DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
(ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)
B.Tech. I Year Course Structure
Applicable From 2020-21Admitted Batch

I YEAR I SEMESTER

S.No.	Course Code	Course Title	L	T	P	Credits
1	MA101BS	Linear Algebra and Calculus	3	1	0	4
2	CH102BS	Engineering Chemistry	3	0	0	3
3	CS103ES	Programming for Problem Solving	3	1	0	4
4	ME104ES	Engineering Graphics	1	0	4	3
5	EN105HS	English	2	0	0	2
6	CH106BS	Engineering Chemistry Lab	0	0	3	1.5
7	CS107ES	Programming for Problem Solving Lab	0	0	2	1
8	EN108HS	English Language and Communication Skills Lab	0	0	3	1.5
9	MA109BS	Employability Skills-I (Aptitude)	0	0	2	0
10		Induction Programme				
		Total Credits	**12**	**2**	**14**	**20**

I YEAR II SEMESTER

S.No.	Course Code	Course Title	L	T	P	Credits
1	MA201BS	Differential Equations and Vector Calculus	3	1	0	4
2	AP202BS	Applied Physics	3	1	0	4
3	CS203ES	Data Structures	3	0	0	3
4	EE204ES	Basic Electrical Engineering	3	0	0	3
5	ME205ES	Engineering Workshop & IT Workshop	0	0	3	1.5
6	AP206BS	Applied Physics Lab	0	0	3	1.5
7	CS207ES	Data Structures Lab	0	0	2	1
8	EE208ES	Basic Electrical Engineering Lab	0	0	2	1
9	EN209HS	Employability skills- II (Business English for Engineers)	0	0	2	0
		Total Credits	**12**	**2**	**12**	**19**

II YEAR I SEMESTER

S.No.	Course Code	Course Title	L	T	P	Credits
1	IT301ES	Analog & Digital Electronics	3	0	0	3
2	CS302PC	Computer Organization and Architecture	3	1	0	4
3	CS303PC	Operating Systems	3	0	0	3
4	AI304PC	Object Oriented Programming using C++	2	0	0	2
5	CS305PC	Discrete Mathematics	3	0	0	3
6	IT306ES	Analog & Digital Electronics Lab	0	0	2	1
7	CS307PC	Operating Systems Lab	0	0	3	1.5
8	AI308PC	Object Oriented Programming using C++ Lab	0	0	3	1.5
9	*MC309	Environmental Science	3	0	0	0
10	MC310	Employability Skills – III	0	0	2	0
Total Credits			**17**	**1**	**10**	**19**

II YEAR II SEMESTER

S.No.	Course Code	Course Title	L	T	P	Credits
1	AI401PC	Artificial Intelligence	3	0	0	3
2	MA402BS	Computer Oriented Statistical Methods	3	1	0	4
3	IT403PC	Database Management Systems	3	0	0	3
4	AI404PC	Java Programming	3	0	0	3
5	AI405PC	Design and Analysis of Algorithms	3	1	0	4
6	IT406PC	Database Management Systems Lab	0	0	2	1
7	AI407PC	Java Programming Lab	0	0	3	1.5
8	AI408PC	Design and Analysis of Algorithms Lab	0	0	3	1.5
9	*MC409	Gender Sensitization Lab	0	0	2	0
10	MC410	Employability Skills – IV	0	0	2	0
Total Credits			**15**	**2**	**12**	**21**

*MC = Satisfactory / Not Satisfactory

III YEAR I SEMESTER

S.No.	Course Code	Course Title	L	T	P	Credits
1	SM501MS	Business Economics & Financial Analysis	3	0	0	3
2	AI502PC	Software Engineering	3	0	0	3
3	AI503PC	Introduction to Python Programming	3	1	0	4
4	CS504PC	Formal Languages and Automata Theory	3	0	0	3
5		Professional Elective - I	3	0	0	3
6	EN505HS	Advanced Communication Skills Lab	0	0	3	1.5
7	AI506PC	Software Engineering Lab	0	0	3	1.5
8	AI507PC	Programming in Python Lab	0	0	2	1
9	*MC509	Constitution of India	3	0	0	0
10	MC510	Employability Skills - V	0	0	2	0
	Total Credits		**18**	**1**	**10**	**20**

III YEAR II SEMESTER

S.No.	Course Code	Course Title	L	T	P	Credits
1	AI601PC	Computer Networks	3	0	0	3
2	CS602PC	Machine Learning	3	1	0	4
3	AI603PC	Principles of Compiler Design	3	0	0	3
4		Professional Elective -II	3	0	0	3
5		Open Elective-I / MOOCs	3	0	0	3
6	AI604PC	Computer Networks Lab	0	0	3	1.5
7	CS605PC	Machine Learning Lab	0	0	2	1
8	AI606PC	Compiler Design Lab	0	0	3	1.5
9	*MC609	Intellectual Property Rights	3	0	0	0
10	*MC610	Cyber Security	0	0	2	0
	Total Credits		**18**	**1**	**10**	**20**

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IV YEAR I SEMESTER

S.No.	Course Code	Course Title	L	T	P	Credits
1	AI701PC	Web Technologies	3	0	0	3
2	AI702PC	Deep Learning	3	0	0	3
3		Professional Elective course - III	3	0	0	3
4		Professional Elective course -IV	3	0	0	3
5		Open Elective-II / MOOCs	3	0	0	3
6	AI703PC	Web Technologies Lab	0	0	3	1.5
7	AI704PC	Deep Learning Lab	0	0	3	1.5
8	AI705PROJ	Industrial Oriented Mini Project	0	0	4	2
9	AI706PROJ	Project-I	0	0	6	3
		Total Credits	**15**	**0**	**16**	**23**

IV YEAR II SEMESTER

S.No.	Course Code	Course Title	L	T	P	Credits
1		Professional Elective course -V	3	0	0	3
2		Professional Elective course -VI	3	0	0	3
3		Open Elective-III / MOOCs	3	0	0	3
4	AI801PROJ	Seminar	0	0	2	1
5	AI802PROJ	Project-II	0	0	16	8
		Total Credits	**9**	**0**	**18**	**18**

Professional Elective – I

1	AI511PE	Software Process & Project Management
2	AI512PE	Data Mining
3	AI513PE	Natural Language Processing
4	AI514PE	Principles of Programming Languages
5	AI515PE	Cryptography & Network Security

Professional Elective - II

1	AI621PE	Software Testing Methodologies
2	AI622PE	Pattern Recognition
3	AI623PE	R Programming
4	AI624PE	Scripting Languages
5	AI625PE	Graph Theory

Professional Elective - III

1	AI731PE	DevOps
2	AI732PE	Big Data Analytics
3	AI733PE	Speech Recognition
4	AI734PE	Semantic Web and Social Networks
5	AI735PE	Internet of Things

Professional Elective - IV

1	AI741PE	Design Patterns
2	AI742PE	Data Analytics and Visualization
3	AI743PE	Computer Graphics
4	AI744PE	Mobile App Development
5	AI745PE	Information Security Assessment and Audit

Professional Elective - V

1	AI851PE	Object Oriented Analysis and Design
2	AI852PE	Predictive Analytics
3	AI853PE	Image Processing
4	AI854PE	Cloud Computing
5	AI855PE	Information Retrieval System

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Professional Elective - VI

1	AI861PE	Web Services and Service Oriented Architecture
2	AI862PE	Bioinformatics
3	AI863PE	Computer Vision
4	AI864PE	Blockchain Technologies
5	AI865PE	Robotic Process Automation

Open Elective - I

1	AI611OE	Information Retrieval System
2	AI612OE	Mobile App Development
3	AI613OE	Python Programming
4	AI614OE	Data Analytics and Visualization

Open Elective - II

1	AI721OE	Database Management Systems
2	AI722OE	Natural Language Processing
3	AI723OE	Machine Learning
4	AI724OE	R Programming

Open Elective - III

1	AI831OE	Semantic Web and Social Networks
2	AI832OE	Speech Recognition
3	AI833OE	Deep Learning
4	AI834OE	Predictive Analytics

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5	EN105HS	English	2	0	0	2
6	CH106BS	Engineering Chemistry Lab	0	0	3	1.5
7	CS107ES	Programming for Problem Solving Lab	0	0	2	1
8	EN108HS	English Language and Communication Skills Lab	0	0	3	1.5
9	MA109BS	Employability skills-I (Aptitude)	1	1	0	0
		Induction Programme				
Total Credits			**13**	**3**	**12**	**20**

I YEAR II SEMESTER

S.No.	Course Code	Course Title	L	T	P	Credits
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3	CS203ES	Data Structures	3	0	0	3
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7	CS207ES	Data Structures Lab	0	0	2	1
8	EE208ES	Basic Electrical Engineering Lab	0	0	2	1
9	EN209HS	Employability skills- II (Business English for Engineers)	0	0	2	0
Total Credits			**12**	**3**	**10**	**19**

MA101BS: LINEAR ALGEBRA AND CALCULUS
(Common to All Branches)

B.Tech. I Year I Sem

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Course Objectives: To learn
- Types of matrices and their properties.
- Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
- Concept of Eigen values and eigenvectors and to reduce the quadratic form to canonical form.
- Concept of Sequence.
- Concept of nature of the series.
- Geometrical approach to the mean value theorems and their application to the mathematical problems
- Evaluation of improper integrals using Beta and Gamma functions.
- Partial differentiation, concept of total derivative.
- Finding maxima and minima of functions of two and three variables.

Course Outcomes: After learning the contents of this paper the student must be able to
- Write the matrix representation of a set of linear equations and to analyze the solution of the system of equations
- Find the Eigen values and Eigen vectors
- Reduce the quadratic form to canonical form using orthogonal transformations.
- Analyze the nature of sequence and series.
- Solve the applications on the mean value theorems.
- Evaluate the improper integrals using Beta and Gamma functions
- Find the extreme values of functions of two variables with/ without constraints.

UNIT-I
Matrices: Types of Matrices, Symmetric, Hermitian, Skew-symmetric, Skew-Hermitian, orthogonal matrices, Unitary Matrices, rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method, System of linear equations, solving system of Homogeneous and Non-Homogeneous equations. Gauss elimination method, Gauss Seidel Iteration Method.

UNIT-II
Eigen values and Eigen vectors: Linear Transformation and Orthogonal Transformation: Eigen values and Eigenvectors and their properties, Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof) finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

UNIT-III

Sequences & Series: Sequence: Definition of a Sequence, limit ,Convergent, Divergent and Oscillatory sequences. Series: Convergent, Divergent and Oscillatory Series, Series of positive terms,Comparison test, p-test, D-Alembert's ratio test, Raabe's test, Cauchy's Integral test, Cauchy's root test, logarithmic test. Alternating series: Leibnitz test, Alternating Convergent series, Absolute and Conditionally Convergence.

UNIT-IV

Calculus: Mean value theorems: Rolle's Theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's mean value Theorem, Taylor's Series. Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates). Definition of Improper Integral: Beta and Gamma functions and their applications.

UNIT-V

Multivariable calculus (Partial Differentiation and applications): Partial Differentiation, Euler's Theorem, Total derivative, Jacobian, Functional dependence independence, Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

TEXTBOOKS
1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.

REFERENCES
1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 201

CH102BS/CH202BS: ENGINEERING CHEMISTRY
(Common to CSM, ME and ECE Branches)

B.Tech. I Year I Sem.   **L T P C**
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Course Objectives
- To bring adaptability to the concepts of chemistry and to acquire the required skills to become a perfect 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 and water treatment which are essential for the Engineers and in industry.
- To identify the type of corrosion and apply various principles for its preventions which are essential for an engineer in industry
- To impart the basic knowledge about solid fuel- coal, liquid fuels- petroleum, kerosene oil and diesel, gaseous fuels – LPG, natural gas their origin, classification, calorific value and its determination.

Course Outcomes
- The basic concepts included in this course will help the student to gain:
- The knowledge of the physical & chemical parameters of quality of water and explain the process of water treatment
- The knowledge to analyze atomic, molecular and electronic changes, band theory related to conductivity.
- The required principles and concepts of electrochemistry, batteries, polymers and their applications
- Identify the mechanism of corrosion of materials on basis of electrochemical approach and devise corrosion control methods.

UNIT-I
Water and its treatment: Introduction – hardness of water – causes of hardness – types of hardness: temporary and permanent – expression and units of hardness – Estimation of hardness of water by complexometric method. Numerical problems. Boiler troubles: Sludges, scales and Caustic embrittlement. Boiler feed water and its treatment –Internal treatment(Calgon conditioning, Phosphate conditioning and Colloidal conditioning). External Treatment- Softening of water by ion exchange processes.
Potable water – specifications, steps involved in the treatment of potable water - Disinfection of potable water by chlorination and Ozonization Desalination of water – Reverse osmosis.

UNIT-II
Molecular structure and Theories of Bonding: Atomic and Molecular orbitals: Linear Combination of Atomic Orbitals (LCAO), molecular orbital of diatomic molecules, molecular energy level diagram of N_2, O_2, and F_2 molecules. π-molecular orbitals of butadiene and benzene.

Crystal Field Theory (CFT): Salient Features of CFT- Crystal Field Splitting of Transition metal ion d-orbitals in Tetrahedral, Octahedral and square planar geometries. Band structure of solids and effect of doping on conductance.

UNIT-III

Electrochemistry & Batteries: Electrochemistry: Electrochemical cells: Daniel cell – cell notation, cell reaction and cell EMF – Numerical problems**.** Electrochemical series and its applications- Nernst equation. Construction and functioning of Standard hydrogen electrode, calomel electrode, Determination of pH of a solution by using Quinhydrone and glass electrode.

Batteries: Primary (Lithium cell) and secondary batteries (Lead – acid storage battery and Lithium ion battery).

Fuel cells: Hydrogen–Oxygen fuel cell, Methanol-Oxygen fuel cell, Advantages and Applications

UNIT – IV

Fuels and Combustions: Classification – solid fuels: coal – analysis of coal - proximate and ultimate analysis and their significance.

Liquid fuels – petroleum and its refining – cracking – types – fixed bed catalytic cracking. Knocking – octane and cetane rating, synthetic petrol, Bergius and Fischer-Tropsch's process.

Gaseous fuels - constituents, characteristics and applications of natural gas, LPG and CNG. Analysis of flue gas by Orsat's apparatus – Numerical Problems.

Combustion – Definition, Calorific value of fuel – HCV, LCV; Determination of calorific value by Junker's gas calorimeter – theoretical calculation of Calorific value by Dulong's formula – Numerical problems on combustion

UNIT-V

Engineering Materials and Corrosion: Polymers: Introduction, classification and mechanism of polymerisation- Addition (Free radical polymerisation mechanism and Condensation polymerisation. Classification of polymers - Thermoplastics & Thermosetting resins. Types of Polymerization of polymers (i) Addition (ii) Condensation (iii) Co-Polymerization.

Preparation, properties and engineering application of PVC, Teflon and Bakelite. Fibers- characteristics of fibers – preparation, properties and uses of Nylon – 6,6 and Dacron – Fiber Reinforced Plastics (FRP) Glass Fibres – applications. Rubber – Natural rubber and its vulcanization. Synthetic Elastomers- Buna S, Butyl rubber and Thiokol Rubber.

Conducting polymers: Introduction, classification and mechanism of conduction in Poly-acetylene, applications of conducting polymers.

Biodegradable polymers: Introduction preparation, properties and applications of polylactic acid Corrosion: Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Types of wet corrosion: Galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion- nature of metal and nature of environment– Corrosion control methods – Cathodic protection (sacrificial anodic and impressed current). Surface coatings: Metallic coatings & methods of application of metallic coatings - hot dipping (galvanization & tinning), metal cladding, Electroless plating (Ni plating)

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TEXT BOOKS

1. Engineering Chemistry by P.C Jain and M.Jain, Dhanpatrai Publishing Company, New Delhi 2010.
2. Engineering Chemistry by Prasanta Rath,B. Rama Devi, Ch.Venkata Ramana Reddy and subhendu Chakroborty, Cengage learning, New Delhi. 2019.
3. Physical Chemistry, by P.W. Atkins

REFERENCE TEXT BOOKS

1. Engineering Chemistry by B. Siva Shankar Mc.Graw Hill Publishing Company Limited, New Delhi 3rd, 2015
2. Text Book of Engineering Chemistry by S.S. Dara & Mukkati S. Chand & Co Publishers, New Delhi (2010).

CS103ES: PROGRAMMING FOR PROBLEM SOLVING
(Common to All branches)

B.Tech. I Year I Sem.   **L T P C**
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Course Objectives
- To learn the fundamentals of computers.
- To understand the various steps in program development.
- To learn the syntax and semantics of C programming language.
- To learn the usage of structured programming approach in solving problems.

Course Outcomes: The student will learn
- To write algorithms and to draw flowcharts for solving problems.
- To convert the algorithms/flowcharts to C programs.
- To code and test a given logic in C programming language.
- To decompose a problem into functions and to develop modular reusable code.
- To use arrays, pointers, strings and structures to write C programs.
- Searching and sorting problems.

UNIT – 1
Introduction to Programming

Introduction to components of a computer system: disks, primary and secondary memory, Processor, operating system, compilers, creating, compiling and executing a program etc., Number systems.
Introduction to Algorithms: steps to solve logical and numerical problems. Representation of Algorithm, Flowchart/Pseudo code with examples, Program design and structured Programming. Introduction to C Programming Language: variables (with data types and space Requirements), Syntax and Logical Errors in compilation, object and executable code, Operators, expressions and precedence, Expression evaluation, Storage classes (auto, extern, Static and register), type conversion, the main method and command line arguments Bitwise operations: Bitwise AND, OR, XOR and NOT operators Conditional Branching and Loops: Writing and evaluation of conditionals and consequent Branching with if, if-else, switch-case, ternary operator, go to, Iteration with for, while, do while Loops. I/O: Simple input and output with scanf and printf, formatted I/O, Introduction to stdin, Stdout and Stderr, Command line arguments.

UNIT – II
Arrays, Strings, Structures and Pointers: Arrays: one and two dimensional arrays, creating, accessing and manipulating elements of arrays. Strings: Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen, strcat, strcpy, strstr etc.), arrays of strings Structures: Defining structures, initializing structures, unions, Array of structures Pointers: Idea of pointers, Defining pointers, Pointers to Arrays and Structures, Use of Pointers in self-referential structures, usage of self referential structures in linked list (no Implementation), Enumeration data type

UNIT – III

Preprocessor and File handling in C: Preprocessor: Commonly used Preprocessor commands like include, define, undef, if, ifdef, Ifndef. Files: Text and Binary files, Creating and Reading and writing text and binary files, Appending data to existing files, Writing and reading structures using binary files, Random Access using fseek, ftell and rewind functions.

UNIT – IV

Function and Dynamic Memory Allocation: Functions: Designing structured programs, declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, Passing arrays to functions, passing pointers to functions, idea of call by reference, Some C Standard functions and libraries Recursion: Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions Dynamic memory allocation: Allocating and freeing memory, Allocating memory for arrays of different data types

UNIT – V

Introduction to Algorithms: Algorithms for finding roots of quadratic equations, finding minimum and maximum numbers of a given set, finding if a number is prime number, etc.
Basic searching in an array of elements (linear and binary search techniques),
Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms), Basic concept of order of complexity through the example programs

TEXT BOOKS
1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)

REFERENCE BOOKS
1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
2. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
3. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
4. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition

ME104ES/ME104ES: ENGINEERING GRAPHICS
(Common to CSM, ME and ECE Branches)

B.Tech. I Year I Sem.　　　　　　　　　　　　　　　　　　　　　　　**L T P C**
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Pre-requisites: Nil
Course Objectives

- To provide basic concepts in engineering drawing.
- To impart knowledge about standard principles of orthographic projection of objects.
- To draw sectional views and pictorial views of solids.

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

- Preparing working drawings to communicate the ideas and information.
- Read, understand and interpret engineering drawings.
- Estimate different projections of lines, planes, solids and sectional views
- Able to sketch two-dimensional orthographic drawings and three-dimensional isometric views
- Create and modify two-dimensional orthographic drawings using AutoCAD software

UNIT – I
Introduction to Engineering Drawing: Principles of Engineering Graphics and their Significance, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid, Scales – Plain & Diagonal.

UNIT- II
Orthographic Projections: Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures.—Auxiliary Planes.

UNIT – III
Projections of Regular Solids – Auxiliary Views - Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views – Sections of Sphere

UNIT – IV
Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone, Intersection of Solids: Intersection of – Prism vs Prism- Cylinder Vs Cylinder

UNIT – V
Isometric Projections: Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa – Conventions
Introduction to CAD:
Introduction to CAD Software Package Commands.- Free Hand Sketches of 2D- Creation of 2D Sketches by CAD Package

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TEXTBOOKS

1. Engineering Drawing N.D. Bhatt /Charotar
2. Engineering Drawing / N. S. Parthasarathy and Vela Murali/Oxford

REFERENCE BOOKS

1. Engineering Drawing / Basant Agrawal and McAgrawal/ McGraw Hill
2. Engineering Drawing/ M. B. Shah, B.C. Rane /Pearson.
3. Computer Aided Engineering Drawing – K Balaveera Reddy et al – CBS Publishers
4. Engineering Drawing and Graphics / K.Venugopal/ New Age International Publishers
5. Engineering Drawing / K.L.Narayana, P.kannaiah/SCITECH

EN105HS/EN205HS: ENGLISH
(Common to CSM, ME and ECE Branches)

B.Tech. I Year I Sem.   **L T P C**
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INTRODUCTION

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

In English classes, the focus should be on the skills development in the areas of vocabulary, grammar, reading and writing. For this, the teachers should use the prescribed text for detailed study. The students should be encouraged to read the texts leading to reading comprehension and different passages may be given for practice in the class.

Learning Objectives: The course will help to
- Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
- Equip students to study academic subjects more effectively and critically using the theoretical and practical components of English syllabus.
- Develop study skills and communication skills in formal and informal situations.

Course Outcomes: Students should be able to
- Use English Language effectively in spoken and written forms.
- Comprehend the given texts and respond appropriately.
- Communicate confidently in various contexts and different cultures.
- Acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

UNIT –I

'The Raman Effect' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.
Vocabulary Building: The Concept of Word Formation --The Use of Prefixes and Suffixes.
Grammar: Identifying Common Errors in Writing with Reference to Articles and Prepositions.
Reading: Reading and Its Importance- Techniques for Effective Reading.
Writing: Paragraph writing– Types, Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents. Importance of Proper Punctuation

UNIT –II

'Ancient Architecture in India' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.
Vocabulary: Synonyms and Antonyms, Idioms and Phrases.
Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

Reading: Improving Reading Comprehension Skills–Techniques for Good Comprehension
Writing: Writing Formal Letters E.g., Letter of Complaint, Letter of Requisition, and Job Application with Resume.

UNIT –III
'Blue Jeans' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.
Vocabulary: Odd words, one word substitution
Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.
Reading: Sub-skills of Reading- Skimming, Scanning
Writing: Defining- Describing Objects, Places and Events – Classifying- Providing Examples or Evidence

UNIT –IV
'What Should You Be Eating' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.
Vocabulary: Standard Abbreviations in English, Verbal Analogy
Grammar: Redundancies in Oral and Written Communication, Tag questions.
Reading: Comprehension- Intensive Reading and Extensive Reading
Writing: Writing Practices- Essay Writing, Précis Writing.

UNIT –V
'Mokshagundam Visvesvaraya' from the prescribed text book by JNTUH 'Epitome of Wisdom' – Maruthi Publications.
Vocabulary: Technical Vocabulary and their usage
Grammar: Error identification
Reading: "If Poem" by Rudyard Klipling
Writing: Creative writing- Advertisement making, Poster preparation, Technical Reports- Characteristics of a Report Writing,

TEXT BOOKS
1. Sudarshana,N.P. and Savitha, C. (2018). English for Engineers. Cambridge University Press.
2. 'Epitome of Wisdom' - Maruthi Publications.
3. Handouts for 'If' poem.

REFERENCE BOOKS
1. Swan, M. (2016). Practical English Usage. Oxford University Press.
2. Kumar, S and Lata, P (2018). Communication Skills. Oxford University Press.
3. Wood, F.T. (2007). Remedial English Grammar. Macmillan.
4. Zinsser, William. (2001). On Writing Well. Harper Resource Book.
5. Hamp-Lyons, L. (2006) Study Writing. Cambridge University Press.
6. Exercises in Spoken English. Parts I –III. CIEFL, Hyderabad. Oxford University Press.

CH106BS/CH206BS: ENGINEERING CHEMISTRY LAB
(Common to CSM, ME and ECE Branches)

B.Tech. I Year I Sem.   **L T P C**
                                                                  0 0 3 1.5

LIST OF EXPERIMENTS: (PERFORM ANY 10 EXPERIMENTS)

Volumetric Analysis:
Experiment No 1: Determination total hardness of water by complexometric method using EDTA.
Experiment No 2: Estimation of ferrous iron in the given solution by permanganometry.
Experiment No 3: Estimation of amount of chloride in water.

Analysis of Coal:
Experiment No 4: Determination of moisture content in the given coal sample

Conductometry:
Experiment No 5: Estimation of HCl by Conductometric titrations
Experiment No 6: Estimation of Acetic acid by Conductometric titrations

Potentiometry:
Experiment No 7: Estimation of Ferrous iron by Potentiometry using dichromate
Experiment No 8: Estimation of HCl by Potentiometry using NaOH

pH Metry:
Experiment No 9: Estimation of HCl by PhMetry using NaOH

Colorimetry:
Experiment No 10: Estimation of Manganese by Colorimetry.

Preparation:
Experiment No 11: Preparation of Bakelite.
Experiment No 12: Preparation of Thiokol Rubber.

TEXT BOOKS
1. J. Mendham and Thomas, 'Vogel' s text book of quantitative chemical analysis", Pearson education Pvt. Ltd. New Delhi, 6th ed. 2002.

SUGGESTED READINGS
1. Dr. Subdharani , "Laboratory Manual on Engineering Chemistry", Dhanpat Rai Publishing, 2012.
2. S.S. Dara, "A Textbook on experiment and calculation in engineering chemistry", S.Chand and Company, 9th revised edition, 2015.

CS107ES: PROGRAMMING FOR PROBLEM SOLVING LAB
(Common to All branches)

B.Tech. I Year I Sem.   **L T P C**
                                                                             0 0 2 1

[Note:The programs may be executed using any available Open Source/ Freely available IDE Some of the Tools available are:
CodeLite: https://codelite.org/
Code::Blocks:http://www.codeblocks.org/
DevCpp : http://www.bloodshed.net/devcpp.html Eclipse: http://www.eclipse.org
This list is not exhaustive and is NOT in any order of preference]

Course Objectives: The students will learn the following:
- To work with an IDE to create, edit, compile, run and debug programs
- To analyze the various steps in program development.
- To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
- To develop modular, reusable and readable C Programs using the concepts like functions, arrays etc.
- To Write programs using the Dynamic Memory Allocation concept.
- To create, read from and write to text and binary files

Course Outcomes: The candidate is expected to be able to:
- formulate the algorithms for simple problems
- translate given algorithms to a working and correct program
- correct syntax errors as reported by the compilers
- identify and correct logical errors encountered during execution
- represent and manipulate data with arrays, strings and structures
- use pointers of different types
- create, read and write to and from simple text and binary files
- modularize the code with functions so that they can be reused

Practice sessions:
a. Write a simple program that prints the results of all the operators available in C (including pre/ post increment, bitwise and/or/not, etc.). Read required operand values from standard input.
b. Write a simple program that converts one given data type to another using auto conversion and casting. Take the values from standard input.

Simple numeric problems:
a. Write a program for findng the max and min from the three numbers.
b. Write the program for the simple, compound interest.
c. Write program that declares Class awarded for a given percentage of marks, where mark <40%= Failed, 40% to <60% = Second class, 60% to <70%=First class, >= 70% = Distinction. Read percentage from standard input.

d. Write a program that prints a multiplication table for a given number and the number of rows in the table. For example, for a number 5 and rows = 3, the output should be:

5 x 1 = 5

5 x 2 = 10

5 x 3 =15

h. Write a program that shows the binary equivalent of a given positive number between 0 to 255.

Expression Evaluation:

a. A building has 10 floors with a floor height of 3 meters each. A ball is dropped from the top of the building. Find the time taken by the ball to reach each floor. (Use the formula $s = ut+(1/2)at^2$ where u and a are the initial velocity in m/sec (= 0) and acceleration in m/sec^2 (= 9.8 m/s^2)).

b. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)

c. Write a program that finds if a given number is a prime number

d. Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome.

e. A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.

f. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

g. Write a C program to find the roots of a Quadratic equation.

h. Write a C program to calculate the following, where x is a fractional value. i. $1-x/2+x^2/4-x^3/6$

i. Write a C program to read two numbers, x and n, and then compute the sum of this geometric progression: $1+x+x^2+x^3+$.............................. $+x^n$. For example: if n is 3 and x is 5, then the program computes 1+5+25+125.

Arrays and Pointers and Functions:

a. Write a C program to find the minimum, maximum and average in an array of integers.

b. Write a function to compute mean, variance, Standard Deviation, sorting of n elements in single dimension array.

c. Write a C program that uses functions to perform the following: i) Addition of Two Matrices ii) Multiplication of Two Matrices iii) Transpose of a matrix with memory dynamically allocated for the new matrix as row and column counts may not be same.

d. Write C programs that use both recursive and non-recursive functions

   i) To find the factorial of a given integer.

   ii) To find the GCD (greatest common divisor) of two given integers.

   iii) To find x^n

e. Write a program for reading elements using pointer into array and display the values using array.

f. Write a program for display values reverse order from array using pointer.

g. Write a program through pointer variable to sum of n elements from array.

Files:

a. Write a C program to display the contents of a file to standard output device.

b. Write a C program which copies one file to another, replacing all lowercase characters with their uppercase equivalents.

c. Write a C program to count the number of times a character occurs in a text file. The file name and the character are supplied as command line arguments.

d. Write a C program that does the following:
    It should first create a binary file and store 10 integers, where the file name and 10 values are given in the command line. (hint: convert the strings using atoi function). Now the program asks for an index and a value from the user and the value at that index should be changed to the new value in the file. (hint: use fseek function). The program should then read all 10 values and print them back.

e. Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file).

Strings:

a. Write a C program to convert a Roman numeral ranging from I to L to its decimal equivalent.

b. Write a C program that converts a number ranging from 1 to 50 to Roman equivalent

c. Write a C program that uses functions to perform the following operations:
    i. To insert a sub-string in to a given main string from a given position.
    ii. To delete n Characters from a given position in a given string.

d. Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba, etc.)

e. Write a C program that displays the position of a character ch in the string S or – 1 if S doesn't contain ch.

f. Write a C program to count the lines, words and characters in a given text.

Miscellaneous:

a. Write a menu driven C program that allows a user to enter n numbers and then choose between finding the smallest, largest, sum, or average. The menu and all the choices are to be functions. Use a switch statement to determine what action to take. Display an error message if an invalid choice is entered.

b. Write a C program to construct a pyramid of numbers as follows:

```
1            *           1           1              *
1 2          * *         2 3         2 2            * *
1 2 3        * * *       4 5 6       3 3 3          * * *
                                     4 4 4 4        * *
                                                     *
```

Sorting and Searching:

a. Write a C program that uses non recursive function to search for a Key value in a given list of integers using linear search method.

b. Write a C program that uses non recursive function to search for a Key value in a given sorted list of integers using binary search method.

c. Write a C program that implements the Bubble sort method to sort a given list of integers in ascending order.

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d. Write a C program that sorts the given array of integers using selection sort in descending order

e. Write a C program that sorts the given array of integers using insertion sort in ascending order
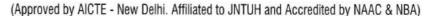
f. Write a C program that sorts a given array of names

Suggested Reference Books for solving the problems

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

2. B.A. Forouzan and R.F. Gilberg, C Programming and Data Structures, Cengage Learning, (3rd Edition)

3. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

4. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)

5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.

6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition

EN108HS/EN208HS: ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB
(Common to CSM, ME and ECE Branches)

B.Tech. I Year I Sem.   **L T P C**
                                                                   0 0 3 1.5

The **Language Lab** focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

Course Objectives
- To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning
- To sensitize students to the nuances of English speech sounds, word accent, intonation and rhythm
- To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking
- To improve the fluency of students in spoken English and neutralize their mother tongue influence
- To train students to use language appropriately for public speaking and interviews

Learning Outcomes: Students will be able to attain
- Better understanding of nuances of English language through audio- visual experience and group activities
- Neutralization of accent for intelligibility
- Speaking skills with clarity and confidence which in turn enhances their employability skills

Syllabus:
English Language and Communication Skills Lab (ELCS) shall have two parts:
   a. **Computer Assisted Language Learning (CALL)Lab**
   b. **Interactive Communication Skills (ICS)Lab**

Listening Skills
Objectives
1. To enable students develop their listening skills so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions

Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.
   • Listening for general content
   • Listening to fill up information
   • Intensive listening
   • Listening for specific information

Speaking Skills
Objectives
1. To involve students in speaking activities in various contexts
2. To enable students express themselves fluently and appropriately in social and professional contexts
   - Oral practice: Just A Minute (JAM)Sessions
   - Describing objects/situations/people
   - Role play – Individual/Group activities

EXERCISE – I
CALL Lab: Introduction to Phonetics – Speech Sounds – Vowels and Consonants.
ICS Lab: Ice-Breaking Activity and JAM Session

EXERCISE – II
CALL Lab: Structure of Syllables – Past Tense Marker and Plural Marker, Weak Forms and Strong Forms.
ICS Lab: Situational Dialogues – Role Play- Expressions in Various Situations –Making Requests and Seeking Permissions – Telephone Etiquette.

EXERCISE - III
CALL Lab: Minimal Pairs- Word Accent and Stress Shifts.
ICS Lab: How to make Formal Presentations.

EXERCISE – IV
CALL Lab: Listening for Specific Details, Intonation and Common Errors in Pronunciation.
ICS Lab: Public Speaking- Making a Short Speech – Extempore.

EXERCISE – V
CALL Lab: Listening for Specific Details, Neutralization of Mother Tongue Influence and Conversation Practice
ICS Lab: Interview Skills. Mock Interviews.

Minimum Requirement of infrastructural facilities for ELCS Lab:

1. Computer Assisted Language Learning (CALL)Lab:
The Computer Assisted Language Learning Lab has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self- study by students.

System Requirement (Hardware component):
Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:

i)   Computers with Suitable Configuration
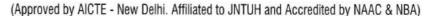
ii)   High Fidelity Headphones

2. Interactive Communication Skills (ICS)Lab:

The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio-visual aids with a Public-Address System, a LCD and a projector etc.

MA109BS/MA209BS: Employability skills-I (Aptitude)
(Common to CSM, ME and ECE Branches)

B.Tech. I Year I Sem.   **L T P C**
                                                            0 0 2 0

Course Objectives
- To enhance the problem-solving skills, to improve the basic mathematical skills and to help students who are preparing for any type of competitive examinations.

Course Outcomes
- Students will be expected to actively do mathematics such as analyzing data, constructing hypotheses, solving problems, reflecting on their work, and making connections. The Quantitative techniques is organized around big mathematical and statistical concepts.

UNIT-I
H.C.F & L.C.M: Division Method, Factorisation method, H.C.F.& L.C.M. of fractions.
Averages: Arithmetic mean, Geometric mean, Harmonic mean.
Problems on Ages: using algebraic equations.
Percentages: Percentage difference, Percentage increase & decrease, fraction to Percentage, Percentage vs percent.

UNIT-II
Profit & Loss: Cost price, selling price, percentages of profit & loss.
Partnerships: definition, Ratio of division of gains, working and sleeping partners.
Simple & compound interest: Principal amount, interest, time & rate of interest.

UNIT-III:
Time & Work: Introduction, time & work by using fractions and percentages, negative work.
Pipes & Cisterns: Inlet, Outlet, time to emptying & filling a tank.

UNIT-IV
Time & Distance: Time, speed, Average and Distance related problems.
Boats & Streams: Upstream, downstream, still water, stream related problems. Average speed, distance, speed when time is given.
Problems on trains: pass a point, Stationary object of length, moving objects same & opposite directions.

UNIT-V
Permutations & Combinations: Definitions, permutations with repetitions allowed & not allowed, rank of dictionary words.
Probability: Basic definitions, axioms, addition theorem, conditional probability, multiplication theorem, total probability theorem, baye's theorem.

TEXTBOOKS
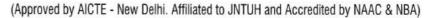1. Quantitative aptitude by Dr.R.S.Aggarwal, S.Chand publications

REFERENCES

1. Fast Track Objective Arithmetic by Rajesh Verma/ Arihant Publications; Fourth edition (2018)
2. Quantitative Aptitude for All Competitive Examinations by Abhijit Guha/ McGraw Hill Education; Sixth edition (25 November 2016).

MA201BS: DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS
(Common to All Branches)

B.Tech. I Year II Sem.   **L T P C**
                                                                        3 1 0 4

Course Objectives: To learn

- Methods of solving the differential equations of first and higher order.
- Concepts & properties of Laplace Transforms
- Solving differential equations using Laplace transform techniques
- Evaluation of multiple integrals and their applications.
- The physical quantities involved in engineering field related to vector valued functions
- The basic properties of vector valued functions and their applications to line, surface and volume integrals

Course Outcomes: After learning the contents of this paper the student must be able to

- Solve higher differential equation and apply the concept of differential equation to real world problems
- Use Laplace transform techniques for solving DE's.
- Evaluate the multiple integrals and apply the concept to find areas, volumes.
- Evaluate the line, surface and volume integrals and converting them from one to another.

UNIT-I
First Order ODE: Exact, linear and Bernoulli's equations; Applications: Newton's law of cooling, Law of natural growth and decay; Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

UNIT-II
Ordinary Differential Equations of Higher Order: Second order linear differential equations with constant coefficients: Non-Homogeneous terms of the type e^{as}, sin ax , cos ax, polynomials in x, $e^{as}V(x)$ and x V(x); method of variation of parameters; Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation.

UNIT-III
Multivariable Calculus (Integration): Evaluation of Double Integrals (Cartesian and polar coordinates); change of order of integration (only Cartesian form); Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals.
Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals), Centre of mass and Gravity (constant and variable densities) by double and triple integrals (applications involving cubes, sphere and rectangular parallelopiped).

UNIT-IV
Vector Differentiation: Vector point functions and scalar point functions. Gradient, Divergence and Curl. Directional derivatives, Tangent plane and normal line. Vector Identities. Scalar potential functions. Solenoidal and Irrotational vectors.

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UNIT-V

Vector Integration: Line, Surface and Volume Integrals. Theorems of Green, Gauss and Stokes (without proofs) and their applications.

TEXT BOOKS

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition,2010
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition Pearson, Reprint, 2002.

REFERENCES

1. Paras Ram, Engineering Mathematics, 2nd Edition, CBS Publishes
2. S. L. Ross, Differential Equations, 3rd Ed., Wiley India,1984.

AP202BS/AP102BS: APPLIED PHYSICS
(Common to CSM, ME and ECE Branches)

B.Tech. I Year II Sem. **L T P C**
                              3 1 0 4

Course Objectives
- The course primarily aims at understanding the behavior of matter in the condensed state and tries to explore the causes with reference to micro level mechanism of the solid matter.
- The objective of the first chapter is to study the micro level behavior of the quantum particles of the matter and their nature as wave and particle.
- The second chapter aims to assess the draw backs of the free electron theory leading to the introduction of the Band Theory of Solids.
- In the third chapter task to discuss dielectric and magnetic properties of the materials.
- In the fourth chapter, it is expected to understand the basic principles behind the coherent artificial light source (LASER) with reference to their construction, mechanism, operation and classification etc. In second part of this chapter aimed at to study an advanced communication system presently ruling the world throughout i.e. Fiber Optic communication system.
- In the fifth chapter plan to discuss on fabrication of nanoparticles and their characterization techniques.

Course Outcomes: After learning the contents of this paper the student must be able to
- Predict the behavior of particle and wave and solve their wave functions.
- Distinguish the different types of Semiconductor devices.
- Recall and choose different materials based on their properties.
- Examine normal light and laser light and its application in communication.
- Categorize Nano materials by fabrication methods.

UNIT-I
Principles of quantum mechanics: Introduction to quantum physics, Waves and particles, Matter waves, de-Broglie Hypothesis, Characteristics of matter waves, Davisson and Germer's experiment, Heisenberg's uncertainty principle, Physical significance of the wave function, Schrodinger's time - independent wave equation, Particle in one dimensional potential Box.

Electron theory of Metals: Draw backs of classical free electron theory, Electron in a periodic potential, Kronig-Penny model (Qualitative Treatment), Origin of energy band formation in solids, Classification of materials, Effective mass of an electron.

UNIT-II
Semiconductor Physics: Introduction to semi conductors, Fermi level, Calculation of carrier concentration in intrinsic and extrinsic (p-type & n-type) semiconductors, Direct and indirect band gap semiconductors, Hall effect and applications.

Physics of Semiconductor Devices: Formation of PN junction, I-V characteristics of PN junction diode, Construction, working and applications: LED, Photo diodes and Solar cells.

UNIT-III
Dielectric Properties: Electric dipole, Dipole moment, Dielectric constant, Electronic, ionic and orientation polarizations and calculation of polarizabilities: electronic and ionic, Internal fields in solids, Clausius - Mossotti equation, concept of Piezo-electricity, Pyro- electricity and Ferro - electricity.

Magnetic Properties: Origin of magnetic moment, Bohr magneton, Classification of magnetic materials: dia, para, ferro, anti ferro and ferri magnetic materials on the basis of magnetic moment, Domain theory of ferro magnetism on the basis of hysteresis curve.

UNIT-IV
Lasers: Characteristics of lasers, Absorption, Spontaneous and stimulated emission of radiation, Meta stable state, Population inversion, Lasing action, Einstein's coefficients and relation between them, Ruby laser, Helium-neon laser, Diode laser and applications of lasers.

Fiber Optics: Principle and construction (structure) of an optical fiber, Acceptance angle, Numerical aperture, Types of optical fibers: step index and graded index fibres, Losses in optical fibers: absorption, scattering and bending and applications of optical fibres in communication.

UNIT-V
Nanotechnology: Origin of nanotechnology, Nano scale, Surface to volume ratio, Quantum confinement, random molecular motion, dominance of electromagnetic forces, Bottom-up fabrication: Sol-Gel method, Top-down fabrication: Chemical vapour Deposition, Physical vapour deposition, Characterization techniques (XRD, SEM & TEM) and applications of nanotechnology.

TEXT BOOKS
1. Principles of Physics by Halliday, Resnick, Walker, Wiley India Pvt Ltd, 9th Edition.
2. Introduction to Solid State Physics by Charles Kittel, Wiley India Pvt Ltd, 7th Edition
3. Engineering Physics by R.K.GAUR & S.L.GUPTA, Dhanpat Rai Publications.
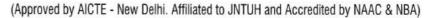4. Solid State Physics by A J Dekker, MACMILLAN INDIA LTD.

REFERENCE BOOKS
1. Modern Engineering Physics by Dr.K.Vijaya Kumar, Dr. S. Chandralingam, S.CHAND & COMPANY LTD
2. Applied Physics by P.K.Mittal, I K International Publishers
3. Applied Physics by P.K. Palanisamy :Scitech publishers
4. Introduction to Nanotechnology by Charles P.Poole, Jr.Frank J ownes, John Wiley & sons
5. Applied Physics for Engineers by P. Madusudana Rao, Academic Publishing Company
6. Engineering Physics by Sanjay D Jain, Girish G Sahasrbudha: University Press.

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CS203ES: DATA STRUCTURES
(Common to All Branches)

B.Tech. I Year II Sem.   **L T P C**
                                                                 3 0 0 3

Prerequisites: A course on "Programming for Problem Solving".

Course Objectives
- Exploring basic data structures such as stacks and queues.
- Introduces a variety of data structures such as hash tables, search trees, tries, heaps, graphs.
- Introduces sorting and pattern matching algorithms

Course Outcomes
- Ability to select the data structures that efficiently model the information in a problem.
- Ability to assess efficiency trade-offs among different data structure implementations or combinations.
- Implement and know the application of algorithms for sorting and pattern matching.
- Design programs using a variety of data structures, including hash tables, binary and general tree structures, search trees, tries, heaps, graphs, and AVL-trees.

UNIT - I
Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks-Operations, array and linked representations of stacks, stack applications, Queues-operations, array and linked representations.

UNIT - II
Dictionaries: linear list representation, skip list representation, operations - insertion, deletion and searching.
Hash Table Representation: hash functions, collision resolution-separate chaining, open addressing-linear probing, quadratic probing, double hashing, rehashing, extendible hashing.

UNIT - III
Search Trees: Binary Search Trees, Definition, Implementation, Operations- Searching, Insertion and Deletion, AVL Trees, Definition, Height of an AVL Tree, Operations – Insertion, Deletion and Searching, Red –Black, Splay Trees.

UNIT - IV
Graphs: Graph Implementation Methods. Graph Traversal Methods.
Sorting: Heap Sort, External Sorting- Model for external sorting, Merge Sort.

UNIT - V
Pattern Matching and Tries: Pattern matching algorithms-Brute force, the Boyer –Moore algorithm, the Knuth-Morris-Pratt algorithm, Standard Tries, Compressed Tries, Suffix tries.

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TEXTBOOKS

1. Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson Freed, *UniversitiesPress*.
2. Data Structures using C – A. S. Tanenbaum, Y. Langsam, and M.J. Augenstein, *PHI/Pearson Education*.

REFERENCE BOOKS

1. Data Structures: A Pseudocode Approach with C, 2nd Edition, R. F. Gilberg and B.A. Forouzan, Cengage Learning.

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EE204ES/EE104ES: BASIC ELECTRICAL ENGINEERING
(Common to CSM, ME and ECE Branches)

B.Tech. I Year II Sem.   **L T P C**
                                                                    3 0 0 3

Course Objectives

- To introduce the concepts of electrical circuits and its components.
- To understand magnetic circuits, DC circuits and AC single phase and three phase circuits.
- To study and understand behaviour of transformers.
- To study and understand behaviour of DC machines.
- To study and understand behaviour of AC machines.

Course Outcomes

- To analyse and solve electrical circuits using network laws and theorems.
- To understand and analyse basic electric and magnetic circuits.
- To study the working principles of transformer.
- To understand working of dc machines and ac machines

UNIT- I
D.C Circuits: Electrical circuit elements (R,L,C), voltage and current sources, KVL & KCL, analysis of simple circuits with DC excitation. Superposition, Thevenin's and Norton's theorems. Time-domain analysis of first – order RL and RC circuits.

UNIT-II
A.C Circuits: Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor, analysis of single-phase ac circuits consisting of R , L , C , RL , RC , RLC combinations (series and parallel), resonance in series R-L-C circuit. Three-phase balanced circuit, voltage and current relations in star and delta connections.

UNIT-III
Transforms: Ideal and practical transformers, equivalent circuits, losses in transformers, regulations and efficiency. Auto-transformer and three-phase transformer connections.

UNIT-IV
DC Machines: DC generators: Construction, working, emf equation and classification, DC motors: construction, working, back emf, torque equation, classification, characteristics, Loss components and efficiency.

UNIT-V
AC Machines: Generation of rotating magnetic fields , construction and working of a three-phase induction motor, significance of torque-slip characteristic, starting methods, Loss components and efficiency, construction and working of synchronous generators.

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SUGGESTED TEXT-BOOKS/REFERENCE-BOOKS

1. Basic electrical engineering -D. P. Kothari and I. J. Nagrath , 3rd edition 2010, Tata Mc Graw Hill.
2. D.C.Kulshreshtha, " Basic electrical engineering", Mc Graw Hill, 2009.
3. L.S. Bobrow , " Fundamentals of electrical engineering" , oxford university press, 2011.
4. Electrical and Electronics Technology, E. Hughes, 10th edition, Pearson, 2010.
5. Electrical engineering fundamental, Vincent Deltoro, second edition, Prentice Hall India, 1989.

ME205ES/ME105ES: ENGINEERING WORKSHOP & IT WORKSHOP
(Common to CSM, ME and ECE Branches)

B.Tech. I Year II Sem.   **L T P C**

                                                                                   0 0 3 1.5

Pre-requisites: Practical skill

Course 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 prescribed tolerances.

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

- Apply safety norms while handling the workshop equipment
- Prepare required models using various engineering trades
- Make use of various power tools

LIST OF EXPERIMENTS

Part-A: Engineering Workshop

1. House Wiring

Power point, light fitting and switches.

2. Carpentry

Study of tools and joints; Practice in planing, chiseling, marking and sawing; Joints: Cross joint, T joint, Dove tail joint.

3. Fitting

Study of tools, practice in filing, cutting, drilling and tapping; Male and female joints, stepped joints**.**

4. Tin Smithy

Preparation of Open scoop, Cylinder, square/rectangular tray

5. **Black Smithy**

S-Hook, Square /Hexagonal headed bolt.

6. Foundry

Preparation of green sand mold using single piece / split pattern

7. Demonstration of Power Tools

Drilling machine, power hacksaw, grinding machine and wood cutting machine.

Part-B: IT Workshop

Course Objectives:

The IT Workshop for engineers is a training lab course spread over 54 hours. The modules include training on PC Hardware, Internet & World Wide Web and Productivity tools including Word, Excel and Power Point.

PC Hardware introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like MS Windows, Linux and the required device drivers. In addition hardware and software level troubleshooting process, tips and tricks would be covered. **The students should work on working PC to disassemble and assemble to working condition and install Windows and Linux on the same PC. Students are suggested to work similar tasks in the Laptop scenario wherever possible.**

Internet & World Wide Web module introduces the different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet. Usage of web browsers, email, newsgroups and discussion forums would be covered. In addition, awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with the viruses, worms and other cyber attacks would be introduced.

Productivity tools module would enable the students in crafting professional word documents, excel spread sheets and power point presentations using the Microsoft suite of office tools and LaTeX. (Recommended to use Microsoft office 2007 in place of MS Office 2003)

Course Outcomes:

- Apply knowledge for computer assembling and software installation.
- Ability how to solve the trouble shooting problems.
- Apply the tools for preparation of PPT, Documentation and budget sheet etc.
- Install and make use of operating systems and MS office tools

1. WINDOWS OPERATING SYSTEM & DRIVERS INSTALLATION
Windows 7/8/10. LAN, graphics, audio, video and command prompt, commands.

2. NETWORK CONNECTIONS & TROUBLESHOOTING
IP configurations, connecting devices in LAN through bridge, hub, switch; Wi-Fi, Li-Fi and Bluetooth settings; Crimping: Crossover, strait over. Hardware and software trouble shooting.

3. Cyber Hygiene
Introduction to Virus, worms, threats. Threats on Internet, Configure the Systems to be Internet safety, Install antivirus, personal firewall, block pop-ups, block active x downloads

4. MS Word
Prepare the project document and resume.

5. MS Excel
Spread sheet basics, modifying worksheets, formatting cells, formulas and functions, sorting and filtering, charts.

6. MS Power Point
Power point screen, working with slides, add content, work with text, working with tables, graphics, slide animation, reordering slides, adding sound to a presentation.

7. PC Hardware

Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

TEXT BOOKS

1. Workshop Practice /B. L. Juneja / Cengage
2. Workshop Manual / K. Venugopal / Anuradha.
3. Comdex Information Technology course tool kit, Vikas Gupta, WILEY Dreamtech

REFERENCE BOOKS

1. Work shop Manual - P. Kannaiah/ K. L. Narayana/ S
2. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.

AP206BS/AP106BS: APPLIED PHYSICS LAB
(Common to CSM, ME and ECE Branches)

B.Tech. I Year II Sem.   **L T P C**
                                                            0 0 3 1.5

List of Experiments:

1. Energy gap of P-N junction diode: To determine the energy gap of a semiconductor diode.
2. Solar Cell: To study the V-I Characteristics of solar cell.
3. LED & LASER: To study the I-V characteristics of LED and LASER .
4. Stewart – Gee's experiment: Determination of magnetic field along the axis of a current carrying coil.
5. Hall effect: To determine Hall co-efficient of a given semiconductor.
6. Photoelectric effect: To determine work function of a given material.
7. Diffraction: Determination of wavelength of a given light source.
8. Optical fibre: To determine the bending losses and Numerical aperture.
9. LCR Circuit: To determine the Quality factor of LCR Circuit.
10. R-C Circuit: To determine the time constant of R-C circuit.
11. Newton's rings experiment: Determination of radius of curvature of a plano convex lens.

Reference

1. Applied Physics Lab Manual, CMREC, Hyd

CS207ES: DATA STRUCTURES LAB
(Common to All Branches)

B.Tech. I Year II Sem.   **L T P C**
                                                                                    0 0 2 1

Prerequisites: A Course on "Programming for problem solving".

Course Objectives
- It covers various concepts of C programming language
- It introduces searching and sorting algorithms
- It provides an understanding of data structures such as stacks and queues.

Course Outcomes
- Ability to develop C programs for computing and real-life applications using basic elements like control statements, arrays, functions, pointers and strings, and data structures like stacks, queues and linked lists.
- Ability to Implement searching and sorting algorithms

LIST OF EXPERIMENTS
1. Write a program that uses functions to perform the following operations on singly linked list.:

   i) Creation   ii) Insertion   iii) Deletion   iv) Traversal
2. Write a program that uses functions to perform the following operations on doubly linked list.:

   i) Creation   ii) Insertion   iii) Deletion   iv) Traversal
3. Write a program that uses functions to perform the following operations on circular linked list.:

   i) Creation   ii) Insertion   iii) Deletion   iv) Traversal
4. Write a program that implement stack (its operations) using

   i) Arrays   ii) Pointers
5. Write a program that implement Queue (its operations) using

   i) Arrays   ii) Pointers
6. Write a program that implements the following sorting methods to sort a given list of integers in ascending order

   i) Bubble sort   ii) Selection sort   iii) Insertion sort
7. Write a program that use both recursive and non recursive functions to perform the following searching operations for a Key value in a given list of integers:

   i) Linear search   ii) Binary search
8. Write a program to implement the tree traversal methods.

   i) In Order ii) Post order iii) Pre order
9. Write a program to implement the graph traversal methods.

TEXTBOOKS
1. Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson Freed, *Universities Press*.

2. Data Structures using C – A. S. Tanenbaum, Y. Langsam, and M. J. Augenstein,
3. *PHI/Pearson Education*.

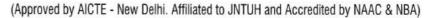**REFERENCE**

1. Data Structures: A Pseudocode Approach with C, 2nd Edition, R. F. Gilberg and B. A. Forouzan, Cengage *Learning*.

EE208ES/EE108ES: BASIC ELECTRICAL ENGINEERING LAB
(Common to CSM, ME and ECE Branches)

B. Tech. I Year I Sem.   **L T P C**
                                                                                0 0 2 1

Course objectives
- To analyze a given network by applying various electrical laws and network theorems.
- To know the response of electrical circuits for different excitations
- To calculate, measure and know the relation between basic electrical parameters.
- To analyze the performance characteristics of DC and AC electrical machines.

Course Outcomes
- Get an exposure to basic electrical laws.
- Understand the response of different types of electrical circuits to different excitations.
- Understand the measurement, calculation and relation between the basic electrical parameters.
- Understand the basic characteristics of transformers and electrical machines.

List of experiments/demonstrations
1. Verification of Ohms Law
2. Verification of KVL and KCL
3. Transient Response of Series RL and RC circuits using DC excitation
4. Transient Response of RLC Series circuit using DC excitation
5. Resonance in series RLC circuit
6. Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits.
7. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single Phase Transformer
8. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)
9. Three Phase Transformer: Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star)
10. Measurement of Active and Reactive Power in a balanced Three-phase circuit
11. Performance Characteristics of a Separately/Self Excited DC Shunt/Compound Motor
12. Torque-Speed Characteristics of a Separately/Self Excited DC Shunt/Compound Motor
13. Performance Characteristics of a Three-phase Induction Motor
14. Torque-Speed Characteristics of a Three-phase Induction Motor
15. No-Load Characteristics of a Three-phase Alternator

EN209HS/EN109HS: Employability skills- II (Business English for Engineers)
(Common to CSM, ME and ECE Branches)

B.Tech. I Year I/II Sem.   **L T P C**
                                                                                              0 0 2 0

Introduction

The rapid breakdown of national barriers over the last decade has resulted in English language skills acquiring a great deal of importance in business sector. Ability to communicate at work place is vital, particularly in the present professional and business climate. In a world with ever-growing levels of globalization and interconnectivity, the significance of Business Communication increased rapidly. But lack of exposure towards Business Communication is a serious handicap for many aspirants. By recognizing this, the institution has focused to train the Engineering Students for Business Communication and motivating to appear BEC examination which is an internationally recognized qualification for getting employability. It has been introduced from B.Tech first year onwards, that can instruct and prepare the students to get the advantage when enter the job world. In today's globalization, it is more significant to show employers that you can communicate in English effectively in every-day business circumstances.

Learning Objectives

   a. It provides language Skills for real life business situations and improves confidence among students.
   b. To train the students to qualify the BEC examination
   c. Develop study skills and communication skills in formal and informal situations.

Course Outcomes: Students should be able to
   • Use Business English Language effectively in spoken and written forms.
   • Comprehend the given texts and respond appropriately.
   • Communicate confidently in various contexts and different cultures.
   • Acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

Syllabus
EXERCISE-I
   ➢ Business Communication Skills, Interpersonal skills and Intrapersonal skills.
   ➢ Active and Effective Listening Skills.
   ➢ Reading skills: Skimming, Scanning.
   ➢ Verbal Ability: Fundamentals of Grammar - Sentence Structure - Parts of Speech.
   ➢ Online Communication- "The power of word of mouse": an article on the power of online customer opinions

EXERCISE-II
   ➢ Corporate Communication: First impression, Personal Grooming, Corporate & Business etiquettes.
   ➢ Business Relationships: Career advice: letters to an advice column, corporate gift-giving, teamwork, thinking globally- "Global HR Management": an article.

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> Technical and Business Vocabulary: Idioms, Phrases, Collocations, Abbreviations, and Analogy.
> Reading Skills: Intensive Reading and Extensive Reading

EXERCISE-III
> Presentation Skills: Group Discussion, Presentations, Role Play and Telephone Handling and Interview skills.
> Reading Comprehension and Techniques: Interpreting bar charts, pie chart, table, and tree diagram.
> Listening to statistical information: short extracts- "Cafe Coffee Day": an article on the growth of the Indian Coffee shop.

EXERCISE-IV
> Writing skills: Paragraph writing, Formal letter writing (Business letters and Official letters), E-mail, Memo, Report and Essay writing.
> Recruitment- Preparing for an interview, Staff development: "Advertisements for training courses: variation between a memo and an advert: sport and business" an article.
> Picture Description including Description of Photos/Images/Posters/Advertisement Analysis etc.,

EXERCISE-V
> Exercises on Common Errors in Grammar: Tenses, Passive forms, Model verbs, Degrees of comparison, Articles, Reference words, word types and Quantity expressions.
> Usage of Words: Model verbs of obligation, Contrast words, words to describe causes and effects.
> Practice of previous BEC Exam: Listening tracks, Reading, Writing and Speaking parts, Communication activities, and Exam skills practice.

REFERENCES
1. Business BENCHMARK, 2nd Edition, South Asian Edition Student's Book- CUP
2. Swan, M. (2016). Practical English Usage. Oxford University Press.
3. Kumar, S and Lata, P.(2018). Communication Skills. Oxford University Press.
4. Wood, F.T. (2007). Remedial English Grammar. Macmillan.
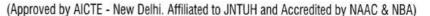5. Hamp-Lyons, L. (2006). Study Writing. Cambridge University Press.

Website links
- http://www.cambridge.org
- http://www.learnenglish.com
- http://www.eslgames.com
- https://www.cambridgeenglish.org/supporting-teachers/
- .https://britishcouncil.zoom.us/webinar/register/WN_Ddm6jFvxTpWAfYwWeZzX_Q
- .https://www.cambridge.org/gb/education/elevate-trial/
- https://learnenglishteens.britishcouncil.org/skills/listening
- https://www.cambridgeenglish.org/teaching-english/resources-for-teachers/webinars/assessing-writing-introducing-new-teacher-guides/

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
(ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)
COURSE STRUCTURE & SYLLABUS (R20)
Applicable From 2020-21Admitted Batch

II YEAR I SEMESTER

S.No.	Course Code	Course Title	L	T	P	Credits
1	IT301ES	Analog & Digital Electronics	3	0	0	3
2	CS302PC	Computer Organization and Architecture	3	1	0	4
3	CS303PC	Operating Systems	3	0	0	3
4	AI304PC	Object Oriented Programming using C++	2	0	0	2
5	CS305PC	Discrete Mathematics	3	0	0	3
6	IT306ES	Analog & Digital Electronics Lab	0	0	2	1
7	CS307PC	Operating Systems Lab	0	0	3	1.5
8	AI308PC	Object Oriented Programming using C++ Lab	0	0	3	1.5
9	*MC309	Environmental Science	3	0	0	0
10	MC310	Employability Skills – III	0	0	2	0
		Total Credits	**18**	**1**	**8**	**19**

II YEAR II SEMESTER

S.No.	Course Code	Course Title	L	T	P	Credits
1	AI401PC	Artificial Intelligence	3	0	0	3
2	MA402BS	Computer Oriented Statistical Methods	3	1	0	4
3	IT403PC	Database Management Systems	3	0	0	3
4	AI404PC	Java Programming	3	0	0	3
5	AI405PC	Design and Analysis of Algorithms	3	1	0	4
6	IT406PC	Database Management Systems Lab	0	0	3	1
7	AI407PC	Java Programming Lab	0	0	3	1.5
8	AI408PC	Design and Analysis of Algorithms Lab	0	0	3	1.5
9	*MC409	Gender Sensitization Lab	0	0	2	0
10	MC410	Employability Skills – IV	0	0	2	0
		Total Credits	**15**	**2**	**13**	**21**

*MC = Satisfactory / Not Satisfactory

IT301ES/CS406ES: ANALOG AND DIGITAL ELECTRONICS
(Common to CSM and INF Branches)

B.TECH. II Year I Sem.   **L T P C**
                                                                      3 0 0 3

Course Objectives
- To introduce components such as diodes, BJTs and FETs.
- To know the applications of components.
- To give understanding of various types of amplifier circuits
- To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
- To understand the concepts of combinational logic circuits and sequential circuits.

Course Outcomes: Upon completion of the Course, the students will be able to:
- Know the characteristics of various components.
- Understand the utilization of components.
- Design and analyze small signal amplifier circuits.
- Learn Postulates of Boolean algebra and to minimize combinational functions
- Design and analyze combinational and sequential circuits
- Know about the logic families and realization of logic gates.

UNIT - I
Diodes and Applications: Junction diode characteristics: Open circuited p-n junction, p-n junction as a rectifier, V-I characteristics, effect of temperature, diode resistance, diffusion capacitance, diode switching times, breakdown diodes, Tunnel diodes, photo diode, LED.
Diode Applications - clipping circuits, comparators, Half wave rectifier, Full wave rectifier, rectifier with capacitor filter.

UNIT - II
BJTs: Transistor characteristics: The junction transistor, transistor as an amplifier, CB, CE, CC configurations, comparison of transistor configurations, the operating point, self-bias or Emitter bias, bias compensation, thermal runaway and stability, transistor at low frequencies, CE amplifier response, gain bandwidth product, Emitter follower, RC coupled amplifier, two cascaded CE and multi stage CE amplifiers.

UNIT - III
FETs and Digital Circuits: FETs: JFET, V-I characteristics, MOSFET, low frequency CS and CD amplifiers, CS and CD amplifiers.
Digital Circuits: Digital (binary) operations of a system, OR gate, AND gate, NOT, EXCLUSIVE OR gate, De Morgan Laws, NAND and NOR DTL gates, modified DTL gates, HTL and TTL gates, output stages, RTL and DCTL, CMOS, Comparison of logic families.

UNIT - IV

Combinational Logic Circuits: Basic Theorems and Properties of Boolean Algebra, Canonical and Standard Forms, Digital Logic Gates, The Map Method, Product-of-Sums Simplification, Don't-Care Conditions, NAND and NOR Implementation, Exclusive-OR Function, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers.

UNIT - V

Sequential Logic Circuits: Sequential Circuits, Storage Elements: Latches and flip flops, Analysis of Clocked Sequential Circuits, State Reduction and Assignment, Shift Registers, Ripple Counters, Synchronous Counters, Random-Access Memory, Read-Only Memory.

TEXTBOOKS

1. Integrated Electronics: Analog and Digital Circuits and Systems, 2/e, Jaccob Millman, Christos Halkias and Chethan D. Parikh, *Tata McGraw-Hill Education*, India, 2010.
2. Digital Design, 5/e, Morris Mano and Michael D. Cilette, *Pearson,* 2011.

REFERENCE BOOKS

1. Electronic Devices and Circuits, Jimmy J Cathey, *Schaum's outline series*, 1988.
2. Digital Principles, 3/e, Roger L. Tokheim, *Schaum's outline series*, 1994.

CS302PC/DS405PC: COMPUTER ORGANIZATION AND ARCHITECTURE
(Common to CSE, INF, CSM and CSC Branches)

B.TECH. II Year I Sem.   **L T P C**
                                                                  3 1 0 4

Course Objectives

- The purpose of the course is to introduce principles of computer organization and the basic architectural concepts.
- It begins with basic organization, design, and programming of a simple digital computer and introduces simple register transfer language to specify various computer operations.
- Topics include computer arithmetic, instruction set design, microprogrammed control unit, pipelining and vector processing, memory organization and I/O systems, and multiprocessors

Course Outcomes

- Understand the basics of instructions sets and their impact on processor design.
- Demonstrate an understanding of the design of the functional units of a digital computer system.
- Evaluate cost performance and design trade-offs in designing and constructing a computer processor including memory.
- Design a pipeline for consistent execution of instructions with minimum hazards.
- Recognize and manipulate representations of numbers stored in digital computers

UNIT - I

Digital Computers: Introduction, Block diagram of Digital Computer, Definition of Computer Organization, Computer Design and Computer Architecture.

Register Transfer Language and Micro operations: Register Transfer language, Register Transfer, Bus and memory transfers, Arithmetic Micro operations, logic micro operations, shift micro operations, Arithmetic logic shift unit.

Basic Computer Organization and Design: Instruction codes, Computer Registers Computer instructions, Timing and Control, Instruction cycle, Memory Reference Instructions, Input – Output and Interrupt.

UNIT - II

Microprogrammed Control: Control memory, Address sequencing, micro program example, design of control unit.

Central Processing Unit: General Register Organization, Instruction Formats, Addressing modes, Data Transfer and Manipulation, Program Control.

UNIT - III

Data Representation: Data types, Complements, Fixed Point Representation, Floating Point Representation.

Computer Arithmetic: Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating – point Arithmetic operations. Decimal Arithmetic unit, Decimal Arithmetic operations.

UNIT - IV

Input-Output Organization: Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupt Direct memory Access.

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary memory, Associate Memory, Cache Memory.

UNIT - V

Reduced Instruction Set Computer: CISC Characteristics, RISC Characteristics.

Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processor.

Multi Processors: Characteristics of Multiprocessors, Interconnection Structures, Inter-processor arbitration, Inter-processor communication and synchronization, Cache Coherence.

TEXT BOOK

1. Computer System Architecture – M. Moris Mano, Third Edition, Pearson/PHI.

REFERENCES

1. Computer Organization – Car Hamacher, Zvonks Vranesic, Safea Zaky, Vth Edition, McGraw Hill.
2. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI.
3. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition, PHI/Pearson.

CS303PC: OPERATING SYSTEMS
(Common to CSE, INF, CSM, CSD and CSC Branches)

B.TECH. II Year I Sem.   **L   T   P   C**
                                                                                   3   0   0   3

Prerequisites
- A course on "Computer Programming and Data Structures".

Course Objectives
- Provide an introduction to operating system concepts (i.e., processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection)
- Introduce the issues to be considered in the design and development of operating system
- Introduce basic Unix commands, system call interface for process management, inter-process communication and I/O in Unix

Course Outcomes
- Will be able to control access to a computer and the files that may be shared
- Demonstrate the knowledge of the components of computer and their respective roles in computing.
- Ability to recognize and resolve user problems with standard operating environments.
- Gain practical knowledge of how programming languages, operating systems, and architectures interact and how to use each effectively.

UNIT - I
Operating System - Introduction, Structures - Simple Batch, Multiprogrammed, Time-shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating System services, System Calls

UNIT - II
Process and CPU Scheduling - Process concepts and scheduling, Operations on processes, Cooperating Processes, Threads, and Interposes Communication, Scheduling Criteria, Scheduling Algorithms, Multiple -Processor Scheduling.
System call interface for process management-fork, exit, wait, waitpid, exec

UNIT - III
Deadlocks - System Model, Deadlocks Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock
Process Management and Synchronization - The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors
Interprocess Communication Mechanisms: IPC between processes on a single computer system, IPC between processes on different systems, using pipes, FIFOs, message queues, shared memory.

UNIT - IV
Memory Management and Virtual Memory - Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging, Demand Paging, Page Replacement, Page Replacement Algorithms.

UNIT - V
File System Interface and Operations -Access methods, Directory Structure, Protection, File System Structure, Allocation methods, Free-space Management. Usage of open, create, read, write, close, lseek, stat, ioctl system calls.

TEXT BOOKS
1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley
2. Advanced programming in the UNIX environment, W.R. Stevens, Pearson education.

REFERENCE BOOKS
1. Operating Systems – Internals and Design Principles Stallings, Fifth Edition–2005, Pearson Education/PHI
2. Operating System A Design Approach- Crowley, TMH.
3. Modern Operating Systems, Andrew S. Tanenbaum 2nd edition, Pearson/PHI
4. UNIX programming environment, Kernighan and Pike, PHI/ Pearson Education
5. UNIX Internals -The New Frontiers, U. Vahalia, Pearson Education.

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AI304PC: OBJECT ORIENTED PROGRAMMING USING C++
(Common to CSM, CSD, and CSC Branches)

B.TECH. II Year I Sem.   **L T P C**
                                                                     2 0 0 2

Prerequisites: A course on "Programming for Problem Solving using C".

Course Objectives

- Introduces Object Oriented Programming concepts using the C++ language.
- Introduces the principles of data abstraction, inheritance and polymorphism;
- Introduces the principles of virtual functions and polymorphism
- Introduces handling formatted I/O and unformatted I/O
- Introduces exception handling

Course Outcomes

- Able to develop programs with reusability
- Develop programs for file handling
- Handle exceptions in programming
- Develop applications for a range of problems using object-oriented programming techniques

UNIT - I

Object-Oriented Thinking: Different paradigms for problem solving, need for OOP paradigm, differences between OOP and Procedure oriented programming, Overview of OOP concepts-Abstraction, Encapsulation, Inheritance and Polymorphism.

C++ Basics: Structure of a C++ program, Data types, Declaration of variables, Expressions, Operators, Operator Precedence, Evaluation of expressions, Type conversions, Pointers, Arrays, Pointers and Arrays, Strings, Structures, References. Flow control statement- if, switch, while, for, do, break, continue, goto statements. Functions - Scope of variables, Parameter passing, Default arguments, inline functions, Recursive functions, Pointers to functions. Dynamic memory allocation and de-allocation operators-new and delete, Preprocessor directives.

UNIT - II

C++ Classes and Data Abstraction: Class definition, Class structure, Class objects, Class scope, this pointer, Friends to a class, Static class members, Constant member functions, Constructors and Destructors, Dynamic creation and destruction of objects, Data abstraction, ADT and information hiding.

UNIT - III

Inheritance: Defining a class hierarchy, Different forms of inheritance, Defining the Base and Derived classes, Access to the base class members, Base and Derived class construction, Destructors, Virtual base class.

Virtual Functions and Polymorphism: Static and Dynamic binding, virtual functions, Dynamic binding through virtual functions, Virtual function call mechanism, Pure virtual functions, Abstract classes, Implications of polymorphic use of classes, Virtual destructors.

UNIT - IV

C++ I/O: I/O using C functions, Stream classes hierarchy, Stream I/O, File streams and String streams, Overloading operators, Error handling during file operations, Formatted I/O.

UNIT - V

Exception Handling: Benefits of exception handling, Throwing an exception, The try block, Catching an exception, Exception objects, Exception specifications, Stack unwinding, Rethrowing an exception, Catching all exceptions.

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.

REFERENCES

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 PvtLtd.

CS305PC/DS402PC: DISCRETE MATHEMATICS
(Common to CSE, INF, CSM and CSC Branches)

B.TECH. II Year I Sem.
           L T P C
           3 0 0 3

Prerequisites: An understanding of Mathematics in general is sufficient.

Course Objectives
- Introduces the elementary discrete mathematics for computer science and engineering.
- Topics include formal logic notation, methods of proof, induction, sets, relations, graph theory, permutations and combinations, counting principles; recurrence relations and generating functions.

Course Outcomes
- Ability to understand and construct precise mathematical proofs
- Ability to use logic and set theory to formulate precise statements
- Ability to analyze and solve counting problems on finite and discrete structures
- Ability to describe and manipulate sequences
- Ability to apply graph theory in solving computing problems

UNIT - I
The Foundations: Logic and Proofs: Propositional Logic, Applications of Propositional Logic, Propositional Equivalence, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference, Introduction to Proofs, Proof Methods and Strategy.

UNIT - II
Basic Structures, Sets, Functions, Sequences, Sums, Matrices and Relations Sets, Functions, Sequences & Summations, Cardinality of Sets and Matrices Relations, Relations and Their Properties, n-ary Relations and Their Applications, Representing Relations, Closures of Relations, Equivalence Relations, Partial Orderings.

UNIT - III
Algorithms, Induction and Recursion: Algorithms, The Growth of Functions, Complexity of Algorithms
Induction and Recursion: Mathematical Induction, Strong Induction and Well-Ordering, Recursive Definitions and Structural Induction, Recursive Algorithms, Program Correctness

UNIT - IV
Discrete Probability and Advanced Counting Techniques: An Introduction to Discrete Probability, Probability Theory, Bayes' Theorem, Expected Value and Variance
Advanced Counting Techniques: Recurrence Relations, Solving Linear Recurrence Relations, Divide-and-Conquer Algorithms and Recurrence Relations, Generating Functions, Inclusion-Exclusion, Applications of Inclusion-Exclusion

UNIT - V

Graphs: Graphs and Graph Models, Graph Terminology and Special Types of Graphs, Representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths, Shortest-Path Problems, Planar Graphs, Graph Coloring.

Trees: Introduction to Trees, Applications of Trees, Tree Traversal, Spanning Trees, Minimum Spanning Trees

TEXT BOOK

1. Discrete Mathematics and its Applications with Combinatorics and Graph Theory-Kenneth H Rosen, 7th Edition, TMH.

REFERENCES BOOKS

1. Discrete Mathematical Structures with Applications to Computer Science-J.P. Tremblay and R. Manohar, TMH,
2. Discrete Mathematics for Computer Scientists & Mathematicians: Joe L. Mott, Abraham Kandel, Teodore P. Baker, 2nd ed, Pearson Education.
3. Discrete Mathematics- Richard Johnsonbaugh, 7Th Edn., Pearson Education.
4. Discrete Mathematics with Graph Theory- Edgar G. Goodaire, Michael M. Parmenter.
5. Discrete and Combinatorial Mathematics - an applied introduction: Ralph.P. Grimald, 5th edition, Pearson Education.

IT306ES/CS406CS: ANALOG AND DIGITAL ELECTRONICS LAB
(Common to INF, CSM and CSC Branches)

B.TECH. II Year I Sem.   **L T P C**
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Course Objectives
- To introduce components such as diodes, BJTs and FETs.
- To know the applications of components.
- To give understanding of various types of amplifier circuits
- To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
- To understand the concepts of combinational logic circuits and sequential circuits.

Course Outcomes: Upon completion of the Course, the students will be able to:
- Know the characteristics of various components.
- Understand the utilization of components.
- Design and analyze small signal amplifier circuits.
- Postulates of Boolean algebra and to minimize combinational functions
- Design and analyze combinational and sequential circuits
- Known about the logic families and realization of logic gates.

LIST OF EXPERIMENTS
1. Full Wave Rectifier with & without filters
2. Common Emitter Amplifier Characteristics
3. Common Base Amplifier Characteristics
4. Common Source amplifier Characteristics
5. Measurement of h-parameters of transistor in CB, CE, CC configurations
6. Input and Output characteristics of FET in CS configuration
7. Realization of Boolean Expressions using Gates
8. Design and realization logic gates using universal gates
9. generation of clock using NAND / NOR gates
10. Design a 4 – bit Adder / Subtractor
11. Design and realization a Synchronous and Asynchronous counter using flip-flops
12. Realization of logic gates using DTL, TTL, ECL, etc.

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CS307PC: OPERATING SYSTEMS LAB (Using UNIX/LINUX)
(Common to INF and CSM Branches)

B.TECH. II Year I Sem.   **L T P C**

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Prerequisites
- A course on "Programming for Problem Solving".
- A course on "Computer Organization and Architecture".

Course Objectives
- To provide an understanding of the design aspects of operating system concepts through simulation
- Introduce basic Unix commands, system call interface for process management, inter-process communication and I/O in Unix

Course Outcomes
- Simulate and implement operating system concepts such as scheduling, deadlock management, file management and memory management.
- Able to implement C programs using Unix system calls

LIST OF EXPERIMENTS

1. Write C programs to simulate the following CPU Scheduling algorithms
   a) FCFS   b) SJF   c) Round Robin   d) priority
2. Write programs using the I/O system calls of UNIX/LINUX operating system (open, read, write, close, fcntl, seek, stat, opendir, readdir)
3. Write a C program to simulate Bankers Algorithm for Deadlock Avoidance and Prevention.
4. Write a C program to implement the Producer – Consumer problem using semaphores using UNIX/LINUX system calls.
5. Write C programs to illustrate the following IPC mechanisms
   a) Pipes   b) FIFOs   c) Message Queues   d) Shared Memory
6. Write C programs to simulate the following memory management techniques
   a) Paging   b) Segmentation

TEXT BOOKS

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley
2. Advanced programming in the Unix environment, W.R.Stevens, *Pearson* education.

REFERENCE BOOKS

1. Operating Systems – Internals and Design Principles, William Stallings, Fifth Edition–2005, Pearson Education/PHI
2. Operating System - A Design Approach-Crowley, TMH.
3. Modern Operating Systems, Andrew S Tanenbaum, 2nd edition, Pearson/PHI
4. UNIX Programming Environment, Kernighan and Pike, PHI/Pearson Education
5. UNIX Internals: The New Frontiers, U. Vahalia, Pearson Education

AI308PC: OBJECT ORIENTED PROGRAMMING USING C++ LAB
(Common to CSM, CSD and CSC Branches)

B.Tech. II Year I Sem.   **L T P C**
                                                                0 0 3 1.5

Prerequisites: A course on "Programming for Problem Solving".

Course Objectives
- Introduces object-oriented programming concepts using the C++ language.
- Introduces the principles of data abstraction, inheritance and polymorphism;
- Introduces the principles of virtual functions and polymorphism
- Introduces handling formatted I/O and unformatted I/O
- Introduces exception handling

Course Outcomes
- Ability to develop applications for a range of problems using object-oriented programming techniques

LIST OF EXPERIMENTS
1. Write a C++ Program to display Names, Roll No., and grades of 3 students who have appeared in the examination. Declare the class of name, Roll No. and grade. Create an array of class objects. Read and display the contents of the array.
2. Write a C++ program to declare Struct. Initialize and display contents of member variables.
3. Write a C++ program to declare a class. Declare pointer to class. Initialize and display the contents of the class member.
4. Given that an EMPLOYEE class contains following members: data members: Employee number, Employee name, Basic, DA, IT, Net Salary and print data members.
5. Write a C++ program to read the data of N employee and compute Net salary of each employee (DA=52% of Basic and Income Tax (IT) =30% of the gross salary).
6. Write a C++ to illustrate the concepts of console I/O operations.
7. Write a C++ program to use scope resolution operator. Display the various values of the same variables declared at different scope levels.
8. Write a C++ program to allocate memory using new operator.
9. Write a C++ program to create multilevel inheritance. (Hint: Classes A1, A2, A3)
10. Write a C++ program to create an array of pointers. Invoke functions using array objects.
11. Write a C++ program to use pointer for both base and derived classes and call the member function. Use Virtual keyword.

*MC309/*MC409: ENVIRONMENTAL SCIENCE
(Common to CSM, ME and ECE Branches)

B.TECH. II Year I Sem.   **L T   P   C**
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Course Objectives
- Understanding the importance of ecological balance for sustainable development.
- Understanding the impacts of developmental activities and mitigation measures.
- Understanding the environmental policies and regulations

Course Outcomes
- Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

UNIT-I

Ecosystems: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity.

UNIT-II

Natural Resources: Classification of Resources: Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non-renewable energy sources.

UNIT-III

Biodiversity and Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT-IV

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary.

Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Issues and Global Efforts: C**limate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). International conventions / Protocols: Earth summit 1992, Kyoto protocol 1997, and Montréal Protocol 1987.

UNIT-V

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act-1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio- economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan(EMP). **Towards Sustainable Future:** Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

TEXT BOOKS

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2. Environmental Studies by Anubha Kaushik and C.P. Kaushik.

REFERENCE BOOKS

1. Environmental Studies – From crisis to cure by Dr. R Rajagopaln.
2. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
3. Environmental Engineering and Disaster Management by KR Chandoke.

MC310: Employability Skills – III
Java Course Syllabus

B.TECH. II Year I Sem.   **L T   P   C**
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UNIT - I
Introduction: Why Java, Paradigms, Diff B/W Java & Other (C, C++), Java History, Java Features, Java programming format, Java Statements, Java Data Types

UNIT - II
OOPS (Object Oriented Programming & Systems): Introduction, Object, Constructors, This Key Word, Inheritance, Super Key Word, Polymorphism (Over Loading & Over Riding), Abstraction, Interface, Encapsulation, Introduction to all predefined packages, User Defined Packages, Access Specifiers

UNIT - III
STRING Manipulation: String, String Buffer
Array: What is Array, Single Dimensional Array, Multi Dimensional Array, Sorting of Arrays

UNIT - IV
Packages: Exception Handling: Introduction, Pre Defined Exceptions, Try-Catch-Finally, Throws, throw, User Defined Exception examples
I/O Streams: Introduction, Byte-oriented streams, Character – oriented streams, File

UNIT - V
Multithreading: Introduction, Thread Creations, Thread Life Cycle, Life Cycle Methods, Synchronization, Wait() notify() notify all() methods
Wrapper Classes: Introduction, Byte, Short, Integer, Long, Float, Double, Character, Boolean classes
Inner Classes: Introduction, Member Inner Class, Static Inner Class, Local Inner Class, Anonymous Inner Class,
Collection Frame Work: Introduction, Util Package interfaces, List, Set, Map, List Interface 7 Its Classes, Set Interface & Its Classes, Map Interface & Is Classes

AI401PC: ARTIFICIAL INTELLIGENCE

B.TECH. II Year II Sem.
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Course Objectives
- To train the students to understand different types of AI agents, various AI search algorithms, fundamentals of knowledge representation, building of simple knowledge-based systems and to apply knowledge representation, reasoning.
- Study of Markov Models enable the student ready to step into applied AI.

UNIT - I
Introduction: AI problems, Agents and Environments, Structure of Agents, Problem Solving Agents **Basic Search Strategies**: Problem Spaces, Uninformed Search (Breadth-First, Depth-First Search, Depth-first with Iterative Deepening), Heuristic Search (Hill Climbing, Generic Best-First, A*), Constraint Satisfaction (Backtracking, Local Search)

UNIT - II
Advanced Search: Constructing Search Trees, Stochastic Search, A* Search Implementation, Minimax Search, Alpha-Beta Pruning
Basic Knowledge Representation and Reasoning: Propositional Logic, First-Order Logic, Forward Chaining and Backward Chaining, Introduction to Probabilistic Reasoning, Bayes Theorem

UNIT - III
Advanced Knowledge Representation and Reasoning: Knowledge Representation Issues, Non-monotonic Reasoning, Other Knowledge Representation Schemes
Reasoning Under Uncertainty: Basic probability, Acting Under Uncertainty, Bayes' Rule, Representing Knowledge in an Uncertain Domain, Bayesian Networks

UNIT - IV
Learning: What Is Learning? Rote Learning, Learning by Taking Advice, Learning in Problem Solving, Learning from Examples, Winston's Learning Program, Decision Trees.

UNIT - V
Expert Systems: Representing and Using Domain Knowledge, Shell, Explanation, Knowledge Acquisition.

TEXT BOOK
1. Russell, S. and Norvig, P, Artificial Intelligence: A Modern Approach, Third Edition, Prentice- Hall, 2010.

REFERENCE BOOKS
1. Artificial Intelligence, Elaine Rich, Kevin Knight, Shivasankar B. Nair, The McGraw Hill publications, Third Edition, 2009.
2. George F. Luger, Artificial Intelligence: Structures and Strategies for Complex Problem Solving, Pearson Education, 6th ed., 2009.

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MA302BS/MA402BS: COMPUTER ORIENTED STATISTICAL METHODS
(Common to CSE, INF and CSM Branches)

B.TECH. II Year II Sem.	**L T P C**
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Pre-requisites: Mathematics I and Mathematics II

Course Objectives: To learn
- The theory of Probability, and probability distributions of single and multiple random variables
- The sampling theory and testing of hypothesis and making inferences
- Stochastic process and Markov chains.

Course Outcomes: After learning the contents of this paper the student must be able to
- Apply the concepts of probability and distributions to some case studies
- Correlate the material of one unit to the material in other units
- Resolve the potential misconceptions and hazards in each topic of study.

UNIT - I
Probability: Sample Space, Events, Counting Sample Points, Probability of an Event, Additive Rules, Conditional Probability, Independence, and the Product Rule, Bayes' Rule.
Random Variables and Probability Distributions: Concept of a Random Variable, Discrete Probability Distributions, Continuous Probability Distributions, Statistical Independence.

UNIT - II
Mathematical Expectation: Mean of a Random Variable, Variance and Covariance of Random Variables, Means and Variances of Linear Combinations of Random Variables, Chebyshev's Theorem.
Discrete Probability Distributions: Introduction and Motivation, Binomial, Distribution, Geometric Distributions and Poisson distribution.

UNIT - III
Continuous Probability Distributions: Continuous Uniform Distribution, Normal Distribution, Areas under the Normal Curve, Applications of the Normal Distribution, Normal Approximation to the Binomial, Gamma and Exponential Distributions.
Fundamental Sampling Distributions: Random Sampling, Some Important Statistics, Sampling Distributions, Sampling Distribution of Means and the Central Limit Theorem, Sampling Distribution of S2, t –Distribution, F-Distribution.

UNIT - IV
Estimation & Tests of Hypotheses: Introduction, Statistical Inference, Classical Methods of Estimation.: Estimating the Mean, Standard Error of a Point Estimate, Prediction Intervals, Tolerance Limits, Estimating the Variance, Estimating a Proportion for single mean , Difference between Two Means, between Two Proportions for Two Samples and Maximum Likelihood Estimation.

Statistical Hypotheses: General Concepts, Testing a Statistical Hypothesis, Tests Concerning a Single Mean, Tests on Two Means, Test on a Single Proportion, Two Samples: Tests on Two Proportions.

UNIT - V

Stochastic Processes and Markov Chains: Introduction to Stochastic processes- Markov process. Transition Probability, Transition Probability Matrix, First order and Higher order Markov process, n- step transition probabilities, Markov chain, Steady state condition, Markov analysis.

TEXT BOOKS
1. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, Probability & Statistics for Engineers & Scientists, 9th Ed. Pearson Publishers.
2. S C Gupta and V K Kapoor, Fundamentals of Mathematical statistics, Khanna publications.
3. S. D. Sharma, Operations Research, Kedarnath and Ramnath Publishers, Meerut, Delhi

REFERENCE BOOKS
1. T.T. Soong, Fundamentals of Probability And Statistics For Engineers, John Wiley & Sons Ltd, 2004.
2. Sheldon M Ross, Probability and statistics for Engineers and scientists, Academic Press.

CS301PC/IT403PC: DATABASE MANAGEMENT SYSTEMS

(Common to INF and CSM Branches)

B.TECH. II Year II Sem.	L	T	P	C
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Prerequisites: A course on "Data Structures".

Course Objectives
- To understand the basic concepts and the applications of database systems.
- To master the basics of SQL and construct queries using SQL.
- Topics include data models, database design, relational model, relational algebra, transaction control, concurrency control, storage structures and access techniques.

Course Outcomes
- Gain knowledge of fundamentals of DBMS, database design and normal forms
- Master the basics of SQL for retrieval and management of data.
- Be acquainted with the basics of transaction processing and concurrency control.
- Familiarity with database storage structures and access techniques

UNIT - I
Database System Applications: A Historical Perspective, File Systems versus a DBMS, the Data Model, Levels of Abstraction in a DBMS, Data Independence, Structure of a DBMS
Introduction to Database Design: Database Design and ER Diagrams, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design with the ER Model

UNIT - II
Introduction to the Relational Model: Integrity constraint over relations, enforcing integrity constraints, querying relational data, logical data base design, introduction to views, destroying/altering tables and views.
Relational Algebra, Tuple relational Calculus, Domain relational calculus.

UNIT - III
SQL: QUERIES, CONSTRAINTS, TRIGGERS: form of basic SQL query, UNION, INTERSECT, and EXCEPT, Nested Queries, aggregation operators, NULL values, complex integrity constraints in SQL, triggers and active data bases.
Schema Refinement: Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, FIRST, SECOND, THIRD normal forms, BCNF, lossless join decomposition, multi-valued dependencies, FOURTH normal form, FIFTH normal form.

UNIT - IV

Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for serializability, Lock Based Protocols, Timestamp Based Protocols, Validation- Based Protocols, Multiple Granularity, Recovery and Atomicity, Log–Based Recovery, Recovery with Concurrent Transactions.

UNIT - V

Data on External Storage, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Hash Based Indexing, Tree base Indexing, Comparison of File Organizations, Indexes and Performance Tuning, Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.

TEXT BOOKS

1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, *Tata Mc Graw Hill* 3rd Edition
2. Database System Concepts, Silberschatz, Korth, *Mc Graw hill*, V edition.

REFERENCES

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate, *Pearson Education*
3. Introduction to Database Systems, C. J. Date, *Pearson Education*
4. Oracle for Professionals, The X Team, S.Shah and V. Shah, *SPD*.
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL,Shah, *PHI*.
6. Fundamentals of Database Management Systems, M. L. Gillenson, *Wiley Student* Edition.

AI404PC: JAVA PROGRAMMING
(Common to CSM, CSD and CSC Branches)

B.TECH. II Year II Sem.   **L T P C**
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Course Objectives

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

Course Outcomes

- Able to solve real world problems using OOP techniques.
- Able to understand the use of abstract classes.
- Able to solve problems using java collection framework and I/o classes.
- Able to develop multithreaded applications with synchronization.
- Able to develop applets for web applications.
- Able to design GUI based applications

UNIT - I

Object-Oriented Thinking- A way of viewing world – Agents and Communities, messages and methods, Responsibilities, Classes and Instances, Class Hierarchies- Inheritance, Method binding, Overriding and Exceptions, Summary of Object-Oriented concepts. Java buzzwords, An Overview of Java, Data types, Variables and Arrays, operators, expressions, control statements, Introducing classes, Methods and Classes, String handling.

Inheritance – Inheritance concept, Inheritance basics, Member access, Constructors, Creating Multilevel hierarchy, super uses, using final with inheritance, Polymorphism-ad hoc polymorphism, pure polymorphism, method overriding, abstract classes, Object class, forms of inheritance- specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance.

UNIT - II

Packages- Defining a Package, CLASSPATH, Access protection, importing packages.
Interfaces- defining an interface, implementing interfaces, Nested interfaces, applying interfaces, variables in interfaces and extending interfaces.

Stream based I/O (java.io) – The Stream classes-Byte streams and Character streams, Reading console Input and Writing Console Output, File class, Reading and writing Files, Random access file operations, The Console class, Serialization, Enumerations, auto boxing, generics.

UNIT - III
Exception handling - Fundamentals of exception handling, Exception types, Termination or resumptive models, Uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws and finally, built- in exceptions, creating own exception sub classes.

Multithreading- Differences between thread-based multitasking and process-based multitasking, Java thread model, creating threads, thread priorities, synchronizing threads, inter thread communication.

UNIT - IV
The Collections Framework (java.util)- Collections overview, Collection Interfaces, The Collection classes- Array List, Linked List, Hash Set, Tree Set, Priority Queue, Array Deque. Accessing a Collection via an Iterator, Using an Iterator, The For-Each alternative, Map Interfaces and Classes, Comparators, Collection algorithms, Arrays, The Legacy Classes and Interfaces- Dictionary, Hashtable, Properties, Stack, Vector

More Utility classes, String Tokenizer, Bit Set, Date, Calendar, Random, Formatter, Scanner

UNIT - V
GUI Programming with Swing – Introduction, limitations of AWT, MVC architecture, components, containers. Understanding Layout Managers, Flow Layout, Border Layout, Grid Layout, Card Layout, Grid Bag Layout.

Event Handling- The Delegation event model- Events, Event sources, Event Listeners, Event classes, Handling mouse and keyboard events, Adapter classes, Inner classes, Anonymous Inner classes.

A Simple Swing Application, Applets – Applets and HTML, Security Issues, Applets and Applications, passing parameters to applets. Creating a Swing Applet, Painting in Swing, A Paint example, Exploring Swing Controls- JLabel and Image Icon, JText Field, **The Swing Buttons**- JButton, JToggle Button, JCheck Box, JRadio Button, JTabbed Pane, JScroll Pane, JList, JCombo Box, Swing Menus, Dialogs.

TEXT BOOKS
1. Java The complete reference, 9th edition, Herbert Schildt, McGraw Hill Education (India) Pvt. Ltd.
2. Understanding Object-Oriented Programming with Java, updated edition, T. Budd, Pearson Education.

REFERENCE BOOKS
1. An Introduction to programming and OO design using Java, J. Nino and F.A. Hosch, John Wiley & sons
2. Introduction to Java programming, Y. Daniel Liang, Pearson Education.
3. Object Oriented Programming through Java, P. Radha Krishna, University Press.
4. Programming in Java, S. Malhotra, S. Chudhary, 2nd edition, Oxford Univ. Press.
5. Java Programming and Object-oriented Application Development, R. A. Johnson, Cengage Learning.

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AI405PC/CS501PC: DESIGN AND ANALYSIS OF ALGORITHMS

B.TECH. II Year II Sem.	L	T	P	C
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Prerequisites
- A course on "Computer Programming"
- A course on "Data Structures"

Course Objectives
- Introduces the notations for analysis of the performance of algorithms.
- Introduces the data structure disjoint sets.
- Describes major algorithmic techniques (divide-and-conquer, backtracking, dynamic programming, greedy, branch and bound methods) and mention problems for which each technique is appropriate;
- Describes how to evaluate and compare different algorithms using worst-, average-, and best-case analysis.
- Explains the difference between tractable and intractable problems, and introduces the problems that are P, NP and NP complete.

Course Outcomes
- Ability to analyze the performance of algorithms
- Ability to choose appropriate data structures and algorithm design methods for a specified application
- Ability to understand how the choice of data structures and the algorithm design methods impact the performance of programs

UNIT - I
Introduction: Algorithm, Performance Analysis-Space complexity, Time complexity, Asymptotic Notations- Big oh notation, Omega notation, Theta notation and Little oh notation.
Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort, Strassen's matrix multiplication.

UNIT - II
Disjoint Sets: Disjoint set operations, union and find algorithms
Backtracking: General method, applications, n-queen's problem, sum of subsets problem, graph coloring

UNIT - III
Dynamic Programming: General method, applications- Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Traveling sales person problem, Reliability design.

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

UNIT - V

Branch and Bound: General method, applications - Travelling sales person problem, 0/1 knapsack problem - LC Branch and Bound solution, FIFO Branch and Bound solution.

NP-Hard and NP-Complete problems: Basic concepts, non deterministic algorithms, NP - Hard and NP-Complete classes, Cook's theorem.

TEXT BOOKS

1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharan, University Press.

REFERENCES

1. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson education.
2. Introduction to Algorithms, second edition, T. H. Cormen, C.E. Leiserson, R. L. Rivest, and C. Stein, PHI Pvt. Ltd./ Pearson Education.
3. Algorithm Design: Foundations, Analysis and Internet Examples, M.T. Goodrich and R. Tamassia, John Wiley and sons.

CS306PC/IT406PC: DATABASE MANAGEMENT SYSTEMS LAB
(Common to INF and CSM Branches)

B.TECH. II Year II Sem.   **L T P C**
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Course Objectives
- Introduce ER data model, database design and normalization
- Learn SQL basics for data definition and data manipulation

Course Outcomes
- Design database schema for a given application and apply normalization
- Acquire skills in using SQL commands for data definition and data manipulation.
- Develop solutions for database applications using procedures, cursors and triggers

LIST OF EXPERIMENTS
1. Concept design with E-R Model
2. Relational Model
3. Normalization
4. Practicing DDL commands
5. Practicing DML commands
6. Querying (using ANY, ALL, IN, Exists, NOT EXISTS, UNION, INTERSECT, Constraints etc.)
7. Queries using Aggregate functions, GROUP BY, HAVING and Creation and dropping of Views.
8. Triggers (Creation of insert trigger, delete trigger, update trigger)
9. Procedures
10. Usage of Cursors

TEXT BOOKS
1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill, 3rd Edition
2. Database System Concepts, Silberschatz, Korth, McGraw Hill, V edition.

REFERENCES BOOKS
1. Database Systems design, Implementation and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate, *Pearson Education*
3. Introduction to Database Systems, C.J. Date, *Pearson Education*
4. Oracle for Professionals, The X Team, S. Shah and V. Shah, *SPD*.
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah, *PHI*.
6. Fundamentals of Database Management Systems, M. L. Gillenson, *Wiley Student Edition.*

AI407PC: JAVA PROGRAMMING LAB
(Common to CSM, CSD and CSC Branches)

B.TECH. II Year II Sem.   **L T P C**
                                                               0 0 3 1.5

Course Objectives
- To write programs using abstract classes.
- To write programs for solving real world problems using java collection frame work.
- To write multithreaded programs.
- To write GUI programs using swing controls in Java.
- To introduce java compiler and eclipse platform.
- To impart hands on experience with java programming.

Course Outcomes
- Able to write programs for solving real world problems using java collection frame work.
- Able to write programs using abstract classes.
- Able to write multithreaded programs.
- Able to write GUI programs using swing controls in Java.

Note
1. Use LINUX and MySQL for the Lab Experiments. Though not mandatory, encourage the use of Eclipse platform.
2. The list suggests the minimum program set. Hence, the concerned staff is requested to add more problems to the list as needed.

LIST OF EXPERIMENTS
1. Use Eclipse or Net bean platform and acquaint with the various menus. Create a test project, add a test class, and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods, and classes. Try debug step by step with a small program of about 10 to 15 lines which contains at least one if else condition and a for loop.
2. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result. Handle any possible exceptions like divided by zero.
3. a) Develop an applet in Java that displays a simple message.
   b) Develop an applet in Java that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button named "Compute" is clicked.
4. Write a Java program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num 2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception. Display the exception in a message dialog box.

5. Write a Java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.

6. Write a Java program for the following: Create a doubly linked list of elements. Delete a given element from the above list. Display the contents of the list after deletion.

7. Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with "Stop" or "Ready" or "Go" should appear above the buttons in selected color. Initially, there is no message shown.

8. Write a Java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle, and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.

9. Suppose that a table named Table.txt is stored in a text file. The first line in the file is the header, and the remaining lines correspond to rows in the table. The elements are separated by commas. Write a java program to display the table using Labels in Grid Layout.

10. Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired (Use Adapter classes).

11. Write a Java program that loads names and phone numbers from a text file where the data is organized as one line per record and each field in a record are separated by a tab (\t). It takes a name or phone number as input and prints the corresponding other value from the hash table (hint: use hash tables).

12. Write a Java program that correctly implements the producer – consumer problem using the concept of interthread communication.

13. Write a Java program to list all the files in a directory including the files present in all its subdirectories.

14. Write a Java program that implements Quick sort algorithm for sorting a list of names in ascending order

15. Write a Java program that implements Bubble sort algorithm for sorting in descending order and also shows the number of interchanges occurred for the given set of integers.

REFERENCE BOOKS

1. Java for Programmers, P. J. Deitel and H. M. Deitel, 10th Edition *Pearson* education.
2. Thinking in Java, Bruce Eckel, *Pearson* Education.
3. Java Programming, D. S. Malik and P. S. Nair, *Cengage* Learning.
4. Core Java, Volume 1, 9th edition, Cay S. Horstmann and G Cornell, *Pearson*.

CMR ENGINEERING COLLEGE

UGC AUTONOMOUS

(Approved by AICTE - New Delhi. Affiliated to JNTUH and Accredited by NAAC & NBA)

AI408PC/CS507PC: DESIGN AND ANALYSIS OF ALGORITHMS LAB

B.TECH. II Year II Sem.	L T P C
	0 0 3 1.5

Prerequisites

- Prerequisite is "Data Structures"

Course Objectives

- Introduces object-oriented programming concepts using the C++ language.
- Introduces the principles of data abstraction, inheritance and polymorphism;
- Introduces the principles of virtual functions and polymorphism
- To write programs in Java to solve problems using divide and conquer strategy.
- To write programs in Java to solve problems using backtracking strategy.
- To write programs in Java to solve problems using greedy and dynamic programming techniques

Course Outcomes

- Ability to develop applications for a range of problems using object-oriented programming techniques
- Ability to write programs in Java to solve problems using algorithm design techniques such as Divide and Conquer, Greedy, Dynamic programming, and Backtracking

LIST OF EXPERIMENTS

1. Write a java program to implement Quick sort algorithm for sorting a list of integers in ascending order
2. Write a java program to implement Merge sort algorithm for sorting a list of integers in ascending order.
3. Write a java program to implement the dfs algorithm for a graph.
4. Write a. java program to implement the bfs algorithm for a graph.
5. Write a java programs to implement backtracking algorithm for the N-queens problem.
6. Write a java program to implement the backtracking algorithm for the sum of subsets problem.
7. Write a java program to implement the backtracking algorithm for the Hamiltonian Circuits problem.
8. Write a java program to implement greedy algorithm for job sequencing with deadlines.
9. Write a java program to implement Dijkstra's algorithm for the Single source shortest path problem.
10. Write a java program that implements Prim's algorithm to generate minimum cost spanning tree.
11. Write a java program that implements Kruskal's algorithm to generate minimum cost spanning tree
12. Write a java program to implement Floyd's algorithm for the all pairs shortest path problem.
13. Write a java program to implement Dynamic Programming algorithm for the 0/1 Knapsack problem.
14. Write a java program to implement Dynamic Programming algorithm for the Optimal Binary Search Tree Problem.

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.
3. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharan, University Press

REFERENCE BOOKS

1. Data structures, Algorithms and Applications in C++, 2nd Edition, S. Sahani, Universities Press.
2. Data structures and Algorithms in java, 3rd edition, A. Drozdek, Cengage Learning.
3. Data structures with Java, J. R. Hubbard, 2nd edition, Schaum's Outlines, TMH.
4. Data structures and algorithms in Java, 2nd Edition, R. Lafore, Pearson Education.
5. Data Structures using Java, D. S. Malik and P.S. Nair, Cengage Learning

CMR ENGINEERING COLLEGE

UGC AUTONOMOUS

(Approved by AICTE - New Delhi. Affiliated to JNTUH and Accredited by NAAC & NBA)

*MC309/*MC409: GENDER SENSITIZATION LAB (An Activity-based Course)
(Common to CSM, ME and ECE Branches)

B.TECH. II Year II Sem.	L	T	P	C
	0	0	2	0

COURSE DESCRIPTION

This course offers an introduction to Gender Studies, an interdisciplinary field that asks critical questions about the meanings of sex and gender in society. The primary goal of this course is to familiarize students with key issues, questions and debates in Gender Studies, both historical and contemporary. It draws on multiple disciplines – such as literature, history, economics, psychology, sociology, philosophy, political science, anthropology and media studies – to examine cultural assumptions about sex, gender, and sexuality.

This course integrates analysis of current events through student presentations, aiming to increase awareness of contemporary and historical experiences of women, and of the multiple ways that sex and gender interact with race, class, caste, nationality and other social identities. This course also seeks to build an understanding and initiate and strengthen programmes combating gender-based violence and discrimination. The course also features several exercises and reflective activities designed to examine the concepts of gender, gender-based violence, sexuality, and rights. It will further explore the impact of gender-based violence on education, health and development.

Course Objectives:
- To develop students' sensibility with regard to issues of gender in contemporary India.
- To provide a critical perspective on the socialization of men and women.
- To introduce students to information about some key biological aspects of genders.
- To expose the students to debates on the politics and economics of work.
- To help students reflect critically on gender violence.
- To expose students to more egalitarian interactions between men and women.

Course Outcomes:
- Students will have developed a better understanding of important issues related to gender in contemporary India.
- Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
- Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
- Students will acquire insight into the gendered division of labour and its relation to politics and economics.
- Men and women students and professionals will be better equipped to work and live together as equals.
- Students will develop a sense of appreciation of women in all walks of life.
- Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

CMR ENGINEERING COLLEGE

UGC AUTONOMOUS

(Approved by AICTE - New Delhi. Affiliated to JNTUH and Accredited by NAAC & NBA)

UNIT – I

UNDERSTANDING GENDER

Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudes towards Gender-Construction of Gender-Socialization: Making Women, Making Men -Preparing for Womanhood. Growing up Male. First lessons in Caste.Just Relationships: Being Together as Equals.

UNIT – II

GENDER ROLES AND RELATIONS

Two or Many? -Struggles with Discrimination-Gender Roles and Relations-Types of Gender Roles-Gender Roles and Relationships Matrix-Missing Women-Sex Selection and Its Consequences-Declining Sex Ratio. Demographic Consequences-Gender Spectrum: Beyond the Binary

UNIT – III

GENDER AND LABOUR

Know your rights 10 laws that protect women and their rights. Women protection laws in India

UNIT – IV

GENDER - BASED VIOLENCE

The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment: Say No! -Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "*Chupulu*".

Domestic Violence: Speaking Out is Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Thinking about Sexual Violence Blaming the Victim-"I Fought for my Life…."

UNIT – V

GENDER AND CULTURE

Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature- Gender Development Issues-Gender Issues-Gender Sensitive Language-Gender and Popular Literature - Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Rosa Parks- The Brave Heart.

> ➢ *Classes will consist of a combination of activities: dialogue-based lectures, discussions, collaborative learning activities, group work and in-class assignments. Apart from the above prescribed book, Teachers can make use of any authentic materials related to the topics given in the syllabus on "Gender".*

ESSENTIAL READING: The Textbook, "*Towards a World of Equals: A Bilingual Textbook on Gender" written* by A.Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu published by Telugu Akademi, Telangana Government in 2015.

ASSESSMENT AND GRADING:

- Discussion & Classroom Participation: 20%
- Project/Assignment: 30%
- End Term Exam: 50%

MC410: Employability Skills – IV
Python Course Syllabus

B.TECH. II Year II Sem.   **L T P C**
                                                                 0 0 2 0

UNIT - I
Module 1: Introduction to Python and Computer Programming, Python - a tool, not a reptile, There is more than one Python, Let's start our Python adventure

Module 2: Data Types, Variables, Basic Input-Output Operations, Basic Operators, Your first program, Python literals, Operators - data manipulation tools, Variables - data-shaped boxes, How to talk to computer?

UNIT - II
Module 3: Boolean Values, Conditional Execution, Loops, Lists and List Processing, Logical and Bitwise Operations, Making decisions in Python, Python's loops, Logic and bit operations in Python, Lists - collections of data, Sorting simple lists - the bubble sort algorithm, Lists - some more details, Lists in advanced applications

Module 4: Functions, Tuples, Dictionaries, and Data Processing, Writing functions in Python, How functions communicate with their environment? Returning a result from a function, Scopes in Python, Let's make some fun... sorry, functions, Tuples and dictionaries

Module 5: Modules, Packages, String and List Methods, and Exceptions, Using modules, Some useful modules, What is package? Errors - the programmer's daily bread, The anatomy of exception, Some of the most useful exceptions, Characters and strings vs. computers, Python's nature of strings, String methods, Strings in action, Four simple programs

UNIT - III
Module 6: The Object-Oriented Approach: Classes, Methods, Objects, and the Standard Objective Features; Exception Handling, and Working with Files, Basic concepts of object programming, A short journey from procedural to object approach, Properties, Methods, Inheritance - one of object programming foundations, Exceptions once again, Generators and closures, Processing files, Working with real files

UNIT - IV
Module 7: Data Structures, List Data Structures, Stacks, Queues, Searching & Sorting, Trees, Graphs

UNIT - V
Module 8: Databases Management, Mysql & MongoDB, Creating Database, Insertion, Deletion, Updating, Selection

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
(ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)
B.Tech. III Year Course Structure (R-20)
Applicable From 2020-21Admitted Batch

III YEAR I SEMESTER

S.No.	Course Code	Course Title	L	T	P	Credits
1	SM501MS	Business Economics & Financial Analysis	3	0	0	3
2	AI502PC	Software Engineering	3	0	0	3
3	AI503PC	Introduction to Python Programming	3	1	0	4
4	CS504PC	Formal Languages and Automata Theory	3	0	0	3
5		Professional Elective - I	3	0	0	3
6	EN505HS	Advanced Communication Skills Lab	0	0	3	1.5
7	AI506PC	Software Engineering Lab	0	0	3	1.5
8	AI507PC	Programming in Python Lab	0	0	2	1
9	*MC509	Constitution of India	3	0	0	0
10	MC510	Employability Skills - V	0	0	2	0
		Total Credits	**18**	**1**	**10**	**20**

III YEAR II SEMESTER

S.No.	Course Code	Course Title	L	T	P	Credits
1	AI601PC	Computer Networks	3	0	0	3
2	CS602PC	Machine Learning	3	1	0	4
3	AI603PC	Principles of Compiler Design	3	0	0	3
4		Professional Elective -II	3	0	0	3
5		Open Elective-I / MOOCs	3	0	0	3
6	AI604PC	Computer Networks Lab	0	0	3	1.5
7	CS605PC	Machine Learning Lab	0	0	2	1
8	AI606PC	Compiler Design Lab	0	0	3	1.5
9	*MC609	Intellectual Property Rights	3	0	0	0
10	*MC610	Cyber Security	0	0	2	0
		Total Credits	**18**	**1**	**10**	**20**

*MC = Satisfactory / Not Satisfactory

SM501MS: BUSINESS ECONOMICS AND FINANCIAL ANALYSIS
(Common to All Branches)

B.Tech. III Year I Sem

L T P C
3 0 0 3

Prerequisites: None

Course Objective:
- Understand the market dynamics namely demand and elasticity of demand and pricing in different market structures.
- Analyze a company's financial statements and come to a reasoned conclusion about the financial situation of the company.
- Acquire the basics of how to analyze and interpret the financial statements through ratio analysis and fund and cash flow statements.

Course Outcome:
- Understand the concepts of managerial economics and concept organizations existing in the modern business
- Understand microeconomic factors in related to demand and supply analysis and its forecasting
- Apply the theory of production function and Cost concepts to determine the Break Even Analysis and Remember different market structures, pricing strategies and different forms business organization
- Determine the financial statement by using Fundamental accounting
- Interpret the financial statement by using Ratio analysis, fund flow and cash flow statements

UNIT-I
INTRODUCTION TO BUSINESS AND ECONOMICS
Business: Structure of Business Firm, Theory of Firm, Types of Business Entities, Limited Liability Companies, Sources of Capital for a Company, Non-Conventional Sources of Finance.
Economics: Significance of Economics, Micro and Macro Economic Concepts, Concepts and Importance of National Income, Inflation, Money Supply in Inflation, Business Cycle, Features and Phases of Business Cycle. Nature and Scope of Business Economics, Role of Business Economist, Multidisciplinary nature of Business Economics.

UNIT – II
DEMAND AND SUPPLY ANALYSIS
Elasticity of Demand: Elasticity, Types of Elasticity, Law of Demand, Measurement and Significance of Elasticity of Demand, Factors affecting Elasticity of Demand, Elasticity of Demand in decision making, Demand Forecasting: Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of Demand Forecasting.
Supply Analysis: Determinants of Supply, Supply Function & Law of Supply.

UNIT - III
PRODUCTION, COST, MARKET STRUCTURES AND PRICING
Production Analysis: Factors of Production, Production Function, Production Function with one variable input, two variable inputs, Returns to Scale, Different Types of Production Functions.
Cost analysis: Types of Costs, Short run and Long run Cost Functions.

Market Structures: Nature of Competition, Features of Perfect competition, Monopoly, Oligopoly, and Monopolistic Competition.

Pricing: Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis, and Cost Volume Profit Analysis.

UNIT - IV
FINANCIAL ACCOUNTING

Accounting concepts and Conventions, Accounting Equation, Double-Entry system of Accounting, Rules for maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, Elements of Financial Statements, and Preparation of Final Accounts.

UNIT - V
FINANCIAL ANALYSIS THROUGH RATIOS

Concept of Ratio Analysis, Liquidity Ratios, Turnover Ratios, Profitability Ratios, Proprietary Ratios, Solvency, Leverage Ratios (simple problems). Introduction to Fund Flow and Cash Flow Analysis (simple problems).

TEXT BOOKS:
1. D.D. Chaturvedi, S.L. Gupta, Business Economics - Theory and Applications, International Book House Pvt. Ltd. 2013.
2. Dhanesh K Khatri, Financial Accounting, Tata McGraw Hill, 2011.
3. Geethika Ghosh, Piyali Gosh, Purba Roy Choudhury, Managerial Economics, 2e, Tata McGraw Hill Education Pvt. Ltd. 2012.

REFERENCE BOOKS:
1. Paresh Shah, Financial Accounting for Management 2e, Oxford Press, 2015.
2. S.N. Maheshwari, Sunil K Maheshwari, Sharad K Maheshwari, Financial Accounting, 5e, Vikas Publications, 2013.

AI502PC: SOFTWARE ENGINEERING

B.Tech. III Year I Sem   **L T P C**
                                                                                 3 0 0 3

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

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

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

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

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

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

UNIT - V

Metrics for Process and Products: Software measurement, metrics for software quality.

Risk management: Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM, RMMM plan.

Quality Management: Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.

TEXT BOOKS:

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

REFERENCE BOOKS:

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

AI503PC: INTRODUCTION TO PYTHON PROGRAMMING

B.Tech. III Year I Sem
L T P C
3 1 0 4

Course Objectives:
- To be able to introduce core programming basics and program design with functions using Python programming language.
- To understand a range of Object-Oriented Programming, as well as in-depth data and information processing techniques.
- To understand the high-performance programs designed to strengthen the practical expertise.

UNIT - I
Introduction to Python, Installing Python. How a Program Works, Using Python, Program Development Cycle, Input, Processing, and Output, Displaying Output with the Print Function, Comments, Variables, Reading Input from the Keyboard, Performing Calculations, Operators. Type conversions, Expressions, More about Data Output. Decision Structures and Boolean Logic: if, if-else, if-elif-else Statements, Nested Decision Structures, Comparing Strings, Logical Operators, Boolean Variables. Repetition Structures: Introduction, while loop, for loop, Calculating a Running Total, Input Validation Loops, Nested Loops. Data types and Expressions: Strings, Assignment and Comments, Numeric Data Types and Character Sets, Expressions, Functions and Modules.

UNIT - II
Control Statements: Definite Iteration, Formatting Text for Output, Selection, Conditional Iteration. File and Exceptions: Introduction to File Input and Output, Using Loops to Process Files, Processing Records, Exceptions. Functions: Introduction, Defining and Calling a Void Function, Designing a Program to Use Functions, Local Variables, Passing Arguments to Functions, Global Variables and Global Constants, Value-Returning Functions-Generating Random Numbers, The math Module, Storing Functions in Modules.

UNIT - III
Strings and Text Files: Accessing Characters and Substrings in a String, Strings and Number System, String Methods, Basic String Operations, String Slicing, Testing, Searching, and Manipulating Strings. Text Files, Data Encryption, Lists, Introduction to Lists, List slicing, Finding Items in Lists with the in Operator, List Methods and Useful Built-in Functions, Copying Lists, Processing Lists, Two-Dimensional Lists, Tuples Sequences, Tuples. Dictionaries and Sets: Dictionaries, Sets, Serializing Objects. Recursion: Introduction, Problem Solving with Recursion, Examples of Recursive Algorithms

UNIT - IV
Design with Classes: Classes and Objects, Classes and Functions, Classes and Methods, Working with Instances, Inheritance and Polymorphism. Object-Oriented Programming: Procedural and Object-Oriented Programming, Classes, techniques for Designing Classes.

UNIT - V
Graphical User Interfaces: Behavior of terminal based programs and GUI-based programs, Coding simple GUI-based programs, other useful GUI resources. GUI Programming: Graphical User Interfaces, Using the tkinter Module, Display text with Label Widgets, Organizing Widgets with Frames, Button Widgets

and Info Dialog Boxes, Getting Input with Entry Widget, Using Labels as Output Fields, Radio Buttons, Check Buttons. Simple Graphics and Image Processing: Overview of Turtle Graphics, Two dimensional Shapes, Colors and RBG System, Image Processing.

TEXT BOOKS:
1. Kenneth A. Lambert, The Fundamentals of Python: First Programs, 2011, Cengage Learning.
2. Think Python First Edition, by Allen B. Downey, Orielly publishing

REFERENCE BOOKS:
1. Introduction to Computation and Programming Using Python. John V. Guttag, The MIT Press.
2. James Payne, Beginning Python using Python 2.6 and Python 3, Wrox publishing
3. Paul Gries, Practical Programming: An Introduction to Computer Science using Python 3,The Pragmatic Bookshelf, 2nd edition (4 Oct. 2013)
4. Charles Dierach, Introduction to Computer Science using Python

CS504PC: FORMAL LANGUAGES AND AUTOMATA THEORY
(Common to CSE, INF. CSM and CSC branches)

B.Tech. III Year I Sem   **L T P C**
                                                                                      3 0 0 3

Course Objectives:
1. To provide introduction to some of the central ideas of theoretical computer science from the perspective of formal languages.
2. To introduce the fundamental concepts of formal languages, grammars and automata theory.
3. Classify machines by their power to recognize languages.
4. Employ finite state machines to solve problems in computing.
5. To understand deterministic and non-deterministic machines.
6. To understand the differences between decidability and undecidability.
7.

Course Outcomes
1. Able to understand the concept of abstract machines and their power to recognize the languages.
2. Able to employ finite state machines for modeling and solving computing problems.
3. Able to design context free grammars for formal languages.
4. Able to distinguish between decidability and undecidability.
5. Able to gain proficiency with mathematical tools and formal methods.

UNIT - I
Introduction to Finite Automata: Structural Representations, Automata and Complexity, the Central Concepts of Automata Theory – Alphabets, Strings, Languages, Problems.
Nondeterministic Finite Automata: Formal Definition, an application, Text Search, Finite Automata with Epsilon-Transitions.
Deterministic Finite Automata: Definition of DFA, How A DFA Process Strings, The language of DFA, Conversion of NFA with €-transitions to NFA without €-transitions. Conversion of NFA to DFA, Moore and Melay machines.

UNIT - II
Regular Expressions: Finite Automata and Regular Expressions, Applications of Regular Expressions, Algebraic Laws for Regular Expressions, Conversion of Finite Automata to Regular Expressions.
Pumping Lemma for Regular Languages: Statement of the pumping lemma, Applications of the Pumping Lemma.
Closure Properties of Regular Languages: Closure properties of Regular languages, Decision Properties of Regular Languages, Equivalence and Minimization of Automata.

UNIT - III
Context-Free Grammars: Definition of Context-Free Grammars, Derivations Using a Grammar, Leftmost and Rightmost Derivations, the Language of a Grammar, Sentential Forms, Parse Tress, Applications of Context-Free Grammars, Ambiguity in Grammars and Languages.
Push Down Automata: Definition of the Pushdown Automaton, the Languages of a PDA, Equivalence of PDA's and CFG's, Acceptance by final state, Acceptance by empty stack, Deterministic Pushdown Automata. From CFG to PDA, From PDA to CFG.

UNIT - IV

Normal Forms for Context- Free Grammars: Eliminating useless symbols, Eliminating €-Productions. Chomsky Normal form Griebech Normal form.

Pumping Lemma for Context-Free Languages: Statement of pumping lemma, Applications

Closure Properties of Context-Free Languages: Closure properties of CFL's, Decision Properties of CFL's

Turing Machines: Introduction to Turing Machine, Formal Description, Instantaneous description, The language of a Turing machine.

UNIT - V

Types of Turing machine: Turing machines and halting

Undecidability: Undecidability, A Language that is Not Recursively Enumerable, An Undecidable Problem That is RE, Undecidable Problems about Turing Machines, Recursive languages, Properties of recursive languages, Post's Correspondence Problem, Modified Post Correspondence problem, Other Undecidable Problems, Counter machines.

TEXT BOOKS:
1. Introduction to Automata Theory, Languages, and Computation, 3nd Edition, John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Pearson Education.
2. Theory of Computer Science – Automata languages and computation, Mishra and Chandrashekaran, 2nd edition, PHI.

REFERENCE BOOKS:
1. Introduction to Languages and The Theory of Computation, John C Martin, TMH.
2. Introduction to Computer Theory, Daniel I.A. Cohen, John Wiley.
3. A Text book on Automata Theory, P. K. Srimani, Nasir S. F. B, Cambridge University Press.
4. Introduction to the Theory of Computation, Michael Sipser, 3rd edition, Cengage Learning.
5. Introduction to Formal languages Automata Theory and Computation Kamala Krithivasan, Rama R, Pearson.

AI511PE: SOFTWARE PROCESS & PROJECT MANAGEMENT
(Professional Elective – I)

B.Tech. III Year I Sem   **L T P C**
                                                              3 0 0 3

Course Objectives:
- To acquire knowledge on software process management
- To acquire managerial skills for software project development
- To understand software economics

Course Outcomes:
- Gain knowledge of software economics, phases in the life cycle of software development, project organization, project control and process instrumentation
- Analyze the major and minor milestones, artifacts and metrics from management and technical perspective
- Design and develop software product using conventional and modern principles of software project management

UNIT - I
Software Process Maturity
Software maturity Framework, Principles of Software Process Change, Software Process Assessment, The Initial Process, The Repeatable Process, The Defined Process, The Managed Process, The Optimizing Process.
Process Reference Models
Capability Maturity Model (CMM), CMMI, PCMM, PSP, TSP).

UNIT - II
Software Project Management Renaissance
Conventional Software Management, Evolution of Software Economics, Improving Software Economics, The old way and the new way.
Life-Cycle Phases and Process artifacts
Engineering and Production stages, inception phase, elaboration phase, construction phase, transition phase, artifact sets, management artifacts, engineering artifacts and pragmatic artifacts, model-based software architectures.

UNIT - III
Workflows and Checkpoints of process
Software process workflows, Iteration workflows, Major milestones, minor milestones, periodic status assessments.
Process Planning
Work breakdown structures, Planning guidelines, cost and schedule estimating process, iteration planning process, Pragmatic planning.

UNIT - IV
Project Organizations
Line-of- business organizations, project organizations, evolution of organizations, process automation.

Project Control and process instrumentation

The seven-core metrics, management indicators, quality indicators, life-cycle expectations, Pragmatic software metrics, metrics automation.

UNIT - V
CCPDS-R Case Study and Future Software Project Management Practices
Modern Project Profiles, Next-Generation software Economics, Modern Process Transitions.
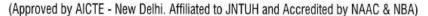
TEXT BOOKS:
1. Managing the Software Process, Watts S. Humphrey, Pearson Education
2. Software Project Management, Walker Royce, Pearson Education

REFERENCE BOOKS:
1. An Introduction to the Team Software Process, Watts S. Humphrey, Pearson Education, 2000
2. Process Improvement essentials, James R. Persse, O'Reilly, 2006
3. Software Project Management, Bob Hughes & Mike Cotterell, fourth edition, TMH, 2006
4. Applied Software Project Management, Andrew Stellman & Jennifer Greene, O'Reilly, 2006.
5. Head First PMP, Jennifer Greene & Andrew Stellman, O'Reilly, 2007
6. Software Engineering Project Management, Richard H. Thayer & Edward Yourdon, 2nd edition, Wiley India, 2004.
7. Agile Project Management, Jim Highsmith, Pearson education, 2004.

CMR ENGINEERING COLLEGE

UGC AUTONOMOUS

(Approved by AICTE - New Delhi. Affiliated to JNTUH and Accredited by NAAC & NBA)

AI512PE: DATA MINING (Professional Elective - I)

B.Tech. III Year I Sem
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Pre-Requisites:
- A course on "Database Management Systems"
- Knowledge of probability and statistics

Course Objectives:
- It presents methods for mining frequent patterns, associations, and correlations.
- It then describes methods for data classification and prediction, and data–clustering approaches.
- It covers mining various types of data stores such as spatial, textual, multimedia, streams.

Course Outcomes:
- Ability to understand the types of the data to be mined and present a general classification of tasks and primitives to integrate a data mining system.
- Apply preprocessing methods for any given raw data.
- Extract interesting patterns from large amounts of data.
- Discover the role played by data mining in various fields.
- Choose and employ suitable data mining algorithms to build analytical applications
- Evaluate the accuracy of supervised and unsupervised models and algorithms.

UNIT - I
Data Mining: Data–Types of Data–, Data Mining Functionalities– Interestingness Patterns– Classification of Data Mining systems– Data mining Task primitives –Integration of Data mining system with a Data warehouse–Major issues in Data Mining–Data Preprocessing.

UNIT - II
Association Rule Mining: Mining Frequent Patterns–Associations and correlations – Mining Methods– Mining Various kinds of Association Rules– Correlation Analysis– Constraint based Association mining. Graph Pattern Mining, SPM.

UNIT - III
Classification: Classification and Prediction – Basic concepts–Decision tree induction–Bayesian classification, Rule–based classification, Lazy learner.

UNIT - IV
Clustering and Applications: Cluster analysis–Types of Data in Cluster Analysis–Categorization of Major Clustering Methods– Partitioning Methods, Hierarchical Methods– Density–Based Methods, Grid–Based Methods, Outlier Analysis.

UNIT - V
Advanced Concepts: Basic concepts in Mining data streams–Mining Time–series data—Mining sequence patterns in Transactional databases– Mining Object– Spatial– Multimedia–Text and Web data – Spatial Data mining– Multimedia Data mining–Text Mining– Mining the World Wide Web.
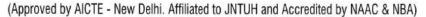
TEXT BOOKS:
1. Data Mining – Concepts and Techniques – Jiawei Han & Micheline Kamber, 3rd Edition Elsevier.
2. Data Mining Introductory and Advanced topics – Margaret H Dunham, PEA.

REFERENCE BOOK:
1. Ian H. Witten and Eibe Frank, Data Mining: Practical Machine Learning Tools and Techniques (Second Edition), Morgan Kaufmann, 2005.

AI513PE: NATURAL LANGUAGE PROCESSING
(Professional Elective - I)

B.Tech. III Year I Sem   **L T P C**

                                                                   3 0 0 3

Prerequisites: Data structures, finite automata and probability theory

Course Objectives:
- Introduce to some of the problems and solutions of NLP and their relation to linguistics and statistics.

Course Outcomes:
- Show sensitivity to linguistic phenomena and an ability to model them with formal grammars.
- Understand and carry out proper experimental methodology for training and evaluating empirical NLP systems
- Able to manipulate probabilities, construct statistical models over strings and trees, and estimate parameters using supervised and unsupervised training methods.
- Able to design, implement, and analyze NLP algorithms
- Able to design different language modeling Techniques.

UNIT - I
Finding the Structure of Words: Words and Their Components, Issues and Challenges, Morphological Models
Finding the Structure of Documents: Introduction, Methods, Complexity of the Approaches, Performances of the Approaches

UNIT - II
Syntax Analysis: Parsing Natural Language, Treebanks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms, Models for Ambiguity Resolution in Parsing, Multilingual Issues

UNIT - III
Semantic Parsing: Introduction, Semantic Interpretation, System Paradigms, Word Sense, Systems, Software.

UNIT - IV
Predicate-Argument Structure, Meaning Representation Systems, Software.

UNIT - V
Discourse Processing: Cohension, Reference Resolution, Discourse Cohension and Structure
Language Modeling: Introduction, N-Gram Models, Language Model Evaluation, Parameter Estimation, Language Model Adaptation, Types of Language Models, Language-Specific Modeling Problems, Multilingual and Crosslingual Language Modeling

TEXT BOOKS:
1. Multilingual natural Language Processing Applications: From Theory to Practice – Daniel M. Bikel and Imed Zitouni, Pearson Publication

2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary

REFERENCE BOOK:

1. Speech and Natural Language Processing - Daniel Jurafsky & James H Martin, Pearson Publications

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AI514PE: PRINCIPLES OF PROGRAMMING LANGUAGES
(Professional Elective - I)

B.Tech. III Year I Sem

L T P C
3 0 0 3

Prerequisites:
1. A course on "Mathematical Foundations of Computer Science"
2. A course on "Computer Programming and Data Structures"

Course Objectives:
- Introduce important paradigms of programming languages
- To provide conceptual understanding of high-level language design and implementation
- Topics include programming paradigms; syntax and semantics; data types, expressions and statements; subprograms and blocks; abstract data types; concurrency; functional and logic programming languages; and scripting languages

Course Outcomes:
- Acquire the skills for expressing syntax and semantics in formal notation
- Identify and apply a suitable programming paradigm for a given computing application
- Gain knowledge of and able to compare the features of various programming languages

UNIT - I
Preliminary Concepts: Reasons for Studying Concepts of Programming Languages, Programming Domains, Language Evaluation Criteria, Influences on Language Design, Language Categories, Language Design Trade-Offs, Implementation Methods, Programming Environments
Syntax and Semantics: General Problem of Describing Syntax and Semantics, Formal Methods of Describing Syntax, Attribute Grammars, Describing the Meanings of Programs

UNIT - II
Names, Bindings, and Scopes: Introduction, Names, Variables, Concept of Binding, Scope, Scope and Lifetime, Referencing Environments, Named Constants
Data Types: Introduction, Primitive Data Types, Character String Types, User Defined Ordinal Types, Array, Associative Arrays, Record, Union, Tuple Types, List Types, Pointer and Reference Types, Type Checking, Strong Typing, Type Equivalence
Expressions and Statements: Arithmetic Expressions, Overloaded Operators, Type Conversions, Relational and Boolean Expressions, Short Circuit Evaluation, Assignment Statements, Mixed-Mode Assignment
Control Structures – Introduction, Selection Statements, Iterative Statements, Unconditional Branching, Guarded Commands.

UNIT - III
Subprograms and Blocks: Fundamentals of Sub-Programs, Design Issues for Subprograms, Local Referencing Environments, Parameter Passing Methods, Parameters that Are Subprograms, Calling Subprograms Indirectly, Overloaded Subprograms, Generic Subprograms, Design Issues for Functions, User Defined Overloaded Operators, Closures, Coroutines.

Implementing Subprograms: General Semantics of Calls and Returns, Implementing Simple Subprograms, Implementing Subprograms with Stack-Dynamic Local Variables, Nested Subprograms, Blocks, Implementing Dynamic Scoping

Abstract Data Types: The Concept of Abstraction, Introductions to Data Abstraction, Design Issues, Language Examples, Parameterized ADT, Encapsulation Constructs, Naming Encapsulations.

UNIT - IV

Concurrency: Introduction, Introduction to Subprogram Level Concurrency, Semaphores, Monitors, Message Passing, Java Threads, Concurrency in Function Languages, Statement Level Concurrency.

Exception Handling and Event Handling: Introduction, Exception Handling in Ada, C++, Java, Introduction to Event Handling, Event Handling with Java and C#.

UNIT - V

Functional Programming Languages: Introduction, Mathematical Functions, Fundamentals of Functional Programming Language, LISP, Support for Functional Programming in Primarily imperative Languages, Comparison of Functional and Imperative Languages

Logic Programming Language: Introduction, an Overview of Logic Programming, Basic Elements of Prolog, Applications of Logic Programming.

Scripting Language: Pragmatics, Key Concepts, Case Study: Python – Values and Types, Variables, Storage and Control, Bindings and Scope, Procedural Abstraction, Data Abstraction, Separate Compilation, Module Library. (Text Book 2)

TEXT BOOKS:
1. Concepts of Programming Languages Robert. W. Sebesta 10/E, Pearson Education.
2. Programming Language Design Concepts, D. A. Watt, Wiley Dreamtech, 2007.

REFERENCE BOOKS:
1. Programming Languages, 2nd Edition, A.B. Tucker, R. E. Noonan, TMH.
2. Programming Languages, K. C. Louden, 2nd Edition, Thomson, 2003

AI515PE: CRYPTOGRAPHY & NETWORK SECURITY
(Professional Elective - I)

B.Tech. III Year I Sem
L T P C
3 0 0 3

Course Objectives:
- Explain the objectives of information security
- Explain the importance and application of each of confidentiality, integrity, authentication and availability
- Understand various cryptographic algorithms.
- Understand the basic categories of threats to computers and networks
- Describe public-key cryptosystem.
- Describe the enhancements made to IPv4 by IPSec
- Understand Intrusions and intrusion detection
- Discuss the fundamental ideas of public-key cryptography.
- Generate and distribute a PGP key pair and use the PGP package to send an encrypted e mail message.
- Discuss Web security and Firewalls

Course Outcomes:
- Student will be able to understand basic cryptographic algorithms, message and web authentication and security issues.
- Ability to identify information system requirements for both of them such as client and server.
- Ability to understand the current legal issues towards information security.

UNIT - I
Security Concepts: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security
Cryptography Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks.

UNIT - II
Symmetric key Ciphers: Block Cipher principles, DES, AES, Blowfish, RC5, IDEA, Block cipher operation, Stream ciphers, RC4.
Asymmetric key Ciphers: Principles of public key cryptosystems, RSA algorithm, Elgamal Cryptography, Diffie-Hellman Key Exchange, Knapsack Algorithm.

UNIT - III
Cryptographic Hash Functions: Message Authentication, Secure Hash Algorithm (SHA-512), Message authentication codes: Authentication requirements, HMAC, CMAC, Digital signatures, Elgamal Digital Signature Scheme.
Key Management and Distribution: Symmetric Key Distribution Using Symmetric & Asymmetric Encryption, Distribution of Public Keys, Kerberos, X.509 Authentication Service, Public – Key Infrastructure

UNIT - IV

Transport-level Security: Web security considerations, Secure Socket Layer and Transport Layer Security, HTTPS, Secure Shell (SSH)

Wireless Network Security: Wireless Security, Mobile Device Security, IEEE 802.11 Wireless LAN, IEEE 802.11i Wireless LAN Security

UNIT - V

E-Mail Security: Pretty Good Privacy, S/MIME IP Security: IP Security overview, IP Security architecture, Authentication Header, Encapsulating security payload, Combining security associations, Internet Key Exchange

Case Studies on Cryptography and security: Secure Multiparty Calculation, Virtual Elections, Single sign On, Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability.

TEXT BOOKS:
1. Cryptography and Network Security - Principles and Practice: William Stallings, Pearson Education, 6th Edition
2. Cryptography and Network Security: Atul Kahate, Mc Graw Hill, 3rd Edition

REFERENCE BOOKS:
1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition.
2. Cryptography and Network Security: Forouzan Mukhopadhyay, Mc Graw Hill, 3rd Edition
3. Information Security, Principles, and Practice: Mark Stamp, Wiley India.
4. Principles of Computer Security: WM. Arthur Conklin, Greg White, TMH
5. Introduction to Network Security: Neal Krawetz, CENGAGE Learning
6. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning

EN505HS: ADVANCED COMMUNICATION SKILLS LAB

B.Tech. III Year I Sem	**L**	**T**	**P**	**C**
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INTRODUCTION:
The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their interpersonal and professional communication in the globalized context.

The proposed course should be a laboratory course to enable students to use English effectively and perform the following:
- Gathering ideas and information to organize ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- Writing formal letters.
- Transferring information from non-verbal to verbal texts and vice-versa.
- Taking part in social and professional communication.

Course Objectives:
This Lab focuses on using multi-media instruction for language development to meet the following targets:
- To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.
- To prepare all the students for their placements.

Course Outcomes: Students will be able to:
- Acquire vocabulary and use it contextually
- Listen and speak effectively
- Develop proficiency in academic reading and writing
- Increase possibilities of job prospects
- Communicate confidently in formal and informal contexts.

SYLLABUS:
The following course content to conduct the activities is prescribed for the Advanced English Communication Skills (AECS) Lab:

1. **Activities on Fundamentals of Inter-personal Communication and Building Vocabulary** -
Starting a conversation – responding appropriately and relevantly – using the right body language – Role Play in different situations & Discourse Skills- using visuals - Synonyms and antonyms, word roots, one-

word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.

2. **Activities on Reading Comprehension** –General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading& effective googling.

3. **Activities on Writing Skills** – Structure and presentation of different types of writing – l*etter Writing/resume writing/ e-correspondence/technical report writing/* – planning for writing – improving students' writing skills.

4. **Activities on Presentation Skills and Team Building** – Oral presentations (individual and group) through JAM
Sessions/seminars/PPTs and written presentations through posters/projects/reports/ emails/ assignments etc. Activities on Presentation Skills, Team Building and Leadership Skills through Problem solving and Team Development Exercises.

5. **Activities on Group Discussion and Interview Skills** – Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation
   ● Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video-conference and Mock Interviews.

MINIMUM REQUIREMENT:
The Advanced Communication Skills (ACS) Laboratory shall have the following infrastructural facilities to accommodate at least 35 students in the lab:
   • Spacious room with appropriate acoustics.
   • Round Tables with movable chairs
   • Audio-visual aids
   • LCD Projector
   • Public Address system
   • P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ
   • T. V, a digital stereo & Camcorder
   • Headphones of High quality

SUGGESTED SOFTWARE:
The software consisting of the prescribed topics elaborated above should be procured and used.
   • Oxford Advanced Learner's Compass, 7th Edition
   • DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.
   • Lingua TOEFL CBT Insider, by Dream tech
   • TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)

TEXT BOOKS:
   1. Effective Technical Communication by M Asharaf Rizvi. McGraw Hill Education (India) Pvt. Ltd.2nd Edition
   2. Academic Writing: A Handbook for International Students by Stephen Bailey, Routledge, 5th Edition.
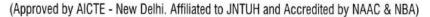
REFERENCES:

1. Learn Correct English – A Book of Grammar, Usage and Composition by Shiv K. Kumar and Hemalatha Nagarajan. Pearson 2007
2. Professional Communication by Aruna Koneru, McGraw Hill Education (India) Pvt. Ltd, 2016.
3. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
4. Technical Communication by Paul V. Anderson. 2007. Cengage Learning pvt. Ltd. New Delhi.
5. English Vocabulary in Use series, Cambridge University Press 2008.
6. Handbook for Technical Communication by David A. McMurrey & Joanne Buckley. 2012. Cengage Learning.
7. Communication Skills by Leena Sen, PHI Learning Pvt Ltd., New Delhi, 2009.
8. Job Hunting by Colm Downes, Cambridge University Press 2008.
9. English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata Mc Graw-Hill 2009.

AI506PC: SOFTWARE ENGINEERING LAB

B.Tech. III Year I Sem   **L T P C**
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Prerequisites:
1. A course on "Programming for Problem Solving"

Co-requisite:
1. A Course on "Software Engineering"

Course Objectives:
- To have hands on experience in developing a software project by using various software engineering principles and methods in each of the phases of software development.

Course Outcomes:
- Ability to translate end-user requirements into system and software requirements
- Ability to generate a high-level design of the system from the software requirements
- Will have experience and/or awareness of testing problems and will be able to develop a simple testing report

List of Experiments
Do the following 8 exercises for any two projects given in the list of sample projects or any other projects:
1. Development of problem statement.
2. Preparation of Software Requirement Specification Document, Design Documents and Testing Phase related documents.
3. Preparation of Software Configuration Management and Risk Management related documents.
4. Study and usage of any Design phase CASE tool
5. Performing the Design by using any Design phase CASE tools.
6. Develop test cases for unit testing and integration testing
7. Develop test cases for various white box and black box testing techniques.

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

TEXT BOOKS:
1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, Mc Graw Hill International Edition.

2. Software Engineering- Sommerville, 7th edition, Pearson Education.
3. The unified modeling language user guide Grady Booch, James Rambaugh, Ivar Jacobson, Pearson Education.

AI507PC: PROGRAMMING IN PYTHON LAB

B.Tech. III Year I Sem   **L T P C**
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Prerequisites: Students should install Python on Linux platform.

Course Objectives:
- To be able to introduce core programming basics and program design with functions using Python programming language.
- To understand a range of Object-Oriented Programming, as well as in-depth data and information processing techniques.
- To understand the high-performance programs designed to strengthen the practical expertise.

Course Outcomes:
- Student should be able to understand the basic concepts scripting and the contributions of scripting language
- Ability to explore python especially the object oriented concepts, and the built in objects of Python.
- Ability to create practical and contemporary applications such as TCP/IP network programming, Web applications, discrete event simulations

List of Programs:
1. Write a program to demonstrate different number data types in Python.
2. Write a program to perform different Arithmetic Operations on numbers in Python.
3. Write a program to create, concatenate and print a string and accessing sub-string from a given string.
4. Write a python script to print the current date in the following format "Sun May 29 02:26:23 IST 2017"
5. Write a program to create, append, and remove lists in python.
6. Write a program to demonstrate working with tuples in python.
7. Write a program to demonstrate working with dictionaries in python.
8. Write a python program to find largest of three numbers.
9. Write a Python program to convert temperatures to and from Celsius, Fahrenheit. [Formula : c/5 = f-32/9]
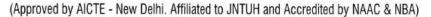10. Write a Python program to construct the following pattern, using a nested for loop

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11. Write a Python script that prints prime numbers less than 20.
12. Write a python program to find factorial of a number using Recursion.
13. Write a program that accepts the lengths of three sides of a triangle as inputs. The program output should indicate whether or not the triangle is a right triangle (Recall from the Pythagorean Theorem that in a right triangle, the square of one side equals the sum of the squares of the other two sides).
14. Write a python program to define a module to find Fibonacci Numbers and import the module to another program.
15. Write a python program to define a module and import a specific function in that module to another program.
16. Write a script named copyfile.py. This script should prompt the user for the names of two text files. The contents of the first file should be input and written to the second file.
17. Write a program that inputs a text file. The program should print all of the unique words in the file in alphabetical order.
18. Write a Python class to convert an integer to a roman numeral.
19. Write a Python class to implement pow(x, n)
20. Write a Python class to reverse a string word by word.

*MC509: CONSTITUTION OF INDIA
(Common to CSE, INF, CSM ME and ECE branches)

B.Tech. III Year I Sem   **L T P C**
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Course objective:
- To enable the student to understand the importance of constitution
- To understand the structure of executive, legislature and judiciary
- To understand philosophy of fundamental rights and duties
- To understand the autonomous nature of constitutional bodies like Supreme Court and high court, controller and auditor general of India and election commission of India.
- To understand the central and state relation, financial and administrative.

Course outcome :-
- Able to understand historical background of the constitutional making and its importance for building a democratic India, the structure of Indian government, the structure of state government, the local Administration,
- Able to apply the knowledge on directive principle of state policy, the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy
- Able to analyze the History, features of Indian constitution, the role Governor and Chief Minister, role of state election commission, the decentralization of power between central, state and local self-government.
- Able to evaluate Preamble, Fundamental Rights and Duties, Zilla Panchayat, block level organization, various commissions of viz SC/ST/OBC and women.

The Constitution of India is the supreme law of India. Parliament of India cannot make any law which violates the Fundamental Rights enumerated under the Part III of the Constitution. The Parliament of India has been empowered to amend the Constitution under Article 368, however, it cannot use this power to change the "basic structure" of the constitution, which has been ruled and explained by the Supreme Court of India in its historical judgments. The Constitution of India reflects the idea of "Constitutionalism" – a modern and progressive concept historically developed by the thinkers of "liberalism" – an ideology which has been recognized as one of the most popular political ideology and result of historical struggles against arbitrary use of sovereign power by state. The historic revolutions in France, England, America and particularly European Renaissance and Reformation movement have resulted into progressive legal reforms in the form of "constitutionalism" in many countries. The Constitution of India was made by borrowing models and principles from many countries including United Kingdom and America.

The Constitution of India is not only a legal document but it also reflects social, political and economic perspectives of the Indian Society. It reflects India's legacy of "diversity". It has been said that Indian constitution reflects ideals of its freedom movement; however, few critics have argued that it does not

truly incorporate our own ancient legal heritage and cultural values. No law can be "static" and therefore the Constitution of India has also been amended more than one hundred times. These amendments reflect political, social and economic developments since the year 1950. The Indian judiciary and particularly the Supreme Court of India has played an historic role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of India and its historic contributions has been recognized throughout the world and it gradually made it "as one of the strongest court in the world".

Course content

1. Meaning of the constitution law and constitutionalism
2. Historical perspective of the Constitution of India
3. Salient features and characteristics of the Constitution of India
4. Scheme of the fundamental rights
5. The scheme of the Fundamental Duties and its legal status
6. The Directive Principles of State Policy – Its importance and implementation
7. Federal structure and distribution of legislative and financial powers between the Union and the States
8. Parliamentary Form of Government in India – The constitution powers and status of the President of India
9. Amendment of the Constitutional Powers and Procedure
10. The historical perspectives of the constitutional amendments in India
11. Emergency Provisions: National Emergency, President Rule, Financial Emergency
12. Local Self Government – Constitutional Scheme in India
13. Scheme of the Fundamental Right to Equality
14. Scheme of the Fundamental Right to certain Freedom under Article 19
15. Scope of the Right to Life and Personal Liberty under Article 21

TEXT BOOKS

1. V.N. Shukla's Constitution of India By Prof (Dr.) Mahendra Pal Singh
2. CONSTITUTION OF INDIA 2021 EDITION BY VN SHUKLA

REFERENCE BOOKS
1. CONSTITUTION OF INDIA By P K AGRAWAL

MC510: EMPLOYABILITY SKILLS – V
(Competitive Programming and Logical Aptitude)
(Common to CSE, INF, CSM, CSD, CSC and ECE branches)

B.Tech. III Year I Sem   **L T P C**
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Course Objectives:
- To enable students to understand the representation and use of primitive data types, built in data structures and allocation used in memory.
- To enable students to understand the concept of stack, queue, link list, tree, graph, memory allocation, garbage collection and applications of Data Structures.
- To understand the fundamentals of data structures and data representations.
- To define high level of abstraction of various linear and nonlinear data structures.
- To study the representation, implementation and applications of linear and nonlinear data structures.

Course Outcomes:
- To code and test a given logic in C programming language.
- To decompose a problem into functions and to develop modular reusable code.
- To use arrays, pointers, strings and structures to write C programs.
- Searching and sorting problems.
- Students will be able to understand the concept of stack, queue, link list, tree, graph, memory allocation, garbage collection and applications of Data Structures.
- Students can able to crack the interview with the skills.

UNIT-I:
Basics, data types, Operations, Type Casting, IO operations, Conditional statement (if, if else, else if, nested if),switch case, Control statements(while, do while, for),jump Control statements(break, continue, go to), Functions, command line arguments, preprocessor Directive, Recursion, storage classes, Arrays-one dimensional, Multi-dimensional arrays, Character arrays-one dimensional, two dimensional, String handling functions, Introduction to pointers, pointer arithmetic, pointers and functions, pointers and arrays, function pointers, Types of pointers, double pointers, triple pointers, constant pointer, pointer to constant. Dynamic memory allocation (malloc, realloc, calloc, free), type def.

UNIT-II:
Structures – initiating structures, structures and arrays, structures and, pointers, structures, and Functions, Structures, functions and pointers and unions, Enumerated data type, bit fields Files-file handling reading and writing characters, writing and reading, structure in textformat, writing and reading in binary format.

UNIT-III:
Introduction to data structures, complexities, array data structures Searching(linear, binary), Sorting(bubble, insertion, selection),Sorting(quick, merge, heap),Stacks, Queues, Linked list Linked list implementation.

UNIT-IV:

Quantitative Aptitude

Number Systems, HCF and LCM, Simplifications and averages, Ratios and Proportions, problems on ages, Percentages, profit and loss, Partnerships, Time and work, Time, Speed and Distance Allegation or Mixtures, Permutations, Combinations & Probability, Simple& Compound Interest

Reasoning Ability:

Number Series, Coding-decoding, Blood Relations, Directions, and Seating Arrangements, Logical Venn diagram & Syllogisms, Clocks Calendars, Cubes & Dices

UNIT-V:

Verbal Ability:

All Grammar Concepts (Tenses, SVA, Articles, Prepositions, Adjectives, Adverbs, Voices, Speeches etc),Spotting Errors, Sentence Correction, Jumbled Sentences/ Para jumbles- Verbal Logics, Extensive practice on Reading Comprehension & Cloze Tests, Vocabulary- Revision & Practice on Synonyms, Antonyms, Verbal Analogies, One word substitutes, Idioms etc Critical Reasoning- Assumptions, Arguments, Courses of action etc) Sentence Completion & Summaries Essay Writing, Practice E-mail Writing, and Extensive practice on Public speaking & Group discussions, Corporate Interview skills.

TEXT BOOKS:
1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)
3. Quantitative Aptitude Fully Solved Book in English By Dr. R S Agarwal

REFERENCE BOOKS:
1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
2. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
3. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
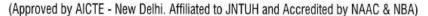4. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition

https://www.hackerrank.com
https://www.codechef.com
https://codeforces.com

AI601PC: COMPUTER NETWORKS

B.Tech. III Year II Sem   **L T P C**
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Prerequisites:
1. A course on "Programming for problem solving"
2. A course on "Data Structures"

Course Objectives:
1. The objective of the course is to equip the students with a general overview of the concepts and fundamentals of computer networks.
2. Familiarize the students with the standard models for the layered approach to communication between machines in a network and the protocols of the various layers.

Course Outcomes:
1. Gain the knowledge of the basic computer network technology.
2. Gain the knowledge of the functions of each layer in the OSI and TCP/IP reference model.
3. Obtain the skills of subnetting and routing mechanisms.
4. Familiarity with the essential protocols of computer networks, and how they can be applied in network design and implementation.

UNIT - I
Network hardware, Network software, OSI, TCP/IP Reference models, Example Networks: ARPANET, Internet.
Physical Layer: Guided Transmission media: twisted pairs, coaxial cable, fiber optics, Wireless transmission.

UNIT - II
Data link layer: Design issues, framing, Error detection and correction.
Elementary data link protocols: simplex protocol, A simplex stop and wait protocol for an error-free channel, A simplex stop and wait protocol for noisy channel.
Sliding Window protocols: A one-bit sliding window protocol, A protocol using Go-Back-N, A protocol using Selective Repeat, Example data link protocols.
Medium Access sub layer: The channel allocation problem, Multiple access protocols: ALOHA, Carrier sense multiple access protocols, collision free protocols. Wireless LANs, Data link layer switching.

UNIT - III
Network Layer: Design issues, Routing algorithms: shortest path routing, Flooding, Hierarchical routing, Broadcast, Multicast, distance vector routing, Congestion Control Algorithms, Quality of Service, Internetworking, The Network layer in the internet.

UNIT - IV
Transport Layer: Transport Services, Elements of Transport protocols, Connection management, TCP and UDP protocols.

UNIT - V

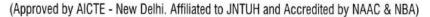Application Layer –Domain name system, SNMP, Electronic Mail; the World WEB, HTTP, Streaming audio and video.

TEXT BOOK:
1. Computer Networks -- Andrew S Tanenbaum, David. j. Wetherall, 5th Edition. Pearson Education/PHI

REFERENCE BOOKS:
2. An Engineering Approach to Computer Networks-S. Keshav, 2nd Edition, Pearson Education
3. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.

CS602PC: MACHINE LEARNING
(Common to CSE, CSM and CSD branches)

B.Tech. III Year II Sem   **L T P C**
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Prerequisites
1. Data Structures
2. Knowledge on statistical methods

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.

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.

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.
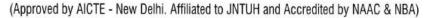
TEXT BOOK:
1. Machine Learning – Tom M. Mitchell, - MGH

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

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AI603PC: PRINCIPLES OF COMPILER DESIGN

B.Tech. III Year II Sem	**L T P C**
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Prerequisites:
1. A course on "Formal Languages and Automata Theory"
2. A course on "Computer Organization and architecture"
3. A course on "Computer Programming and Data Structures"

Course Objectives:
- Introduce the major concepts of language translation and compiler design and impart the knowledge of practical skills necessary for constructing a compiler.
- Topics include phases of compiler, parsing, syntax directd translation, type checking use of symbol tables, code optimization techniques, intermediate code generation, code generation and data flow analysis.

Course Outcomes:
- Demonstrate the ability to design a compiler given a set of language features.
- Demonstrate the the knowledge of patterns, tokens & regular expressions for lexical analysis.
- Acquire skills in using lex tool & yacc tool for devleoping a scanner and parser.
- Design and implement LL and LR parsers
- Design algorithms to do code optimization in order to improve the performance of a program in terms of space and time complexity.
- Design algorithms to generate machine code.

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

UNIT - II
Syntax Analysis: Introduction, Context-Free Grammars, Writing a Grammar, Top-Down Parsing, Bottom-Up Parsing, Introduction to LR Parsing: Simple LR, More Powerful LR Parsers, Using Ambiguous Grammars and Parser Generators.

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

UNIT - IV

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

Code Generation: Issues in the Design of a Code Generator, The Target Language, Addresses in the Target Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, A Simple Code Generator, Peephole Optimization, Register Allocation and Assignment, Dynamic Programming Code-Generation.

UNIT - V

Machine-Independent Optimization: The Principal Sources of Optimization, Introduction to Data-Flow Analysis, Foundations of Data-Flow Analysis, Constant Propagation, Partial-Redundancy Elimination, Loops in Flow Graphs.
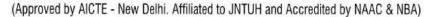
TEXT BOOK:
1. Compilers: Principles, Techniques and Tools, Second Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffry D. Ullman.

REFERENCE BOOKS:
1. Lex & Yacc – John R. Levine, Tony Mason, Doug Brown, O'reilly
2. Compiler Construction, Louden, Thomson.

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AI621PE: SOFTWARE TESTING METHODOLOGIES
(Professional Elective - II)

B.Tech. III Year II Sem   **L T P C**
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Prerequisites
1. A course on "Software Engineering"

Course Objectives
- To provide knowledge of the concepts in software testing such as testing process, criteria, strategies, and methodologies.
- To develop skills in software test automation and management using latest tools.

Course Outcomes:
- Design and develop the best test strategies in accordance to the development model.

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

UNIT - II
Transaction Flow Testing: transaction flows, transaction flow testing techniques. Dataflow testing: Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing. Domain Testing: domains and paths, Nice & ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability.

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

UNIT - IV
State, State Graphs and Transition testing: state graphs, good & bad state graphs, state testing, Testability tips.

UNIT - V
Graph Matrices and Application: Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools. (Student should be given an exposure to a tool like JMeter or Win-runner).

TEXT BOOKS:
1. Software Testing techniques - Baris Beizer, Dreamtech, second edition.
2. Software Testing Tools – Dr. K. V. K. K. Prasad, Dreamtech.

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

AI622PE: PATTERN RECOGNITION (Professional Elective - II)

B.Tech. III Year II Sem   **L T P C**
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Prerequisites
- Students are expected to have knowledge basic linear algebra, basic probability theory and basic programming techniques;
- A course on "Computational Mathematics"
- A course on "Computer Oriented Statistical Methods"

Course Objectives
- This course introduces fundamental concepts, theories, and algorithms for pattern recognition and machine learning.
- Topics include: Pattern Representation, Nearest Neighbor Based Classifier, Bayes Classifier, Hidden Markov Models, Decision Trees, Support Vector Machines, Clustering, and an application of hand-written digit recognition.

Course Outcomes
- Understand the theory, benefits, inadequacies and possible applications of various machine learning and pattern recognition algorithms
- Identify and employ suitable machine learning techniques in classification, pattern recognition, clustering and decision problems.

UNIT - I: Introduction: What is Pattern Recognition, Data Sets for Pattern Recognition, Different Paradigms for Pattern Recognition. Representation: Data Structures for Pattern Representation, Representation of Clusters, Proximity Measures, Size of Patterns, Abstractions of the Data Set, Feature Extraction, Feature Selection, Evaluation of Classifier, Evaluation of Clustering.

UNIT - II: Nearest Neighbor Based Classifier: Nearest Neighbor Algorithm, Variants of the NN Algorithm use of the Nearest Neighbor Algorithm for Transaction Databases, Efficient Algorithms, Data Reduction, Prototype Selection. Bayes Classifier: Bayes Theorem, Minimum Error Rate Classifier, Estimation of Probabilities, Comparison with the NNC, Naïve Bayes Classifier, Bayesian Belief Network.

UNIT - III: Hidden Markov Models: Markov Models for Classification, Hidden Morkov Models, Classification using HMMs. Decision Trees: Introduction, Decision Tree for Pattern Classification, Construction of Decision Trees, Splitting at the Nodes, Overfitting and Pruning, Examples of Decision Tree Induction.

UNIT - IV: Support Vector Machines: Introduction, Learning the Linear Discriminant Functions, Neural Networks, SVM for Classification. Combination of Classifiers: Introduction, Methods for Constructing Ensembles of Classifiers, Methods for Combining Classifiers.

UNIT - V: Clustering: Why is Clustering Important, Hierarchical Algorithms, Partitional Clustering, Clustering Large Data Sets. An Application-Hand Written Digit Recognition: Description of the Digit

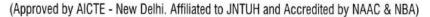Data, Preprocessing of Data, Classification Algorithms, Selection of Representative Patterns, Results.

TEXT BOOK:
1. Pattern Recognition: An Algorithmic Approach: Murty, M. Narasimha, Devi, V. Susheela, Spinger Pub,1st Ed.

REFERENCE BOOKS:
1. Machine Learning - Mc Graw Hill, Tom M. Mitchell.
2. Fundamentals of Speech Recognition: Lawrence Rabiner and Biing- Hwang Juang. PrenticeHall Pub.

AI623PE: R PROGRAMMING (Professional Elective – II)

B.Tech. III Year II Sem   **L T P C**
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Course Objectives:
- Understanding and being able to use basic programming concepts
- Automate data analysis
- Working collaboratively and openly on code
- Knowing how to generate dynamic documents
- Being able to use a continuous test-driven development approach

Course Outcomes:
- be able to use and program in the programming language R
- be able to use R to solve statistical problems
- be able to implement and describe Monte Carlo the technology
- be able to minimize and maximize functions using R

UNIT – I
Introduction: Overview of R, R data types and objects, reading and writing data, sub setting R Objects, Essentials of the R Language, Installing R, Running R, Packages in R, Calculations, Complex numbers in R, Rounding, Arithmetic, Modulo and integer quotients, Variable names and assignment, Operators, Integers, Factors, Logical operations

UNIT – II
Control structures, functions, scoping rules, dates and times, Introduction to Functions,preview of Some Important R Data Structures, Vectors, Character Strings, Matrices, Lists, Data Frames, Classes Vectors: Generating sequences, Vectors and subscripts, Extracting elements of a vector using subscripts, Working with logical subscripts, Scalars, Vectors, Arrays, and Matrices, Adding and Deleting Vector Elements, Obtaining the Length of a Vector, Matrices and Arrays as Vectors Vector Arithmetic and Logical Operations, Vector Indexing, Common Vector Operations

UNIT – III
Lists: Creating Lists, General List Operations, List Indexing Adding and Deleting List Elements, Getting the Size of a List, Extended Example: Text Concordance Accessing List Components and Values Applying Functions to Lists, DATA FRAMES, Creating Data Frames, Accessing Data Frames, Other Matrix-Like Operations

UNIT - IV
FACTORS AND TABLES, Factors and Levels, Common Functions Used with Factors,Working with Tables, Matrix/Array-Like Operations on Tables , Extracting a Subtable, Finding the Largest Cells in a Table, Math Functions, Calculating a Probability, Cumulative Sums and Products, Minima and Maxima, Calculus, Functions for Statistical Distributions
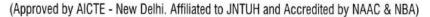
UNIT - V

OBJECT-ORIENTED PROGRAMMING: S Classes, S Generic Functions, Writing S Classes, Using Inheritance, S Classes, Writing S Classes, Implementing a Generic Function on an S Class, visualization, Simulation, code profiling, Statistical Analysis with R, data manipulation

TEXT BOOKS:
1. R Programming for Data Science by Roger D. Peng
2. The Art of R Programming by Prashanth singh, Vivek Mourya, Cengage Learning India.

AI624PE: SCRIPTING LANGUAGES (Professional Elective – II)

B.Tech. III Year II Sem   **L T P C**
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Prerequisites:
1. A course on "Computer Programming and Data Structures"
2. A course on "Object Oriented Programming Concepts"

Course Objectives:
1. This course introduces the script programming paradigm
2. Introduces scripting languages such as Perl, Ruby and TCL.
3. Learning TCL

Course Outcomes:
- Comprehend the differences between typical scripting languages and typical system and application programming languages.
- Gain knowledge of the strengths and weakness of Perl, TCL and Ruby; and select an appropriate language for solving a given problem.
- Acquire programming skills in scripting language

UNIT - I
Introduction: Ruby, Rails, The structure and Excution of Ruby Programs, Package Management with RUBYGEMS, Ruby and web: Writing CGI scripts, cookies, Choice of Webservers, SOAP and webservices
RubyTk – Simple Tk Application, widgets, Binding events, Canvas, scrolling

UNIT - II
Extending Ruby: Ruby Objects in C, the Jukebox extension, Memory allocation, Ruby Type System, Embedding Ruby to Other Languages, Embedding a Ruby Interperter

UNIT - III
Introduction to PERL and Scripting
Scripts and Programs, Origin of Scripting, Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL- Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines.

UNIT - IV
Advanced perl
Finer points of looping, pack and unpack, filesystem, eval, data structures, packages, modules, objects, interfacing to the operating system, Creating Internet ware applications, Dirty Hands Internet Programming, security Isses.

UNIT - V

TCL -TCL Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures, input/output, procedures, strings, patterns, files, Advance TCL- eval, source, exec and uplevel commands, Name spaces, trapping errors, event driven programs, making applications internet aware, Nuts and Bolts Internet Programming, Security Issues, C Interface.

Tk-Visual Tool Kits, Fundamental Concepts of Tk, Tk by example, Events and Binding, Perl-Tk

TEXT BOOKS:
1. The World of Scripting Languages, David Barron,Wiley Publications.
2. Ruby Progamming language by David Flanagan and Yukihiro Matsumoto O'Reilly
3. "Programming Ruby" The Pramatic Progammers guide by Dabve Thomas Second edition

REFERENCE BOOKS:
1. Open Source Web Development with LAMP using Linux Apache, MySQL, Perl and PHP, J. Lee and B. Ware (Addison Wesley) Pearson Education.
2. Perl by Example, E. Quigley, Pearson Education.
3. Programming Perl, Larry Wall, T. Christiansen and J. Orwant, O'Reilly, SPD.
4. Tcl and the Tk Tool kit, Ousterhout, Pearson Education.
5. Perl Power, J. P. Flynt, Cengage Learning.

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AI625PE: GRAPH THEORY (Professional Elective – II)

B.Tech. III Year II Sem   **L T P C**
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Pre-requisites:
1. An understanding of Mathematics in general is sufficient.

Course Outcomes:
- Know some important classes of graph theoretic problems;
- Be able to formulate and prove central theorems about trees, matching, connectivity, colouring and planar graphs;
- Be able to describe and apply some basic algorithms for graphs;
- Be able to use graph theory as a modelling tool.

UNIT - I
Introduction-Discovery of graphs, Definitions, Subgraphs, Isomorphic graphs, Matrix representations of graphs, Degree of a vertex, Directed walks, paths and cycles, Connectivity in digraphs, Eulerian and Hamilton digraphs, Eulerian digraphs, Hamilton digraphs, Special graphs, Complements, Larger graphs from smaller graphs, Union, Sum, Cartesian Product, Composition, Graphic sequences, Graph theoretic model of the LAN problem, Havel-Hakimi criterion, Realization of a graphic sequence.

UNIT - II
Connected graphs and shortest paths - Walks, trails, paths, cycles, Connected graphs, Distance, Cut-vertices and cut-edges, Blocks, Connectivity, Weighted graphs and shortest paths, Weighted graphs, Dijkstra"s shortest path algorithm, Floyd-Warshall shortest path algorithm.

UNIT - III
Trees- Definitions and characterizations, Number of trees, Cayley"s formula, Kircho◄-matrix-tree theorem, Minimum spanning trees, Kruskal"s algorithm, Prim"s algorithm, Special classes of graphs, Bipartite Graphs, Line Graphs, Chordal Graphs, Eulerian Graphs, Fleury"s algorithm, Chinese Postman problem, Hamilton Graphs, Introduction, Necessary conditions and sufficient conditions.

UNIT - IV
Independent sets coverings and matchings– Introduction, Independent sets and coverings: basic equations, Matchings in bipartite graphs, Hall"s Theorem, K¨onig"s Theorem, Perfect matchings in graphs, Greedy and approximation algorithms.

UNIT - V
Vertex Colorings- Basic definitions, Cliques and chromatic number, Mycielski"s theorem, Greedy coloring algorithm, Coloring of chordal graphs, Brooks theorem, Edge Colorings, Introduction and Basics, Gupta-Vizing theorem, Class-1 and Class-2 graphs, Edge-coloring of bipartite graphs, Class-2 graphs, Hajos union and Class-2 graphs, A scheduling problem and equitable edge-coloring.

TEXT BOOKS:

1. J. A. Bondy and U. S. R. Murty. Graph Theory, volume 244 of Graduate Texts in Mathematics. Springer, 1st edition, 2008.
2. J. A. Bondy and U. S. R. Murty. Graph Theory with Applications.

REFERENCE BOOKS:
1. Lecture Videos: http://nptel.ac.in/courses/111106050/13
2. Introduction to Graph Theory, Douglas B. West, Pearson.
3. Schaum's Outlines Graph Theory, Balakrishnan, TMH
4. Introduction to Graph Theory, Wilson Robin j, PHI
5. Graph Theory with Applications to Engineering And Computer Science, Narsing Deo, PHI
6. Graphs - An Introductory Approach, Wilson and Watkins

AI604PC: COMPUTER NETWORKS LAB
(Common to CSE and CSM branches)

B.Tech. III Year II Sem   **L T P C**
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Course Objectives:
- To understand the working principle of various communication protocols.
- To understand the network simulator environment and visualize a network topology and
- observe its performance
- To analyze the traffic flow and the contents of protocol frames

Course Outcomes:
- Implement data link layer farming methods
- Analyze error detection and error correction codes.
- Implement and analyze routing and congestion issues in network design.
- Implement Encoding and Decoding techniques used in presentation layer
- To be able to work with different network tools.

List of Experiments:
1. Implement the data link layer framing methods such as character, character-stuffing and bit stuffing.
2. Write a program to compute CRC code for the polynomials CRC-12, CRC-16 and CRC CCIP
3. Develop a simple data link layer that performs the flow control using the sliding window protocol, and loss recovery using the Go-Back-N mechanism.
4. Implement Dijsktra's algorithm to compute the shortest path through a network
5. Take an example subnet of hosts and obtain a broadcast tree for the subnet.
6. Implement distance vector routing algorithm for obtaining routing tables at each node.
7. Implement data encryption and data decryption
8. Write a program for congestion control using Leaky bucket algorithm.
9. Write a program for frame sorting technique used in buffers.
10. Write a program for Wireshark
    i. Packet Capture Using Wire shark
    ii. Starting Wire shark
    iii. Viewing Captured Traffic
    iv. Analysis and Statistics & Filters.
11. How to run Nmap scan
12. Operating System Detection using Nmap
13. Do the following using NS2 Simulator
    i. NS2 Simulator-Introduction
    ii. Simulate to Find the Number of Packets Dropped
    iii. Simulate to Find the Number of Packets Dropped by TCP/UDP
    iv. Simulate to Find the Number of Packets Dropped due to Congestion

v. Simulate to Compare Data Rate& Throughput.
vi. Simulate to Plot Congestion for Different Source/Destination
vii. Simulate to Determine the Performance with respect to Transmission of Packets

CS605PC: MACHINE LEARNING LAB
(Common to CSE, CSM and CSD branches)

B.Tech. III Year II Sem   **L T P C**
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Course Objective:
- The objective of this lab is to get an overview of the various machine learning techniques and can able to demonstrate them using python.
-

Course Outcomes:
After the completion of the course the student can able to:
- Understand complexity of Machine Learning algorithms and their limitations;
- Understand modern notions in data analysis-oriented computing;
- Be capable of confidently applying common Machine Learning algorithms in practice and implementing their own;
- Be capable of performing experiments in Machine Learning using real-world data.

List of Experiments
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 the probability 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 k means 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 lowcredit-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

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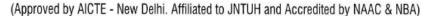
low football security single twenties no -> medRisk
medium golf media single thirties yes -> medRisk
medium golf transport married forties yes -> lowRisk
high skiing banking single thirties yes -> highRisk
low golf unemployed married forties yes -> highRisk

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.

AI606PC: COMPILER DESIGN LAB

B.Tech. III Year II Sem   **L T P C**
                                                              0 0 3 1.5

Prerequisites
* A Course on "Objected Oriented Programming through Java"

Course Objectives:
* To provide hands-on experience on web technologies
* To develop client-server application using web technologies
* To introduce server-side programming with Java servlets and JSP
* To understand the various phases in the design of a compiler.
* To understand the design of top-down and bottom-up parsers.
* To understand syntax directed translation schemes.
* To introduce lex and yacc tools.

Course Outcomes:
* Design and develop interactive and dynamic web applications using HTML, CSS, JavaScript and XML
* Apply client-server principles to develop scalable and enterprise web applications.
* Ability to design, develop, and implement a compiler for any language.
* Able to use lex and yacc tools for developing a scanner and a parser.
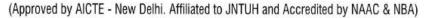* Able to design and implement LL and LR parsers.

List of Experiments
Compiler Design Experiments:
1. Write a LEX Program to scan reserved word & Identifiers of C Language
2. Implement Predictive Parsing algorithm
3. Write a C program to generate three address code.
4. Implement SLR(1) Parsing algorithm
5. Design LALR bottom up parser for the given language
    <program> ::= <block>
    <block> ::= { <variabledefinition> <slist> }
    | { <slist> }
    <variabledefinition> ::= int <vardeflist> ;
    <vardeflist> ::= <vardec> | <vardec> , <vardeflist>
    <vardec> ::= <identifier> | <identifier> [<constant>]
    <slist> ::= <statement> | <statement> ; <slist>
    <statement> ::= <assignment> | <ifstatement> | <whilestatement>
    | <block> | <printstatement> | <empty>
    <assignment> ::= <identifier> = <expression>
    | <identifier> [<expression>] = <expression>
    <ifstatement> ::= if <bexpression> then <slist> else <slist> endif

| if <bexpression> then <slist> endif
<whilestatement> ::= while <bexpression> do <slist> enddo
<printstatement> ::= print (<expression>)
<expression> ::= <expression> <addingop> <term> | <term> | <addingop> <term>
<bexpression> ::= <expression> <relop> <expression>
nstant>
<identifier> ::= <identifier> <letterordigit> | <letter>
<letterordigit> ::= <letter> | <digit>
<letter> ::= a|b|c|d|e|f|g|h|i|j|k|l|m|n|o|p|q|r|s|t|u|v|w|x|y|z
<digit> ::= 0|1|2|3|4|5|6|7|8|9
<empty> has the obvious meaning
Comments (zero or more characters enclosed between the standard C/Java-style comment brackets
/*...*/) can be inserted. The language has rudimentary support for 1-dimensional arrays. The declaration int a[3] declares an array of three elements, referenced as a[0], a[1] and a[2]. Note also that you should worry about the scoping of names.
A simple program written in this language is:

```
{
        int a[3],t1,t2;
        t1=2;
        a[0]=1; a[1]=2; a[t1]=3;
        t2=-(a[2]+t1*6)/(a[2]-t1);
        if t2>5 then
                print(t2);
        else {
                int t3;
                t3=99;
                t2=-25;
                print(-t1+t2*t3); /* this is a comment
                on 2 lines */
        }
        endif
}
```

*MC609: INTELLECTUAL PROPERTY RIGHTS
(Common to CSE, INF, CSM, ME and ECE branches)

B.Tech. III Year II Sem   **L T P C**
                                                                                3 0 0 0

Course Objective:
- Understanding, defining and differentiating different types of intellectual properties (IPs) and their roles in contributing to organizational competitiveness.
- Understanding the Framework of Strategic Management of Intellectual Property (IP).
- Appreciating and appraising different IP management (IPM) approaches and describing how pioneering firms initiate, implement and manage IPM programs,
- Explaining how to derive value from IP and leverage its value in new product and service
- Development Exposing to the Legal management of IP and understanding of real life practice of IPM

Course Outcome:
- Identify different types of Intellectual Properties (IPs), the right of ownership, scope of protection as well as the ways   to create and to extract value from IP.
- Recognize the crucial role of IP in organizations of different industrial sectors for the purposes of product and technology development.
- Identify activities and constitute IP infringements and the remedies available to the IP owner and describe the precautious steps to be taken to prevent infringement of proprietary rights in products and technology development.
- Be familiar with the processes of Intellectual Property Management (IPM) and various approaches for IPM and conducting IP and IPM auditing and explain how IP can be managed as a strategic resource and suggest IPM strategy.
- Be able to anticipate and subject to critical analysis arguments relating to the development and reform of intellectual property right institutions and their likely impact on creativity and innovation.
- Be able to demonstrate a capacity to identify, apply and assess ownership rights and marketing protection under intellectual property law as applicable to information, ideas, new products and product marketing;

UNIT – I
Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT – II
Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting, and evaluating trade mark, trade mark registration processes.

UNIT – III

Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, International copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer.

UNIT – IV

Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation. Unfair competition: Misappropriation right of publicity, false advertising.

UNIT – V

New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits. International overview on intellectual property, international – trade mark law, copy right law, International patent law, and international development in trade secrets law.

TEXT & REFERENCE BOOKS:
1. Intellectual property right, Deborah. E. Bouchoux, Cengage learning.
2. Intellectual property right – Unleashing the knowledge economy, prabuddha ganguli, Tata McGraw Hill Publishing company ltd

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MC610: CYBER SECURITY

B.Tech. III Year II Sem   **L T P C**
                                                                   0 0 2 0

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

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

UNIT - III
Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies an Measures in Mobile Computing Era, Laptops.

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

UNIT - V
Cyber Security: Organizational Implications, Introduction, Cost of Cybercrimes and IPR issues, Web threats for Organizations, Security and Privacy Implications, Social media marketing: Security Risks and Perils for Organizations, Social Computing and the associated challenges for Organizations.
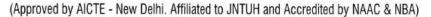
TEXT BOOK:
1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole and Sunil Belapure, Wiley INDIA.

REFERENCE BOOKS:
1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.
2. Introduction to Cyber Security, Chwan-Hwa (john) Wu, J. David Irwin. CRC Press T&F Group

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
(ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)
B.Tech. IV Year Course Structure(R-20)
Applicable From 2020-21Admitted Batch

IV YEAR I SEMESTER

S.No.	Course Code	Course Title	L	T	P	Credits
1	AI701PC	Web Technologies	3	0	0	3
2	AI702PC	Deep Learning	3	0	0	3
3		Professional Elective course - III	3	0	0	3
4		Professional Elective course -IV	3	0	0	3
5		Open Elective-II / MOOCs	3	0	0	3
6	AI703PC	Web Technologies Lab	0	0	3	1.5
7	AI704PC	Deep Learning Lab	0	0	3	1.5
8	AI705PROJ	Industrial Oriented Mini Project	0	0	4	2
9	AI706PROJ	Project-I	0	0	6	3
		Total Credits	**15**	**0**	**16**	**23**

IV YEAR II SEMESTER

S.No.	Course Code	Course Title	L	T	P	Credits
1		Professional Elective course -V	3	0	0	3
2		Professional Elective course -VI	3	0	0	3
3		Open Elective-III / MOOCs	3	0	0	3
4	AI801PROJ	Seminar	0	0	2	1
5	AI802PROJ	Project-II	0	0	16	8
		Total Credits	**9**	**0**	**18**	**18**

AI701PC: WEB TECHNOLOGIES

B.Tech. IV Year I Sem   **L T P C**
                                                                                              3 0 0 3

Course Objectives:
1. To introduce PHP language for server-side scripting
2. To introduce XML and processing of XML Data with Java
3. To introduce Server-side programming with Java Servlets and JSP
4. To introduce Client-side scripting with Javascript and AJAX.

Course Outcomes
- To gain knowledge of client-side scripting, validation of forms and AJAX programming
- To understand server-side scripting with PHP language
- To understand what is XML and how to parse and use XML Data with Java
- To introduce Server-side programming with Java Servlets and JSP

UNIT- I
Introduction to PHP: Declaring variables, data types, arrays, strings, operators, expressions, control structures, functions, Reading data from web form controls like text boxes, radio buttons, lists etc., Handling File Uploads. Connecting to database (MySQL as reference), executing simple queries, handling results, Handling sessions and cookies
File Handling in PHP: File operations like opening, closing, reading, writing, appending, deleting etc. on text and binary files, listing directories.

UNIT- II
HTML Common tags- List, Tables, images, forms, Frames; Cascading Style sheets;
XML: Introduction to XML, Defining XML tags, their attributes and values, Document Type Definition, XML Schemes, Document Object Model, XHTML Parsing XML Data – DOM and SAX Parsers in java.

UNIT - III
Introduction to Servlets: Common Gateway Interface (CGI), Life cycle of a Servlet, deploying a servlet, The Servlet API, Reading Servlet parameters, Reading Initialization parameters, Handling Http Request & Responses, Using Cookies and Sessions, connecting to a database using JDBC.

UNIT - IV
Introduction to JSP: The Anatomy of a JSP Page, JSP Processing, Declarations, Directives, Expressions, Code Snippets, implicit objects, Using Beans in JSP Pages, Using Cookies and session for session tracking, connecting to database in JSP.

UNIT - V
Client-side Scripting: Introduction to Javascript, Javascript language – declaring variables, scope of variables, functions. event handlers (onclick, onsubmit etc.), Document Object Model, Form validation.
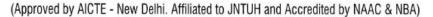
TEXT BOOKS:

1. Web Technologies, Uttam K Roy, Oxford University Press
2. The Complete Reference PHP — Steven Holzner, Tata McGraw-Hill

REFERENCE BOOKS
1. Web Programming, building internet applications, Chris Bates 2″ edition, Wiley Dreamtech
2. Java Server Pages —Hans Bergsten, SPD O'Reilly,
3. Java Script, D.Flanagan
4. Beginning Web Programming-Jon Duckett WROX.
5. Programming world wide web, R.W.Sebesta, Fourth Edition, Pearson.
6. Internet and World Wide Web — How to program. Dietel and Nieto, Pearson.

AI702PC: DEEP LEARNING

B.Tech. IV Year I Sem
                                                     L T P C
                                                     3 0 0 3

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

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

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

UNIT - IV
Regularization for Deep Learning: Parameter norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised learning, Multi-task learning, Early Stopping, Parameter Typing and Parameter Sharing, Sparse Representations, Bagging and other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, tangent Prop and Manifold, Tangent Classifier

UNIT - V
Optimization for Train Deep Models: Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second Order

Methods, Optimization Strategies and Meta-Algorithms Applications: Large-Scale Deep Learning, Computer Vision, Speech Recognition, Natural Language Processing

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.

AI731PE: DEVOPS (Professional Elective – III)

B.Tech. IV Year I Sem   **L T P C**
                                                                             3 0 0 3

Prerequisite:
- Software Engineering

Course Objectives
1. To enable learners realize various aspects of DevOps Ecosystem.
2. To enable students appreciate the agile led development environment.
3. To give the students a perspective to grasp the need for Minimum viable product led development using Sprints.
4. To enable students acquire fundamental knowledge of CI/CD and CAMS.

Course Outcomes:
At the end of this course student should be able to :
- CO.1. Explain traditional software development methodologies like waterfall.
- CO.2. Apply the Agile Methodology and comparing various other software development models with agile.
- CO.3Explain implementing Continuous Integration and Continuous Delivery.
- CO.4. Explain CAMS for DevOps (Culture, Automation, Measurement and Sharing).
- CO.5. Create quick MVP prototypes for modules and functionalities.

UNIT I:
TRADITIONAL SOFTWARE DEVELOPMENT
The Advent of Software Engineering, Waterfall method, Developers vs IT Operations conflict

UNIT II:
RISE OF AGILE METHODOLOGIES
Agile movement in 2000, Agile Vs Waterfall Method, Iterative Agile Software Development, Individual and team interactions over processes and tools, Working software over comprehensive documentation, Customer collaboration over contract negotiation, Responding to change over following a plan

UNIT III:
DEFINITION OF DEVOPS
Introduction to DevOps, DevOps and Agile.

UNIT IV:
PURPOSE OF DEVOPS
Minimum Viable Product, Application Deployment, Continuous Integration, Continuous Delivery

UNIT V:
CAMS (CULTURE, AUTOMATION, MEASUREMENT AND SHARING)
CAMS – Culture, CAMS – Automation, CAMS – Measurement, CAMS – Sharing, Test-Driven Development, Configuration Management, Infrastructure Automation, Root Cause Analysis, Blamelessness, Organizational Learning
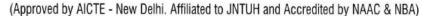
TEXT BOOKS:
1. Dev Ops – Volume 1 , Pearson and Xebia Press

REFERENCE BOOKS:
1. The DevOps Handbook - Book by Gene Kim, Jez Humble, Patrick Debois, and Willis Willis
2. What is DevOps? - by Mike Loukides

AI732PE: BIG DATA ANALYTICS (Professional Elective – III)

B.Tech. IV Year I Sem   **L T P C**
                                                              3 0 0 3

Course Objectives:
- To introduce the terminology, technology and its applications
- To introduce the concept of Analytics for Business
- To introduce the tools, technologies & programming languages which is used in day to day analytics cycle

UNIT - I
Data Management (NOS 2101): Design Data Architecture and manage the data for analysis, understand various sources of Data like Sensors/signal/GPS etc. Data Management, Data Quality (noise, outliers, missing values, duplicate data) and Data Preprocessing. Export all the data onto Cloud ex. AWS/Rackspace etc.
Maintain Healthy, Safe & Secure Working Environment (NOS 9003): Introduction, workplace safety, Report Accidents & Emergencies, Protect health & safety as your work, course conclusion, assessment.

UNIT – II
Big Data Tools (NOS 2101): Introduction to Big Data tools like Hadoop, Spark, Impala etc., Data ETL process, Identify gaps in the data and follow-up for decision making.
Provide Data/Information in Standard Formats (NOS 9004):
Introduction, Knowledge Management, Standardized reporting & compliances, Decision Models, course conclusion. Assessment

UNIT - III
Big Data Analytics: Run descriptives to understand the nature of the available data, collate all the data sources to suffice business requirement, Run descriptive statistics for all the variables and observer the data ranges, Outlier detection and elimination.

UNIT - IV
Machine Learning Algorithms (NOS 9003): Hypothesis testing and determining the multiple analytical methodologies, Train Model on 2/3 sample data using various Statistical/Machine learning algorithms, Test model on 1/3 sample for prediction etc.

UNIT - V (NOS 9004)
Data Visualization (NOS 2101): Prepare the data for Visualization, Use tools like Tableau, Qlick View and D3, Draw insights out of Visualization tool. Product Implementation

TEXT BOOK:
1. Student's Handbook for Associate Analytics.

REFERENCE BOOKS:
1. Introduction to Data Mining, Tan, Steinbach and Kumar, Addison Wesley, 2006
2. Data Mining Analysis and Concepts, M. Zaki and W. Meira (the authors have kindly made an online version available): http://www.dataminingbook.info/uploads/book.pdf
3. Mining of Massive Datasets Jure Leskovec Stanford Univ. Anand Rajaraman Milliway Labs Jeffrey D. Ullman, Stanford Univ.
   (http://www.vistrails.org/index.php/Course:_Big_Data_Analysis)

AI733PE: SPEECH RECOGNITION (Professional Elective – III)

B.Tech. IV Year I Sem   L T P C
                                                                           3 0 0 3

Objectives: The student should be made:
- To understand the speech production mechanism and the various speech analysis techniques and speech models
- To understand the speech compression techniques
- To understand the speech recognition techniques
- To know the speaker recognition and text to speech synthesis techniques

Outcomes: At the end of the course, the student should be able to:
- Design speech compression techniques
- Configure speech recognition techniques
- Design speaker recognition systems
- Design text to speech synthesis systems

UNIT I
SPEECH SIGNAL CHARACTERISTICS & ANALYSIS
Speech production process - speech sounds and features- - Phonetic Representation of Speech -- representing= speech in time and frequency domains - Short-Time Analysis of Speech - Short- Time Energy and Zero-Crossing Rate - Short-Time Autocorrelation Function - Short-Time Fourier Transform (STFT) - Speech Spectrum - Cepstrum - Mel-Frequency Cepstrum Coefficients - Hearing and Auditory Perception - Perception of Loudness - Critical Bands - Pitch Perception

UNIT II
SPEECH COMPRESSION
Sampling and Quantization of Speech (PCM) - Adaptive differential PCM - Delta Modulation - Vector Quantization- Linear predictive coding (LPC) - Code excited Linear predictive Coding (CELP)

UNIT III
SPEECH RECOGNITION
LPC for speech recognition- Hidden Markov Model (HMM)- training procedure for HMM- subword unit model based on HMM- language models for large vocabulary speech recognition - Overall recognition system based on subword units - Context dependent subword units- Semantic post processor for speech recognition
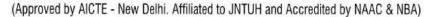
UNIT IV
SPEAKER RECOGNITION
Acoustic parameters for speaker verification- Feature space for speaker recognition-similarity measures- Text dependent speaker verification-Text independent speaker verification techniques

UNIT V
SPEAKER RECOGNITION AND TEXT TO SPEECH SYNTHESIS
Text to speech synthesis (TTS)-Concatenative and waveform synthesis methods, sub-word units for TTS, intelligibility and naturalness-role of prosody

TEXT BOOKS:
1. L. R. Rabiner and R. W. Schafer, Introduction to Digital Signal Processing, Foundations and Trendsin Signal Processing Vol. 1, Nos. 1–2 (2007) 1–194
2. Ben Gold and Nelson Morgan ―Speech and Audio signal processing- processing and perception of speech and music‖, John Wiley and sons 2006

REFERENCES
1. Lawrence Rabiner, Biiing and– Hwang Juang and B.Yegnanarayana ―Fundamentals of Speech Recognition‖, Pearson Education, 2009
2. Claudio Becchetti and Lucio Prina Ricotti, ―Speech Recognition‖, John Wiley and Sons, 1999
3. Donglos O shanhnessy ―Speech Communication: Human and Machine ―, 2nd Ed. University press 2001.

AI734PE: SEMANTIC WEB AND SOCIAL NETWORKS
(Professional Elective – III)

B.Tech. IV Year I Sem   **L T P C**
                                                                                        3 0 0 3

Course Objectives:
- To learn Web Intelligence
- To learn Knowledge Representation for the Semantic Web
- To learn Ontology Engineering
- To learn Semantic Web Applications, Services and Technology
- To learn Social Network Analysis and semantic web

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

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

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

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

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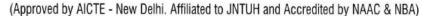What is social Networks analysis, development of the social networks analysis, Electronic Sources for Network Analysis – Electronic Discussion networks.

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

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

REFERENCE BOOKS:
1. Semantic Web Technologies, Trends and Research in Ontology Based Systems, J.Davies, Rudi Studer, Paul Warren, John Wiley & Sons.
2. Semantic Web and Semantic Web Services -Liyang Lu Chapman and Hall/CRC Publishers,(Taylor & Francis Group)
3. Information sharing on the semantic Web - Heiner Stucken schmidt; Frank Van Harmelen, Springer Publications.
4. Programming the Semantic Web, T. Segaran, C. Evans, J. Taylor, O'Reilly, SPD.

AI735PE: INTERNET OF THINGS (Professional Elective – III)

B.Tech. IV Year I Sem

L T P C
3 0 0 3

Course Objectives:
- To introduce the terminology, technology and its applications
- To introduce the concept of M2M (machine to machine) with necessary protocols
- To introduce the Python Scripting Language which is used in many IoT devices
- To introduce the Raspberry PI platform, that is widely used in IoT applications
- To introduce the implementation of web based services on IoT devices

Course Outcomes:
- Interpret the impact and challenges posed by IoT networks leading to new architectural models.
- Compare and contrast the deployment of smart objects and the technologies to connect them to network.
- Appraise the role of IoT protocols for efficient network communication.
- Elaborate the need for Data Analytics and Security in IoT.
- Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.

UNIT - I
Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, Iot Communication APIs IoT enabaled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates Domain Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle

UNIT - II
IoT and M2M – Software defined networks, network function virtualization, difference between SDN and NFV for IoT Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER
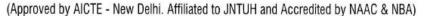
UNIT - III
Introduction to Python - Language features of Python, Data types, data structures, Control of flow, functions, modules, packaging, file handling, data/time operations, classes, Exception handling Python packages - JSON, XML, HTTPLib, URLLib, SMTPLib

UNIT - IV
IoT Physical Devices and Endpoints - Introduction to Raspberry PI-Interfaces (serial, SPI, I2C) Programming – Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins.

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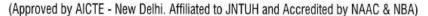
UNIT - V
IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication APIs Webserver – Web server for IoT, Cloud for IoT, Python web application framework Designing a RESTful web API

TEXT BOOKS:
1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759

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AI741PE: DESIGN PATTERNS (Professional Elective – IV)

B.Tech. IV Year I Sem   **L T P C**
                                                                 3 0 0 3

Prerequisites:
1. A Course on Software Engineering"
2. A Course on "Object Oriented Programming Through Java"

Course Objectives:
- The aim of the course is to appreciate the idea behind Design Patterns in handling common problems faced during building an application
- This course covers all pattern types from creational to structural, behavioral to concurrency and highlights the scenarios when one pattern must be chosen over others.

Course Outcomes:
- Create software designs that are scalable and easily maintainable
- Understand the best use of Object Oriented concepts for creating truly OOP programs
- Use creational design patterns in software design for class instantiation
- Use structural design patterns for better class and object composition
- Use behavioral patterns for better organization and communication between the objects
- Use refactoring to compose the methods for proper code packaging
- Use refactoring to better organize the class responsibilities of current code

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

UNIT - II
Designing a Document Editor: Design Problems, Document Structure, Formatting, Embellishing the User Interface, Supporting Multiple Look-and-Feel Standards, Supporting Multiple Window Systems, User Operations Spelling Checking and Hyphenation, Summary.

UNIT - III
Creational Patterns: Abstract Factory, Builder, Factory Method, Prototype, Singleton, Discussion of Creational Patterns.

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

UNIT - V

Behavioral Patterns: Chain of Responsibility, Command, Interpreter, Iterator, Mediator, Memento, Observer, State, Strategy, Template Method, Visitor.
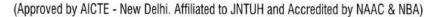
TEXT BOOK:
1. Design Patterns, Erich Gamma, Pearson Education

REFERENCE BOOKS:
1. Pattern's in Java, Vol –I, Mark Grand, Wiley Dream Tech.
2. Patterns in Java, Vol-II, Mark Grand, Wiley Dream Tech.
3. Java Enterprise Design Patterns Vol-III, Mark Grand, Wiley Dream Tech.
4. Head First Design Patterns, Eric Freeman, O'reily publications

AI742PE: DATA ANALYTICS AND VISUALIZATION
(Professional Elective – IV)

B.Tech. IV Year I Sem   **L T P C**
                                                                 3 0 0 3

Prerequisites:
1. A course on "Database Management Systems".
2. Knowledge of probability and statistics.

Course Objectives:
- To explore the fundamental concepts of data analytics.
- To learn the principles and methods of statistical analysis
- Discover interesting patterns, analyze supervised and unsupervised models and estimate the accuracy of the algorithms.
- To understand the various search methods and visualization techniques.

Course Outcomes: After completion of this course students will be able to
- Understand the impact of data analytics for business decisions and strategy
- Carry out data analysis/statistical analysis
- To carry out standard data visualization and formal inference procedures
- Design Data Architecture
- Understand various Data Sources

UNIT - I
Data Management: Design Data Architecture and manage the data for analysis, understand various sources of Data like Sensors/Signals/GPS etc. Data Management, Data Quality(noise, outliers, missing values, duplicate data) and Data Processing & Processing.

UNIT - II
Data Analytics: Introduction to Analytics, Introduction to Tools and Environment, Application of Modeling in Business, Databases & Types of Data and variables, Data Modeling Techniques, Missing Imputations etc. Need for Business Modeling.

UNIT - III
Regression – Concepts, Blue property assumptions, Least Square Estimation, Variable Rationalization, and Model Building etc.
Logistic Regression: Model Theory, Model fit Statistics, Model Construction, Analytics applications to various Business Domains etc.

UNIT - IV
Object Segmentation: Regression Vs Segmentation – Supervised and Unsupervised Learning, Tree Building – Regression, Classification, Overfitting, Pruning and Complexity, Multiple Decision Trees etc.

Time Series Methods: Arima, Measures of Forecast Accuracy, STL approach, Extract features from generated model as Height, Average Energy etc and Analyze for prediction

UNIT - V
Data Visualization: Pixel-Oriented Visualization Techniques, Geometric Projection Visualization Techniques, Icon-Based Visualization Techniques, Hierarchical Visualization Techniques, Visualizing Complex Data and Relations.
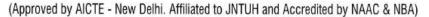
TEXT BOOKS:
1. Student's Handbook for Associate Analytics – II, III.
2. Data Mining Concepts and Techniques, Han, Kamber, 3rd Edition, Morgan Kaufmann Publishers.

REFERENCE BOOKS:
1. Introduction to Data Mining, Tan, Steinbach and Kumar, Addision Wisley, 2006.
2. Data Mining Analysis and Concepts, M. Zaki and W. Meira
3. Mining of Massive Datasets, Jure Leskovec Stanford Univ. Anand Rajaraman Milliway Labs Jeffrey D Ullman Stanford Univ.

AI743PE: COMPUTER GRAPHICS (Professional Elective –IV)

B.Tech. IV Year I Sem   **L T P C**
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Prerequisites
- Familiarity with the theory and use of coordinate geometry and of linear algebra such as matrix multiplication.
- A course on "Computer Programming and Data Structures"

Course Objectives
- The aim of this course is to provide an introduction of fundamental concepts and theory of computer graphics.
- Topics covered include graphics systems and input devices; geometric representations and 2D/3D transformations; viewing and projections; illumination and color models; animation; rendering and implementation; visible surface detection;

Course Outcomes
- Acquire familiarity with the relevant mathematics of computer graphics.
- Be able to design basic graphics application programs, including animation
- Be able to design applications that display graphic images to given specifications

UNIT - I
Introduction: Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices
Output primitives: Points and lines, line drawing algorithms (Bresenham's and DDA Algorithm), midpoint circle and ellipse algorithms
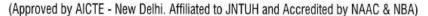**Polygon Filling:** Scan-line algorithm, boundary-fill and flood-fill algorithms

UNIT - II
2-D geometrical transforms: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems
2-D viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland algorithms, Sutherland –Hodgeman polygon clipping algorithm.

UNIT - III
3-D object representation: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces. Basic illumination models, polygon rendering methods.

UNIT - IV
3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations.
3-D viewing: Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping.

UNIT - V
Computer animation: Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications
Visible surface detection methods: Classification, back-face detection, depth-buffer, BSP-tree methods and area sub-division methods

TEXT BOOKS:
1. "Computer Graphics C version", Donald Hearn and M. Pauline Baker, Pearson Education
2. "Computer Graphics Principles & practice", second edition in C, Foley, Van Dam, Feiner and Hughes, Pearson Education.
3. Computer Graphics, Steven Harrington, TMH

REFERENCE BOOKS:
1. Procedural elements for Computer Graphics, David F Rogers, Tata Mc Graw hill, 2nd edition.
2. Principles of Interactive Computer Graphics", Neuman and Sproul, TMH.
3. Principles of Computer Graphics, Shalini Govil, Pai, 2005, Springer.

AI744PE: MOBILE APP DEVELOPMENT (Professional Elective – IV)

B.Tech. IV Year I Sem   **L T P C**
                                                     3 0 0 3

Prerequisites:
1. Acquaintance with JAVA programming
2. A Course on DBMS

Course Objectives:
- To demonstrate their understanding of the fundamentals of Android operating systems
- To improves their skills of using Android software development tools
- To demonstrate their ability to develop software with reasonable complexity on mobile platform
- To demonstrate their ability to deploy software to mobile devices
- To demonstrate their ability to debug programs running on mobile devices

Course Outcomes:
- Student understands the working of Android OS Practically.
- Student will be able to develop Android user interfaces
- Student will be able to develop, deploy and maintain the Android Applications.

UNIT - I
Introduction to Android Operating System: Android OS design and Features – Android development framework, SDK features, Installing and running applications on Android Studio, Creating AVDs, Types of Android applications, Best practices in Android programming, Android tools.
Android application components – Android Manifest file, Externalizing resources like values, themes, layouts, Menus etc, Resources for different devices and languages, Runtime Configuration Changes Android Application Lifecycle – Activities, Activity lifecycle, activity states, monitoring state changes

UNIT - II
Android User Interface: Measurements – Device and pixel density independent measuring UNIT - s Layouts – Linear, Relative, Grid and Table Layouts
User Interface (UI) Components – Editable and non-editable TextViews, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers
Event Handling – Handling clicks or changes of various UI components
Fragments – Creating fragments, Lifecycle of fragments, Fragment states, Adding fragments to Activity, adding, removing and replacing fragments with fragment transactions, interfacing between fragments and Activities, Multi-screen Activities

UNIT - III
Intents and Broadcasts: Intent – Using intents to launch Activities, Explicitly starting new Activity, Implicit Intents, Passing data to Intents, Getting results from Activities, Native Actions, using Intent to dial a number

or to send SMS

Broadcast Receivers – Using Intent filters to service implicit Intents, Resolving Intent filters, finding and using Intents received within an Activity

Notifications – Creating and Displaying notifications, Displaying Toasts

UNIT - IV

Persistent Storage: Files – Using application specific folders and files, creating files, reading data from files, listing contents of a directory Shared Preferences – Creating shared preferences, saving and retrieving data using Shared Preference

UNIT - V

Database – Introduction to SQLite database, creating and opening a database, creating tables, inserting retrieving and etindelg data, Registering Content Providers, Using content Providers (insert, delete, retrieve and update)

TEXT BOOKS:
1. Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox), 2012
2. Android Application Development for Java Programmers, James C Sheusi, Cengage Learning, 2013

REFERENCE BOOK:
1. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 2013

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AI745PE: INFORMATION SECURITY ASSESSMENT AND AUDIT
(Professional Elective – IV)

B.Tech. IV Year I Sem
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Course Objectives:
- To introduce the terminology, technology and its applications
- To introduce the concept of Security Analyst
- To introduce the tools, technologies & programming languages which is used in day to day security analyst job role.

UNIT - I
Information Security Performance Metrics and Audit: Security Metrics and Reporting, Common Issues and Variances of Performance Metrics, Introduction to Security Audit, Servers and Storage devices, Infrastructure and Networks, Communication Routes, Information Security Methodologies (Black-box, White-box, Grey-box), Phases of Information Security Audit and Strategies, Ethics of an Information Security Auditor etc. Maintain Healthy, Safe & Secure Working environment (NOS 9003)

UNIT - II
Information Security Audit Tasks, Reports and Post Auditing Actions: Pre-audit checklist, Information Gathering, Vulnerability Analysis, External Security Audit, Internal Network Security Audit, Firewall Security Audit, IDS Security Auditing, Social Engineering Security Auditing, Web Application Security Auditing, Information Security Audit Deliverables & Writing Report, Result Analysis, Post Auditing Actions, Report Retention etc. Provide Data/Information in Standard formats (NOS 9004)

UNIT - III
Vulnerability Management: Information Security Vulnerabilities – Threats and Vulnerabilities, Human-based Social Engineering, Computer-based Social Engineering, Social Media Countermeasures, Vulnerability Management – Vulnerability Scanning, Testing, Threat management, Remediation etc.
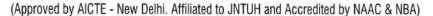
UNIT - IV
Information Security Assessments: Vulnerability Assessment, Classification, Types of Vulnerability Assessment, Vulnerability Assessment Phases, Vulnerability Analysis Stages, Characteristics of a Good Vulnerability Assessment Solutions &Considerations, Vulnerability Assessment Reports – Tools and choosing a right Tool, Information Security Risk Assessment, Risk Treatment, Residual Risk, Risk Acceptance, Risk Management Feedback Loops etc.

UNIT - V
Configuration Reviews: Introduction to Configuration Management, Configuration Management Requirements-Plan-Control, Development of configuration Control Policies, Testing Configuration Management etc.

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TEXT BOOKS:
1. Assessing Information Security (strategies, tactics, logic and framework) by A Vladimirov, K. Gavrilenko, and A. Michajlowski
2. "The Art of Computer Virus Research and Defense by Peter Szor."

REFERENCES:
1. https://www.sans.org/reading-room/whitepapers/threats/implementing-vulnerabilitymanagement-process-34180
2. http://csrc.nist.gov/publications/nistpubs/800-40-Ver2/SP800-40v2.pdf

AI703PC: WEB TECHNOLOGIES LAB

B.Tech. IV Year I Sem   **L T P C**
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1. Write a PHP script to print prime numbers between 1-50.
2. PHP script to
   a) Find the length of a string.
   b) Count no of words in a string.
   c) Reverse a string.
   d) Search for a specific string.
3. Write a PHP script to merge two arrays and sort them as numbers, in descending order.
4. Write a PHP script that reads data from one file and write into another file.
5. Develop static pages (using Only HTML) of an online book store. The pages should resemble:
6. www.amazon.com. The website should consist the following pages.
   a) Home page
   b) Registration and user Login
   c) User Profile Page
   d) Books catalog
   e) Shopping Cart
   f) Payment By credit card
   g) Order Conformation
7. Validate the Registration, user login, user profile and payment by credit card pages using JavaScript.
8. Create and save an XML document on the server, which contains 10 users information. Write a program, which takes User Id as an input and returns the user details by taking the user information from the XML document.
9. Install TOMCAT web server. Convert the static web pages of assignments 2 into dynamic web pages using servlets and cookies. Hint: Users information (user id, password, credit card number) would be stored in web.xml. Each user should have a separate Shopping Cart.
10. Redo the previous task using JSP by converting the static web pages of assignments 2 into dynamic web pages. Create a database with user information and books information. The books catalogue should be dynamically loaded from the database. Follow the MVC architecture while doing the website.

TEXT BOOK:
1. WEB TECHNOLOGIES: A Computer Science Perspective, Jeffrey C. Jackson, Pearson Education

REFERENCE BOOKS:
1. Deitel H.M. and Deitel P.J., "Internet and World Wide Web How to program", Pearson International, 2012, 4th Edition.
2. J2EE: The complete Reference By James Keogh, McGraw-Hill
3. Bai and Ekedhi, The Web Warrior Guide to Web Programming, Thomson
4. Paul Dietel and Harvey Deitel," Java How to Program", Prentice Hall of India, 8th Edition

5. Web technologies, Black Book, Dreamtech press.
6. Gopalan N.P. and Akilandeswari J., "Web Technology", Prentice Hall of India

AI704PC: DEEP LEARNING LAB

B.Tech. IV Year I Sem   **L T P C**
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Prerequisite:
- Any programming language Python/R/Matlab

Course Objectives:
- To implement ANN and Deep Learning concepts

List of Experiments:
1. Implementation of MP model
2. Implementation of feed forward neural network
3. Implementation of back propagation neural network
4. Implement all activation function of neural network for any pattern recognition application
5. Implement any one of ImageNet or GoogleNet
6. Implement a system to recognize hand written character using CNN
7. Classify images appropriately using CNN
8. Implement LSTM Neural Network for Time Series Prediction

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AI851PE: OBJECT ORIENTED ANALYSIS AND DESIGN
(Professional Elective – V)

B.Tech. IV Year II Sem   **L T P C**
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Course Objectives:
- Concisely define the following key terms: class, object, state, behavior, object class, class diagram, object diagram, operation, encapsulation, constructor operation, query operation, update operation, scope operation, association, association role, multiplicity, association class, abstract class, concrete class, class-scope attribute, abstract operation, method, polymorphism, overriding, multiple classification, aggregation, and composition.
- Describe the activities in the different phases of the object-oriented development life cycle.
- State the advantages of object-oriented modeling vis-à-vis structured approaches.
- Compare and contrast the object-oriented model with the E-R and EER models.
- Model a real-world application by using a UML class diagram.
- Provide a snapshot of the detailed state of a system at a point in time using a UML(Unified Modeling Language) object diagram.
- Recognize when to use generalization, aggregation, and composition relationships.
- Specify different types of business rules in a class diagram.

Course Outcomes: Graduate can able to take up the case studies and model it in different views with respect user requirement such as use case, logical, component and deployment and etc, and preparation of document of the project for the unified Library application.

UNIT - I
Introduction to UML: Importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Architecture, Software Development Life Cycle.

UNIT - II
Basic Structural Modeling: Classes, Relationships, common Mechanisms, and diagrams. Advanced Structural Modeling: Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages.
Class & Object Diagrams: Terms, concepts, modeling techniques for Class & Object Diagrams.

UNIT - III
Basic Behavioral Modeling-I: Interactions, Interaction diagrams.
Basic Behavioral Modeling-II: Use cases, Use case Diagrams, Activity Diagrams

UNIT - IV
Advanced Behavioral Modeling: Events and signals, state machines, processes and Threads, time and space, state chart diagrams.
Architectural Modeling: Component, Deployment, Component diagrams and Deployment diagrams.

UNIT - V

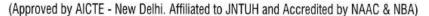Patterns and Frameworks, Artifact Diagrams. Case Study: The Unified Library application.

TEXT BOOKS:
1. Grady Booch, James Rumbaugh, Ivar Jacobson: The Unified Modeling Language User Guide, Pearson Education 2nd Edition.
2. Object-Oriented Analysis and Design with the Unified Process By John W. Satzinger, Robert B Jackson and Stephen D Burd, Cengage Learning.

REFERENCE BOOKS:
1. Meilir Page-Jones: Fundamentals of Object Oriented Design in UML, Pearson Education.
2. Pascal Roques: Modeling Software Systems Using UML2, WILEY-Dreamtech India Pvt. Ltd.
3. Atul Kahate: Object Oriented Analysis & Design, The McGraw-Hill Companies.
4. Mark Priestley: Practical Object-Oriented Design with UML, TMH.
5. Appling UML and Patterns: An introduction to Object – Oriented Analysis and Design and Unified Process, Craig Larman, Pearson Education.
6. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: UML 2 Toolkit, WILEY- Dreamtech India Pvt. Ltd.
7. UML and C++, R. C. Lee, and W. M. Tepfenhart, PHI.
8. Object Oriented Analysis, Design and Implementation, B. Dathan, S. Ramnath, Universities Press.
9. OODesign with UML and Java, K. Barclay, J. Savage, Elsevier.
10. 1Learning UML 2.0, Russ Miles and Kim Hamilton, O'Reilly, SPD.

AI852PE: PREDICTIVE ANALYTICS (Professional Elective –V)

B.Tech. IV Year II Sem
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Course Objectives:
1. To introduce the terminology, technology and its applications
2. To introduce the concept of Analytics for Business
3. To introduce the tools, technologies & programming languages which is used in day to day analytics cycle

UNIT - I
Introduction to Predictive Analytics & Linear Regression (NOS 2101)
What and Why Analytics, Introduction to Tools and Environment, Application of Modelling in Business, Databases & Types of data and variables, Data Modelling Techniques, Missing imputations etc.
Need for Business Modelling, Regression – Concepts, Blue property-assumptions-Least Square Estimation, Variable Rationalization, and Model Building etc.

UNIT - II
Logistic Regression (NOS 2101): Model Theory, Model fit Statistics, Model Conclusion, Analytics applications to various Business Domains etc.
Prediction vs Regression, Linear regression and multiple regression

UNIT – III
Objective Segmentation (NOS 2101): Regression Vs Segmentation – Supervised and Unsupervised Learning, Tree Building – Regression, Classification, Over fitting, Pruning and complexity, Multiple Decision Trees etc.
Develop Knowledge, Skill, and Competences (NOS 9005): Introduction to Knowledge skills & competences, Training & Development, Learning & Development, Policies and Record keeping, etc.

UNIT - IV
Time Series Methods /Forecasting, Feature Extraction (NOS 2101): Arima, Measures of Forecast Accuracy, STL approach, Extract features from generated model as Height, Average, Energy etc and Analyze for prediction. Project

UNIT - V
Applications: Working with Documents (NOS 0703) - Standard Operating Procedures for documentation and knowledge sharing, Defining purpose and scope documents, Understanding structure of documents – case studies, articles, white papers, technical reports, minutes of meeting etc., Style and format, Intellectual Property and Copyright, Document preparation tools – Visio, PowerPoint, Word, Excel etc., Version Control, Accessing and updating corporate knowledge base, Peer review and feedback.

TEXT BOOKS:
1. Student's Handbook for Associate Analytics - III.

REFERENCE BOOKS:
1. Gareth James • Daniela Witten • Trevor Hastie Robert Tibshirani. An Introduction to Statistical Learning with Applications in R

AI853PE: IMAGE PROCESSING (Professional Elective –V)

B.Tech. IV Year II Sem   **L T P C**
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Prerequisites
1. Students are expected to have knowledge in linear signals and systems, Fourier Transform, basic linear algebra, basic probability theory and basic programming techniques; knowledge of Digital Signal Processing is desirable.
2. A course on "Computational Mathematics"
3. A course on "Computer Oriented Statistical Methods"

Course Objectives
- Provide a theoretical and mathematical foundation of fundamental Digital Image Processing concepts.
- The topics include image acquisition; sampling and quantization; preprocessing; enhancement; restoration; segmentation; and compression.

Course Outcomes
- Demonstrate the knowledge of the basic concepts of two-dimensional signal acquisition, sampling, and quantization.
- Demonstrate the knowledge of filtering techniques.
- Demonstrate the knowledge of 2D transformation techniques.
- Demonstrate the knowledge of image enhancement, segmentation, restoration and compression techniques.

UNIT - I
Digital Image Fundamentals: Digital Image through Scanner, Digital Camera. Concept of Gray Levels. Gray Level to Binary Image Conversion. Sampling and Quantization. Relationship between Pixels. Imaging Geometry. 2D Transformations-DFT, DCT, KLT and SVD.

UNIT - II
Image Enhancement in Spatial Domain Point Processing, Histogram Processing, Spatial Filtering, Enhancement in Frequency Domain, Image Smoothing, Image Sharpening.

UNIT - III
Image Restoration Degradation Model, Algebraic Approach to Restoration, Inverse Filtering, Least Mean Square Filters, Constrained Least Squares Restoration, Interactive Restoration.

UNIT - IV
Image Segmentation Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region Oriented Segmentation.

UNIT - V
Image Compression Redundancies and their Removal Methods, Fidelity Criteria, Image Compression Models,

Source Encoder and Decoder, Error Free Compression, Lossy Compression.

TEXT BOOK:
1. Digital Image Processing: R.C. Gonzalez & R. E. Woods, Addison Wesley/ Pearson Education, 2nd Ed, 2004.

REFERENCE BOOKS:
1. Fundamentals of Digital Image Processing: A. K. Jain, PHI.
2. Digital Image Processing using MAT LAB: Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins: Pearson Education India, 2004.
3. Digital Image Processing: William K. Pratt, John Wilely, 3rd Edition, 2004.

AI854PE: CLOUD COMPUTING (Professional Elective –V)

B.Tech. IV Year II Sem   **L T P C**
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Pre-requisites:
1. A course on "Computer Networks"
2. A course on "Operating Systems"
3. A course on "Distributed Systems"

Course Objectives:
- This course provides an insight into cloud computing
- Topics covered include- distributed system models, different cloud service models, service-oriented architectures, cloud programming and software environments, resource management.

Course Outcomes:
- Ability to understand various service delivery models of a cloud computing architecture.
- Ability to understand the ways in which the cloud can be programmed and deployed.
- Understanding cloud service providers.

UNIT - I
Computing Paradigms: High-Performance Computing, Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing, Bio computing, Mobile Computing, Quantum Computing, Optical Computing, Nano computing.

UNIT - II
Cloud Computing Fundamentals: Motivation for Cloud Computing, The Need for Cloud Computing, Defining Cloud Computing, Definition of Cloud computing, Cloud Computing Is a Service, Cloud Computing Is a Platform, Principles of Cloud computing, Five Essential Characteristics, Four Cloud Deployment Models

UNIT - III
Cloud Computing Architecture and Management: Cloud architecture, Layer, Anatomy of the Cloud, Network Connectivity in Cloud Computing, Applications, on the Cloud, Managing the Cloud, Managing the Cloud Infrastructure Managing the Cloud application, Migrating Application to Cloud, Phases of Cloud Migration Approaches for Cloud Migration.

UNIT - IV
Cloud Service Models: Infrastructure as a Service, Characteristics of IaaS. Suitability of IaaS, Pros and Cons of IaaS, Summary of IaaS Providers, Platform as a Service, Characteristics of PaaS, Suitability of PaaS, Pros and Cons of PaaS, Summary of PaaS Providers, Software as a Service, Characteristics of SaaS, Suitability of SaaS, Pros and Cons of SaaS, Summary of SaaS Providers, Other Cloud Service Models.

UNIT V
Cloud Service Providers: EMC, EMC IT, Captiva Cloud Toolkit, Google, Cloud Platform, Cloud Storage, Google Cloud Connect, Google Cloud Print, Google App Engine, Amazon Web Services, Amazon Elastic

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Compute Cloud, Amazon Simple Storage Service, Amazon Simple Queue ,service, Microsoft, Windows Azure, Microsoft Assessment and Planning Toolkit, SharePoint, IBM, Cloud Models, IBM Smart Cloud, SAP Labs, SAP HANA Cloud Platform, Virtualization Services Provided by SAP, Sales force, Sales Cloud, Service Cloud: Knowledge as a Service, Rack space, VMware, Manjra soft, Aneka Platform

TEXT BOOK:
1. Essentials of cloud Computing: K. Chandrasekhran, CRC press, 2014

REFERENCE BOOKS:
1. Cloud Computing: Principles and Paradigms by Rajkumar Buyya, James Broberg and Andrzej M. Goscinski, Wiley, 2011.
2. Distributed and Cloud Computing, Kai Hwang, Geoffery C. Fox, Jack J. Dongarra, Elsevier, 2012.
3. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Tim Mather, Subra Kumaraswamy, Shahed Latif, O'Reilly, SPD, rp 2011.

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AI855PE: INFORMATION RETRIEVAL SYSTEM
(Professional Elective –V)

B.Tech. IV Year II Sem   **L T P C**
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Prerequisites:
- Data Structures

Course Objectives:
- To learn the important concepts and algorithms in IRS
- To understand the data/file structures that are necessary to design, and implement information retrieval (IR) systems.

Course Outcomes:
- Ability to apply IR principles to locate relevant information large collections of data
- Ability to design different document clustering algorithms
- Implement retrieval systems for web search tasks.
- Design an Information Retrieval System for web search tasks.

UNIT - I
Introduction to Information Retrieval Systems: Definition of Information Retrieval System, Objectives of Information Retrieval Systems, Functional Overview, Relationship to Database Management Systems, Digital Libraries and Data Warehouses
Information Retrieval System Capabilities: Search Capabilities, Browse Capabilities, Miscellaneous Capabilities

UNIT - II
Cataloging and Indexing: History and Objectives of Indexing, Indexing Process, Automatic Indexing, Information Extraction
Data Structure: Introduction to Data Structure, Stemming Algorithms, Inverted File Structure, N-Gram Data Structures, PAT Data Structure, Signature File Structure, Hypertext and XML Data Structures, Hidden Markov Models

UNIT - III
Automatic Indexing: Classes of Automatic Indexing, Statistical Indexing, Natural Language, Concept Indexing, Hypertext Linkages
Document and Term Clustering: Introduction to Clustering, Thesaurus Generation, Item Clustering, Hierarchy of Clusters
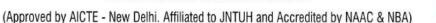
UNIT - IV
User Search Techniques: Search Statements and Binding, Similarity Measures and Ranking, Relevance Feedback, Selective Dissemination of Information Search, Weighted Searches of Boolean Systems, Searching the INTERNET and Hypertext
Information Visualization: Introduction to Information Visualization, Cognition and Perception, Information

Visualization Technologies

UNIT - V
Text Search Algorithms: Introduction to Text Search Techniques, Software Text Search Algorithms, Hardware Text Search Systems
Multimedia Information Retrieval: Spoken Language Audio Retrieval, Non-Speech Audio Retrieval, Graph Retrieval, Imagery Retrieval, Video Retrieval

TEXT BOOK:
1. Information Storage and Retrieval Systems – Theory and Implementation, Second Edition, Gerald J. Kowalski, Mark T. Maybury, Springer

REFERENCE BOOKS:
1. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall, 1992.
2. Information Storage & Retrieval By Robert Korfhage – John Wiley & Sons.
3. Modern Information Retrieval By Yates and Neto Pearson Education

AI861PE: WEB SERVICES AND SERVICE ORIENTED ARCHITECTURE
(Professional Elective –VI)

B.Tech. IV Year II Sem   **L T P C**
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Course Objectives:
- To understand the details of web services technologies like WSDL, UDDI, SOAP
- To learn how to implement and deploy web service client and server
- To explore interoperability between different frameworks

Course Outcomes:
- Basic details of WSDL, UDDI, SOAP
- Implement WS client and server with interoperable systems

UNIT - I
Evolution and Emergence of Web Services - Evolution of distributed computing, Core distributed computing technologies – client/server, CORBA, JAVA RMI, Microsoft DCOM, MOM, Challenges in Distributed Computing, role of J2EE and XML in distributed computing, emergence of Web Services and Service Oriented Architecture (SOA).
Introduction to Web Services – The definition of web services, basic operational model of web services, tools and technologies enabling web services, benefits and challenges of using web services.
Web Services Architecture – Web services Architecture and its characteristics, core building blocks of web services, standards and technologies available for implementing web services, web services communication models, basic steps of implementing web services.

UNIT - II
Fundamentals of SOAP – SOAP Message Structure, SOAP encoding, Encoding of different data types, SOAP message exchange models, SOAP communication and messaging, Java and Axis, limitations of SOAP.

UNIT - III
Describing Web Services – WSDL – WSDL in the world of Web Services, Web Services life cycle, anatomy of WSDL definition document, WSDL bindings, WSDL Tools, limitations of WSDL.

UNIT - IV
Discovering Web Services – Service discovery, role of service discovery in a SOA, service discovery mechanisms, UDDI – UDDI registries, uses of UDDI Registry, Programming with UDDI, UDDI data structures, Publishing API, Publishing, searching and deleting information in a UDDI Registry, limitations of UDDI.
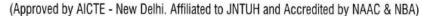
UNIT - V
Web Services Interoperability – Means of ensuring Interoperability, Overview of .NET, Creating a .NET client for an Axis Web Service, creating Java client for a Web service, Challenges in Web Services Interoperability.
Web Services Security – XML security frame work, Goals of Cryptography, Digital signature, Digital

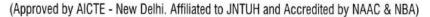Certificate, XML Encryption.

TEXT BOOK:
1. Developing Java Web Services, R. Nagappan, R. Skoczylas, R.P. Sriganesh, Wiley India.

REFERENCE BOOKS:
1. Java Web Service Architecture, James McGovern, Sameer Tyagi et al., Elsevier
2. Building Web Services with Java, 2nd Edition, S. Graham and others, Pearson Edn.
3. Java Web Services, D.A. Chappell & T. Jewell, O'Reilly,SPD.
4. Web Services, G. Alonso, F. Casati and others, Springer.

AI862PE: BIOINFORMATICS (Professional Elective –VI)

B.Tech. IV Year II Sem   **L T P C**

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Unit- I
Introduction to Bioinformatics: Definition, concepts, History, Overview of molecular biology, the cell as basic unit of life-Prokaryotic cell and Eukaryotic cell - Central Dogma: DNA-RNA-Protein, Introduction to DNA and Protein sequencing, Human Genome Project, SNP, Future and scope of Bioinformatics

Unit- II
Bioinformatics databases - Nucleotide sequence databases, Primary nucleotide sequence databases-EMBL, GeneBank, DDBJ; Secondary nucleotide sequence databases; Protein databases- UniProt, Protein Data Bank

Unit- III
Sequence Analysis-Basic concepts, Alignment of pairs of sequence: Homologous, Analogue, Orhtologous, paralogous, Xenologous (Need for sequence alignment, Local and Global alignment, Scoring matrices- PAM and BLOSUM matrices

Unit-IV
Pairwise sequence alignments: BLAST, Multiple sequence alignments (MSA) BLAST:- Nucleotide BLAST, Protein BLAST, PSI-BLAST, Analysis of BLAST results, E Value, sensitivity and specificity of BLAST, FASTA Structure analysis tools and softwares

Unit- V
Dynamic Programming, Needleman-Wunsch algorithm for global alignment, SmithWaterman algorithm for local alignment, Introduction to RASMOL, SWISS-PDB Viewer, ARGUS LAB
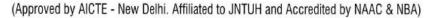
TEXT BOOK:
1. P. Narayanan, Bioinformatics: A Primer, New Age International Publishers.
2. Harshawardhan P. Bal, Bioinformatics Principles and Applications, Tata McGraw-Hill Publishing Company Ltd.

REFERENCE BOOKS:
1. Marketa Zvelebil and Jeremy O. Baum, Understanding Bioinformatics, Garland Science
2. Rastogiet. al., Bioinformatics: Methods and Applications, Prentice Hall of India.
3. Dan E. Krane and Michael L. Raymer, Fundamental Concepts of Bioinformatics, Pearson Education.
4. Claverie & Notredame, Bioinformatics - A Beginners Guide, Wiley-Dreamtech India Pvt Ltd.

AI863PE: COMPUTER VISION (Professional Elective –VI)

B.Tech. IV Year II Sem   **L T P C**
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Course Objectives:
- Learn basic principles of image formation, image processing algorithms and different algorithms for recognition from single or multiple images (video).
- Understand the core vision tasks of scene understanding and recognition.
- Applications to 3D modelling, video analysis, video surveillance, object recognition

Course outcomes:
- Implement fundamental image processing techniques required for computer vision
- Understand Image formation process
- Perform shape analysis
- Develop applications using computer vision techniques
- Understand video processing and motion computation

UNIT-I
Introduction and Image Formation: What is computer vision? A brief history, Geometric primitives and transformations, Photometric image formation, The digital camera. Pinhole Perspective, Weak Perspective, Cameras with Lenses, The Human Eye, Intrinsic Parameters and Extrinsic Parameters, Geometric Camera Calibration

UNIT-II
Early Vision – One Image: Linear Filters and Convolution, Shift Invariant Linear Systems, Spatial Frequency and Fourier Transforms, Sampling and Aliasing, Filters as Templates, Local Image Features, Texture

UNIT-III
Early Vision – Multiple Images: Stereopsis and Structure from Motion

UNIT-IV
Mid-level Vision: Segmentation by Clustering, Grouping and Model fitting, Tracking

UNIT-V
High-level Vision: Registration, Smooth Surface and their Outlines, Range Data Detecting Objects in Images, Recognition

TEXT BOOKS:
1. Computer Vision: Algorithms and Applications (CVAA), Richard Szeliski, Springer, 2nd edition, 2020, http://szeliski.org/Book/
2. Computer Vision – A modern approach, by D. Forsyth and J. Ponce, Prentice Hall, 2nd edition, 2012

REFERENCE BOOKS:

1. R. C. Gonzalez, R. E. Woods. Digital Image Processing. Addison Wesley Longman, Inc., 1992.
2. D. H. Ballard, C. M. Brown. Computer Vision. Prentice-Hall, Englewood Cliffs, 1982.
3. Image Processing, Analysis, and Machine Vision. Sonka, Hlavac, and Boyle. Thomson.
4. Simon J. D. Prince, Computer Vision: Models, Learning, and Inference, Cambridge University, Press, 2012
5. Introductory Techniques for 3D Computer Vision, by E. Trucco and A. Verri, Publisher: Prentice Hall.
6. Building Computer Vision Applications Using Artificial Neural Networks - With Step-by-step Examples in OpencvAndTensorflow With Python, Shamshad Ansari,Apress, 2020

AI864PE: BLOCKCHAIN TECHNOLOGIES (Professional Elective –VI)

B.Tech. IV Year II Sem

L T P C
3 0 0 3

Course Objectives:
- Define and Explain the fundamentals of Blockchain
- Illustrate the technologies of blockchain
- Describe the models of blockchain
- Analyze and demonstrate the Ethereum

Course outcomes:
- Define and Explain the fundamentals of Blockchain
- Illustrate the technologies of blockchain
- Describe the models of blockchain
- Analyze and demonstrate the Ethereum
- Analyze and demonstrate Hyperledger fabric

UNIT-I
Blockchain 101: Distributed systems, History of blockchain, Introduction to blockchain, Types of blockchain, CAP theorem and blockchain, Benefits and limitations of blockchain.

UNIT-II
Decentralization and Cryptography: Decentralization using blockchain, Methods of decentralization, Routes to decentralization, Decentralized organizations. Cryptography and Technical Foundations: Cryptographic primitives, Asymmetric cryptography, Public and private keys

UNIT-III
Bitcoin and Alternative Coins
A: Bitcoin, Transactions, Blockchain, Bitcoin payments
B: Alternative Coins
Theoretical foundations, Bitcoin limitations, Namecoin, Litecoin, Primecoin, Zcash

UNIT-IV
Smart Contracts and Ethereum 101: Smart Contracts: Definition, Ricardian contracts.
Ethereum 101: Introduction, Ethereum blockchain, Elements of the Ethereum blockchain, Precompiled contracts.

UNIT-V
Alternative Blockchains: Blockchains
Blockchain-Outside of Currencies: Internet of Things, Government, Health, Finance, Media

TEXT BOOK:
1. Mastering Blockchain - Distributed ledgers, decentralization and smart contracts explained, Imran

Bashir, Packt Publishing Ltd, Second Edition, ISBN 978-1-78712-544-5, 2017

REFERENCE BOOKS:
1. Blockchain Technology (Concepts and applications), Kumar saurabh, Ashutosh saxena, Wiley, 2020
2. Bitcoin and Cryptocurrency Technologies, Arvind Narayanan, Joseph Bonneau, Edward Felten,2016
3. Blockchain Basics: A Non-Technical Introduction in 25 Steps, Daniel Drescher, Apress, First Edition, 2017
4. Mastering Bitcoin: Unlocking Digital Cryptocurrencies, Andreas M. Antonopoulos, O'Reilly Media, First Edition, 2014

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AI865PE: ROBOTIC PROCESS AUTOMATION (Professional Elective –VI)

B.Tech. IV Year II Sem   **L T P C**
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Course Objectives:
- To understand basic concepts of RPA
- To Describe RPA, where it can be applied and how it is implemented
- To Describe the different types of variables, Control Flow and data manipulation techniques
- To Understand and Image, Text and Data Tables Automation
- To Describe various types of Exceptions and strategies to handle

Course outcomes:
- To Understand the basic concepts of RPA
- To Describe various components and platforms of RPA
- To Describe the different types of variables, control flow and data manipulation techniques
- To Understand various control techniques and OCR in RPA
- To Describe various types and strategies to handle exceptions

UNIT-I
RPA Foundations- What is RPA – Flavors of RPA- History of RPA- The Benefits of RPAThe downsides of RPA- RPA Compared to BPO, BPM and BPA – Consumer Willingness for Automation- The Workforce of the Future- RPA Skills-On-Premise Vs. the Cloud- Web Technology- Programming Languages and Low Code- OCR-Databases-APIs- AI-Cognitive Automation-Agile, Scrum, Kanban and Waterfall0 DevOps-Flowcharts.

UNIT-II
RPA Platforms- Components of RPA- RPA Platforms-About Ui Path- About UiPath - The future of automation - Record and Play - Downloading and installing UiPath Studio -Learning Ui Path Studio- - Task recorder - Step-by-step examples using the recorder.
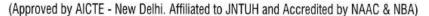
UNIT-III
Sequence, Flowchart, and Control Flow-Sequencing the workflow-Activities-Control flow, various types of loops, and decision making-Step-by-step example using Sequence and Flowchart-Step-by-step example using Sequence and Control flow-Data Manipulation Variables and Scope-Collections-Arguments – Purpose and use-Data table usage with examples-Clipboard management-File operation with step-by-step example-CSV/Excel to data table and vice versa (with a step-by-step example).

UNIT-IV
Taking Control of the Controls- Finding and attaching windows- Finding the control Techniques for waiting for a control- Act on controls – mouse and keyboard activities Working with UiExplorer- Handling events-Revisit recorder- Screen Scraping- When to use OCR- Types of OCR available- How to use OCR- Avoiding typical failure points.

UNIT-V

Exception Handling, Debugging, and Logging- Exception handling- Common exceptions and ways to handle them- Logging and taking screenshots- Debugging techniques Collecting crash dumps- Error reporting- Future of RPA

TEXT BOOKS:
1. Tom Taulli , The Robotic Process Automation Handbook : A Guide to Implementing RPA Systems,2020, ISBN-13 (electronic): 978-1-4842-5729-6, Publisher : Apress
2. Alok Mani Tripathi, Learning Robotic Process Automation, Publisher: Packt Publishing Release Date: March 2018 ISBN:9781788470940

REFERENCE BOOKS:
1. Frank Casale, Rebecca Dilla, Heidi Jaynes, Lauren Livingston, "Introduction to Robotic Process Automation: A Primer", Institute of Robotic Process Automation.
2. Richard Murdoch, Robotic Process Automation: Guide To Building Software Robots, Automate Repetitive Tasks& Become An RPA Consultant
3. Srikanth Merianda, Robotic Process Automation Tools, Process Automation and their benefits: Understanding RPA and Intelligent Automation