MANGALAYATAN UNIVERSITY

Learn Today to Lead Tomorrow

BCA Syllabi
(Choice Based Credit System)
Department of Computer Engineering & Applications
Institute of Engineering & Technology

Mangalayatan University
Beswan, Aligarh – 202145

2022-25

Ist Semester

Course Code: A040102T	**L**	**T**	**P**	**C**
Course Name: Communicative English	**2**	**0**	**0**	**2**

S. No.	**Course Outcomes(COs)**	**Cognitive Level**
1.	**Define** Communication	Understanding
2.	**Distinguish** between General and Professional communication	Remember
3.	**Make Use of** verbal and non-verbal communication	Apply
4.	**Develop** effective communication with correct pronunciation	Apply
5.	**Develop** error free writing skills.	Apply

Unit I *Communication:*
Introduction, Definition, Nature and Scope of Communication, Importance and Purpose of Communication, Process of Communication; Encoder and Decoder, Message, Types of Communication; Verbal and Non-Verbal Communication Personal Appearance, Gestures, Postures, Facial Expression, Eye Contacts, Body Language (Kinesics), Time language, Silence Inter and Intra Personal Communication.

Unit II *Language Skills:*
Four Language Skills; Receptive Skills, Productive Skills, Listening: Listening-concept and cycle, Barriers to Effective Listening, Physical Barriers, Psychological Barriers, Linguistic Barriers, Listening for general content, Listening for filling up information.

Unit III *Vocabulary:*
Chosen list of general commonly used everyday words Synonyms, Antonyms, Homonyms, Homographs, Homophones.

Unit IV *Removing grammatical Errors I:*
Difference between Mistakes and errors, Wrong use of preposition, wrong use of tenses, misplaced modifiers, confused adverbs, confused adjective, confused nouns and other words.

Unit V Removing grammatical Errors II:

Subject-Verb Agreement, Indefinite and Unnecessary articles, Correct order of words, confusion of number, negatives and questions, un-English expressions, Incorrect/Omission/unnecessary prepositions.

Books Recommended:

1. *You can win, Shiv Khera, Macmillan Publishers, India*
2. *Listening Skills: Year1/2 and P2/3 Bk.3, Graeme Beals, Jean Edwards, Prim-Ed Publishi ng*
3. *A Practical Course for developing speaking skills in English, Gangal J. K., PHI*
4. *A Practical Course for developing writing skills in English, Gangal J. K., PHI*
5. *Little Red Book: Modern Writings Skills, Terry O Brien, Rupa Publications*

Course Code: A040102T	**L**	**T**	**P**	**C**
Course Name: Communicative English	**2**	**0**	**0**	**2**

S. No.	Course Outcomes(COs)	Mapping
1.	**Define** Communication	**Skill Development**
2.	**Distinguish** between General and Professional communication	**Skill Development**
3.	**Make Use of** verbal and non-verbal communication	**Skill Development**
4.	**Develop** effective communication with correct pronunciation	**Skill Development**
5.	**Develop** error free writing skills.	**Skill Development**

Unit I *Communication:*
Introduction, Definition, Nature and Scope of Communication, Importance and Purpose of Communication, Process of Communication; Encoder and Decoder, Message, Types of Communication; Verbal and Non-Verbal Communication Personal Appearance, Gestures, Postures, Facial Expression, Eye Contacts, Body Language (Kinesics), Time language, Silence Inter and Intra Personal Communication.

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Four Language Skills; Receptive Skills, Productive Skills, Listening: Listening-concept and cycle, Barriers to Effective Listening, Physical Barriers, Psychological Barriers, Linguistic Barriers, Listening for general content, Listening for filling up information.

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Chosen list of general commonly used everyday words Synonyms, Antonyms, Homonyms, Homographs, Homophones.

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Difference between Mistakes and errors, Wrong use of preposition, wrong use of tenses, misplaced modifiers, confused adverbs, confused adjective, confused nouns and other words.

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4. *A Practical Course for developing writing skills in English, Gangal J. K., PHI*
5. *Little Red Book: Modern Writings Skills, Terry O Brien, Rupa Publications*

Paper Code: B-030103T	**L**	**T**	**P**	**C**
Paper Name: Applied Mathematics-I	**3**	**1**	**0**	**4**

Course Outcomes:

S.No.	Course Outcomes (COs)	Cognitive Level
1.	**Recall** limits continuity & differentiation.	Remember
2.	**Describe** various theorems of calculus.	Remember
3.	**Recall** proper and improper integrals.	Remember
4.	**Compute** multiple integrals.	Understand
5.	**Interpret** vector calculus.	Understand

Unit-I: Differential Calculus-I

Review of limit, continuity and differentiability, uniform continuity, Sequences and series, limsup, liminf, convergence of sequences and series of real numbers, absolute and conditional convergence, Successive differentiation, Leibnitz's theorem for the nth derivative of the product of two function.

Unit-II: Differential Calculus-II

Mean value theorem, Maclaurin's& Taylor's expansion of functions, Functions of several variables, limit and continuity, partial derivatives and differentiability, gradient, directional derivatives, chain rule, Taylor's theorem, maxima and minima and the method of Lagrange multipliers, curve tracing.

Unit-III:Integral Calculus

Riemann integral, fundamental theorem of integral calculus, applications of definite integrals, improper integrals, beta and gamma functions.

Unit-IV: Multiple Integrals

Double Integration:Evaluation of Double Integral (In Cartesian and Polar form), change of order of integration, Jacobian and change of variables.

Triple integrals: Triple integration, change to spherical- Coordinates, calculation of volume, surface area, mass.

Unit-V: Vector Calculus

Vector differentiation, scalar and vector point function, Geometric meaning of gradient, Equation of normal line and normal plane, Equation of tangent line and tangent plane, Directional derivative, Divergence of vector function and its interpretation, Curl and their physical interpretation, Line integral, Surface integral, Volume integral, Gauss and Stokes' theorems with applications.

Books Recommended

1. Dass, H.K; Introduction to Engg. Mathematics, Vol-I, S.Chand
2. Bali, N. P.; Engg. Mathematics Vol-I, Laxmi Publication
3. Grewal, BS; Engg. mathematics Vol-I, Khanna Publication
4. Vashishtha, A.R.; Engg. Mathematics Vol-I, PragatiPrakashan

Paper Code: B-030103T	**L**	**T**	**P**	**C**
Paper: Applied Mathematics-I	**3**	**1**	**0**	**4**

Course outcomes focused on employability/ entrepreneurship/ skill development

Course Outcomes:

S. No.	Course Outcomes (COs)	Mapping
1.	**Recalls** limit continuity & differentiation**.**	**Skill Development**
2.	**Describe** various theorems of calculus.	**Skill Development**
3.	**Recall** proper and improper integrals**.**	**Skill Development**
4.	**Compute** multiple integrals.	**Skill Development**
5.	**Interpret** vector calculus**.**	**Skill Development**

Unit-I: Differential Calculus-I

Review of limit, continuity and differentiability, uniform continuity, Sequences and series, limsup, liminf, convergence of sequences and series of real numbers, absolute and conditional convergence, Successive differentiation, Leibnitz's theorem for the nth derivative of the product of two function.

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1. Dass, H.K; Introduction to Engg. Mathematics, Vol-I, S.Chand
2. Bali, N. P.; Engg. Mathematics Vol-I, Laxmi Publication
3. Grewal, BS; Engg. mathematics Vol-I, Khanna Publication
4. Vashishtha, A.R.; Engg. Mathematics Vol-I, PragatiPrakashan

Paper Code: B070101T	**L**	**T**	**P**	**C**
Paper: Problem Solving using Computer	**3**	**1**	**0**	**4**

Course outcomes:

S. No.	Course Outcomes (COs)	Cognitive Level
1.	Understand hardware components of computer system such as memory system organization, input/output devices, aware of software components of computer system, and windows operating system concepts.	Understand
2.	Develops basic understanding of computers, the concept of algorithm and algorithmic thinking.	Understand
3.	Develops the ability to analyze a problem, develop an algorithm to solve it.	Apply
4.	Develops the use of the Python programming language to implement various algorithms, and	Analyze
5.	Develops the basic concepts and terminology of programming in general.	Create

Unit--I: Computer Fundamentals

Introduction to Computers:Characteristics of Computers, Uses of computers, Types and generations of Computers. Basic Computer Organization - Units of a computer, CPU, ALU, memory hierarchy, registers, I/O devices. Planning the Computer Program: Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation.

Unit-II: Techniques of Problem Solving

Flowcharting, decision table, algorithms, Structured programming concepts, Programming methodologies viz. top-down and bottom-up programming. Overview of Programming: Structure of a Python Program, Elements of Python, IDEs for python, Python Interpreter, Using Python as calculator, Python shell, Indentation.

Unit-III: Introduction to Python

Atoms, Identifiers and keywords, Literals, Strings, Operators (Arithmetic operator, Relational operator, Logical or Boolean operator, Assignment, Operator, Ternary operator, Bit wise operator, Increment or Decrement operator). Creating Python Programs: Input and Output Statements, Control statements (Looping- while Loop, for Loop, Loop Control, Conditional Statement- if...else, Difference between break, continue and pass).

Unit-IV: Structures:

Numbers, Strings, Lists, Tuples, Dictionary, Date & Time, Modules, Defining Functions, Exit function, default arguments. File handling in python.

Unit-V: Introduction to Advanced Python

Objects and Classes,Inheritance, Regular Expressions, Event Driven Programming, GUI Programming. Basic concepts of concepts of Package and modules

Suggested Readings:

1. P. K. Sinha & Priti Sinha , "Computer Fundamentals", BPB Publications, 2007.
2. Dr. Anita Goel, Computer Fundamentals, Pearson Education, 2010.
3. T. Budd, Exploring Python, TMH, 1st Ed, 2011

4. Python Tutorial/Documentation www.python.or 2010
5. Allen Downey, Jeffrey Elkner, Chris Meyers , How to think like a computer scientist : learning with Python , Freely available online.2012
6. Rober Sedgewick, K Wayne -Introduction to Programming in Python: An interdisciplinary Approach" Pearson India

Suggestive digital platforms web links-

1. https://www.pearsoned.co.in/prc/book/anita-goel-computer-fundamentals-1e-1/9788131733097
2. http://docs.python.org/3/tutorial/index.html
3. http://interactivepython.org/courselib/static/pythonds
4. http://www.ibiblio.org/g2swap/byteofpython/read/

Paper Code: B070101T **L T P C**
Paper: Problem Solving using Computer **3 1 0 4**

Course outcomes:

S. No.	Course Outcomes (COs)	Mapping
1.	Understand hardware components of computer system such as memory system organization, input/output devices, aware of software components of computer system, and windows operating system concepts.	Employability/Skill Development
2.	Develops basic understanding of computers, the concept of algorithm and algorithmic thinking.	Employability/Skill Development
3.	Develops the ability to analyze a problem, develop an algorithm to solve it.	Skill Development
4.	Develops the use of the Python programming language to implement various algorithms, and	Skill Development
5.	Develops the basic concepts and terminology of programming in general.	Skill Development

Unit-I: Computer Fundamentals
Introduction to Computers:Characteristics of Computers, Uses of computers, Types and generations of Computers. Basic Computer Organization - Units of a computer, CPU, ALU, memory hierarchy, registers, I/O devices. Planning the Computer Program: Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation.

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2. Dr. Anita Goel, Computer Fundamentals, Pearson Education, 2010.
3. T. Budd, Exploring Python, TMH, 1st Ed, 2011
4. Python Tutorial/Documentation www.python.or 2010

5. Allen Downey, Jeffrey Elkner, Chris Meyers , How to think like a computer scientist : learning with Python , Freely available online.2012
6. Rober Sedgewick, K Wayne -Introduction to Programming in Python: An interdisciplinary Approach" Pearson India

Suggestive digital platforms web links-

1. https://www.pearsoned.co.in/prc/book/anita-goel-computer-fundamentals-1e-
2. 1/9788131733097
3. http://docs.python.org/3/tutorial/index.html
4. http://interactivepython.org/courselib/static/pythonds
5. http://www.ibiblio.org/g2swap/byteofpython/read/

Course Code:**H-000101T**	Course Title: Food and Nutrition
	L-T-P-C: 2-0-0-2

Unit	Topics
I	Concept of Food and Nutrition (a) Definition of Food, Nutrients, Nutrition, Health, balanced Diet (b) Types of Nutrition- Optimum Nutrition, under nutrition, Over Nutrition (c) Meal planning- Concept and factors affecting Meal Planning (d) Food groups and functions of food
II	Nutrients: Macro and Micro RDA, Sources, Functions, Deficiency and excess of (a) Carbohydrate (b) Fats (c) Protein (d) Minerals Major: Calcium, Phosphorus, Sodium, Potassium Trace: Iron, Iodine, Fluorine, Zinc (e) Vitamins Water soluble vitamins: Vitamin B, C Fat soluble vitamins: Vitamin A, D, E, K (f) Water (g) Dietary Fibre
III	1000 days Nutrition (a) Concept, Requirement, Factors affecting growth of child (b) Prenatal Nutrition (0 - 280 days): Additional Nutrients' Requirement and risk factors during pregnancy (c) Breast / Formula Feeding (Birth – 6 months of age) (d) Complementary and Early Diet (6 months – 2 years of age)
IV	Community Health Concept (a) Common diseases prevalent in the society and its causes (b) National and International Program and Policies for improving Dietary Nutrition (c) Nutrition requirement in the following Diabetes Hypertension Obesity Constipation Diarrhea Typhoid (d) Immunity Boosting Food

Suggested Readings:

1. Singh, Anita, "Food and Nutrition", Star Publication, Agra, India, 2018.
2. 1000Days-Nutrition_Brief_Brain-Think_Babies_FINAL.pdf
3. https://pediatrics.aappublications.org/content/141/2/e20173716
4. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5750909/

Suggested Continuous Evaluation Methods:
MCQs, Practical Diet/ Meal Planning, assignments Presentations, group Discussion, Case study, Survey
Suggested equivalent online courses:
https://www.udemy.com/course/internationally-accredited-diploma-certificate-in-nutrition
Diploma in Human Nutrition-Revised Offered by Alison

Paper Code: B070103T **L T P C**
Paper: Logical Organisation of Computers **3 1 0 4**

S. No.	Course Outcomes (COs)	Cognitive Level
1.	**Examine** the organization of basic computer , its design and the design of control unit.	Analyzing
2.	**Demonstrate** the working of central processing unit and RISC and CISC Architecture.	Understand
3.	**Describe** the operations and language of the register transfer, micro operations and input- output organization	Understand
4.	**Apply** advanced concepts of computer architecture, Parallel Processing, interprocessor communication and synchronization	Applying
5.	**Adapt** the concepts of computer organization & architecture	Creating

Unit – I: Basic Organization
Number Systems, Number Base conversion, Octal and Hexadecimal Numbers, Binary Arithmetic, 2's Complements: Addition and Subtraction of 2's Complements, Fixed-point and Floating-point representation of numbers, BCD Codes, Decimal and Alphanumeric codes, Error detecting and correcting codes.

Unit – II: Binary Logic
Boolean Algebra, Boolean Theorems, Boolean Functions and Truth Tables, Canonical and Standard forms of Boolean functions, Simplification of Boolean Functions – Venn Diagram, Karnaugh Maps.

Unit – III: Digital Logic
Basic Gates – AND, OR, NOT, Universal Gates – NAND, NOR, Other Gates – XOR, XNOR etc. NAND, NOR, AND-OR-INVERT and OR-AND-INVERT implementations of digital circuits, Combinational Logic – Characteristics, Design Procedures and analysis procedures.

Unit – IV: Combinational Circuits
Half-Adder, Full-Adder, Half-Subtractor, Full-Subtractor, Encoders, Decoders, Multiplexers, Demultiplexers, Comparators, Code Converters, BCD to Seven-Segment Decoder.

Unit – V: Sequential Logic
Characteristics, Flip-Flops, Clocked RS, D type, JK, T type and Master-Slave flip-flops, State table, state diagram and state equations. Flip-flop excitation tables.

Books Recommended/Suggested Reading

1. M. Morris Mano, Digital Logic and Computer Design, Prentice Hall of India Pvt. Ltd.
2. V. Rajaraman, T. Radhakrishnan, An Introduction to Digital Computer Design, Prentice Hall of India Pvt. Ltd.
3. Andrew S. Tanenbaum, Structured Computer Organization, Prentice Hall of India Pvt. Ltd.
4. Nicholas Carter, Schaum's Outlines Computer Architecture, Tata McGraw-Hill

Paper Code: B070103T	**L**	**T**	**P**	**C**
Paper: Logical Organisation of Computers	**3**	**1**	**0**	**4**

Course outcomes focused on employability/ entrepreneurship/ skill development

S. No.	Course Outcomes (COs)	Mapping
1.	**Examine** the organization of basic computer , its design and the design of control unit.	Skill Development
2.	**Demonstrate** the working of central processing unit and RISC and CISC Architecture.	Skill Development
3.	**Describe** the operations and language of the register transfer, micro operations and input- output organization	Skill Development
4.	**Apply** advanced concepts of computer architecture, Parallel Processing, interprocessor communication and synchronization	Skill Development
5.	**Adapt** the concepts of computer organization & architecture	Skill Development

Unit – I: Basic Organization

Number Systems, Number Base conversion, Octal and Hexadecimal Numbers, Binary Arithmetic, 2's Complements: Addition and Subtraction of 2's Complements, Fixed-point and Floating-point representation of numbers, BCD Codes, Decimal and Alphanumeric codes, Error detecting and correcting codes.

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Boolean Algebra, Boolean Theorems, Boolean Functions and Truth Tables, Canonical and Standard forms of Boolean functions, Simplification of Boolean Functions – Venn Diagram, Karnaugh Maps.

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Basic Gates – AND, OR, NOT, Universal Gates – NAND, NOR, Other Gates – XOR, XNOR etc. NAND, NOR, AND-OR-INVERT and OR-AND-INVERT implementations of digital circuits, Combinational Logic – Characteristics, Design Procedures and analysis procedures.

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Half-Adder, Full-Adder, Half-Subtractor, Full-Subtractor, Encoders, Decoders, Multiplexers, Demultiplexers, Comparators, Code Converters, BCD to Seven-Segment Decoder.

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Characteristics, Flip-Flops, Clocked RS, D type, JK, T type and Master-Slave flip-flops, State table, state diagram and state equations. Flip-flop excitation tables.

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Paper Code: B070102P **L T P C**
Paper: Software Lab using Python **0 0 4 2**

S. No.	Course Outcomes (COs)	Mapping
1.	Examine To learn and understand Python programming basics.	Skill Development
2.	Demonstrate To learn and understand python looping, control statements and string manipulations.	Skill Development
3.	Describe Students should be made familiar with the concepts of GUI controls and designing GUI applications.	Skill Development
4.	Apply To learn and know the concepts of file handling, exception handling.	Skill Development
5.	Adapt To learn and know the concepts of database connectivity.	Skill Development

Section: A (Simple programs)

1. Write a menu driven program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.
2. WAP to calculate total marks, percentage and grade of a student. Marks obtained in each of the three subjects are to be input by the user. Assign grades according to the following criteria:
   Grade A: Percentage >=80
   Grade B: Percentage>=70 and <80
   Grade C: Percentage>=60 and <70
   Grade D: Percentage>=40 and <60
   Grade E: Percentage<40
3. Write a menu-driven program, using user-defined functions to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.
4. WAP to display the first n terms of Fibonacci series.
5. WAP to find factorial of the given number.
6. WAP to find sum of the following series for n terms:
   1 – 2/2! + 3/3!---------- n/n
7. WAP to calculate the sum and product of two compatible matrices.

Section: B (Visual Python)

All the programs should be written using user defined functions, wherever possible.

1. Write a menu-driven program to create mathematical 3D objects
   I. Curve
   II. Sphere
   III. Cone
   IV. Arrow
   V. Ring
   VI. Cylinder
2. WAP to read n integers and display them as a histogram.
3. WAP to display sine, cosine, polynomial and exponential curves.
4. WAP to plot a graph of people with pulse rate p vs. height h. The values of p and h are to be entered by the user.

5. WAP to calculate the mass m in a chemical reaction. The mass m (in gms) disintegrates according to the formula m=60/(t+2), where t is the time in hours. Sketch a graph for t vs. m, where t>=0.
6. A population of 1000 bacteria is introduced into a nutrient medium. The population p grows as follows:

   P(t) = (15000(1+t))/(15+ *e)*

   where the time t is measured in hours. WAP to determine the size of the population at given time t and plot a graph for P vs t for the specified time interval.
7. Input initial velocity and acceleration, and plot the following graphs depicting equations of motion:
   I. velocity wrt time (v=u+at)
   II. distance wrt time (s=u*t+0.5*a*t*t)
   III. distance wrt velocity (s=(v*v-u*u)/2*a)

Suggested Readings:

1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016 (http://greenteapress.com/wp/thinkpython/)
2. Guido van Rossum and Fred L. Drake Jr, "An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.
3. Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013.
4. John V Guttag, "Introduction to Computation and Programming Using Python'', Revised and expanded Edition, MIT Press , 2013
5. Kenneth A. Lambert, "Fundamentals of Python: First Programs", CENGAGE Learning, 2012.

Paper Code: B-070103P **L T P C**
Paper: Logical Organisation of Computers Lab **0 0 0 2**

S. No.	Course Outcomes (COs)	Cognitive Level
1.	**Examine** the organization of basic computer , its design and the design of control unit.	Analyzing
2.	**Demonstrate** the working of central processing unit and RISC and CISC Architecture.	Understand
3.	**Describe** the operations and language of the register transfer, micro operations and input- output organization	Understand
4.	**Apply** advanced concepts of computer architecture, Parallel Processing, interprocessor communication and synchronization	Applying
5.	**Adapt** and learn the basic concept behind the architecture and organization of computers	Creating

List of Experiments:-

1. Study and Bread Board Realization of Logic Gates. K-Map, Flip-Flop equation, realization of characteristic and excitation table of various Flip Flops.
2. Study of Logic gates and their ICs and universal gates
3. Implement code converters
4. Implement Adder and Subtractor Arithmetic circuits
5. Design and implement combinational circuit based on the problem given and minimizing using K-maps
6. Implement Encoder and Decoder and Multiplexer and De-multiplexers
7. Study of flip-flops and counters Memory Organization
8. Study of counter ICs and designing Mod-N counters

IInd Semester

Paper Code: CEL-1206	**L**	**T**	**P**	**C**
Paper: Disaster Management	**2**	**0**	**0**	**2**

Course Outcomes:

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

1. Assess risk of a disaster and associated damages.
2. Develop a disaster management plan.
3. Appraise role of various stakeholders in disaster management.
4. Perceive disaster management policies.

Unit 1: Introduction to Disaster Management (DM)

Importance & Significance, Types of Disasters, Climate Change, DM cycle.

Unit 2: Risk Assessment

Risk, Vulnerability, Types of Risk, Risk identification, Emerging risks, Risk Assessment, Damage Assessment, Risk modeling.

Unit 3: Disaster Management

Phases, Cycle of Disaster Management, Institutional Framework, Incident Command System, DM Plan , Community Based DM, Community health and safety, Early Warning and Disaster Monitoring, Disaster Communication, Role of GIS and Remote Sensing, Do's and Don'ts in various disasters.

Unit 4: Role of an Engineer

Challenges and solutions for DM, Disaster Safe Designs and Constructions, Structural and Non Structural Mitigation of Disasters.

Unit 5: Disaster Management Policy & Practices

Disaster Management Act 2005, Disaster Management Policy, National Guidelines and Plans, Role of Government, Non-Government and Private Agencies.

Self-Study:

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Books Recommended/ Suggested Readings:

1. Modh, S., Introduction to Disaster Management, Macmillan.

2. Sinha, P.C., Disaster Relief Rehabilitation and Emergency Humanitarian Assistance, SBS Publishers.

3. Piers B, Cannon T., Davis I., & Ben W., At Risk: Natural hazards, People Vulnerability and Disasters, Routledge.

4. Singh R.B. (Ed.), Natural Hazards and Disaster Management Vulnerability Mitigation, Rawat Publications.

5. Robert B., & Edwards K., Natural Hazards: Earth 's' processes as hazards disasters and catastrophe, Pearson Prentice Hall.

Paper Code: MAL-1201	**L**	**T**	**P**	**C**
Paper Name: Applied Mathematics-II	**3**	**0**	**0**	**3**

S. No.	Course Outcomes (COs)	Cognitive Level
1.	**Describe** vector spaces and matrices.	Remember
2.	**Recall** theorems of linear algebra.	Remember
3.	**Extend** differential equations.	Understand
4.	**Compute** boundary value problems.	Understand
5.	**Apply** Fourier and Laplace Transformation	Apply

UNIT-I: Linear Algebra-I

Vector spaces over Q, R and C, subspaces, linear independence, linear span of a set of vectors, basis and dimension of a vector space, sum and direct sum. Systems of linear (homogeneous and non-homogeneous) equations, matrices and Gauss elimination, elementary row operations, row space, column space, null space and rank of a matrix.

UNIT-II: Linear Algebra-II

Linear transformation, rank-nullity theorem and its applications, matrix representation of a linear transformation, change of basis and similarity, Eigen values and Eigen vectors, characteristic and minimal polynomials, Cayley-Hamilton theorem (without proof) and applications.

Unit-III: Differential Equations-I

Review of first order differential equations, Picard's theorem, linear dependence and Wronskian. Dimensionality of space of solutions, linear ODE with constant coefficients of second and higher order, Cauchy-Euler equations, Method of undetermined coefficients and method of variation of parameters.

Unit-IV: Differential Equations-II

Boundary Value Problems: Sturm-Liouville, eigen value problems. System of linear differential equations with constant coefficients, fundamental matrix, matrix methods.Power Series and its convergence, power series method.

UNIT-V: Fourier Series and Laplace Transformation

Fourier series, Change of interval for even and odd functions Fourier series for half wave symmetry function, Solution of boundary value problem by using integral transform, Laplace transformation, Properties of Laplace transforms, Differentiation & Integration of Laplace Transforms. Inverse Laplace transforms of derivatives and integrals, Inverse Laplace transforms by convolution and by other methods.

Books Recommended

1. Dass, H.K; Introduction to Engg. Mathematics, Vol-I, S.Chand
2. Bali, N. P.; Engg. Mathematics Vol-II, Laxmi Publication
3. Grewal, B.S; Engg. mathematics Vol-II, Khanna Publication

Paper Code: MAL-1201 **L T P C**
Paper Name: Applied Mathematics-II **3 0 0 3**

S.No.	Course Outcomes (COs)	Cognitive Level
1.	**Describe** vector spaces and matrices.	**Skill Development**
2.	**Recall** theorems of linear algebra.	**Skill Development**
3.	**Extend** differential equations.	**Skill Development**
4.	**Compute** boundary value problems.	**Skill Development**
5.	**Apply** Fourier and Laplace Transformation	**Skill Development**

UNIT-I: Linear Algebra-I
Vector spaces over Q, R and C, subspaces, linear independence, linear span of a set of vectors, basis and dimension of a vector space, sum and direct sum. Systems of linear (homogeneous and non-homogeneous) equations, matrices and Gauss elimination, elementary row operations, row space, column space, null space and rank of a matrix.

UNIT-II : Linear Algebra-II
Linear transformation, rank-nullity theorem and its applications, matrix representation of a linear transformation, change of basis and similarity, Eigen values and Eigen vectors, characteristic and minimal polynomials, Cayley-Hamilton theorem (without proof) and applications.

Unit-III: Differential Equations-I
Review of first order differential equations, Picard's theorem, linear dependence and Wronskian. Dimensionality of space of solutions, linear ODE with constant coefficients of second and higher order, Cauchy-Euler equations, Method of undetermined coefficients and method of variation of parameters.

Unit-IV: Differential Equations-II
Boundary Value Problems: Sturm-Liouville, eigen value problems. System of linear differential equations with constant coefficients, fundamental matrix, matrix methods.Power Series and its convergence, power series method.

UNIT-V: Fourier Series and Laplace Transformation
Fourier series, Change of interval for even and odd functions Fourier series for half wave symmetry function, Solution of boundary value problem by using integral transform, Laplace transformation, Properties of Laplace transforms, Differentiation & Integration of Laplace Transforms. Inverse Laplace transforms of derivatives and integrals, Inverse Laplace transforms by convolution and by other methods.

Books Recommended

1. Dass, H.K; Introduction to Engg. Mathematics, Vol-I, S.Chand
2. Bali, N. P.; Engg. Mathematics Vol-II, Laxmi Publication
3. Grewal, B.S; Engg. mathematics Vol-II, Khanna Publication

Paper Code: B070203T **L T P C**
Paper: Management Information System **3 1 0 4**

S. No.	Course Outcomes (COs)	Cognitive Level
1.	**Relate** the basic concepts and technologies used in the field of management information systems;.	Remembering
2.	**Compare** the processes of developing and implementing information systems.	Understand
3.	**Outline** the role of the ethical, social, and security issues of information systems.	Understand
4.	**Translat**e the role of information systems in organizations, the strategic management processes,with the implications for the management.	Applying
5.	**Apply** the understanding of how various information systems like DBMS work together to accomplish the information objectives of an organization.	Applying

UNIT-I: Introduction of MIS

Introduction, need for information system, Decision support systems, systems approach, the systems view of business, role of MIS within the company. Management Organizational theory and the systems approach: Development of organization theory, management and organizational behavior, management, information and the systems approach.

UNIT-II: Information Systems for decision making

Introduction, Evolution of an information system, Basic Information Systems, decision making and MIS, decision making and the human brain, bounded rationality, tools and technique of decision making,types ofdecision.

UNIT-III: Strategic and project planning for MIS

General business planning, appropriate MIS response, MIS planning –general, MIS planning – details.

UNIT-IV: Conceptual system design

Define the problems, set system objectives, establish system constraints, determine information needs, determine information sources, develop alternative conceptual designs and select one, document the system concept, prepare the conceptual design report.

UNIT-V: Implementation, evaluation and maintenance of the MIS Plan

The implementation, acquire floor space and plan space layouts, organize for implementation, develop procedures for implementation, train and operating personnel, computer related acquisitions, develop forms for data collection and information, dissemination, develop the files, test the system, cut over, document the system, evaluate the MIS, control and maintain the system. Pitfalls in MIS development: Fundamental weaknesses, soft spots in planning, design problems.

Books Recommended/Suggested Reading:

1. R.G. Murdick, J. E. Ross and J. R. Clagget: “Information Systems for Modern Management”, 3rd Edition.
2. Parker, Charles Case, Thomas: “Management Information System: Strategy & Action”, 2nd
3. O.vrian: Management Information System.
4. W.S. Javedkar: Management Information System.

Paper Code: B070203T **L T P C**
Paper: Management Information System **3 1 0 4**
Course outcomes focused on employability/ entrepreneurship/ skill development

S. No.	Course Outcomes (COs)	Mapping
1.	Relate the basic concepts and technologies used in the field of management information systems;.	Employability/Skill Development
2.	Compare the processes of developing and implementing information systems.	Employability/Skill Development
3.	Outline the role of the ethical, social, and security issues of information systems.	Employability/Skill Development
4.	Translate the role of information systems in organizations, the strategic management processes,with the implications for the management.	Employability/Skill Development
5.	Apply the understanding of how various information systems like DBMS work together to accomplish the information objectives of an organization.	Employability/Skill Development

UNIT-I: Introduction of MIS
Introduction, need for information system, Decision support systems, systems approach, the systems view of business, role of MIS within the company. Management Organizational theory and the systems approach: Development of organization theory, management and organizational behavior, management, information and the systems approach.

UNIT-II: Information Systems for decision making
Introduction, Evolution of an information system, Basic Information Systems, decision making and MIS, decision making and the human brain, bounded rationality, tools and technique of decision making, types of decision.

UNIT-III: Strategic and project planning for MIS
General business planning, appropriate MIS response, MIS planning general, MIS planning details.

UNIT-IV: Conceptual system design
Define the problems, set system objectives, establish system constraints, determine information needs, determine information sources, develop alternative conceptual designs and select one, document the system concept, prepare the conceptual design report.

UNIT-V: Implementation, evaluation and maintenance of the MIS Plan
The implementation, acquire floor space and plan space layouts, organize for implementation, develop procedures for implementation, train and operating personnel, computer related acquisitions, develop forms for data collection and information, dissemination, develop the files, test the system, cut over, document the system, evaluate the MIS, control and maintain the system. Pitfalls in MIS development: Fundamental weaknesses, soft spots in planning, design problems.

Books Recommended/Suggested Reading:

1. R. G. Murdick, J. E. Ross and J. R. Clagget: "Information Systems for Modern Management", 3rd Edition.
2. Parker, Charles Case, Thomas: "Management Information System:Strategy & Action", 2nd
3. O.vrian: Management Information System.
4. W.S. Javedkar: Management Information System.

Paper Code: B070201T **L T P C**
Paper: Database Management System **3 1 0 4**

S. No.	Course Outcomes (COs)	Cognitive Level
1.	Understands the basic concepts of data base management systems.	Remembering
2.	Design E-R diagrams for real world applications.	Analyzing
3.	Formulate relational algebraic expressions using relational data models and languages.	Applying
4.	Apply normalization transaction properties and concurrency control to design database.	Creating
5.	Analyze the security algorithms for database protection.	Evaluating

UNIT-I: Introduction
Database System Concepts, File system vs. database system, Database system architecture, Data models and their types, Data base scheme and instances, Data independence, Database Languages and Interfaces.
UNIT-II: Data Modeling Concepts: ER model concepts: Notations for ER diagram, Extended E-R diagram, Extended E-R model, E-R model design issues, constraints, and keys:Weak entity set strong entity set, Relationships of higher degree. **Relational model concepts:** code rules, constraints, Relational Algebra operations, Extended relational algebra operations, Relational Calculus, Tuple and Domain relational calculus.

UNIT-III: Database Design
Functional dependencies, Normal forms, First, second, and third normal forms, BCNF, Multi-valued dependencies and Fourth Normal form, Join Dependencies and Fifth Normal form.
UNIT-IV: Concurrency Control
Transaction, Query Processing Transaction and system concepts: transaction states, ACID properties of transactions, concurrent execution schedules and Recoverability,Serializability of schedules.Query Processing and Optimization: Measures of Query cost, Cost, Evaluation of expression.Optimization: Transformation of relational expression, Choice of evaluation plan.Concurrency Control Techniques: Two phase Locking Techniques for Concurrency Control; Time stamping in Concurrency control.
UNIT-V: Introduction to SQL
Basic Structure of SQL Query, Set operators, SELECT, UNION,INTERSECT, and EXCEPT, Nested queries, Aggregate function, Null values, Derived Relations, Modification of the Database, Joined relations and up-dates in SQL. Database Security Importance of data, Threats and risks, Users and database privileges,Access Control, Security for Internet Applications, Role of Database Administrator.

Suggested Readings:

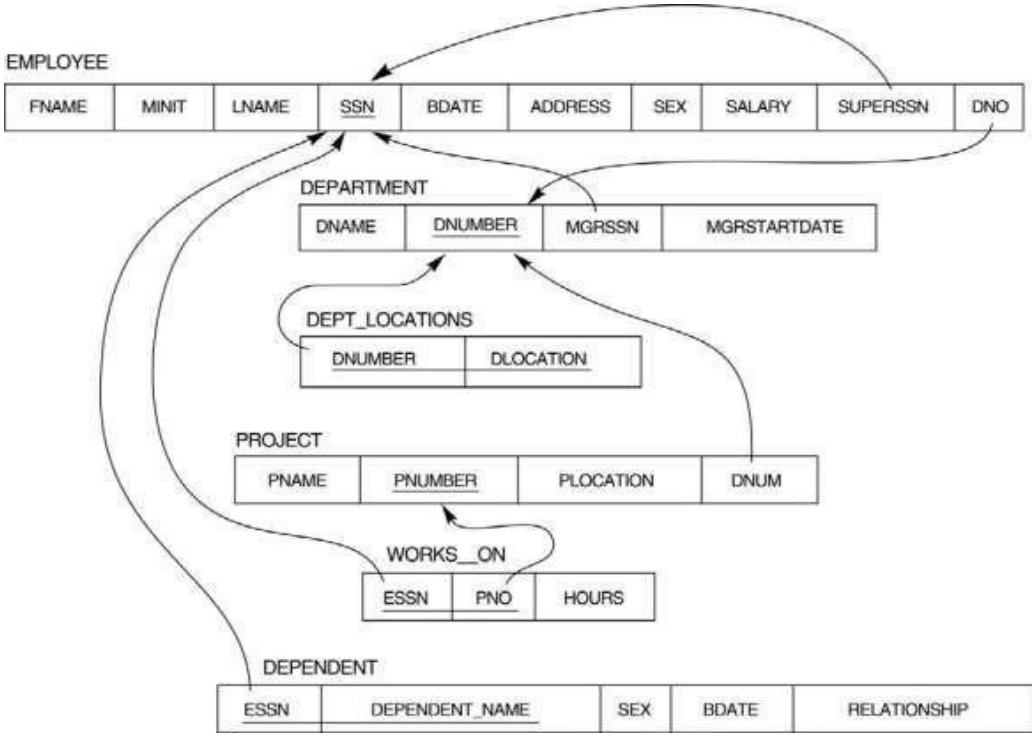
1. Henry F. Korth and Abraham Silberschatz, "Database System Concepts," Second Edition, McGraw Hill, 1991.
2. AtulKahate, "Introduction to Database Management Systems," Pearson India, 2004.
3. Raghu Ramakrishnan and Johannes Gehrike, "Database Management Systems," Third McGraw Hill, Edition, 2003.
4. R. Elmasri, S.B. Navathe Database Systems Models, Languages, Design and application Programming, 6 Edition, Pearson Education,2013.
5. Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts 6th Edition, McGraw Hill, 2010.
6. C.J Date " An Introduction to Database Systems", Addison Wesley

Paper Code: B070201P	L	T	P	C
Paper: Database Management System Lab	0	0	4	2

List of Experiments

1. Creation of databases and execution of SQL queries.
2. Creation of Tables using MySQL: Data types, Creating Tables (along with Primary and Foreign keys), Altering Tables and Dropping Tables.
3. Practicing DML commands- Insert, Select, Update, Delete.
4. Practicing Queries using ANY, ALL, IN, EXISTS, NOT, EXISTS, UNION, INTERSECT, and CONSTRAINTS, etc.
5. Practice Queries using COUNT, SUM, AVG, MAX, MIN, GROUP BY, HAVING, VIEWS Creation and Dropping.
6. Use of COMMIT, ROLLBACK and SAVEPOINT.
7. Practicing on Triggers - creation of trigger, Insertion using trigger, Deletion using trigger, Updating using trigger.
8. To remove the redundancies and anomalies in the above relational tables, Normalize up to Third Normal Form.

Relational Database Schema - COMPANY



Questions to be performed on above schema

1. Create tables with relevant foreign key constraints
2. Populate the tables with data
3. Perform the following queries on the database :
    1. Display all the details of all employees working in the company.
    2. Display ssn, lname, fname, address of employees who work in department no 7.
    3. Retrieve the birthdate and address of the employee whose name is 'Franklin T.Wong'
    4. Retrieve the name and salary of every employee

5. Retrieve all distinct salary values
6. Retrieve all employee names whose address is in ‘Bellaire’
7. Retrieve all employees who were born during the 1950s
8. Retrieve all employees in department 5 whose salary is between 50,000 and 60,000(inclusive)

9. Retrieve the names of all employees who do not have supervisors
10. Retrieve SSN and department name for all employees
11. Retrieve the name and address of all employees who work for the 'Research' department
12. For every project located in 'Stafford', list the project number, the controlling department number, and the department manager's last name, address, and birthdate.
13. For each employee, retrieve the employee's name, and the name of his or her immediate supervisor.
14. Retrieve all combinations of Employee Name and Department Name
15. Make a list of all project numbers for projects that involve an employee whose last name is 'Narayan’ either as a worker or as a manager of the department that controls the project.
16. Increase the salary of all employees working on the 'ProductX' project by 15%. Retrieve employee name and increased salary of these employees.
17. Retrieve a list of employees and the project name each works in, ordered by the employee's department, and within each department ordered alphabetically by employee first name.
18. Select the names of employees whose salary does not match with salary of any employee in department 10.
19. Retrieve the name of each employee who has a dependent with the same first name and same sex as the employee.
20. Retrieve the employee numbers of all employees who work on project located in Bellaire, Houston, or Stafford.
21. Find the sum of the salaries of all employees, the maximum salary, the minimum salary, and the average salary. Display with proper headings.
22. Find the sum of the salaries and number of employees of all employees of the ‘Marketing’ department, as well as the maximum salary, the minimum salary, and the average salary in this department.
23. Select the names of employees whose salary is greater than the average salary of all employees in department 10.
24. For each department, retrieve the department number, the number of employees in the department, and their average salary.
25. For each project, retrieve the project number, the project name, and the number of employees who work on that project.
26. Change the location and controlling department number for all projects having more than 5 employees to ‘Bellaire’ and 6 respectively.
27. For each department having more than 10 employees, retrieve the department no, no of employees drawing more than 40,000 as salary.
28. Insert a record in Project table which violates referential integrity constraint with respect to Department number. Now remove the violation by making necessary insertion in the Department table.
29. Delete all dependents of employee whose ssn is ‘123456789’.
30. Delete an employee from Employee table with ssn = ‘12345’(make sure that this employee has some dependents, is working on some project, is a manager of some department and is supervising some employees). Check and display the cascading effect on Dependent and Works on table. In Department table MGRSSN should be set to default value and in Employee table SUPERSSN should be set to NULL
31. Perform a query using alter command to drop/add field and a constraint in Employee table.

32. A Hostel Management System for a University requires a computerized system to automize its operations that support the following activities:
    - Registration for UG/PG students
    - Hostel Rooms Allocation
    - Hostel Warden
    - Hostel Mess
    - Basic amenities in the room
    - Hostel community room maintenance
    - Maintenance/complaints handling (lights, fans, taps, electricity, stair-case lighting etc.,)
    - Query support
    - Report generation

    Perform the following tasks:
    a. Using any of the drawing tools like smartdraw, dia, visio, conceptdraw etc. or else by your own hand, draw the complete ER diagram for the above event management system by identifying the entities, relationships, cardinality and key constraints. Follow proper conventions.
    b. (Create database to support/accommodate all the functionalities referred above. Perform Normalization till required NF and prepare Normalized tables.
    c. Using MySQL, implement by designing various forms to support the above modules
    d. Report generation should include the expenditure statement for list of students along with room-nos., reports of expenditure in hostel-mess, expenditure incurred in hostel maintenance etc.

Note: The instructors should design detailed experiments based on above suggested experiments. **MySQL may be used**

Suggested Readings:

1. Paul DuBois, "MySQL Cookbook: Solutions for Database Developers and Administrators," Third Edition, O'Reilly Media, 2014.
2. Frank M. Kromann, "Beginning PHP and MySQL: From Novice to Professional," Fifth Edition, Apress, 2018.
3. Joel Murach and Ray Harris, "Murach's PHP and MySQL," First Edition, Mike Murach & Associates, 2010.
4. Luke Welling, Laura Thomson, "PHP and MySQL Web Development," Fourth Edition, Addison-Wesley, 2008.

Paper Code: B070202T **L T P C**
Paper: C- Programming **3 1 0 4**

S. No.	Course Outcomes (COs)	Cognitive Level
1.	**Demonstrate** the concept of Compile/debug programs in C language and use different data types for writing the programs and also recognize the basic programming structure of C-Programs	Understanding
2.	**Define** the C–Programs using various Control structures like IF, Switch-Case, For etc.	Remembering
3.	**Compile** C Programs for implementing Arrays, Functions and structures.	Creating
4.	**Compile** and debug programs in C language and use different data types for writing the programs.	Creating
5.	**Develop** and **Explain** programs in C to handle structures, file access methods etc.	Creating

Unit-I: 'C' Language Fundamentals

Introduction to 'C' Language, Pre Processor, Program Element (Token, Keyword, Data Type, Variable, Delimiter, Identifiers, Constant, Library Function, Conversion Specifies, Operators).

Unit-II: Program Development in 'C'

Program control statement: Sequential Statement, Decision Statement and looping statement.

Unit-III: Array and Function

Array (One Dimensional, Two Dimensional, Multi Dimensional), Array of Character, Sting Manipulation using Library Function, Function (Call by Value, Call by Reference, Recursion), Different Storage Classes.

Unit-IV: User Defined Types and Pointer

User Defined Data Types (Structure, Union and Enumeration), Pointers in 'C', Pointer Arithmetic, Pointer Comparison, Pointer to Array, Pointer to Structure, Pointer to Function, Pointer to Pointer, Dynamic Memory Allocation, Type Def.

Unit-V: Files, Macros and Graphics

Macros, Introduction to File, File I/O, Introduction to Graphics.

Books Recommended/Suggested Reading:

1. E. Balaguruswamy: "Programming in C", Tata McGraw Hill
2. H. Schildt: "C The Complete Reference", Tata McGraw Hill
3. Y. Kanetkar: "Let us C", BPB Publications

Paper Code: B070202P **L T P C**
Paper: C - Programming Lab **0 0 2 2**

Course Outcomes:

S. No.	Course Outcomes (COs)	Cognitive Level
1.	Use and handle the various office based tasks.	Knowledge
2.	Write, debug and run a sample program in C	Understand
3.	Differentiate the variables and constants and understand how decision making statements are written.	Understand
4.	Understand and use the basic programming constructs of C and learn C data types, memory allocation/de-allocations, functions and pointers.	Apply
5.	Create a simple real life applications using C.	Apply

Course Content: - As per the Lab Manual

Books Recommended/Suggested Reading:

1. E. Balaguruswamy: "Programming in C", Tata McGraw Hill
2. H. Schildt: "C The Complete Reference", Tata McGraw Hill
3. Y. Kanetkar: "Let us C", BPB Publications

III[rd] Semester

Paper Code: B070301T **L T P C**
Paper Name: Operating Systems **3 1 0 4**

S. No.	Course Outcomes (COs)	Cognitive Level
1.	**Classify** the basics of operating systems like kernel, shell, types and views of operating systems	Understanding
2.	**Explain** the various CPU scheduling algorithms and remove deadlocks.	Understanding
3.	**Identify** various memory management techniques and concept of thrashing	Applying
4.	**Examine** disk scheduling algorithms for better utilization of external memory.	Analyzing
5.	**Measure** process deadlock handling techniques.	Evaluate

Unit-I: Introduction
Operating system and functions, Classification of Operating systems: Batch, Interactive, Time sharing, Real Time System, Multiprocessor Systems, Multiuser Systems, Multithreaded Systems, Operating System Structure, System Components, Operating System Services, Kernels, Monolithic and Microkernel Systems.

Unit-II: Process Management
Process Concept, Process States, Process Synchronization, Critical Section, Mutual Exclusion, Classical Synchronization Problems, Process Scheduling, Process States, Process Transitions, Scheduling Algorithms Interprocess Communication, Threads and their management, Security Issues.

Unit-III: CPU Scheduling
Scheduling Concepts, Techniques of Scheduling, Preemptive and Non- Preemptive Scheduling: First-Come-First-Serve, Shortest Request Next, Highest Response Ration Next, Round Robin, Least Complete Next, Shortest Time to Go, Long, Medium, Short Scheduling, Priority Scheduling. Deadlock: System model, Deadlock characterization, Prevention, Avoidance and detection, Recovery from deadlock.

Unit-IV: Memory Management
Memory allocation, Relocation, Protection, Sharing, Paging,Segmentation, Virtual Memory, Demand Paging, Page Replacement Algorithms, Thrashing. Unit – IV: **I/O Management and Disk Scheduling** I/O devices, and I/O subsystems, I/O buffering, Disk storage and disk scheduling, RAID. **File System:** File concept, File organization and access mechanism, File directories, and File sharing, File system implementation issues, File system protection and security.

Unit-V: Shell introduction and Shell Scripting
What is shell and various type of shell, Various editors present in linux, Different modes of operation in vi editor, What is shell script, Writing and executing the shell script, Shell variable (user defined and system variables) System calls, Using system calls, Pipes and Filters, Decision making in Shell Scripts (If else, switch), Loops in shell, Functions, Utility programs (cut, paste, join, tr , uniq utilities), Pattern matching utility (grep)

Suggested Readings:

1. Andrew S. Tanenbaum and Herbert Bos,"Modern Operating Systems," Fourth Edition, Pearson, 2014.

2. Abraham Silberschatz, Greg Gagne, and Peter B. Galvin, "Operating System Concepts," Tenth Edition, Wiley, 2018.
3. William Stallings, "Operating Systems: Internals and Design Principles," Seventh Edition, Prentice Hall, 2011.
4. Dhanjay Dhamdhere, "Operating Systems," First Edition, McGraw-Hill, 2008
5. Milan Milankovic "Operating systems, Concepts and Design" McGraw Hill

Paper Code: B070302T **L T P C**
Paper: Analysis of Algorithm and Data Structures **3 1 0 4**

S. No.	Course Outcomes (COs)	Cognitive Level
1.	Define algorithms and algorithm correctness.	Understanding
2.	Summarize searching and sorting techniques	Understanding
3.	Demonstrate stack,queue and linked list operation	Applying
4.	Assess knowledge of tree and graphs concepts.	Analyzing
5.	Construct the basic concepts of data structures and algorithms	Evaluate

Unit-I: Introduction

Basic Design and Analysis techniques of algorithms, time and space complexity, Correctness of Algorithm, Algorithm Design Techniques: Iterative techniques, Divide and Conquer, Dynamic Programming, Greedy Algorithms. Sorting Techniques: Elementary sorting techniques-Bubble Sort, Insertion Sort, Merge Sort, Advanced Sorting techniques-Heap Sort, Quick Sort, Sorting in Linear Time- Bucket Sort, Radix Sort and Count Sort

Unit-II: Searching Techniques and Complexity Analysis

Linear and Binary search, Medians & Order Statistics. **Arrays**: Single and Multi-dimensional Arrays, Sparse Matrices;

Unit – III: Stacks and Queues : Implementing stack using array and linked list, Prefix, Infix and Postfix expressions, Utility and conversion of these expressions from one to another; Array and Linked representation of Queue, De-queue, Priority Queues

Unit – IV: Linked Lists

Singly, Doubly and Circular Lists, representation of Stack and Queue as Linked Lists.

Unit –V: Recursion

Developing Recursive Definition of Simple Problems and their implementation; Advantages and Limitations of Recursion; Trees: Introduction to Tree as a data structure; Binary Trees, Binary Search Tree, (Creation, and Traversals of Binary Search Trees)

Suggested Readings:

1. Cormen T.H., Leiserson Charles E., Rivest Ronald L., Stein Clifford, Introduction to Algorithms, PHI Learning Pvt. Ltd., 2009, 3rd Edition.
2. Basse Sara & A.V. Gelder, Computer Algorithm: Introduction to Design and Analysis, Pearson, 2000, 3rd Edition.
3. Drozdek Adam, "Data Structures and algorithm in C++", Cengage Learning, 2012, Third Edition.
4. Tenenbaum Aaron M., Augenstein Moshe J., Langsam Yedidyah, "Data Structures Using C and C++, PHI, 2009, Second edition.
5. Kruse Robert L., "Data Structures and Program Design in C++", Pearson.

Paper Code: B070303T	**L**	**T**	**P**	**C**
Paper: Object Oriented Programming using C++	**3**	**1**	**0**	**4**

S. No.	Course Outcomes (COs)	Cognitive Level
1.	Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects.	Understand
2.	Demonstrate dynamic memory management techniques using pointers, constructors, destructors, etc	Understand
3.	Construct programs on overloading, operator overloading, virtual functions and polymorphism..	Apply
4.	Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming.	Analyze
5.	Prepare the list of various OOPs concepts with the help of programs.	Create

Unit-I: Introduction to OOPs and C++ Element

Introduction to OOPs, Features & Advantages of OOPs, Different element of C++ : Tokens, Keywords, Identifiers, Constants, Operators, String and Expression, Data Types : Basic Data Types, User Define Data Types and Derived Data Types, Preprocessor Directives.

Unit-II: Program Control Statements

Sequential Constructs, Decision Making Construct, Iteration / Loop Construct, Arrays, Functions : User defined Function: Call By Value, Call By Reference and Call By Pointer, Inline Function, Function Overloading, Structure, Union and Enumeration

Unit-III: Class, Object, Constructor & Destructor

Class and Objects, Modifiers: Private, Public & Protected, Data Members, Member Functions, Static Data Members, Static Member Function, Friend Function, Constructor: Default Constructors, Parameterized Constructor, Copy Constructor and Destructor.

Unit-IV: Pointer, Polymorphism & Inheritance

Pointer: Pointer to Object, this Pointer, Pointer to Derive Class, Introduction to Polymorphism, Operator Overloading, Inheritance: Single Inheritance, Multiple Inheritance, Multilevel Inheritance, Hierarchical Inheritance, Hybrid Inheritance, Virtual Function, Virtual Base Class, Abstract Class.

Unit-V: File Handling

Files I/O : Introduction, File Stream, opening and Closing a File,Aceessing Modes, File Pointer and their Manipulations, Error Handling in Files.

Books Recommended/Suggested Reading:

1. E. Balaguruswami: Object Oriented programming with C++
2. Kris James: Success with C++
3. David Parsons: Object Oriented programming with C++
4. D. Ravichandran: Programming in C++
5. Dewhurst and Stark: Programming in C++
6. Venugopal, Ravishankar, Rajkumar: Mastering in C++

Paper Code :MAL-2102 **L T P C**
Paper: Computer Based Numeric Methods **3 1 0 4**

S. No.	Course Outcomes (COs)	Cognitive Level
1.	**Choose** the error in the number generated by the solution.	Remembering
2.	**Compare** solution of algebraic and transcendental equation by numerical methods like Bisection method and Newton Rapshon method.	Evaluating
3.	**Apply** Numerical analysis which has enormous application in the field of Science and some fields of Engineering.	Applying
4.	**Relate** with numerical integration and differentiation, numerical solution of ordinary differential equations.	Remembering
5.	**Elaborate** with calculation and interpretation of errors in numerical method.	Creating

Unit-I: Floating Point and Numerical Solution of Non-Linear Equation
Floating point Arithmetic: Representation of floating point numbers, Normalization, Arithmetic Operations, Pitfalls of floating point representation. Solution of Non-Linear Equation: Bisection Method, Method of Iteration Method of false position, Secant method, Newton Raphson method, Method of successive Approximations, Iterative methods.

Unit -II: Linear Simultaneous Equations/Curve Fitting
Simultaneous Linear Equations: direct method- Gauss Elimination Method with and without pivoting, Crout's Method, Iterative methods - Gauss Jacobi method, Gauss Seidal. Curve fitting: Method of least squares, fitting of straight lines, polynomials and exponential curves.

Unit-III: Interpolation
Interpolation and approximation: Finite Differences, Difference tables Polynomial Interpolation: Newton's forward and backward formula. Central Difference Formulae: Stirling's formula. Interpolation with unequal intervals: Lagrange's Interpolation, Newton Divided difference formula.

Unit-IV: Numerical Differentiation and Integration
Numerical Differentiation, Numerical Integration: Trapezoidal rule, Simpson's 1/3 and 3 /8 rules with its error term, Gaussian Quadrature - Gauss-Legendre formulae.

Unit-V: Numerical Solution of Differential Equations
Introduction, Taylor series method, Picard's method, Euler's method, Modified Euler's method, Runge-Kutta 4^{th} order method, Milne's Predictor –corrector method.

Books Recommended/Suggested Reading:

1. Jain, Iyengar and Jain, "Numerical Methods for Scientific and Engineering Computations", New Age Int.
2. Gerald. G. F, Wheatley P . O. " Applied Numerical Analysis" , Addision Wesley, Latest Edition .
3. Grewal B. S., "Numerical methods in Engineering and Science", Khanna Publishers, Delhi.
4. Rajaraman V., "Computer Oriented Numerical Methods", PHI,1997.

Paper Code:	**L**	**T**	**P**	**C**
Paper Name: Accounts with Tally	**3**	**1**	**0**	**4**

S. No.	**Course Outcomes (COs)**	**Mapping**
1.		
2.		
3.		
4.		
5.		

Unit-I:

Unit-II:

Unit-III:

Unit-IV

Books Recommended:

Paper Code: B070302P	**L**	**T**	**P**	**C**
Paper: Operating Systems Lab	**0**	**0**	**4**	**2**

Lab on Operating Systems

Note: Following exercises can be performed using Linux or Unix

1. Usage of following commands:
   ls, pwd, tty, cat, who, who am I, rm, mkdir, rmdir, touch, cd.
2. Usage of following commands:
   cal, cat(append), cat(concatenate), mv, cp, man, date.
3. Usage of following commands: chmod, grep, tput (clear, highlight), bc.
4. Write a shell script to check if the number entered at the command line is prime or not.
5. Write a shell script to modify "cal" command to display calendars of the specified months.
6. Write a shell script to modify "cal" command to display calendars of the specified range of months.
7. Write a shell script to accept a login name. If not a valid login name display message – "Entered login name is invalid".
8. Write a shell script to display date in the mm/dd/yy format.
9. Write a shell script to display on the screen sorted output of "who" command along with the total number of users .
10. Write a shell script to display the multiplication table any number,
11. Write a shell script to compare two files and if found equal asks the user to delete the duplicate file.
12. Write a shell script to check whether the file have all the permissions or not.
13. Simulate FCFS CPU scheduling algorithm in C++.
14. Simulate SJF CPU scheduling algorithm in C++.
15. Simulate Priority CPU scheduling algorithm in C++.
16. Simulate Round Robin CPU scheduling algorithm in C++.
17. Simulate FIFO page replacement algorithm in C++.
18. Simulate LRU page replacement algorithm in C++.

Suggested Readings:

1. Sumitabh Das, "Your Unix/Linux: The Ultimate Guide," McGraw Hill, 2012.
2. Richard Blum and Christine Bresnahan, "Linux Command Line and Shell Scripting Bible," Wiley, 2015.
3. Stroustrup, Bjarne, Programming: Principles and Practice Using C++, Addison Wesley, USA, 2014, 2nd ed.
4. E Balagurusamy, Object Oriented Programming with C++, McGraw Hill Education (India) Pvt. Ltd., India, 2013, 6th ed.

Paper Code: B070303P **L T P C**
Paper: Algorithm and Data Structures with C++ Lab **0 0 4 2**

S. No.	Course Outcomes (COs)	Cognitive
1.	Optimize the solution with respect to time complexity & memory usage	Remembering
2.	Assess how the choice of data structures and algorithm design methods impacts the performance of programs.	Evaluating
3.	Choose the appropriate data structure and algorithm design method for a specified application.	Applying
4.	Solve problems using data structures such as linear lists, stacks, queues and writing programs for these solutions	Remembering
5.	Solve problems using data structures such as binary trees, binary search trees and writing programs for these solutions	Creating

Practical List of on Analysis of Algorithms and Data Structures with C++:

1. Write a program that uses functions to perform the following:
   a) Create a singly linked list of integers.
   b) Delete a given integer from the above linked list.
   c) Display the contents of the above list after deletion.

2. Write a program that uses functions to perform the following:
   a) Create a doubly linked list of integers.
   b) Delete a given integer from the above doubly linked list.
   c) Display the contents of the above list after deletion.

3. Write a program that uses stack operations to convert a given infix expression into its postfix Equivalent, implement the stack using an array.

4. Write program to implement a double ended queue using
   a) array and
   b) doubly linked list respectively.

5. Write a program that uses functions to perform the following:
   a) Create a binary search tree of characters.
   b) Traverse the above Binary search tree recursively in Postorder.

6. Write a program that uses functions to perform the following:
   a) Create a binary search tree of integers.
   b) Traverse the above Binary search tree non recursively in inorder.

7. Write program for implementing the following sorting methods to arrange a list of integers in ascending order:
   a) Insertion sort b) Merge sort

8. Write program for implementing the following sorting methods to arrange a list of integers in ascending order:
   a) Quick sort

b) Selection sort

9. Write program to implement Insertion Sort (The program should report the number of comparisons)

10. Write program implement Merge Sort(The program should report the number of comparisons)

11. Write program implement Heap Sort (The program should report the number of comparisons)

12. Write program implement Randomized Quick sort (The program should report the number of comparisons)
13. Write program for creation and traversal of Binary Search Tree.

IVth Semester

Paper Code: B070401T **L T P C**
Paper Name: Computer System Architecture **3 1 0 4**

S. No.	Course Outcomes (COs)	Mapping
1.	Understand the basic arithmetic of a Computer System; how the data is represented.	Skill development
2.	How the various operation are performed on the data, the basic circuits to perform these operations	Skill development
3.	How instructions are formatted and how these instructions are executed to accomplish a particular operation.	Skill development, entrepreneurship
4.	Learn the organization of the peripheral devices, the interface between these devices to the system.	Skill development
5.	Understand the architecture of a basic computer, its registers, bus system and the interaction flow among them.	Skill development, entrepreneurship

Unit -I: Data Representation and basic Computer Arithmetic

Number systems, complements, fixed and floating point representation, character representation, addition, subtraction, magnitude comparison. Logic gates and circuits: logic gates, boolean algebra, combinational circuits, circuit simplification, introduction to flip-flops and sequential circuits, decoders, multiplexers, registers, counters.

Unit-II: Basic Computer Organization and Design

Computer registers, bus system, instruction set, timing and control, instruction cycle, memory reference,input-output and interrupt.Central Processing Register organization, arithmetic and logical micro-operations, stack organization, Hardwired vs. micro programmed control.

Unit-III: Pipeline control

Instruction pipelines, pipeline performance, super scalar processing, Pipelining, RISC & CISC .Programming the Basic Computer: Instruction formats,addressing modes, instruction codes, assembly language

Unit-IV: Memory Organization

Memory device characteristics,random access memories, serial access memories, Multilevel memories, address translation, memory allocation, Main features, address mapping, structure versus performance.Input-output Organization: Peripheral devices, I/O interface,

Unit-V: Modes of data transfer

Programmed, Interrupt Driven and Direct Memory Access.Parallel processing: Processor-level parallelism, multiprocessor architecture

Suggested Readings:

1. M. Mano, “Computer System Architecture”, Pearson Education, New Jersey, 2017,ThirdEdition.
2. W. Stallings, “Computer Organization and Architecture Designing for Performance”,Prentice Hall of India, 2015, Tenth Edition.
3. M. Mano, “Digital Design”, Pearson Education, New Jersey, 2018, Sixth Edition.
4. Vranasic and Hamacher, Computer Organization, TMH"

Paper Code: B070402T **L T P C**
Paper: Web Technology **3 1 0 4**

S. No.	Course Outcomes (COs)	Cognitive Level
1.	Explain the history of the internet and related internet concepts that are vital in understanding web development.	Understand
2.	Discuss the insights of internet programming and implement complete application over the web.	Understand
3.	Utilize the concepts of JavaScript and Java	Apply
4.	Demonstrate the important HTML tags for designing static pages and separate design from content using Cascading Style sheet.	Apply
5.	Reframe web application development software	Evaluate

Unit-I: Introduction to Internet Basic
The Basic of the Internet, Concepts of Domain, IP Addressing, Resolving Domain Names, Overview of TCP/IP and its Services, WWW**.**

Unit-II: Designing Pages with HTML
Introduction to HTML, Essential Tags, Deprecated Tags, Tags and Attributes, Text Styles and Text Arrangements, Text, Effects, Exposure to Various Tags (DIV, MARQUEE, NOBR, DFN, HR, LISTING, Comment, IMG), Color and Background of Web Pages, Lists and their Types, Attributes of Image Tag, Hypertext, Hyperlink and Hypermedia, Links, Anchors and URLs, Links to External Documents.

Unit-III: DHTML
Dynamic HTML, Document Object Model, Features of DHTML, CSSP (Cascading Style Sheet Positioning) and JSSS (JavaScript assisted Style Sheet), Layers of Netscape, The ID Attribute, DHTML Events.

Unit-IV: Java Script
Objects, Methods, Events and Functions, Tags, Operators, Data Types, Literals and Type Casting in JavaScript, Programming Construct, Array and Dialog Boxes, Relating JavaScript to DHTML, Dynamically Changing Text, Style, Content.

Unit-V: Front Page
Front Page Basics , Web Terminologies, Phases of Planning and Building Web Sites, The FTP, HTTP and WPP, Features, Front Page Views, Adding Pictures, Backgrounds, Links, Relating Front Page to DHTML.

Books Recommended/Suggested Reading:

1. Steven Holzner: Dreamtech Press
2. Evan Bayross: HTML, Java Script, DHTML, PERL, CGI.
3. Ivon Bayros: Introduction to HTML, DHTML, Java Script.

Paper Code: B070403T **L T P C**
Paper Name: Software Engineering **3 1 0 4**

S. No.	Course Outcomes (COs)	Cognitive Level
1.	**Plan** a software engineering process life cycle	Understanding
2.	**Analyze** and specify software requirements through a productive working relationship with various stakeholders of the project	Analyzing
3.	**Analyze** and translate a specification into a design, and then realize that design practically, using an appropriate software engineering methodology.	Analyzing
4.	**Measure** testing performances using different testing tools	Evaluating
5.	**Adapt** role play of software project management, time management and software reuse.	Creating

UNIT-I: Software and Software Engineering
Software Components, Software Characteristics, Software Crisis, Software Process, Software Engineering Practice, Software Myths. Process Models: A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal and Team Process Models, Process Terminology, Product and Process.

UNIT-II: Requirements Analysis and Specification
Requirements Gathering and Analysis, Software Requirement Specification (SRS), Formal System Specification. Software Design: Overview of the Design Process, How to Characterize of a Design, Cohesion and Coupling, Layered Arrangement of Modules, Approaches to Software Design.
Software Quality Assurance (SQA): Verification and Validation, SQA Plans, Software Quality Frameworks, ISO 9000 Models, SEI-CMM Model.

UNIT-III: Function-Oriented Software Design
Overview of Structured Analysis Methodology, Developing the DFD Model of a System, Structured Design, Detailed Design, Design Review, an overview of Object Oriented design. User Interface Design: Characteristics of Good User Interface, Basic Concepts, Types of User Interfaces, Fundamentals of Component-based GUI Development, A User Interface Design Methodology.

UNIT-IV: Coding and Testing
Coding, Code Review, Software Documentation, Testing, Unit Testing, Black-Box Testing, White-Box Testing, Debugging, Program Analysis Tool, Integration Testing, Testing Object-Oriented Programs, System Testing, Some General Issues Associated with Testing, Software Reliability, Statistical Testing.

Unit-V Software Maintenance and Software Project Management
Software as an Evolutionary Entity, Need for Maintenance, Categories of Maintenance: Preventive, Corrective and Perfective Maintenance, Cost of Maintenance, Software Re-Engineering, Reverse Engineering. Software Configuration Management Activities, Change Control Process, Software Version Control. An Overview of CASE Tools. Estimation of Various Parameters such as Cost, Efforts, Schedule/Duration, Constructive Cost Models (COCOMO), Resource Allocation Models, Software Risk Analysis and Management.

Books Recommended/Suggested Reading:

1. Software Engineering A practitioner's Approach, Roger S. Pressman, Seventh Edition McGraw-Hill International Edition.
2. Fundamentals of Software Engineering, Rajib Mall, Third Edition, PHI.
3. Software Engineering, Ian Sommerville, Ninth edition, Pearson education
4. The Software Engineering: A Primer, Waman S Jawadekar, Tata McGraw-Hill, 2008
5. Software Engineering, A Precise Approach, PankajJalote, Wiley India,2010.
6. The Software Engineering, Principles, and Practices, Deepak Jain, Oxford University Press.
7. Software Engineering1: Abstraction and modeling, Diner Bjorner, Springer International edition, 2006.
8. A. Leon and M. Leon, Fundamentals of Software Engineering, Vikas Publication.

Paper Code: MAL-2201 **L T P C**
Paper Name: Discrete Mathematics **3 1 0 4**

S. No.	Course Outcomes (COs)	Cognitive Level
1.	**Classify** out operations on various discrete structures such as sets, functions, relations, and sequences	Analyzing
2.	**Demonstrate** problems using Counting techniques, Permutation and Combination, Recursion and generating functions.	Understand
3.	**Apply** algorithms and use of graphs and trees as tools to visualize and simplify Problems.	Applying
4.	**Apply** algorithms and use of graphs and trees as tools to visualize and simplify Problems.	Applying
5.	**Determine** K-Maps and Truth Tables to construct and verify correctness of a Boolean expression.	Evaluating

Unit-I: Propositional Logic

Proposition, First order logic, Basic logical operation, truth tables, tautologies, Contradictions, Algebra of Proposition, logical implications, logical equivalence, predicates, Universal and existential quantifiers, Nested Quantifiers, Rules of Inference.

Unit-II: Posets, Lattices and Boolean algebra

Partial order sets: Definition, Partial order sets, Combination of partial order sets, Hasse diagram.
Lattices: Definition, Properties of lattices – Bounded, Complemented, Modular and Complete lattice.
Boolean Algebra: Introduction, Axioms and Theorems of Boolean algebra, Algebraic manipulation of Boolean expressions. Simplification of Boolean Functions, Karnaugh maps, Logic gates, Digital circuits and Boolean algebra.

Unit-III: Advance Counting Technique

The Basics of Counting, The Pigeonhole Principle, Permutations and Combinations, Binomial Coefficients and Identities, Generalized Permutations and Combinations, Recurrence Relation, Applications of Recurrence Relations, Solving Linear Recurrence Relations, Divide-and-Conquer Algorithms and Recurrence Relations, Generating Function, Solution of recurrence relation by generating function.

Unit-IV: Graphs

Graphs:Simple graph, multi graph, graph terminology, representation of graphs, Bipartite, Regular, Planar and connected graphs, connected components in a graph, Euler graphs, Hamiltonian path and circuits, Graph coloring, isomorphism and Homomorphism of graphs. Tree: Definition, Labeled Trees, Undirected Trees, Spanning trees, Minimal Spanning Trees, Prims and Kruskal Algorithm.

Unit-V: Basic Structure and Algebraic Structure

Basic Structure: Sets, set operations, function, recursive functions Algebraic Structures: Definition, Semigroup, Monoids, Groups, Subgroups and order, Cyclic Groups, Cosets, Lagrange's theorem, Normal Subgroups, Permutation and Symmetric groups, Group Homomorphisms, Definition and elementary properties of Rings and Fields.

Books Recommended/Suggested Reading:

1. Discrete Mathematical Structures, Kolman, Busby & Ross : PHI, 5th Edition, 2006.
2. Elements of Discrete Maths, C.L. Liu : Tata McGraw Hill, 2nd edition,2001.
3. Discrete Mathematics and Its Applications: By Kenneth H Rosen, McGraw Hill, Sept.2007.
4. J. P. Tremblay, R. Manohar:Discrete Mathematical Structures with Applications to Computer Science, McGraw Hill Pub, 1975.
5. Narsing Deo: Graph Theory and Applications

Paper Code: B070402P **L T P C**
Paper Name: Computer System Architecture Lab **0 0 4 2**

S. No.	Course Outcomes (COs)	Cognitive Level
1.	**Classify** functions of various hardware components and their building blocks	Analyzing
2.	**Demonstrate** Boolean algebraic expressions to digital design	Understand
3.	**Apply** and implementation of different sequential and Combinational circuits	Applying
4.	**Apply** computer buses and input/output peripherals	Applying
5.	**Determine** memory hierarchy and design of primary memory.	Evaluating

Practical: 60 Lab Periods

Memory Instruction format

4096 words 0 3 4 15

16 bits per word

Basic Computer Instructions

Memory Reference Register Reference Input-Output

1. Create a machine based on the following architecture: Register Set

IR DR AC AR PC FGI FGO S I E

0 15 0 15 0 15 011 011 1 Bit 1 Bit 1 Bit 1 bit 1 Bit

Symbol	Hex		Symbol	Hex	Symbol	Hex	
AND	0xxx		CLA CLA	E800 E800	INP	F80 0	
ADD	2xxx		CLE CLE	E400	OUT	F40 0	
ISZ	Cxxx		INC	E020			
AND_I	1xxx		SPA	E010			

ADD_I	3xxx	Indirect Addressing	SNA	E008		
LDA_I	5xxx		SZA	E004		
STA_I	7xxx		SZE	E002		
BUN_I	9xxx		HLT	E001		
BSA_I	Bxxx					
ISZ_I	Dxxx					

Refer to Chapter-5 of Morris Mano for description of instructions.

ii) Create the micro operations and associate with instructions as given in the chapter (except interrupts). Design the register set, memory and the instruction set. Use this machine for the assignments of this section.

iii) Create a Fetch routine of the instruction cycle.

iv) Simulate the machine to determine the contents of AC, E, PC, AR and IR registers in hexadecimal after the execution of each of following register reference instructions:

a. CLA
b. CLE
c. CMA
d. CME
e. CIR
f. CIL
g. INC
h. SPA
i. SNA
j. SZA
k. SZE
l. HLT

Initialize the contents of AC to (A937)16, that of PC to (022)16 and E to 1.

5. Simulate the machine for the following memory-reference instructions with I= 0 and address part = 082. The instruction to be stored at address 022 in RAM. Initialize the memory word at address 082 with the operand B8F2 and AC with A937. Determine the contents of AC, DR, PC, AR and IR in hexadecimal after the execution.

a. ADD
b. AND
c. LDA
d. STA
e. BUN
f. BSA
g. ISZ

6. Simulate the machine for the memory-reference instructions referred in above question with I= 1 and address part = 082. The instruction to be stored at address 026 in RAM. Initialize the memory word at address 082 with the value 298. Initialize the memory word at address 298 with operand B8F2 and AC with A937. Determine the contents of AC, DR, PC, AR and IR in hexadecimal after the execution.

7. Modify the machine created in Practical 1 according to the following instruction format:**Instruction format**

0	2 3	4	15
Opcode	I		Address

a. The instruction format contains a 3-bit opcode, a 1-bit addressing mode and a 12-bit address. There are only two addressing modes, I = 0 (direct addressing) and I = 1 (indirect addressing).
b. Create a new register I of 1 bit.
c. Create two new microinstructions as follows :
    i. Check the opcode of instruction to determine type of instruction (Memory Reference/Register Reference/Input-Output) and then jump accordingly.
    ii. Check the I bit to determine the addressing mode and then jump accordingly.

Paper Code: B070403P **L T P C**
Paper: Software Engineering Lab **0 0 2 2**

S. No.	Course Outcomes (COs)	Cognitive Level
1	Describe projects using OO concepts.	Knowledge
2	Explain UML	Understand
3	Apply appropriate design patterns.	Apply
4	Analyze code from design.	Analyze
5	Design testing techniques.	Create

List of Experiments:

1. Develop Flow-Charts to understand basic problem solving technique by the help of Raptor tool.
2. Develop requirements specification for a given problem.
3. Develop DFD model (level-0, level-1 DFD and Data dictionary) of the project.
4. Structured design for the developed DFD model.
5. Develop UML Use case model for a problem.
6. Develop sequence diagram.
7. Develop Class diagram.
8. Develop java programming language code for sample class diagram.
9. Use of testing tool such as Junit.
10. Project management using Gantt Project.

Paper Code: B070404P	**L**	**T**	**P**	**C**
Paper: Seminar/ Presentation	**0**	**0**	**2**	**1**

Seminar Presentation: Students are required to give seminar presentations on various topics related to IS, IT and/or recent developments in the field of IS & IT. The topics for seminar presentation need to be approved by the Teacher in- charge/Lab Teachers.

Vth Semester

Paper Code: B070503T **L T P C**
Paper Name: Compiler Design & Architecture **3 1 0 4**

S. No.	Course Outcomes (COs)	Cognitive Level
1.	**Illustrate** the basics of system programs like editors, compiler, assembler, linker, loader, interpreter and debugger.	Understanding
2.	**Describe** the various concepts of assemblers and microprocessors.	Applying
3.	**Categorize** to understand the various phases of compiler and compare its working with assembler.	Analyzing
4.	**Distinguish** how linker and loader create an executable program from an object module created by assembler and compiler.	Analyzing
5.	**Examine** various editors and debugging techniques.	Analyzing

Unit-I: Compiler structure & Lexical analysis
Introduction to compilers – Analysis of the source program, Phases of a compiler, Grouping of phases, compiler writing tools – bootstrapping. Lexical Analysis: The role of Lexical Analyzer, Input Buffering, Specification of Tokens using Regular Expressions, Review of Finite Automata, Recognition of Tokens.

Unit-II: Syntax analysis
Syntax Analysis: Context-Free Grammars – Derivation trees and Parse Trees, Ambiguity. Top-Down Parsing: Recursive Descent parsing, Predictive parsing, LL(1) Grammars. Bottom-Up Parsing: Shift Reduce parsing – Operator precedence parsing (Concepts only), LR parsing – Constructing SLR , Canonical LR and LALR parsing tables.

Unit-III: Syntax directed definitions
Syntax directed translation: Syntax directed definitions, Bottom- up evaluation of S- attributed and L-attributed definitions, Top-down translation, Bottom-up evaluation of inherited attributes. Type Checking: Type systems, Specification of a simple type checker, type expressions, structural and name equivalence of types, type conversion, overloaded functions and operators, polymorphic functions.

Unit-IV: Run Time System & Storage Organization
Run-Time Environments: Source Language issues, Storage organization, Storage-allocation strategies. Intermediate Code Generation (ICG): Intermediate languages – Graphical representations, Three-Address code, Quadruples, Triples. Assignment statements, Boolean expressions, Implementation issues.

Unit-V: Code Optimization & Code Generation
Code Optimization: DAG representation of programs, peep hole optimization, Principal sources of optimization, Optimization of Basic blocks.
Code generation: Issues in the design of a code generator, The target machine, A simple code generator.

Books Recommended/Suggested Reading:

1. Aho A. Ravi Sethi and D Ullman. Compilers – Principles Techniques and Tools, Addison Wesley, 2006.
2. D. M.Dhamdhare, System Programming and Operating Systems,Tata McGraw Hill & Company, 1996.
3. Kenneth Louden," Compiler Construction", Cengage Learning.
4. Charles Fischer and Ricard LeBlanc," Crafting a Compiler with C", Pearson Education.

Paper Code: B070504T **L T P C**
Paper Name: Core Java **3 1 0 4**

S. No.	Course Outcomes (COs)	Cognitive Level
1.	**Describe** integrated development environment	Understand
2.	**Explain** elementary modifications to Java programs that solve real-world problems.	Understand
3.	**Validate** input in a Java program.	Apply
4.	**Sketch** out security issues in code.	Apply
5.	**Construct** Java programs using Javadoc.	Apply

Unit-I: Introduction
A simple Java Application, a simple Java Applet , Brief History of Java, Special Features of Java, Data Type & Operators in Java, Arrays, Objects, the Assignment Statement, Arithmetic Operators, Relational and Logical Operators in Java, control Structures. Introducing classes, objects and methods: defining a class, adding variables and methods, creating objects, constructors, Finalizers, Classes inside classes: composition

Unit-II: Interface and Interfaces
Inheritance & Interface, Deriving Classes, Method Overriding, Method Overloading, Access Modifiers, super, abstract and final classes, Wrapper classes, Abstract Method, Interfaces, Packages, Imports and Class Path.

Unit – III: Exception Handling and Threads
Exception Handling, The Try-Catch Statement, Catching more than one Exception, The Finally Clause,Generating Exceptions Threads: Introduction, Creating Threads in Applications, Method in Thread Class, Threads in Applets.

Unit-IV: Applets & AWT
Java APIs – Java Applet, Frames, Life cycle of applet, overview of APIs, IO Packages, Java Input Stream Classes, Java Output Stream Classes, File Class. Event Handling: Event Classes, Event Listener Interfaces, Adapter and Inner Classes, Graphics and Text using AWT controls, Layout managers and menus, handling Image.

Unit-V: String Operations and Networking
Input/Output Applets: Basics Streams, String Buffer classes, Byte and Character Stream, predefined streams, Reading and writing from console and files. Networking: Basics, networking classes and interfaces, using java.net package, doing TCP/IP and Data-gram Programming

Books Recommended/Suggested Reading:

1. Patrick Naughton and Herbertz Schildt, "Java-2 The Complete Reference", 1999, TMH.
2. E Balagurusamy, "Programming with Java – A Primer", McGraw Hill, 2017.
3. Horstmann, "Computing Concepts with Java 2 Essentials", John Wiley, 2004.
4. Decker & Hirshfield, "Programming Java: A introduction to programming using JAVA",
5. Vikas Publication, 2000.
6. Deitel, Java: How To Program, Pearson Education.

Paper Code: B070505T **L T P C**

Paper Name: Data Communication and Computer Networks **3 1 0 4**

S. No.	Course Outcomes (COs)	Cognitive Level
1.	**Define** computer network basics, network architecture, TCP/IP and OSI reference models.	Remembering
2.	**Identify** and understand various techniques and modes of transmission	Applying
3.	**Elaborate** data link protocols, multi-channel access protocols and IEEE 802 standards for LAN	Creating
4.	**Compare** routing and congestion in network layer with routing algorithms and classify IPV4 addressing scheme	Understanding
5.	**Analyze** network security and define various protocols such as FTP, HTTP, Telnet, DNS	Analyzing

Unit-I : Introduction Concepts

Introduction to networks – Data Communication – Data flow simplex, Half duplex, Full duplex- Type of Connection – broadcast, Point–to-Point, multi-drop. Bandwidth- bit rate, baud rate. Transmission media –Copper wires, fibre optics, Radio transmission, microwave, Satellite. Switching - circuit, packet, message, ISDN.

Unit-II: Networks Software

Network software - standards- Layering, packets, Layered PDUs, LAN, MAN, WAN, topologies, Bridges, Hub, Routers, Gateways, Repeaters, ISO-OSI model, TCP/IP model – Comparison.

Unit-III : Data-Link layer

Framing- bit oriented, byte oriented, Asynchronous and synchronous transmission, TDM, FDM. Error correction – detection – parity, hamming code, CRC. Flow control – stop and wait, sliding window, Error control - Stop &wait ARQ Go Back N ARQ, Piggybacking, pipelining, Ethernet

Unit-IV: Network Layer

Multiple Access Protocols - pure- slotted ALOHA, CSMA, CSMA/CD. LAN Standards, Token bus, Token ring.Internetworking -TCP / IP - IP packet, IP address, IPv6: Introduction and difference with IPv4.

Unit-V: Internetworking

Datagrams, fragmentation – Routing-Flooding, Distance vector routing, Link state routing. Concepts of congestion control-leaky bucket algorithm. Process to Process delivery - TCP, UDP, Application Layer -DNS, Remote login, file transfer protocol (FTP).

Books Recommended/Suggested Reading:

1. Behrouz A Forouzan, Data Communication and Computer networks, 4thed,McGraw Hill .
2. A.S. Tanenbaum, "Computer Networks", 4th Edition, Prentice Hall India, 1997.
3. S. Keshav, "An Engineering Approach on Computer Networking", Addison Wesley, 1997
4. W. Stallings, "Data and Computer Communication", Macmillan Press, 1989.
5. Achyut S Godbole, Data communications and networks, McGrawHill, Second.

Paper Code: B070505P **L T P C**
Paper Name: Computer Networks Lab **0 0 4 2**

S. No.	Course Outcomes (COs)	Cognitive Level
1.	Understand and explain the concept of Data Communication and networks,layered architecture and their applications.	Applying
2.	Analyze and Set up protocol designing issues for Communication networks.	Creating
3.	Evaluate data communication link considering elementary concepts of data linklayer protocols for error detection and correction	Understanding
4.	Apply various network layer techniques for designing subnets and supernets and analyze packet flow on basis of routing protocols.	Analyzing
5	Estimate the congestion control mechanism to improve quality of service of networking application	Creating

Software Lab based on Computer Networks:

Implement the concepts of Computer Networks such as:

1. Simulate Checksum Algorithm.
2. Simulate CRC Algorithm
3. Simulate Stop & Wait Protocol.
4. Simulate Go-Back-N Protocol.
5. Simulate Selective Repeat Protocol.

Paper Code: B070504R	**L**	**T**	**P**	**C**
Paper Name: Research Project –I	**0**	**0**	**2**	**3**

1. **Objectives of the Project**
   - To facilitate the student to independently formulate and solve a social, philosophical, commercial, or technological problem and present the results in written and oral form.
   - To render students to the real life problems.
   - To provide opportunities to students to interact with people and present them confidently.
2. **Types of Project**

   The students are expected to work on:

   (1) Application Oriented Project or (2) Research Oriented Project.

   However, it is not mandatory for a student to work on a real-life project. The student can formulate a project problem with the help of his Guide and submit the project proposal of the same. **Approval of the project proposal is mandatory.** If approved, the student can commence working on it, and complete it. It is upon the student to carry the same project of V semester to VI semester OR choose a new project for VI semester. Use the latest versions of the software packages for the development of the project.
3. **Software and Broad Ideas of Application**

   Languages - C, C++, Java, VC++, C#, R,Python
   Scripting Languages - PHP,JSP, SHELL Scripts (Unix), TcL/TK
   .NET Platform - F#,C#. Net, Visual C#. Net, ASP.Net
   Middle Ware(Component) Technologies - COM/DCOM, Active-X, EJB
   Front-End/GUI Tools - .Net Technologies, Java
   Back-End/DBMS - Oracle, SQL Plus, MY SQL, SQL Server
   UNIX Internals - Device Drivers, RPC, Threads, Socket programming
   Real time Operating Systems/Embedded Skills - LINUX, Raspberry Pi, Arduino.

   Application and Research Areas - Financial / Insurance / Manufacturing / Multimedia / Computer Graphics / Instructional Design/ Database Management System/ Internet / Intranet / Computer Networking-Communication Software development/ E-Commerce/ ERP/ MRP/ TCP-IP programming / Routing protocols programming/ Socket programming

4. **Introduction to the Project**

   The student should include the details in the project diary, in which they will record the progress of their project throughout the course. The project report should be documented with scientific approach to the solution of the problem that the students have sought to address. The project report should be prepared in order to solve the problem in a methodical and professional manner, making due references to appropriate techniques, technologies and professional standards. The project report should contain enough details to enable examiners to evaluate the work. The important points should be highlighted in the body of the report, with details often referred to appendices.

5. **Structure and Format of the Project**

   Chapter 1 to 4 should be submitted in Semester V in spiral binding and these chapters have also to be included in Semester VI report if same project is carried from V to VI semester. If different projects are taken than complete project report is to be submitted in each semester. Semester VI report has to be hard bound with golden embossing. Students will be evaluated based on the project in V and VI semester independently.

Paper Code: B070506T	**L**	**T**	**P**	**C**
Paper Name: Cyber Security & Cyber Laws	**3**	**1**	**0**	**4**

Course outcomes: After the completion of the course the students will be able to:

S. No.	Course Outcomes (COs)	Cognitive Level
1.	Understand types of information, cyber threats, and national/international cyber security standards.	Understanding
2.	Do mathematical modeling and development of security techniques and information system.	Applying
3.	Develop understanding of legal issues related to cyber security.	Analyzing
4.	Apply ethical principles/responsibilities in cyber practices.	Analyzing
5.	Examine copyright laws, patent laws, software license..	Analyzing

Unit-I: Introduction: Introduction to Information System, Type of information system, Development of information system, CIA model of Information Characteristics, Introduction to Information Security, Need of Information Security, Cyber Security, Business need, Ethical and Professional issues of security.

Unit-II: Information Security Model, Component of an Information security, Aspect of information security, Security attacks (Active and Passive Attacks), Security mechanism and Security Services (X.800).

Unit-III: Information Security Techniques, Introduction to Cryptography: Terminology, cryptanalysis, Security of algorithms, Substitution Cipher and Transposition Cipher, Single XOR , One-way Pad,

Unit-IV: Cryptographic Protocols-I: Arbitrated and Adjudicated Protocol, One- Way Hash function, Cryptographic Protocols-II: Public key cryptography, Digital Signature, Digital Watermarking Technique: Characteristics and Types. Security Policies, Why Policies should be developed, WWW policies, Email Security policies, Policy Review Process-Corporate policies- Sample Security Policies. copyright laws, patent laws, software license.

Unit-V: Cyber Laws I: Information Security Standards, IT act 2000 Provisions, Introduction to digital laws, **Cyber Laws II:** cyber laws, intellectual property rights, patent laws, software license.

Suggested Readings:

1. Michael E. Whitman and Herbert J. Mattord, "Principles of Information Security," Sixth Edition, Cengage Learning, 2017.
2. Douglas J. Landoll, "Information Security Policies, Procedure, and Standards: A Practitioner's Reference," CRC Press, 2016.
3. Harold F. Tipton, and Micki Krause, "Hand book of information security management," Sixth Edition, Archtech Publication, 2007.
4. William Stallings, "Cryptography and Network Security: Principles and Practice," Sixth Edition, Pearson, 2014.

Paper Code: B070507T **L T P C**
Paper Name: Soft Computing **3 1 0 4**

S. No.	Course Outcomes (COs)	Cognitive Level
1.	Understand the knowledge of soft computing concepts and he can apply them for practical applications.	Understanding
2.	Able to choose and design suitable Neural Network for real time problems.	Applying
3.	Appropriately use fuzzy rules and reasoning to develop decision making and expert systems.	Analyzing
4.	Know the importance of optimization techniques and genetic programming.	Analyzing

Unit-I: Introduction To Neural Networks
Neural Networks Neuron, Nerve Structure And Synapse, Artificial Neuron and Its Model, Activation Functions. Neural Network Architecture: Single Layer And Multilayer Feed Forward Networks, Recurrent Networks. Perception and Convergence Rule. Supervised Learning Network & Unsupervised Learning Network.

Unit-II: Back Propagation Networks-I
Perceptron Model, Solution, Single Layer, Multilayer Perception Model; **Back Propagation Networks**-II: Back Propagation Learning Methods, Effect Of Learning Rule Co-Efficient; Back Propagation Algorithm, Applications.

Unit-III: Fuzzy Logic Introduction-I
Basic Concepts Of Fuzzy Logic, Fuzzy Sets And Crisp Sets, Fuzzy Set Theory And Operations, Properties Of Fuzzy Sets **Fuzzy Logic Introduction-II:** Fuzzy And Crisp Relations, Fuzzy To Crisp Conversion, Membership Functions, Interference In Fuzzy Logic, Fuzzy If-Then Rules, Fuzzy fications & Defuzzification.

Unit-IV: Genetic Algorithm-I
Basic Concepts, Working Principle, Procedures of GA, Flow
Chart of GA

Unit-V: Genetic Algorithm-II:
Genetic Representations, (Encoding), Genetic Operators, Mutation, Generational Cycle.

Suggested Readings:

1. S. Rajsekaran& G.A. VijayalakshmiPai, "Neural Networks,Fuzzy Logic and Genetic Algorithm:Synthesis and Applications" Prentice Hall of India,2003
2. Anderson, James, "Introduction to Neural Networks", PHI Publication, Delhi, India
3. N.P.Padhy,"Artificial Intelligence and Intelligent Systems" Oxford University Press, USA, 2005.
4. Simon Haykin,"Neural Networks and Learning Machines "Prentice Hall of India, 2005, Third Edition.

Paper Code: B070508T **L T P C**
Paper Name: Android Programming **3 1 0 4**

S. No.	Course Outcomes (COs)	Cognitive Level
1.	Demonstrate the Understanding of fundamental of Android Programming.	Understanding
2.	Build their ability to develop software with reasonable complexity on mobile platform.	Applying
3.	Discover the life cycles of Activities, Applications, intents and fragments.	Evaluate
4.	Design the Android apps by using Java Concepts.	Create

Unit-I: Basic of Android Programming
Introduction to Android OS, Setting up the Android Application Development Environment, Creating, Testing and Debugging Applications, Android Stack, Android applications structure, Activity life cycle, Understanding implicit and explicit intents.

Unit-II: User Interface in Android
Adaptive and responsive user interfaces, User Input Controls, Menus,Screen Navigation, Recycler View, Drawables, Themes and Styles,Fragments Fragment Life Cycle, Introduction to Material Design, Testing the user interface.

Unit- IIIBackground tasks
AsyncTask, AsyncTaskLoader, Connecting App to Internet, Broadcast receivers, Services, Notifications, Alarm managers. Sensor, Location and Maps:Sensor Basic, Motion and Position Sensors, Location services, Google maps API, Google Places API

Unit -IV: Working with data in Android
Shared Preferences, App Setting, SQLite primer, Store data using SQLite database, Content Providers, Content Resolver, Loader

Unit-V: Performance Improvement of App:
Performance Parameters, Profiling Tools, Rendering and Layout,Garbage Collection and Memory Leaks, Best Practices. Publishing Your App: Preparing for publishing ,Signing and preparing the graphics , Publishing to the Android Market

Suggested Readings:

1. Android: A Programming Guide by J.F. DiMarzio
2. Hello, Android: Introducing Google's Mobile Development Platform by Ed Burnett
3. Programming android by Zigurd Mednieks
4. Android User Interface Design: Turning Ideas and Sketches into Beautifully Designed Apps byIan G. Clifton
5. Android Developer Fundamental Course by Google.

Semester –VI

Paper Code: H-000601T	**L**	**T**	**P**	**C**
Paper Name: Communication Skills and Personality Development	**2**	**0**	**0**	**2**

S. No.	**Course Outcomes (COs)**	**Cognitive Level**
1.	Define Communication	Knowledge
2.	Differentiate between General and Professional communication	Understand
3.	Use verbal and non-verbal communication	Apply
4.	Assess effectively with correct pronunciation	Evaluate

Unit-1
Unit-II
Unit-III
Unit-IV
Unit-V
References

1.
2.
3.
4.
5.

Semester –VI

Paper Code: B-070601T	**L**	**T**	**P**	**C**
Paper Name: Introduction to .Net	**3**	**1**	**0**	**4**

S. No.	**Course Outcomes (COs)**	**Cognitive Level**
1.	Understand the basic concepts of .NET programming	Knowledge
2.	Apply the concept of windows based applications to design an interactive GUI	Understand
3.	Create an executable file to demonstrate the working of real world application.	Apply
4.	Converting the real time problems into an interactive window based application to attain a solution.	Evaluate

Unit-1

The .Net framework: Introduction, The Origin of .Net Technology, Common Language Runtime (CLR), Common Type System (CTS), Common Language Specification (CLS), Microsoft Intermediate Language (MSIL), Just-In –Time Compilation, Framework Base Classes.

Unit-II

C -Sharp Language (C#): Introduction, Data Types, Identifiers, Variables, Constants, Literals, Array and Strings, Object and Classes, Inheritance and Polymorphism, Operator Overloading, Interfaces, Delegates and Events. Type conversion.

Unit-III

C# Using Libraries: Namespace- System, Input-Output, Multi-Threading, Networking and sockets, Managing Console I/O Operations, Windows Forms, Error Handling.

Unit-IV

Advanced Features Using C#: Web Services, Window Services, Asp.net Web Form Controls, ADO.Net. Distributed Application in C#, Unsafe Mode, Graphical Device interface with C#.

Unit-V

.Net Assemblies and Attribute: .Net Assemblies features and structure, private and share assemblies, Built-In attribute and custom attribute. Introduction about generic.

References

1. Wiley," Beginning Visual C# 2008",Wrox
2. Fergal Grimes," Microsoft .Net for Programmers". (SPI)
3. Balagurusamy," Programming with C#", (TMH)
4. Mark Michaelis, "Essential C# 3.0: For .NET Framework 3.5, 2/e, Pearson Education
5. Shibi Parikkar, " C# with .Net Frame Work" , Firewall Media.

Paper Code: B-070602T **L T P C**
Paper Name: Artificial Intelligence **3 1 0 4**

S. No.	Course Outcomes (COs)	Cognitive Level
1	Demonstrate fundamental understanding of artificial intelligence (AI) and expert systems.	Knowledge
2	Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning	Understand
3	Discuss the basics of ANN and different optimizations techniques.	Apply
4	Demonstrate proficiency in applying scientific method to models of machine Learning	Evaluate

UNIT-I:
Introduction to artificial intelligence: Introduction , history, intelligent systems, foundations of AI, applications, tic-tac-tie game playing, development of AI languages, current trends in AI, **Problem solving: state-space search and control strategies:** Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative- deepening a*, constraint satisfaction

UNIT-II:
Problem reduction and game playing: Introduction, problem reduction, game playing, alpha- beta pruning, two-player perfect information games, **Logic concepts:** Introduction, propositional calculus, proportional logic, natural deduction system, axiomatic system, semantic tableau s ystem in proportional logic, resolution refutation in proportional logic, predicate logic

UNIT-III:
Knowledge representation: Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames, **advanced knowledge representation techniques:** Introduction, conceptual dependency theory, script structure, cyc theory, case grammars, semantic web, **Expert system and applications:** Introduction phases in building expert systems, expert system versus traditional systems, rule-based expert systems blackboard systems truth maintenance systems, application of expert systems, list of shells and tools

UNIT-IV:
Uncertainty measure: probability theory: Introduction, probability theory, Bayesian belief networks, certainty factor theory, dempster-shafer theory , **Fuzzy sets and fuzzy logic:** Introduction, fuzzy sets, fuzzy set operations, types of membership functions, multi valued logic, fuzzy logic, linguistic variables and hedges, fuzzy propositions, inference rules for fuzzy propositions, fuzzy systems.

UNIT-V:
Machine learning paradigms: Introduction, machine learning systems, supervised and unsupervised learnings, inductive learning, deductive learning, clustering, support vector machines, case based reasoning and learning, **Artificial neural networks:** Introduction, artificial networks, single layer feed forward networks, multi layered forward networks, design issues of artificial neural networks

Text Books:

1. Artificial Intelligence- Saroj Kaushik, CENGAGE Learning,

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

Reference Books:

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

Paper Code: B-070603T **L T P C**
Paper Name: E-Commerce **3 1 0 4**

S. No.	Course Outcomes (COs)	Cognitive Level
1	Impart the students with higher level knowledge and understanding of contemporary trends in e-commerce and business finance.	Knowledge
2	Provide adequate knowledge and understanding about E-Com practices to the students	Understand
3	Learners will be able to recognize features and roles of businessmen, entrepreneur, managers, consultant, which will help learners to possess knowledge and other soft skills and to react aptly when confronted with critical decision making.	Apply
4	Apply basic principles of E-Commerce which will help learners to possess knowledge and other soft skills and to react aptly when confronted with critical decision making.	Evaluate

UNIT-I Introduction to E-Commerce:

Fundamental of e-commerce, Brief history of e-commerce, Impact ofe-commerce, Benefits and limitations of e-commerce, Classification of e-commerce: Inter organizational e-commerce, Intra organizational e-commerce, Business to Business electronic commerce, Business to Customer electronic commerce and Collaborative commerce, Mobile Commerce etc., Applications of e-commerce technologies, E-Commerce Business models.

UNIT-II E-Commerce Infrastructure:

Framework of e-commerce, I-Way Concept, EC Enablers, Review of the Internet structure, the TCP/IP Protocol Suite, The client/server model, Review of the architectural components of World-Wide Web, Proxy servers, Internet call centers, cookies, Agents in e-commerce and their role, Network infrastructure for e-commerce: Intranets and their applications, Extranets and their applications, Virtual Private Networks (VPNs), Internet-based VPNs, Firewalls and their types

UNIT-III Security in E-Commerce:

Issues in Network and Transaction Security, Cryptography and Cryptanalysis, Symmetric and Public Key Cryptographic systems, Authentication protocols, Public Key Infrastructure (PKI), Integrity and Non-repudiation, Digital Certificates, Digital Signatures, Electronic mail security, Security protocols for web commerce: SSL, SET etc.

UNIT-IV Electronic Payments:

Introduction to Money, The nature of money, Overview of electronic payment systems, Limitations of traditional payment instruments, Electronic payment system issues, Some methods of payment, Electronic payment system requirements, Micro payments, Online payment systems, Card-based payment systems.

Reference :-

1. Ravi KalaKota, Andrew Whinston “Frontiers of Electronic Commerce” Addition Wesley
2. Diwan, Sharma “E-Commerce” Excel
3. Asset International “Net Commerce” TMH
4. Bajaj and Nag “E-Commerce: The Cutting Edge of Business” TMH
5. Denlal Amor “The E Business Revolution” Addition Wesley
6. Sokal “From EDI to E-Commerce: A Business Inttiative” TMH
7. Greeanstein and Feinman “E-Commerce” TMH
8. Bharat Bhasker “Electronic Commerce-Framework, Technologies & Applications” TMH

9. K. C. Laudon and C. G. Traver "E-commerce: business, technology, society", Addison Wesle.
10. David Whiteley "E-commerce:Strategies,Technologies and Applications", TMH
11. P.T. Joseph, E-Commerce An Indian Perspective, Prentice-Hall of India, 2007
12. Norman Sadeh "M-Commerce : Technologies, Services & Business Module" Wiley
13. O'Malinoy Donalad, M.A. Peirce, Hitesh Tiwari" Electronic Payment Systems for E-Commerce.

Paper Code: B-070604T **L T P C**
Paper Name: Data Warehousing **3 1 0 4**

S. No.	Course Outcomes (COs)	Cognitive Level
1	**Understand** the functionality of the various data mining and data warehousing component	Knowledge, Understand
2	**Appreciate** the strengths and limitations of various data mining and data warehousing models	Apply, Create
3	**Explain** the analyzing techniques of various data	Analyze
4	**Describe** different methodologies used in data mining and data ware housing.	Analyze
5	**Compare** different approaches of data ware housing and data mining with various technologies.	Evaluating

UNIT-1:
Introduction to Data mining, types of Data, Data Quality, Data Processing, Measures of Similarity and Dissimilarity, Exploring Data: Data Set, Summary Statistics, Visualization, OLAP and multi dimensional data analysis.

UNIT-II:
Classification: Basic Concepts, Decision Trees and model evaluation: General approach for solving a classification problem, Decision Tree induction, Model over fitting: due to presence of noise, due to lack of representation samples, Evaluating the performance of classifier. Nearest Neighborhood classifier, Bayesian Classifier, Support vector Machines: Linear SVM, Separable and Non Separable case.

UNIT-III:
Association Analysis: Problem Definition, Frequent Item-set generation, rule generation, compact representation of frequent item sets, FP-Growth Algorithms. Handling Categorical, Continuous attributes, Concept hierarchy, Sequential, Sub graph patterns

UNIT-IV:
Clustering: Over view, K-means, Agglomerative Hierarchical clustering, DBSCAN, Cluster evaluation: overview, Unsupervised Cluster Evaluation using cohesion and separation, using proximity matrix, Scalable Clustering algorithm

UNIT-V:
Web data mining: Introduction, Web terminology and characteristics, Web content mining, Web usage mining, web structure mining, Search Engines: Characteristics, Functionality, Architecture, Ranking of WebPages, Enterprise search

TEXTBOOKS:

1. Introduction to Data Mining: Pang-Ning tan, Michael Steinbach, Vipin kumar, Addision-Wesley.
2. Introduction to Da ta Mining with Case Studies: GK Gupta: Prentice Hall.

REFERENCEBOOKS:

1. Data Mining: Introductory and Advanced Topics, Margaret H Dunham, Pearson, 2008.
2. Fundamentals of data warehouses, 2/e, Jarke, Lenzerini, Vassiliou, Vassiliadis, Springer.
3. Data Mining Theory and Practice, Soman, Diwakar, Ajay, PHI, 2006.
4. Data Mining, Concepts and Techniques, 2/e, Jiawei Han, Micheline Kamber, Elsevier, 2006.

Paper Code: B070604R	**L**	**T**	**P**	**C**
Paper Name: Research Project-II	**0**	**0**	**0**	**3**

1. **Objectives of the Project**
   - To facilitate the student to independently formulate and solve a social, philosophical, commercial, or technological problem and present the results in written and oral form.
   - To render students to the real life problems.
   - To provide opportunities to students to interact with people and present them confidently.
2. **Types of Project**

The students are expected to work on:

(1) Application Oriented Project or (2) Research Oriented Project.

However, it is not mandatory for a student to work on a real-life project. The student can formulate a project problem with the help of his Guide and submit the project proposal of the same. **Approval of the project proposal is mandatory.** If approved, the student can commence working on it, and complete it. It is upon the student to carry the same project of V semester to VI semester OR choose a new project for VI semester. Use the latest versions of the software packages for the development of the project.

3. **Software and Broad Ideas of Application**

Languages - C, C++, Java, VC++, C#, R,Python
Scripting Languages - PHP,JSP, SHELL Scripts (Unix), TcL/TK
.NET Platform - F#,C#. Net, Visual C#. Net, ASP.Net
Middle Ware(Component) Technologies - COM/DCOM, Active-X, EJB
Front-End/GUI Tools - .Net Technologies, Java
Back-End/DBMS - Oracle, SQL Plus, MY SQL, SQL Server
UNIX Internals - Device Drivers, RPC, Threads, Socket programming
Real time Operating Systems/Embedded Skills - LINUX, Raspberry Pi, Arduino.
Application and Research Areas - Financial / Insurance / Manufacturing / Multimedia / Computer Graphics / Instructional Design/ Database Management System/ Internet / Intranet / Computer Networking-Communication Software development/ E-Commerce/ ERP/ MRP/ TCP-IP programming / Routing protocols programming/ Socket programming

4. **Introduction to the Project**

The student should include the details in the project diary, in which they will record the progress of their project throughout the course. The project report should be documented with scientific approach to the solution of the problem that the students have sought to address. The project report should be prepared in order to solve the problem in a methodical and professional manner, making due references to appropriate techniques, technologies and professional standards. The project report should contain enough details to enable examiners to evaluate the work. The important points should be highlighted in the body of the report, with details often referred to appendices.

5. **Structure and Format of the Project**

Chapter 1 to 4 should be submitted in Semester V in spiral binding and these chapters have also to be included in Semester VI report if same project is carried from V to VI semester. If different projects are taken than complete project report is to be submitted in each semester. Semester VI report has to be hard bound with golden embossing. Students will be evaluated based on the project in V and VI semester independently.

Paper Code: B-070606P	**L**	**T**	**P**	**C**
Paper: Artificial Intelligence Lab	**0**	**0**	**2**	**2**

Artificial Intelligence Lab
The following programs may be developed -
1.Study of Prolog.

2 Write simple fact for the statements using PROLOG.

3 Write predicates One converts centigrade temperatures to Fahrenheit, the other checks if a temperature is below freezing.

4 Write a program to solve the Monkey Banana problem.

5 WAP in turbo prolog for medical diagnosis and show the advantage and disadvantage of green and red cuts.

6 WAP to implement factorial, fibonacci of a given number.

7 Write a program to solve 4-Queen problem.

8 Write a program to solve traveling salesman problem.

9 Write a program to solve water jug problem using LISP

Paper Code: B-070607P	**L**	**T**	**P**	**C**
Paper: Introduction to .Net Lab	**0**	**0**	**2**	**2**

List of experiments:

1. Write a console application that obtains four int values from the user and displays the product.
2. If you have two integers stored in variables var1 and var2, what Boolean test can you perform to see if one or the other (but not both) is greater than 10?
3. Write a console application that places double quotation marks around each word in a string .
4. Write an application that receives the following information from a set of students: Student Id: Student Name: Course Name: Date of Birth: The application should also display the information of all the students once the data is Entered. Implement this using an Array of Structures.
5. Create a project that calculates the total of fat, carbohydrate and protein. Allow the user to enter into text boxes. The grams of fat, grams of carbohydrate and grams of protein. Each gram of fat is 9 calories and protein or carbohydrate is 4 calories. Display the total calories of the current food item in a label. Use to other labels to display and accumulated some of calories and the count of items entered. The form food have 3 text boxes for the user to enter the grams for each category include label next to each text box indicating what the user is enter.
6. Write a program for Arithmetic Calculator using Windows Application.
7. Implement Windows Form based application using controls like menus, dialog and tool tip, dropdown, radio and selection button etc.
8. Implement Master Form with Windows application.
9. Implement Overloading and Overriding, constructor and Destructor.
10. Write a program for events and Delegates.
11. Implement concepts of Inheritance, visual inheritance and Interface in windows application.
12. Implement printing of GDI+ with windows application.
13. Use Dataset, Data Reader, XML Reader & Data Sources (SQL, Object & XML) with Any Windows or Web Application.
14. Use Data Controls like Data List, Grid View, Detail View, Repeater and List Bound Control
15. Implement web application using ASP.NET with web controls.
16. Write a code for web application to provide input validations using Input Valuators.
17. Create a Web application that illustrates the use of themes and master pages with Site-Map.
18. Create a Web Application in ASP.NET using various CSS
19. Implement the concept of state management in a web application.
20. Implement code in ASP.NET that creates and consumes Web service by any web application.

Semester-VIII

Paper Code: B-070701T	**L**	**T**	**P**	**C**
Paper Name: Advanced Java	**3**	**1**	**0**	**4**

S. No.	Course Outcomes (COs)	Cognitive Level
1	Create a full set of UI widgets and other components, including windows, menus, buttons, checkboxes, text fields, scrollbars and scrolling lists, using Abstract Windowing Toolkit (AWT) & Swings	Knowledge, Understand
2	Apply event handling on AWT and Swing components	Apply, Create
3	Learn to access database through Java programs, using Java Data Base Connectivity (JDBC)	Analyze
4	Understand the multi-tier architecture of web-based enterprise applications using Enterprise JavaBeans (EJB).	Analyze
5	Create dynamic web pages, using Servlets and JSP,make a resusable software component, using Java Bean.	Evaluating

UNIT-I:
Directory Services and JNDI: Naming and Directory Services, Using JNDI, Java and LDAP, LDAP operations, Searching an LDAP Server

UNIT-II:
Distributed Computing Using RMI: RMI Architecture, Locating Remote Objects and Developing Applications with RMI, Parameter passing in RMI, RMI firewalls and HTTP

UNIT-III
Java Beans: Introduction to Java Beans, Advantages of Java Beans, BDK Introspection, Using Bound properties, Bean Info Interface, Constrained properties Persistence, Customizes, Java Beans API, Introduction to EJB's, EJB Architecture and Design: EJB Container and its services, Working with EJBs, Design of the EJB Tier

UNIT-IV:
Web Servers and Servlets: Tomcat web server, Introduction to Servlets: Lifecycle of a Servlet, JSDK, The Servlet API, The javax.servlet Package, Reading Servlet parameters, Reading. Initialization parameters. The javax.servlet HTTP package, Handling Http Request & Responses, Using Cookies-Session Tracking, Security Issues

UNIT V:
Database Access: Database Programming using JDBC, Studying Javax.sql.*package, J2EE and Web Services: Web Service Technologies (SOAP, WSDL, and UDDI), Developing Web services, making Services smarter.

Text Books:

1. Professional Java Server Programming, J2EE 1.3 edition, APRESS publications (Units 1,2,4,8)
2. The complete Reference Java 8th Edition by Patrick Naughton and Herbert Schildt. TMH (Units 3,5,6,7)

Reference Books:

1. Programming world wide web-Sebesta, Pearson
2. Core SERVLETS ANDJAVASERVER PAGES VOLUME 1: CORE TECHNOLOGIES By Marty Hall and Larry Brown Pearson

3. Internet and World Wide Web – How to program by Dietel and Nieto PHI/Pearson Education Asia
4. Murach's beginning JAVA JDK 5, Murach, SPD
5. An Introduction to web Design and Programming –Wang-Thomson
6. Web Applications Technologies Concepts-Knuckles,John Wiley
7. Web Warrior Guide to Web Programmming-Bai/Ekedaw-Thomas
8. Beginning Web Programming-Jon Duckett WROX

Paper Code: B-070702T **L T P C**
Paper Name: Advanced DBMS **3 1 0 4**

S. No.	Course Outcomes (COs)	Cognitive Level
1	Design, develop and implement a mid-scale relational database for an application domain using a commercial-grade RDBMS	Knowledge, Understand
2	Identify and resolve physical database design and implementation issues	Apply, Create
3	Research, analyse and use emerging technologies such as Big Data, NoSQL, On-Line Analytical Processing (OLAP) and Data Warehouses	Analyze
4	Have hands-on experience with a number of contemporary information management systems	Analyze

UNIT-I:
Advanced database concept, Enhanced Data Model for Advanced Applications: Object Oriented Database, Object Relational Database and Extended Relational Systems, Active database concept and Triggers-ECA model, Temporal Database concept. Distributed Database Management: Distributed DBMS feature and needs; Reference Architecture, levels of distribution transparency, replication, and Distributed database design, Distributed Query Processing and Optimization, Distributed Transaction Modeling. Concurrency control-2 phase locks, Management of Distributed transactions-2 phase unit protocols. Heterogeneous database- federated database, Client server databases, SQL server, open database connectivity, Client server Architecture its relationship to distributed databases.

UNIT-II:
Data mining concepts, Data warehouse and data marts. **Types of transaction processing system**: Decision Support System: Aspect of decision support, Database design for decision support. Online analytical processing; Online transaction processing. Deductive Databases: Introduction and deductive database system, Data log and Recursion, Evaluation of Data log program, Recursive queries with negation, Deductive object oriented database, Application of deductive database system Parallel Databases: Parallel architectures, shared nothing/shared disk/shared memory based architectures, Data partitioning, Intraoperator parallelism, pipelining, Design of Parallel Databases, and Parallel Query Evaluation.

UNIT-III:
Database on the World Wide Web, Mobile databases: Mobile Computing architecture, Characteristics of mobile environments, Data management issues. Genome databases Management: Biological Sciences & Genetics, Characteristic of Biological data, Existing Biological databases, Knowledge base system, Expert database system, Modeling concepts

UNIT-IV:
Image and Multimedia Databases: Modeling and Storage of Image and Multimedia Data, Data Structures – R-tree, k-d tree, Quad trees, Content Based Retrieval: Color Histograms, Textures, etc., Image Features, Spatial and Topological Relationships, Multimedia Data Formats, Video Data Model, Audio & Handwritten Data, Geographic Information Systems (GIS). WEB Database: Accessing Databases through WEB, WEB Servers, XML Databases, Commercial Systems – Oracle.

References:

1. Date, C.J.,"An Introduction to Database Systems",Narosa Publishing House, New Delhi.
2. Desai, B., "An Introduction to Database Concepts", Galgotia Publications, New Delhi.
3. Elmsari and Navathe,"Fundamentals of Database Systems", Addison Wesley, New Delhi

4. Ullman, J.D.,"Principles of Database Systems", Galgotia Publications, New Delhi
5. Hansen & Hansen "Database Management & Design" (PHI)
6. James Mortin- Principles of Database Management Object Oriented Modeling & Design

BOOKS:

1. R. Ramakrishnan, "Database Management Systems", 1998, McGraw Hill International Editions
2. Elmagarmid.A.K. "Database transaction models for advanced applications", Morgan Kaufman.
3. Transaction Processing, Concepts and Techniques, J. Gray and A. Reuter, Morgan Kauffman..
4. S. Abiteboul, R. hull and V. Vianu, "Foundations of Databases", 1995, Addison – Wesley Publishing Co., Reading Massachusetts.
5. W. Kim, "Modern Database Systems", 1995, ACM Press, Addison – Wesley.
6. D. Maier, "The Theory of Relational Databases", 1993, Computer Science Press, Rockville, Maryland
7. A Silberschatz, H.F Korth, Sudersan "Database System Concepts" –, MGH Publication.
8. Raghurama Krishnan "Database Systems" TMH

Paper Code: B-070703T **L T P C**
Paper Name: Cloud Computing **3 1 0 4**

S. No.	Course Outcomes (COs)	Cognitive Level
1	Explain the core concepts of the cloud computing paradigm: how and why this paradigm shift came about, the characteristics, advantages and challenges brought about by the various models and services in cloud computing.	Knowledge, Understand
2	Apply the fundamental concepts in datacenters to understand the tradeoffs in power, efficiency and cost.	Apply, Create
3	Identify resource management fundamentals, i.e. resource abstraction, sharing and sandboxing and outline their role in managing infrastructure in cloud computing.	Analyze
4	Analyze various cloud programming models and apply them to solve problems on the cloud.	Analyze

UNIT I:
Introduction: Network centric computing, Network centric content, peer-to –peer systems, cloud computing delivery models and services, Ethical issues, Vulnerabilities, Major challenges for cloud computing. Parallel and Distributed Systems: introduction, architecture, distributed systems, communication protocols, logical clocks, message delivery rules, concurrency, and model concurrency with Petri Nets.

UNIT II:
Cloud Infrastructure: At Amazon, The Google Perspective, Microsoft Windows Azure, Open Source Software Platforms, Cloud storage diversity, Inter cloud, energy use and ecological impact, responsibility sharing, user experience, Software licensing, Cloud Computing : Applications and Paradigms: Challenges for cloud, existing cloud applications and new opportunities, architectural styles, workflows, The Zookeeper, The Map Reduce Program model, HPC on cloud, biological research

UNIT III:
Cloud Resource virtualization: Virtualization, layering and virtualization, virtual machine monitors, virtual machines, virtualization- full and para, performance and security isolation, hardware support for virtualization, Case Study: Xen, vBlades, Cloud Resource Management and Scheduling: Policies and Mechanisms, Applications of control theory to task scheduling, Stability of a two-level resource allocation architecture, feedback control based on dynamic thresholds, coordination, resource bundling, scheduling algorithms, fair queuing, start time fair queuing, cloud scheduling subject to deadlines, Scheduling Map Reduce applications, Resource management and dynamic application scaling

UNIT IV:
Storage Systems: Evolution of storage technology, storage models, file systems and database, distributed file systems, general parallel file systems. Google file system. Apache Hadoop, Big Table, Megastore (text book 1), Amazon Simple Storage Service(S3) (Text book 2), Cloud Security: Cloud security risks, security – a top concern for cloud users, privacy and privacy impact assessment, trust, OS security, Virtual machine security, Security risks

UNIT V:

Cloud Application Development: Amazon Web Services : EC2 – instances, connecting clients, security rules, launching, usage of S3 in Java, Installing Simple Notification Service on Ubuntu 10.04, Installing Hadoop on Eclipse, Cloud based simulation of a Distributed trust algorithm, Cloud service for adaptive data streaming (Text Book 1), Google: Google App Engine, Google Web Toolkit (Text Book 2), Microsoft: Azure Services Platform, Windows live, Exchange Online, Share Point Services, Microsoft Dynamics CRM (Text Book 2)

Text Books:

1. Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier
2. Cloud Computing, A Practical Approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH

Reference book:

1. Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christen vecctiola, S Tammarai selvi, TMH

Paper Code: B-070704T **L T P C**
Paper Name: HUMAN COMPUTER INTERFACE **3 1 0 4**

S. No.	Course Outcomes (COs)	Cognitive Level
1	Provide an overview of the concepts relating to the design of human-computer interfaces in ways making computer-based systems comprehensive, friendly and usable.	Knowledge, Understand
2	Understand the theoretical dimensions of human factors involved in the acceptance of computer interfaces.	Apply, Create
3	Understand the important aspects of implementation of human-computer interfaces.	Analyze
4	Identify the impact of usable interfaces in the acceptance and performance utilization of information systems.	Analyze
5	Identify the importance of working in teams and the role of each member within an interface development phase.	Knowledge, Understand

UNIT I:
Introduction : Importance of user Interface – definition, importance of 8 good design. Benefits of good design. A brief history of Screen design. The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface

UNIT II:
Design process: Human interaction with computers, importance of 8 human characteristics human consideration, Human interaction speeds, understanding business junctions. III Screen Designing : Design goals – Screen

UNIT III:
Screen Designing : Design goals – Screen planning and purpose, 8 organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design.

UNIT IV:
Windows : New and Navigation schemes selection of window, 8 selection of devices based and screen based controls. Components – text and messages, Icons and increases – Multimedia, colors,uses problems, choosing colors

UNIT V:
Software tools : Specification methods, interface – Building Tools. 8 Interaction Devices – Keyboard and function keys – pointing devices – speech recognition digitization and generation – image and video displays – drivers.

Text books:
1. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale Human Computer Interaction, 3rd Edition Prentice Hall, 2004.
2. Jonathan Lazar Jinjuan Heidi Feng, Harry Hochheiser, Research Methods in HumanComputer Interaction, Wiley, 2010.
3. Ben Shneiderman and Catherine Plaisant Designing the User Interface: Strategies for Effective Human-Computer Interaction (5th Edition, pp. 672, ISBN 0- 321-53735-1, March 2009), Reading, MA: Addison-Wesley Publishing Co.

Paper Code: B-070701P **L T P C**
Paper Name: Advanced Java Lab **0 0 4 4**

S.No	Practical's Name	Tools
1	Script showing use of variables in JavaScript	JavaScript
2	Script showing use of arrays in JavaScript.	JavaScript
3	Script showing user defined functions	JavaScript
4	Script showing how JavaScript places code in the browser window	JavaScript
5	Script showing use of alert dialog box	JavaScript
6	Script showing use of prompt dialog box	JavaScript
7	Script showing use of Confirm dialog box	JavaScript
8	Program showing JavaScript front-end validation	JavaScript
9	Program implementing the concept of cookies in JSP	JSP
10	Program implementing the concept of session in JSP	JSP

Paper Code: B-070701P	**L**	**T**	**P**	**C**
Paper Name: Dissertation on Major	**0**	**0**	**0**	**6**

Course Objectives/Course Description

To provide students with knowledge of practical skills for various technological applications.

To enable the student to develop an application with their respective domain.

Learning Outcome

CO1: Demonstrate their ability to apply database concepts to design any application of their choice.

CO2: Develop solutions by adhering to coding standards using any front end and back end tools.

CO3: Evaluate the code by following the various testing methodology.

Project work/Dissertation is considered as a special course involving application of knowledge in solving / analyzing /exploring a real life situation / difficult problem. A Project/Dissertation work would be of 6 credits. A Project/Dissertation work may be given in lieu of a discipline specific elective paper.
The students will be allowed to work on any project based on the concepts studied in core / elective or skill based elective courses.

OBJECTIVES:
The aim of the mini project is that the student has to understand the real time software development environment. The student should gain a thorough knowledge in the problem, he/she has selected and the language / software, he/she is using.

Project planning:
BCA Major Project is an involved exercise, which has to be planned well in advance. The topic should be chosen in the beginning of final year itself. Related reading training and discussions of first internal project viva voce should be completed in the first term of final year.

I Selection of the project work
Project work could be of three types.

a) Developing solution for real life problem
In this case a requirement for developing a computer-based solution already exists and the different stages of system development life cycle is to be implemented successfully. Examples are accounting software for particular organization, computerization of administrative function of an organization, web based commerce etc.

b) System Software Project
Projects based on system level implementation.

b) Research level project
These are projects which involve research and development and may not be as a structured and clear cut as in the above case. This type of projects provides more challenging opportunities to students.

II Selection of team
To meet the stated objectives, it is imperative that major project is done through a individual effort. .

III Selection of Tools
No restrictions shall be placed on the students in the choice of platform/tools/languages to be utilized for their project work, though open source is strongly recommended, wherever possible. No value shall be placed on the use of tools in the evaluation of the project.

Paper Code: B-070705T
Paper Name: Departmental Elective Course-I

Paper Code: B-070506T	**L**	**T**	**P**	**C**
Paper Name: DEEP LEARNING	**3**	**1**	**0**	**4**

S. No.	**Course Outcomes (COs)**	**Cognitive Level**
1	Identify the deep learning algorithms which are more appropriate for various types of learning tasks in various domains.	Knowledge, Understand
2	Implement deep learning algorithms and solve real-world problems.	Apply, Create
3	Explain Machine Learning concepts, classifications of Machine Learning	Analyze
4	Describe Supervised Learning concepts.	Analyze
5	Describe unsupervised learning concepts and dimensionality reduction techniques.	Knowledge, Understand

UNIT I:
INTRODUCTION : Introduction to machine learning- Linear models (SVMs and Perceptrons, logistic regression)- Intro to Neural Nets: What a shallow network computes- Training a network: loss functions, back propagation and stochastic gradient descent- Neural networks as universal function approximates

UNIT II:
DEEP NETWORKS : History of Deep Learning- A Probabilistic Theory of Deep Learning- Backpropagation and regularization, batch normalization- VC Dimension and Neural Nets-Deep Vs Shallow Networks-Convolutional Networks- Generative Adversarial Networks (GAN), Semisupervised Learning

UNIT III:
DIMENTIONALITY REDUCTION : Linear (PCA, LDA) and manifolds, metric learning - Auto encoders and dimensionality reduction in networks - Introduction to Convnet - Architectures – AlexNet, VGG, Inception, ResNet - Training a Convnet: weights initialization, batch normalization, hyperparameter optimization

UNIT IV:
OPTIMIZATION AND GENERALIZATION : Optimization in deep learning– Non-convex optimization for deep networks- Stochastic Optimization Generalization in neural networks- Spatial Transformer Networks- Recurrent networks, LSTM - Recurrent Neural Network Language Models- Word-Level RNNs & Deep Reinforcement Learning - Computational & Artificial Neuroscience

UNIT V:
CASE STUDY AND APPLICATIONS : Imagenet- Detection-Audio WaveNet-Natural Language Processing Word2Vec - Joint Detection-Bioinformatics- Face Recognition- Scene Understanding-Gathering Image Captions

Text books:

1. Cosma Rohilla Shalizi, Advanced Data Analysis from an Elementary Point of View, 2015.
2. Deng & Yu, Deep Learning: Methods and Applications, Now Publishers, 2013.
3. Ian Goodfellow, Yoshua Bengio, Aaron Courville, Deep Learning, MIT Press, 2016.
4. Michael Nielsen, Neural Networks and Deep Learning, Determination Press, 2015.

Paper Code: B-070506T **L T P C**
Paper Name: DEEP LEARNING **3 1 0 4**

S. No.	Course Outcomes (COs)	Mapping
1	Identify the deep learning algorithms which are more appropriate for various types of learning tasks in various domains.	Skill development
2	Implement deep learning algorithms and solve real-world problems.	Skill development
3	Explain Machine Learning concepts, classifications of Machine Learning	Skill development
4	Describe Supervised Learning concepts.	Skill development, entrepreneurship
5	Describe unsupervised learning concepts and dimensionality reduction techniques.	Skill development, entrepreneurship

UNIT I:
INTRODUCTION : Introduction to machine learning- Linear models (SVMs and Perceptrons, logistic regression)- Intro to Neural Nets: What a shallow network computes- Training a network: loss functions, back propagation and stochastic gradient descent- Neural networks as universal function approximates

UNIT II:
DEEP NETWORKS : History of Deep Learning- A Probabilistic Theory of Deep Learning- Backpropagation and regularization, batch normalization- VC Dimension and Neural Nets-Deep Vs Shallow Networks-Convolutional Networks- Generative Adversarial Networks (GAN), Semisupervised Learning

UNIT III:
DIMENTIONALITY REDUCTION : Linear (PCA, LDA) and manifolds, metric learning - Auto encoders and dimensionality reduction in networks - Introduction to Convnet - Architectures – AlexNet, VGG, Inception, ResNet - Training a Convnet: weights initialization, batch normalization, hyperparameter optimization

UNIT IV:OPTIMIZATION AND GENERALIZATION :
Optimization in deep learning– Non-convex optimization for deep networks- Stochastic Optimization Generalization in neural networks- Spatial Transformer Networks- Recurrent networks, LSTM - Recurrent Neural Network Language Models- Word-Level RNNs & Deep Reinforcement Learning - Computational & Artificial Neuroscience

UNIT V:CASE STUDY AND APPLICATIONS :
Imagenet- Detection-Audio WaveNet-Natural Language Processing Word2Vec - Joint Detection-Bioinformatics- Face Recognition- Scene Understanding-Gathering Image Captions

Text books:
1. Cosma Rohilla Shalizi, Advanced Data Analysis from an Elementary Point of View, 2015.
2. Deng & Yu, Deep Learning: Methods and Applications, Now Publishers, 2013.
3. Ian Goodfellow, Yoshua Bengio, Aaron Courville, Deep Learning, MIT Press, 2016.
4. Michael Nielsen, Neural Networks and Deep Learning, Determination Press, 2015.

Paper Code: B-070507T **L T P C**
Paper Name: Parallel Programming with MPI **3 1 0 4**

S. No.	Course Outcomes (COs)	Cognitive Level

1	Develop an understanding of various basic concepts associated with parallel computing environments.	Knowledge, Understand
2	Understand the effects that issues of synchronization, latency and bandwidth have on the efficiency and effectiveness of parallel computing applications.	Apply, Create
3	Gain experience in a number of different parallel computing paradigms including memory passing, memory sharing, data-parallel and other approaches.	Analyze
4	Earn experience in designing and testing parallel computing solutions to programming problems.	Analyze
5	Develop improved communication and collaborative skills.	Knowledge, Understand

Unit-I

Introduction to Parallel Computing; Motivating Parallelism, Scope of Parallel Computing; Parallel Programming; Platforms : Implicit parallelism, Limitation of Memory System Performance, Dichotomy of Parallel Computing Platforms, Physical Organization of Parallel Platforms, Communication Costs of Parallel Machines, Routing Mechanism for Interconnection Networks, Impact of Process-processor Mapping and Mapping Techniques.

Unit-II

Principles of Parallel Algorithm Design : Preliminaries, Decomposition Techniques, Characteristics of Tasks and Interactions, Mapping Techniques for Load Balancing, Methods for containing interaction Overheads, parallel Algorithm Models. Analytical.

Unit-III

Modelling of Parallel Programs : Sources of Overhead in Parallel Programs, Performance metrics for parallel systems, the effect of Granularity on Performance, Scalability of Parallel Systems, minimum Executuion time and minimum cost-optional Execution Time, Asymptotic Analysis of Parallel Programs, other Scalability Metrics.

Unit-IV

Basic Communication Operations: One-to-All Broadcast and All-to-One Reduction, All-to- All Broadcast and Reduction, Scatter and Gather, All-to-All Personalized Communication, Circular Shift.

Unit-V

Introduction to MPI Principles of Message - Passing Programming, The Building Blocks (Send and Receive Operations), MPI (the Message Passing Interface), Collective Communication and Computation Operations, Examples of Matrix - Matrix multiplication, One dimensional Matrix Vector Multiplication using MPI.

Text Books:

1. Ananth**Grama**, George **Karypis**, Vipin**Kumar**, Anshul**Gupta**, ―*Introduction to Parallel Computing*‖, 2nd Edition, 2004, Pearson Education, Inc. New Delhi.
2. Michael J. **Quinn**, ―*Parallel Computing: Theory and Practice*‖, 1994, McGraw-Hill Education (India), New Delhi.

Reference Books:

1. Calvin **Lin**, Larry **Snyder**, ―*Principles of Parallel Programming*‖, 1st Edition, 2009, Pearson Education, Inc. New Delhi.
2. Michael J. **Quinn**, ―*Parallel Programming in C with MPI and OpenMP*‖, 2004, McGraw-Hill Education (India), New Delhi.

3. Barry **Wilkinson**, **—***Parallel Programming: Techniques and Applications Using Networked Workstations and Parallel Computers*‖, 2nd Edition, 2005, Pearson Education, Inc. New Delhi.
4. Yves **Robert**, Henri **Casanova**, Armand **Legrand**, **—***Parallel Algorithms*‖, 1st Edition, 2009, CRC Press. ISBN-13:9781584889458.
5. Harry F. **Jordan**, Gita **Alagband**, **—***Fundamentals of Parallel Processing*‖, first Edition, 2003, PHI Learning Pvt. Ltd. New Delhi.

Paper Code: B-070507T	**L**	**T**	**P**	**C**
Paper Name: Parallel Programming with MPI	**3**	**1**	**0**	**4**

S. No.	Course Outcomes (COs)	Mapping
1	Develop an understanding of various basic concepts associated with parallel computing environments.	Skill development
2	Understand the effects that issues of synchronization, latency and bandwidth have on the efficiency and effectiveness of parallel computing applications.	Skill development
3	Gain experience in a number of different parallel computing paradigms including memory passing, memory sharing, data-parallel and other approaches.	Skill development
4	Earn experience in designing and testing parallel computing solutions to programming problems.	Skill development, entrepreneurship
5	Develop improved communication and collaborative skills.	Skill development, entrepreneurship

Unit-I

Introduction to Parallel Computing; Motivating Parallelism, Scope of Parallel Computing; Parallel Programming; Platforms : Implicit parallelism, Limitation of Memory System Performance, Dichotomy of Parallel Computing Platforms, Physical Organization of Parallel Platforms, Communication Costs of Parallel Machines, Routing Mechanism for Interconnection Networks, Impact of Process-processor Mapping and Mapping Techniques.

Unit-II

Principles of Parallel Algorithm Design : Preliminaries, Decomposition Techniques, Characteristics of Tasks and Interactions, Mapping Techniques for Load Balancing, Methods for containing interaction Overheads, parallel Algorithm Models. Analytical.

Unit-III

Modelling of Parallel Programs : Sources of Overhead in Parallel Programs, Performance metrics for parallel systems, the effect of Granularity on Performance, Scalability of Parallel Systems, minimum Executuion time and minimum cost-optional Execution Time, Asymptotic Analysis of Parallel Programs, other Scalability Metrics.

Unit-IV

Basic Communication Operations: One-to-All Broadcast and All-to-One Reduction, All-to- All Broadcast and Reduction, Scatter and Gather, All-to-All Personalized Communication, Circular Shift.

Unit-V

Introduction to MPI Principles of Message - Passing Programming, The Building Blocks (Send and Receive Operations), MPI (the Message Passing Interface), Collective Communication and Computation Operations, Examples of Matrix - Matrix multiplication, One dimensional Matrix Vector Multiplication using MPI.

Text Books:

1. Ananth**Grama**, George **Karypis**, Vipin**Kumar**, Anshul**Gupta**, ―*Introduction to Parallel Computing*‖, 2nd Edition, 2004, Pearson Education, Inc. New Delhi.
2. Michael J. **Quinn**, ―*Parallel Computing: Theory and Practice*‖, 1994, McGraw-Hill Education (India), New Delhi.

Reference Books:

1. Calvin **Lin**, Larry **Snyder**, ―*Principles of Parallel Programming*‖, 1st Edition, 2009, Pearson Education, Inc. New Delhi.
2. Michael J. **Quinn**, ―*Parallel Programming in C with MPI and OpenMP*‖, 2004,

McGraw-Hill Education (India), New Delhi.

3. Barry **Wilkinson**, ―*Parallel Programming: Techniques and Applications Using Networked Workstations and Parallel Computers*‖, 2nd Edition, 2005, Pearson Education, Inc. New Delhi.
4. Yves **Robert**, Henri **Casanova**, Armand **Legrand**, ―*Parallel Algorithms*‖, 1st Edition, 2009, CRC Press. ISBN-13:9781584889458.
5. Harry F. **Jordan**, Gita **Alagband**, ―*Fundamentals of Parallel Processing*‖, first Edition, 2003, PHI Learning Pvt. Ltd. New Delhi.

Paper Code: B-070508T **L T P C**
Paper Name: Digital Image Processing **3 1 0 4**

S. No.	Course Outcomes (COs)	Cognitive Level

1	Understand the need for image transforms different types of image transforms and their properties.	Knowledge, Understand
2	Develop any image processing application.	Apply, Create
3	Understand the need for image compression and to learn the spatial and frequency domain techniques of image compression.	Analyze
4	Learn different techniques employed for the enhancement of images.	Analyze
5	Learn different causes for image degradation and overview of image restoration techniques.	Knowledge, Understand

UNIT-I:
INTRODUCTION – The Origins of Digital Image Processing – Application of Digital Image Processing – Fundamental Steps in Digital Image Processing – Component of Image Processing System FUNDAMENTALS: Image Acquisition Using a Single Sensor – Image Acquisition Using Sensor Arrays

UNIT-II:
IMAGE SAMPLING AND QUANTIZATION: Basic concepts-Representing Digital Images – Spatial and Grey Level Resolution-Aliasing &more patterns – Zooming and Shrinking Digital Images. BASIC RELATIONSHIPS BETWEEN PIXELS: Neighbors of a Pixel – Adjacency, Connectivity, Regions and Boundaries – Distance Measures, Image Operations on a Pixel Basis

UNIT-III:
COLOR IMAGE PROCESSING: Fundamentals-color models: RGB color model-CMY and CMYK color model-HIS model-Color Image smoothing &color Image sharping. IMAGE ENHANCEMENT IN SPATIAL DOMAIN: Gray Level Transformation – Image Negatives – Log Transformations –Piecewise-Linear transformation function- Enhancement Using Arithmetic/Logic Operations – Image Subtraction – Image Averaging

UNIT-IV:
IMAGE COMPRESSION: Fundamentals-Coding Redundancy – Inter pixel Redundancy – PsychoVisual Redundancy – Image Compression Models – The Source Encoder and Decoder – The Channel Encoder and Decoder

UNIT-V:
IMAGE SEGMENTATION: Detection of Discontinuities Point Detection – Line Detection – Edge Detection. REPRESENTATION OF IMAGES: Chain Codes – Polygonal Approximation – Signatures – Boundary Segments – Skeletons

Text Books:
1. ―Digital Image Processing‖ – Second Edition – Rafael C.Gonzalez and Richar E.Woods

Reference Books:
1. Anil K.Jain, ―Fundamentals of Digital Image Processing‖, PHI, 1995.
2. Sid Ahme M.A, ―Image Processing‖, McGraw Hill Inc, 1995
3. Gonzalaz R and Wintz P., ―Digital Image Processing‖, Addison Wesley, 2nd Ed, 1987

Paper Code: B-070509T **L T P C**
Paper Name: Big Data and Analytics **3 1 0 4**

S. No.	**Course Outcomes (COs)**	**Cognitive Level**

1	Understand big data platform and its analysis techniques.	Knowledge, Understand
2	Design efficient algorithms for mining the data from large volumes.	Apply, Create
3	Model a framework for Human Activity Recognition.	Analyze
4	Analyze the big data for useful business applications.	Analyze
5	Implement search methods and Visualization.	Knowledge, Understand

Unit I

Introduction to Big Data Platform – Challenges of Conventional Systems – Intelligent data analysis – Nature of Data – Analytic Processes and Tools – Analysis Vs Reporting – Modern Data Analytic Tools – Statistical Concepts: Sampling Distributions – Re-Sampling – Statistical Inference –Prediction Error.

Unit II

Regression Modeling – Multivariate Analysis – Bayesian Methods –Bayesian Paradigm – Bayesian Modeling – Inference and Bayesian Networks – Support Vector and Kernel Methods – Analysis of Time Series: Linear Systems Analysis – Nonlinear Dynamics – Rule Induction – Fuzzy Logic: Extracting Fuzzy Models from Data – Fuzzy Decision Trees.

Unit III

Search by simulated Annealing – Stochastic, Adaptive search by Evaluation – Evaluation strategies – Genetic Algorithm – Genetic Programming – Visualization – Classification of Visual Data Analysis Techniques – Data Types – Visualization Techniques – Interaction techniques – Specific Visual data analysis Techniques.

Unit IV

Introduction To Streams Concepts – Stream Data Model and Architecture – Stream Computing – Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window – Real- time analytics Platform(RTAP) Applications – Case Studies – Real-Time Sentiment Analysis, Stock Market Predictions.

Unit V

MapReduce –Hadoop, Hive, MapR – Sharding –NoSQL Databases – S3 – Hadoop Distributed File Systems – Case Study – Preventing Private Information Inference Attacks on Social Networks – Grand Challenge: Applying Regulatory Science and Big Data to Improve Medical Device Innovation.

Reference Book:

1. Anand Rajaraman and Jeffrey David Ullman, “Mining of Massive Datasets”, Cambridge University Press, 2012.
2. Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, John Wiley & sons, 2012.
3. Pete Warden, “Big Data Glossary”, O’Reilly, 2011.
4. Raymond Heatherly, Murat Kantarcioglu and Bhavani Thuraisingham, “Preventing Private Information Inference Attacks on Social Networks” IEEE Transaction on Knowledge & Data Engg., Vol 25, No.8, Aug. 2013.
5. R. N. Prasad and Seema Acharya “Fundamentals of Business Analytics,” John Wiley & Sons, 2011.

Paper Code: B-070509T	**L**	**T**	**P**	**C**
Paper Name: Big Data and Analytics	**3**	**1**	**0**	**4**

S. No.	Course Outcomes (COs)	Mapping
1	Understand big data platform and its analysis techniques.	Skill development
2	Design efficient algorithms for mining the data from large volumes.	Skill development
3	Model a framework for Human Activity Recognition.	Skill development
4	Analyze the big data for useful business applications.	Skill development, entrepreneurship
5	Implement search methods and Visualization.	Skill development, entrepreneurship

Unit I

Introduction to Big Data Platform – Challenges of Conventional Systems – Intelligent data analysis – Nature of Data – Analytic Processes and Tools – Analysis Vs Reporting – Modern Data Analytic Tools – Statistical Concepts: Sampling Distributions – Re-Sampling – Statistical Inference – Prediction Error.

Unit II

Regression Modeling – Multivariate Analysis – Bayesian Methods –Bayesian Paradigm – Bayesian Modeling – Inference and Bayesian Networks – Support Vector and Kernel Methods – Analysis of Time Series: Linear Systems Analysis – Nonlinear Dynamics – Rule Induction – Fuzzy Logic: Extracting Fuzzy Models from Data – Fuzzy Decision Trees.

Unit III

Search by simulated Annealing – Stochastic, Adaptive search by Evaluation – Evaluation strategies – Genetic Algorithm – Genetic Programming – Visualization – Classification of Visual Data Analysis Techniques – Data Types – Visualization Techniques – Interaction techniques – Specific Visual data analysis Techniques.

Unit IV

Introduction To Streams Concepts – Stream Data Model and Architecture – Stream Computing – Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window – Real- time analytics Platform(RTAP) Applications – Case Studies – Real-Time Sentiment Analysis, Stock Market Predictions.

Unit V

MapReduce –Hadoop, Hive, MapR – Sharding –NoSQL Databases – S3 – Hadoop Distributed File Systems – Case Study – Preventing Private Information Inference Attacks on Social Networks – Grand Challenge: Applying Regulatory Science and Big Data to Improve Medical Device Innovation.

Reference Book:

1. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.
2. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons, 2012.
3. Pete Warden, "Big Data Glossary", O'Reilly, 2011.
4. Raymond Heatherly, Murat Kantarcioglu and Bhavani Thuraisingham, "Preventing Private Information Inference Attacks on Social Networks" IEEE Transaction on Knowledge & Data Engg., Vol 25, No.8, Aug. 2013.

Semester-VIII

Paper Code: B-070801T **L T P C**

Paper Name: Advanced Python Programming **3 1 0 4**

S. No.	Course Outcomes (COs)	Cognitive Level
1	Interpret the basic principles of Python programming language	Knowledge, Understand
2	Articulate the Object-Oriented Programming concepts such as encapsulation, inheritance and polymorphism as used in Python	Apply, Create
3	Identify the commonly used operations involving file systems and regular expressions.	Analyze
4	Implement database and GUI applications	Analyze
5	Implement Machine Learning algorithms	Knowledge, Understand

UNIT-I:

Introduction to Python, use IDLE to develop programs, Basic coding skills, working with data types and variables, working with numeric data, working with string data, Python functions, Boolean expressions, selection structure, iteration structure, working with lists, work with a list of lists, work with tuples, work with dates and times, get started with dictionaries

UNIT-II:

Classes in Python: OOPS Concepts, Classes and objects , Classes in Python, Constructors, Data hiding, Creating Classes, Instance Methods, Special Methods, Class Variables, Inheritance, Polymorphism, Type Identification, Custom Exception Classes, Iterators, generators and decorators.

UNIT-III:

I/O and Error Handling In Python :Introduction, Data Streams, Creating Your Own Data Streams, Access Modes, Writing Data to a File, Reading Data From a File, Additional File Methods, Handling IO Exceptions, Errors, Run Time Errors, The Exception Model, Exception Hierarchy, Handling Multiple Exceptions, Working with Directories.

UNIT-IV:

An Introduction to relational databases: SQL statements for data manipulation, Using SQLite Manager to work with a database, Using Python to work with a database, Creating a GUI that handles an event, working with components.

UNIT-V:

Implement Machine Learning algorthims: Usage of Numpy for numerical Data,Usage of Pandas for Data Analysis, Matplotlib for Python plotting, Seaborn for Statical plots, interactive Dynamic visualizations, SciKit for Machine learning.

TEXT BOOKS

1. Michael Urban and Joel Murach, Python Programming, Shroff/Murach, 2016
2. Haltermanpython
3. Mark Lutz, Programming Python, O`Reilly, 4th Edition, 2010

ONLINE RESOURCES:

https://www.w3schools.com/python
https://docs.python.org/3/tutorial/index.html
https://www.python-course.eu/advanced_topics.php

Paper Code: B-070802T **L T P C**
Paper Name: TCP/IP Programming **3 1 0 4**

S. No.	Course Outcomes (COs)	Cognitive Level
1	Understand the problematic of service integration in TCP/IP networks focusing the protocol design, implementation, and performance issues.	Knowledge, Understand
2	Demonstrate the current trends and leading research in the computer networking area.	Apply, Create
3	To understand the recent advancement in networking.	Analyze
4	Demonstrate to gain a through understanding of the design of modern computer networks and protocols, including the Internet.	Analyze
5	Understand the workings of at least one actual TCP/IP Stack and will be able to apply this understanding in modifying it or implementing additional protocols.	Knowledge, Understand

UNIT-I:

Introduction to Network Programming: OSI model, Unix standards, TCP and UDP & TCP connection establishment and Format, Buffer sizes and limitation, standard internet services, Protocol usage by common internet application.

UNIT-II:

TCP client server: Introduction, TCP Echo server functions, Normal startup, terminate and signal handling server process termination, Crashing and Rebooting of server host shutdown of server host.

UNIT-III:

Sockets: Address structures, value – result arguments, Byte ordering and manipulation function and related functions Elementary TCP sockets – Socket, connect, bind, listen, accept, fork and exec function, concurrent servers. Close function and related function.**I/O Multiplexing and socket options:** I/O Models, select function, Batch input, shutdown function, poll function, TCP Echo server, getsockopt and setsockopt functions. Socket states, Generic socket option IPV6 socket option ICMPV6 socket option IPV6 socket option and TCP socket options.

UNIT-IV:

Elementary UDP sockets: Introduction UDP Echo server function, lost datagram, summary of UDP example, Lack of flow control with UDP, determining outgoing interface with UDP. **Elementary name and Address conversions:** DNS, gethost by Name function, Resolver option, Function and IPV6 support, uname function, other networking information.

UNIT-V:

IPC : Introduction, File and record locking, Pipes, FIFOs streams and messages, Name spaces, system IPC, Message queues, Semaphores. **Remote Login:** Terminal line disciplines, Pseudo-Terminals, Terminal modes, Control Terminals, rlogin Overview, RPC Transparency Issues.

TEXTBOOK:

1. UNIX Network Programming, Vol. I, SocketsAPI, 2nd Edition. - W.Richard Stevens, Pearson Edn. Asia.

2. UNIX Network Programming, 1st Edition, - W.Richard Stevens. PHI.

Paper Code: B-070803T **L T P C**

Paper Name: Mobile Computing **3 1 0 4**

S. No.	Course Outcomes (COs)	Cognitive Level
1	Apply wireless communication fundamentals.	Knowledge, Understand
2	Understand mobile cellular communication networks.	Apply, Create
3	Apply wireless networks for real time applications.	Analyze
4	Analyze adaptations required in the Network layer to accommodate mobility.	Analyze
5	Analyze adaptations required in the transport and Application layers to accommodate mobility.	Knowledge, Understand

Unit I

WIRELESS COMMUNICATION FUNDAMENTALS – Wireless transmission – Frequencies for radio transmission – Signals – Antennas – Signal Propagation – Multiplexing – Modulations – Spread Spectrum – MAC – SDMA – FDMA – TDMA – CDMA – Cellular Wireless Networks.

Unit II

TELECOMMUNICATION SYSTEMS :GSM – Mobile Services - System Architecture – Radio Interface - Protocols – Localization and Calling – Handover – Security – GPRS

Unit III

WIRELESS NETWORKS : Wireless LAN - IEEE 802.11 Standards – Architecture – Services - HIPERLAN – Ad Hoc Network – Bluetooth

Unit IV

NETWORK LAYER : Mobile IP – Dynamic Host Configuration Protocol – Routing – DSDV – DSR – AODV – ZRP – ODMR.

Unit V

TRANSPORT AND APPLICATION LAYERS :TCP over Wireless Networks - Indirect TCP- Snooping TCP- Mobile TCP- Fast retransmit / Fast Recovery – Transmission / Timeout Freezing – Selective Retransmission- Transaction Oriented TCP – WAP – WAP Architecture – WDP – WTLS – WTP – WSP – WML – WML Script – WAE - WTA.

Text Book:

1. William Stallings, “Wireless Communications and Networks”, Second Edition, Pearson Education, 2004.
2. Kaveh Pahlavan, Prasanth Krishnamoorthy, “Principles of Wireless Networks”, Pearson Education, 2003.
3. William C. Y. Lee, “Mobile Communications Engineering”, Tata McGraw Hill Publications, Second Edition, 2009.
4. Raj Kamal, “Mobile Computing”, Second Edition, Oxford University Press, 2012.
5. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, “Principles of Mobile Computing”, Springer, New York, 2003.
6. C. K. Toh, “Ad Hoc Mobile Wireless Networks”, Prentice Hall Inc., 2003.

Paper Code: B-070805T	**L**	**T**	**P**	**C**
Paper Name: Simulation and Modeling	**3**	**1**	**0**	**4**

S. No.	Course Outcomes (COs)	Cognitive Level
1	Understand the techniques of modeling in the context of hierarchy of knowledge about a system	Knowledge, Understand
2	Develop the capability to apply the same to study systems through available software.	Apply, Create
3	Learn different types of simulation techniques.	Analyze
4	Learn to simulate the models for the purpose of optimum control by using software.	Analyze
5	Analyze simulation output data to evaluate performance criteria.	Knowledge, Understand

Unit-1

System definition and components, stochastic activities, continuous and discrete systems, system modeling, types of models, static and dynamic physical models, static and dynamic mathematical models, full corporate model, types of system study.

Unit-II

System simulation, why & when to simulate, nature and techniques of simulation, comparison of simulation and analytical methods, types of system simulation, real time simulation, hybrid simulation , simulation of pure-pursuit problem, single-server queuing system and an inventory problem, Monte-Carlo simulation, Distributed Lag models, Cobweb model.

Unit-III

Simulation of continuous systems, analog vs. digital Simulation, Simulation of water reservoir system, Simulation of a servo system, simulation of an autopilot,Discrete system simulation, fixed time-step vs. even to even model, generation of randomnumbers, test for randomness, Monte-Carlo computation vs. stochastic simulation.

Unit-IV

System dynamics, exponential growth models, exponential decay models, modified exponential growth models, logistic curves, generalization of growth models, system dynamic diagrams Introduction to SIMSCRIPT: Program, system concepts, origination, and statements, defining the telephone system model.

Unit-V

Simulation of PERT Networks, critical path computation, uncertainties in activity duration , resource allocation and consideration.

Simulation languages and software, continuous and discrete simulation languages, expression based languages, object oriented simulation, general purpose vs. application - oriented simulation packages, CSMP-III, MODSIM-III.

References

1. Geoftrey Gordon, " System Simulation", PHI
2. Jerry Banks, John S. C Barry L. Nelson David M. Nicol, "Discrete Event System Simulation", Pearson Education
3. V P Singh, "System Modeling and simulation", New Age International.
4. Averill M. Law, W. David Kelton, "System Modeling and simulation and Analysis", TMH

Paper Code: B-070806P	**L**	**T**	**P**	**C**
Paper Name: TCP/IP Programming Lab	**0**	**0**	**4**	**4**

NETWORK PROGRAMMING LAB

1. Write a shell script that accepts a file name, starting and ending line numbers as arguments and displays all the lines between the given line numbers.

2. Write a shell script that deletes all lines containing a specified word in one or more files supplied as arguments to it.

3. Write a shell script that displays a list of all the files in the current directory to which the user has read, write and execute permissions.

4. Write a shell script that receives any number of file names as arguments checks if every argument supplied is a file or a directory and reports accordingly. Whenever the argument is a file, the number of lines on it is also reported.

5. Write a shell script that accepts a list of file names as its arguments, counts and reports the occurrence of each word that is present in the first argument file on other argument files.

6. Write a shell script that accepts any number of arguments and prints them in the reverse order.

7. Write a shell script that determines the period for which a specified user is working on the system.

8. Write a shell script to list all of the directory files in a directory.

9. Write an interactive file-handling shell program- Let it offer the user the choice of copying, removing or linking files. Once the user has made a choice, have the program ask him for the necessary information such as the file name, new name and so on.

10. Write a shell script to find factorial of a given integer.

11. Write a shell script to find the G.C.D. of two integers.

12. Write a shell script to generate a multiplication table.

13. Write a shell script that copies multiple files to a directory.

14. Write a shell script that counts the number of lines and words present in a given file.

Paper Code: B-070807P **L T P C**

Paper Name: Interplanetary Dissertation	**0**	**0**	**0**	**6**