ETERNAL UNIVERSITY

(Established Under Himachal Pradesh State Act No.3 of 2009)

STUDY SCHEME AND SYLLABUS

FOR

4 YEAR – UG COURSE

B.TECH CSE-2021-2022 (Onward)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

AKAL COLLEGE OF ENGINEERING& TECHNOLOGY

ETERNAL UNIVERSITY, BARU SAHIB, SIRMAUR H.P.

Vision & Mission of Department

Vision

To achieve academic & research excellence in the field of Computer Science and Engineering with industrial & social perspective.

Mission

- To provide environment for high quality academics, research and development.
- To disseminate sound knowledge of recent Computer Technologies by organizing seminar/workshops/short-term courses.
- To develop interaction/collaboration with the industry.

General, Course structure & Theme & Semester-wise credit distribution

A. Definition of Credit:-

1 Hr. Lecture (L) per week	1 credit
1 Hr. Tutorial (T) per week	1 credit
1 Hr. Practical (P) per week 2 Hours Practical(Lab)/week	0.5 credits 1 credit

B. Range of credits –

A range of credits from 150 to 160 for a student to be eligible to get Under Graduate degree in Engineering. A student will be eligible to get Under Graduate degree with Honours or additional Minor Engineering, if he/she completes an additional 20 credits. These could be acquired through MOOCs.

C. Structure of Undergraduate Engineering program:-

S. No.	Category	Suggested Breakup of Credits(Total 198)
1	Humanities and Social Sciences including Management courses	10*
2	Basic Science courses	11*
3	Engineering Science courses including workshop, music, Electronics/electrical/civil/mechanical/Carpentry NCC/NSS etc	25*
4	Professional core courses	58*
5	Professional online MOOC Elective courses relevant to chosen specialization/branch	16*
6	Open subjects – Electives from other technical and /or emerging Subjects	19*
7	Project work, seminar and internship in industry or elsewhere	30*
8	Mandatory Courses [Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Traditional Knowledge]	(non-credit)
	Total	169*

**Minor variation is allowed as per need of the respective disciplines.*

D. Credit distribution in the First year of Undergraduate Engineering program:

	Lecture (L)	Tutorial (T)	Laboratory/Practical (P)	Total credits (C)
Chemistry	3	1	3	5.5
Physics	3	1	3	5.5
Maths-1	3	1	0	4
Maths -2	3	1	0	4
Programming for Problem solving	3	0	4	5
English	2	0	2	3
Engineering Graphics & Design	1	0	4	3
Workshop/ Practicals	1	0	4	3
Basic Electrical Engg.	3	1	2	5
*Biology	2	1	0	3
*Engg. Mechanics	3	1	0	4
*Maths-3	3	1	0	4

**These courses may be offered preferably in the 3rd semester & onwards.*

E. Course code and definition:-

Course code	Definitions
L	Lecture
T	Tutorial
P	Practical
BSC	Basic Science Courses
ESC	Engineering Science Courses
HSMC	Humanities and Social Sciences including Management courses
PCC	Professional core courses
PEC	Professional Elective courses
OEC	Open Elective courses
LC	Laboratory course
MC	Mandatory courses
PROJ	Project

F. ENGINEERING SCIENCE COURSES

Sl. No.	Course Code	Course Title	Hours per week			Credits	Preferred semester
			L	T	P		
1	ESC101	Basic Electrical Engineering	3	1	2	5	I
2	ESC102	Engineering Graphics & Design	1	0	4	3	I
3	ESC103	Programming for Problem Solving	3	0	4	5	II
4	ESC104	Workshop/Manufacturing Practices	1	0	4	3	II

F. Structure of curriculum

Mandatory Induction Program

3 weeks duration
• Physical activity • Creative Arts • Universal Human Values • Literary • Proficiency Modules • Lectures by Eminent People • Visits to local Areas • Familiarization to Dept./Branch & Innovations

Semester-I

Degree in Computer Science & Engineering

Sr.NO	Course Code	Course Title	L	T	P	Project	Credit
1	HUM101	Business Communications Professional Skills	2	0	2		3
2	CSE101	Problem Solving and Programming	3	0	2		4
3	ETE103	Elements of Electronics Engineering	3	0	2		4
4	EMH111	Engineering Mathematics	3	0	0		3
5	EESL103	Basics Engineering Technology Lab	0	0	4		2
6	EPH101	Engineering Physics	2	0	0		2
7	ECH101	Engineering Chemistry	2	0	0		2
8	CSE102	Data Communication and Networking	3	0	2		4
	Total		18	0	12		24

DURATION: MINIMUM 45 DAYS (ONLINE)

Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations (**Students need to acquire knowledge of programming language certification during semester break. Evaluation will be in the first week of next semester on the basis of presentation and MOOC Lab will be evaluated after the presentation and evolution)** ***As per proposed AICTE framework for UG Courses***

Semester-II

Sr.NO	Course Code	Course Title	L	T	P	Project	Credit
1	EMH112	Numerical Analysis	3	0	2		4
2	CSE103	Data Structures and Algorithms	3	0	2		4
3	CSE104	Software Engineering	3	0	0		3
4	CSE105	Object Oriented Programming (C++)	2	0	4		4
5	EDU101	Human Values and Professional Ethics	2	0	0		2
6	EVS301	Environmental Studies	3	0	0		3
7	CSE106	IT Act & IPR	2	0	0		2
8	CSL107	Hardware Lab	0	0	4		2
9	TRG101	Induction Program (Non Credit)	0	0	0		0
	Total		18	0	12		24

Note: Syllabus will be revised in every academic year under supervision of standing committee including industry experts and external academic expert under the chairmanship of Dean ACET and Dean Academics. The committee will evaluate all subjects of both semesters according to the latest need of the industry and make changes in the syllabi and submit to Academic Council/COE before commencing current Academic Session.
The purpose of the revision is mainly to focus on hands on practice as per the need of latest Evolution happening.

DURATION: MINIMUM 45 DAYS (ONLINE)

Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations (**Students need to acquire knowledge of Basic Networking certification during semester break. Evaluation will be done in 1st week of Next Semester) – Every student have to prepare and give presentation in the starting of next semester under induction program.**

Semester –III							
Sr.No	**Course Code**	**Course Title**	**L**	**T**	**P**	**Project**	**Credits**
1	CSE201	Operating Systems	3	0	2		4
2	CSE202	Algorithm Analysis &Design	3	0	2		4
3	CSE203	Foundation of Data Science	3	0	0		3
4	CSE204	Database Management Systems	3	0	2		4
5	EEE201	Engineering Economics & Entrepreneurship	3	0	0		3
6	CSE205	Computer Graphics & Multimedia	3	0	2		4
7	EHU101	Divine Music Lab	0	0	2		1
8	TRG201	Induction Program (Non Credit)	0	0	0		0
	Total		18	0	10		23

DURATION: MINIMUM 45 DAYS (ONLINE)

Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations (Students need to acquire knowledge Networking during semester break. Evaluation will be done in 1st week of Next Semester) – Every student have to prepare and give presentation in the starting of next semester under induction program.

Semester –IV							
Sr.NO	**Course Code**	**Course Title**	**L**	**T**	**P**	**Project**	**Credits**
1	CSE206	Artificial Intelligence	3	0	0		3
2	CSE207	Computer Organization & Architecture	3	0	0		3
3	CSE208	Data Mining & Warehousing	3	0	0		3
4	CSE209	Computer Networks	3	0	2		4
5	CSE210	Statistical Foundations of Data Science	3	0	0		3
6	CSE211	System Software	3	0	2		4
7	CSL 212	Networking Lab	0	0	6		3
8	TRG202	Induction Program (Non Credit)	0	0	0		0
	Total		18	0	10		23

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The purpose of the revision is mainly to focus on hands on practice as per the need of latest Evolution happening.

DURATION: MINIMUM 45 DAYS (ONLINE)

Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations (**Students need to acquire knowledge of different programming languages during semester break. Evaluation will be done in 1st week of Next Semester) – Every student have to prepare and give presentation in the starting of next semester under induction program.**

Semester-V

Sr.NO	Course Code	Course Title	L	T	P	Project	
1	CSE301	Web Technologies	3	0	2		4
2	CSE302	Discrete Structure	3	0	0		3
3	CSE303	Compiler Design	3	0	2		4
4	CSE304	Network Programming	3	0	2		4
5	CSE305	Simulation and Modelling	3	0	2		4
6	CSL306	Introduction to Python Lab	0	0	4		2
7	TRG301	Induction Program (Non Credit)	0	0	0		0
	Total		15	0	12		21

DURATION: MINIMUM 45 DAYS (ONLINE)

Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations (**Students need to acquire knowledge of different programming languages during semester break. Evaluation will be done in 1st week of Next Semester) – Every student have to prepare and give presentation in the starting of next semester under induction program.**

Semester –VI

Sr.NO	Course Code	Course Title	L	T	P	Project	Credits
1	CSE307	Automata and Formal Languages	3	0	0		3
2	CSE308	Software Reliability & Testing	3	0	2		4
3	CSE309	Machine Learning	3	0	2		4
3		Professional Elective 1	3	0	0		3
4		Professional Elective 2	3	0	0		3
5	CSE310	Java Programming	3	0	2		4
6	PRJ301	Minor Project	0	0	2	2	1
7	TRG302	Induction Program (Non Credit)	0	0	0		0
	Total		18	0	6	2	22

Note: Syllabus will be revised in every academic year under supervision of standing committee including industry experts and external academic expert under the chairmanship of Dean ACET and Dean Academics. The committee will evaluate all subjects of both semesters according to the latest need of the industry and make changes in the syllabi and submit to Academic Council/COE before commencing current Academic Session.
The purpose of the revision is mainly to focus on hands on practice as per the need of latest Evolution happening.

DURATION: MINIMUM 45 DAYS (ONLINE)

Students must participate in Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations (**Students need to acquire knowledge of different programming languages and different project management tools and Techniques during semester break. Evaluation will be done in 1st week of Next Semester) – Every student have to prepare and give presentation in the starting of next semester under induction program.**

List of Electives

		Electives-I					
1	CSE311	Natural Language Processing	3	0	0		3
2	CSE312	Pattern Recognition	3	0	0		3
3	CSE313	Digital Image Processing	3	0	0		3
4	CSE314	Cloud Computing	3	0	0		3
5	CSE315	Distributed Systems	3	0	0		3
6	CSE316	Linux Programming	3	0	0		3
7	CSE317	Data or Information Cryptography	3	0	0		3
8	CSE318	Security in Computing	3	0	0		3
		Elective II					
1	CSE319	Computer Forensic & Digital Evidence	3	0	0		3
2	CSE320	Mobile Communication Systems	3	0	0		3
3	CSE321	Semantic Web	3	0	0		3
4	CSE322	Neural Networks	3	0	0		3
5	CSE323	Soft Computing	3	0	0		3
6	CSE324	Information Retrieval	3	0	0		3
7	CSE325	Intrusion Detection	3	0	0		3
8	CSE326	Ad-Hoc & Sensor Networks	3	0	0		3

Semester-VII							
Sr.No	**Course Code**	**Course Title**	**L**	**T**	**P**	**Project**	**Credits**
1	CSE401	Intro to Competitive Programming	3	0	2		4
2	CSE402	Mobile App Development	3	0	4		5
3	CSE403	Pega- A Digital Transformation Software Paradigm	2	0	2		3
4	CSE404	Introduction to Animation & Gaming	2	0	2		3
5	CSE405	Cloud Computing with AWS	3	0	4		5
6	TRG401	Induction Program (Non Credit)	0	0	0		2
		Total	13	0	12		22

Semester-VIII							
Sr.No	**Course Code**	**Course Title**	**L**	**T**	**P**	**Project**	**C**
1	PRJ401	Project and Industrial Training	0	0	2	2*8=16	8
2	NS102	NCC/NSS and Evaluation of overall Extra Curriculum Activities during last 4 years	0	0	0	4	2
	Total		0	0	0	20	10

SEMESTER –I

Course Code: HUM101 **L T P 2-0-2 Credit:3**

Course Title: Business Communication Professional Skills

OBJECTIVES

• To improve the students' accuracy and fluency in English through a well-developed vocabulary, and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different sociocultural and professional contexts.

• To enable students face competitive exams such as, GRE, TOEFL, IELTS, UPSC and other Bank examinations.

• To enable them communicate their ideas relevantly and coherently in writing.

UNIT I

Listening and speaking skills: Conversational skills (formal and informal), group discussion, making effective presentations using computers, listening/watching interviews conversations, documentaries. Listening to lectures, discussions, talk shows, new programmes, dialogues from TV/Radio/ Podcast.

UNIT II

Vocabulary and Usage: Word Formations (by adding suffixes and prefixes); Technical Word Formation; Synonyms, Antonyms, Homophones, and Homonyms; One Word Substitution; Misappropriations; Indianisms; Redundant Words; Phrasal Verb Idioms. English for national and international examinations and placements: International English Language Testing System (IELTS), Test of English as a Foreign Language (TOEFL), Civil Service (Language related) Verbal Ability.

UNIT III

Reading and writing skills: Reading different genres of tests ranging from newspapers to creative writing. Writing job applications: cover letter, resume, emails, letters, memos, reports. Writing abstracts, summaries, interpreting visual texts.

Technical Writing:

(A) Scientific Attitude and Impersonal Style; Plain Statements, Definitions; Description and Explanations (of objects, instruments, Processes, Scientific Principles, etc.) Summarizing and abstracting; Expressing ideas within a restricted word limit; Paragraph Writing (Paragraph division, introduction and the conclusion, Variety in sentences and paragraphs) Interpretation and use of charts, graphs and tables in technical writing.Punctuation

(B) Reading at various speeds (slow, fast, very fast); reading different kinds of texts for differentpurpose (e.g. for relaxation, for information, for discussion at a later stage, etc.); reading between the lines. Comprehension of Unseen Passages

UNIT IV

Soft skills: Motivation, self- image, goal setting, managing changes: time management, stress Management, leadership traits, team work, career and life planning emotional intelligence-Multiple intelligences- emotional intelligence, spiritual quotient, intercultural Communication, creative and critical thinking, learning styles and strategies.

Interview skills: Different types of Interview format, answering questions, offering information, mock interviews, body language(paralinguistic features), articulation of sounds, intonation.

TEACHING METHODS

• To be totally learner-centric with minimum teacher intervention as the course revolves around practice.

• Suitable audio/video samples from Podcast/YouTube to be used for illustrative purposes.

• Portfolio approach for writing to be followed. Learners are to be encouraged to blog, tweet, text and email employing appropriate language.

• GD/Interview/Role Play/Debate could be conducted off the laboratory (in a regular classroom) but learners are to be exposed to telephonic interview and video conferencing.

• Learners are to be assigned to read/write/listen/view materials outside the classroom as well for graining proficiency and better participation in the class.

TEXT BOOKS:

• Maison, Margaret M. Examine Your English, Hyderabad: Orient Longman, 1980

• Sharma, R.S. Technical Writing. Delhi: Radha Publication, 1999

• Sudarsanam, R. Understanding Technical English. Delhi: Sterling Publishers Pvt. Ltd., 1992

REFERENCES:

• Business English Certificate Materials, Cambridge University Press.
• Graded Examinations in Spoken English and Spoken English for Work downloadable materials from Trinity College, London.
• International English Language Testing System Practice Tests, Cambridge University Press.
• Interactive Multimedia Programs on Managing Time and Stress.
• Personality Development (CD-ROM), Times Multimedia, Mumbai.
• Robert M Sherfield and et al. "Developing Soft Skills" 4th edition, New Delhi: Pearson • Education, 2009.

WEB SOURCES:

• http://www.slideshare.net/rohitjsh/presentation-on-group-discussion
• http://www.washington.edu/doit/TeamN/present_tips.html
• http://www.oxforddictionaries.com/words/writing-job-applications
• http://www.kent.ac.uk/careers/cv/coveringletters.htm

OUTCOMES:

- To improve the students' accuracy and fluency in English through a well-developed vocabulary, and enable them to listen to English spoken at normal conversational speed by educated English
- To enable students face competitive exams such as, GRE, TOEFL, IELTS, UPSC and other Bank examinations
- To enable them communicate their ideas relevantly and coherently in writing
- Students will also exhibit advanced skills of interview, debating and discussion

List of Practicals

1. Phonetic Symbols and Transcriptions.
2. Extempore.
3. Group Discussion.
4. Dialogue Writing.
5. Listening comprehension.

Course Code: CSE101 **LTP: 3-0-2 Credit:4**

Course Title: Problem Solving and Programming

OBJECTIVES

- **To understand the concepts of Programming language.**
- **To learn the basics of C declarations, operators and expressions.**
- **To learn on the manipulation of strings, functions and pointers.**
- **To apply concepts and techniques for implementation**

Main Topics	Course outlines
Introduction to system	Introduction and characteristics of computer system, Generations, Classifications, Applications, Central Processing Unit, Memory, I/O devices, Introduction to operating system and its types, Algorithm, Flowchart.
C Programming Basics	Basic program construction, Structure of a C program, Compilation process, preprocessor directives, Comments, Data types, Type conversions, Operators - Arithmetic, Relational, Logical, Conditional, Increment/decrement, Library functions, Header files.
Loops and Decision Statements	*for* loop, *while* loop, *do* loop, Various forms of *if* statement, *switch* statement, *break* statement, *continue* statement, *go to* statement.
Functions	Defining functions, Passing arguments to functions, Returning values from functions, Reference arguments, Storage classes.
Pointers	Pointers, Pointers to pointers, Declaring and initializing pointers, Pointer expressions, Pointers and arrays, Pointers and strings.
Arrays	Arrays and strings, Declaring an array, Initializing arrays, Accessing the array elements, Working with multidimensional arrays, Declaring and initializing string variables, String handling functions.
Structures and Union	Declaring and initializing a structure, Accessing the members of a structure, Nested structures, Array of structures, Using structures in functions, Pointers and structures, Declaring and initializing a union.
Files	Reading and writing to text and binary files, Character I/O, String I/O, File pointers, Error handling, Redirection, Command line arguments.

Recommended Books:

1. Raja Raman V., Fundamentals of Computers, PHI.
2. Kernighan Brian W. and Ritchie, Dennis M., The C Programming language, Dorling Kingsley.

Balagurusamy E., Programming in ANSI C, TMH Publications

OUTCOMES

- To develop programs using the basic elements like control statements, Arrays and Strings .
- To solve the memory access problems by using pointers
- To understand about the dynamic memory allocation using pointers which is essential for
- utilizing memory

- To understand about the code reusability with the help of user defined functions.
- To develop advanced applications using enumerated data types, function pointers and nested structures.
- To understand the uses of preprocessors and various header file directives. uses
- of preprocessors and various header file directives.

LIST OF PRACTICALS

1. WAP to find multiplication and addition of two numbers.
2. WAP to swap two numbers without using third variable.
3. WAP to divide two input numbers (also check divide by 0 condition).
4. WAP to calculate temperature in Fahrenheit to Celsius using formula C= (F- 32)/1.8.
5. WAP to calculate Sum and Average of N numbers using sequence of statements.
6. WAP to convert integer arithmetic to a given number of day and month using switch case.
7. WAP to find maximum out of 3 numbers a, b &c using Control Statements (if, else, nested if, nested else).
8. WAP to find minimum out of 3 numbers a, b & c using Control Statements (if, else, nested if, else)
9. WAP to find whether entered number is palindrome or not.
10. WAP to check entered number is even or odd .
11. WAP to find whether entered year is leap year or not.
12. WAP to find factorial of positive integer using for loop.
13. WAP to input a number from 1 to 10 and print its table.
14. WAP to print all the number between 1 to 100 which are divisible by7 using the concept of loops.
15. WAP to generate Fibonacci series up to n using loops.
16. Write a program to calculate area of circle using function.
17. Write an iterative function to calculate factorial of given number.
18. Write a recursive function to calculate factorial of given number
19. WAP to find even & odd up to a given limit using the concept of array and loops.
20. WAP to reverse a string.
21. WAP to find addition of two matrix of n*n order using the concept of 2 dimensional array
22. WAP to find multiplication of two matrix of n*n order using the concept of 2 dimensional array.
23. WAP program to study the concept of structure.
24. WAP to implement the concept of switch and break statements.
25. WAP to implement the concept of continue statements.
26. WAP to create a data file, retrieve data from the file.

Course Code: ETE103 **LTP: 3-0-2 Credit:4**
Course Title: Elements of Electronics Engineering
Course Objectives:

- **The primary objective of this course is to prepare students for entry-level positions in the IT field within several different working environments**
- **A corporate or mobile environment with a high level of face-to-face client interaction. Job titles include enterprise technician, IT administrator, field service technician, and PC technician.**

UNIT 1

Introduction, Number Systems and codes

Introduction to the concept of Digital Electronics, Number systems, binary number system, octal number system, hexadecimal number system, signed and unsigned numbers, Arithmetic using Different Number Systems; Representation of Binary Number in Sign-Magnitude, Sign 1's & 2's Complement Notation; Rules for Addition and Subtraction with Complement.

UNIT II

Introduction to various types of codes

BCD, EBCDIC, ASCII, Extended ASCII, Gray and other Codes. Boolean Function and its Minimization. Simplification of Boolean Function using Boolean theorems; Canonical and Standard Forms(SOP and POS) for Boolean Functions etc,Combinational Logic Circuits Using Discrete Logic Gates Half & Full Adder; Half & Full Subtractor; Parity Generator and Checker; Code Converters; Carry look ahead generator; Binary Multiplier; Majority Circuits, Magnitude Comparator. Combinational Logic Using MSI Circuits, Introduction to Flip-flop Circuits, Sequential Logic Circuit Design & Counters

UNIT III

Introduction to Network Devices: ADSL Router, Wi-Fi Router, Wireless Access Point and Repeater, Firewall. Configuring and securing Wireless Networks and Access Points Providing Wireless Client Access with Secure Key and MAC Filtering. Introduction to Laptop Basic Hardware OS and Driver Installation for Laptops, Basic Troubleshooting of Laptops , Creating Backup/OS Recovery Media in branded Laptops and Desktops.

CC TV Camera settings and Installation

UNIT IV

Introduction and characteristics of computer system, Generations, Classifications, Applications, Central Processing Unit, Memory, I/O devices, Introduction to operating system and its types, Algorithm, Flowchart. Networking: Introduction to Networking / Types of Networking, Crimping RJ45 Connectors, Introduction to windows networking, Data Sharing, Printer Sharing, Remote Desktop Connection using , Virtual Network Computing using Real VNC, Creating Shared Folders for each user, Assigning Access Rights and Changing Ownership for Shared Folders using File Server Wizard, Installing, Configuring Windows Server, DNS, ADS, DHCP Configuration.

UNIT V

Introduction to Internet, Uses of Internet, Working on Internet using various browsers like IE, Chrome, Firefox, Opera, etc. Explaining URL, HTTP, HTTPS, etc. Clearing Browser Cache, Creating Mail ID's, Send / Receive Mails, Mail Client Configuration using Outlook/Thunderbird, etc, Internet Configuration using ADSL, Router/Broadband Modem. Introduction to Wireless Data Cards and 3G/4G Wi-Fi Dongles. Details about purchasing Software (OS, Application Software's, etc.) and Hardware Components, Internet Downloads (Tools, Software's, Device Drivers, Torrents, etc.) and Getting Online Support

Recommended Books:

1. Morris Mano: "Digital Logic and Computer Design", PHI.
2. Bartee Thomas: "Digital Computer Fundamentals", McGraw-Hill.
3. Raja Raman V., Fundamentals of Computers, PHI.
4. Kernighan Brian W. and Ritchie, Dennis M., The C Programming language, Dorling Kingsley.
5. Balagurusamy E., Computer Harware & Networking TMH Publications

Course Outcomes:

- **A remote-based work environment where client interaction, client training, operating systems, and connectivity issues are emphasized. Job titles include remote support technician, help desk technician, call center technician, IT specialist, and representative.**
- **Perform a step by step assembly of a desktop computer tower.**
- **Explain the purpose of preventive maintenance and identify the elements of the troubleshooting process**

LIST OF PRACTICALS

Perform conversions among different number systems, became familiar with basic logic gates and understand Boolean algebra and simplify simple Boolean functions by using basic Boolean properties & design of combinational circuits such as MUX, DEMUX, Encoder and Decoder etc
Understand the design of sequential Circuits such as Flip-Flops, Registers, Counters
Obtain a basic level of Digital Electronics knowledge and set the stage to perform the analysis and design of Complex Digital electronic Circuits

MS Office i) MIcrosoft Word ii) Microsoft Powerpoint
Operating system & installation steps
PHP & introduction to other web development tools
Microsoft -Access, Excel & Talley software basic working
Desktop assembly & basic trouble shootings.

Course Code:EMH111 **LTP: 3-0-0 Credit:3**
Course Title: Engineering Mathematics

COURSE OBJECTIVES:
• Gain the knowledge to develops the concepts of surface Z=fxy, its partial derivatives, Euler Theorem & modified Euler Theorem for homogenous function & deduction develops ability to solve problems related to partial derivatives.
• Learn to expand any functions of two variables in the ascending power of variables and also develops error and approximation, extremum value of a given function related to engineering application.
• Develops the ability to solve higher order & first degree linear non homogenous differential equation arising in various branch of engineering and related mathematical model develops arising to form mathematical modeling of Real World Problem with its physical interpretation.
• Solve some differential equation which is not solvable in ordinary case
• Develop the concepts of Differential equation and Ordinary Differential Equation with given boundary conditions which is helpful in all engineering & research work.

Calculus:
Improper integrals (Beta and Gamma functions) and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.

Sequences and Series:
Convergence of sequence and series, tests for convergence; Power series, Taylor's series, series for exponential, trigonometric and logarithm functions.

Fourier Series:
Periodic functions, Fourier series, Euler's formula, Change of intervals,Half range sine and cosine series, Parseval's theorem.

Multivariable Calculus (Differentiation): Limit, continuity and partial derivatives, directional derivatives, total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, curl and divergence.

Multivariable Calculus (Integration): Multiple Integration: Double integrals (Cartesian), change of order of integration in double integrals, Change of variables (Cartesian to polar).

Matrices:
Rank of a matrix, rank-nullity theorem; System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem, and Orthogonal transformation.

First order ordinary differential equations:
Linear and Bernoulli's equations, Exact equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type. CauchyEuler equation; Power series solutions including Legendre differential equation and Bessel differential equations. Order and Degree, Formation; Linear Partial differential Caluations of First order, Lagrange's Form, Non Linear Partial Differential equations of first order, Charpit's method, Standard forms.

REFERENCE BOOKS:
1. B.S. Grewal, "Elementary Engineering Mathematics", 13th Ed., 2008.
2. H.K. Dass, "Advanced Engineering Mathematics", S. Chand & Company, 9th Revised Edition, 2001.
3. Shanti Narayan, "Integral Calculus", S. Chand & Company, 1999.

4. Shanti Narayan, “Differential Caluculs”, S.Chand& Company, 1998

OUTCOMES

• Solve linear differential equations using Laplace transforms
• Evaluate multiple integrals and improper integrals
• Convert line integrals to area integrals
• Convert surface integrals to volume integrals CO5 Determine potential functions for irrotational force fields

Course Code:EESL103 **LTP: 0-0-4 Credit:2**
Course Title: Basic Engineering Technologies Lab
Objectives:

- To Study of different hand operated power tools, uses and their demonstration.
- To gain a good basic working knowledge required for the production of various engineering products.
- To provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field.
- To develop a right attitude, team working, precision and safety at work place.
- It explains the construction, function, use and application of different working tools, equipment and machines.
- To study commonly used carpentry joints.
- To have practical exposure to various welding and joining processes.
- Identify and use marking out tools, hand tools, measuring equipment and to work to

Basic Workshop Lab- Identification of tools and equipments for bench work-practice, safety practice and general guidelines. Fitting Practice: Demonstration, usage of tools, finishing and sizing MS-flats. Cutting and Filing. Demonstration of tools and equipment for welding, safety practices and general, Lap and Butt Joints & Basic tools used in Workshop

Carpentry Concept: Demonstration of power tools and equipment for carpentry, safety practices and general guidelines. Cutting, Plaining and Sizing. Measurement And Finishing. Nails filling various tools used for carpentry work.

Plumbing Practice: Demonstration – plumbing tools, symbols and joints. Demonstrations at home repair work. Joining GI pipes by threading, PVC pipes by gluing and cementing, various plumbing tools knowledge.

Basic of Electrical Concepts: Fluorescent lamp wiring, Stair case wiring, Measurement of electrical quantities-voltage current, power & power factor in RLC circuit, Residential house wiring using fuse, switch, indicator, lamp and energy meter, Measurement of energy using single phase energy meter, Measurement of resistance to earth of electrical equipment–

Basic of Electronic equipment's understanding & repair: Resistor Colour coding using digital multi-meter. Assembling electronic components on bread board. Measurement of ac signal parameters using cathode ray oscilloscope and function generator. Soldering and desoldering practice. AC & DC supply, rectifier, Transformers use & type, Repair maintenance & installation of electronics equipments like Washing Machine, microwave oven, steam iron, electric rice cooker mixer- grinder etc & Basic tools used in repair.

Civil Engineering Concept: Carry out various types of surveying like levelling, plane tabling, theodolite surveying, and tachometry and contouring; and use modern surveying techniques like total station, remote sensing, GIS and GPS. Prepare topographical plan survey building construction, RCC, concrete operations. Characteristics of stones – Marble, Kota stone, Granite, Sand, Trap, Basalt stone, Lime stone and Slate & bricks and tiles, cement and cement based products, lime, timber and wood based products, paints and varnishes, metals and other miscellaneous materials. Manufacturing of bricks & Basic tools used in civil engginering.

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

- Study and practice on machine tools and their operations
- Practice on manufacturing of components using workshop trades including pluming, fitting,carpentry, foundry, house wiring and welding.
- Identify and apply suitable tools for different trades of Engineering processes including
- drilling, material removing, measuring, chiseling.

Course Code:EPH101 **LTP: 2-0-0 Credit:2**
Course Title: Engineering Physics
OBJECTIVES
- **To understand the general scientific concepts required for technology.**
- **To apply the Physics concepts in solving engineering problems.**
- **To educate scientifically the new developments in engineering and technology.**
- **To emphasize the significance of Green technology through Physics principles**

Wave Optics:

Newton's Rings, Michelson's Interferometer, Fraunhofer Diffraction from a Single Slit. Diffraction grating: Construction, theory and spectrum, Resolving power and Rayleigh criterion for limit of resolution, Resolving power of diffraction grating, X-Ray diffraction and Bragg's Law.

Quantum Mechanics:

Introduction to quantum Mechanics, Wave-particle duality, Matter waves, Wave function and basic postulates, Time dependent and time independent Schrodinger's Wave Equation, physical interpretation of wave function and its properties, Applications of the Schrodinger's Equation: Particle in one dimensional and three dimensional boxes.

Coherence and Optical Fibers:

Spatial and temporal coherence: Coherence length; Coherence time and 'Q' factor for light, Visibility as a measure of Coherence and spectral purity, Optical fiber as optical wave guide, Numerical aperture; Maximum angle of acceptance and applications of optical fiber.

Laser:

Einstein's Theory of laser action; Einstein's coefficients; Properties of Laser beam, amplification of light by population inversion, Components of laser, Construction and working of He-Ne and semiconductor lasers, Applications of Lasers in Science, engineering and medicine.

Material Science & Semiconductor Physics:

Bonding in solids: covalent and metallic bonding, Energy bands in solids: Classification of solids as Insulators, Semiconductors and Conductors, Intrinsic and extrinsic semiconductors, Fermi dirac distribution function and Fermi energy, Conductivity in semiconductors, Hall Effect: Theory, Hall Coefficient and applications.

Introduction to Electromagnetism:

Divergence and curl of electrostatic field, Laplace's and Poisson's equations for electrostatic potential, Bio-Savart law, Divergence and curl of static magnetic field, Faraday's law, Displacement current and magnetic field arising from time dependent electric field, Maxwell's equations, Flow of energy and Poynting vector.

TEXT BOOKS:

1. A. Ghatak, "Optics"
2. N. Subrahmanyam and BrijLal, "Optics"
3. Jenkins and White, "Fundamentals of Optics"
4. C. Kittle, "Mechanics", Berkeley Physics Course, Vol.- I.
5. A. Beiser, "Concepts of Modern Physics"

OUTCOMES

- Solve engineering problems using the concepts of wave and particle nature of radiant energy Understand the use of lasers as light sources for low and high energy applications
- Understand the nature and characterization of acoustic design, nuclear accelerators and new materials
- Apply the concepts of light in optical fibers, light wave communication systems, and holography and for sensing physical parameters
- Understand theory of relativity and effect of oscillations

Course Code: ECH101 **LTP: 2-0-0 Credit:2**

Course Title: Engineering Chemistry

Course Objectives:

- **To bring adaptability to the concepts of chemistry and to acquire the required skills to become aperfect engineer.**
- **To impart the basic knowledge of atomic, molecular and electronic modifications which makes the student to understand the technology based on them.**
- **To acquire the knowledge of electrochemistry, corrosion and water treatment which are essentialfor the Engineers and in industry.**
- **To acquire the skills pertaining to spectroscopy and to apply them for medical and other fields.**

Water: Common impurities, hardness, determination of hardness by complexometric (EDTA method), Degree of hardness, Units of hardness Municipal water supply: Requisite of drinking water, Purification of water; sedimentation, filtration, disinfection, breakpoint chlorination. Boiler troubles: Scale and Sludge formation, Internal treatment methods, Priming and Foaming, Boiler corrosion and Caustic embrittlement Water softening; Lime-Soda process, Zeolite (Permutit) process, Demineralization process. Numerical problems based on Hardness, EDTA, Lime-Soda and Zeolite process.

Organic Fuels: Solid fuels: Coal, Classification of Coal, Proximate and Ultimate analyses of coal and its significance, Gross and Net Calorific value, Determination of Calorific value of coal by Bomb Calorimeter. Metallurgical coke, Carbonization processes; Otto-Hoffmann by product oven method. Liquid fuels : Advantages of liquid fuels, Mining, Refining and Composition of petroleum, Cracking, Synthetic petrol, Reforming, Knocking, Octane number, Anti-knocking agents, Cetane number Gaseous fuels; Advantages, manufacturing, composition and Calorific value of coal gas and oil gas, Determination of calorific value of gaseous fuels by Junker's calorimeter Numerical problems based on determination of calorific value (bomb calorimeter/Junkers calorimeter/Dulongs formula, proximate analysis & ultimate and combustion of fuel.

Corrosion and its control: Definition and significance of corrosion, Mechanism of chemical (dry) and electrochemical (wet) corrosion, galvanic corrosion, concentration corrosion and pitting corrosion. Protection from corrosion; protective coatings-galvanization and tinning, cathodic protection, sacrificial anode and modifications in design.

Engineering Materials:

Portland Cement; Definition, Manufacturing by Rotary kiln. Chemistry of setting and hardening of cement. Role of Gypsum. Glass: Definition, Manufacturing by tank furnace, significance of annealing, Types and properties of soft glass, hard glass, borosilicate glass, glass wool, safety glass Lubricants: Classification, Mechanism, Properties; Viscosity and viscosity index, flash and fire point, cloud and pour point.

TEXT BOOKS:

1. Physical Chemistry, by P.W. Atkins
2. Engineering Chemistry by P.C.Jain & M.Jain; Dhanpat Rai Publishing Company (P) Ltd., New Delhi.
3. Fundamentals of Molecular Spectroscopy, by C.N. Banwell
4. Organic Chemistry: Structure and Function by K.P.C. Volhardt and N.E.Schore, 5th Edition.
5. University Chemistry, by B.M. Mahan, Pearson IV Edition.
6. Engineering Chemistry (NPTEL Web-book), by B.L. Tembe, Kamaluddin and M.S. Krishnan

Course Outcomes:

The knowledge of atomic, molecular and electronic changes, band theory related to conductivity.
The required principles and concepts of electrochemistry, corrosion and in understanding the problem of water and its treatments.
The required skills to get clear concepts on basic spectroscopy and application to medical and other fields.
The knowledge of configurational and conformational analysis of molecules and reaction mechanisms.

Course Code: CSE102 L-T-P 3-0-2 Credit: 4
Course Title: Data Communication and Networking
Course Objectives

- Understand basics of computer networks
- Learn use of physical and datalink layer in networking
- Understand the concept of MAC and Network layer
- Learn various protocols used in transport and application layer

UNIT-I

Introduction & Basics of Computer Networks Need & Evolution of Computer Networks, Data communication and its components, Description of LAN, MAN, WAN, OSI and TCP/IP models with description of Data Encapsulation & peer to peer communication, Comparison of OSI and TCP/IP. Introduction to wired network, optical Network and wireless network, Flow of communication: Half duplex, duplex and full duplex, Communication Links: point to point , multipoint, physical and logical topologies, protocols and standards.

UNIT-II

Physical Layer Functions of physical layer-Bit representation and data rate: bandwidth, bit rate, baud rate, signals, low pass channels, band pass channels, digital versus analog bandwidth, transmission impairments and bit rate, need of encoding & modulation, Encoding techniques, Modulation techniques. Interfaces and media- Dispersion, Jitter, Latency and collision. Transmission Media – Guided media: Shielded twisted pair, Unshielded twisted pair, Coaxial cable, Optical Fiber cable, Unguided media: Propagation methods, electromagnetic spectrum, wireless transmission waves
Data link Layer Functions of data link layer, Framing, addressing, Error control: error detection and correction techniques-parity check, checksum, cyclic redundancy check, hamming code. Flow control: Simplex protocol, Sliding window protocols-Go Back by N and Selective Repeat

UNIT -III

Medium Access Sublayer and LAN architectures Access control, Multiple Access protocols-ALOHA, CSMA, CSMA/CD CSMA/CA, Controlled access methods: Reservation, polling ,token passing, LAN architectures: Ethernet 802.3: traditional, fast & gigabit ethernet, Token Bus, Token Ring, LAN & WAN devices – Router, bridge, switch, HUB, Modem etc. Switching techniques.
Network Layer Functions of network layer, , Network layer addressing, , IP addressed classes. Subnetting : Sub network, Subnet mask. Dynamic address Configuration, Autonomous system, Routing Protocols-Interior routing protocols : RIP, IGRP, OSPF and EIGRP, Exterior routing protocols : BGP. Network-layer data gram, IP protocol.

UNIT-IV

Transport Layer Functions of transport layer, Client Server Model, port address, socket address, Protocols: TCP & UDP. Three-way handshakes open connection. Application Layer Application layer design issue. Application layer Protocol: TELNET, FTP, HTTP, SMTP, WWW and recent development.

Recommended Books:

1. Tanenbaum, Computer Network, Prentice Hall India
2. William Stalling, Data and Computer Communication, Prentice Hall
3. Douglas E. Comer, Internetworking with TCP/IP Volume – I, Prentice Hall India
4. W. Richard Stevens, TCP/IP Illustrated Volume-I, Pub. Addison Wesley
5. B. Forouzan, Data Communication And Networking, TMH

Course Outcomes:

- Understand the rudiments of how computers communicate.
- Be familiar with the architecture of a number of different networks.
- Understand the principles of protocol layering.
- Be familiar with modern communication systems.
- Understand the basic aspects of packet-based protocol design and implementation.

LIST OF PRACTICALS

1. Introduction to LAN with its cables, connectors and topologies.
2. To connect two personnel computer with straight thru and cross over twisted pair.
3. Introduction to motherboard and installation of LAN card.
4. Case study of Ethernet (10 base 5,10 base 2,10 base T).
5. Create a simple network with two PCs using a hub.
    a. Identify the proper cable to connect the PCs to the hub
    b. Configure workstation IP address information.
    c. Test connectivity using the Ping command
    d. Installation and working of Telnet.
6. Implement the ALOHA protocol for packet communication between a number of nodes connected to a common bus.
7. Implement the ALOHA protocol for packet communication between a number of nodes connected to a star topologies.

SEMESTER-II

Course Code : EMH112 **LTP 3-0-2 Credit:4**
Course Title:Numerical Analysis
Course Objectives:

- Understand the errors, source of error and its effect on any numerical computations and also analysis the efficiency of any numerical algorithms.
- Learn how to obtain numerical solution of nonlinear equations using bisection, secant, newton, and fixed-point iteration methods.

Floating-Point Numbers: Floating-point representation, rounding, chopping, error analysis, conditioning and stability.

Non-Linear Equations: Bisection, secant, fixed-point iteration, Newton method for simple and multiple roots, their convergence analysis and order of convergence.

Linear Systems and Eigen-Values: Gauss elimination method using pivoting strategies, LU decomposition, Gauss-Seidel and successive-over-relaxation (SOR) iteration methods and their convergence, ill and well conditioned systems, Rayleigh's power method for eigen-values and eigen-vectors.

Interpolation and Approximations: Finite differences, Newton's forward and backward interpolation, Lagrange and Newton's divided difference interpolation formulas with error analysis, least square approximations.

Numerical Integration: Newton-Cotes quadrature formulae (Trapezoidal and Simpson's rules) and their error analysis, Gauss-Legendre quadrature formulae.

Differential Equations: Solution of initial value problems using Picard, Taylor series, Euler's and Runge-Kutta methods (up to fourth-order), system of first-order differential equations.

Text Books / Reference Books

- Curtis F. Gerald and Patrick O. Wheatley, Applied Numerical Analysis, Pearson, (2003) 7th Edition.
- M. K. Jain, S .R. K. Iyengar and R. K. Jain, Numerical Methods for Scientific and Engineering Computation, New Age International Publishers (2012), 6th edition.
- Steven C. Chappra, Numerical Methods for Engineers, McGraw-Hill Higher Education; 7 th edition (1 March 2014)
- J. H. Mathew, Numerical Methods for Mathematics, Science and Engineering, Prentice Hall, (1992) 2nd edition,
- Richard L. Burden and J. Douglas Faires, Numerical Analysis, Brooks Cole (2004), 8th edition.
- K. Atkinson and W. Han, Elementary Numerical Analysis, John Willey & Sons (2004), 3rd Edition

Course Outcomes

- Solve system of linear equations numerically using direct and iterative methods.
- Understand how to approximate the functions using interpolating polynomials.
- Learn how to solve definite integrals and initial value problems numerically.

LIST OF PRACTICALS

Lab experiments will be set in consonance with materials covered in the theory. Implementation of numerical techniques using MATLAB.

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

- Understand the errors, source of error and its effect on any numerical computations and also analysis the efficiency of any numerical algorithms.
- Learn how to obtain numerical solution of nonlinear equations using bisection, secant, newton, and fixed-point iteration methods.
- Solve system of linear equations numerically using direct and iterative methods.
- Understand how to approximate the functions using interpolating polynomials.
- Learn how to solve definite integrals and initial value problems numerically.

2. Brief list of topics to be covered

- Floating-Point Numbers
- Non-Linear Equations
- Linear Systems and Eigen-Values
- Interpolation and Approximations
- Numerical Integration
- Differential Equations

Title of the course: Data Structures and Algorithms
Subject Code: CSE103 LTP 3-0-2 Credit: 4

OBJECTIVES

• To study various data structure concepts like Stacks, Queues, Linked List, Trees and Files
• To overview the applications of data structures
• To be familiar with utilization of data structure techniques in problem solving
• To have a comprehensive knowledge of data structures and algorithm
• To carry out asymptotic analysis of algorithm

UNIT-I

Introduction Basic concepts and notations; Data structures and data structure operations; Mathematical notation and functions; Algorithmic complexity and time-space trade off. Recursion; Types of recursion; Examples of recursion – the exponential power of a number, Fibonacci numbers, the greatest common divisor, towers of Hanoi.

UNIT-II

Arrays Introduction; One-dimensional array – storage, traversing, insertion, deletion, searching; Multidimensional arrays – two-dimensional arrays, general multidimensional arrays; String processing and manipulation. Linked List Introduction; Basic concepts of linked list – memory representation, building a linked list, traversing, insertion, deletion, searching; Doubly linked list; Merging two lists; Header linked list; Circular linked list.

UNIT-III

Stacks & Queues Stack, Representation of stack, Implementation of stack; Polish notation; Queues; Implementation of queues; Circular queues; Double ended queues; Priority queues.Trees Binary trees; Complete binary trees; Extended binary tree; Representation of binary tree; Insertion and deletion from the binary tree; Tree traversals using in-order, pre-order and post-orders; Applications of binary tree; search tree; Heap tree, Balanced binary tree; B-trees.

UNIT-IV

Graphs Basic concepts & definitions; Representation of graph – Adjacency list, Adjacency matrix; Path matrix, Graph traversal – BFS, DFS; Shortest path algorithms. Sorting & Searching Linear search; Binary search; Bubble sort; Insertion sort; Quick sort; Selection sort; Merge sort; Heap sort; Selection sort, Hashing Techniques.

Recommended Books:

1. Lipschutz, Schaum Series, Data Structures , TMH.
2. A. M. Tanenbaum, Data Structures using C and C++, Pearson Education.
3. Trembley Sorenson, Introduction to Data Structures with Applications, TMH.

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

- **Learn the program independent view of data structures, including their representation**
- **and the operations performed on them**
- **Familiar with the utilization of the data structures in problem solving**
- **Learn how to analyze the time and space requirements of a given algorithm**

LIST OF PRACTICALS

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

Design, implement, test, and debug programs using a variety of data structures including linked lists, stacks, queues, binary search trees, heaps and graphs
Implement and know when to apply standard algorithms for searching and sorting
Learn to choose the appropriate data structure and algorithm design method for a specified application

1. WAP to generate Fibonacci Series using recursion.
2. Write a function that interchanges the first element with last element, second element with second last element and so on.
3. WAP to multiply two Matrices.
4. Write a Function that removes all duplicate elements from an Array.
5. WAP that insert an element in beginning of Linear Link List.
6. WAP that delete an element from the beginning of the Linear Link List.
7. WAP that delete an element from the end of the Linear Link List.
8. WAP that delete an element after a given element of the given Linear Link List.
9. WAP that reverse the element of the Linear Link List.
10. WAP that concatenate two Linear Linked List.
11. WAP to remove the Top element of Stack.
12. WAP to insert (or push) an element at the Top of Stack.
13. WAP to insert an element at the end of queue.
14. WAP to remove the first element of the queue.
15. WAP to illustrate the implementation of Binary Search Tree.
16. WAP to sort an array of integer in Ascending Order using Bubble Sort.
17. WAP to sort an array of integer in Ascending Order using Insertion Sort.
18. WAP to sort an array of integer in Ascending Order using Quick Sort.
19. WAP to search an element using Linear Search Method.
20. WAP to search an element using Binary Search Method.

Course Code:CSE104 **LTP 3-0-0 Credit:3**

Title of the course: Software Engineering

OBJECTIVES

- **To learn about generic models of software development process.**
- **To understand fundamental concepts of requirements engineering and Analysis Modelling.**
- **To understand the different design techniques and their implementation.**
- **To learn various testing and maintenance measures**

Unit-I

Evolving role of Software Introduction to Software Engineering, importance of Software, The Software Evolution, Software Characteristics, Software Applications, Software Crisis: Problem and Causes.Software Development Life Cycle Models Build and fix model, Waterfall model, Prototyping Model, RAD Model, Incremental Model, Spiral Model, Selection of a life cycle model

UNIT-II

S/W scope resources, estimation, decomposition techniques, empirical estimation models. Project scheduling, refinement of major tasks, scheduling project plan, Software reliability Software reliability models, Software quality, software quality ISO standards, Capability Maturity Model, The system engineering hierarchy information engineering, information strategy planning, requirement analysis, analysis principles

UNIT-III

Software Testing Software testing Fundamentals, Test Case design, White box testing, Basis path testing, Control structure testing, Black box testing. Post implementation review Review plan. S/W maintenance and enhancement procedure. System security.

UNIT-IV

Reverse Engineering Scope, Levels of reverse engineering, tools, software re-engineering, documentation. Control Measures Threats & control measures, disaster/recovery planning, ethics in system development, ethics codes & standard of behaviour.

Recommended Books:

1. Roger S. Pressman, Software Engineering, A Practitioner's Approach, McGrawHill International Edition.
2. Ian Sommerville, Software Engineering, Addison-Wesley Publishing Company
3. James F. Peter, Software Engineering - An Engineering Approach, John Wiley
4. Pankaj Jalote, An integrated Approach to Software Engineering, Narosa.

Course Outcomes:

- Gain understanding of software development life cycle
- Prepare SRS document for a software project
- Apply software design and development techniques
- Apply estimation techniques for software development
- Implement testing at each phase of SDLC

Course Code: CSE105 **L T P 2-0-4 Credit-4**
Course Title: Object Oriented Programming (C++)

Objectives:

- **Understand the difference between object oriented programming and procedural programming Choose data types and structures to solve mathematical and scientific problems**
- **Write programs using C++ features such as composition of objects, operator overloading, inheritance, polymorphism etc.**
- **Simulate the real world problems into object-oriented programs**
- **Illustrate the process of data file manipulations using C++**

Unit-I

Introduction Basic concepts of object-oriented programming, Characteristics of object-oriented programming,Comparison between procedural programming paradigm and object-oriented programming paradigm. Classes and Objects Specifying a class, Creating class objects, Accessing class members, Access specifiers – public, private, and protected, Static members variables and functions, Static class objects, The const keyword, Friend functions, Friend classes, Empty classes, Nested classes, Local classes, Abstract classes, Container classes.

UNIT-II

Constructors and Destructors Need for constructors and destructors, Default constructor, Parameterized constructor, Copy constructor, Dynamic constructors, Destructors, Constructors and destructors with static members. Inheritance Introduction, Defining derived classes, Forms of inheritance, Ambiguity in multiple and multipath inheritance, Virtual base class, Object slicing, Overriding member functions, Object composition and delegation, Order of execution of constructors and destructors.

UNIT-III

Virtual Functions and Polymorphism Concept of Binding - Early binding and late binding, Virtual functions, Pure virtual functions, Abstract classes, Virtual destructors & polymorphism. Operator Overloading and Type Conversion Defining operator overloading, Rules for overloading operators, Overloading of unary operators and binary operators, Overloading of new and delete operators, Type conversion - Basic type to class type, Class type to basic type, Class type to another class type.

UNIT-IV

Pointers and Dynamic Memory Management Understanding pointers, Accessing address of a variable, Declaring & initializing pointers, Accessing a variable through its pointer, Pointer arithmetic, Pointer to a pointer, Pointer to a function, Dynamic memory management - new and delete Operators, Pointers and classes, Pointer to an object, Pointer to a member, this Pointer, Self-referential classes, Possible problems with the use of pointers - Dangling/wild pointers, Null pointer assignment, Memory leak and allocation failures. Exception Handling and Managing Data Files Exception and its types, Exception handling mechanisms, File streams, Hierarchy of file stream classes, Error handling during file operations, Reading/Writing of files, Accessing records randomly, Updating files, Data formatting in memory buffers.

TEXT BOOKS:

1. The Complete Reference C++, 4th Edition, Herbert Schildt, Tata McGraw Hill.
2. Problem solving with C++: The Object of Programming, 4th Edition, Walter Savitch, Pearson Education.

REFERENCE BOOKS:

1. The C++ Programming Language, 3rd Edition, B. Stroutstrup, Pearson Education.
2. OOP in C++, 3rd Edition, T. Gaddis, J. Walters and G. Muganda, Wiley Dream Tech Press.
3. Object Oriented Programming in C++, 3rd Edition, R. Lafore, Galigotia Publications Pvt Ltd.

OUTCOMES

The student will be able to:

- Understand the Object oriented programming fundamentals
- Develop ability to design algorithms and use functions, strings and pointers
- Write computer programs to solve practical engineering problems
- Design efficient computer programs to solve practical engineering problems

LIST OF PRACTICALS

1. WAP to check a given number is even or odd using function.
2. WAP to generate Fibonacci series up to n using loops
3. Write an iterative function to calculate factorial of given number.
4. Write a recursive function to calculate factorial of given number.
5. Write a program using function to calculate the addition of array elements.
6. Write a program that uses a class where the member functions are defined inside a class.
7. Write a program that uses a class where the member functions are defined outside a class.
8. WAP to create a Class Employee with the following specifications:

private members: name [20] characters,
Employee_ ID int, Basic, DA, HRA Float salary Float
calculate_sal() function computes the salary and returns it. Salary is the sum of Basic, DA and HRA.
public members: Readdata() function accepts the data values and invokes the calculate() function.Display () function shows the results on screen.

9. Write a program to demonstrate the use of static data members.
10. Write a program to demonstrate the use of const data members.
11. Write a program to demonstrate the use of zero argument andparameterized constructors.
12. Write a program to demonstrate the use of copy constructors.
13. Write a programs which show the concept of Single/Multiple/Multilevel/Hybrid Inheritance.
14. Write a program to show the concept of function overloading.
15. Write a program to demonstrate the compile time polymorphism.
16. Write a program to demonstrate the runtime polymorphism.
17. Write a program to demonstrate the overloading of binary arithmetic operators.
18. Write a program to demonstrate the overloading of increment and decrement operators.
19. Write a program to demonstrate the typecasting of basic type to class type.
20. Write a program to demonstrate the typecasting of class type to basic type.
21. Write a program to demonstrate the typecasting of class type to class type.
22. Write a program to show the concept of pointer.
23. Write a program to illustrate the use of friend function.
24. Write a program to copy the contents of a file to another file.
25. Write a program to demonstrate the reading and writing of mixed type of data in file.
26. Write a program to demonstrate the reading and writing of objects in file.

Note: The above mentioned list of experiments is suggested list. Teacher may add more programs/ experiments as per requirement.

Course Code: EDU101 **L T P 2- 0- 0 Credit:2**
Course Title: Human Values and Professional Ethics

OBJECTIVES

• To help individuals think about and reflect on different values.

• To deepen understanding, motivation and responsibility with regard to making personal and social choices and the practical implications of expressing them in relation to themselves, others, the community and the world at large.

• To inspire individuals to choose their own personal, social, moral and spiritual values and be aware of practical methods for developing and deepening

UNIT-I

Course Introduction - Need, Basic Guidelines, Content and Process for Value Education Understanding the need, basic guidelines, content and process for Value Education. Self Exploration- what is it? - its content and process; „Natural Acceptance and Experiential Validation- as the mechanism for self exploration. Continuous Happiness and Prosperity- A look at basic Human Aspirations Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly -A critical appraisal of the current scenario. Method to fulfill the above human aspirations: understanding and living in harmony at various levels

UNIT-II

Understanding Harmony in the Human Being - Harmony in Myself!

Understanding human being as a co-existence of the sentient "I" and the material "Body" Understanding the needs of Self ("I") and "Body" - Sukh and Suvidha. Understanding the Body as an instrument of "I" (I being the doer, seer and enjoyer).Understanding the characteristics and activities of "I" and harmony in "I". Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Swasthya.

UNIT-III

Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

Understanding harmony in the Family- the basic unit of human interaction. Understanding values in human-human relationship; meaning of Nyaya and program for its fulfilment to ensure Ubhaytripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship. Understanding the meaning of Vishwas; Difference between intention and competence.Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals. Visualizing a universal harmonious order in society- Undivided Society (*AkhandSamaj),* Universal Order (*SarvabhaumVyawastha)*- from family to world family.

UNIT-IV

Understanding Harmony in the Nature and Existence - Whole existence as Co-existence

Understanding the harmony in the Nature.Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature.Understanding Existence as Coexistence(Sah-astitva) of mutually interacting units in all-pervasive space. Holistic perception of harmony at all levels of existence.

RECOMMENDED BOOKS:

1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Value Education.

SUGGESTED READINGS / BOOKS:

2. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
3. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
4. A Nagraj, 1998, JeevanVidyaekParichay, Divya Path Sansthan, Amarkantak.
5. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
6. PL Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
7. A.N. Tripathy, 2003, Human Values, New Age International Publishers

8.Subhas Palekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) KrishiTantraShodh,Amravati.
9. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth - Club of Rome's report, Universe Books.
10. E G Seebauer& Robert L. Berry, 2000, Fundamentals of Ethics for Scientists &Engineers ,Oxford University Press
11. M Govindrajran, S Natrajan& V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd
12. B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.
13. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.

OUTCOMES

• Students develop the capability of shaping themselves into outstanding personalities, through a value based life.
• Students turn themselves into champions of their lives.
• Students take things positively, convert everything into happiness and contribute for the happiness of others.
• Students become potential sources for contributing to the development of the society around them and institutions / organisations they work in.
• Students shape themselves into valuable professionals, follow professional ethics and are able to solve their ethical dilemmas.

Course Code: EVS301 **L T P 3-0-0 Credit:3**
Course Title: Environmental Studies

OBJECTIVES

- **To gain knowledge on the importance of environmental education and ecosystem.**
- **To acquire knowledge about environmental pollution- sources, effects and control measures of environmental pollution.**
- **To understand the treatment of wastewater and solid waste management.**
- **To acquire knowledge with respect to biodiversity, its threats and its conservation and appreciate the concept of interdependence.**
- **To be aware of the national and international concern for environment for protecting the environment**

UNIT I

Multidisciplinary nature of environmental studies: Definition, scope and importance, need for public awareness, introduction to concept of green technology. **Environmental conservation and management:** Forest resources: Use and over-exploitation,deforestation, Timber extraction, mining, dams and their 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. Food resources: World food problems, changes caused by agriculture and over-grazing, 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-green fuel. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

UNIT II

Environmental pollution & control: Air Pollution - Types of pollutants, source, effects, sink &control of primary pollutants– CO, NOX, HC, SOx and particulates, effect of pollutants on man &environment: photochemical smog, acid rain and global warming, CO2 Sequestration. Water Pollution - Classification of Pollutants, their sources, waste water treatment (domestic and industrial). Soil Pollution – Composition of soil, classification and effects of solid pollutants and their control. Solid Waste Pollution – Classification, waste treatment and disposal methods; compositing, sanitary land filling, thermal processes. Hazardous wastes - Classification, radioactive, biomedical & chemical, treatment and disposal- Physical, chemical and biological processes.

UNIT III

Chemical toxicology: Toxic chemicals in the environment, Impact of toxic chemicals on enzymes,biochemical effects of arsenic, cadmium, lead, chromium, mercury, biochemical effects of pesticides.**Eco-friendly polymers :**Polymer synthesis, Environmental degradation of polymers,photodegradable polymers, hydrolysis and hydro-biodegradable polymers, biopolymers and bioplastics, thermal degradation of plastics during recycling.

UNIT IV

Green technology: Introduction, Basic principles of green technology, concept of Atom economy,Tools of Green technology, zero waste technology.

Environmental management systems: Objectives, Components, Environmental Impact Assessment, Some important Environmental laws, Green bench, Carbon Credits, EnvironmentalManagement System standards-ISO 14000 series.

REFERENCE BOOKS:

- Roger Permanet. al., Natural Resources & Environmental Economics, 2nd Ed., Longman, USA, 2000
- Stern, A.C. (1980), Air Pollution, Vol. 1-VIII, Academic Press.
- James M., Lynch & Alan Wiseman, Environmental Bio-monitoring : The Biotechnology Ecotoxicology Interface, Cambridge University Press, 1998.
- John Glasson, RikiTherivel and Andrew Chadwick, Introduction to Environmental Impact Assessment, 2nd Ed., UCL Press, Philadelphia, USA, 1994.
- Richard K. Morgan, Environmental Impact Assessment: A methodological perspective,

Kluwar Academic Publications, Boston, 1998.
• Gabriel Bitton, Wastewater Microbiology, 2nd Ed., Wiley-Liss, New York, 1999.
• Environmental Chemistry & Pollution Control, S. Chand & Co. (Latest ed.), By S.S. Dara
• Environmental Chemistry, I.K. Publishers, 2007, BalaramPani
• Environmental Chemistry, New Age Int. Publ. (Latest ed.), A.K. De.
• Environmental Studies, S.K. Kataria Publ. . (Latest ed.), S.K. Dhamija.
• A text book in Environmental Science, Narosa Publ. 2007, V. Subramanian

OUTCOMES

• Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
• Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.
• Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.
• Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.
• Demonstrate proficiency in quantitative methods, qualitative analysis, critical thinking, and written and oral communication needed to conduct high-level work as interdisciplinary scholars and/or practitioners.

Course Code:CSE106 **L-T-P 2-0-0 Credits:2**
Course Title: IT Act & IPR
Course Objectives:

- **To introduce fundamental aspects of Intellectual property Rights to students who are going to play a major role in development and management of innovative projects in industries.**
- **To disseminate knowledge on patents, patent regime in India and abroad and registration aspects**
- **To disseminate knowledge on copyrights and its related rights and registration aspects**
- **To disseminate knowledge on trademarks and registration aspects**
- **To disseminate knowledge on Design, Geographical Indication (GI), Plant Variety and Layout Design Protection and their registration aspects**
- **To aware about current trends in IPR and Govt. steps in fostering IPR**

Need for Cyber Law: Computers and its Impact in Society, Cyber Jurisprudence at International and Indian Level, Overview of Computer and Web Technology, Freedom of Speech and Expression in Cyberspace, Right to Access Cyberspace – Access to the Internet, Right to Privacy, Digital Forgery.

Cyber Crimes against Individuals, Institution and State, Identity Theft & Fraud, Cyber Defamation, Cyber terrorism.

Different offences under IT Act, 2000, Interface with Copyright Law, Trademarks & Domain Names Related issues, Applicability of Indian Contract Act, 1872, Indian Context of Jurisdiction and IT Act, 2000 & section of IPC in IT Act, International Law and Jurisdictional Issues in Cyberspace, Cyber Crime Laws in India.

Dispute Resolutions, Data or Information Cryptography, Intellectual Property Issues, Computer Forensics & Digital Evidences. Internet Architecture & Network Security, E-Commerce Legal Issues.

Reference Book:

- Deborah E.Bouchoux: "Intellectual Property". Cengage learning, New Delhi
- Kompal Bansal & Parishit Bansal "Fundamentals of IPR for Engineers", BS Publications (Press)
- Cyber Law. Texts & Cases, South-Western's Special Topics Collections Prabhuddha Ganguli: ' Intellectual Property Rights" Tata Mc-Graw – Hill, New Delhi
- Richard Stim: "Intellectual Property", Cengage Learning, New Delhi. R. Radha Krishnan, S. Balasubramanian: "Intellectual Property Rights", Excel Books. New Delhi.
- M. Ashok Kumar and Mohd. Iqbal Ali: "Intellectual Property Right" Serials Pub

Course Outcomes:

The students once they complete their academic projects, shall get an adequate knowledge on patent and copyright for their innovative research works

During their research career, information in patent documents provide useful insight on novelty of their idea from state-of-the art search. This provide further way for developing their idea or innovations

Pave the way for the students to catch up Intellectual Property(IP) as an career option

a. R&D IP Counsel
b. Government Jobs – Patent Examiner
c. Private Jobs
d. Patent agent and Trademark agent
e. Entrepreneur

Course Code: CSL107 **L-T-P 0-0-4 Credits:2**
Course Title: Hardware Lab

Hardware tools understanding: Formatting, Installation process, booting process, IDE connector & Master/Slave Settings, SATA connector, Parallel Port & Serial Port, different types of connectors available in Power supplies

ESD tools, Hand tools, Cleaning tools, Diagnostic tools working & uses like digital multimeter, Disk Management Tools like FDISK, Disk Management Tool, Formatting, Installing the Drivers, System File Checker (SFC), Defrag & Disk Cleanup. Understanding SMPS & its various types & uses of AT and ATX SMPS, Motherboard, FDD, HDD, CD/DVD and add on cards installation & hands on practice.
Printer, scanner & Operating System Installation and Servicing and troubleshoot. Install and Configure Dual OS Installation.
Assembling and Disassembling of Laptop to identify the parts and to install OS and configuration updates like RAM, ROM, Chipsets, BIOS Setup Utility and Common Trouble Shooting understanding.
Protection Software Tools: Window 7 Firewall, Antispyware program, Antivirus program, Windows/Unix Action Center.
Wireless access points, Wi-Fi LAN Cards, Working of LED Monitors & major types of keyboards technologies & their identifications.
Assignment for every individual student: Building and Assembling a Desktop PC : Market survey for latest price, configuration & building of individual machine & presentation by students & declared best student award to Value for money configuration machine.

SEMESTER-III

Course Code: CSE201 L-T-P 3-0-2 Credits:4

Course Title: Operating Systems

OBJECTIVES

• To understand the structure and functions of OS
• To learn about Processes, Threads and Scheduling algorithms
• To understand the principles of concurrency and Deadlocks
• To learn various memory management schemes
• To study I/O management and File systems

UNIT-I

Operating Systems and computer system Overview- Basic Elements, Instruction Execution,Interrupts, Memory Hierarchy, Cache Memory, Direct Memory Access, Multiprocessor and Multicore Organization.Operating system overview- objectives and functions, Evolution of Operating System-Computer System Organization-Operating System Structure and Operations-System Calls, System Programs, OS Generation and System Boot.

UNIT-II

Processes-Process Concept, Process Scheduling, Operations on Processes, Interprocess Communication; Threads- Overview, Multicore Programming, Multithreading Models; Windows 7 – Thread and SMP Management.Process Synchronization – Critical Section Problem, Mutex Locks, Semophores, Monitors; CPU Scheduling and Deadlocks.

UNIT-III

Storage Management: Main Memory-Contiguous Memory Allocation, Segmentation, Paging, 32and 64 bit architecture Examples; Virtual Memory- Demand Paging, Page Replacement, Allocation,Thrashing; Allocating Kernel Memory, OS Examples.

I/O systems: Mass Storage Structure- Overview, Disk Scheduling and Management; File System Storage-File Concepts, Directory and Disk Structure, Sharing and Protection; File System Implementation- File System Structure, Directory Structure, Allocation Methods, Free Space Management, I/O Systems.

UNIT-IV

CASE STUDY, Linux System- Basic Concepts; System Administration-Requirements for LinuxSystem Administrator, Setting up a LINUX Multifunction Server, Domain Name System, Setting Up Local Network Services; Virtualization- Basic Concepts, Setting Up Xen,VMware on Linux Host and Adding Guest OS.

TEXT BOOK:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Concepts”,9th Edition, John Wiley and Sons Inc., 2012.
2. William Stallings, “Operating Systems – Internals and Design Principles”, 7th Edition, Prentice Hall, 2011.
3. Andrew S. Tanenbaum, “Modern Operating Systems”, Second Edition, Addison Wesley, 2001.
4. Charles Crowley, “Operating Systems: A Design-Oriented Approach”, Tata McGraw Hill Education”, 1996.
5. D M Dhamdhere, “Operating Systems: A Concept-Based Approach”, Second Edition, Tata McGraw-Hill Education, 2007.
6. http://nptel.ac.in/.

OUTCOMES

- To make students able to learn different types of operating systems along with concept of file systems and CPU scheduling algorithms used in operating system.
- To provide students knowledge of memory management and deadlock handling algorithms.

- Students will be able to implement various algorithms required for management, scheduling, allocation and communication used in operating system.

List of Practicals

1. Shell Programming.
2. . Implement all file allocation strategies
3. Sequential b) Indexed c) Linked
4. Implement Semaphores
5. Implement all File Organization Techniques
6. Implement basic commands of UNIX and LINUX
7. Write a program in shell programming to find the sum of five digit number.
8. Write a programme in shell programming to enter an integer through the keyboard and find
9. whether the givenno. is even or
10. WAP to implement following CPU scheduling algorithms:
    - FCFS
    - SJF
    - Priority
    - Round Robin
11. WAP to implement MVT and MFT.
12. WAP to implement Bankers algorithm for deadlock avoidance.
13. WAP to implement Bankers algorithm for deadlock prevention.
14. WAP to implement following page replacement algorithms:
    - FIFO
    - LRU
15. WAP to implement paging technique of memory management.

Course Code: CSE202 **L-T-P 3-0-2 Credits:4**
Course Title: Algorithm Analysis &Design

OBJECTIVES

- **Analyze the asymptotic performance of algorithms.**
- **Write rigorous correctness proofs for algorithms.**
- **Demonstrate a familiarity with major algorithms and data structures.**
- **Apply important algorithmic design paradigms and methods of analysis.**
- **Synthesize efficient algorithms in common engineering design situations.**

UNIT – I

Preliminaries: Review of growth of functions, Recurrences: The substitution method, The iteration method, The master method, Data Structures for Disjoint Sets.
Divide and Conquer Approach: Merge Sort, Quick sort, Medians and Order statistics, Strassen's algorithm for Matrix Multiplications.

UNIT – II

Dynamic Programming: Elements of Dynamic Programming, Matrix Chain Multiplication, Longest common subsequence and optimal binary search trees problems.
Greedy Algorithms: Elements of Greedy strategy, An activity selection problem, Huffman Codes, A task scheduling problem.

UNIT – III

Graph Algorithms: Representation of Graphs, Breadth First Search, Depth First Search, Topological Sort, Strongly Connected Components, Algorithm for Kruskal's and Prim's for finding Minimum cost Spanning Trees, Dijkstra's and Bellman Fort Algorithm for finding Single source shortest paths. All pair shortest paths and matrix multiplication, Floyd – Warshall algorithm for all pair shortest paths.

UNIT – IV

String matching: The naïve String Matching algorithm, The Rabin-Karp Algorithm, String Matching with finite automata, The Knuth-Morris Pratt algorithm.
NP-Complete Problem: Polynomial-time verification, NP-Completeness and Reducibility, NP-Completeness Proof, NP-Complete problems.

TEXT BOOKS:

1. T. H. Cormen, C. E. Leiserson, R. L. Rivest, Clifford Stein, "Introduction to Algorithms", 2nd Ed., PHI, 2004.
2. AnanyLevitin, "Introduction to the Design and Analysis of Algorithms", Third Edition, Pearson Education, 2012.

REFERENCES BOOKS:

1. A. V. Aho, J. E. Hopcroft, J. D. Ullman, "The Design and Analysis of Computer Algorithms", Addition Wesley, 1998.
2. Ellis Horowitz and SartazSahani, "Computer Algorithms", Galgotia Publications, 1999.
3. D. E. Knuth, "The Art of Computer Programming", 2nd Ed., Addison Wesley, 1998.

OUTCOMES

- Students will be able to argue the correctness of algorithms using inductive proofs and invariants.
- Analyze worst-case running times of algorithms using asymptotic analysis.
- Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it.
- Apply design principles and concepts to algorithm design

- Have the mathematical foundation in analysis of algorithms
- Understand different algorithmic design strategies
- Analyze the efficiency of algorithms using time and space complexity theory

LIST OF PRACTICALS

- Implementation of Stack & Queue.
- Singly Linked List
- Doubly Linked list
- Binary Tree Implementations and traversals.
- Sorting Techniques: Insertion, Selection Sort
- Sorting Techniques: Quick sort, Merge sort
- Divide and Conquer Method - Binary Search - Max Min Problem
- Greedy Method - Knapsack Problem
- Traversal Technique - Depth First Search - Breadth First Search
- Backtracking - 8-Queens Problem

Course Code : CSE203 **L-T-P 3-0-0 Credit: 3**
Course Title: Foundations of Data Science

Course Objectives:
The course will introduce the fundamental concepts of linear algebra, probability and statistics required for a program in data science.

UNIT 1

Introduction: What is Data Science? Big Data and Data Science – Datafication - Current landscape of perspectives - Skill sets needed; Matrices - Matrices to represent relations between data, and necessary linear algebraic operations on matrices -Approximately representing matrices by decompositions (SVD and PCA); Statistics: Descriptive Statistics: distributions and probability - Statistical Inference: Populations and samples - Statistical modeling - probability distributions – fitting a model - Hypothesis Testing - Intro to R/ Python.

UNIT-II

Data preprocessing: Data cleaning - data integration - Data Reduction Data Transformation and Data Discretization. Evaluation of classification methods – Confusion matrix, Students T-tests and ROC curves-Exploratory Data Analysis - Basic tools (plots, graphs and summary statistics) of EDA, Philosophy of EDA - The Data Science Process.

UNIT-III

Basic Machine Learning Algorithms: Association Rule mining - Linear Regression- Logistic Regression - Classifiers - k-Nearest Neighbors (k-NN), k-means -Decision tree - Naive Bayes- Ensemble Methods - Random Forest. Feature Generation and Feature Selection - Feature Selection algorithms - Filters; Wrappers; Decision Trees; Random Forests.

UNIT-IV

Clustering: Choosing distance metrics - Different clustering approaches - hierarchical agglomerative clustering, k-means (Lloyd's algorithm), - DBSCAN - Relative merits of each method - clustering tendency and quality. Data Visualization: Basic principles, ideas and tools for data visualization.

TEXTBOOKS

1. Cathy O'Neil and Rachel Schutt, " Doing Data Science, Straight Talk From The Frontline", O'Reilly,
2014.
2. Jiawei Han, Micheline Kamber and Jian Pei, " Data Mining: Concepts and Techniques", Third Edition.
ISBN 0123814790, 2011.
3. Mohammed J. Zaki and Wagner Miera Jr, "Data Mining and Analysis: Fundamental Concepts and
Algorithms", Cambridge University Press, 2014.
4. Matt Harrison, "Learning the Pandas Library: Python Tools for Data Munging, Analysis, and
Visualization , O'Reilly, 2016.
5. Joel Grus, "Data Science from Scratch: First Principles with Python", O'Reilly Media, 2015.

Learning Outcomes:

On successful completion of this course students will be able to:

1. Demonstrate understanding of basic mathematical concepts in data science, relating to linear algebra, probability, and calculus.
2. Employ methods related to these concepts in a variety of data science applications.
3. Apply logical thinking to problem-solving in context.
4. Demonstrate skills in writing mathematics.

Course Code: CSE204 **L-T-P-3-0-2 Credits:4**
Course Title: Database Management Systems

Course Objectives:

- **To provide a general introduction to relational model**
- **To learn about ER diagrams**
- **To learn about Query Processing and Transaction Processing**

UNIT – I

Basic Concepts and Conceptual Database Design: Database administrator & Database Users, Characteristics of the Database, Database Systems, Concepts and Architecture, Data Models, Schemes & Instances, DBMS Architecture & Data Independence, Database Languages & Interfaces, Overview of Hierarchical, Network & Relational Data Base Management Systems, Data Modelling Using The Entity-Relationship Model – Entities, Attributes and Relationships, Cardinality of Relationships, Strong and Weak Entity Sets, Generalization, Specialization, and Aggregation, Translating your ER Model into Relational Model

UNIT – II

Relational Model, Languages & Systems: Relational Data Model & Relational Algebra, Relational Model Concepts, Relational Model Constraints, Relational Algebra, SQL – A Relational Database Language, Data Definition in SQL, View and Queries in SQL, Specifying Constraints and Indexes in SQL, Practicing SQL commands using ORACLE.

UNIT – III

Relational Data Base Design and Oracle Architecture: Functional Dependencies & Normalization for Relational Databases, Functional Dependencies, Normal Forms Based on Primary Keys, (1NF, 2NF, 3NF,BCNF, 4NF & 5NF), Lossless Join and Dependency Preserving Decomposition, Oracle 8 Architecture, Database Storage, Oracle Software Structures, Shared Database Access Mechanism, Database Protection.

UNIT – IV

Transaction Management: Transaction Concept and State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Concurrency Control Techniques, Lock-Based Protocols, Timestamp-based Protocols, Deadlock Handling, Recovery System, Failure Classification, Storage Structure, Recovery and Atomicity, Log-based Recovery, Shadow Paging, Recovery with Concurrent Transactions, Buffer Management, Indexing, Hashing and Query Processing: Query Processing, Overview, Measures of Query Cost, Selection Operation, Sorting, Concepts of Object Oriented Database Management Systems, Distributed Data Base Management Systems.

TEXT BOOK:

1.Hector Garcia-Molina, Jeff Ullman, and Jennifer Widom, “Database Systems: The Complete Book”, Pearson Education, Second Edition, 2008. 116 CS-Engg&Tech-SRM-2013

REFERENCES

1. Silberschatz, H. Korth and Sudarshan S., "Database System Concepts", 6th Edition, McGraw-Hill International, 2010.
2. Elmasri R. and Shamakant B. Navathe, "Fundamentals of Database Systems", 6th Edition, AddisionWesley , 2011.

OUTCOMES

- Master the basic concepts and appreciate the applications of database systems.
- Master the basics of SQL and construct queries using SQL.
- Be familiar with a commercial relational database system (Oracle) by writing SQL using the system
- Be familiar with the relational database theory, and be able to write relational algebra expressions for queries
- Master sound design principles for logical design of databases, including the E-R method and normalization approach.
- Master the basics of query evaluation techniques and query optimization.
- Be familiar with the basic issues of transaction processing and concurrency control.

LIST OF PRACTICALS

1. Introduction to various constraints such as Primary key, secondary key, Super key, etc.
2. To implement Data Definition Commands (create, drop).
3. To implement Data Manipulation Commands (insert, delete, update, select)
4. To implement Data Control Commands (Commit, revoke, rollback, connect, execute)
5. Create Table, SQL for Insertion, Deletion, Update and Retrieval using aggregating functions.
6. Write Programs in PL/SQL, Understanding the concept of Cursors.
7. Write Program for Join, Union & intersection etc.
8. Creating Views, Writing Assertions, and Triggers.
9. Creating Forms, Reports etc.
10. WAP in PL/SQL for adding two numbers.
11. WAP in PL/SQL for reversing the number. For example the number is 12345 and reverse number will be 54321)
12. WAP in PL/SQL to find the number is even or odd.
13. WAP in PL/SQL to count numbers from 1 to 100.
14. WAP to test MAX, MIN, GROUP BY and ORDER BY commands.

Course Code:EEE201 **L-T-P-3-0-0 Credits:3**

Course Title: Engineering Economics and Entrepreneurship

Course Objectives:

To make fundamentally strong base for decision making skills by applying the concepts of economics.

- Educate the students on how to systematically evaluate the various cost elements of a typical manufactured product, an engineering project or service, with a view to determining the price offer.
- Prepare engineering students to analyze profit/revenue data and carry out make economic analysis in the decision making process to justify or reject alternatives/projects.

UNIT-I

Introduction. Basic concepts of the following: Value of money, equation for Economic studies, equivalence, types of interest, discrete, continuous. Continuous cash flow and interest compounding. Present worth of an annuity, perpetuities and capitalised costs. Bonds and debentures: value of a bond and yield rate. Definition and structure of entrepreneur. Definitions, kinds and importance of IPRs.

UNIT-II

Depreciation: Types and various methods of calculating depreciation, depreciation accounting. Cost accounting: Basic relationship in accounting, balance sheet and income statement. Various ratios to study the balance sheet andincome statements.

Cost estimation: cash flow for industrial operations. Factors affecting investments and production costs – estimation of capital investment, cost indices. Methods of estimating capital investment.

UNIT-III

Profitability: alternative investments and replacements. Mathematical methods for profitability evaluation. Economic production charts for plants operating below 100%, above 100% and under dumping conditions. General procedure for determining optimum conditions. Break-even chart of a production schedule and its significance for optimum analysis. Economic balance in cyclic operations and semicontinuous cyclic operations – simple examples.

UNIT-IV

Theories of entrepreneurship, institutes in aid of entrepreneurs, problems of entrepreneurship. Project report.Copyright and related rights. Patents, trade secrets, copyrights, trademark, plant breeders and farmers rights. Indias PVP legislation, international development in plant protection; biodiversity – related issues. Biopiracy; Govt. initiatives.

Recommended Textbooks:

For engineering economics:

1. Plant design and economics for chemical engineers (Fourth edition) by Max S Peters and Klaus D. Timmerhaus (Chapters 5 – 11). McGraw Hill Book Company.
2. Process engineering economics by Herbest E Schweyer. McGraw Hill Book Company.

For entrepreneurship and IPRs:

1. Dynamics of entrepreneurial development and management by Vasant desai, Himalaya Publishing, House. (2006)
2. Mashelkar Committee report. (internet)
3. Importance of IPR by Abhishek Joshi. National Law Institute, Bhopal University.(Internet)
4. Mohd Usama and Amit Pal. Intellectual property rights. EnviroNews. Vol.12, No.4,Dec. 2006. (Internet)

Course outcomes:

Upon completing the course, students will be able to:

- Understand major principles of economic analysis for entrepreneurship decision making among alternative courses of action in engineering.
- Apply economic principles to prices and quantities in competitive supply and demand for goods and find the cost estimation.
- Solve economic problems involving comparison and selection of alternatives by using analytical techniques including benefit-cost ratio and breakeven analysis

Course Code: CSE205 **L-T-P-3-0-2 Credits:4**
Course Title: Computer Graphics & Multimedia

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

Provide comprehensive introduction about computer graphics system and design algorithms
Familiar with two dimensional and three dimensional transformations
Familiar with techniques of clipping, hidden surface removal and shading
Provide information about Multimedia and data compression techniques

Theory

Main Topics	Course outlines
1. Overview of graphics systems, Output Primitives	Display devices, physical input and output devices: storage tube graphic displays, Raster Refresh, Plasma Panel Displays, Liquid Crystals, Point plotting, Line Drawing algorithms – Slope Line Method, DDA algorithms, Bresenham's Line algorithm
2. Two-dimensional Transformations	Basic transformations-translation, scaling, rotation, Matrix representation and homogenous coordinates, composite transformations, Rotation about an arbitrary point, scaling relative to a fixed point
3. Windowing and Clipping Techniques	Windowing concepts, clipping algorithms-Line clipping – Cohen-Sutherland algorithm
4. 3D Transformations and Projections	Scaling, rotation, translation, rotation about arbitrary axis, Parallel projections, perspective projections
5. Hidden-Surface and Hidden-Line Removal	Back face removal method, Depth-buffer method, Scan-line method
6. Shading Overview	Polygon shading methods: Z-Flat shading, Lambert flat
7.Introduction to Multimedia	Evolution of Multimedia, structure and components of multimedia, internet and multimedia, multimedia and interactivity, multimedia devices. Animation, Animation principles, animation tools, various animation effects.
8. Data compression and standards	Text compression, image compression, various methods of compression, run-length coding, Huffman coding, LZW Encoding, JPEG-objectives and architecture.

Recommended Books:

1. Hearn & Baker, "Computer Graphics", PHI.
2. Newman & Sproul, "Principles of Interactive Graphics",Mcgraw Hill.
3. Steven Harrington, "Computer Graphics-A Programming Approach",Mcgraw Hill.
4. Sinha & Udai, "Computer Graphics", Mcgraw Hill.

LIST OF PRACTICALS

1) List out and discuss the use of basic graphics functions in "graphics.h".
2) WAP to draw a hut or another geometric figure.
3) WAP to implement slope line method.
4) WAP to draw a line using Digital Differential Analyzer (DDA) Algorithm

5) WAP to draw a circle and ellipse using midpoint algorithm.
6) WAP to draw a line using Bresenham's Line Algorithm (BLA) for lines with slopes positive and greater than 1.
7) WAP to draw a line using Bresenham's Line Algorithm (BLA) for lines with slopes negative and greater than 1.
8) WAP to translate about the origin
    a) Two Dimensional Object
    b) Three Dimensional object
9) WAP to perform Scaling of a
    a) Two Dimensional Object
    b) Three Dimensional Object
10) WAP to rotate about the origin
    a) Two Dimensional Object
    b) Three Dimensional Object
11) WAP to implement Shear Transformations.
12) WAP to implement Two Dimensional Composite Transformations.
13) WAP to implement Three Dimensional Composite Transformations.
14) WAP to fill different types of geometric shapes using Flood Fill algorithm.
15) WAP to fill different types of geometric shapes using Boundary Fill algorithm.
16) WAP to perform line clipping using Cohen Sutherland Algorithm.
17) WAP to perform polygon clipping.
18) WAP to implement Sutherland – Hodgeman algorithm for Polygon clipping.
19) WAP to remove hidden surface from a three dimensional object.

Course Code: EHU101 L-T-P 0-0-2 Credit:1

Course Title:Divine Music Lab

"Ragas in the Guru Granth Sahib" there are 31 main Ragas in the **Guru Granth Sahib** with a total of 60 that include sub-**raags.** Tanti Saaj (Sikh Musical Instruments) And Raag/Taal/Dhuni: The Rabab, The Saranda, The Jori also known as Panjabi Pakhawaj (Tabla), The Sarangi, The Taus, Dilruba & Lastly about Harmonium, Dhad, Ghungroo, tambura, Mridang (dholki), Nagara & their ragas cum History. Every student must try to understand & try to learn atleast one instrument & vocal (reciting) during semester.

Note: Students need to jointly perform at the end of semester where every student must participate in the divine music & play/perform as assignment Student should visit music department if allowed otherwise instruments will be issued & learn online from various resources: SIKHIWIKI , Barusahib music online resources.

SEMESTER-IV

Course Code: CSE206 L-T-P 3-0-0 Credit:3

Course Title:Artifcial Intelligence

OBJECTIVES

- **To study the concepts of Artificial Intelligence.**
- **To learn the methods of solving problems using Artificial Intelligence.**
- **To give an insight of Neural Networks.**
- **To introduce the concepts of Expert Systems and machine learning.**

UNIT-I

Artificial Intelligence and applications, Artificial Intelligence Techniques, Criteria of Success, Intelligent agents, Nature and Structure of agents, Learning Agents, Heuristic Search technologies, Generate and Test Hill Climbing, Best first search, Problem reduction, Constraint satisfaction, Means Endo analysis.

UNIT-II

Knowledge Representation, Mapping between facts and representations, Approaches to Knowledge representation, Procedural versus Declarative knowledge, Forward versus Backward reasoning, Matching, Conflict resolution, Non-Monotonic reasoning, Default Reasoning, Statistical Reasoning, Fuzzy Logic ,Weak and Strong Filler structures, Semantic nets, Frame conceptual dependency, Scripts.

UNIT-III

Planning, Planning problem, Planning with state space research, Partial order planning, Planning Graphs, Planning with proposition logic, Analysis of planning approaches, Hierarchical Planning, Conditional Planning, Continuous and Multi Agent planning. Learning: Forms of Learning, Inductive Learning, Decision Trees, Computational Learning theory, Logical formulation, Knowledge in Learning, Explanation based and Relevance based learning, Statistical learning, Learning with complete data and hidden variables, Instance based learning and Neural networks.

UNIT-IV

Definition – Features of an expert system, Organization, Characteristics, Prospector, Knowledge Representation in expert systems , Expert system tools – MYCIN – EMYCIN. Exisitng Expert Systems-(DENDRIL,MYCIN), Domain exploration, Meta Knowledge, Expertise Transfer, Self Explaining System.

TEXT BOOKS:

1. Stuart Russel and Peter Norvig, 'Artificial Intelligence A Modern Approach', Second Edition, Pearson Education, 2003 / PHI.
2. Donald A.Waterman, 'A Guide to Expert Systems', Pearson Education

REFERENCE BOOKS:

1. George F.Luger, 'Artificial Intelligence – Structures and Strategies for Complex Problem Solving', Fourth Edition, Pearson Education, 2002.
2. Elain Rich and Kevin Knight, 'Artificial Intelligence', Second Edition Tata McGraw Hill, 1995.
W. Patterson, 'Introduction to Artificial Intelligence and Expert Systems', Prentice Hall of India, 2003.

OUTCOMES

- Students will be able to identify problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem.
- Formalise a given problem in the language/framework of different AI methods (e.g., as a search problem, as a constraint satisfaction problem, as a planning problem, etc).

- Implement basic AI algorithms (e.g., standard search or constraint propagation algorithms).
- Design and perform an empirical evaluation of different algorithms on a problem formalisation, and state the conclusions that the evaluation supports.

Course Code: CSE207 L-T-P 3-0-0 Credit:3

Course Title: Computer Organization & Architecture

Learning Objectives The educational Objectives of this Course are: • To have a thorough understanding of the basic structure and operation of a digital computer. • To study the different ways of communicating with I/O devices and standard I/O interfaces.

Contents

Sequential Logic: Flip-flops, Triggering of Flip-flops, Analysis of clocked sequential circuits, State reduction and Assignment, Flip-flop excitation, Design of counters, Design with state equations.

Overview Of Register Transfer And Microoperations, Register Transfer Language, Register transfer, Bus and Memory transfer, Arithmetic Micro-operations, Logic Micro-operations, Shift Micro-operations, Arithmetic Logic Shift Unit.

Basic Computer Organization And Design: Instruction codes, Computer registers • Computer instructions, Timing and Control, Instruction cycle, Memory-Reference Instructions, Input-output and interrupt, Design of Basic computer, Design of Accumulator Unit.

Programming The Basic Computer, Introduction, Machine Language, Assembly Language, the Assembler, Program loops, Programming Arithmetic and logic operations, Subroutines, I-O Programming.

Central Processing Unit: Introduction, General Register Organization, Stack Organization, Instruction format, Addressing Modes, Data transfer and manipulation, Program Control, Reduced Instruction Set Computer (RISC).

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

Learning Outcome: Understanding Logic gates, flip flops and counter, Clear Understanding of Computer Architecture, Pipeline processing, RISC and CISC architectures, Develop a base for advance micro-processors.

Reference Books:

1. Computer System Architecture: By M. Morris Mano.
2. Structured Computer Organization: By Tanenbaum.
3. Computer Organization: By Stallings.
4. Computer Architecture and Organization: By Hayes.
5. Microprocessor Architecture, Programming, and Applications with the 8085 - Ramesh S. Gaonkar Pub: Penram International.

Course Code: CSE208 L-T-P 3-0-0 Credit:3

Course Title: Data Mining &Warehousing

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

Analyze the concepts of data warehouse and data mining
Learn the tools and techniques used for Knowledge Discovery in Databases
Equip with data mining skills through hands on sessions on tools and techniques taught

Theory

Main Topics	Course outlines
1. Introduction	Introduction, Relational Databases, Data Warehouses, Transactional databases, Advanced database Systems and Application.
2. Data Mining	Data Mining Functionalities, Classification of Data Mining Systems, Major Issues in Data Mining.
3. Data Warehouse	Introduction, A Multidimensional data Model, Data Warehouse Architecture, Data Warehouse Implementation, Data Cube Technology, From Data warehousing to Data Mining.
4. Data Processing	Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and concept Hierarchy Generation, Data Mining Primitives, Languages and System Architecture: Data Mining Primitives, DMQL, Architectures of Data Mining Systems.
5. Concept Description	Data Generalization & Summarization – Based Characterization, Analytical Characterization, and Mining class Comparisons, Mining Descriptive Statistical Measures in Large Databases. Mining Association Rules in Large Databases, Association Rule Mining, Single – Dimensional Boolean Association Rules,
6. Association Rules	Multilevel Association Rules from Transaction Databases, Multi Dimensional Association Rules from Relational Databases, From Association Mining to Correlation Analysis, Constraint – Based Association Mining.
7. Classification and Prediction	Classification & Prediction, Issues Regarding Classification & Prediction, Classification by decision Tree Induction, Bayesian Classification, Classification by Back propagation, Classification based on concepts & Association Rule, Other Classification, Prediction, Classification Accuracy, Cluster Analysis**,** Types of.
8. Cluster Analysis	Data in Cluster Analysis, Partitioning methods, Hierarchical methods, Density – Based Methods, Grid – Based Methods, Model – Based Clustering Methods, Outlier Analysis

COURSE OUTCOMES:

After undergoing the course, Students will be able to understand

1. Design a data mart or data warehouse for any organization
2. Extract knowledge using data mining techniques
3. Adapt to new data mining tools.
4. Explore recent trends in data mining such as web mining, spatial-temporal mining

Recommended Books:

1. Jiawei Han & Micheline Kamber, Data Mining Concepts & Techniques, Harcout
2.
3. I.H. Witten E. Frank, Data Mining, Morgan Kaufman

Course Code: CSE209 **L T P 3-0-2 Credit:4**

Course Title: Computer Networks

OBJECTIVES

- **To understand the concepts of data communications**
- **To be familiar with the Transmission media and Tools**
- **To study the functions of OSI layers**
- **To learn about IEEE standards in computer networking**
- **To get familiarized with different protocols and network components**

UNIT-I

Data Communication Components-Data representation and Data flow, Networks, Type of Connections, Topologies, Protocols and Standards, Reference Model (OSI Model, TCP/IP), Transmission Media, LAN-Wired LANs, Wireless LANs, Connecting LANs, Virtual LANs, IP Address Classes, Subnetting, Telephone System, Narrowband ISDN and Broadband ISDN.

UNIT – II

The Data Link Layer: Data link layer design issues, error detection and correction, data link protocols, sliding window protocols, Examples of Data Link Protocols.

UNIT - III

The Medium Access Sublayer: The channel allocation problem, multiple access protocols, IEEE standard 802 for LANS and MANS, high-speed LANs, satellite networks, Networking & internetworking devices-repeaters, hubs, switches, gateways and bridges.

UNIT – IV

The Network Layer: Network layer design issues, routing algorithms, congestion control algorithm, internetworking, the network layer in the internet, the network layer in ATM networks.

TEXT BOOKS:

1. A. S. Tananbaum, “Computer Networks”, 3rd Ed, PHI, 1999.

REFERENCE BOOKS:

1. U. Black, “Computer Networks-Protocols, Standards and Interfaces”, PHI, 1996.
2. W. Stallings, “Computer Communication Networks”, PHI, 1999.
3. Laura Chappell (ed), “Introduction to Cisco Router Configuration”, Techmedia, 1999.
4. Michael A. Miller, “Data & Network Communications”, Vikas Publication, 1998.
5. William A. Shay, “Understanding Data Communications & Networks”, Vikas Publication, 1999

OUTCOMES

- Students will be able to implement the terminology and concepts of the OSI reference model and the TCP-IP reference model.
- To master the concepts of protocols, network interfaces, and design/performance issues in local area networks and wide area networks.
- To be familiar with wireless networking concepts.
- To be familiar with contemporary issues in networking technologies.
- To be familiar with network tools and network programming

List of Practicals

- Study of different types of network cables and practically implement the cross wired cable and straight through cable using clamping tool.
- Study of network devices in detail .
- Study of network IP.
- Connect the computers in Local Area Network.
- Study of basic network command and network configuration commands.
- Configure a network topology using packet tracer software.
- Configure a network using Distance Vector Routing protocol.
- Configure a network using Link State Vector Routing protocol.
- Study different modes of Routing.
- Write a program to implement subnet of hosts to obtain Broadcasting

Course Code: CSE210 **L-T-P 3-0-0 Credits: 3**
Course Title: Statistical Foundations for Data Science

Course objectives:

This course introduces fundamental mathematical concepts relevant to computer science and provides a basis for further postgraduate study in data science, statistical machine learning, and cybersecurity. Topics covered are probability: sets, counting, probability axioms, Bayes theorem; optimisation and calculus

UNIT-I
Data Science & scientific processes, approaches, methods, systems and algorithms to extract requisite insights and information from structured and unstructured data. Data Science main components: Big Data, Machine Learning and Modelling in Data Science. Basics of Statistics, Coding, Business Intelligence, Data Structures, Mathematics, Machine Learning, Algorithms.

Probability spaces, conditional probability, independence; Random variables, distribution functions,probability mass and density functions, functions of random variables, standard univariate discreteand continuous distributions.

Mathematical expectations, moments, moment generating functions, inequalities; Random vectors, joint, marginal and conditional distributions, conditional expectations, independence, covariance, correlation, standard multivariate distributions, functions of random
vectors;

Law of large numbers, central limit theorem. Sampling distributions; Point estimation -
estimators, minimum variance unbiased estimation, maximum likelihood estimation, method ofmoments, consistency; Interval estimation; Testing of hypotheses - tests and critical regions, likelihood ratio tests; Linear regression.

Course Outcomes:
On successful completion of this course students will be able to:

1. Demonstrate understanding of basic mathematical concepts in data science, relating to linear algebra, probability, and calculus.
2. Employ methods related to these concepts in a variety of data science applications.
3. Apply logical thinking to problem-solving in context.
4. Demonstrate skills in writing mathematics.

Texts/References:
B. L. S. Prakasa Rao, A First Course in Probability and Statistics, World Scientific/Cambridge University Press India, 2009.
R. V. Hogg, J. W. McKean and A. Craig, Introduction to Mathematical Statistics, 6th Ed., PearsonEducation India, 2006.

Course Code:CSE211 **L-T-P 3-0-2 Credits: 4**
Course Title: System Software

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

Understanding different machine architecture
Phases of assemblers, Compilers and their features
Understanding the issues related to macroprocessor design and its implementation
Understanding the concepts of different loaders and linkers

Theory

Main Topics	Course outlines
Introduction	Definition and Role of System Software, Examples of System Software, Evolutions of System Software, System Software and Machine Architecture, Some common architecture – SIC, CISC and RISC Machines.
Assembler	Introduction, Basic Assembler features, Single passes Assembler, Two Pass Assembler, Design of Operation code table, Symbol table, Literal table.
Macro Processor	Introduction of Macros, Macro processor design, Forward reference, Backward reference, positional parameters, keyword parameters, conditional assembly, Macro calls within Macros.
Implementation of Macro Processor	Implementation of macros within Assembler. Designing Macro name table, Macro Definition table, Kew word parameter table, Actual parameter table, Expansion time variable storage
Compile Structure	Analysis-synthesis model of compilation, various phases of a compiler, tool based approach to compiler construction.
Loaders	Absolute loader, Relocation - Relocating loader, Dynamic loader, Bootstrap loader, Linking-loader, Program relocatablity, Design of Absolute Loader,
Linkers	Design of direct-linking loader, other Loader scheme e.g. (Binders, Linking Loaders, Overlays, Dynamic Binders)
Other common System Software's	Introduction and brief discussion on Editors: Types and Structure; Operating System: Definition and types e.g. single, multi -Tasking, multi – user (referring to MS-DOS, LINUX and UNIX); Device Drivers: Definition, role and types;

Recommended Books:

1. Donovan, J.J., System programming, McGraw-Hill.
2. Dhamdhere, System Programming, TMH.

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

Understand the architecture of various machines
Implement of Single Pass and Two Pass Assembler
Implement of Absolute Loader and Text Editor

LIST OF PRACTICALS

1. Study of general machine architecture and different machine architectures available.
2. Implementation of Assembly language programs using microprocessor kit.
3. Implementation of a Symbol table with functions to create, insert, modify, search and display in C language.
4. Implementation of a single pass assembler in C language.
5. Implementation of pass one of a two pass assembler in C language
6. Implementation of pass two of a two pass assembler in C language.
7. Implementation of an Absolute loader in C language.
8. Implementation of simple text editor with features like insertion/deletion of a character word and sentence in C language.

Course Code: CSL212 **L-T-P 0-0-6 Credits: 3**
Course Title: Networking Lab

Study of different types of Network cables and Practically implement the cross-wired cable and straight through cable using clamping tool, Install and Configure Wired and Wireless NIC and transfer files between systems in LAN and Wireless LAN, Install and configure Network Devices: HUB, Switch and Routers, Configure Host IP, Subnet Mask and Default Gateway in a System in LAN (TCP/IP Configuration), Study of basic network command and Network configuration commands, Configure a Network topology using packet tracer software. Cables and connectors, Router working & network traffic, hardware firewall, wireless access point.

Types of computer ports, Steps for installing UBUNTU along with Windows & Prepare the partition, Motherboard Device Drivers, Running Disk Management Tool, Installation, Configuration and trouble shooting of Local network LAN, MAN, WAN, WiFi devices. Simulating a Local Area Network, Simulating a Wi-Fi Network

Windows 98/XP/2000/Vista/Windows latest version, Windows 2008/2010 server or latest version, configuring Network Printer.

Configuring and setting up Windows Workgroup based Network, Configure IP Address and Subnet Mask for each System, Sharing a Folder in System1, Accessing the Shared Folder in System1 from System2 or System3, Connecting to a Shared Printer from another System.

How we issue Unique IP address, Two addressing schemes for TCP/IP: IPv4 and IPv6 MAC Address.

SEMESTER-V

Course Code:CSE301 **L-T-P 3-0-2 Credits:4**
Course Title: Web Technologies

Course Objectives:

This course is intended to teach the basics involved in publishing content on the World Wide Web. This includes the 'language of the Web' – HTML, the fundamentals of how the Internet and the Web function, a basic understanding of graphic production with a specific stress on creating graphics for the Web, and a general grounding introduction to more advanced topics such as programming and scripting. This will also expose students to the basic tools and applications used in Web publishing.

Theory

Main Topics	Course outlines
Introduction	Understanding Web fundamentals, URL, ISP, W3C – Architecture, Evolution, Website Designing strategies, major issues in Web Development, Web Browsers, Web-Servers, Search Engines.
E-Commerce	Definition, Types of E-commerce, merits & demerits, Problems and issues related to Internet based E-commerce, M-Commerce, E-commerce laws & forms of agreements, E-governance & role of government.
HTML5 & CSS3	Features of HTML5, Revisiting basic tags in HTML5, New markup elements of HTML5, New Forms, Tables, Images, List & Links, Audio & Video attibutes of HTML5, Introduction to VB Script – variables, arrays, looping & conditional statements, printing text using Vbscript. Enhancing web page features using CSS3, Advanced Java script.
4. Security	E-commerce & security, Web security schemes, Cryptography, VPN, Firewalls, IDS.
5. Advanced JAVA	Core Java and advanced Java-AWT GUI components, Swings & Events Exception Handling JDBC.
6. Server-side Programming	Introduction to XML, XML-DTD, JSP, Servlet technology, J2EE & RMI.

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

Understanding of Web fundamentals and its working around the world
Understanding and Web Development skills using different flavors of HTML along with CSS technology and interactive validations of different elements using javascript/ vbscript
Understanding E-commerce market and being aware of prime security issues while developing applications
Understanding the programming skills using java as Internet programming tool, developing client-server applications, Swings & Events Exception Handling, Servlet and JDBC applications
The Practicability of all above contents is covered in Lab-Sessions

Recommended Books:

1. Uttam K. Roy, Web technologies; Oxford.
2. Zak Ruvalcaba & Anne Boehm, Murach's HTML5 and CSS3; SPD.
3. Firuza Aibara, HTML5 for beginners; SPD.
4. Jim Farley and William Crawford, Java Enterprise in a nutshell; SPD-O'reilly.
5. Michael Morrison, Head First Java Script; SPD-O'reilly.

LIST OF PRACTICALS

1. Introduction to various protocols used in internet technology and protocols associated with e-mail service.
2. Introduction to various types of domains, URLs & URL classes.
3. Comparative analysis IPv4 & IPv6.
4. Study & Analysis of E-commerce models, M-commerce along with merits & demerits.
5. Design a VPN using different platforms.
6. Design a HTML page using CSS3 features.
7. Design a HTML5 page using CSS3 features to enhance Table properties.
8. Design a HTML5 page using CSS3 features to enhance Forms properties.
9. Create a HTML page using java script to perform validation checks at different text boxes.
10. Create a HTML page using VB script to perform various controls/checks at different components and printing.
11. Design a web page to use google web fonts.
12. Design a web page using JDBC components and FORM elements.
13. How to use Query – a case study.
14. Design a client-server program using servlets.
15. Design a web page to provide instant sharing option for all major social network websites.

Course Code:CSE302 **L-T-P 3-0-0 Credits:3**
Course Title: Discrete Structure

Course Objectives:
To develop logical thinking and its application to computer science (to emphasize the importance of proving statements correctly and de-emphasize the hand-waving approach towards correctness of an argument). The subject enhances one's ability to reason and ability to present a coherent and mathematically accurate argument. About 40% of the course time will be spent on logic and proofs and remaining 60% of the course time will be devoted to functions, relations, etc.

Propositional logic: Syntax, semantics, valid, satisfiable and unsatisfiable formulas, encoding and examining the validity of some logical arguments.
Proof techniques: forward proof, proof by contradiction, contrapositive proofs, proof of necessity and sufficiency.
Sets, relations and functions: Operations on sets, relations and functions, binary relations, partial ordering relations, equivalence relations, principles of mathematical induction.
Size of a set: Finite and infinite sets, countable and uncountable sets, Cantor's diagonal argument and the power set theorem, Schroeder-Bernstein theorem.
Introduction to counting: Basic counting techniques - inclusion and exclusion, pigeon-hole principle, permutation, combination, summations. Introduction to recurrence relation and generating function.
Algebraic structures and morphisms: Algebraic structures with one binary operation - semigroups, monoids and groups, congruence relation and quotient structures. Free and cyclic monoids and groups, permutation groups, substructures, normal subgroups. Algebraic structures with two binary operations - rings, integral domains and fields. Boolean algebra and Boolean ring.
Introduction to graphs: Graphs and their basic properties - degree, path, cycle, subgraphs, isomorphism, Eulerian and Hamiltonian walks, graph coloring, planar graphs, trees.
References

1. Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata McGraw-Hill.
2. C. L. Liu, Elements of Discrete Mathematics, Tata McGraw-Hill.
3. Norman L. Biggs, Discrete Mathematics, Oxford University Press.
4. Kenneth Bogart, Clifford Stein and Robert L. Drysdale, Discrete Mathematics for Computer Science, Key College Publishing.
5. Thomas Koshy, Discrete Mathematics with Applications, Elsevier.
6. Ralph P. Grimaldi, Discrete and Combinatorial Mathematics, Pearson Education, Asia.

Course Outcomes:

1. Be able to construct simple mathematical proofs and possess the ability to verify them
2. Have substantial experience to comprehend formal logical argument
3. Be skillful in expressing mathematical properties formally via the formal language of propositional logic and predicate logic

Course Code:CSE303 **L-T-P 3-0-2 Credits:4**
Course Title: Compiler Design

OBJECTIVES:
The student should be made to:

- Learn the design principles of a Compiler.
- Learn the various parsing techniques and different levels of translation
- Learn how to optimize and effectively generate machine codes

UNIT I INTRODUCTION TO COMPILERS
Translators-Compilation and Interpretation-Language processors -The Phases of Compiler-Errors Encountered in Different Phases-The Grouping of Phases-Compiler Construction Tools -Programming Language basics.

UNIT II LEXICAL ANALYSIS
Need and Role of Lexical Analyzer-Lexical Errors-Expressing Tokens by Regular Expressions- Converting Regular Expression to DFA- Minimization of DFA-Language for Specifying Lexical Analyzers-LEX-Design of Lexical Analyzer for a sample Language.

UNIT III SYNTAX ANALYSIS
Need and Role of the Parser-Context Free Grammars -Top Down Parsing -General Strategies- Recursive Descent Parser Predictive Parser-LL(1) Parser-Shift Reduce Parser-LR Parser-LR (0)Item- Construction of SLR Parsing Table -Introduction to LALR Parser - Error Handling and Recovery in Syntax Analyzer-YACC-Design of a syntax Analyzer for a Sample Language .

UNIT IV SYNTAX DIRECTED TRANSLATION & RUN TIME ENVIRONMENT
Syntax directed Definitions-Construction of Syntax Tree-Bottom-up Evaluation of S-Attribute Definitions- Design of predictive translator - Type Systems-Specification of a simple type checker- Equivalence of Type Expressions-Type Conversions.
RUN-TIME ENVIRONMENT: Source Language Issues-Storage Organization-Storage Allocation-Parameter Passing-Symbol Tables-Dynamic Storage Allocation-Storage Allocation in FORTAN.

UNIT V CODE OPTIMIZATION AND CODE GENERATION
Principal Sources of Optimization-DAG- Optimization of Basic Blocks-Global Data Flow Analysis- Efficient Data Flow Algorithms-Issues in Design of a Code Generator - A Simple Code Generator Algorithm.

TEXTBOOK:
1. Alfred V Aho, Monica S. Lam, Ravi Sethi and Jeffrey D Ullman, "Compilers – Principles, Techniques and Tools", 2nd Edition, Pearson Education, 2007.

REFERENCES:
1. Randy Allen, Ken Kennedy, "Optimizing Compilers for Modern Architectures: A Dependence-based Approach", Morgan Kaufmann Publishers, 2002.
2. Steven S. Muchnick, "Advanced Compiler Design and Implementation, "Morgan Kaufmann Publishers - Elsevier Science, India, Indian Reprint 2003.
3. Keith D Cooper and Linda Torczon, "Engineering a Compiler", Morgan Kaufmann Publishers Elsevier Science, 2004.
4. Charles N. Fischer, Richard. J. LeBlanc, "Crafting a Compiler with C", Pearson Education, 2008

OUTCOMES:

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

- Design and implement a prototype compiler.
- Apply the various optimization techniques.

Use the different compiler construction tools.

LIST OF PRACTICALS

1. Write a C program to identify whether a given line is a comment or not.
2. Write a C program to test whether a given identifier is valid or not.
3. Write a program to find the FIRST of the given grammar.
4. Write a program to generate tokens for the given N Grammer.
5. Write a program to implement the parser PREDICTIVE PARSER
6. Write a program to implement the parser SHIFT REDUCE PARSER
7. Implement the following expressions into quadruples a+b+c*d/e+f
8. Constructing LR Parsing Table
9. Use LEX Tool to implement a lexical analyzer.

Course Code:CSE304 **L-T-P 3-0-2 Credits:4**

Course Title: Network Programming

Course Objectives:

Demonstrate mastery of main protocols comprising the Internet.
2. Develop skills in network programming techniques.
3. Implement network services that communicate through the Internet.
4. Apply the client-server model in networking applications.
5. Practice networking commands available through the operating systems.

Theory

Main Topics	Course outlines
Introduction	Review of basic concepts of addressing IPV4 and IPV6, port, classless and classful addressing, basic concept of fork and exec function.
Socket Introduction	Socket address structure, byte ordering functions, byte manipulations functions, read, written and readline functions
TCP Sockets	Basic concepts of socket, bind, connect, listen and accept functions, concurrent server, close function, getsockname and getpeername functions, TCP echo client server, wait and waitpid function I/O Multiplexing, select and poll functions, IPV4 socket options.
UDP and Raw Socket	Recvfrom and sendto functions, UDP echo client server, connectfunction, TCP and UDP echo server using select, raw socket.
Address Conversion	Gethostbyname function, gethostbyaddr function, uname function, getaddrinfo, getnameinfo function.
Client Server Design Alternatives	TCP test client, iterative server, concurrent server, preforked server.
Threads	Creation and termination of thread, TCP echo server using thread, thread specific data.
Interprocess communication	Inter process communication using pipes, FIFO or named pipes, mutex and condition variables, record locking, IPC facilities: message passing, semaphore, shared memory.

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

Learn basics and advanced techniques of socket based client server programming
Identify and apply various socket programming concepts and mechanisms
Gain depth knowledge of sockets and the system calls needed to support network programming
Effectively use the socket interface to develop Client-Server Internet applications

Recommended Books:

1. Douglas E. Comer, David L. Stevens, Inter-networking with TCP/IP: Client Server Programming and Applications, Vol. III, PHI.
2. Jaffrey D. Schank, Client server Applications and Architecture, BPB Novell press.
3. Douglas J. Reilly, Client-server server Developers guide, Addision Wesley Developers press.
4. UNIX Network Programming, Networking APIs: Sockets and XTI, Prentice Hall.

LIST OF PRACTICALS:

1. Installation of Linux Operating system.
2. How to connect to Linux/Unix (Logging on).
3. Creating and managing user accounts.
4. How to work with files and directories.
5. Perform an experiment to understand working of file utilities.
6. Perform an experiment to understand working of resource monitoring utilities.
7. Searching a file
8. Write and execute at least 10 programs in Linux using shells such as
    a. Factorial of numbers
    b. Even/odd numbers.
    c. Fibonacci series.
    d. Prime numbers
    e. Arrange the numbers.
    f. Reverse of numbers.
    g. Lower case to upper case
    h. Greatest of three numbers etc.
9. Perform experiments to understand the working of all vi-editor commands.
10. Installing and configuring X-windows
11. Installation of device drivers
12. Customizing desktop
13. Write a program that creates a zombie and verify that the process is zombie.
    Send a data from parent to child over a pipe.

Course Code:CSE305 **L-T-P 3-0-2 Credits:4**
Course Title: Simulation and Modelling

Course Objectives:
Modeling and Simulation has become an essential tool for engineers for optimum design and the course aims to impart an overview of the modeling and simulation approaches with emphasis on applications using MATLAB.

Theory

Main Topics	Course outlines
1. Introduction	Concept of a system, stochastic activities, continue and discrete system, system modeling, mathematical modeling, principle used in modeling.
2. Simulation of Systems	Concepts of simulation of continuous systems with the help of two examples; use of integration formulas; concepts of discrete system simulation with the help of two examples, Generation of random numbers, Generation of non-uniformly distributed numbers.
3. Simulation of Queuing Systems	Rudiments of queuing theory, Simulation of Single-Server queue, two-server queue, general queues.
4. Simulation in Inventory Control and Forecasting:	Elements of inventory theory, inventory models, Generation of Poisson and Erlang variants, forecasting and regression analysis.
5. Design and Evaluation of Simulation Experiments:	Experimental layout and validation. Simulation Languages: Continuous and discrete simulation languages, Block-Structured continuous simulation languages, expression based languages,
6. Discrete simulation languages	Discrete system simulation languages, simscript, GPSS, SIMULA, Simpack, GASP IV, CSIM, factors in selection of a discrete system simulation languages.

Recommended Books:
1. Narsingh Deo, System Simulation with Digital Computer, Prentice-Hall of India.
2. Gordon, System Simulation, Prentice Hall of India.

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

Analyze the system and its behavior so that the physical behavior of a system can transform into a mathematical model that can in turn transform into an efficient algorithm for simulation purpose.
Understand the methodology for modeling & simulation of continuous, discrete and combined systems using simulation languages.
Have basic knowledge on simulation software and use it in solving of engineering problems, analysis and validation of the results.
Understand how simulation modeling can aid in effective decision-making.

LIST OF PRACTICALS

1. Introduction to MATLAB.
2. Write programs to implement various constructs such as branching statements, loops, functions, additional data types, plots, arrays, inputs/outputs etc. in MATLAB.
3. Write a program to add two matrices using MATLAB.
4. Write a program to find the transpose of a matrix using MATLAB.
5. Computer generation of random numbers using MATLAB.
6. Perform testing of random number generators using MATLAB.
7. Simulation of Single Server Queuing System using MATLAB.
8. Simulation of Two-Server Queuing System using MATLAB.
9. Introduction regarding usage of any Network Simulator.

Course Code: CSL306 **L-T-P 0-0-4 Credits:2**
Course Title: Introduction to Python Lab

Course Contents
Fundamental concepts: Literals, variables and identifiers, operators,
expressions and data types;
Control structures: Boolean expressions, selection control,iterative control; Lists: List structures, Lists, (sequences), iterating over lists; Functions:
Program routines, calling value-returning functions, calling non value-returning functions,
parameter passing, variable scope; Dictionaries and Sets; Recursion; Text Files: Using text
files, string passing, exception handling.

SEMESTER-VI

Course Code: CSE307 **L-T-P 3-0-0 Credits:3**
Course Title: Automata and Formal Languages

OBJECTIVES

- **To understand various Computing models like Finite State Machine, Pushdown Automata, and Turing Machine.**
- **To design finite automata, pushdown automata, Turing machines, formal languages, and grammars.**
- **To understand Decidability and Undecidability of various problems**

UNIT-I

Finite automata: Introduction, Basic Mathematical Notation and techniques, Finite State systems: Basic Definitions: Finite Automaton, DFA & NDFA, Finite Automaton with €-moves, Regular Languages, Regular Expression, Equivalence of NFA and DFA, Equivalence of NDFA's with and without €-moves, Equivalence of finite

Introduction to Machines: Concept of basic machines; Properties and limitation of FSM; Moore and Mealy Machines; Equivalence of Moore and Mealy Machines; Conversion of NFA to DFA by Arden's method.

Automaton and regular expressions: Minimization of DFA, Pumping Lemma for Regular sets, Problems based on Pumping Lemma.

UNIT-II

Grammar Introduction: Types of Grammar: Context Free Grammars and Languages, Derivations and Languages, Ambiguity, Relationship between derivation and derivation trees, Simplification of CFG, Elimination of Useless symbols, Unit productions, Null productions, Greibach Normal form, Chomsky normal form, Problems related to CNF and GNF

UNIT-III

Pushdown Automata: Definitions: Moves, Instantaneous descriptions, Deterministic pushdown automata Equivalence of Pushdown automata and CFL, pumping lemma for CFL, problems based on pumping Lemma

UNIT-IV

Turing Machines, Introduction: Formal definition of Turing machines, Instantaneous descriptions, Turing Machine as Acceptors, Turing Machine as Transducers Computable Languages and functions, Turing Machine constructions, Modifications of Turing Machines
Computational complexity

Undecidability: Basic definitions, Decidable and undecidable problems, Properties of Recursive and Recursively enumerable languages, Introduction to Computational Complexity: Definitions-Time and Space complexity of TMs, complexity classes – introduction to NP-Hardness and NP-Completeness.

TEXT BOOK:

1. E.Hopcroft and J.D.Ullman, "Introduction to Automata Theory, Languages and Computation", Pearson, Education Publishers, 2nd Edition, 2004

REFERENCE BOOKS:

1. Michael Sipser, "Introduction to the Theory of Computation", Thomson Asia, 2004
2. J.C.Martin, "Introduction to Languages and Theory of Computation", McGrawHill,2003
3. K.L.P. Mishra, N.Chandrasekaran , " Theoretical Computer Science", PHI, 3rd Edition,

2007

OUTCOMES

- Students will analyse and design finite automata, pushdown automata, Turing machines, formal languages, and grammars.
- Students will demonstrate their understanding of key notions, such as algorithm, computability, decidability, and complexity through problem solving.
- Students will demonstrate knowledge of basic mathematical models of computation and describe how they relate to formal languages
- Students will understand that there are limitations on what computers can do, and learn examples of unsolvable problems.
- Students will learn that certain problems do not admit efficient algorithms, and identify such problems.

Course Code: CSE308 **L-T-P 3-0-2 Credits:4**
Course Title: Software Reliability & Testing
Objectives:
The course was designed to bring focus to reliability,models and envirnonment changes since many jobs and opportunities are available in this area. The course covers both technical foundations and tools, as well as managerial and organizational aspects.

Theory

Main Topics	**Course outlines**
1. Introduction	Software Reliability & Hardware Reliability, Basic Concepts, Availability, Modeling.
2. Selected Models	Execution Time Component, Calendar Time Component, Model Choice.
3. Applications:	System Engineering, Project Management, Management of Operational Phase, Evaluation of S/W Engineering Technologies.
4. System Definition	Failure definition, System Configuration, Text Run Selection.
5. Parameter Determination	Execution Time Component, Calendar Time Component.
6. Project Specific Techniques	Unobserved Failures, Failure Time Measurement, Evolving Programs, Changes in Environment, Other Consideration.

Recommended Books:

1. Pressman, Software Engineering concepts, TMH.

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

Understand the concept of reliability and access the difference between H/W & S/W reliability and evaluate different S/W engineering technologies
Understand and anticipate the possible causes of failure and knowledge of how to prevent them and know about various parameter determination methods
Analyze and test a S/W system, when it is evolved to accommodate a set of change requirements such as adding new functionalities, bug fixing etc

LIST OF PRACTICALS

1) Study of Software and Hardware reliability.
2) Evaluation of Software Engineering Technologies.
3) Study of any web testing tool (e.g. Selenium)
4) Write the test cases for any known application (e.g. Banking application)
5) Study of any bug tracking tool (e.g. Bugzilla, bugbit)
6) Study of any test management tool (e.g. Test Director)
7) Create a test plan document for any application (e.g. Library Management System)
8) Study of any open source-testing tool (e.g. Test Link)

Course Code: CSE309 **LTP 3-0-2 Credit:4**
Course Title: Machine Learning

Course Objectives

- This course explains machine learning techniques such as decision tree learning, Bayesian
- learning etc.
- To understand computational learning theory.
- To study the pattern comparison techniques.

UNIT - I

Introduction - Well-posed learning problems, designing a learning system, Perspectives and issues in machine learning

Concept learning and the general to specific ordering – introduction, a concept learning task, concept learning as search, find-S: finding a maximally specific hypothesis, version spaces and the candidate elimination algorithm, remarks on version spaces and candidate elimination, inductive bias**.**

Decision Tree Learning – Introduction, decision tree representation, appropriate problems for decision

tree learning, the basic decision tree learning algorithm, hypothesis space search in decision tree learning, inductive bias in decision tree learning, issues in decision tree learning.

UNIT - II

Artificial Neural Networks-1– Introduction, neural network representation, appropriate problems for neural network learning, perceptions, multilayer networks and the back-propagation algorithm.

Artificial Neural Networks-2- Remarks on the Back-Propagation algorithm, An illustrative example: face recognition, advanced topics in artificial neural networks.

Evaluation Hypotheses – Motivation, estimation hypothesis accuracy, basics of sampling theory, a general approach for deriving confidence intervals, difference in error of two hypotheses, comparing learning algorithms.

UNIT - III

Bayesian learning – Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum Likelihood and least squared error hypotheses, maximum likelihood hypotheses for predicting probabilities, minimum description length principle, Bayes optimal classifier, Gibs algorithm, Naïve Bayes classifier, an example: learning to classify text, Bayesian belief networks, the EM algorithm.

Computational learning theory – Introduction, probably learning an approximately correct hypothesis, sample complexity for finite hypothesis space, sample complexity for infinite hypothesis spaces, the mistake bound model of learning.

Instance-Based Learning- Introduction, *k*-nearest neighbour algorithm, locally weighted regression, radial basis functions, case-based reasoning, remarks on lazy and eager learning.

UNIT- IV

Genetic Algorithms – Motivation, Genetic algorithms, an illustrative example, hypothesis space search, genetic programming, models of evolution and learning, parallelizing genetic algorithms.

Learning Sets of Rules – Introduction, sequential covering algorithms, learning rule sets: summary, learning First-Order rules, learning sets of First-Order rules: FOIL, Induction as inverted deduction, inverting resolution.

Reinforcement Learning – Introduction, the learning task, *Q*–learning, non-deterministic, rewards and actions, temporal difference learning, generalizing from examples, relationship to dynamic programming.

UNIT - V

Analytical Learning-1- Introduction, learning with perfect domain theories: PROLOG-EBG, remarks on explanation-based learning, explanation-based learning of search control knowledge.

Analytical Learning-2-Using prior knowledge to alter the search objective, using prior knowledge to augment search operators.

Combining Inductive and Analytical Learning – Motivation, inductive-analytical approaches to learning, using prior knowledge to initialize the hypothesis.

TEXT BOOK:

1. Machine Learning – Tom M. Mitchell, - MGH

REFERENCE BOOK:

1. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis

Course Outcomes

- Understand the concepts of computational intelligence like machine learning
- Ability to get the skill to apply machine learning techniques to address the real time problems
- in different areas
- Understand the Neural Networks and its usage in machine learning application.

List of Practicals

1. The probability that it is Friday and that a student is absent is 3 %. Since there are 5 school days in a week, the probability that it is Friday is 20 %. What is theprobability that a student is absent given that today is Friday? Apply Baye's rule in python to get the result. (Ans: 15%)
2. Extract the data from database using python
3. Implement k-nearest neighbours classification using python
4. Given the following data, which specify classifications for nine combinations of VAR1 and VAR2 predict a classification for a case where VAR1=0.906 and VAR2=0.606, using the result of kmeans clustering with 3 means (i.e., 3 centroids)

VAR1 VAR2 CLASS
1.713 1.586 0
0.180 1.786 1
0.353 1.240 1
0.940 1.566 0
1.486 0.759 1
1.266 1.106 0
1.540 0.419 1
0.459 1.799 1
0.773 0.186 1

5. The following training examples map descriptions of individuals onto high, medium and low credit-worthiness.

medium skiing design single twenties no -> highRisk
high golf trading married forties yes -> lowRisk
low speedway transport married thirties yes -> medRisk
medium football banking single thirties yes -> lowRisk
high flying media married fifties yes -> highRisk
low football security single twenties no -> medRisk
medium golf media single thirties yes -> medRisk
medium golf transport married forties yes -> lowRisk
high skiing banking single thirties yes -> highRisk
low golf unemployed married forties yes -> highRisk

Input attributes are (from left to right) income, recreation, job, status, age-group, home-owner. Find the
unconditional probability of `golf' and the conditional probability of `single' given `medRisk' in the dataset?

6. Implement linear regression using python.
7. Implement Naïve Bayes theorem to classify the English text
8. Implement an algorithm to demonstrate the significance of genetic algorithm
9. Implement the finite words classification system using Back-propagation algorithm

Course Code:CSE310 **L T P 3-0-2 Credit:4**
Course Title: Java Programming

OBJECTIVES

• Understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
• Understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
• Use various Java programming language constructs to create several Java technology applications.
• Be aware of the important topics and principles of software development.
• Be able to use the Java SDK environment to create, debug and run simple Java programs.

UNIT – I

Introduction to Java: Importance and features of Java, Keywords, constants, variables and Data Types, Operators and Expressions, Decision Making, Branching and Looping: if..else, switch,operator, while, do, for statements, labeled loops, jump statements: break, cotinue return. Introducing classes, objects and methods: defining a class, adding variables and methods, creating objects, constructors, class inheritance. Arrays and String: Creating an array, one and two dimensional arrays, string array and methods, Classes: String and String Buffer classes, Wrapper classes: Basics types, using super, Multilevel hierarchy abstract and final classes, Object class, Packages and interfaces, Access protection, Extending Interfaces, packages.

UNIT – II

Exception Handling: Fundamentals exception types, uncaught exceptions, throw, throw, final, built in exception, creating your own exceptions, Multithreaded Programming: Fundamentals, Java thread model: priorities, synchronization, messaging, thread classes, Run able interface, inter thread Communication, suspending, resuming and stopping threads. Input/Output Programming: Basics, Streams, Byte and Character Stream, predefined streams, Reading and writing from console and files. Using Standard Java Packages (lang, util, io, net). Networking: Basics, networking classes and interfaces, using java.net package, doing TCP/IP and Data-gram Programming

UNIT – III

Event Handling: Different Mechanism, the Delegation Event Model, Event Classes, Event Listener Interfaces, Adapter and Inner Classes, Working with windows, Graphics and Text, using AWT controls, Layout managers and menus, handling Image, Java Applet. Beans: Introduction to Java Beans and Swings, Servlets

UNIT – IV

Website Designing: Overview of Internet and Intranet Services, Sending and Receiving Mails,HTML Tags, Creating Tables, Check Boxes, Text Books, Frames, Static & Dynamic Web Pages, Guidelines for a good website design, DHTML, ASP, Javascript

TEXT BOOKS:

1. Patrick Naughton and Herbertz Schildt, “Java-2 The Complete Reference”, 1999, TMH
2. Rick Dranell, “HTML 4 unleashed”, Techmedia Publication, 2004.
3. Shelley Powers, “Dynamic Web Publishing”, 2nd Ed., Techmedia, 1998.

REFERENCES BOOKS:

1. E. Balaguruswamy, “Programming with Java: A Primer”, TMH, 1998.
2. Horstmann, “Computing Concepts with Java 2 Essentials”, John Wiley, 2004.
3. Decker & Hirshfield, “Programming Java: A introduction to programming using JAVA”, Vikas Publication, 2000.
4. Tmy Gaddies, “Starting out with Java”, Wiley Dreamtech, 2005.
5. Holzner, “HTML Blackbook”, Wiley Dreamtech, 2005

OUTCOMES

• To gain knowledge of the structure and model of the Java programming language.
• Students will be able to use the Java programming language for various programming technologies.

• To develop software in the Java programming language.
• Students will evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements.
• To propose the use of certain technologies by implementing them in the Java programming language to solve the given problem.
• Students will be able to choose an engineering approach to solving problems, starting from the acquired knowledge of programming and knowledge of operating systems.

List of Practicals

% http://spoken-tutorial.org/tutorial-search/?search_foss=Java&search_language=English
Practi**cals** ar**e available** in **IIT-Bombay Spoken Tutorial in the above mentioned website.**
JAVA BASICS
1. Programs illustrating various data types in Java.
2. Programs illustrating class, objects and methods
3. Programs for addition and multiplication of Matrices
4. Programs illustrating Overloading in Java
5. Programs illustrating the implementation of Various forms of Inheritance(Single, Hierarchical,Multilevel)
6. Programs illustrating Overriding methods in Java
7. Programs illustrating Exception Handling
8. Programs to manipulate strings
JAVA INTERFACES, PACKAGES and THREADS
9. Programs illustrating Interfaces in Java
10. Programs to create Packages in Java
11. Programs illustrating Threads in Java
JAVA APPLETS
12. Programs to write applets to draw the various shapes
13. Programs to manipulate labels, lists, text fields and panels
14. Programs to handle mouse events

LIST OF ELECTIVES

Course Code:CSE311 **L T P 3-0-0 Credit:3**
Course Title: Natural Language Processing

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

Understand the approaches to syntax and semantics in Natural Language Processing, the various types of language processors, and the computational morphology
Understand the basic parsing strategies and the approaches to ambiguity resolution
Explain and apply the fundamental algorithms and techniques in the area of Natural Language Processing

Main Topics	Course Outlines
1. Introduction	Applications of Natural Language Processing; Levels of linguistic processing – morphology, syntax, semantics.
2. Goals of NLP	Language processors – recognizers, transducers, parsers, generators; Language as a rule-based system; Language understanding as an inferential activity.
3. Resources for NLP	Lexicons and knowledge bases; Elements of formal language theory – alphabet, string, language, grammar, productions, symbol vocabulary, generator, recognizer, procedure; Types of grammar; the Chomsky hierarchy.
4. Computational Morphology	Lemmatization; Part-of-Speech tagging; Finite-State analysis.
5. Parsing	Definition of a parser; derivations; basic parsing strategies for context free grammars; determinism and non-determinism; decidability.
6. Implementation of Parser	Data structures and algorithms for parsing; unification based grammar formalisms.
7. Ambiguity and its Resolution	Syntactic ambiguities and heuristics; lexical ambiguities and selectional restrictions; indeterminacy of reference.
8. Generation and Dialogue	Syntactic generation algorithms and reversibility; text planning; modeling dialogue agents.

Recommended Books:

1. Daniel Jurafsky and James H. Martin, Speech and Language Processing, Prentice Hall.
2. James F. Allen, Natural Language Understanding, Benjamin-Cummings.
3. G. Gazdar, C. Mellish, Natural Language Processing in Prolog: An Introduction to Computational Linguistics, Addison Wesley.

Course Code:CSE312 **L T P 3-0-0 Credit:3**
Course Title: Pattern Recognition
Course Objectives:

Students will learn the fundamentals of pattern recognition and its relevance to classical and modern problems. Main objective is to be able to identify where, when and how pattern recognition can be applied. Students will learn the sufficient background necessary to read more advance texts as well as journal articles on the field.

Contents:

Introduction to statistical, syntactic and descriptive approaches, features and feature extraction. Bayes Decision theory- continuous case, 2-category classification, minimum error rate classification, discriminant functions and decision surfaces, discrete case.

Parameter estimation, supervised learning- Maximum likelihood, Bayes, general bayesian learning. Nonparametric - density estimation, parzen windows, k-nearest Neighbor, estimation posterior probability.

Linear discriminant functions- decision surfaces, generalized linear discriminant functions, 2-category linearly separable case, non-separable behavior, linear programming procedures, SVMs.

Supervised learning: Feed forward Neural networks, Backpropagation algorithm, error surfaces. Clustering - data description and clustering, Hierarchical clustering, self organizing maps.

Books:

1) Duda and Hart P.E, and David G Stork, Pattern classification , John Wiley & Sons.

2) Duda and Hart P.E, Pattern classification and scene analysis, John Wiley and sons.

3) Earl Gose, Richard Johnsonbaugh, and Steve Jost; Pattern Recognition and Image Analysis, PHI.

4) Fu K.S., Syntactic Pattern recognition and applications, Prentice Hall.s

Course Outcomes:

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

- Explain and compare a variety of pattern classification, structural pattern recognition, and pattern classifier combination techniques.
- Summarize, analyze, and relate research in the pattern recognition area verbally and in writing.
- Apply performance evaluation methods for pattern recognition, and critique comparisons of techniques made in the research literature.
- Apply pattern recognition techniques to real-world problems such as document analysis and recognition.
- Implement simple pattern classifiers, classifier combinations, and structural pattern recognizers.

Course Code: CSE313 **L T P 3-0-0 Credit:3**
Course Title: Digital Image Processing

Course Objectives: At the end of the course, the student will be able to:
To study the image fundamentals and mathematical transforms necessary for image processing.

- To study the image enhancement techniques
- To study image restoration procedures.
- To study the image compression procedures.

Main Topics	**Course outlines**
1. Introduction	Image model, human vision, digital images representation, image acquisition, storage, processing, communication and display, Image Geometry, Image transformations,
2. Fourier Transformation	Discrete Fourier transformation, Fast Fourier Transformation, other represent able image transformation.
3. Image Enhancement	Image enhancement, special domain and frequency domain methods, enhancement by point frequency,
4. Filters	Special filtering, enhancement in frequency domain, color image frequency.
5. Image Restoration	Image restoration, degradation model, algebraic approval to restoration, constrained least square restoration, Interactive restoration, restoration in special domain.
6. Image Compression	Image compression, image compression models, loss less and glossy image compressions methods.
7. Image Segmentation	Image segmentation, detection of discontinuities, Region oriented segmentation.
8. Image Detection	edge detection and boundary detection, shareholding,

Recommended Books:

1. Rafacl C. Gonzalez, Digital image processing, Addison Wesley.
2. Jain Tenber, Digital Image Processing, PHI.

Course Outcomes:

- Review the fundamental concepts of a digital image processing system.
- Analyze images in the frequency domain using various transforms.
- Evaluate the techniques for image enhancement and image restoration.
- Categorize various compression techniques.

Course Code: CSE314 **L T P 3-0-0 Credit:3**
Course Title: Cloud Computing

Course Objectives:

- Identify the technical foundations of cloud systems architectures.
- Analyze the problems and solutions to cloud application problems.
- Apply principles of best practice in cloud application design and management.
- Identify and define technical challenges for cloud applications and assess their importance.

Main Topics	Course outlines
1. Understanding Cloud Computing	Background of cloud computing, enabling technologies and technology innovations, introduction to cloud computing including benefits, challengers and risks. Reference Architecture: cloud consumer, cloud service provider, cloud broker, cloud Auditor, cloud carrier. Boundaries of cloud computing.
2. Service deployment Models and Virtualization	Cloud Characteristics, Cloud service model, cloud deployment models. Virtualization concepts: types of virtualization, benefits of virtualization, introduction to various virtualization operating systems.
3. Cloud Security	Security concepts: Confidentiality, privacy, integrity, authenticity, availability, access control, non-repudiation, Threat, Vulnerability, Risk, Security Controls, Virtualization Attack: Guest hopping, attacks on the VM, VM migration attack. Legal and compliance issues: responsibility, ownership of data, right to penetration test, compliance for cloud provider vs. compliance for the customer.
4. Cloud Computing Architecture	Fundamental Cloud Architectures: Architecture of Workload Distribution, Resource Pooling, Dynamic Scalability, Capacity, Service Load Balancing.
5. Advance cloud computing architecture	Hypervisor Clustering, Load Balanced Virtual Server Instances, Zero Downtime, Cloud Balancing, Resource Reservation, Dynamic Failure Detection and Recovery, Storage Workload Management
6. Case study	Public cloud environment: Understanding and exploring Amazon web services, managing and creating EC2 instances.

Recommended Books:

1. Thomas Erl, Zaigham Mahmood, Ricardo Puttini, "Cloud Computing: Concepts, Technology and Architecture", Prentice Hall.
2. John W. Rittinghouse, James F. Ransome, "Cloud Computing Implementation, Management and Security", CRC Press.
3. Alfredo Mendoza, "Utility Computing Technologies, Standards, and Strategies", Artech House INC.
4. Bunker, Darren Thomson, "Delivering Utility Computing",John Wiley and Sons Ltd.

Course Outcomes:

- Understand the fundamental principles of distributed computing. Understand how the distributed computing environments known as Grids can be built from lower level services.
- Understand the importance of virtualization in distributed computing and how this has enabled the development of Cloud Computing.
- Analyze the performance of Cloud Computing.

Course Code:CSE315 **L T P 3-0-0 Credit:3**
Course Title: Distributed Systems

Course Objectives:

The structure of distributed systems using multiple levels of software is emphasized. Specific topics include:

- distributed algorithms
- distributed file systems
- distributed databases,
- security and protection
- distributed services such as the world-wide web, and
- examples of research and commercial distributed systems

Main Topics	**Course outlines**
1. Introduction to Distributed Systems	Definition of distributed systems, their objectives, types, hardware and software concepts, architecture.
2. Web Services Concepts	Introduction to XML, SOAP, Web and Grid services concepts.
3. Communication	Inter process communication, Remote Procedure Call (RPC), Remote Method Invocation (RMI), Remote Object Invocation, and Message Oriented Communication.
4. Processes	Introduction to threads, Threads in distributed and non distributed systems, Client side software, Design issues for Servers, Software agents.
5. Naming	General issues with respect to naming, Name resolution, implementation of a name space, Domain name Systems, X.500 name space.
6. Security	Introduction to security in distributed systems, General issues in authentication and access control, Security management: Key management, secure group management, authorization management; examples: Kerberos, x.509 certificates.
7. Distributed Object-based Systems	Introduction to distributed object based systems, Overview of CORBA and DCOM and their comparison.
8. Distributed File System and Document Based Systems	Introduction to distributed file system, distributed document-based systems, their examples.

Recommended Books:

1. Andrew S Tanenbaum, Principles and Paradigms of Distributed Sytsems, Pearson Education.
2. George Coulouris, Distributed Systems, Addison Wesley.

Course Outcomes:

The primary learning outcome of the course is two-fold:
1. Students will identify the core concepts of distributed systems: the way in which several machines orchestrate to correctly solve problems in an efficient, reliable and scalable way.
2. Students will examine how existing systems have applied the concepts of distributed systems in designing large systems, and will additionally apply these concepts to develop sample systems.

Course Code: CSE316 **L T P 3-0-0 Credit:3**

Course Title: Linux Programming

OBJECTIVES

• To understand the usage of UNIX inter process cosmmunications (IPC)
• To understand File systems and File structures and controlling resources with various commands
• To provide support for distributed and networked applications in UNIX environment
• To study the detail concepts of low level file access
• To know the basic concept of Linux scripting

UNIT – I

Linux – The Operating System: Linux history, Linux features, Linux distributions, Linux's relationship to Unix, Overview of Linux architecture, Installation, Booting, Login and Shutdown Process, Start up scripts, controlling processes, system processes (an overview), Linux Security, Networking on Linux: Preparing Linux for Networking, Network Installation, configuring network setting after installation

UNIT – II

Networking commands, Filters.Linux utilities- File handling utilities, Process utilities, Disk utilities,Text processing utilities and Backup utilities, sedscripts, operation, addresses, commands, applications, awk-execution, fields and records, scripts, operation, patterns, actions ,functions, using system commands in awk.

UNIT –III

Working with the Bourne again shell(bash):Introduction,shell responsibilities, pipes and input redirection, output redirection, here documents, running a shell script, shell as a programming language, shell meta characters, file name substitution, shell variables, command ubstitution, shell commands, environment, quoting, test command, control structures, script examples, debugging shell scripts.

UNIT – IV

Interprocess Communication: Introductions to IPC, Pipes, FIFOs, Introduction to three types of IPC message queues, semaphores and shared memory. Message Queues-Kernel support for messages, Unix system V APIs for messages, client/server example. Semaphores-Kernel support for semaphores.

TEXT BOOKS:

1. N. Barkakati, "X-Windows System Programming", PHI, 2001
2. K. Cox, "Red Hat Linux Administrator's Guide", PHI, 2001
3. Michael Jain, "Red Hat Linux 9", BPB Publications, 2003.
4. Peterson Richard, "The Complete References Linux", 2nd Ed., Tata McGraw Hill, 2002.

REFERENCES BOOKS:

1. O'Reilly and Associates Vol. 0: Protocol Reference Manual, 1992
2. O'Reilly and Associates Vol. 1: Xlib Programming Manual, 1992
3. O'Reilly and Associates Vol. 2: Xlib Programming Manual, 1992
4. Bach, "The Design of the Unix Kernel", PHI, 2000.

COURSE OUTCOMES

• Understanding the basic set of commands and utilities in Linux/UNIX systems.
• Students will learn to develop software for Linux/UNIX systems.
• To learn the C language and get experience programming in C.
• To learn the important Linux/UNIX library functions and system calls.
• To understand the inner workings of UNIX-like operating systems

Course Code:CSE317 **L T P 3-0-0 Credit:3**
Course Title: Data or Information Cryptography

Course Objectives:

1. To understand basics of Cryptography and Network Security.
2. To be able to secure a message over insecure channel by various means.
3. To learn about how to maintain the Confidentiality, Integrity and Availability of data.

Contents:

Elliptic Curve Cryptography Secret Sharing, Threhold cryptography – Robust ElGamal system Visual Cryptography Interactive zero knowledge proofs, witness hiding protocols. Group encryption, decryption. Group signatures, ring signatures. EVoting: requirements, issues and challenges, existing solutions, write-in ballots. Pair based cryptography – Weil and Tate pairing.

Books: 1) Serious Cryptography: A Practical Introduction to Modern: Jean-Philippe Aumasson

2. Selected paper and online reference material.

Course Outcomes:

After successful completion of the course, the learners would be able to

1. Provide security of the data over the network.
2. Do research in the emerging areas of cryptography and network security.
3. Implement various networking protocols.
4. Protect any network from the threats in the world.

Course Code:CSE318 **L T P 3-0-0 Credit:3**
Course Title: Security in Computing

Course Objectives:

1. To understand basics of Cryptography and Network Security.
2. To be able to secure a message over insecure channel by various means.
3. To learn about how to maintain the Confidentiality, Integrity and Availability of data.

Contents:

Computer security, threats, attacks, computer criminals, defense methods, information and network policies, cryptography, symmetric and public-key encryption, uses of encryption.

Secure file systems and database security.

Program security, secure programs, viruses and other malicious code, control against program threats, protection in general-purpose OS, protected resources and methods of protection, user authentication.

Binding programs to machines.

Language based security, Integrating security in compilers.

Designing trusted OS, models of security, database security, security requirements, reliability and integrity, inference.

Administering security, legal, privacy, and ethical issues in computer security.

Books:

1) Pfleeger and Pfleeger, Security in Computing, Pearson Education.

2) M. Bishop and S. S. Venkatramanayya, Introduction to Computer Security, Pearson Education.

3) Stallings W., Cryptography and Network Security Principles and Practice, Pearson Education.

4) Stallings W., Network Security Essentials: Applications and Standards, Pearson Education

Course Outcomes:

After successful completion of the course, the learners would be able to

1. Provide security of the data over the network.
2. Do research in the emerging areas of cryptography and network security.
3. Implement various networking protocols.
4. Protect any network from the threats in the world.

Course Code:CSE319 **L T P 3-0-0 Credit:3**
Course Title: Computer Forensics & Digital Evidence

Course Objectives:

- To study the fundamentals of Computer Forensics
  • To learn, analyze and validate Forensics Data
  • To study the tools and tactics associated with Cyber Forensics

File System Forensics: Duplicating hard disks for "dead analysis", reading hidden data on a disk's Host Protected Area (HPA), Direct versus BIOS access, dead versus live acquisition, Disk partitions - DOS, Apple, and GPT partitions, BSD disk labels, Sun Volume;

Multiple disk volumes - RAID and disk spanning; Analyzing FAT, NTFS, Ext2, Ext3, UFS1, and UFS2 file systems, Finding evidence: File metadata, recovery of deleted files, Using The Sleuth Kit (TSK).

Autopsy Forensic Browser, and related open source tools Web Forensics: network-based evidence in Windows and Unix environments, Reconstructing Web browsing, e-mail activity, Tracing domain name ownership and the source of e-mails System Forensics:

Windows Registry changes, Duplicating and analyzing the contents of PDAs and flash memory devices Electronic document, computer image verification and authentication

Books:
1) Brian Carrier. File System Forensic Analysis, Addison Wesley.
2) Chris Prosise, Kevin Mandia. Incident Response and Computer Forensics, McGraw Hill.
3) Linda Volonino, Reynaldo Anzaldua, and Jana Godwin. Computer Forensics: Principles and Practices, Prentice Hall.
4) Keith J. Jones, Richard Bejtlich, and Curtis W. Rose. Real Digital Forensics: Computer Security and Incident Response, Addison Wesley
5) Vacca, John R., Computer Forensics Computer Crime Scene Investigation, Charles River Media.
6) Nelson, Phillips, Enfinger, Steuart. Guide to computer Forensics and Investigation, Course Technology

Course Outcomes:

1. Students are able to demonstrate critical thinking by analyzing situations and by constructing and selecting solutions to problems.
2. able to understand and appreciate the legal and ethical environment impacting individuals as well as business organizations and have an understanding of the ethical implications of IT legal decisions.
3. able to understand fundamentals and advanced issues of various threats faced by today's cyber infrastructure.

Course Code:CSE320 **L T P 3-0-0 Credit:3**
Course Title: Mobile Communication Systems

1. To make students familier with fundamentals of mobile communication systems

2. To identify the requirements of mobile communication as compared to static communication

4. To identify the limitations of 2G and 2.5G wireless mobile communication and use design of 3G and beyond mobile communication systems

5. As a prerequisite for the course in Wireless LANs

Main Topics	**Course outlines**
1. Introduction	History of wireless communication, Need of mobility, Application of wireless communication, Cellular concept
2. First Generation (1G) Mobile Systems	Advanced Mobile Phone System (AMPS) and Nordic Mobile Telephony (NMT), frequency allocation, channels, modulation, multiple access scheme, network operation.
3. Second Generation (2G) Mobile Systems	Network architecture, channels and operation of GSM, CDMAOne (IS-95), and IS-41, mobility management, Network operations of GPRS, CDMATwo (IS-95B), CDPD, and HCSD.
4. Third Generation (3G) Mobile Systems	3G spectrum requirements, enabling technologies, service classes, applications and radio access standards (WCDMA and CDMA2000), Introduction to EDGE and WLAN. Introduction to 4G.
5. Network Layer Mobility	Mobile IP, Goals, Assumptions and requirements, Entities and terminology, IP packet delivery, Agent advertisement and discovery, Registration, Tunnelling and Encapsulation , Optimisation , Reserve Tunnelling, ipv6 Protocol, Dynamic Host configuration Protocol(DHCP), Micro-mobility.

Course Outcomes: At the end of the course, the student will be able to:
1. To make students familiar with various generations of mobile communications
2. To understand the concept of cellular communication
3. To understand the basics of wireless communication
4. Knowledge of GSM mobile communication standard, its architecture, logical channels, advantages and limitations.

Recommended Books:
1. J.Schiller, Mobile Communications, Pearson Education.
2. Pomportsis, Wireless Networks, John Wiley and Sons.

Course Code:CSE321 **L T P 3-0-0 Credit:3**
Course Title: Semantic Web

Course Objectives:
1. To understand the concepts of Semantic Web.
2. To understand the characteristics of the agents.
3. To understand design and implementation of Agents.
4. To understand the implementation described in the architecture level.

Introduction to semantic web, architecture, langauages and tools for knowledge management. XML, RDF, OIL, DAML, OWL for semantic web.

Semantic Web Technologies:

Ontology-based Systems: Ontology based knowledge management; ontology construction; generating, storing, aligning and maintaining ontologies for semantic web; information retrieval from natural language based documents; ontology evolution; ontological indexing and searching techniques for Searching web

Books: 1) John Davies, Rudi Studer, and Paul Warren. Semantic Web Technologies: Trends and Research in Ontology-based Systems, Wiley.

2) John Davies, Dieter Fensel, Frank van Harmelen, and Frank van Harmelen. Towards the Semantic Web: Ontology-Driven Knowledge Management, Wiley.

Course Outcomes:

1. Discuss about basic of semantic web and search engine
2. Explain RDFS and its process
3. Explain semantic issue and prototype system
4. Explain various semantic web services and its design

Course Code:CSE322 **L T P 3-0-0 Credit:3**
Course Title: Neural Networks

Course Objectives:

- To introduce the foundations of Artificial Neural Networks
- To acquire the knowledge on Deep Learning Concepts
- To learn various types of Artificial Neural Networks
- To gain knowledge to apply optimization strategies

UNIT-I

Artificial Neural Networks Introduction, Basic models of ANN, important terminologies, Supervised Learning Networks, Perceptron Networks, Adaptive Linear Neuron, Back-propagation Network.

Associative Memory Networks. Training Algorithms for pattern association, BAM and Hopfield Networks.

UNIT-II

Unsupervised Learning Network- Introduction, Fixed Weight Competitive Nets, Maxnet, Hamming Network, Kohonen Self-Organizing Feature Maps, Learning Vector Quantization, Counter Propagation Networks, Adaptive Resonance Theory Networks. Special Networks-Introduction to various networks.

UNIT - III

Introduction to Deep Learning, Historical Trends in Deep learning, Deep Feed - forward networks, Gradient-Based learning, Hidden Units, Architecture Design, Back-Propagation and Other Differentiation Algorithms

TEXT BOOKS:

1. Deep Learning: An MIT Press Book By Ian Goodfellow and Yoshua Bengio and Aaron Courville
2. Neural Networks and Learning Machines, Simon Haykin, 3rd Edition, Pearson Prentice Hall

Course Outcomes:

- Ability to understand the concepts of Neural Networks
- Ability to select the Learning Networks in modeling real world systems
- Ability to use an efficient algorithm for Deep Models
- Ability to apply optimization strategies for large scale applications

Course Code:CSE323 **L T P 3-0-0 Credit:3**
Course Title: Soft Computing

Course Objectives:
1. Develop the skills to gain a basic understanding of neural network theory and fuzzy logic theory.
2. Introduce students to artificial neural networks and fuzzy theory from an engineering perspective

Main Topics	Course outlines
1. Fuzzy Set Theory	Introduction to Fuzzy Sets, Operation on Fuzzy Arithmetic and Fuzzy Relations.
2. Fuzzy Rules and Fuzzy Reasoning	Multivalued logics, Fuzzy propositions, Fuzzy Quantifiers, Linguistic Hedges, Fuzzy Inference and Reasoning, Rules Composition and Defuzzification. Examples of use of Fuzzy logic in control of real world systems.
3. Genetic Algorithms	Biological background of Genetic Algorithms; Simple Genetic Algorithm, Chromosome representations; crossover operations; Mutation operations, Operational Rates; concept of exploration and exploitation , Selection Schemes; Fitness function design; Population size; Replacement Schemes; Parameter tuning and control ,Convergence of algorithm, Application of Genetic Algorithms
4. Artificial Neural Networks	Introduction to Biological Neuron, Architecture, Learning : Supervised and Unsupervised, Backpropagation and Feedforward Networks, Perceptron, Adaline, Backpropagation Multilayer Perceptrons, Backpropgation Learning Rule, Methods of Speeding, Radial Basis Function Networks, Support Vector Machine. Competitive Learning Networks, Kohonen self-organising networks, The Hopfield Network.
5. Neuro- Fuzzy Modeling	Neural Networks and Fuzzy Logic, Fuzzy Neuron, Fuzzy Perceptron, Fuzzy classification Networks using Backpropogation, Fuzzy Neural Inference System, Fuzzy Adaptive Resonance Theory, Fuzzy Associative Memory, Neural-Fuzzy Systems, Neuro Fuzzy Evolutionary Integration.

Recommended Books:

1. Satish Kumar, Neural Networks, TMH
2. George J, Bo Yuan, Fuzzy Sets and Fuzzy Logic: Theory and Applications, PHI.
3. Man and Kwong, Genetic Algorithms: Concepts and Designs, Springer Verlag.
4. Neuro- Fuzzy and Soft Computing, Jang, Sun, E.Mizutani, PHI

Course Outcomes: At the end of the course, the student will be able to:
1. To understand the fundamental theory and concepts of neural networks, Identify different neural network architectures, algorithms, applications and their limitations
2. Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications
3. Reveal different applications of these models to solve engineering and other problem

Course Code:CSE324 **L T P 3-0-0 Credit:3**
Course Title: Information Retrieval

Course Objectives:

1. The main objective of this course is to present the basic concepts in information retrieval and more advance techniques of multimodal based information systems.
2. understand the underlined problems related to IR and
3. acquired the necessary experience to design, and implement real applications using Information Retrieval systems.

INTRODUCTION- Information storage and retrieval systems, Data Structures and Algorithms Related to Information Retrieval.

RETRIEVAL STRATEGIES - Vector Space Model, Probabilistic Retrieval Strategies, Language Models, Inference Network, Extended Boolean retrieval, Latent Semantic Indexing

RETRIEVAL UTILITIES - Relevance Feedback , Clustering, PassageBased Retrieval, N-grams, Regression Analysis, Thesauri, Stemming, Semantic Networks, Parsing, Ranking

EFFICIENCY- Inverted Index, Query Processing, Signature Files, Duplicate Document Detection
INTEGRATING STRUCTURED DATA AND TEXT - Review of the Relation Model, A Historic Progression, Information Retrieval as a Relational Application, Semi-Structured Search using a Relational Schema, Multi-dimensional Data Mode

Course Outcomes:

- gain an understanding of the basic concepts and techniques in Information Retrieval;
- understand how statistical models of text can be used to solve problems in IR, with a focus on how the vector-space model and language models are implemented and applied to document retrieval problems;
- understand how statistical models of text can be used for other IR applications, for example clustering and news aggregation;
- appreciate the importance of data structures, such as an index, to allow efficient access to the information in large bodies of text;

Books:

1. Information Retrieval Data Structures & Algorithms by William B. Frakes, Ricardo Baeza-Yates
2. Information retrieval- by D A Grossman , Ophir Frieder, Springer International Edition

Course Code:CSE325 **L T P 3-0-0 Credit:3**
Course Title: Intrusion Detection

Course objectives:

1. Apply knowledge of the fundamentals and history of Intrusion Detection in order to avoid common pitfalls in the creation and evaluation of new Intrusion Detection Systems
2. Analyze intrusion detection alerts and logs to distinguish attack types from false alarms.
3. Understand when, where, how, and why to apply Intrusion Detection tools and techniques in order to improve the security posture of an enterprise.

Contents:

Introduction- Intrusion detection system (IDS), intrusion prevention system (IPS), Unauthorized access – buffer overflow, packet fragmentation, out-of-spec packets Review of Network protocol – TCP-/IP,Intrusiond detection through tcpdump.

IDS and IPS – Architecture and internals. Malicious and non-malicious traffic, IP headers, TDP, UPD and ICMP protocols and header formats, Header information to detect intrusion, logs and their analysis, IDS through reaction and response

Intrusion analysis – data correlation, tools, SNORT

Course Outcomes:

1. Explain the fundamental concepts of Network Protocol Analysis and demonstrate the skill to capture and analyze network packets.
2. Use various protocol analyzers and Network Intrusion Detection Systems as security tools to detect network attacks and troubleshoot network problems.

Books:

1) Matt Fearnow, Stephen Northcutt, Karen Frederick, and Mark Cooper. Intrusion Signatures and Analysis, SAMS.
2) Carl Endorf, Gene Schultz, Jim Mellander, Intrusion Detection and Prevention, McGraw Hill.
3) Stephen Northcutt and Judy Novak. Network Intrusion Detection, SAMS.
4) Paul E. Proctor. The Practical Intrusion Detection Handbook, Prentice Hall.

Course Code:CSE326 **L T P 3-0-0 Credit:3**
Course Title: Ad-Hoc & Sensor Networks

Course Objectives:
To understand the concepts of sensor networks
To understand the MAC and transport protocols for ad hoc networks
To understand the security of sensor networks
To understand the applications of adhoc and sensor networks

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, Topologybased routing algorithms-**Proactive**: DSDV; **Reactive**: DSR, AODV; Hybrid: ZRP; Position-based routing algorithms-**Location Services**-DREAM, Quorum-based; **Forwarding Strategies:** Greedy Packet, Restricted Directional Flooding-DREAM, LAR.
UNIT - II
Data Transmission - Broadcast Storm Problem, **Rebroadcasting Schemes**-Simple-flooding, Probability-based Methods, Area-based Methods, Neighbor Knowledge-based: SBA, Multipoint Relaying, AHBP. **Multicasting: Tree-based:** AMRIS, MAODV; **Mesh-based:** ODMRP, CAMP; **Hybrid:** AMRoute**,** MCEDAR.
UNIT - III
Geocasting: Data-transmission Oriented-LBM; Route Creation Oriented-GeoTORA, MGR**.** TCP over Ad Hoc TCP protocol overview, TCP and MANETs, Solutions for TCP over Ad hoc
UNIT - IV
Basics of Wireless, Sensors and Lower Layer Issues: Applications, Classification of sensor networks, Architecture of sensor network, Physical layer, MAC layer, Link layer, Routing Layer.
UNIT - V
Upper Layer Issues of WSN: Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs, Sensor Networks and mobile robots.
TEXT BOOKS:
1. Ad Hoc and Sensor Networks – Theory and Applications, Carlos Corderio Dharma P. Aggarwal, 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).

Course Outcomes:
Ability to understand the state-of-the-art research in the emerging subject of Ad Hoc and Wireless Sensor Networks
Ability to solve the issues in real-time application development based on ASN.
Ability to conduct further research in the domain of ASN