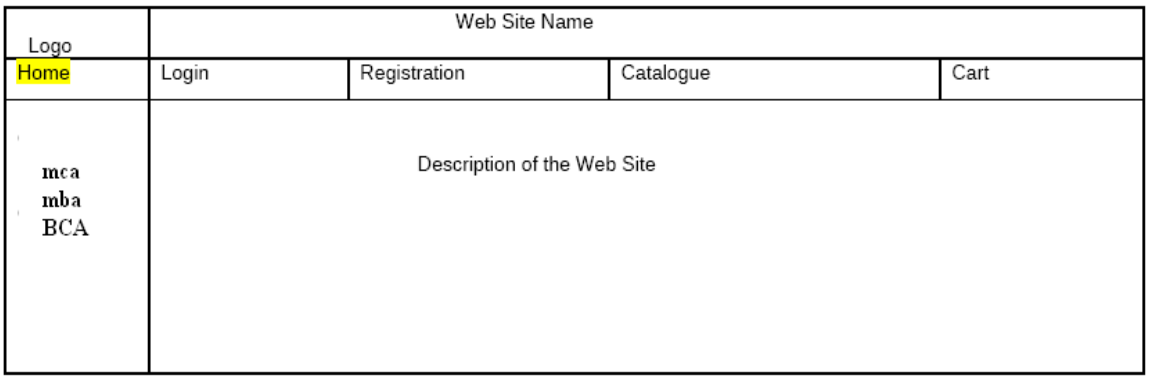
The static home page must contain three **frames**.

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.

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



(b) **LOGIN PAGE:**

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
MCA MBA BCA	Login : 11a51f0003 Password: ******** Submit Reset			

(c) **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.

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
MCA MBA		Book : XML Bible Author : Winston Publication : Wiely	$ 40.5	Add to cart
BCA		Book : AI Author : S.Russel Publication : Princeton hall	$ 63	Add to cart
		Book : Java 2 Author : Watson Publication : BPB publications	$ 35.5	Add to cart
		Book : HTML in 24 hours Author : Sam Peter Publication : Sam	$ 50	Add to cart

d). **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)

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

3) Design a dynamic web page with validation using JavaScript.

4) Design a HTML having a text box and four buttons viz Factorial, Fibonacci, Prime, and Palindrome. When a button is pressed an appropriate javascript function should be called to display

a. Factorial of that number b. Fibonacci series up to that number c. Prime numbers up to that number d. Is it palindrome or not
5) Write JavaScript programs on Event Handling a. Validation of registration form b. Open a Window from the current window c. Change color of background at each click of button or refresh of a page d. Display calendar for the month and year selected from combo box e. On Mouse over event
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 a) **Write a Document Type Definition (DTD) to validate the above XML file.** b) **Write a XML Schema Definition (XSD) to validate the above XML file.**
7) Create Web pages using AJAX.
8) User Authentication: Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 and pwd4 respectively. Write a PHP for doing the following. 1. Create a Cookie and add these four user id's and passwords to this Cookie. 2. Read the user id and passwords entered in the Login form (week1) and authenticate with the values (user id and passwords) available in the cookies. If he is a valid user (i.e., user-name and password match) you should welcome him by name (user-name) else you should display "You are not an authenticated user ''. Use init-parameters to do this.
9) Example PHP program for registering users of a website and login.
10) Install a database (Mysql or Oracle). Create a table which should contain at least the following fields: name, password, email-id, phone number (these should hold the data from the registration form). Write a PHP program to connect to that database and extract data from the tables and display them. Experiment with various SQL queries. Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page (week2).
11) Write a PHP which does the following job: Insert the details of the 3 or 4 users who register with the web site (week9) by using registration form. Authenticate the user when he submits the login form using the user name and password from the database (similar to week8 instead of cookies).
12) Implement a Servlet program on request response processing.
13) Implement a Servlet program for Registration Page.
14) Connect to a database using JSP and practice SQL Queries (MySql or Oracle).

III YEAR II SEM	Code: 20CS6S04	L	T	P	C
		0	0	3	1.5
Skill Advanced course: Game Development					
1	Mini – Game Project				
2	Coin Collection Game				
3	Adventure Game				
4	Car Race Game				
5	Puzzle Game				
Software's					
1	Unity 5.6.7f1				
2	Blender 2.79				
3	Krita				
4	World Machine				

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Detailed Syllabus – BR20
For UG - B.Tech: Computer Science and Engineering
IV Year I Semester

S.No	Course Code	Courses	L	T	P	Credits
1	20CS7D09 20CS7D10 20CS7D11 20CS7D12	**Professional Elective -III** 5. Cryptography and Network Security 6. Neural Networks 7. Ad-hoc and Sensor Networks 8. Cyber Security & Forensics/**MOOCs-3**	3	0	0	3
2	20CS7D13 20CS7D14 20CS7D15 20CS7D16	**Professional Elective -IV** 5. Software Testing Methodologies 6. Deep Learning Techniques 7. Social Networks & Semantic Web 8. Computer Vision	3	0	0	3
3	20CS7D17 20CS7D18 20CS7D19 20CS7D20	**Professional Elective -V** 5. Machine Learning 6. Block-Chain Technologies 7. Wireless Network Security 8. Ethical Hacking	3	0	0	3
4	20CS7E04 20CE7E03 20EC7E03 20EE7E03	**Open Elective -III** 5. Nature Inspired Computing Techniques 6. Disaster Management 7. Embedded Systems 8. Electrical Distribution Systems	2	0	2	3
5	20CS7E05 20EC7E04 20ME7E04 20CE7E04	**Open Elective- IV** 5. Secure Coding Techniques 6. 5G Communications 7. 3D Printing Technologies 8. Project Management	2	0	2	3
6	20HS7E01	**Humanity and Social Science Elective** 1.Resource Management 2. Industrial Management 3. Management Science 4. IPR and Patents	3	0	0	3
7	20HS7S01	English for Employability	1	0	2	2
8	20CS7P02	Industrial/Research Internship 2 months after III_I Evaluated during IV_I	0	0	6	3
		Total	17	0	6	23

IV Year - I Semester	Code: 20CS7D09	L	T	P	C
		3	0	0	3

CRYPTOGRAPHY AND NETWORK SECURITY

Course Outcomes:

By the end of the course the student

- ✓ Identify information security goals, classical encryption techniques
- ✓ Compare and apply different encryption and decryption techniques
- ✓ Apply the knowledge of cryptographic checksums and evaluate the performance of different message digest algorithms
- ✓ Apply different digital signature algorithms to achieve authentication
- ✓ Apply network security basics, analyze different attacks on networks and evaluate the performance of firewalls and security protocols like SSL, IPSec, and PGP

UNIT I

Introduction: Elements of Information security, Security attacks, services & mechanisms, A model of network security, Symmetric Cipher Model, Substitution Techniques, Transportation Techniques, Steganography

UNIT II

Block Ciphers & Symmetric Key Cryptography

Traditional Block Cipher Structure, Block Cipher Design Principles, Data Encryption Standard, AES-Structure, Transformation functions, Key Expansion.

UNIT III

Number Theory: Prime and Relatively Prime Numbers, Modular Arithmetic, Fermat's and Euler's Theorems, The Chinese Remainder theorem.

Public Key Cryptography: Principles, public key cryptography algorithms, RSA Algorithms, Diffie Hellman Key Exchange, Elgamal encryption & decryption.

UNIT IV

Cryptographic Hash Functions & Digital Signatures

Application of Cryptographic hash Functions, Requirements & Security, Secure Hash Algorithm, Message Authentication Functions, Requirements & Security, and HMAC & CMAC. Digital Signatures, NIST Digital Signature Algorithm. Key management & distribution.

UNIT V

Transport Level Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Shell (SSH), **Electronic Mail Security:** Pretty Good Privacy (PGP) and S/MIME.**P Security:** IP Security Overview, IP Security Architecture.

Text Books:

1. Cryptography & Network Security: Principles and Practices, William Stallings, PEA, Sixth edition.
2. Introduction to Computer Networks & Cyber Security, Chwan Hwa Wu, J.David Irwin, CRC press

Reference Books:

1. Everyday Cryptography, Fundamental Principles & Applications, Keith Martin, Oxford
2. Network Security & Cryptography, Bernard Menezes, Cengage, 2010

IV Year - I Semester	Code: 20CS7D10	L	T	P	C
		3	0	0	3

NEURAL NETWORKS

Course Outcomes:

- ✓ Understanding the alternative paradigm of conventional computing by machines called neural computing. This subject covers from basic neuron model to complex models, their learning algorithms and their applications.
- ✓ Explore learning processes in neural networks
- ✓ Illustrate single layer and multilayer neural networks.
- ✓ Illustrate recurrent neural networks.

UNIT I

INTRODUCTION - What is neural network? Human Brain, Models of a Neuron, Neural networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural Networks
LEARNING PROCESS – Error Correction learning, Memory based learning, Hebbian learning, Competitive, Boltzmann learning, Credit Assignment Problem, Memory, Adaption, Statistical nature of the learning process

UNIT II

SINGLE LAYER PERCEPTRONS – Adaptive filtering problem, Unconstrained Organization Techniques, Linear least square filters, least mean square algorithm, learning curves, Learning rate annealing techniques, perceptron –convergence theorem, Relation between perceptron and Bayes classifier for a Gaussian Environment

UNIT III

MULTILAYER PERCEPTRON – Back propagation algorithm XOR problem,
Heuristics, Output representation and decision rule, Computer experiment, feature detection,
BACK PROPAGATION - back propagation and differentiation, Hessian matrix, Generalization, Cross validation, Network pruning Techniques, Virtues and limitations of back propagation learning, Accelerated convergence, supervised learning.

UNIT IV

SELF ORGANIZATION MAPS – Two basic feature mapping models, Self Organization map, SOM algorithm, properties of feature map, computer simulations, learning vector quantization, Adaptive patter classification

UNIT V

Chapter objectives: **RECURRENT NW**, Architecture, Hopfield Network and Boltzman Machine, Statistical Hopfield Network, Associative Memory, Bidirectional Associative Memory, Temporal Associative Memory, Linear Associative Memory.

Text Books:

1. Jacek M. Zurada, **Introduction to Artificial Neural Systems**, PWS Publishing Company, 1995.
2. Gunamani Jena, R.B Singh, An Introductory Course on Artificial Neural Networks, Kindle Edition, Amazon.
3. Simon Haykin, Neural Networks: A Comprehensive Foundation, Macmillan College Publishing Company, 1994.

Reference Books:

1. Laurene Fausett, Fundamentals of Neural Networks: Architectures, Algorithms, and Applications, Prentice Hall International, Inc., 1994.
2. B. D. Ripley, Pattern Recognition and Neural Networks, Cambridge University Press., 1996
3. Mohamad H. Hassoun, Foundamentals of Artificial Neural Networks, The MIT Press, 1995.

IV Year - I Semester	Code: 20CS7D11	L	T	P	C
		3	0	0	3

ADHOC AND SENSOR NETWORKS

Course Outcomes:

By the end of the course the student

- Able to think and develop new applications in Manets and WSN.
- Able to take any new technical issue related to these new thrust areas and come up with a solution(s).
- Able to develop algorithms/protocols for Manets and WSN.
- Understand the issues and solutions of various layers of Manets, namely MAC layer, Network Layer & Transport Layer in Manets and WSN.
- Understand the issues in *Security and Sensor Network and Tools.*

UNIT I

Introduction to Ad Hoc Networks: Characteristics of MANETs, applications of MANETs, and challenges of MANETs. Routing in MANETs: Criteria for classification, Taxonomy of MANET routing algorithms, Topology based routing algorithms, Position based routing algorithms,

UNIT II

Data Transmission: Broadcast storm problem, Broadcasting, Multicasting and Geo casting

UNIT III

TCP over Ad Hoc: TCP protocol overview, TCP and MANETs, and Solutions for TCP over Ad hoc networks.

UNIT IV

Basics of Wireless Sensors and Applications: Applications, Classification of sensor networks, Architecture of sensor networks, Physical layer, MAC layer, Link layer.

UNIT V

Security: Security in ad hoc networks, Key management, Secure routing, Cooperation in MANETs, and Intrusion detection systems.

Text Books:

1. Ad hoc and Sensor Networks - Theory and Applications, by Carlos Cordeiro and Dharma P. Agrawal, World Scientific Publications, March 2006, ISBN 981-256-681-3.
2. Wireless Sensor Networks: An Information Processing Approach, Feng Zhao, Leonidas Guibas, Elsevier Science ISBN: 978-1-55860-914-3, (Morgan Kauffman)

Reference Books:

1. AD HOC AND SENSOR NETWORKS: THEORY AND APPLICATIONS 2ND EDITION, KINDLE EDITION

IV Year - I Semester	Code: 20CS7D12	L	T	P	C
		3	0	0	3

CYBER SECURITY & FORENSICS

Course Outcomes:

By the end of the course the student

- Able to explain about cyber crime
- Able to illustrate cyber offences.
- Able to describe cyber crime.
- Able to demonstrate tools and methods used in cyber crime.

UNIT I

Introduction to Cybercrime: Introduction, Cyber crime and Information Security, Who are Cybercriminals, Classifications of Cybercrimes, Cybercrime: The legal Perspectives and Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes.

UNIT II

Cyber Offenses: How Criminals Plan Them: Introduction, How Criminals plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector, Cloud Computing.

UNIT III

Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones.

UNIT IV

Tools and Methods Used in Cybercrime: Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horse and Backdoors, Steganography, DoS and DDoS attacks, SQL Injection, Buffer Overflow

UNIT V

Cyber Security: Organizational Implications, Introduction, Cost of Cybercrimes and IPR issues, Web threats for Organizations, Security and Privacy Implications, Social media marketing: Security Risks and Perils for Organizations, Social Computing and the associated challenges for Organizations.

Text Books:

1.Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole and Sunil Belapure, Wiley INDIA

Reference Books:

1. CYBER SECURITY ESSENTIALS, JAMES GRAHAM, RICHARD HOWARD AND RYAN OTSON, CRC PRESS.

2. INTRODUCTION TO CYBER SECURITY, CHWAN-HWA (JOHN) WU, J. DAVID IRWIN. CRC PRESS T&F GROUP

IV Year - I Semester	Code : 20CS7D13	L	T	P	C
		3	0	0	3

SOFTWARE TESTING METHODOLOGIES

Course Objectives:

1. To study the fundamental concepts of software testing which includes objectives, process, criteria, strategies, and methods.
2. To discuss various software testing types and levels of testing like black and white box testing along with levels unit test, integration, regression, and system testing.
3. It also helps to learn the types of bugs, testing levels with which the student can very well identify a bug and correct as when it happens.

Course Outcomes:

1. Know the basic concepts of software testing and its essentials.
2. Able to identify the various bugs and correcting them after knowing the consequences of the bug.
3. Use of program's control flow as a structural model is the corner stone of testing.
4. Performing functional testing using control flow and transaction flow graphs.

UNIT I

Introduction:-Purpose of testing, Dichotomies,model for testing, consequences of bugs, taxonomy of bugs, Flow graphs and Path testing:- Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

UNIT II

Transaction Flow Testing:-transaction flows, transaction flow testing techniques. Dataflow testing:- Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing.

UNIT III

Domain Testing:-domains and paths, Nice & ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability.

UNIT IV

Paths, Path products and Regular expressions:- path products &path expression, reduction procedure, applications, regular expressions & flow anomaly detection. Logic Based Testing:-overview, decision tables,path expressions,kv charts, specifications.

UNIT V

State, State Graphs and Transition testing:- state graphs, good & bad state graphs, state testing, Testability tips. Graph Matrices and Application:-Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools

Text Books:

1. Software Testing techniques – Boris Beizer, Dreamtech, second edition.
2. Software Testing Tools – Dr.K.V.K.K.Prasad, Dreamtech.

Reference Books:

1. The craft of software testing – Brian Marick, Pearson Education.
2. Software Testing Techniques – SPD(Oreille)
3. Software Testing in the Real World – Edward Kit, Pearson.
4. Effective methods of Software Testing, Perry, John Wiley.
5. Art of Software Testing – Meyers, John Wiley.

IV Year - I Semester	Code: 20CS7D14	L	T	P	C
		3	0	0	3

DEEP LEARNING TECHNIQUES

Course Objectives:

- Demonstrate the major technology trends driving Deep Learning
- Build, train and apply fully connected deep neural networks
- Implement efficient (vectorized) neural networks
- Analyze the key parameters and hyper parameters in a neural network's architecture

Course Outcomes:

- Demonstrate the mathematical foundation of neural network
- Describe the machine learning basics
- Differentiate architecture of deep neural network
- Build a convolutional neural network
- Build and train RNN and LSTMs

UNIT I

Linear Algebra: Scalars, Vectors, Matrices and Tensors, Matrix operations, types of matrices, Norms, Eigen decomposition, Singular Value Decomposition, Principal Components Analysis. Probability and Information Theory: Random Variables, Probability Distributions, Marginal Probability, Conditional Probability, Expectation, Variance and Covariance, Bayes' Rule, Information Theory. Numerical Computation: Overflow and Underflow, Gradient-Based Optimization, Constrained Optimization, Linear Least Squares.

UNIT II

Machine Learning: Basics and Under fitting, Hyper parameters and Validation Sets, Estimators, Bias and Variance, Maximum Likelihood, Bayesian Statistics, Supervised and Unsupervised Learning, Stochastic Gradient Descent, Challenges Motivating Deep Learning. Deep Feed forward Networks: Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation and other Differentiation Algorithms.

UNIT III

Regularization for Deep Learning: Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised Learning, Multi-Task Learning, Early Stopping, Parameter Tying and Parameter Sharing, Sparse Representations, Bagging and Other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, Tangent Prop and Manifold Tangent Classifier. Optimization for Training Deep Models

UNIT IV

Convolutional Networks: The Convolution Operation, Pooling, Convolution, Basic Convolution Functions, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features, Basis for Convolutional Networks.

UNIT V

Sequence Modeling: Recurrent and Recursive Nets: Unfolding Computational Graphs, Recurrent Neural Networks, Bidirectional RNNs, Encoder-Decoder Sequence-to-Sequence Architectures, Deep Recurrent Networks, Recursive Neural Networks, Echo State Networks, LSTM, Gated RNNs, Optimization for Long-Term Dependencies, Auto encoders, Deep Generative Models.

Text Books:

1) Ian Goodfellow, Yoshua Bengio, Aaron Courville, "Deep Learning", MIT Press,2016.
2) Josh Patterson and Adam Gibson,

Reference Books:

1) Fundamentals of Deep Learning, Designing next-generation machine intelligence algorithms, Nikhil Buduma, O'Reilly, Shroff Publishers, 2019.
2) Deep learning Cook Book, Practical recipes to get started Quickly, Douwe Osinga, O'Reilly, Shroff Publishers, 2019.

IV Year - I Semester	Code: 20CS7D15	L	T	P	C
		3	0	0	3

SOCIAL NETWORKS & SEMANTIC WEB

Course Outcomes:

- Ability to understand and knowledge representation for the semantic web.
- Ability to create ontology
- Ability to build a blogs and social networks

UNIT I

Thinking and Intelligent Web Applications, The Information Age ,The World Wide Web, Limitations of Today's Web, The Next Generation Web. Machine Intelligence, Artificial Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee www, Semantic Road Map, Logic on the semantic Web.

UNIT II

Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web – Resource Description Framework(RDF) / RDF Schema, Ontology Web Language(OWL),UML,XML/XML Schema. Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping.

UNIT III

Logic, Rule and Inference Engines. Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base.

UNIT IV

XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods, What is social Networks analysis, development of the social networks analysis, Electronic Sources for Network Analysis – Electronic Discussion networks.

UNIT V

Blogs and Online Communities, Web Based Networks. Building Semantic Web Applications with social network features.

Text Books:

1. Thinking on the Web - Berners Lee, Godel and Turing, Wiley interscience.
2. Social Networks and the Semantic Web, Peter Mika, Springer.

Reference Books:

1. Semantic Web Technologies, Trends And Research In Ontology Based Systems, J. Davies, Rudi Studer, Paul Warren, John Wiley & Sons.
2. Information Sharing On The Semantic Web - Heiner Stucken Schmidt; Frank Van Harmelen, Springer Publications.
3. Programming The Semantic Web, T. Segaran, C. Evans, J. Taylor, O'reilly, Spd.

IV Year - I Semester	Code: 20CS7D16	L	T	P	C
		3	0	0	3

COMPUTER VISION

Course Objectives:

To introduce students the fundamentals of image formation; To introduce students the major ideas, methods, and techniques of computer vision and pattern recognition; To develop an appreciation for various issues in the design of computer vision and object recognition systems; and To provide the student with programming experience from implementing computer vision and object recognition applications

Course Outcomes:

After completing the course Student will be able to:

1. Identify basic concepts, terminology, theories, models and methods in the field of computer vision,
2. Describe known principles of feature detection and matching,
3. Describe basic methods of computer vision related to image stitching, photography like high dynamic range imaging and blur removal.
4. Suggest a design of a computer vision system for a 3D Reconstruction, Albedos, image based rendering views and depths

UNIT I

Introduction: Image Formation: Geometric Primitives and Transformation, Photometric Image Formation, Digital Camera, Image Processing: Point Operators, Linear Filtering, More Neighborhood Operators, Fourier Transforms, Pyramids and Wavelets, Geometric Transformations, Global Optimization.

UNIT II

Feature Detection and Matching: Points and Patches, Edges, Lines, Segmentation: Active Contours, Split and Merge, Mean Shift and Mode Finding, Normalized Cuts, Feature-Based Alignment: 2D and 3D Feature-based Alignment, Pose Estimation, Geometric Intrinsic Calibration.

UNIT III

Structure and Motion: Triangular, Two-frame Structure from Motion, Factorization, Bundle Adjustment, Constrained Structure and Motion, Dense Motion Estimation: Translation Alignment, Parametric Motion, Spline-based Motion, Optical Flow, Layered motion.

UNIT IV

Image Stitching: Motion Models, Global Alignment, Composing, Computational Photography: Photometric Calibration, High Dynamic Range Imaging, Super-Resolution and Blur Removal, image Matting and Compositing, Texture Analysis and Synthesis.

UNIT V

3D Reconstruction: Shape From X, Active Range Finding, Surface Representation, Point-based Representation, Volumetric Representation, Model-based Reconstruction, Recovering Texture Maps and Albedos, Image- based Rendering: View Interpolation, Layered Depth Images, Light Fields and Lumigraphs, Environment Mattes, Video-based Rendering.

Text Books:

1. Richard Szeliski, Computer Vision: Algorithms and Applications, Springer-Verlag London Limited, 2011.
2. Simon J.D Prince, Computer Vision: Models, Learning and Inference, 1st Edition, 2012.

Reference Books:

1. Computer Vision - A modern approach, by D. Forsyth and J. Ponce, Prentice Hall Robot Vision, by B. K. P. Horn, McGraw-Hill.
2. Haralick& Shapiro, “Computer and Robot Vision”, Vol II

IV YEAR I SEM	Code : 20CS7D17	L	T	P	C
		3	0	0	3

MOBILE COMPUTING

Course Objectives:

4. Define mobile technologies in terms of hardware, software, and communications.
5. Utilize mobile computing nomenclature to describe and analyze existing mobile computing frameworks and architectures.
6. Evaluate the effectiveness of different mobile computing frameworks.

Course Outcomes:

1. Define mobile technologies in terms of hardware, software, and communications.
2. Utilize mobile computing nomenclature to describe and analyze existing mobile computing frameworks and architectures in Medium Access Control
3. Utilize mobile computing nomenclature to describe and analyze existing mobile computing frameworks and architectures in Mobile Network Layer

UNIT I

Introduction: Mobile Communications, Mobile Computing-Paradigm, Promises/Novel Applications and Impediments and Architecture; Mobile and Hand held Devices, Limitations of Mobile and Hand held Devices. GSM-Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Hand over, Security, New Data Services, GPRS.

UNIT II

(Wireless) Medium Access Control (**MAC**): Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA.TDMA, CDMA, Wireless LAN/(IEEE802.11).

UNIT III

Mobile Network Layer: IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, DHCP.

UNIT IV

Mobile Transport Layer: Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Transport Layer Protocols for Mobile Networks.

Database Issues: Database Hoarding & Caching Techniques, Client-Server Computing & Adaptation, Transactional Models, Query processing, Data Recovery Process & QoS Issues.

UNIT V

Data Dissemination and Synchronization: Communications Asymmetry, Classification of Data Delivery Mechanisms, Data Dissemination, Broadcast Models, Selective Tuning and Indexing Methods, Data Synchronization Introduction, Software, and Protocols

Text Books:

1. JochenSchiller, "MobileCommunications, Addison-Wesley SecondEdition, 2009.
2. RajKamal."MobileComputing" Oxford University Press, 2007 ISBN:0195686772

Reference Books:

ASOKE K TALUKDER, HASAN AHMED. ROOPA RYAVAGAL. "Mobile Computing. Technology Applications and Service Creation" Second Edition. McGraw Hill.
UWE Hansmann, Lother Merk, Martin S. Nocklous, Thomas Stober, "Principles of Mobile Computing", Second Edition, Springer.

IV Year - I Semester	Code: 20CS7D18	L	T	P	C
		3	0	0	3

BLOCKCHAIN 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 distributedapplications,
- Integrate ideas from block chain technology into their own projects.

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 andfunding.
- Identify the risks involved in building Block chain applications.
- Review of legal implications using smart contracts.

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, and 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.

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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WIRELESS NETWORK SECURITY

Course Outcomes:

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

1. Comprehend the fundamental concepts of mobile and wireless network security
2. Identify security threats in wireless networks and design strategies to manage network security
3. Design secured network application considering all possible threats

UNIT I

Security in General Wireless/Mobile Networks: High Performance Elliptic Curve Cryptographic Co-processor, An Adaptive Encryption Protocol in Mobile Computing

UNIT II

Security in Wireless LANs: Cross Domain Mobility Adaptive Authentication, AAA Architecture and Authentication for wireless LAN Roaming, Experimental Study on Security Protocols in WLANs

UNIT III

Security in Ad Hoc Networks: Pre-authentication and authentication models in Ad Hoc Networks, Promoting Identity-based key management, attacks and countermeasures, Secure and resilient data aggregation, Secure routing in MANET, Intrusion Detection System in MANET

UNIT IV

Security in Mobile Cellular Networks: Security issues in GSM, 3G and 4G networks, Authentication and encryption, Security concerns in 5G networks

UNIT V

Security in Sensor Networks and IoT: Security Issues, Key Management Schemes, Secure Routing in Sensor Networks, Energy-aware security mechanisms, Security and privacy issues in IoT, Identity and access management, Data Integrity, Best practices for IoT security

Text Books:

1. Y. Xiao, X. Shen, D. Z.Du, Wireless Network Security, Springer International Edition.
2. Lei Chen, JiahuangJi, Zihong Zhang, Wireless Network Security, Springer Science & Business Media
3. W. Stallings. Cryptography & Network Security: Principles and Practice, Prentice Hall
4. Noureddine Boudriga, Security of Mobile Communications, CRC Press
5. Levente Buttyán and Jean-Pierre Hubaux, Security and Cooperation in Wireless Networks, Cambridge University Press

Reference Books:

1. James Kempf, Wireless Internet Security: Architectures And Protocols, Cambridge University Press
2. Patrick Traynor, Patrick Mcdaniel, And Thomas La Porta, Security For Telecommunications Networks, Springer

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ETHICAL HACKING

Course Outcomes:

- Gain the knowledge of the use and availability of tools to support an ethical hack
- Gain the knowledge of interpreting the results of a controlled attack
- Understand the role of politics, inherent and imposed limitations and metrics for planning of a test
- Comprehend the dangers associated with penetration testing

UNIT I

Introduction: Hacking Impacts, The Hacker Framework: Planning the test, Sound Operations, Reconnaissance, Enumeration, Vulnerability Analysis, Exploitation, Final Analysis, Deliverable, Integration. **Information Security Models:** Computer Security, Network Security, Service Security, Application Security, Security Architecture. **Information Security Program:** The Process of Information Security, Component Parts of Information Security Program, Risk Analysis and Ethical Hacking

UNIT II

Planning for a Controlled Attack: Inherent Limitations, Imposed Limitations, Timing is Everything, Attack Type, Source Point, Required Knowledge, Multi-Phased Attacks, Teaming and Attack Structure

UNIT III

Preparing for a Hack: Technical Preparation, Managing the Engagement Reconnaissance: Social Engineering, Physical Security, Internet Reconnaissance

UNIT IV

Enumeration: Enumeration Techniques, Soft Objective, Looking Around or Attack, Elements of Enumeration, Preparing for the Next Phase. **Exploitation**: Intutive Testing, Evasion, Threads and Groups, Operating Systems, Password Crackers, RootKits, applications, Wardialing, Network, Services and Areas of Concern

UNIT V

Deliverable: The Deliverable, The Document, Overal Structure, Aligning Findings, Presentation **Integration:** Integrating the Results, Integration Summary, Mitigation, Defense Planning, Incident Management, Security Policy, Conclusion

Text Books:

1.James S. Tiller, "The Ethical Hack: A Framework for Business Value Penetration Testing", Auerbach Publications, CRC Press

Reference Books:

1. EC-COUNCIL, "ETHICAL HACKING AND COUNTERMEASURES ATTACK PHASES", CENGAGE LEARNING

2. MICHAEL SIMPSON, KENT BACKMAN, JAMES CORLEY, "HANDS-ON ETHICAL HACKING AND NETWORK DEFENSE", CENGAGE LEARNING

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NATURE INSPIRED COMPUTING TECHNIQUES

Course Objectives:

Learn the theoretical foundations of Nature Inspired Computing techniques, how they can be used to solve problems, and in which areas are most useful and effective.

Course Outcomes:

By completing the course the students will be able to:

- Understand the strengths, weaknesses and appropriateness of nature-inspired algorithms.
- Apply nature-inspired algorithms to optimization, design and learning problems.

UNIT I

Analysis of Algorithms: Analysis of Optimization Algorithms, Nature Inspired Algorithms, Parameter Tuning and Parameter Control: Parameter Tuning, Hyper optimization, Multi objective View, Parameter Control, Simulated Annealing: Algorithm, Basic Convergence Properties, Stochastic Tunneling

UNIT II

Genetic Algorithms: Introduction, Role of Genetic Operators, Choice of Parameters, GA Variants, **Differential Evolution:** Introduction, Differential Evolution, Variants, Choice of Parameters, Convergence Analysis, **Particle Swarm Optimization:** Swarm Intelligence, PSO Algorithm, Accelerated PSO, Binary PSO

UNIT III

Firefly Algorithms: Firefly Behavior, Standard Firefly Algorithm Variations of Light Intensity and Attractiveness, Controlling Randomization, Firefly Algorithms in Applications

Cuckoo Search: Cuckoo Breeding Behavior, Levy Flights, Cuckoo Search: Special Cases of Cuckoo Search, Variants of Cuckoo Search, Global Convergence, Applications

UNIT IV

Bat Algorithms: Echolocation of Bats: Behavior of Microbats, Acoustics of Echolocation, Bat Algorithms: Movement of Virtual Bats, Loudness and Pulse Emission, Binary Bat Algorithm, Variants of the Bat Algorithm, Convergence Analysis, Applications: Continuous Optimization, Combinatorial Optimization and Scheduling, Inverse Problems and Parameter Estimation, Classifications, Clustering and Data Mining, Image Processing, Fuzzy Logic and Other Applications

UNIT V

Flower Pollination Algorithms: Introduction, Characteristics of Flower Pollination, Flower Pollination Algorithms, Multi-Objective Flower Pollination Algorithms, Validation and Numerical Experiments: Single-Objective Test Functions, Multi-Objective Test Functions, Applications: Single-Objective Design Benchmarks, Multi-Objective Design Benchmarks

Text Books:

1. "Nature-Inspired Optimization Algorithms", Yang, Xin-She, Elsevier Science, 2014.

Reference Books:

1."Nature-Inspired Computing and Optimization: Theory and Applications," Germany: Springer International Publishing, 2017.

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SECURE CODING TECHNIQUES

Course Outcomes:

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

- Differentiate the objectives of information security
- Understand the trend, reasons and impact of the recent Cyber attacks
- Understand OWASP design principles while designing a web application
- Understand Threat modelling
- Importance of security in all phases of SDLC
- Write secure coding using some of the practices in C/C++/Java and Python programming languages

UNIT I

Network and Information security Fundamentals: Network Basics, Network Components, Network Types, Network Communication Types, Introduction to Networking Models, Cyber Security Objectives and Services, Other Terms of Cyber Security, Myths Around Cyber Security, Myths Around Cyber Security, Recent Cyber Attacks, Generic Conclusion about Attacks, Why and What is Cyber Security, Categories of Attack

UNIT II

Introduction to Cyber security: Introduction to OWASP Top 10, A1 Injection, A1 Injection Risks Root Causes and its Mitigation, A1 Injection, A2 Broken Authentication and Session Management, A7 Cross Site Scripting XSS,A3 Sensitive Data Exposure, A5 Broken Access Control, A4 XML External Entity (XEE), A6 Security Misconfiguration, A7 Missing Function Level Access Control, A8 Cross Site Request Forgery CSRF, A8 Insecure Deserialization, A9 Using Components With Known Vulnerabilities, A10 Unvalidated Redirects and Forwards, A10 Insufficient Logging and Monitoring, Secure Coding Practices, Secure Design Principles, Threat Modeling, Microsoft SDL Tool

UNIT III

Secure coding practices and OWASP Top 10: Declarative Security, Programmatic Security, Concurrency, Configuration, Cryptography, Input and Output Sanitization, Error Handling, Input Validation, Logging and auditing, Session Management, Exception Management, Safe APIs, Type Safety, Memory Management, Tokenizing, Sandboxing, Static and dynamic testing, vulnerability scanning and penetration testing

UNIT IV

Secure coding practices in C/C++ and Java: Potential Software Risks in C/C++, Defensive coding, Preventative Planning, Clean Code, Iterative Design, Assertions, Pre Post Conditions, Low level design inspections, Unit Tests

Java- Managing Denial of Service, Securing Information, Data Integrity, Accessibility and Extensibility, Securing Objects, Serialization Security

UNIT V

Secure coding in Python: Interactive Python Scripting, Python Variables, Conditionals, Loops, Functions, External Modules, File operations, Web requests

Text Books:

1. Networking Fundamentals, 2019 edition, Packt, Author: Gordon Davies
2. Principles of Information Security, Authors: Michael E. Whitman and Herbert J. Mattord, Course

technology incorp.
3. CSSLP SECURE SOFTWARE LIFECYCLE PROFESSIONAL ALL-IN-ONE EXAM GUIDE, Third Edition, 3rd Edition, Authors: Wm. Arthur Conklin, Daniel Paul Shoemaker, Released February 2022,Publisher(s): McGraw-Hill,ISBN: 9781264258215
4. OCP Oracle Certified Professional Java SE 11 Programmer II Study Guide: Exam 1Z0-816 and Exam 1Z0-817 Paperback – 6 August 2020, Authors: Scott Selikoff , Jeanne Boyarsky
5. OWASP 2017 Handbook,
https://owasp.org/www-pdf-archive/OWASP_Top_10_2017_RC2_Final.pdf

Web Reference :

1.https://www.stealthlabs.com/blog/infographic-top-15-cybersecurity- myths-vs-reality/
2. https://microage.ca/cybersecurity-layering-approach/
3.https://www.synopsys.com/glossary/what-is-threat-modeling.html#:~:text=Threat%20modeling%20is%20a%20structured,An%20abstraction%20of%20the%20system