INVERTIS UNIVERSITY, BAREILLY

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING SCHEME OF INSTRUCTION AND DETAILED SYLLABUS OF B.TECH. PROGRAM IN COMPUTER SCIENCE AND ENGINEERING.

Effective from the batches admitted 2016-2017 and onwards

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

VISION-

To be renowned itself as a reputed organization in engineering education. Creating knowledge of fundamental principles and innovation technologies through research within the core areas of computer science and also in inter- disciplinary topics.

MISSION-

- Providing learner centric Teaching learning process in excellent infrastructure for making the graduates industry ready with social ethics.

- To empower the students with the required skills to solve the complex technological problems of modern society and also provide them with a framework for promoting collaboration and multidisciplinary activities.

- To impart high quality professional training at the postgraduate and undergraduate level with an emphasis on basic principles of computer science and engineering.

PROGRAM EDUCATIONAL OBJECTIVES (PEO):

PEO1	To prepare students to excel in Computer Science and Engineering program through quality education enabling them to succeed in computing industry profession.
PEO2	To provide students with a solid foundation in mathematics, engineering, basic science fundamentals required to solve computing problems.
PEO3	To expose students to tools and techniques of Computer Science and Engineering so that they can comprehend, analyze, design and create innovative computing products and solutions for real life problems.
PEO4	To inculcate in students multidisciplinary approach, professional attitude and ethics, communication and teamwork skills, and ability to relate computer engineering issues with social awareness.
PEO5	To develop professional skills in students that prepares them for immediate employment and for lifelong learning in advanced areas of computer science and related fields.
PEO6	To prepare students which are an asset to the country, who can contribute towards nation building.
PEO7	To imbibe such qualities in students which enable them to be successful entrepreneurs.
PEO8	Apply probability, statistics, mathematics through differential and integral calculus, sciences including applications appropriate to the Computer Science & Engineering topics.

PROGRAM OUTCOMES(PO):At the end of the program the student will be able to:

PO1	Apply knowledge of mathematics, science, and engineering in the design and development of software systems
PO2	Perform experiments on different software packages either obtain from external parties or developed by themselves and analyse the experimental results.
PO3	Design and develop software projects given their specifications and within performance and cost constraints.
PO4	Understand professional and ethical responsibilities and analyze the impact of computing on individuals, organizations, and the society.
PO5	Communicate effectively in oral, written and graphical form.
PO6	Work cooperatively, responsibly, creatively, and respectfully in teams.
PO7	An ability to apply knowledge of mathematics, science and engineering.
PO8	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
PO9	An ability to identify opportunities for establishing an enterprise.

SCHEME OF INSTRUCTION

B.Tech.(Computer Science and Engineering)

Course Structure

B. TECH. I- YEAR, I SEMESTER

S. No.	Course Code	SUBJECT	L	T	P	Credits
1	BAS-103	Mathematics-I	3	1	0	4
2	BAS-102 or BME-102	Engg. Chemistry Or Engg. Mechanics	3	1	0	4
3	BEE-101 or BCS-101	Electrical Engg. Or Computer fundamentals & programming in C	3	1	0	4
4	BEC-101 or BHU-101	Electronics Engineering Or Professional Communication	3	1	0	4
5	BAS-101	Engg. Physics-I	3	1	0	4
6	BME-101 or BAS-104	Manufacturing Process Or Environment & Ecology	2	0	0	2
7	BME-151 Or BCE-151	Workshop Practice Or Engg. Drawing & Computer Graphics	0	1	3	2
8	BAS-152 Or BCE-151	Engg. Chemistry Lab Or Engg. Mechanics Lab	0	0	2	1
9	BEE-151 Or BCS-151	Electrical Engg. Lab Or Computer fundamentals & Programming in C lab	0	0	2	1
10	BAS-151 Or BHU-151	Physics Lab Or Professional Communication Lab	0	0	2	1
11	GP-101	General Proficiency	-	-	-	1
Total			17	6	9	28

B.TECH. I YEAR, II SEMESTER

S. No.	Course Code	SUBJECT	L	T	P	Credits
1	BAS-203	Mathematics-II	3	1	0	4
2	BME-202 or BAS-202	Engg. Mechanics -I Or Engg. Chemistry	3	1	0	4
3	BCS-201 or BEE-201	Computer Fundamentals & Programming in C Or Electrical Engg.	3	1	0	4
4	BHU-201 or BEC-201	Professional Communication Or Electronics Engineering	3	1	0	4
5	BAS-201	Engg. Physics-II	3	1	0	4
6	BAS-204 or BME-201	Environment & Ecology Or Manufacturing Process	2	0	0	2
7	BCE-251 Or BME-251	Engg. Drawing & Computer Graphics Or Workshop Practice	0	1	3	2
8	BME-252 Or BAS-252	Engg. Mechanics Lab Or Engg. Chemistry Lab	0	0	2	1
9	BCS-251 Or BEE-251	Computer Fundamentals & Programming in C Lab Or Electrical Engg. Lab	0	0	2	1
10	BHU-251 Or BAS-251	Professional Communication Lab Or Physics Lab	0	0	2	1
11	GP-201	General Proficiency	-	-	-	1
		Total	17	6	9	28

B.Tech.YEAR II, SEMESTER III

S. No.	Course Code	SUBJECTS	HOURS			EVALUATION SCHEME					SUBJECT TOTAL	Credit
						SESSIONAL EXAM.				END SEM		
			L	T	P	CT	TA	AT	TOTAL			
THEORY												
1	BHU-302/BHU-301	Industrial Sociology / Industrial Psychology	2	1	0	10	5		15	35	50	2
2	BAS-301	Mathematics-III	3	1	0	20	10		30	70	100	4
3	BCS-301	Data Structures	3	1	0	20	10		30	70	100	4
4	BCS-302	Discrete Structures	3	1	0	20	10		30	70	100	4
5	BCS-303	Digital Logic Design	3	1	0	20	10		30	70	100	4
6	BCS-304	IT Infrastructure and its Management	3	1	0	20	10		30	70	100	4
PRACTICALS AND PROJECTS												
7s	BCS-351	Data structures Lab	0	0	2	-	-		10	15	25	1
8	BCS-353	Digital Logic Design Lab	0	0	2	-	-		10	15	25	1
9	BCS-354	IT Infrastructure Lab	0	0	2	-	-		10	15	25	1
10	GP-301	General Proficiency	-	-	-	-	-		50	-	50	1
		TOTAL	17	6	6				245	430	675	26

B.Tech.YEAR II, SEMESTER IV

S. No.	Course Code	SUBJECTS	HOURS			EVALUATION SCHEME					SUBJECT TOTAL	Credit
						SESSIONAL EXAM.				END SEM.		
			L	T	P	CT	TA	AT	TOTAL			
THEORY												
1	BHU-402/BHU-401	Industrial Sociology / Industrial Psychology	2	1	0	10	5		15	35	50	2
2	BCS-401	Computer Organization & Introduction to Microprocessor	3	1	0	20	10		30	70	100	4
3	BCS-402	Design and Analysis of Algorithms	3	1	0	20	10		30	70	100	4
4	BCS-403	Operating Systems	3	1	0	20	10		30	70	100	4
5	BCS-404	Unix & Shell Programming	3	1	0	20	10		30	70	100	4
6	BCS-407	Object Oriented Techniques	3	1	0	20	10		30	70	100	4
PRACTICALS AND PROJECTS												
7	BCS-451	Computer Organization & Introduction to Microprocessor Lab	0	0	2	-	-		10	15	25	1
8	BCS-452	Design and Analysis of Algorithms Lab	0	0	2	-	-		10	15	25	1
9	BCS-454	Unix & Shell Programming Lab	0	0	2	-	-		10	15	25	1
10	GP-401	General Proficiency	-	-	-	-	-		50	-	50	1
		TOTAL	17	6	6				245	430	675	26

B.Tech. YEAR III, SEMESTER V

S. No.	Course Code	SUBJECTS	HOURS			EVALUATION SCHEME					SUBJECT TOTAL	Credit
						SESSIONAL EXAM.				END SEM.		
			L	T	P	CT	TA	AT	TOTAL			
THEORY												
1	BCS-501	Theory of Computation	3	1	0	20	10		30	70	100	4
2	BCS-502	Data Base Management System	3	1	0	20	10		30	70	100	4
3	BCS-503	Java Programming	3	1	0	20	10		30	70	100	4
4	BCS-504	Software Engineering	3	1	0	20	10		30	70	100	4
5	BCS-051-054	CS Elective-I	3	1	0	20	10		30	70	100	4
6	BOE-501-504	Open Elective-1	2	1	0	10	5		15	35	50	2
PRACTICALS AND PROJECTS												
7	BCS- 552	DBMS Lab	0	0	2	-	-		10	15	25	1
8	BCS-553	Java Programming Lab	0	0	2	-	-		10	15	25	1
9	BCS-554	Software Engineering Lab	0	0	2	-	-		10	15	25	1
10	GP-501	General Proficiency	-	-	-	-	-		50	-	50	1
		TOTAL	17	6	6				245	430	675	26

B.Tech. YEAR III, SEMESTER VI

S. No.	Course Code	SUBJECTS	HOURS			EVALUATION SCHEME					SUBJECT TOTAL	Credit
						SESSIONAL EXAM.				END SEM.		
			L	T	P	CT	TA	AT	TOTAL			
THEORY												
1	BCS-601	Computer Networks	3	1	0	20	10		30	70	100	4
2	BCS-602	Computer Graphics	3	1	0	20	10		30	70	100	4
3	BCS-603	Compiler Design	2	1	0	10	5		15	35	50	2
4	BCS-604	Internet Technology	3	1	0	20	10		30	70	100	4
5		CS Elective-II	3	1	0	20	10		30	70	100	4
6		CS Elective-III	3	1	0	20	10		30	70	100	4
PRACTICALS AND PROJECTS												
7	BCS-651	Computer Networks Lab	0	0	2	-	-		10	15	25	1
8	BCS-652	Computer Graphics Lab	0	0	2	-	-		10	15	25	1
9	BCS-654	Internet Technology Lab	0	0	2	-	-		10	15	25	1
10	GP-601	General Proficiency	-	-	-	-	-		50	-	50	1
		TOTAL	17	6	6				245	430	675	26

B.Tech. YEAR IV, SEMESTER VII

S. No.	Course Code	SUBJECTs	HOURS			EVALUATION SCHEME					SUBJECT TOTAL	Credit
						SESSIONAL EXAM.				END SEM.		
			L	T	P	CT	TA	AT	TOTAL			
THEORY												
1	BCS-701	Advanced Computer Architecture	3	1	0	20	10		30	70	100	4
2	BCS-702	Artificial Intelligence and Expert Systems	3	1	0	20	10		30	70	100	4
3	BCS-703	Data Warehouse and Data Mining	3	1	0	20	10		30	70	100	4
4	BCS-704	Distributed Systems	3	1	0	20	10		30	70	100	4
5		CS Elective-IV	3	1	0	20	10		30	70	100	4
PRACTICALS AND PROJECTS												
7	BCS-751	Industrial Training Viva-Voce	0	0	2	-	-		25		25	1
8	BCS-752	Artificial Intelligence Lab	0	0	2	-	-		10	15	25	1
9	BCS-753	Project	0	0	4	-	-		25	25	50	2
10	BCS-754	Seminar	0	0	2	-	-		25	-	25	1
11	GP-701	General Proficiency	-	-	-	-	-		25	-	25	1
		TOTAL	17	6	6				260	390	650	26

B.Tech. YEAR IV, SEMESTER VIII

S. No.	Course Code	SUBJECTs	HOURS			EVALUATION SCHEME					SUBJECT TOTAL	Credit
						SESSIONAL EXAM.				END SEM.		
			L	T	P	CT	TA	AT	TOTAL			
THEORY												
1	BCS-801	Cryptography and Network Security	3	1	0	20	10		30	70	100	4
2	BCS-802	.NET Framework	2	1	0	10	5		15	35	50	2
3	BCS-803	Mobile Computing	3	1	0	20	10		30	70	100	4
4		CS Elective-V	3	1	0	20	10		30	70	100	4
5		CS Elective-VI	3	1	0	20	10		30	70	100	4
PRACTICALS AND PROJECTS												
7	BCS-851	Cryptography and Network Security Lab	0	0	2	-	-		10	15	25	1
8	BCS-852	.NET Lab	0	0	2	-	-		10	15	25	1
9	BCS-853	Mobile Computing Lab	0	0	2	-	-		10	15	25	1
10	BCS-854	Project	0	0	6	-	-		50	50	100	4
11	GP-801	General Proficiency	-	-	-	-	-		25	-	25	1
		TOTAL	14	5	6				240	410	650	26

List of Electives

YEAR III, SEMESTER V

OPEN ELECTIVE-I

BOE-501 Total Quality Management
BOE-502 Human Computer Interaction
BOE-503 Entrepreneurship Development
BOE-504 Non-Conventional Energy Resource
BOE-505 Operational Research

CS ELECTIVE-I

BCS-051 Principles of Programming Language
BCS-052 Fuzzy logic
BCS-053 Multimedia Systems
BCS-054 Soft Computing
BCS-055 Cloud Architecture

YEAR III, SEMESTER VI

CS ELECTIVE-II

BCS-061 Software Testing
BCS-062 Graph Theory
BCS-063 System Programming
BCS-064 PHP
BCS-065 Linux Administration

CS ELECTIVE-III

BCS-066 Software Project Management
BCS-067 Pattern Recognition
BCS-068 Parallel Algorithm
BCS-069 Natural Language Processing
BCS-070 ERP Systems

YEAR IV, SEMESTER VII

CS ELECTIVE-IV

BCS-071 Embedded and Real Time Systems
BCS-072 Data Compression
BCS-073 Neural Networks
BCS-074 OS for Smart Devices (Android)
BCS-075 Client Server Computing

YEAR IV, SEMESTER VIII

CS ELECTIVE-V

BCS-081 Distributed Database
BCS-082 Software Quality Management
BCS-083 Simulation and Modeling
BCS-084 Bioinformatics
BCS-085 Digital Image Processing

CS ELECTIVE-VI

BCS-086 Computational Geometry
BCS-087 Computational Complexity
BCS-088 IT in Forensic Science
BCS-089 Advanced Computer Network
BCS-090 Big Data Analysis

B.Tech.1st Year

BAS-103	Mathematics I	3-1-0	Credit-4

Pre-requisites: None.

Course Objective:

- To enable the student to use Matrix theory to solve linear system of equations.
- To enable the student to find Eigen values and Eigen vectors of a matrix and apply Cayley Hamilton theorem.
- Understand the mathematical and physical interpretation of Vector differential operator operating on a vector or scalar point function, the line, surface and volume integrals, vector integral theorems and their applications to find work done, area, and volume.
- Apply the properties of curves in applications of single integral, solve the multiple integrals and to develop the capacity to understand the applications of multiple integrals.

Detailed syllabus

MODULE-I

Matrices Elementary row and column transformation, Rank of matrix, Linear dependence, Consistency of linear system of equations and their solution, Characteristic equation, Caley-Hamilton theorem, Eigen values and eigen vectors, Diagonalization, Complex and unitary matrices, Application of matrices to engineering problems.

MODULE-II

Differential Calculus-I: Leibnitz theorem, Partial differentiation, Euler's theorem, Curve tracing, Change of variables, Expansion of function of several variables.
Differential Calculus-II Jacobian, approximation of errors, Extrema of functions of several variables, Lagrange's method of multipliers (Simple applications).

MODULE-III

Fourier Series Periodic functions, Trigonometric series, Fourier series of period 2 π, Euler's formulae, Functions having arbitrary period, Change of interval, Even and odd functions, Half range sine and cosine series.
Vector Calculus: Vector differentiation. Velocity, acceleration of a particle moving on a space curve. Point function, gradient, divergence and curl of a vector and their physical interpretations.

Text Books: -

1. *H.K. Dass, Higher Engineering Mathematics, S. Chand Publications.*
2. *B.S. Grewal, Engineering Mathematics, Khanna Publishers, 2004.*

Reference Books: -

1. *R.K. Jain & S.R.K. Iyengar, Advance Engineering Mathematics, Narosa Publishing House, 2002.*
2. *B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 2005.*
3. *E. Kreyszig, Advanced engineering Mathematics, John Wiley & Sons, 2005.*
4. *C. Ray Wylie & Louis C. Barrett, Advanced Engineering Mathematics, Tata Mc Graw-Hill Publishing Company Ltd. 2003*
5. *Peter V. O"Neil, Advanced Engineering Mathematics, Thomson (Cengage) Learning, 2007.*

6. Peter V. O"Neil, "Advanced Engineering Mathematics", Thomson (Cengage) Learning, 2007.

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

CO1	Solve linear system equation
CO2	Determine the Eigen values and vectors of a matrix
CO3	Determine the power series expansion of a function
CO4	Estimate the maxima and minima of multivariable functions
CO6	To enable the student to expand a function in Fourier Series.

BAS-102/202	Engineering Chemistry	3-1-0	Credit-4

Pre-requisites: None

Course Objectives:

- Acquired sufficient information to ensure that they have an appreciation of polymer science and the typical role of the polymer scientist in today's society.
- Understand the principles of toxicology, the molecular mechanisms of how chemicals affect human health and the environment, and the resources to identify and assess molecular hazards
- Learned about the many scientific, ethical, social and political issues arising from the development of nanotechnology.
- Learning about the Synthesis, properties and applications of polymers , fuels and alternative energy sources & their significance in petrochemical industries
- . Analyzing water quality for its various parameters & its significance in industries

DETAILED SYLLABUS

MODULE-I

Chemical bonding Molecular Orbital Theory and its applications to Homo and Hetero diatomic molecules, Hydrogen bonding and its consequences, Band theory of metals and its applications. Liquid crystalline state classification and its application.

Solid state: Limiting radius ratio (cubic). Braggs equational Distinctive allotropes of carbon such as graphite and fullerenes (two dimensional); properties and applications.

Gaseous stateGas laws: Boyle‟s law, Charles law, Gay lussac law and kinetic theory of gases. Reaction kinetics Order and molecularity of reaction, integrated rate equation for zero first and second order. Theories of reaction rate.

Phase rule Phase rule and its application to one component system (water) Electrochemistry Electrode potential, electrochemical and concentration cell, electrochemical theory of corrosion and its Prevention.

MODULE-II

Concepts of organics Electronic displacement in covalent bonded compound, Stability of reaction intermediates; carbocation, carbonation, free radical. E-Z nomenclature and R-S configuration, Conformation of n butane, Nucleophilic substitution reactions

Structural and mechanistics Reaction mechanism of

(i) Aldol Condensation

(ii) Cannizarro Reaction

(iii) Hoffmann Rearrangement

(iv) Beckmann rearrangement

(v) Diels Alder reaction.

PolymersPolymerization techniques; addition, condensation and co – ordination polymerization. Structure preparation, properties and application of Elastomers, plastomers, polyamides and polyesters. Conducting Polymers

MODULE-III

SpectroscopyElementary idea and simple application of U.V, IR and NMR spectral techniques.

WaterWater processing: boiler feed water (Calgon process), process water (Zeolite process) potable water, (ion exchange method)

FuelAnalysis of coal (proximate and Ultimate) and their implications, calorific value and its determination (Bomb Calorimeter).

Titrimetric analysis Types of titrimetric analysis: Acid Base, Redox, Precipitation and Complexometric titrations

Text Books: -

1. Cotton F.A., Wilkinson G., Murillo, C.A. and Bochmann" Advanced inorganic chemistry", Wiley, chiester ,1992

2. Smith, Michael B./March Jerry, March, s "Advanced organic chemistry Reaction, mechanism and structure"., Wilelly and Sons ,2007

3. Glaston,Samuel B., "Elements of physical chemistry", ELBS,2005

4. Finar, I.L, "Organic Chemistry (vol I&II), Addision-Wesley Longman Ltd.

Reference Books: -

1. F.W. Billmeyer, "Text Book of Polymer Science", Jonhon Wielly &sons

2. G.W. Gary and P.A. Winsor, Ellis "Harwood series in Physical Chemistry, Liquid crystals and plastic crystals (vol I"), New York

3. M.G. Fontana, "Corrosion Engineering", McGraw Hill Publications.

Course Outcomes: After the completion of the course the student will be able to:

CO1	Understand and apply the concepts in electrochemistry and corrosion science.
CO2	Understand the concepts in molecular interactions.
CO3	Understand the Synthesis and analysis of modern materials.
CO4	Apply the concepts of organic chemistry for synthesis.
CO5	Understand the Synthesis and applications of polymer science.
CO6	Identify the structures of organic molecules using photo chemistry and Chemical spectroscopy.
CO7	Able to apply the basic concept of Organic Chemistry and knowledge of chemical reactions to industries , and technical fields
CO8	Able to apply the knowledge of different fuels and corrosion to different industries .
CO9	Able to analyse water quality parameter for its various parameters & its significance in industries.

BME-102/202	Engineering Mechanics	3-1-0	credit-4

Pre-requisites: None

Course Objectives:

- Understand the vector and scalar representation of forces and moments.
- Describe static equilibrium of particles and rigid bodies both in two dimensions and also in three dimensions
- Illustrate the laws of motion, kinematics, of motion and their interrelationship.

DETAILED SYLLABUS:

MODULE -1

Two-Dimensional Force Systems Basic concepts, Laws of motion, Principle of Transmissibility of forces, Transfer of a force to parallel position, Resultant of a force system, Simplest Resultant of Two dimensional concurrent and Non-concurrent Force systems, Distributed force system, Free body diagrams, Equilibrium and Equations of Equilibrium, Applications.
FrictionIntroduction, Laws of Coulomb Friction, Equilibrium of Bodies involving Dry-friction, Belt friction, Application.

MODULE- 2

Beam Introduction, Shear force and Bending Moment, Differential Equations for Equilibrium, Shear force and Bending Moment Diagrams for Statically Determinate Beams.
TrussesIntroduction, Simple Truss and Solution of Simple truss, Method f Joints and Method of Sections.
Centroid and Moment of Inertia Centroid of plane, curve, area, volume and composite bodies, Moment of inertia of plane area, Parallel Axes Theorem, Perpendicular axes theorems, Principal Moment Inertia, Mass Moment of Inertia of Circular Ring, Disc, Cylinder, Sphere and Cone about their Axis of Symmetry.

MODULE -3

Kinematics and Kinetics of Rigid Body Introduction to stress and strain and their types Plane Motion of Rigid Body, Velocity and Acceleration under Translation and Rotational Motion, Relative Velocity. Introduction to Force, Mass and Acceleration,

Work and Energy, Impulse and Momentum, Alembert's Principles and Dynamic Equilibrium.

Simple Stress and Strain: Introduction, Normal and Shear stresses, Stress- Strain Diagrams for ductile and brittle material, Elastic Constants, One Dimensional Loading of members of varying cross-sections, Strain energy.

Pure Bending of Beams Introduction, Simple Bending Theory, Stress in beams of different cross sections.

TorsionIntroduction, Torsion of shafts of circular section, torque and twist, shear stress due to torque.

Text books:

1. Irving H. Shames, "Engineering Mechanics", Prentice-Hall
2. Abdul Mubeen," Mechanics of Solids", Pearson Education Asia.
3.E.P. Popov, "Mechanics of Materials", Prentice Hall of India Private Limited

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

CO1	Construct free body diagram and calculate the reactions necessary to ensure static equilibrium.
CO2	Understand basics of thermodynamics and components of a thermal power plant
CO3	Study the effect of friction in static and dynamic conditions.
CO4	Understand basics of heat transfer, refrigeration and internal combustion engines
CO5	Understand mechanism of power transfer through belt, rope, chain and gear drives

BEE-101/201	Electrical Engineering	3-1-0	Credit-4

Pre-requisite: None

Course objectives:

- To understand the working of different DC machines, AC Machines, Transformers and their performance characteristics with the help of suitable tests.

DETAILED SYLLABUS

MODULE-I

D C Circuit Analysis and Network Theorems Circuit Concepts:

Concepts of network, Active and passive elements, voltage and current sources, concept of linearity and linear network, unilateral and bilateral elements, R, L and C as linear elements, source transformation. Kirchhoff's laws; mesh and nodal methods of analysis, star-delta transformation.**Network Theorems** Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem (simple numerical problems).

Steady- State Analysis of Single-Phase AC Circuits AC Fundamentals:

Sinusoidal, square and triangular waveforms – average and effective values, form and peak factors, concept of phasors, phasor representation of sinusoidally varying voltage and current. Analysis of series, parallel and series-parallel RLC Circuits: apparent, active & reactive powers, power factor, causes and problems of low power factor, power factor improvement; resonance in series and parallel circuits, bandwidth and quality factor (simple numerical problems).

Magnetic Circuit

Magnetic circuit concepts, analogy between electric & magnetic circuits, magnetic circuits with DC and AC excitations, magnetic leakage, B-H curve, hysteresis and eddy current losses, magnetic circuit calculations, mutual coupling

MODULE-II

Three Phase AC Circuits:

Three phase system-its necessity and advantages, meaning of phase sequence, star and delta connections, balanced supply and balanced load, line and phase voltage/current relations, three-phase power and its measurement (simple numerical problems).

Single Phase Transformer:

Principle of operation, construction, e.m. f. equation, equivalent circuit, power losses, efficiency (simple numerical problems), introduction to auto transformer.

Measuring Instruments:

Types of instruments, construction and working principles of PMMC and moving iron type voltmeters & ammeters, single phase dynamometer, wattmeter and induction type energy meter, use of shunts and multipliers (simple numerical problems on energy meter, shunts and multipliers).

MODULE-III

Principles of electro mechanical energy conversion.

DC machines

Types, e.m.f equation of generator and torque equation of motor, characteristics and applications of dc motors (simple numerical problems).

Three Phase Induction Motor

Types, Principle of operation, slip-torque characteristics, applications (numerical problems related to slip only

Single Phase Induction motor: Principle of operation and introduction to methods of starting, applications.

Three Phase Synchronous Machines

Principle of operation of alternator and synchronous motor.

Text Books:

1. V. Del Toro, "Principles of Electrical Engineering" Prentice Hall International

2. S.N. Singh, "Basic Electrical Engineering" Prentice Hall International

3. I.J. Nagarath, "Basic Electrical Engineering" Tata McGraw Hill

***Reference Books**:*

1. Edward Hughes, "Electrical Technology" Longman

2. T.K. Nagsarkar & M.S. Sukhija, "Basic Electrical Engineering" Oxford University Press.

3. H. Cotton, "Advanced Electrical Technology" Wheeler Publishing

4. W.H. Hayt & J.E. Kennely, "Engineering Circuit Analysis" Mc Graw Hill.

5. D.E. Fitzgerald & A. Grabel Higginbotham, "Basic Electrical Engineering Mc-Graw Hill.

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

CO1	Analyze and solve electric and magnetic circuits
CO2	Identify the type of electrical machines for a given application
CO3	Recognize the ratings of different electrical apparatus
CO4	Identify meters for measuring electrical quantities

BCS-101/201	Computer Fundamentals & Programming in C	3-1-0	Credit-4

Pre-requisites: None

Course objectives:

- To impart adequate knowledge on the need of programming languages and problem-solving techniques.
- To enable effective usage of arrays, structures, functions, pointers and to implement the memory management concepts.
- To study the advantages of user defined data type which provides flexibility for application development
- To teach the basics of pre-processors available with C compiler.

DETAILED SYLLABUS

MODULE-1

Introduction to any Operating System [Unix, Linux, Windows], Programming Environment, Write and Execute the first program, Introduction to the Digital Computer, Computer Generations, Concept of an algorithm, From algorithms to programs, Algorithm specification, top-down development and stepwise refinement. Introduction to Programming, use of high-level programming language for the systematic development of programs, Introduction to the design and implementation of correct, efficient and maintainable programs, Structured Programming, Trace an algorithm to depict the logic, Number Systems and conversion methods Application software, word processors, spreadsheets, Database management systems, Power point presentations

MODULE-2

Standard I/O in "C", Fundamental Data Types and Storage Classes: Character types, Integer, short, long, unsigned, single and double-precision floating point, storage classes, automatic, register, static and external,

Operators and Expressions: Using numeric and relational operators, mixed operands and type conversion, Logical operators, Bit operations, Operator precedence and associativity,

Conditional Program Execution: Applying if and switch statements, nesting if and else, restrictions on switch values, use of break and default with switch.

Program Loops and Iteration: Uses of while, do and for loops, multiple loop variables, assignment operators, using break and continue.

Modular Programming: Passing arguments by value, scope rules and global variables, separate compilation, and linkage, building your own modules.

MODULE-3

Arrays: Array notation and representation, manipulating array elements, using multidimensional arrays, arrays of unknown or varying size.
Structures: Purpose and usage of structures, declaring structures, assigning of Structures.
Pointers to Objects: Pointer and address arithmetic, pointer operations and declarations, using pointers as function arguments, Dynamic memory allocation. Sequential search Bubble and Selection Sort, String operations.
The Standard C Pre-processor: Defining and calling macros, utilizing conditional compilation, passing values to the compiler.
The Standard C Library: Input/output: open, fread, etc, string handling functions, Math functions: log, sin, alike Other Standard C functions.

***Text Books**:*

1. *Jeri R. Hanly, Elliot B. Koffman, "Problem Solving and Program Design in C", Pearson Addison-Wesley, 2006.*
2. *Behrouz A. Forouzan, Richard F. Gilberg, Computer Science- "A Structured Programming Approach Using C", Thomson, Third Edition [India Edition], 2007.*
3. *Victor Alvarado, Mocygo San Jose,"M. S. Office for ME Word, Excel, Power Point, CA"*
4. *Yashwant Kanetker, "Let us C", BPB Publication, 2008.*
5. *Balagurusamy, "Programming in ANSI „C", TMH, 3rd Edition".*
6. *Detiel & Detiel, "„C" How to program, ISBN: 0132404168, 5th Edition, 2007".*
7. *Dennis Ritchie, "„C" Programming, PHI"*

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

CO1	Understand the components of computing systems
CO2	Choose data types and structures to solve mathematical and scientific problems
CO3	Develop modular programs using control structures
CO4	Write programs to solve real world problems using object-oriented features

BEC-101/201	Electronics Engineering	3-1-0	Credit-4

Pre-requisites: None

Course objectives:

- To analyse logic processes and implement logical operations using combinational logic circuits
- To apply concepts for the design of Regulators and Amplifiers
- To understand DC analysis and AC models of semiconductor devices.

DETAILED SYLLABUS

MODULE –I

Semiconductor Diodes and Applications:

Introduction: Semiconductors, Extrinsic & Intrinsic type, doping, p-n junction diode, formation of depletion layer, Biasing, current equation, v-i characteristics, ideal and practical diodes, diode resistance, diode capacitance, Reverse recovery time.

Applications: P-N junction diodes as rectifiers (half wave and full wave), calculation of ripple factor, PIV, Calculation of DC component & AC components of Rectifier output, Diode as filter (Shunt capacitor filter), Introduction to clipping & clamping circuits, Voltage multipliers.

Breakdown diodes: Breakdown mechanism (Zener and avalanche), breakdown characteristics, zener diode application as shunt regulator.

MODULE –II

Introduction to Transistor Family:

Bipolar Junction Transistor (BJT): Basic construction, transistor amplification action, input/ output characteristics of CB CE and CC configurations, biasing of transistors (fixed bias, emitter bias, potential divider bias).

Field Effect Transistor (FET): JFET: Basic construction, principle of working, concept of pinch-off, maximum drain saturation current, input and output characteristics, characteristic equation.

MOSFET: Depletion and Enhancement type MOSFET- construction, operation and characteristics.

MODULE III

Operational Amplifier (Op-Amp): Concept of ideal operational amplifier and its parameters, inverting, non-inverting and unity gain configurations, applications of Op-Amp as adders, difference amplifiers, integrators and differentiator.

Switching Theory and Logic Design (STLD): Number systems & conversion of Bases (Binary, Octal, Decimal and Hexadecimal, Addition of Binary Numbers, subtraction using r‟s and (r-1)‟s complement, Boolean algebra, logic gates, concept of universal gates ,canonical forms, minimization using K-map (don't care conditions also).

CRO as Measurement Instrument: CRO (its working with block diagram), measurement of voltage, current, and frequency using CRO.

Books and references:

1. Robert L. Boylestad/ Louis Nashelsky "Electronic Devices and Circuit Theory", 9th Edition, Pearson Education 2007

2. Devid A. Bell "Electronic Devices and Circuits", 5th Edition, OXFORD University Press 2008

3. Jacob Millman/ Christos C. Halkias/ Satyabrata Jit "Electronics Devices and Circuits", 3rd Edition, TMH 2008

4. Morris Mano "Digital Computer Design", PHI 2003

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

CO1	Characterize semiconductors, diodes, transistors and operational amplifiers
CO2	Design simple analog circuits
CO3	Design simple combinational and sequential logic circuits
CO4	Understand functions of digital multimeter, cathode ray oscilloscopes and transducers in the measurement of physical variables
CO5	Understand the fundamental principles of radio communication.

BHU-101/201	Professional Communication	3-1-0	Credits-4

Pre-requisites: None

Course objectives:

- An understanding of how the perception of both verbal and non-verbal messages influences culture, behaviour, and action of life itself.
- Become more knowledgeable about current speaking strategies and practices
- Obtain a general knowledge of the various contexts of human communication and how they differ from each other, including at a minimum, interpersonal, small group, organizational, intercultural, and mass communication, plus other contexts (such as journalism, public relations, and the new media technologies) as time permits.

DETAILED SYLLABUS

Personality Enhancement Programmer

Profiling (2 Days)

Ice Breaking Games (2 Hrs.)

Grooming Workshop (1 Day)

Self-Awareness and Self Analysis (1 Hr.)

Confidence Building (1 Hr.)

Positive thinking and Motivation (1 hr.)

1. **Grammar (12Hrs.)**
    - Subject verb agreement
    - Tenses.
    - One-word substitution
    - Article
    - Correct and Incorrect Sentences
    - Jumbled sentences
    - Translation/Summary
    - Direct Indirect
    - Active Passive

1. **Speaking Skills (18 Hrs.)**
    - Story building through opening sentences, Pictures, Flash cards, PPTs,
    - Narration on given situations, Memories, Scenic, Emotions, Reporting incidents
    - Conversation and Dialogues
    - Situation (visit to a bank, booking a railway ticket, visit to a doctor, introduction over a social evening, leave during an emergency etc.,)
    - Invitation to an Occasion
    - Disagreement on a topic
    - Conversation etiquettes on a social evening-Do's and Don't's
2. **Listening skills (8 hrs.)**
    - Conversations and Dialogues
    - Correct pronunciations
    - Speeches/ motivation videos
    - Comprehensions
    - Passages/Stories of Acheivers
    - English Songs
3. **Writing Skills (10 Hrs.)**
    - Comprehension passages
    - Short Speeches. (congratulatory, farewell, welcome, call for a meeting, conduct a random meeting, introduction, minutes of meeting, agenda, 5. Reading Skills (12 hrs.)
    - Newspaper Reading
    - Corporate, Film/theatre, International news/Sports
    - Questionnaire
    - Interviews
    - Case Study
    - Aptitude Tests
4. **Learning beyond Classrooms (LBC)**
    - Workshop on Psychological Analysis
    - Workshop on interacting in Social evenings and Dining etiquettes
    - Visit to a Bank/ Doctor
    - Quiz
    - Guest Lectures

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

CO1	Understand basic grammar principles.

CO2	Write clear and coherent passages.
CO3	Write effective letters for job application and complaints.
CO4	Prepare technical reports and interpret graphs.
CO5	Enhance group discussion and presentation skills.
CO6	Comprehend English speech sound system, stress and intonation

BAS-101	Engineering Physics-I		3-1-0	4 credits

Pre-requisite: None

Course Objectives:

- To Relate Fundamental Physics to Practical Engineering Problems
- To get acquainted with a curriculum of Interdisciplinary Nature
- To understand and appreciate Modern Physics Concepts
- To introduce Advanced Topics in Physics in contemporary context

DETAILED SYLLABUS

MODULE -IRelativistic Mechanics Frame of reference, Galilean transformation, Inertial and Non-inertial frames, Postulates of special theory of relativity, Michelson-Morley experiment, Lorentz transformation of space and time, Length contraction, Time dilation, Addition of velocities, Variation of mass with velocity, Equivalence of mass and energy, Momentum-energy transformation equations

Interference Theory of interference of light, Conditions for sustained interference, Classification of interference, Fresnel‟sBiprism experiment, displacement of fringes, Interference in thin films- wedge shaped film and Newton‟s rings.

MODULE- II

Diffraction Single, Double & N- slit Diffraction, Diffraction grating, Grating spectra, Rayleigh's criterion and resolving power of grating

Polarization Phenomena of double refraction, Doubly refracting crystals, Quarter wave plate & Half wave plate, Nicol prism, Production and analysis of plane, circular and elliptical polarized light, Optically active substance, Fresnel's theory of optical activity, Specific rotation and Polarimeters.

MODULE –III

Laser and Holography Spontaneous and stimulated emission of radiation, Einstein‟s coefficients, construction and working of Ruby, He-Ne lasers and laser applications, Basic Principle of Holography, Construction and reconstruction of Image on hologram and applications of holography

Fiber Optics Fundamental ideas about optical fiber, Types of fibers, Acceptance angle and cone, Numerical aperture, Propagation mechanism and communication in optical fiber, Attenuation, Signal loss in optical fiber and dispersion.

Reference Books

1. AurthurBeiser, "Concepts of Modern Physics" - (Mc-Graw Hill)

2. Robert Resnick – "Introduction to Special theory of Relativity" –Wiely

3. AjoyGhatak," Optics - (TMH)" Brijlal& Subramanian (S. Chand)

4. Anuradha De., "Optical Fibre& Laser "- (NewAge)

5. Resnick, Halliday& Walker," Fundamental of Physics" - (Wiely)

6. R.A. Serway& J.W. Jewett, "Principles of Physics" - (Thomson Asia Pvt. Ltd.)

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

CO1	Solve engineering problems by applying the concepts of wave and particle nature of radiant energy.
CO2	Use lasers as light sources for low and high energy applications.
CO3	Understand the nature and characterization of acoustic design, nuclear accelerators and new materials.
CO4	Apply the concepts of light in optical fibers, light wave communication systems, holography and for sensing physical parameters.
CO5	Construct a quantum mechanical model to explain the behavior of a system at microscopic level.

BME-101/201	Manufacturing Process	2-0-0	2 credits

Pre-requisites: None

Course Objectives:

- Understand modern manufacturing operations, including their capabilities, limitations, and how to design for lowest cost.
- Gain insight into how designers influence manufacturing schedule and cost.
- Learn how to analyze products and be able to improve their manufacturability and lower costs.
- Understand the relationship between customer desires, functional requirements, product materials, product design, and manufacturing process selection.

DETAILED SYLLABU

MODULE- I

Introduction to Materials and Manufacturing Introduction to engineering materials such as metals and alloys and their applications. Art of manufacturing Classification of manufacturing processes, selection of a manufacturing, Guide to processing of metals and alloys. Importance of Materials & Manufacturing towards Technological &Socio-Economic developments Plant location Plant layout & its types. Types of Production. Production versus Productivity.

Properties of Materials Strength, elasticity, stiffness, malleability, ductility, brittleness, toughness and hardness. Elementary ideas of fracture, fatigue & creep.

Ferrous Materials Carbon steels, its classification based on % carbon as low, mild, medium & high carbon steel, its properties & applications. Pig iron, Wrought iron, Cast iron. Alloy steels: stainless steel, tool steel. Elementary introduction to Heat- treatment of carbon steels: annealing, normalizing, quenching tempering and hardening.

MODULE -II

Non-Ferrous metals & alloys Common uses of various non-ferrous metals & alloys and its composition such as Cu-alloys: Brass, Bronze, Al-alloys such as Duralumin. Casting Pattern & allowances. Molding sands and its desirable properties. Mould making with the use of a core. Gating system. Casting defects & remedies. Cupola Furnace. Die-casting and its uses.

Metal Forming Basic metal forming operations & uses of such as : Forging , Rolling , Wire &Tubedrawing/making and Extrusion, and its products/applications. Press-work, & die & punch assembly, cutting and forming, its applications. Hot-working versus cold-working.

Machining Processes and Machine Tools Classification of machining processes and machine tools; Construction and working of lathe, Drilling machine, Shaper, Slotter and Planer, Boring Machine, Milling Machine, Grinding Machine, Brief introduction of Newer Machining Processes such as EDM, ECM, USM, LBM, WJM etc.

MODULE -III

Welding Importance & basic concepts of welding, classification of welding processes. Gas-welding, types of flames. Electric-Arc welding. Resistance welding. Soldering & Brazing and its uses.

Non-Metallic Materials Common types & uses of Wood, Cement-concrete, Ceramics, Rubber, Plastics and Composite-materials.

Misc. Processes Powder-metallurgy process & its applications, Plastic-products manufacturing, Galvanizing and Electroplating.

Modern Trends in Manufacturing Automation, Concept of CAD, CAM and CIM; Concept of Micro manufacturing and nanotechnology.

Text Books

1. *Hajra& Bose, "Workshop Technology, Vol 1 & 2", Roy Media Promoters*
2. *Rao,P.N., "Manufacturing Technology", (Vol. 2), Tata McGraw-Hill*
3. *Kalpakjian, S., and Schmid, S.R., "Manufacturing Engineering and Technology", Pearson Education*
4. *Ghosh& Malik, "A textbook of Manufacturing Process".*
5. *J. K. Lal& N. V. Reddy, "Machining Senses".*
6. *Digarmo, "A textbook of Machining Process"*

Reference Books

1. *Raghuvanshi, B.S., "Workshop Technology, Vol 1 & 2", DhanpatRai& Sons*
2. *Laxmi Narayan &Vaish W, "A Text Book of Practical Geometrical" Drawin*

3. *Chapmann , "A book of Workshop technology, Vol.1,II, and III"*

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

CO1	Understand basics of thermodynamics and components of a thermal power plant
CO2	Identify engineering materials, their properties, manufacturing methods encountered in engineering practice
CO3	Understand basics of heat transfer, refrigeration and internal combustion engines
CO4	Understand mechanism of power transfer through belt, rope, chain and gear drives
CO5	Understand functions and operations of machine tools including milling, shaping, grinding and lathe machines

BAS-104/204	Environment & Ecology	2-0-0	Credit-2

Pre-requisites: None

Course Objectives:

- Develop an appreciation of the modern scope of scientific inquiry in the field of Ecology.
- Become familiar with the variety of ways that organisms interact with both the physical and the biological environment.
- Develop an understanding of the differences in the structure and function of different types of ecosystems.

Detailed Syllabus:

MODULE -I

Environment Definition-Scope & Importance, Need for Public Awareness, Ecosystem-Food chain, Food-web, Ecological pyramids, Energy-photosynthesis, 10% Law, Food, Shelter, Economic & social security. Biogeochemical Cycles- Carbon, nitrogen & sulphur cycle.

MODULE -II

Natural Resources- Forest Resources -Types & Functions, Deforestation-causes & impacts, Chipko Movement , Water Resources, Energy-Conventional & Non- Conventional Energy resources - Solar, water, wind, ocean thermal, fossil fuels (coal, oil & natural gas). Solid Waste Management, Public Health Aspects, Sustainable Development

MODULE -III

Pollution- Air, water, noise, soil & automobile pollution, Indian Legislation of Air & water Act, Wild Life Act, Environmental Impact Assessment.

Global Warming, Acid Rain, Climate Change, Ozone Layer, Green House Effects, Urbanisation, Population, Animal Husbandry, Environmental Education, Women Education.

Text Books:

1. *Benny Joseph – "Environmental Studies" –Tata McgrawHill-2005*
2. *Dr. D.L. Manjunath, "Environmental Studies" –Pearson Education-2006.*
3. *R. Rajagopalan –" Environmental studies" –Oxford Publication – 2005.*
4. *M. Anji Reddy – " Text book of Environmental Science & Technology" –BS Publication.*

ReferenceBooks

1. *P. Venugoplan Rao, "Principles of Environmental Science and Engineering" –Prentice Hall of India.*
2. *Meenakshi, "Environmental Science and Engineering" –Prentice Hall India*

Course Outcome: After studying this course, you should be able to:

CO1	construct a glossary of scientific terms;
CO2	make notes on what has been read and review these notes.

BME-151/251	Workshop practical lab	2-0-0	2 credits

Pre-requisites: None

Course Objectives:

- To develop a skill in dignity of labour, precision, safety at work place, team working and development of right attitude.
- To acquire skills in basic engineering practice
- To identify the hand tools and instruments

Detailed Syllabus:

1. Carpentry Shop

1. Study of tools & operations and carpentry joints.
2. Simple exercise using jack plane.
3. To prepare half-lap corner joint, mortise & tennon joints.
4. Simple exercise on woodworking lathe.

2. Fitting Bench Working Shop

1. Study of tools & operations
2. Simple exercises involving fitting work.
3. Make perfect male-female joint.
4. Simple exercises involving drilling/tapping/dieing.

3. Black Smithy Shop

1. Study of tools & operations
2. Simple exercises base on black smithy operations such as upsetting, drawing down, punching, bending, fullering & swaging.

4. Welding Shop

1. Study of tools & operations of Gas welding & Arc welding
2. Simple butt and Lap welded joints.
3. Oxy-acetylene flame cutting.

5. Sheet-metal Shop

1. Study of tools & operations.
2. Making Funnel complete with „soldering".
3. Fabrication of tool-box, tray, electric panel box etc.

6. Machine Shop

1. Study of machine tools and operations.

2. Plane turning.
3. Step turning
4. Taper turning.
5. Threading
6. Single point cutting tool grinding.

7. Foundry Shop

1. Study of tools & operations
2. Pattern making.
3. Mould making with the use of a core.
4. Casting

8. Electroplating Shop

9. Unconventional Energy Resources, Solar Energy/Wind (Lab Model).

10. Metal Forming: Introduction to metal forming, Extrusion and Forging.

Course Outcome: After studying this course, you should be able to:

CO1	know the importance of general safety precautions on different shop floors. identify the basics of tools and equipments used in fitting,
CO2	carpentry, sheet metal, machine, welding and smithy. fabrication of wooden joints and understand joining of metals.
CO3	. make metal joints and sheet metal work.

BCE-151/251	Engineering drawing and Computer graphics	2-0-0	2 credits

Pre-requisites: None

Course Objectives:

- To present fundamentals of graphics and drafting appropriate for developing functional skill in computer aided drafting.
- To provide students with adequate knowledge and experience in preparing engineering drawings using AutoCAD and CATIA
- To teach students to read, construct and understand basic engineering drawings.
- To help students acquire the skills pertinent to the production of properly detailed, formatted and dimensioned Engineering drawings

Detailed Syllabus:

1. **Introduction to Computer AidedSketching**
Introduction, Drawing Instruments and their uses, BIS conventions, lettering Dimensioning and free hand practicing.

Computer screen, layout of the software, standard tool bar/menus and description of most commonly used tool bars, navigational tools. Coordinate system and reference planes. Definitions of HP, VP, RPP & LPP. Creation of 2D/3D environment. Selection of drawing size and scale. Commands and creation of Lines, Co-ordinate points, axes, poly-lines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints viz. tangency, parallelism, inclination and perpendicularity. Dimensioning, line convention, material conventions and lettering. **2-Sheet**

2. **OrthographicProjections**
Introduction, Definitions- Planes of projection, reference line and conventions employed, Projections of points in all the four quadrants, Projections of straight lines (located in First quadrant/first angle only), True and apparent lengths, True and apparent inclinations to reference planes (No application problems). **2-Sheet**

3. **Orthographic Projections of Plane Surfaces (First Angle ProjectionOnly)**
Introduction, Definitions-projections of plane surfaces-triangle, square rectangle, rhombus, pentagon, hexagon and circle, planes in different positions by change of position method only (No problems on punched plates and composite plates.) 1-**Sheet**

4. **Projections of Solids (First Angle ProjectionOnly)**
Introduction, Definitions- Projections of right regular- tetrahedron, hexahedron (cube), prisms, pyramids, cylinders and cones in different positions. (No problems on octahedrons and combination solid) **2-Sheet**

5. **Sections and Development of Lateral Surfaces ofSolids**
Introduction, Section planes, Sections, section views, Sectional views, apparent shapes and True shapes of Sections of right regular prisms, pyramids, cylinders and cones resting with base on HP. (No problems on section of solids) 1-Sheet

Development of lateral surface of above solids, their frustums and truncations. (No problems on lateral surfaces of trays, Tetrahedrons spheres and transition pieces), Intersection of solids.

6. **Isometric Projection (Using Isometric ScaleOnly)**
Introduction, Isometric scale, Isometric Projection of simple plane figures, Isometric Projection of tetrahedron, hexahedron (cube), right regular prisms, pyramids, cylinders, cones, spheres, cut spheres and combination of solids (Maximum of three Solids).

7. **Introduction to computergraphics:**
Note : At least 3 drawing assignments must be on AUTOCAD.

Text Books:

1. *N.D. Bhatt & V.M. Panchal, "Engineering Drawing" –, 48th edition, 2005 Charotar Publishing House, Gujarat.*
2. *" A Primer on Computer Aided Engineering Drawing"-2006, Published by VTU, Belgaum.*

Reference Books:

1. *S. Trymbaka Murthy, "Computer Aided Engineering Drawing" –I.K. International Publishing House Pvt. Ltd., New Delhi, 3_{rd} revised edition-2006.*
2. *K.R. Gopalakrishna, "Engineering Graphics", 32nd edition, 2005 – Subash Publishers Bangalore.*
3. *Luzadder Warren J, duff John M.- "Fundamentals of Engineering Drawing with an Introduction to Interactive Computer Graphics for Design and Production", Eastern Economy Edition, 2005 – Prentice- Hall of India Pvt. Ltd., New Delhi.*

Course Outcome: After studying this course, you should be able to:

CO1	produce geometric construction, multiview, dimensioning and detail drawings of typical 3- D engineering objects.
CO2	apply the skill for preparing detail drawing of engineering objects.
CO3	understand and visualize the 3-D view of engineering objects
CO4	understand and apply computer software to prepare engineering drawing.

Bas-152/252	Engineering Chemistry lab	2-0-0	2 credits

Pre-requisites: None

Course Objectives:

- To teach good laboratory practice and skills to analyze and interpret the data from experiments with some insight into future career prospect in the fields related to Chemistry.

Detailed Syllabus:

Volumetric Analysis (Any five)

1. Determination of constituents and amount of alkalinity of water sample.
2. Determination of temporary and permanent hardness (Complexometric titration).
3 Determination of available chlorine in bleaching powder.
4 Determination of chloride content in water (Mohr,s Method).
5 Determination of iron content in the ore sample using external indicator.
6. Analysis of river water: suspended matter, TDS, heavy metals and pH.
7. Determination of BOD and COD of river water sample.
8 . Determination of equivalent wt. of iron by chemical displacement method

Instrumental Analysis (Any two)

9. Determination of strength of a unknown acid solution by pH metric titration.
10. Determination of iron concentration in water by calorimetric method.
11 Determination of viscosity of addition polymer by viscometer.(Polystyrene)

Miscellaneous [Prep (1) and Elemental & Functional (2)]

12. Preparation of Bakelite resin.
13 Synthesis of Aspirin
14 Elemental analysis of organic compounds
15 Determination of functional groups in organic compounds

Course Outcome: After studying this course, you should be able to:

CO1	know about the methods for the determination of water quality parameters.
CO2	They can assess the quality of water for drinking purposes, pisciculture etc. by performing experiments like determination of Total hardness, Total alkalinity, Ca^{2+}, Mg^{2+}, Fe, Cu ions and dissolved oxygen present in water.
CO3	determine the physical properties of liquids by performing the experiments such as viscosity and surface tension of liquids. They will also be able to determine the viscous nature of the lubricating oil.
CO4	The generated knowledge can be used for industrial product development like detergent formulation, paints, drugs etc. synthesize coordination complexes of biologically important transition metal ions.

BME-152/252	Engg. Mechanics lab	2-0-0	Credit-2

Pre-requisites: None

Course Objectives:

- To develop a skill in dignity of labour, precision, safety at work place, team working and development of right attitude.
- To acquire skills in basic engineering practice
- To identify the hand tools and instruments

Detailed Syllabus:

1. (a). To conduct the tensile test and determine the ultimate tensile strength, percentage Elongation for a steel specimen.

   (b). To determine the compression test and determine the ultimate compressive strength for a Specimen

2. To conduct the Impact-tests Izod and Charpy on Impact-testing machine to find the Toughness.

3. To determine the hardness of the given specimen using Brinell and Rockwell hardness testing machine.

4. (a) Friction experiments on inclined plane.

   (b) Belt-Pulley experiment

5. (a). To study the slider-crank mechanism.

   (b). Simple & compound gear-train experiment.

6. Worm & worm-wheel experiment for load lifting.

7. (a). Bending of simply-supported beam for theoretical & experimental deflection. (b). Torsion of rod/wire experiment.

8. (a). Experiment on Trusses.

(b). Statics experiment on equilibrium.

9. (a). Dynamics experiment on momentum conservation

(b). Dynamics experiment on collision for determining coefficient of restitution.

10. Experiment on Moment of Inertia.

Course Outcome: After studying this course, you should be able to:

CO1	know the importance of general safety precautions on different shop floors. identify the basics of tools and equipments used in fitting,
CO2	carpentry, sheet metal, machine, welding and smithy. fabrication of wooden joints and understand joining of metals
CO3	make metal joints and sheet metal work.

BEE-151/251	Electrical Engineering lab	2-0-0	2 credits

Pre-requisites: None

Course Objectives:

- To demonstrate the use of various electrical circuit solving theorems including Thevenin;s theorm,
- Norton's theorem, maximum power transfer theorem, Reciprocity theorem. To study resonance of RLC circuit n series and parallel combinations.
- To demonstrate calibration of various meters like millivoltmeter, milliammeter.
- To demonstrate the DC motor speed control.
- To study the OC and SC test of 1 phase transformer
- To demonstrate measurement of current, voltage and power in electrical circuit.

Detailed Syllabus:

Note: A minimum of 10 experiments from the following should be performed

1. Verification of Kirchhoff‟s laws
2. Verification of (i) Superposition theorem (ii) Thevenin‟s Theorem (iii) Maximum Power Transfer Theorem.
3. Measurement of power and power factor in a single phase ac series inductive circuit and study improvement of power factor using capacitor
4. Study of phenomenon of resonance in RLC series circuit and obtain resonant frequency.
5. Measurement of power in 3- phase circuit by two wattmeter method and determination of its power factor.
6. Determination of parameters of ac single phase series RLC circuit
7. Determination of (i) Voltage ratio (ii) polarity and (iii) efficiency by load test of a single phase transformer
8. To study speed control of dc shunt motor using (i) armature voltage control (ii) field flux control.
9. Determination of efficiency of a dc shunt motor by load test
10. To study running and speed reversal of a three phase induction motor and record speed in both directions.
11. To measure energy by a single phase energy meter and determine error.
12. To study P-N diode characteristics
13. To study full wave and half wave rectifier circuits with and without capacitor and determine ripple factors.
14. To study various logic gates (TTL)
15. To study Operational Amplifier as Adder and Subtractor

16. To study transistor as a switch.

Course Outcome: At the end of the course the students will be able to Demonstrate the different circuit laws in practical circuits.

CO1	Apply various network theorems to solve circuit parameters. .
CO2	Gain an intuitive understanding of the role of common measurement methods used for current,
CO3	voltage and power in 1 phase and 3 phase circuits. Become adept at using various methods calibration of measuring meters
CO4	Demonstrate the ability to control of speed of DC motors using flux control and armature
CO5	resistance control Find out the resonance frequency of a given RLC circuit in series and parallel combinations.

BCS-151/251	Computer fundamentals & programming in C	2-0-0	2 credits

Pre-requisites: None

Course Objectives:

- To make students aware about building blocks of programming.
- To provide exposure to procedural programming.
- To enable students to synthesize a problem and structure it in programmatic way.

Detailed Syllabus:

Assignments will be conducted in tandem with the theory course so that the topics for problems given in the lab are already initiated in the theory class. The topics taught in the theory course should appropriately be sequenced for synchronization with the laboratory. Assignments for lab classes are as follows:

1. Introduction of Computer System: I/O devices, storage devices.
2. Getting familiar with software: OS and C compiler.
3. Write a program to print Hello.
4. Write a program to add two integers.
5. Write a program to compute factorial of a number.
6. Write a program to determine whether a number is prime or not.
7. Write a program to print Fibonacci series. .
8. Write a program in C to check whether a given number is Armstrong or not?
9. Write a program to calculate factorial of an integer using recursion.
10. Show with example (program) how arguments are passed using „Call by value‟ and

    „Call by reference‟ respectively.
11. Write a program to print the sum of all values of an array.
12. Write a program in C that accepts N x N matrix as input and prints transpose of this matrix.

13. Write a program to add the elements of two arrays in to third array using dynamic memory allocation.
14. Write a program in C to calculate the sum of series up to first 10 terms 1^ 4+ 2^4+ 3^4 + 4^4 + 5^4 + 6^4+7^4…10terms
15. Write a program in C that takes input from a file and write it into another file.
16. Write a program to implement stack operation (Push & Pop).
17. Write a program to create a link list.

Course Outcome (CO):

CO1	Learn formulation of simple algorithms for arithmetic and logical problems.
CO2	Able to translate the algorithms into programs (in C language).
CO3	Able to use derived types, control structures, functions and pointers for problem solving

BAS-151/251	Physics lab	2-0-0	Credit-2

Pre-requisites: None

Course Objectives:

- To gain practical knowledge by applying the experimental methods to correlate with the Physics theory.
- To learn the usage of electrical and optical systems for various measurements.
- Apply the analytical techniques and graphical analysis to the experimental data.

Detailed Syllabus:

Group –A

1. To determine the wavelength of monochromatic light by Newton‟s ring.
2. To determine the wavelength of monochromatic light with the help of Fresnel‟s biprism.
3. To determine the focal length of two lenses by nodal slide and locate the position of cardinal points.
4. To determine the specific rotation of cane sugar solution using polarimeter.
5. To determine the wavelength of spectral lines using plane transmission grating.
6. To study the polarization of light by simple reflection using laser.
7. Measurement of Wavelength of a laser (He- Ne) light using single slit diffraction.

Group – B

8. To determine the specific resistance of a given wire using Carey Foster‟s bridge.
9. To study the variation of magnetic field along the axis of current carrying - Circular coil and then to estimate the radius of the coil.
10. To verify Stefan‟s Law by electrical method.
11. To calibrate the given ammeter and voltmeter by potentiometer.
12. To study the Hall effect and determine Hall coefficient, carrier density and - mobility of a given semiconductor using Hall effect set up.
13. To determine the energy band gap of a given semiconductor material.
14 To determine E.C.E. of copper using Tangent or Helmholtz galvanometer.
15. To draw hysteresis curve of a given sample of ferromagnetic material and from - this to determine magnetic susceptibility and permeability of the given specimen.
16. To determine the ballistic constant of a ballistic galvanometer.
17. To determine the coefficient of viscosity of a liquid.
18. Measurement of fiber attenuation and aperture of fiber.
19. High resistance by leakage method.
20. Magnetic Susceptibility of paramagnetic solution.

Course Outcome: After studying this course, you should be able to:

CO1	Apply the various procedures and techniques for the experiments.
CO2	Use the different measuring devices and meters to record the data with precision
CO3	Apply the mathematical concepts/equations to obtain quantitative results
CO4	Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the

BHU-151/251	Professional Communication lab	2-0-0	Credit-2

Pre-requisites: None

Course Objectives:

- Introduction to Phonetics - Speech Sound s- Vowels and Consonants
- Articles, Prepositions, Word Formation-Prefixes & Suffixes, Synonyms & Antonyms
- Situational Dialogues- Role Play- Expressions in various situations- Self introduction and introducing others- Greetings- Apologies- Requests- Social and Professional EtiquetteTelephone Etiquette etc. and Conversation Practice. 10. Information Transfer- Oral Presentation Skills Reading Comprehension

Detailed Syllabus:

1. Group Discussion: Practical based on Accurate and Current Grammatical Patterns.
2. Conversational Skills for Interviews under suitable Professional Communication Lab conditions with emphasis on Kinesics.
3. Communication Skills for Seminars/Conferences/Workshops with emphasis on Paralinguistics/Kinesics.
4. Presentation Skills for Technical Paper/Project Reports/ Professional Reports based on proper Stress and Intonation Mechanics.
5. Official/Public Speaking based on suitable Rhythmic Patterns.
6. Theme- Presentation/ Key-Note Presentation based on correct argumentation methodologies.
7. Individual Speech Delivery/Conferences with skills to defend Interjections/Quizzes.
8. Argumentative Skills/Role Play Presentation with Stress and Intonation.
9. Comprehension Skills based on Reading and Listening Practicals on a model Audio- Visual Usage.

Reference Books

1. *Bansal R.K. & Harrison:" Phonetics in English", Orient Longman, New Delhi.*
2. *Sethi & Dhamija: "A Course in Phonetics and Spoken English",*

Prentice Hall, New Delhi.
3. *L.U.B.Pandey & R.P.Singh, "A Manual of Practical Communication", A.I.T.B.S. Pub. India Ltd. Krishan Nagar, Delhi.*
4. *Joans Daniel," English Pronouncing Dictionary", Cambridge Univ. Press.*

Course Outcome:

CO1	Develop communication skills through various language learning activities.
CO2	Summarize to the nuances of English speech sounds, stress, rhythm, intonation and syllable division
CO3	After completion of the course, the students are expected to have good pronunciation, to be better in listening and comprehension, to become more effective communicators by organizing communication coherently, and to articulate ideas in a clear concise manner.

BAS-203	Mathematics II	4-0-0	4 credits

Pre-requisites: Engineering Mathematics-I

Course Objectives:

- To identify & solve the 1 st order differential equations and apply in Engineering
- Understand the mathematical and physical interpretation of Vector differential operator operating on a vector or scalar point function, the line, surface and volume integrals, vector integral theorems and their applications to find work done, area, and volume.
- Apply the properties of curves in applications of single integral, solve the multiple integrals and to develop the capacity to understand the applications of multiple integrals.

Detailed syllabus

MODULE-I

Numerical Techniques –I

Zeroes of transcendental and polynomial equation using Bisection method, Regula-falsi method and Newton-Raphson method, Rate of convergence of above methods. Interpolation: Finite differences, difference tables, Newton‟s forward and backward interpolation , Lagrange‟s and Newton‟s divided difference formula for unequal intervals.

Numerical Techniques –II

Solution of system of linear equations, Gauss- Seidal method, Crout method. Numerical differentiation, Numerical integration , Trapezoidal , Simpson‟s one third and three-eight rules, Solution of ordinary differential (first order, second order and simultaneous) equations by Euler‟s, Picard‟s and forth-order Runge-Kutta mehthods.

MODULE-II

Statistical Techniques - I

Moments, Moment generating functions, Skewness, Kurtosis, Curve fitting, Method of least squares, Fitting of straight lines, Polynomials, Exponential curves etc., Correlation, Linear, non –linear and multiple regression analysis, Probability theory.

Statistical Techniques - II

Binomial, Poisson and Normal distributions, Sampling theory (small and large), Tests of significations, Chi-square test, t-test.

MODULE-III

Multiple Integrals

Double and triple integral, Change of order, Change of variables, Beta and Gamma functions, Application to area, volume, Dirichlet integral and applications.

Vector Calculus

Line, surface and volume integrals, Statement and problems of Green‟s, Stoke‟s and Gauss divergence theorems (without proof).

Text Books:-

1. H.K.Dass, Higher Engineering Mathmatics, S.Chand Publications.
2. B.S.Grewal, Engineering Mathematics, Khanna Publishers, 2004.

Reference Books:-

1. R.K.Jain & S.R.K.Iyenger, Advance Engineering Mathematics, Narosa Publishing House, 2002.
2. B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers, 2005.
3. E.Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 2005.
4. C.Ray Wylie & Louis C. Barrett, Advanced Engineering Mathematics, Tata Mc Graw-Hill Publishing Company Ltd. 2003
5. Peter V. O‟Neil, Advanced Engineering Mathematics, Thomson (Cengage) Learning, 2007.

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

CO1	Use matrices, determinants and techniques for solving systems of linear equations in the different areas of Linear Algebra.
CO2	Understand the definitions of Vector Space and its linear Independence
CO3	To integrate a continuous function of two or three variables over a bounded region.
CO4	Understand Curl, divergence and gradient with their applications.
CO5	Have the idea of directional derivatives and derive the equations of tangent planes and normal lines
CO6	Calculate line integral, surface integral and volume integral and correlate them with the application of Stokes, Green and Divergence theorem.

STUDY AND EVALUATION SCHEME

B.Tech. in Computer Science and Engineering
(Effective from session 2016-2017)
YEAR II, SEMESTER III

S. No.	Course Code	SUBJECTS	HOURS			EVALUATION SCHEME					SUBJECT TOTAL	Credit
						SESSIONAL EXAM.				END SEM.		
			L	T	P	CT	TA	AT	TOTAL			
THEORY												
1	BHU-302/BHU-301	Industrial Sociology / Industrial Psychology	2	1	0	10	5		15	35	50	2
2	BAS-301	Mathematics-III	3	1	0	20	10		30	70	100	4
3	BCS-301	Data Structures	3	1	0	20	10		30	70	100	4
4	BCS-302	Discrete Structures	3	1	0	20	10		30	70	100	4
5	BCS-303	Digital Logic Design	3	1	0	20	10		30	70	100	4
6	BCS-304	IT Infrastructure and its Management	3	1	0	20	10		30	70	100	4
PRACTICALS AND PROJECTS												
7	BCS-351	Data structures Lab	0	0	2	-	-		10	15	25	1
8	BCS-353	Digital Logic Design Lab	0	0	2	-	-		10	15	25	1
9	BCS-354	IT Infrastructure Lab	0	0	2	-	-		10	15	25	1
10	GP-301	General Proficiency	-	-	-	-	-		50	-	50	1
		TOTAL	17	6	6				245	430	675	26

L-Lecture, **T-** Tutorial ,**P-** Practical , **CT –** Cumulative Test ,**TA –**Teacher Assessment ,
AT – Attendance ,**E-Sem –** End Semester Marks

BCS-301	Data Structures	L T P 3 10	4 Credits

Pre-requisites: None

Course Objectives:

CO1	Introduce the concept of data structures through ADT including List, Stack, Queues
CO2	To understand various data structures and operation performed on them and the concepts of algorithm writing and efficiency analysis .
CO3	To design and implement various data structure algorithms.
CO4	Able to analyze algorithms and determine their time complexity
CO5	To introduce various techniques for representation of the data in the real world.
CO6	To develop application using data structure algorithms. Compute the complexity of various algorithms.

Detailed Syllabus

MODULE-I

Introduction: Basic Terminology, Elementary Data Organization, Algorithm**,** Time and space complexity of algorithms. Asymptotic notations, Abstract data types.

Elementary data structures: Arrays, ordered lists, representation of arrays, singly linked lists, doubly linked lists, stacks, queues, deques, generalized lists, polynomial arithmetic, sparse matrices, equivalence relations, infix, postfix and prefix arithmetic expression conversion and evaluations, recursion, tower of Hanoi problem, Garbage collection and compaction.

MODULE-II

Graphs: Representation, traversal, connected components, spanning trees, Minimum Cost Spanning Trees: Prims and Kruskal algorithm, shortest path and transitive closure, topological sort, activity network.

Trees: Binary trees, traversal, threaded binary tree, set representation and operations, decision tree, B-Tree, Huffman coding.

MODULE-III

Searching : Sequential search, Binary Search, Comparison and Analysis

Internal Sorting: Insertion Sort, Selection, Bubble Sort, Quick Sort, Two Way Merge Sort, Heap Sort..

Hashing: Hash Function, Collision Resolution Strategies

Text books and References:

1. Aaron M. Tenenbaum, YedidyahLangsam and Moshe J. Augenstein "Data Structures Using C and C++" , PHI
2. Horowitz and Sahani, "Fundamentals of Data Structures", Galgotia Publication
3. Jean Paul Trembley and Paul G. Sorenson, "An Introduction to Data Structures with applications", McGraw Hill
4. R. Kruse etal, "Data Structures and Program Design in C", Pearson Education
5. Lipschutz, "Data Structures" Schaum's Outline Series, TMH
6. G A V Pai, "Data Structures and Algorithms", TMH

COURSE OUTCOMES:

CO1	Able to define the concepts of data structure, data type and study different types of data structures such as array, stack , queues, linked list, trees and graph.
CO2	Able to understand various data structures and operation performed on them and the concepts of algorithm writing and efficiency analysis .
CO3	Able apply and implement various data structure such as stacks, queues, trees and graphs to solve various computing problems using algorithms and C-programming language.
CO4	Able to analyze algorithms and determine their time complexity
CO5	Able differentiate the various data structures on the basis of efficiency of different operations being performed.
CO6	Able to effectively choose the data structure that efficiently model the information in a problem

BCS-302	**Discrete Structures**	**L T P** **3 1 0**	**4 Credits**

Pre-requisites: High school Mathematics

Course Objectives:

CO1	To develop logical thinking and its application to computer science (to emphasize the importance of proving statements correctly.
CO2	To Have substantial experience to comprehend formal logical arguments.
CO3	To express mathematical properties formally via the formal language of propositional logic and predicate logic.
CO4	To understand basic mathematical objects such as sets, functions, and relations and will also be able to verify simple mathematical properties that these objects possess.
CO5	The subject enhances one's ability to reason and ability to present a coherent and mathematically accurate argument.

Detailed Syllabus

MODULE-I

Set Theory: Introduction, Combination of sets, Multisets, Ordered pairs. Proofs of some general identities on sets.**Relations:** Definition, Operations on relations, Properties of relations, Composite Relations, Equality of relations, Recursive definition of relation, Order of relations.

Functions: Definition, Classification of functions, Operations on functions, Recursively defined functions.Natural Numbers: Introduction, Mathematical Induction, Proof Methods,Proof by contradiction.**Algebraic Structures:** Definition, Groups, Subgroups and order, Cyclic Groups, Lagrange's theorem, Normal Subgroups, Permutation and Symmetric groups, Group Homomorphisms, Definition and elementary properties of Rings and Fields.

MODULE-II

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.

Propositional Logic: Proposition, well formed formula, Truth tables, Tautology, Satisfiability, Contradiction, Algebra of proposition, Theory of Inference.

Predicate Logic: First order predicate, well formed formula of predicate, quantifiers, Inference theory of predicate logic.

MODULE-III

Trees : Definition, Binary tree, Binary tree traversal, Binary search tree. **Graphs:** Definition and terminology, Representation of graphs, Multigraphs, Bipartite graphs, Planar graphs, Isomorphism and Homeomorphism of graphs, Euler and Hamiltonian paths, Graph coloring, Recurrence Relation, Method of solving recurrences.

Text Books:-

1. Koshy, Discrete Structures, Elsevier Pub. 2008

Reference Book:-

1. Kenneth H. Rosen, Discrete Mathematics and Its Applications, 6/e, McGraw-Hill, 2006.

2.B. Kolman, R.C. Busby, and S.C. Ross, Discrete Mathematical Structures,

5/e,PrenticeHall, 2004.

3. E.R. Scheinerman, Mathematics: A Discrete Introduction, Brooks/Cole, 2000.

4. R.P. Grimaldi, Discrete and Combinatorial Mathematics, 5/e, Addison Wesley, 2004.

5. Jean Paul Trembley, R Manohar, Discrete Mathematical Structures with Application to

Computer Science, McGraw-Hill, Inc. New York, NY, 1975.

Course Outcomes: After the completion of the course the student will be able to:

CO1	Be able to construct simple mathematical proofs and possess the ability to verify them.
CO2	Have substantial experience to comprehend formal logical arguments.
CO3	Be skillful in expressing mathematical properties formally via the formal language of propositional logic and predicate logic.
CO4	Be able to specify and manipulate basic mathematical objects such as sets, functions, and relations and will also be able to verify simple mathematical properties that these objects possess.
CO5	Gain experience in using various techniques of mathematical induction (weak, strong and structural induction) to prove simple mathematical properties of a variety of discrete structures.

BCS-303	Digital Logic Design	**L T P** **3 1 0**	**4 Credits**

Pre-requisites: None

Course Objectives:

CO1	Understand the concepts of various components.

CO2	Understand concepts that underpin the disciplines of analog and digital electronic logic circuits.
CO3	Understand various Number systems and Boolean algebra, the Boolean expression using Boolean algebra and design it using logic gates.
CO4	Understand Design and implementation of combinational circuits
CO5	Understand Design and develop sequential circuits.
CO6	Understand RTL for representing real work problems.

Detailed Syllabus

MODULE-I

Digital system and binary numbers: Signed binary numbers, binary codes, cyclic codes, error detecting and correcting codes, hamming codes. Floating point representation Gate-level minimization: The map method up to five variable, don't care conditions, POS simplification, NAND and NOR implementation, Quine Mc-Clusky method (Tabular method).

MODULE-II

Combinational Logic: Combinational circuits, analysis procedure, design procedure, binary adder-subtractor, decimal adder, binary multiplier, magnitude comparator, decoders, encoders, multiplexers

Synchronous Sequential logic: Sequential circuits, storage elements: latches, flip flops, analysis of clocked sequential circuits, state reduction and assignments, design procedure. Registers and counters: Shift registers, ripple counter, synchronous counter, other counters.

MODULE-III

Memory and programmable logic: RAM, ROM, PLA, PAL.
Design at the register transfer level: ASMs, design example, design with multiplexers.
Asynchronous sequential logic: Analysis procedure, circuit with latches, design procedure, reduction of state and flow table, race free state assignment, hazards.

Text Book:

1. M. Morris Mano and M. D. Ciletti, "Digital Design", 4th Edition, Pearson Education

Reference Books :

1. Introduction to Digital Logic Design, JP Hayes, PHI.

2. *The Art of Digital Design: An Introduction to Top-Down Design, Franklin P. Prosser, PHI.*

COURSE OUTCOMES:

CO1	Understand the concepts of various components to design stable analog circuits.
CO2	Represent numbers and perform arithmetic operations.
CO3	Minimize the Boolean expression using Boolean algebra and design it using logic gates.
CO4	Analyze and design combinational circuit.
CO5	Design and develop sequential circuits.
CO6	Translate real world problems into digital logic formulations using RTL

BCS-304	**IT Infrastructure and its Management**	**L T P** **3 1 0**	**4 Credits**

Pre-requisites: None

CO1	To understand underlying principles of IT infrastructure and management services.
CO2	To undersatnd IT systems, service delivery and service support process for providing a quality service.
CO3	To understand the basics of storage management
CO4	To study policies for security management and mitigate security related risks in the organization
CO5	To understand the IT and cyber ethics and study cyber forensics law and cyber crimes.

CO6	To understand emerging trends in IT

Detailed Syllabus

MODULE-I

INTRODUCTION: Information Technology, Computer Hardware, Computer Software, Network and Internet, Computing Resources,
IT INFRASTRUCTURE: Design Issues, Requirements, IT System Management Process, Service Management Process, Information System Design, IT Infrastructure Library
SERVICE DELIVERY PROCESS: Service Delivery Process, Service Level Management, Financial Management, Service Management, Capacity Management, Availability Management

MODULE-II

SERVICE SUPPORT PROCESS: Service Support Process, Configuration Management, Incident Management, Problem Management, Change Management, Release Management
STORAGE MANAGEMENT: Backup & Storage, Archive & Retrieve, Disaster Recovery, Space Management, Database & Application Protection, Bare Machine Recovery, Data Retention

MODULE-III

SECURITY MANAGEMENT: Security, Computer and internet Security, Physical Security, Identity Management, Access Management. Intrusion Detection, Security Information Management
IT ETHICS: Introduction to Cyber Ethics, Intellectual Property, Privacy and Law, Computer Forensics, Ethics and Internet, Cyber Crimes
EMERGING TRENDS in IT: Electronics Commerce, Electronic Data Interchange, GSM, Bluetooth, Infrared.

Text Book*:*

Phalguni Gupta, Surya Prakash, UmaraniJayaraman, IT Infrastructure and its Management, Tata Mcgraw Hill, Publication

COURSE OUTCOMES:

CO1	To describe basic IT infrastructure, storage management, security measures, cyber ethics,

	computer forensics, cyber laws and electronic commerce.
CO2	To summarize the design requirements for IT systems, service delivery and service support process for providing a quality service.
CO3	To relate various service delivery and service support process for development of a quality product.
CO4	To focus on various storage and security schemes to provide availability and safety of IT system.
CO5	To test the data collected at any cyber crime scene and organize it to find out the sequence of events responsible for present situation using computer forensic schemes.
CO6	To create a security model for protection of IT infrastructure as well as the data and network.

STUDY AND EVALUATION SCHEME
B.Tech. in Computer Science and Engineering
(Effective from session 2016-2017)
YEAR II, SEMESTER IV

S. No.	Course Code	SUBJECTS	HOURS			EVALUATION SCHEME					SUBJECT TOTAL	Credit
						SESSIONAL EXAM.				END SEM.		
			L	T	P	CT	TA	AT	TOTAL			
THEORY												
1	BHU-402/BHU-401	Industrial Sociology / Industrial Psychology	2	1	0	10	5		15	35	50	2
2	BCS-401	Computer Organization & Introduction to Microprocessor	3	1	0	20	10		30	70	100	4
3	BCS-402	Design and Analysis of Algorithms	3	1	0	20	10		30	70	100	4
4	BCS-403	Operating Systems	3	1	0	20	10		30	70	100	4
5	BCS-404	Unix & Shell Programming	3	1	0	20	10		30	70	100	4
6	BCS-407	Object Oriented Techniques	3	1	0	20	10		30	70	100	4
PRACTICALS AND PROJECTS												
7	BCS-451	Computer Organization & Introduction to Microprocessor Lab	0	0	2	-	-		10	15	25	1
8	BCS-452	Design and Analysis of Algorithms Lab	0	0	2	-	-		10	15	25	1
9	BCS-454	Unix & Shell Programming Lab	0	0	2	-	-		10	15	25	1
10	GP-401	General Proficiency	-	-	-	-	-		25	-	25	1
		TOTAL	17	6	6				220	430	650	26

L-Lecture, **T**- Tutorial , **P**- Practical , **CT –** Cumulative Test ,**TA –**Teacher Assessment , **AT –** Attendance , **E-Sem –** End Semester Marks

BCS-401 COMPUTER ORGANIZATION & INTRODUCTION TO MICROPROCESSOR

L	T	P	C
3	1	0	4

Pre-requisites: None

Course Objectives:

CO1	Conceptualize the basics of organizational and architectural issues of a digital computer.
CO2	Understand concepts of register transfer logic and arithmetic operations.
CO3	Explain different types of addressing modes and memory organization.
CO4	Learn the different types of input and output devices and their working.
CO5	To become familiar with the architecture and the instruction set of an Intel microprocessor 8085.
CO6	To do assembly language programming in 8085.

Detailed Syllabus

MODULE-I

Introduction:, Digital computer Block diagram, functional units and their interconnections, buses, types of buses and bus arbitration.

Number representation : Fixed point Integer representation , Fixed point arithmetic operations in 2's complement form: Addition, Subtraction, Booths multiplication algorithm, array multiplier, and Division. Floating point number representation, IEEE standard for floating point representation , Floating point arithmetic operation , ASCII coding.

Central Processing unit: Register, bus and Memory transfer, Register Transfer language, Arithmetic, logic and shift micro operations, arithmetic and logic unit, Processor organization: Single Accumulator, general register and stack organization, Addressing modes, Instruction types, Instruction formats, instruction cycle.

MODULE-II

Control Unit :Hardwired and microprogrammed control, concept of horizontal and vertical microprogramming

Memory: Basic concept and hierarchy, semiconductor RAM memories, ROM memories, Cache memory, address mapping techniques and replacement, Auxiliary memories, Virtual memory.

Input / Output: Peripheral devices, I/O interface, I/O ports, Interrupts, types of interrupts, Modes of Data Transfer, Programmed I/O, interrupt initiated I/O and Direct Memory Access.

MODULE-III

Introduction to microprocessor : Microprocessor evolution and types, microprocessor architecture and operation of its components, Pin diagram and internal architecture of 8085 microprocessor, registers, ALU, Control & status, interrupts and machine cycle, Instruction sets, Addressing modes, Instruction formats, Instruction Classification, timing diagram, Simple Assembly language programming based on Intel 8085.

Text Books:

1.William Stalling- Computer Organization,PHI

2. Morris Mano, Computer System Architecture, PHI

3.John P. Hays – Computer Organization , Mc-Graw Hill

4. Vravice,Hamacher & Zaky, "Computer Organization", TMH

5 Gaonkar, Ramesh S, "Microprocessor Architecture, Programming and Applications with 8085", Penram International Publishing.

Course Outcomes: After the completion of the course the student will be able to:

CO1	Understand concepts of register transfer logic and arithmetic operations
CO2	Define different number systems, binary addition and subtraction, 2's complement representation and operations with this representation.
CO3	Understand the architecture and functionality of central processing unit.
CO4	Exemplify in a better way the I/O and memory organization.
CO5	Understand 8085 architecture and write assembly language programs in it .
CO6	Design a simple CPU with applying the theory concepts.

BCS-402 DESIGN & ANALYSIS OF ALGORITHMS

L	T	P	C
3	1	0	4

Pre-requisites: None

Course Objectives:

CO1	To understand and remember algorithms and its analysis procedure.
CO2	To introduce the concept of data structures through ADT including List, Stack, Queues.
CO3	To design and implement various data structure algorithms.
CO4	To introduce various techniques for representation of the data in the real world.
CO5	To develop application using data structure algorithms.
CO6	Compute the complexity of various algorithms.

Detailed Syllabus

MODULE-I

Introduction: Algorithms, Analyzing algorithms, Complexity of algorithms, Growth of Functions- master theorem, Sorting- insertion sort, selection sort, Shell sort, Comparison of sorting algorithms, sorting in linear time.

Divide and Conquer: General method, merge sort, quick sort, Heap sort, Strassen's matrix multiplication algorithm.

Advanced data Structures: B – trees , Red-Black trees, Data Structure for Disjoint sets.

MODULE-II

Graphs: Minimum Spanning trees – Prim's and Kruskal's algorithms, Single source shortest paths - Dijkstra's and Bellman Ford algorithms, Multistage graphs, all pairs shortest paths: Warshal's and Floyd's algorithms

The Greedy Method : optimal storage on tapes, Fractional Knapsack problem, Job sequencing with deadlines,.

Dynamic Programming: Introduction, O/1 knapsack,. Matrix chain multiplication, longest Common sequence.

MODULE-III

Back Tracking: Introduction, 8 queen's problem, graph coloring, Hamiltonian cycles, Subset Sum Problem.

Branch and Bound: Introduction, traveling salesperson problem, Euclids algorithm for GCD

String matching: Naïve String Matching, Rabin karp, Knuth-Morris-Pratt algorithm.

NP Completeness : Introduction to P, NP hard and NP completeness, NP complete problems : Clique problem, Vertex Cover problem, Travelling salesman problem.

Text Books:

1. *Fundamental of Computer algorithms, Ellis Horowitz and Sartaj Sahni, 1978, Galgotia Publications*
2. *Introduction To Algorithms, Thomas H Cormen, Charles E Leiserson And Ronald L Rivest: 1990, TMH*

Reference Books:

1. *The Design and Analysis of Computer Algorithm, Aho A.V. Hopcroft J.E., 1974, Addison Wesley.*
2. *Algorithms-The Construction, Proof and Analysis of Programs, Berlion, P.Bizard, P., 1986. Johan Wiley & Son*
3. *Introduction to Design and Analysis of Algorithm, Goodman, S.E. & Hedetnieni, 1997, MGH.*
4. *Introduction to Computers Science- An algorithms approach , Jean Paul Trembley, Richard B.Bunt.*

Course Outcomes: After the completion of the course the student will be able to:

CO1	Select appropriate data structures as applied to specified problem definition.
CO2	Implement operations like searching, insertion, and deletion, traversing mechanism etc. on various data structures.
CO3	Implement Linear and Non-Linear data structures.
CO4	Implement appropriate sorting/searching technique for given problem.
CO5	Design advance data structure using Non- Linear data structure.
CO6	Determine and analyze the complexity of given Algorithms.

BCS-403 OPERATING SYSTEM

L	T	P	C
3	1	0	4

Pre-requisites: None

Course Objectives:

CO1	To understand the main components of an OS & their functions.
CO2	To study the process management and scheduling.
CO3	To understand various issues in Inter Process Communication (IPC) and the role of OS in IPC.
CO4	To understand the concepts and implementation Memory management policies and virtual memory.
CO5	To understand the working of an OS as a resource manager, file system manager, process manager, memory manager and I/O manager and methods used to implement the different parts of OS.
CO6	To understand the concept of file organization and access mechanism.

Detailed Syllabus

MODULE-I

Introduction : Operating system and functions, Classification of Operating systems- Batch, Interactive, Time sharing, Real Time System, Multiprocessor Systems, Multiuser Systems, Multiprocessor Systems, Multithreaded Systems, Operating System Structure- Layered structure, System Components, Operating System services. Concurrent Processes: Process Concept, Principle of Concurrency, Producer / Consumer Problem, Mutual Exclusion, Critical Section Problem, Dekker's solution, Peterson's solution, Semaphores, Test and Set operation.

MODULE-II

Classical Problem in Concurrency- Dining Philosopher Problem, Sleeping Barber Problem, Inter Process Communication models and Schemes, Process generation. **CPU Scheduling:** Scheduling Concepts, Performance Criteria, Process States, Process Transition Diagram, Schedulers, Process Control Block (PCB), Process address space, Process identification information, Threads and their management, Scheduling Algorithms, Multiprocessor Scheduling. Deadlock: System model, Deadlock characterization, Prevention, Avoidance and detection, Recovery from deadlock.

MODULE-III

Memory Management: Multiprogramming with fixed partitions, Multiprogramming with variable partitions, Protection schemes, Paging, Segmentation, Paged segmentation, Virtual

memory concepts, Demand paging, Performance of demand paging, Page replacement algorithms, Thrashing, Cache memory organization, **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.

Text Books :

1. *Silberschatz, Galvin and Gagne, "Operating Systems Concepts", Wiley*
2. *Sibsankar Halder and Alex A Aravind, "Operating Systems", Pearson Education*
3. *Harvey M Dietel, " An Introduction to Operating System", Pearson Education*
4. *D M Dhamdhere, "Operating Systems : A Concept based Approach", 2nd Edition, 13 TMH*
5. *William Stallings, "Operating Systems: Internals and Design Principles ", 6th Edition, Pearson EducationH.*

Course Outcomes: After the completion of the course the student will be able to:

CO1	Describe the important computer system resources and the role of operating system in their management policies and algorithms.
CO2	Understand the process management policies and scheduling of processes by CPU.
CO3	Evaluate the requirement for process synchronization and coordination handled by operating system.
CO4	Describe and analyze the memory management and its allocation policies.
CO5	Identify, use and evaluate the storage management policies with respect to different storage management technologies.
CO6	Set file access permissions and protect and secure files.

BCS-404 UNIX & SHELL PROGRAMMING

L	T	P	C
3	1	0	4

Pre-requisites: None

Course Objectives:

CO1	To familiarize the students with the basic concepts of single & multiuser Operating System, basic structure of UNIX kernel and its subsystems.
CO2	To introduce the concept of file subsystem, inodes and how files are managed by inodes & to introduce process control subsystem, process scheduling paradigms and different types of scheduling employed in UNIX.
CO3	To acquaint students with command structure of UNIX, various types of shells and types of commands and familiarize students with some general commands, directory and file related commands, process related and user communication related commands in UNIX.
CO4	To understand the concept of filters and piping, system administration and some system administration related commands.
CO5	To introduce various editors available in UNIX and the detailed working on the most prevalent editor: Vi editor.
CO6	To understand basics of shell programming, wild cards and how to write simple shell programs, introduce concepts of decision control, looping, nested looping and control flow clauses in shell programming. Also make them write the related shell programs

Detailed Syllabus

MODULE-I

Introduction to UNIX: Features of UNIX Operating System,UNIX system organization (the kernel and the shell), Files and directories, Library Functions and system calls, Editors (vi and ed). Introduction to the Concept of Open Source Software, Linux, Linux Architecture, Linux file system (inode, Super block, Mounting and Un- mounting), Essential Linux Commands(grep, fgrep, egrep, make, nmake, gmake, rcs, cvs, sccs, ar, tar, cpio, pax, RPM, autoconfig. Users and permissions- chmod, su, mount, df, fsck, dd, etc), Kernel, Process Management in Linux, Signal Handling, System call, System call for Files, Processes and Signals.

MODULE-II

Programming in shell script: Types of shells, Shell Meta characters, Shell variables, Shell scripts, Shell commands, the environment, Integer arithmetic and string manipulation, Special command line characters, Decision making and loop control, controlling terminal input, trapping signals, arrays. I/O Redirection and Piping,Vi and Emacs editor, Shell control statements, Find, Shell Meta- characters, Shell Scripts, Shell keywords, Shell Procedures and Reporting, Handling documents, scheduling of processes at command, cron, batch

commands,Command line argument, Background processes, process synchronization, Sharing of data, user-id, group-id.

MODULE-III

Network Administration: System administration Common administrative tasks, identifying administrative files – configuration and log files, Role of system administrator, Managing user accounts-adding & deleting users, changing permissions and ownerships, Creating and managing groups, modifying group attributes, Temporary disable user's accounts, creating and mounting file system, checking and monitoring system performance file security & permissions, becoming super user using su. Case study-Amoeba, Corba, Mac, Eros, Ubuntu.

Text Book:

1. *"Unix Programming Environment" The Kernighan and Pike Prentice – Hall of India*

Reference Book :

2. *"Unix –Shell Programming" Kochar*

Course Outcomes: After the completion of the course the student will be able to:

CO1	Understand basic concepts of Operating Systems, UNIX development, concept of kernel and shell, different subsystems of kernel, types of shells.
CO2	Understand File subsystem in detail: Types of files, hierarchical structure, data structures and index nodes.
CO3	Understand Process Control subsystem in detail: State diagram, data structures and various types of scheduling
CO4	Understand and execute various types of commands on the standard shell viz. basic commands, directory and file related, pipe and filter related, process related, user communication related and the system administration related commands.
CO5	Understand how to work on the standard editor of UNIX i.e. Vi editor and write shell scripts using this editor
CO6	Understand basics of shell, wild cards, redirection, positional and command line parameters able to write shell scripts involving decision control, looping and control flow statements.

BCS-407 OBJECT ORIENTED TECHNIQUES

L	T	P	C
3	1	0	4

Pre-requisites: None

Course Objectives:

CO1	To explain the difference between object oriented programming and procedural programming.
CO2	To make familiar with the syntax of the language
CO3	To program using more Java features such as composition of objects, operator overloading, dynamic memory allocation, inheritance and polymorphism, file I/O, exception handling, templates etc.
CO4	To build Java classes using appropriate encapsulation and design principles.
CO5	To improve the problem solving skills.
CO6	To apply object oriented or non-object oriented techniques to solve bigger Real World Computing problems.

Detailed Syllabus

MODULE I

Introduction: The meaning of Object Orientation, principles of modeling, object oriented modeling, conceptual model of the UML. Class &Object Diagrams: Terms, concepts, modeling techniques for Class & Object Diagrams. Collaboration Diagrams: Terms, Concepts, depicting a message, polymorphism in collaboration Diagrams, iterated messages, use of self in messages. Sequence Diagrams: Terms, concepts, depicting asynchronous messages with/without priority, callback mechanism, broadcast messages. Use cases and Use case Diagrams, Activity Diagrams, State Machine, interaction diagram, Package diagram. Deployment, Component diagrams and Deployment diagrams.

MODULE II

Structured analysis and structured design (SA/SD), Jackson Structured Development (JSD). Mapping object oriented concepts using non-object oriented language, Translating classes into data structures, Passing arguments to methods, Implementing inheritance, associations encapsulation. Object oriented programming style: reusability, extensibility, robustness, programming in the large. Procedural v/s OOP, Object oriented language features. Abstraction and Encapsulation.

MODULE III

Introduction to Java, History, Features, Object Oriented concept of Java, Classes and Objects, Inheritance, Packages, Interface , abstract method and classes, Polymorphism, Inner classes, String Handling, I/O , Networking, Event Handling. Multi threading, Collection, Java APIs, Java Beans: Application Builder tools, The bean developer kit(BDK), JAR files, Introspection, Developing a simple bean, using Bound properties.

Text Books:

1. *James Rumbaugh et. al, "Object Oriented Modeling and Design", PHI*
2. Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language User Guide", Pearson Education
3. Naughton, Schildt, "The Complete Reference JAVA2", TMH
4. Mark Priestley "Practical Object-Oriented Design with UML", TMH
5. Booch, Maksimchuk, Engle, Young, Conallen and Houstan, "Object Oriented Analysis and Design with Applications", Pearson Education
6. Pandey, Tiwari, "Object Oriented Programming with JAVA", Acme Learning

Course Outcomes: After the completion of the course the student will be able to:

CO1	Differentiate between Procedure-Oriented programming and Object-Oriented programming
CO2	Understand the syntax of the language
CO3	Understand and apply various object oriented features like inheritance, data abstraction, encapsulation and polymorphism to solve various computing problems using Java language.
CO4	Apply concepts of operator overloading, constructors and destructors
CO5	Apply exception handling.
CO6	Apply object oriented concepts in real world programs

BCS-451: COMPUTER ORGANIZATION & MICROPROCESSOR LAB

L	T	P	C
0	0	2	1

1. Bread Board Implementation of Flip-Flops.
2. Bread Board implementation of counters & shift registers.
3. Bread Board implementation of Binary Adder.
4. Bread Board implementation of Seven Segment Display.
5. Write a program using 8085 Microprocessor for Decimal, Hexadecimal addition and subtraction of two Numbers.
6. Write a program using 8085 Microprocessor for addition and subtraction of two BCD numbers.
7. To perform multiplication and division of two 8 bit numbers using 8085.
8. To find the largest and smallest number in an array of data using 8085 instruction set.
9. To write a program to arrange an array of data in ascending and descending order.
10. To convert given Hexadecimal number into its equivalent ASCII number and vice versa using 8085instruction set.

BCS-452 DESIGN AND ANALYSIS OF ALGORITHMS LAB

L	T	P	C
0	0	2	1

Programming assignments on each algorithmic strategy:

1 Program for Quick Sort

2 Program for Merge Sort

3 Program for Knapsack Problem

4 Program for minimal spanning trees.

5 Program for Travelling salesman problem

6 Program for Insertion sort

7 Program for counting sort

8 Program for sequential and binary search

9 Program for k-th element to find minimum and maximum

10 Program for n-queens problem

11 Program for Heap sort

12 Program for Graph coloring problem.

BCS-454 UNIX & SHELL PROGRAMMING LAB

L	T	P	C
0	0	2	1

Requirements: UNIX Operating System

Assignments will be provided for the following

1 Introduction to UNIX Commands-
cal,date,echo,printf,bc,script,mailx,passwd,who,uname,tty,sty,pwd,cd,mkdir,rmdir,ls,cat,cp,rm,mv,more,tar.

2 Introduction to vi editor

3 Programming in shell script

i. Write a script to implement the READ statement, i.e. ask user for inputs.
ii. Write a script which implements command line arguments.
iii. Write a script to compare three numbers using conditional statements.
iv. Write a script that accepts a filename as argument and displays the last modification time if file exists and a suitable message if it doesn't.
v. Devise a script that accepts two directory names bar1 and bar2 and delete those files in bar2 which are identical to their namesakes in bar1.
vi. Write a script that to display the numbers from zero to nine using while loop.
vii. Write a script showing nesting of loops to print the following output

0

1 0

2 1 0

3 2 1 0

4 3 2 1 0

4 Introduction to programming in AWKs

B.Tech. YEAR III, SEMESTER V

S. No.	Course Code	SUBJECTS	HOURS			EVALUATION SCHEME					SUBJECT TOTAL	Credit
						SESSIONAL EXAM.				END SEM.		
			L	T	P	CT	TA	AT	TOTAL			
THEORY												
1	BCS-501	Theory of Computation	3	1	0	20	10		30	70	100	4
2	BCS-502	Data Base Management System	3	1	0	20	10		30	70	100	4
3	BCS-503	Java Programming	3	1	0	20	10		30	70	100	4
4	BCS-504	Software Engineering	3	1	0	20	10		30	70	100	4
5	BCS-051-054	CS Elective-I	3	1	0	20	10		30	70	100	4
6	BOE-501-504	Open Elective-1	2	1	0	10	5		15	35	50	2
PRACTICALS AND PROJECTS												
7	BCS- 552	DBMS Lab	0	0	2	-	-		10	15	25	1
8	BCS-553	Java Programming Lab	0	0	2	-	-		10	15	25	1
9	BCS-554	Software Engineering Lab	0	0	2	-	-		10	15	25	1
10	GP-501	General Proficiency	-	-	-	-	-		50	-	50	1
		TOTAL	17	6	6				245	430	675	26

B.Tech. YEAR III, SEMESTER VI

S. No.	Course Code	SUBJECTS	HOURS			EVALUATION SCHEME					SUBJECT TOTAL	Credit
						SESSIONAL EXAM.				END SEM.		
			L	T	P	CT	TA	AT	TOTAL			
THEORY												
1	BCS-601	Computer Networks	3	1	0	20	10		30	70	100	4
2	BCS-602	Computer Graphics	3	1	0	20	10		30	70	100	4
3	BCS-603	Compiler Design	2	1	0	10	5		15	35	50	2
4	BCS-604	Internet Technology	3	1	0	20	10		30	70	100	4
5		CS Elective-II	3	1	0	20	10		30	70	100	4
6		CS Elective-III	3	1	0	20	10		30	70	100	4
PRACTICALS AND PROJECTS												
7	BCS-651	Computer Networks Lab	0	0	2	-	-		10	15	25	1
8	BCS-652	Computer Graphics Lab	0	0	2	-	-		10	15	25	1
9	BCS-654	Internet Technology Lab	0	0	2	-	-		10	15	25	1
10	GP-601	General Proficiency	-	-	-	-	-		50	-	50	1
		TOTAL	17	6	6				245	430	675	26

BCS-502	DATA BASE MANAGEMENT SYSTEMS	L T P 3 1 0	4Credits

Pre-requisites: None

Course Objectives:

This course is intended to provide an understanding ofthecurrent theory and practice of database management systems. The course provides a solidtechnical overview of database management systems, using a currentdatabase product as a case study. In addition to technical concerns, more general issues are emphasized. These include data independence, integrity, security, recovery, performance, database design principles,and database administration.

Detailed Syllabus

MODULE-I

Introduction: An overview of database management system, database system Vs file system, Database system concept and architecture, data model schema and instances, data independence and database language and interfaces, data definitions language, DML, Overall Database Structure.

Data Modeling:

ER Data model, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation, reduction of an ER diagrams to tables, extended ER model, relationship of higher degree.

Relational data model concepts, integrity constraints, entity integrity, referential integrity, Keys constraints, Domain constraints, relational algebra, relational calculus, tuple and domain calculus.

MODULE-II

Introduction on SQL: Characteristics of SQL, advantage of SQL. SQl data type and literals, Types of SQL commands, SQL operators, Tables, views and indexes, Insert, update and

delete operations, Queries and sub queries Aggregate functions, Joins, Unions, Intersection, Minus, Cursors, Triggers.

Data Base Design & Normalization: Functional dependencies, normal forms, first, second, third normal forms, BCNF, inclusion dependence, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design.

MODULE-III

Transaction Processing Concept: Transaction system, Testing of serializability, serializability of schedules, Types of serializability, recoverability, Recovery from transaction failures, log based recovery, checkpoints, deadlock handling.

Concurrency Control Techniques: Concurrency control, Locking Techniques for concurrency control, Time stamping protocols for concurrency control, validation based protocol, multiple granularity, Multi version schemes, Recovery with concurrent transaction, case study of Oracle.

Text Books:-

1. Date C J, " An Introduction to Database Systems", Addision Wesley

2. Korth, Silbertz, Sudarshan," Database Concepts", McGraw Hill

Reference Books:-

1. Elmasri, Navathe, " Fudamentals of Database Systems", Addision Wesley

2. O'Neil, Databases, Elsevier Pub.

3. Leon &Leon,"Database Management Systems", Vikas Publishing House

4. Bipin C. Desai, " An Introduction to Database Systems", Gagotia Publications

5.Majumdar& Bhattacharya, "Database Management System", TMH

Course Outcomes: After the completion of the course the student will be able to:

CO1	Basic Knowledge about data &information

CO2	Understand the role of a database management system in an Organization.
CO3	Understand basic database concepts, including the structure andOperation of the relational data model.
CO4	. Construct simple and moderately advanced database queries usingStructured Query Language (SQL).
CO5	Construct simple and moderately advanced database queries using Structured Query Language (SQL).
CO6	Understand and successfully apply logical database design Principles, including E-R diagrams and database normalization.
CO7	Design and implement a small database project using SQL-Iplus
CO8	Understand the concept of a database transaction and related database facilities, including concurrency control, journaling, backup and recovery, and data object locking and protocols.

BCS-552	DATA BASE MANAGEMENT SYSTEMS LAB	L T P 0 0 2	1Credit

Pre-requisites: None

Course Objectives:

This course is intended to provide an understanding ofthecurrent theory and practice of database management systems. The course provides a solidtechnical overview of database management systems, using a currentdatabase product as a case study. In addition to technical concerns, more general issues are emphasized. These include data independence, integrity, security, recovery, performance, database design principles,and database administration.

Detailed Syllabus

Program1. Data Definition, Table Creation, Constraints,
Program2. Insert, Select Commands, Update & Delete Commands.
Program3. Nested Queries & Join Queries
Program4. Views
Program5. High level Programming language(Control structures, Procedures and Functions).
Program6. Front end tools
Program7. Forms
Program8. Triggers
Program9. Menu Design
Program10. Reports.
Program11 Database Design and implementation (Mini Project).

Course Outcomes: After the completion of the course the student will be able to:

CO1	Understand basic database concepts, including the structure andOperation of the relational data model.
CO2	. Construct simple and moderately advanced database queries usingStructured Query Language (SQL).
CO3	Construct simple and moderately advanced database queries using Structured Query Language (SQL).
CO4	Understand and successfully apply logical database design Principles, including E-R diagrams and database normalization.
CO5	Design and implement a small database project using SQL-Iplus

BOE-503	Entrepreneurship Development	L T P 2 1 0	2 Credits

Pre-requisites: None

Course Objectives:

The students develop and can systematically apply an entrepreneurial way of thinking that will allow them to identify and create business opportunities that may be commercialized successfully.

Detailed Syllabus

MODULE I

Entrepreneurship- Definition, Growth of small scale industries in developing countries and their positions vis-a-vis large industries; role of small scale industries in the national economy; characteristics and types of small scale industries; demand based and resources based ancillaries and sub-control types. Government policy for small scale industry; stages in starting a small scale industry.
Project identification- assessment of viability, formulation, evaluation, financing, field-study and collection of information, preparation of project report, demand analysis, material balance and output methods, benefit cost analysis, discounted cash flow, internal rate of return and net present value methods.

MODULE II

Accountancy- Preparation of balance sheets and assessment of economic viability, decision making, expected costs, planning and production control, quality control, marketing, industrial relations, sales and purchases, advertisement, wages and incentive, inventory control, preparation of financial reports, accounts and stores studies.

MODULE III

Project Planning and control:
The financial functions, cost of capital approach in project planning and control. Economic evaluation, risk analysis, capital expenditures, policies and practices in public enterprises. Profit planning and programming, planning cash flow, capital expenditure and operations. Control of financial flows, control and communication.

Laws concerning entrepreneur viz, partnership laws, business ownership, sales and income taxes and workman compensation act.
Role of various national and state agencies which render assistance to small scale industries.

Text Books: -

1. Forbat, John, “Entrepreneurship” New Age International.
2. Havinal, Veerbhadrappa, “Management and Entrepreneurship” New Age International
3. Joseph, L. Massod, “Essential of Management", Prentice Hall of India.

REFERENCE BOOKS:-

1. Entrepreneurship: Strategies and Resources, 3/E -: Marc Dollinger; Prentice Hall
2. Bringing New Technology to Market- Kathleen R. Allen, Prentice Hall
3. Entrepreneurship in Action, 2/E - Mary Coulter; Prentice Hall

Course Outcomes: After the completion of the course the student will be able to:

CO1	Have the ability to discern distinct entrepreneurial traits
CO2	Understand the systematic process to select and screen a business idea
CO3	. Design strategies for successful implementation of ideas
CO4	Write a business plan

BOE-502	Human Computer Interaction	L T P 3 1 0	4 Credits

Pre-requisites: None

Course Objectives:

Human Computer Interactions (**HCI**) is concerned with designing, evaluating and deploying usable, effective technologies in a range of contexts - be it home, office, school, cyberspace or other domain. The **objective** of this **course** is to give an introduction to the key areas, approaches and developments in the field.

Detailed Syllabus

MODULE-I

User centered design of system & interfaces, anatomy and rational of WIMP (Window, Icon, Menus & Pointing Devices) interfaces.

Dialogue design, Presentation design, user documentation, evaluation/usability testing of user interface.

MODULE II

Ergonomics and Cognitive issues, hypertext and the World Wide Web.

User centered design, human factors in user-centered design, development & evaluation, Interactive design –rapid prototyping.

MODULE III

Designing for usability –effectiveness, learnability, flexibility, attitude and usability goals, criteria for acceptability.

Text Books:-

1. Ben Shneiderman, Catherine Plaisant, Maxine Cohen, Steven Jacobs" Human Computer Interaction".

Reference Book:-

1. Sudifte AG, “Human Computer Interface Design”, 2nd ed. Macmillan, 1995

2. Sheiderman B Designing the user interface, “Strategies for Effective Human Computer Interaction”, 2nd ed. Addison Wesley, 1992

Course Outcomes: After the completion of the course the student will be able to:

CO1	Describe what interaction design is and how it relates to human computer interaction and other fields.
CO2	Describe the social mechanisms that are used by people to communicate and collaborate
CO3	Describe how technologies can be designed to change people's attitudes and behaviour
CO4	Discuss the difference between qualitative and quantitative data and analysis
CO5	Consider which interface is best for a given application or activity

BCS-503	Java Programming	**L T P** **3 1 0**	**4Credits**

Pre-requisites: Computer Fundamentals & Principle of Computer Programming, Programming Concepts of C and C++

Course Objectives:

The learning objectives of this course are to introduce students to the object oriented concepts, java utilities, applet concept, and also database connectivity using JDBC. This course also provides advanced java programming that includes java beans, servlets and web programming.

Detailed Syllabus

MODULE-I

The Java Language: History and evolution of Java, Java's Lineage, The Creation of Java, Java's Magic Code; The Byte Code, The Java's Class File Format, The java's Buzzwords,The Evolution of Java. Object Orientation concepts; Class, Object and its significance. Environment variable. Data Types, Variables and Array: Strongly typed Language, Primitive type, Non Primitive type, Wrapper classes, Scope & lifetime of the variables, Type Conversion and casting, Automatic Type promotions, Operators: Arithmetic operator, The Bitwise operator, Relational operator, Assignment operator, The ? Operator, Operator precedence. Control Statements: Selection Statement, Iteration Statement, Jump Statement. **Introducing classes:** Class Fundamentals, Object & Object reference ,Object Life time & Garbage Collection, Creating and Operating Objects, Constructor & initialization code block, Access Control, Modifiers, methods, Nested , Inner Class &Anonymous Classes, Abstract Class & Interfaces, Defining Methods, Argument Passing Mechanism, Method Overloading, Recursion, Dealing with Static Members, Mark and sweep principle (Garbage collection) , Finalize() Method, Native Method. Use of "this "reference, Use of Modifiers with Classes & Methods, Command line arguments. **Inheritance:** Use and Benefits of Inheritance in OOP, Types of Inheritance in Java, Inheriting Data Members and Methods. Role of Constructors. Overloading concept & Overriding Super Class Methods.Use of "super".Polymorphism in inheritance. Type Compatibility and Conversion Implementing interfaces. **Package:** Organizing Classes and Interfaces in Packages. Package as Access Protection Defining Package CLASSPATH Setting for Packages. Making JAR Files for Library Packages Import and Static Import Naming Convention For Packages **Exception Handling:** The Idea behind Exception ,Exceptions & Errors Types of Exception, Control Flow In Exceptions, JVM reaction to Exceptions, Use of try, catch, finally, throw, throws in Exception Handling, Inbuilt and User Defined Exceptions, Checked and Un-Checked Exceptions, **Thread:** Understanding Threads, Needs of Multi-Threaded Programming, Thread Life-Cycle, Thread Priorities, Synchronizing Threads, Inter Communication of Threads.

Module II

Array &String : Defining an Array, Initializing & Accessing Array, Multi–Dimensional Array, Operation on String, Mutable & Immutable String, Using Collection Bases Loop for String Tokenizing a String, Creating Strings using StringBuffer. **Java Utilities (java.util Package) Java IO:** Streams and the new

I/O Capabilities, Understanding Streams, The Classes for Input and Output, The Standard Streams, Working with File Object, File I/O Basics, Reading and Writing to Files, Buffer and Buffer Management, Read/Write Operations with File Channel Serializing **Applet:** Applet & Application, Applet Architecture, Parameters to Applet, Embedding Applets in Web page, Applet Security Policies. **Event Handling:** Event-Driven Programming in Java, EventHandling Process, Event-Handling Mechanism, The Delegation Model of Event Handling, Event Classes, Event Sources, Event Listeners, Adapter Classes as Helper Classes in Event Handling, Anonymous Inner classes a Short –cut to Event Handling, Avoiding Deadlocks in GUI Code, Event Types &Classes. **GUI Programming (Java AWT):** Components and Containers: Basics of Components, Using Containers, Layout Managers, AWT Components, Adding a Menu to Window, Extending GUI Features Using Swing Components.

MODULE-III

Software development using Java: JavaBeans: What is Java Bean, Advantages of Bean, Introspection, Persistence, the Java Bean API, A Bean Example, Jar file specification, Introducing Swings: The Origin of swings, swings is built on AWT, Two swings key features, Swings package & event Handling. Database Programming using JDBC: Introduction to JDBC, JDBC Drivers & Architecture Servlets: Architecture of Servlets Technology, Life Cycle of Servlets, Javax.Servlet package.

Text Book:

1. Herbert Schieldt, "The Complete Reference: Java" Seventh Edition, TMH. Reference

Books:

1. Herbert Schieldt" Java Programming Cook Book" McGraw Hill.

2. Core Java™ 2 Volume I - Fundamentals, Seventh Edition Prentice Hall PTR

3. Core Java™ 2 Volume II - Fundamentals, Seventh Edition Prentice Hall PTR

CO1	Design the process of interaction between Objects and System w.r.t. Object Oriented Paradigm.
CO2	Acquire a basic knowledge of Object Orientation with different properties as well as different features of Java, threads
CO3	Analyze basic programming concepts in Java with different object related issues and various string handling functions as well as basic I/O operations
CO4	Discuss basic Code Reusability concept w.r.t. Inheritance, Package and Interface
CO5	Implement Exception handling, Multithreading and Applet (Web program in java) programming concept in Java
CO6	

BCS-553	JAVA PROGRAMMING LAB	L T P 0 0 2	1Credit

Pre-requisites: Knowledge of C programming language

Course Objectives:

This course introduces computer programming using the JAVA programming language with object-oriented programming principles. Emphasis is placed on event-driven programming methods, including creating and manipulating objects, classes, and using object-oriented tools such as the class debugger. This course has been approved to satisfy the Comprehensive Articulation Agreement for transferability as a premajor and/or elective course requirement.

Detailed Syllabus

1. WAP to show the concept of various principle of OOP's such as
    a. Inheritance
    b. Polymorphism
    c. Encapsulation
    d. Abstraction
2. WAP to create a calculator using class & inheritance?
3. WAP to print the matrix?
4. WAP to print the addition of two matrixes?
5. WAP to print the multiplication of two matrixes?
6. WAP to print the default value of instance variable?
7. WAP to demonstrate the scope of variables?
8. WAP to show the concept of up casting & down casting? (Implicit & explicit typecasting)
9. WAP to overload the constructor?(Compile time polymorphism)
10. WAP to calculate the sine series, i.e. create a user defined method of sine series?
11. WAP to overload the method? (Compile time polymorphism)
12. WAP to override the method (sine series method). (Runtime polymorphism)

13. WAP to show the dynamic method dispatch. (Make all possible combination)

14. Demonstrate the calling of constructor.

15. WAP to Demonstrate concept of Automatic type conversion apply to overloading.

16. WAP to calculate the factorial using static methods.

17. WAP to use command line arguments.

18. WAP to show the use of this keyword of java.

19. WAP to show the two use of super keyword of java.

20. WAP to show the ways to call the static method in java.

21. WAP to demonstrate to handle the exception.

22. WAP to create user defined exception.

23. WAP to read its own java source file & write that file in another java file.

24. WAP to create multiple Threads & show how inter Thread communication is performed?

25. WAP to demonstrate the life cycle of an applet.

26. Draw following shapes on an applet :

    a) Circle

    b) Rectangle

    c) Square

Make sure that all shapes must have different colors.

27. WAP to create calculator GUI in java with proper event handling.

28. Create a notepad in java. (Menu driven)

Course Outcomes: After the completion of the course the student will be able to:

CO1	Define and Discuss basic Data abstraction concepts w.r.t. Inheritance, Package and Interface
CO2	Analyze the significance of various keywords w.r.t Encapsulation and polymorphism technique in OOPs. Implements exception handling in Java
CO3	Implement basic knowledge of code reusability with the help of Java in Object Oriented Programming, Exception handling, Multithreading and Applet (Web program in java) programming concept
CO4	Differentiate overloading and overriding, keyword and super keyword
CO5	Judge command line arguments
CO6	Create notepad, GUI calculator,

BOE-504	Non-Conventional Energy Resource	L T P 2 1 0	2 Credits

Pre-requisites: None

Course Objectives:

To impart the knowledge of basics of different non-conventional types of power generation & power plants in detail so that it helps them in understanding the need and role of Non-Conventional Energy sources particularly when the conventional sources are scarce in nature.

Detailed Syllabus

MODULE 1

Introduction
Various non-conventional energy resources- Introduction, availability, classification, relative merits and demerits. **Solar Cells:** Theory of solar cells. Solar cell materials, solar cell array, solar cell power plant, limitations.
Solar Thermal Energy:
Solar radiation, flat plate collectors and their materials, applications and performance, focusing of collectors and their materials, applications and performance; solar thermal power plants, thermal energy storage for solar heating and cooling, limitations.

MODULE II

Geothermal Energy:
Resources of geothermal energy, thermodynamics of geo-thermal energy conversion-electrical conversion, non-electrical conversion, environmental considerations.
Magneto-hydrodynamics (MHD): Principle of working of MHD Power plant, performance and limitations. **Fuel Cells:** Principle of working of various types of fuel cells and their working, performance and limitations.

MODULE III

Thermo-electrical and thermionic Conversions: Principle of working, performance and limitations. **Wind Energy:** Wind power and its sources, site selection, criterion, momentum theory, classification of rotors, concentrations and augments, wind characteristics. Performance and limitations of energy conversion systems. **Bio-mass:** Availability of bio-mass and its conversion theory.
Ocean Thermal Energy Conversion (OTEC): Availability, theory and working principle, performance and limitations.
Wave and Tidal Wave: Principle of working, performance and limitations.
Waste Recycling Plants.

Text Books:

1. Raja etal, “Introduction to Non-Conventional Energy Resources” Scitech Publications.
2. John Twideu and Tony Weir, “Renewal Energy Resources” BSP Publications, 2006.
3. M.V.R. Koteswara Rao, “ Energy Resources: Conventional & Non-Conventional “ BSP Publications,2006.
4. D.S. Chauhan,”Non-conventional Energy Resources” New Age International.
5. C.S. Solanki, “Renewal Energy Technologies: A Practical Guide for Beginners” PHI Learning.

References Books:

Renewable energy sources and conversion technology by N.K. Bansal, M. Kleemann, M. Heliss, Tata McGraw Hill 1990.

Course Outcomes: After the completion of the course the student will be able to:

CO1	Understand the different non-conventional sources and the power generation techniques to generate electrical
CO2	Design a prescribed engineering sub-system
CO3	Recognize the need and ability to engage in lifelong learning for further developments in this field.

BCS-504	SOFTWARE ENGINEERING	L T P 3 1 0	4Credits

Pre-requisites: Basic computer knowledge

Course Objectives:

Software engineering is a discipline that allows students to apply engineering and computer science concepts in the development and maintenance of reliable, usable, and dependable software. The course is designed to present software engineering concepts and principles in parallel with the software development life cycle.

Detailed Syllabus

MODULE-I

Introduction: Introduction to Software Engineering, Software Components, Software Characteristics, Software Crisis, Software Engineering Processes, and Software Quality Attributes. Software Development Life Cycle (SDLC) Models: Water Fall Model, Prototype Model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Model. Software Requirement Specifications (SRS) Requirement Engineering Process: Elicitation, Analysis, Documentation and Review, Feasibility Study, Information Modeling, Data Flow Diagrams, Entity Relationship Diagrams, Decision Tables, SRS Document, IEEE Standards for SRS. Software Quality Assurance (SQA): Verification and Validation, SQA Plans, Software Quality Frameworks, ISO 9000 Models, SEI-CMM Model.

MODULE-II

Software Design: Basic Concept of Software Design, Architectural Design, Low Level Design:

Modularization, Design Structure Charts, Pseudo Codes, Flow Charts, Coupling and Cohesion

Measures, Design Strategies: Function Oriented Design, Object Oriented Design, Top-Down and

Bottom-Up Design. Software Measurement and Metrics: Various Size Oriented Measures:

Halestead's Software Science, Function Point (FP) Based Measures, cyclomatic Complexity

Measures: Control Flow Graphs.

Software Testing: Testing Objectives, Unit Testing, Integration Testing, Acceptance Testing,

Regression Testing, Testing for Functionality and Testing for Performance, Top-Down and BottomUp Testing Strategies: Test Drivers and Test Stubs, White Box Testing, Black Box Testing, Alpha and Beta Testing of Products. Static Testing Strategies: Formal Technical Reviews (Peer Reviews), Walk Through, Code Inspection, Compliance with Design and Coding Standards.

MODULE-III

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 Paraeters such as Cost, Efforts, Schedule/Duration, Constructive Cost Models (COCOMO), Resource Allocation Models, Software Risk Analysis and Management.

Text Books:-

1. R. S. Pressman, Software Engineering: A Practitioners Approach, McGraw Hill.
2. Rajib Mall, Fundamentals of Software Engineering, PHI Publication.

Reference Books:-

1. K. K. Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers.
2. PankajJalote, Software Engineering, Wiley
3. Carlo Ghezzi, M. Jarayeri, D. Manodrioli, Fundamentals of Software Engineering, PHI Publication.

Course Outcomes: After the completion of the course the student will be able to:

CO1	To understand basic concept of software engineering, different phases to make a software & study them in detail, project management concepts & their metrics, design models & its principles
CO2	Discuss requirement engineering and its models (Information, functional, behavioural), different testing techniques for different projects
CO3	implement Software life cycle models,
CO4	compare different types of models
CO5	calculation of staffing for a particular project, its cost & schedule
CO6	develop quality software ,its maintenance & introduce about software reliability, create an unambiguous SRS (software requirement specification) after collecting requirements of any client

BCS-501	THEORY OF COMPUTATION	**L T P** **3 1 0**	**4Credits**

Pre-requisites: Basics of Discrete Mathematics- Sets and Relations,

Course Objectives:

The learning objectives of this course are to: introduce students to the mathematical foundations of computation including automata theory; the theory of formal languages and grammars; the notions of algorithm, decidability, complexity, and computability. It also helps to enhance/develop students' ability to understand and conduct mathematical proofs for computation and algorithms.

Detailed Syllabus

MODULE-I

Finite Automata and Regular Expressions: Finite State Systems, Basic Definitions NonDeterministic finite automata (NDFA), Deterministic finite automata (DFA), Equivalence of DFA and NDFA Finite automata with E-moves, Regular Expressions, Equivalence of finite automata and Regular Expressions, Regular expression conversion and vice versa, Arden's Theorem. Introduction to Machines: Concept of basic Machine, Properties and limitations of FSM.Moore and mealy Machines, Equivalence of Moore and Mealy machines.

MODULE-II

Properties of Regular Sets: The Pumping Lemma for Regular Sets, Applications of the pumping lemma, Closure properties of regular sets, Myhill-Nerode Theorem and minimization of finite Automata, Minimization Algorithm. Grammars: Definition, Context free and Context sensitive grammar, Ambiguity regular grammar, Reduced forms, Removal of useless Symbols and unit production, Chomsky Normal Form (CNF), Griebach Normal Form (GNF).

MODULE-III

Pushdown Automata: Introduction to Pushdown Machines, Acceptance of PDA, PDA to CFG and CFG to PDA, Application of Pushdown Machines Turing Machines: Deterministic and Non-Deterministic Turing Machines, Design of T.M,Halting problem of T.M., PCP Problem. Chomsky Hierarchies: Chomsky hierarchies of grammars, unrestricted grammars, Context sensitive languages, Relation between languages of classes. Computability: Basic concepts, Primitive Recursive Functions.

Text Book:

1. Introduction to automata theory, language & computations- Hopcroaft&O.D.Ullman, R Mothwani, 2001, Addison Wesley

Reference Books:

1. Theory of Computer Science (Automata, Languages and computation): K.L.P.Mishra & N.Chandrasekaran, 2000, PHI.

2. Introduction to formal Languages & Automata-Peter Linz, 2001, Narosa.

CO1	Students will be able to define the mathematical principles behind theoretical computer science.
	Students will be able to identify the different computational problems and their associated complexity.
CO2	Students will be able to differentiate and give examples for the different types of automata like finite automata, push down automata, linear bounded automata and Turing machine.
CO3	To apply the techniques of designing grammars and recognizers for several programming languages.
CO4	Students will be able to correlate the different types of automata to real world applications.
CO5	Students will be able to choose and design appropriate automata for the different requirements outlined by theoretical computer science
CO6	

BOE-501	Total Quality Management	L T P 2 1 0	3Credits

Pre-requisites: None

Course Objectives:

Quality management is a system that serves to control Quality in the critical activities of an organization by bringing together resources, equipment, people and procedures. It uses techniques and principles such as quality function deployment, Taguchi method, service quality management, quality audits and Six Sigma to control quality in every sphere of activity in an organization.

Detailed Syllabus

MODULE 1

Quality Concepts:
Evolution of Quality Control, concept change, TQM Modern concept, Quality concept in design, Review of design, Evolution of proto type.

Control on Purchased Product
Procurement of various products, evaluation of supplies, capacity verification, Development of sources, procurement procedure.

Manufacturing Quality
Methods and techniques for manufacture, inspection and control of product, quality in sales and services, guarantee, analysis of claims.

MODUEL II

Quality Management
Organization structure and design, quality function, decentralization, designing and fitting, organization for different type products and company, economics of quality value and contribution, quality cost, optimizing quality cost, seduction program.

Control Charts
Theory of control charts, measurement range, construction and analysis of R charts, process capability study, use of control charts.

Attributes of Control Chart
Defects, construction and analysis of charts, improvement by control chart, variable sample size, construction and analysis of C charts.

MODUEL III

Defects diagnosis and prevention defect study, identification and analysis of defects, correcting measure, factors affecting reliability, MTTF, calculation of reliability, building reliability in the product, evaluation of reliability, interpretation of test results, reliability control, maintainability, zero defects, quality circle. **,**ISO-9000 and its concept of Quality Management,ISO 9000 series, Taguchi method, JIT in some details. **7**

Text Books:

1. *Lt. Gen. H. Lal, "Total Quality Management", Eastern Limited, 1990.*
2. *Greg Bounds, "Beyond Total Quality Management", McGraw Hill, 1994.*
3. *Menon, H.G, "TQM in New Product manufacturing", McGraw Hill 1992.*

Course Outcomes: After the completion of the course the student will be able to:

CO1	To realize the importance of significance of quality
CO2	Manage quality improvement teams
CO3	Identify requirements of quality improvement programs
CO4	To have exposure to challenges in Quality Improvement Programs
CO5	To have a good understanding of the concept of Quality

BCS-404	Unix & Shell Programming	L T P 3 1 0	4 Credits

Pre-requisites: None

Course Objectives:

This course covers design principles of Unix Operating System, algorithms for process management, memory management. Structure of File system and virtual file system is also elaborated. This course contains details of shell programming and introduces system administration.

Detailed Syllabus

MODULE-I

Introduction to UNIX system: - Overview of UNIX operating system, Features, Layard architecture of UNIX, Basic of Kernel and its types, Basic of Shell and its types. File system /IO and system calls: - File layout, attributes of files and directories, Block structure, System calls & their implementation, Essential UNIX Commands: - File/Directory operation related, Environments variables, Navigational type, Display content, Pipes and Filters, Administration, information, utilities, Users and file permissions, Help. Editor: - Basic of editor, features, vi editor and its modes, useful vi commands, Process Management and Signal Handling:- The Process Descriptor and task structure, pid, Types of process, ps command and its options, Life Cycle of process, Process scheduling, Basic of signals and its types, kill command, Sending signals and trapping signals.

MODULE-II

Shell Programming: - Shell Meta characters, Shell variables, Shell scripts, Shell commands, Writing simple shell scripts, command line arguments, Integer arithmetic and string manipulations operators, Special command line characters, Decision making and loop control statements , advanced shell programming.

MODULE-III

Administration:- Common administrative tasks, identifying administrative files – configuration and log files, Role of system administrator, Managing user accounts-adding & deleting users, changing permissions and ownerships, Creating and managing groups, modifying group attributes, Temporary disable user’s accounts, creating and mounting file

system, checking and monitoring system performance file security & permissions, becoming super user using su. Case study- Amoeba, Mac, Eros, Ubuntu. Android.

TEXT AND REFERENCE BOOKS

1. Maurice Bach , "The Design of Unix Operating System", Pearson Education
2. Robert Love, "Linux Kernel Development ", Person Education
3. StephanPrata, "Advance Unix-Programmers Guide", SAMS Publication

CO1	Understand UNIX operating system with file system layout and file permissions with modes, basic commands, admin responsibilities and commands to handle it.
CO2	Knowledge of vi editor, command line interpreter and shell programming, Identify and estimate process management and signal management.

4. TomAdelstein and Bill Lubanovic, "Linux System Administration", O'Reilly Media, Inc., 1st Edition, 2007.ISBN-10: 0596009526 | ISBN-13: 978-0596009526
5. Harvey M. Deitel, "Operating Systems", Prentice Hall, 3rd Edition,2003, ISBN-10: 0131828274 | ISBN-13: 978-0131828278
6. Sumitabha Das, " Unix Concepts and application", Tata Mcgraw Hill Publication

Course Outcomes: After the completion of the course the student will be able to:

CO3	Implement different system calls for various file handling operations, Ability to handle the files or records through filters by using regular expression.
CO4	Analysis of environment, libraries, memory management and debugging methodologies.
C05	Construct shell scripts
C06	Debate various case studies

STUDY & EVALUATION SCHEME
B. Tech. Computer Science & Engineering
(With specialization in Cloud Technology and Information Security)
(Effective from the academic year 2014-2015)

YEAR IV, SEMESTER-VII

S.NO.	COURSE CODE	SUBJECTS	PERIODS			Evaluation Scheme				SUBJECT TOTAL	CREDITS
						SESSIONAL EXAM.					
			L	T	P	CT	TA	SUB TOTAL	E-SEM		
THEORY											
1	BCS-701	Computer Architecture	3	1	0	20	10	30	70	100	4
2	BCS-704	Introduction to VOIP	3	1	0	20	10	30	70	100	4
3	BCS-705	Cloud Web Services	3	1	0	20	10	30	70	100	4
4	BCS-706	Cyber Forensics	3	1	0	20	10	30	70	100	4
5		CS Elective-III	3	1	0	20	10	30	70	100	4
PRACTICALS & PROJECTS											
7	BCS-751	Industrial Training viva-voce	0	0	2	-	-	25	-	25	1
8	BCS-755	Cloud Web Services Lab	0	0	2	-	-	10	15	25	1
9	BCS-753	Project	0	0	4	-	-	50	-	50	2
10	GP-701	General Proficiency	-	-	-	-	-	25	-	25	1
Total			15	5	8	100	50	260	365	625	25

STUDY & EVALUATION SCHEME
B. Tech. Computer Science & Engineering
(With specialization in Cloud Technology and Information Security)
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YEAR IV, SEMESTER-VIII

CS ELECTIVE-III

BCS-071 Distributed Systems

BCS-072 Data Compression

BCS-073 Neural Network

BCS -074 Data Mining

S.NO.	COURSE CODE	SUBJECTS	PERIODS			Evaluation Scheme				SUBJECT TOTAL	CREDITS
						SESSIONAL EXAM.					
			L	T	P	CT	TA	SUB TOTAL	E-SEM		
THEORY											
1	BCS-801	Cryptography & Network Security	3	1	0	20	10	30	70	100	4
2	BCS-803	COBIT and Risk Management in IT	3	1	0	20	10	30	70	100	4
3	BCS-804	OWASP Framework	3	1	0	20	10	30	70	100	4
4		CS Elective-IV	3	1	0	20	10	30	70	100	4
PRACTICALS & PROJECTS											
7	BCS-851	Cryptography & Network Security lab	0	0	2	-	-	10	15	25	1
8	BCS-854 .	OWASP Framework Lab	0	0	2	-	-	10	15	25	1
9	BCS-853	Project	0	0	8	-	-	50	100	150	6
10	GP-801	General Proficiency	-	-	-	-	-	25	-	25	1
Total			12	4	12	80	40	215	410	625	25

CS ELECTIVE-IV

BCS-081 Distributed Database

BCS-082 Software quality Management

BCS-083 Simulation and Modeling

BCS-084 Soft Computing

BCS-801	CRYPTOGRAPHY AND NETWORK SECURITY	L T P 3 1 0	4 Credits

Pre-requisites: Graduate student status or a Senior in Computer Science

Course Objectives:

1.To introduce fundamental concepts of symmetric and asymmetric cipher models..
2To introduce fundamental concepts of authentication.
3.To introduce network security and web security protocols.

Detailed Syllabus

MODULE-1

Introduction to security attacks: services and mechanism, Classical encryption techniquessubstitution ciphers and transposition ciphers, cryptanalysis, steganography, Stream and block ciphers.

Modern Block Ciphers: Block ciphers principles, Shannon's theory of confusion and diffusion,fiestal structure, Data encryption standard(DES), Strength of DES, block cipher modes of operations, Triple DES, Advanced Encryption Standard (AES) encryption and decryption.

MODULE-II

Introduction to group, field, finite field of the form GF(p): modular arithmetic, prime and relativeprime numbers, Extended Euclidean Algorithm,Fermat's and Euler's theorem, Primality testing, Chinese Remainder theorem, Discrete Logarithmic Problem,Principals of public key crypto systems, RSA algorithm, security of RSA,Message Authentication Codes: Authentication requirements, authentication functions, messageauthentication code, hash functions, birthday attacks, security of hash functions, Securehashalgorithm (SHA),Digital

Signatures: Digital Signatures, Elgamal Digital Signature Techniques, Digital signaturestandards (DSS).

MODULE-III

Key Management and distribution: Symmetric key distribution, Diffie-Hellman Key Exchange,Public key distribution, X.509 Certificates, Public key Infrastructure,Authentication Applications: KerberosElectronic mail security: pretty good privacy (PGP), S/MIME,IP Security: Architecture, Authentication header, Encapsulating security payloads, combiningsecurity associations, key management.Introduction to Secure Socket Layer, Secure electronic, transaction (SET),System Security: Introductory idea of Intrusion, Intrusion detection, Viruses and related threats,firewalls.

CO1	CO-2: Analyze solutions for effective key management and distribution and conduct cryptanalysis
CO2	Analyze and use cryptographic data integrity algorithms and user authentication protocols
CO3	Analyze the security requirements and solutions for wireless networks and distributed systems
CO4	: Explore the attacks and controls associated with IP, transport-level, web and E-mail security

Text Books:

1. William Stallings, "Cryptography and Network Security: Principals and Practice",Pearson Education.

2. Behrouz A. Frouzan: Cryptography and Network Security, Tata McGraw Hill

References:

1. Bruce Schiener, "Applied Cryptography". John Wiley & Sons

2. Bernard Menezes," Network Security and Cryptography", Cengage Learning.

3. AtulKahate, "Cryptography and Network Security", Tata McGraw Hill

BCS-851 CRYPTOGRAPHY AND NETWORK SECURITY LAB

1. Implement caeser cipher
2. Implement Euclid's Algorithm for GCD
3. Implement Rabin Miller Algorithm for prime test.
4. Implement DES algorithm.
5. Implement Diffie-Hellman Algorithm
6. Implement RSA algorithm
7. Implement Kerberos.
8. Implement Digital Signature algorithm.
9. Configure SSH (Secure Shell) and send/receive a file on this connection to verify the correctness of this system using the configured parameters.
10. Configure a firewall to block the following for 5 minutes and verify the correctness of this system using the configured parameters:
    (a) Two neighborhood IP addresses on your LAN.
    (b) All ICMP requests
    (c) All TCP SYN Packets

BCS-071	DISTRIBUTED SYSTEMS	L T P 3 1 0	4 Credits

Pre-requisites: students should have the basic knowledge of operating system.

Course Objectives:

1. To introduce fundamental principles of distributed systems, technical challenges and key design issues.

2 To impart knowledge of the distributed computing models, algorithms and the design of distributed system.

Detailed Syllabus

MODULE-I

Characterization of Distributed Systems: Introduction, Examples of distributed Systems, Resource sharing and the Web Challenges. Architectural models, Fundamental Models.

Theoretical Foundation for Distributed System: Limitation of Distributed system, absence of global clock, shared memory, Lamport'sLogicalclock, Vectors clocks.

Concepts in Message Passing Systems: causal order, total order, Techniques for Message Ordering, Causal ordering of messages, global state, termination detection.

Distributed Mutual Exclusion: Classification of distributed mutual exclusion, requirement of mutual exclusion theorem, Token based and non token based algorithms, performance metric for distributed mutual exclusion algorithms.

MODULE-II

Distributed Deadlock Detection: system model, resource Vs communication deadlocks, deadlock prevention, avoidance, detection & resolution, centralized dead lock detection, distributed dead lock detection, path pushing algorithms, edge chasing algorithms.

Agreement Protocols: Introduction, System models, classification of Agreement Problem, Byzantine agreement problem, Consensus problem, Interactive consistency Problem, Solution to Byzantine Agreement problem, Application of Agreement problem, Atomic Commit in Distributed Database system.

Distributed Resource Management: Issues in distributed File Systems, Mechanism for building distributed file systems, Design issues in Distributed Shared Memory, Algorithm for Implementation of Distributed Shared Memory**.**

MODULE-III

Failure Recovery in Distributed Systems: Concepts in Backward and Forward recovery, Recovery in Concurrent systems, obtaining consistent Checkpoints, Recovery in Distributed Database Systems.

Fault Tolerance: Issues in Fault Tolerance, Commit Protocols, Voting protocols, Dynamic voting protocols.

Transactions and Concurrency Control: Transactions, Nested transactions, Locks, Optimistic Concurrency control, Timestamp ordering.

Distributed Transactions: Flat and nested distributed transactions, Atomic Commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery. Replication: System model and group communication, Fault - tolerant services, highly available services, Transactions with replicated data.

Course outcome:-

CO1	**illustrate the mechanisms of inter process communication in distributed system**
CO2	**apply appropriate distributed system principles in ensuring transparency ,consistency and fault-tolerance in distributed file system**
CO3	**compare the concurrency control mechanisms in distributed transactional environment**
CO4	**outline the need for mutual exclusion and election algorithms in distributed systems**

Text Books:

1. Singhal&Shivaratri, "Advanced Concept in Operating Systems", McGraw Hill

2. Coulouris, Dollimore, Kindberg, "Distributed System: Concepts and Design", Pearson Education

References:

1. Tenanuanbaum, Steen," Distributed Systems", PHI

2. Gerald Tel, "Distributed Algorithms", Cambridge University Press.

BCS-072	**DATA COMPRESSION**	**L T P** **3 1 0**	**4 Credits**

Pre-requisites: students should have the knowledge of computer graphics.

Course Objectives:

1. To introduce students to basic applications, concepts, and techniques of Data Compression.
2. To develop skills for using recent data compression software to solve practical problems in a variety of disciplines.
3. To gain experience doing independent study and research.

Detailed Syllabus

MODULE-I

Compression Techniques: Loss less compression, Lossy Compression, Measures of prefonnance,Modeling and coding, Mathematical *Preliminaries* for Lossless compression: A briefintroduction to information theory, Models: Physical models,Probability models, Markov models, composite source model, Coding: uniquely decodablecodes, Prefix codes.

The Huffman coding algorithm: Minimum variance Huffman codes, Adaptive Huffman coding:Update procedure, Encoding procedure, Decoding procedure. Golomb codes, Rice codes,Tunstall codes, Applications of Hoffman coding: Loss less image compression, Textcompression, Audio Compression.

MODULE-II

Coding a sequence, Generating a binary code, Comparison of Binary and Huffman cding,Applications: Bi-level image compression-The JBIG standard, JBIG2, Image compression.Dictionary Techniques: Introduction, Static Dictionary: Diagram Coding, Adaptive Dictionary.The LZ77 Approach, The LZ78 Approach, Applications: File Compression-UNIX compress.

Image Compression: The Graphics Interchange Format (GIF), Compression over Modems: V.42bits.Predictive Coding: Prediction with Partial match (ppm): The basic algorithm, The ESCAPE SYMBOL, length of context, The Exclusion Principle, The Burrows-Wheeler Transform: Moveto- front coding, CALIC, JPEG-LS, Multi-resolution Approaches, Facsimile Encoding, Dynamic Markoy Compression.

MODULE-III

Distortion criteria, Models, Scalar Ouantization: The Quantization problem, Uniform Quantizer, Adaptive Quantization, Non uniform Quantization.

Advantages of Vector Quantization over Scalar Quantization, The Linde-Buzo-Gray Algorithm, Tree structured Vector Quantizers. Structured Vector Quantizers.

CO1	**program, analyze Hoffman coding: Loss less image compression, Text compression, Audio Compression**
CO2	**program and analyze various Image compression and dictionary based techniques like static Dictionary, Diagram Coding, Adaptive Dictionary**
CO3	**understand the statistical basis and performance metrics for lossless compression**

CO4	**understand the conceptual basis for commonly used lossless compression techniques, and understand how to use and evaluate several readily available implementations of those techniques**

Text Book:

1. Khalid Sayood, Introduction to Data Compression, Morgan Kaufmann Publishers

BCS-073	**NEURAL**	**L T P**	**4 Credits**

	NETWORK	3 1 0	

Pre-requisites: 1.students should know about artificial intelligence.

2.students have the knowledge of back tracking and neural network.

Course Objectives:

1.To understand the basic concepts of learning and decision trees.
2.To understand the neural networks and genetic algorithms
3.To understand the Bayesian techniques
4.To understand the instant based learning
5.To understand the analytical learning and reinforced learning

Detailed Syllabus

MODULE-I

Neuro computing and Neuroscience: Historical notes, human Brain, neuron Mode l, Knowledge representation, Al and NN. Learning process: Supervised and unsupervised learning, Error correction learning, competitive learning, adaptation, statistical nature of the learning process.

Data processing: Scaling, normalization, Transformation (FT/FFT), principal component analysis, regression, covariance matrix, eigen values & eigen vectors. Basic Models of Artificial neurons, activation Functions, aggregation function, single neuron computation, multilayer perceptron, least mean square algorithm, gradient descent rule, nonlinearly separable problems and bench mark problems in NN.

MODULE-II

Multilayered network architecture, back propagation algorithm, heuristics for making BP algorithm performs better. Accelerated learning BP (like recursive least square, quick prop, PROP algorithm), approximation properties of RBF networks and comparison with multilayerperceptran.

MODULE-III

Recurrent network and temporal feed-forward network, implementation with BP, self organizing map and SOM algorithm, properties of feature map and computer simulation. Principal component and Independent component analysis, application to image and signal processing.

Complex valued NN and complex valued BP, analyticity of activation function, application in2D information processing. Complexity analysis of network models.Softcomputing.Neuro-Fuzzy-genetic algorithm Integration.

CO1	Choose the learning techniques with this basic knowledge.
CO2	Apply effectively neural networks and genetic algorithms for appropriate applications.
CO3	Explain the different machine learning techniques
CO4	Choose and differentiate reinforcement and analytical learning techniques

Text Books:

1. J.A. Anderson, AnIntoduction to Neural Networks, MIT
2. Hagen Demuth Beale, Neural Network Design, Cengage Learning

References:

1. R.L. Harvey, Neural Network Principles, PHI
2. Kosko, Neural Network and Fuzzy Sets, PHI

BCS-074	**DATA MINING**	**L T P**	**4 Credits**

		3 1 0	

Pre-requisites: the knowledge of database should help in data mining.

Course Objectives:

1.Define Data warehousing Architecture and Implementation
2. Explain Data mining principles and techniques and Introduce DM as a cutting edge business intelligence
3. Interpret association rule mining for handling large data
4. Classification for the retrieval purposes
5. Explain clustering techniques in details for better organization and retrieval of data

Detailed Syllabus

MODULE-I

Overview, Motivation(for Data Mining),Data Mining-Definition & Functionalities, Data

Processing, Form of Data Preprocessing, Data Cleaning: Missing Values, Noisy Data,(Binning,Clustering, Regression, Computer and Human inspection),Inconsistent Data, Data Integrationand Transformation. Data Reduction:-Data Cube Aggregation, Dimensionality reduction, Data Compression, Numerosity Reduction, Clustering, Discretization and Concept hierarchy generation.

Concept Description:- Definition, Data Generalization, Analytical Characterization, Analysis ofattribute relevance, Mining Class comparisions, Statistical measures in large Databases. Measuring Central Tendency, Measuring Dispersion of Data, Graph Displays of Basic Statisticalclass Description, Mining Association Rules in Large Databases, Association rule mining, mining Single-Dimensional Boolean Association rules from Transactional Databases– Apriori Algorithm, Mining Multilevel Association rules from Transaction Databases and Mining Multi-Dimensional Association rules from Relational Databases.

MODULE-II

Classification and Predictions: What is Classification & Prediction, Issues regarding Classification and prediction, Decisiontree, Bayesian Classification, Classification by Back propagation, Multilayer feed-forward Neural Network, Back propagation Algorithm, Classification methods K-nearest neighborclassifiers, Genetic Algorithm.

Cluster Analysis: Data types in cluster analysis, Categories of clustering methods, Partitioning methods.

Hierarchical Clustering- CURE and Chameleon, Density Based Methods-DBSCAN, OPTICS,Grid Based Methods- STING, CLIQUE, Model Based Method –Statistical Approach, Neural Network approach, Outlier Analysis.

MODULE-III

Data Warehousing: Overview, Definition, Delivery Process, Difference between Database System and Data Warehouse, Multi Dimensional Data Model, Data Cubes, Stars, Snow Flakes, Fact Constellations, Concept hierarchy, Process Architecture, 3 Tier Architecture, Data Marting.

Aggregation, Historical information, Query Facility, OLAP function and Tools. OLAP Servers, ROLAP, MOLAP, HOLAP, Data Mining interface, Security, Backup and Recovery, TuningData Warehouse, Testing Data Warehouse.

CO1	Apply different preprocessing techniques for different attributes.
CO2	Determine frequent item set using association rules.
CO3	Apply different classification techniques to classify the given data set.
CO4	Analyze different clustering techniques.

Text Books:

1. M.H.Dunham,"DataMining:Introductory and Advanced Topics" PearsonEducation

2. Jiawei Han, MichelineKamber, "Data Mining Concepts & Techniques" Elsevier

References:

1. Sam Anahory, Dennis Murray, "Data Warehousing in the Real World: A Practical Guidefor Building Decision Support Systems, Pearson Education

2. Mallach,"Data Warehousing System",McGraw –Hill

BCS-081	**DISTRIBUTED DATABASE**	**L T P** **3 1 0**	**4 Credits**

Pre-requisites: students should know about the database and distribution system and how the data can distributed .

Course Objectives:

- Enhanced the knowledge in the area of Distributed Database system.
- Comprehend the Distributed query processing
- The subject explores the ideas of Transaction management and concurrency control.
- Know the parallel database system architecture.
- Become conscious about current trends.

Detailed Syllabus

MODULE-I

Transaction and schedules: Concurrent Execution of transaction, Conflict and ViewSerializability, Testing for Serializability, Concepts in Recoverable and Cascadeless schedules.

Lock based protocols, time stamp based protocols, Multiple Granularity and MultiversionTechniques, Enforcing serializablity by Locks, Locking system with multiple lock modes,architecture for Locking scheduler.

MODULE-II

Distributed Transactions Management: Data Distribution, Fragmentation and ReplicationTechniques, Distributed Commit, Distributed Locking schemes, Long duration transactions,Moss Concurrency protocol.

Issues of Recovery and atomicity in Distributed Databases, Traditional recovery techniques, Logbased recovery, Recovery with Concurrent Transactions, Recovery in Message passing systems,Checkpoints, Algorithms for recovery line, Concepts in Orphan and Inconsistent Messages.

MODULE-III

Distributed Query Processing: Multiway Joins, Semi joins, Cost based query optimization fordistributed database, Updating replicated data, protocols for Distributed Deadlock Detection,Eager and Lazy Replication Techniques.

CO1	Aware of fundamentals of Distributed Database systems.
CO2	Use the different techniques of Distributed query processing.
CO3	Set the rules over management of transaction and concurrency control.
CO4	Familiar with parallel database system architecture.

Text Books:

1. Silberschatz, orth and Sudershan, Database System Concept', McGraw Hill

2. Ramakrishna and Gehrke,' Database Management System, McGraw Hill

References:

1.Garcia-Molina, Ullman,Widom,' Database System Implementation' Pearson Education

2. Ceei and Pelagatti,'Distributed Database', TMH

3. Singhal and Shivratri, 'Advance Concepts in Operating Systems' MC Graw Hill

BCS-082	SOFTWARE QUALITY MANAGEMENT	L T P 3 1 0	4 Credits

Pre-requisites: 1.shudents should know about the quality states of software.

2. Students should know parameters of quality os a software.

Course Objectives:

1.To make the students understand the quality management process in the development of software.

2 To make the students understand the importance of standards in the quality assurance process and their impact on the final product.

Detailed Syllabus

MODULE - I

INTRODUCTION TO SOFTWARE QUALITY:
Software Quality – Hierarchical models of Boehm and McCall – Quality measurement – Metrics measurement and analysis – Gilb's approach – GQM ModelSOFTWARE**QUALITY ASSURANCE:**

Quality tasks – SQA plan – Teams – Characteristics – Implementation – Documentation – Reviews and Audits

MODULE - II

QUALITY CONTROL AND RELIABILITY:
Tools for Quality – Ishikawa's basic tools – CASE tools – Defect prevention and removal – Reliability models – Rayleigh model – Reliability growth models for quality assessment

MODULE - III

QUALITY MANAGEMENT SYSTEM:
Elements of QMS – Rayleigh model framework – Reliability Growth models for QMS – Complexity metrics and models – Customer satisfaction analysis.QUALITY**STANDARDS:**
Need for standards – ISO 9000 Series – ISO 9000-3 for software development – CMM and CMMI – Six Sigma concepts.

CO1	Distinguish between the various activities of quality assurance, quality planning and quality control

Text Books:

1. *Allan C. Gillies, "Software Quality: Theory and Management", Thomson Learning, 2003.*
2. *Stephen H. Kan, "Metrics and Models in Software Quality Engineering", Pearson Education (Singapore) Pte Ltd., 2002.*

References Books:

1. *Norman E. Fenton and Shari Lawrence Pfleeger, "Software Metrics" Thomson, 2003*
2. *Mordechai Ben – Menachem and Garry S.Marliss, "Software Quality", Thomson Asia Pte Ltd, 2003.*
3. *Mary Beth Chrissis, Mike Konrad and Sandy Shrum, "CMMI", Pearson Education (Singapore) Pte Ltd, 2003.*
4. *ISO 9000-3 "Notes for the application of the ISO 9001 Standard to software development".*

BCS-083	SIMULATION AND MODELING	L T P 3 1 0	4 Credits

Pre-requisites:

Course Objectives:

1.Define the basics of simulation modeling and replicating the practical situations in organizations
2.Generate random numbers and random variates using different techniques.
3.Develop simulation model using heuristic methods.
4.Analysis of Simulation models using input analyzer, and output analyzer
5.Explain Verification and Validation of simulation model.

Detailed Syllabus

MODULE-I

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

System simulation, why & when to simulate, nature and techniques of simulation, comparison ofsimulation and analytical methods, types of system simulation, real time

simulation, hybridsimulation, simulation of pure-pursuit problem, single-server queuing system and an inventoryproblem, Monte-Carlo simulation, Distributed Lag models, Cobweb model.

MODULE-II

Simulation of continuous systems, analog vs. digital Simulation, Simulation of water reservoirsystem, 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.

System dynamics, exponential growth models, exponential decay models, modified exponentialgrowth models, logistic curves, generalization of growth models, system dynamic diagramsIntroduction to SIMSCRIPT: Program, system concepts, origination, and statements, definingthe telephone system model.

MODULE-III

Simulation of PERT Networks, critical path computation, uncertainties in activity duration ,resource allocation and consideration.Simulation languages and software, continuous and discrete simulation languages, expressionbased languages, object oriented simulation, general purpose vs. application - oriented simulationpackages, CSMP-III, MODSIM-III.

CO:-

CO1	Describe the role of important elements of discrete event simulation and modeling paradigm.
CO2	Conceptualize real world situations related to systems development decisions, originating from source requirements and goals.
CO3	Develop skills to apply simulation software to construct and execute goal-driven system models.
CO4	Interpret the model and apply the results to resolve critical issues in a real world environment.

. **Text Books:**

1. Geoftrey Gordon, " System Simulation", PHI

2. Jerry Banks, John S. C Barry L. Nelson David M. Nicol, "Discrete Event SystemSimulation", Pearson Education

References:

1. V P Singh, "System Modeling and simulation", New Age International.

2. Averill M. Law, W. David Kelton, "System Modeling and simulation and Analysis",TMH

BCS-084	SOFT COMPUTING	L T P 3 1 0	4 Credits

Pre-requisites: students should know about the artificial intelligence.

Students should know back propagation theory.

Course Objectives:

1.To learn the basics of Soft Computing usage.
2.To learn the basics of many optimization algorithm
3.To learn to solve and optimize the real world problem using soft computing methodology.

Detailed Syllabus

MODULE-I

Artificial Neural Networks: Basic concepts - Single layer perception - Multilayer Perception - Supervised and Unsupervisedlearning – Back propagation networks - Kohnen'sself organizing networks - Hopfield network.

Fuzzy Systems: Fuzzy sets, Fuzzy Relations and Fuzzy reasoning, Fuzzy functions - Decomposition – Fuzzyautomata and languages - Fuzzy control methods - Fuzzy decision making.

MODULE-II

Neuro-Fuzzy Modeling: Adaptive networks based Fuzzy interface systems - Classification and Regression Trees –Dataclustering algorithms - Rule based structure identification - Neuro-Fuzzy controls –Simulatedannealing – Evolutionary computation.

Genetic Algorithms: Survival of the Fittest - Fitness Computations - Cross over - Mutation - Reproduction –Rankmethod - Rank space method.

MODULE-III

Application of Soft Computing: Optimiation of traveling salesman problem using Genetic Algorithm, Genetic algorithm basedInternet Search Techniques, Soft computing based hybrid fuzzy controller, IntoductiontoMATLAB Environment for Soft computing Techniques.

CO1	To acquire the knowledge of soft computing and hard computing
CO2	To develop skill in soft computing methodology
CO3	To acquire the knowledge of the fuzzy Neural network and Genetic Language
CO4	To analyze and optimized the problem of real-life applications

Text Books:

1. Sivanandam, Deepa, " Principles of Soft Computing", Wiley

2. Jang J.S.R, Sun C.T. and Mizutani E, "Neuro-Fuzzy and Soft computing", PrenticeHall

3. Timothy J. Ross, "Fuzzy Logic with Engineering Applications", McGraw Hill

References:

1. LaureneFausett, "Fundamentals of Neural Networks", Prentice Hall

2. D.E. Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning",Addison Wesley

3. Wang, "Fuzzy Logic", Springer

BCS-803	MOBILE COMPUTING	L T P 3 1 0	4 Credits

Pre-requisites: 1. Students should know about the basics of networking.

Course Objectives:

1.To learn about the basic concepts of Mobile Computing.
2 To understand about networking concepts relevant to modern wireless systems.
3 To introduce emerging mobile computing ideas and best practices
4 To gain hands-on knowledge practice with mobile computing

Detailed Syllabus

MODULE-I

Introduction: Issues in mobile computing, overview of wireless telephony: cellular concept, GSM: air-interface, channel structure, location management: HLR-VLR, handoffs, channel allocation in cellular systems, CDMA, GPRS. Wireless LAN Overview: MAC issues, IEEE 802.11, Blue Tooth, Wireless multiple access protocols, TCP over wireless, Wireless applications, Mobile IP, WAP: Architecture, protocol stack, application environment,

MODULE-II

Data management issues: data replication for mobile computers, adaptive clustering for mobile wireless networks, File system, Disconnected operations. Mobile Agents computing, security and fault tolerance, transaction processing in mobile computing environment.

MODULE-III

Adhoc networks and localization: Adhoc Networks issues, Routing protocols, global state routing (GSR),Destination sequenced distance vector routing (DSDV), Dynamic source routing (DSR), Ad Hocon demand distance vector routing (AODV), Temporary ordered routing algorithm (TORA),QoS in Ad Hoc Networks, applications.

CO:-

CO1	various wireless communication technologies.
CO2	Enables the students to visualize the various important steps in GSM communication
CO3	To acquire the knowledge of the fuzzy Neural network and Genetic Language
CO4	Enables the students to analyze the mobile IP andTransport Protocol.

Text Books:

1. J. Schiller, Mobile Communications, Addison Wesley.

2. Charles Perkins, Mobile IP, Addison Wesley.

Reference Books:

1. Charles Perkins, Ad hoc Networks, Addison Wesley.

2. Upadhyaya, “Mobile Computing”, Springer

BCS-081	DISTRIBUTED DATABASE	**L T P** **3 1 0**	**4 Credits**

Pre-requisites: students should about the

Basic concept of DBMS and RDBMS.

Course Objectives:

The aim of this module is to build on the previous background of database systems by Deepening the understanding of the theoretical and practical aspects of the database technologies, showing the need for distributed database technology to tackle deficiencies of the centralized database systems and finally introducing the concepts and techniques of distributed database including principles, architectures, design, implementation and major domain of application.

Detailed Syllabus

MODULE-I

Transaction and schedules: Concurrent Execution of transaction, Conflict and ViewSerializability, Testing for Serializability, Concepts in Recoverable and Cascadeless schedules.

Lock based protocols, time stamp based protocols, Multiple Granularity and MultiversionTechniques, Enforcing serializablity by Locks, Locking system with multiple lock modes,architecture for Locking scheduler.

MODULE-II

Distributed Transactions Management: Data Distribution, Fragmentation and ReplicationTechniques, Distributed Commit, Distributed Locking schemes, Long duration transactions,Moss Concurrency protocol.

Issues of Recovery and atomicity in Distributed Databases, Traditional recovery techniques, Logbased recovery, Recovery with Concurrent Transactions, Recovery in Message passing systems,Checkpoints, Algorithms for recovery line, Concepts in Orphan and Inconsistent Messages.

MODULE-III

Distributed Query Processing:Multiway Joins, Semi joins, Cost based query optimization fordistributed database, Updating replicated data, protocols for Distributed Deadlock Detection,Eager and Lazy Replication Techniques.

CO:-

CO1	Identify the introductory distributed database concepts and its structures.
CO2	Describe terms related to distributed object database design and management.
CO3	Produce the transaction management and query processing techniques in DDBMS.
CO4	Relate the importance and application of emerging database technology.

Text Books:

1. Silberschatz, orth and Sudershan, Database System Concept', McGraw Hill

2. Ramakrishna and Gehrke,' Database Management System, McGraw Hill

Reference Books:

1. Garcia-Molina, Ullman,Widom,' Database System Implementation' Pearson Education

2. Ceei and Pelagatti,'Distributed Database', TMH

3. Singhal and Shivratri, 'Advance Concepts in Operating Systems' MC Graw Hill

BCS-084	BIOINFORMATICS	**L T P** **3 1 0**	**4 Credits**

Pre-requisites: students should know the basic knowledge of biology.

2. Students should know the knowledge of batabase and AI.

Course Objectives:

To enable the students to understand scope of Bioinformatics
2. Understanding of popular bioinformatics database
3. Learn Fundamentals of Databases and Sequence alignment
4. Approaches to drug discovery using bioinformatics techniques

Detailed Syllabus

MODULE I

Introduction to bioinformatics and data generation What is bioinformatics and its relation with molecular biology. Examples of related tools(FASTA, BLAST, BLAT, RASMOL), databases(GENBANK, Pubmed, PDB) and software(RASMOL,Ligand Explorer). Data generation; Generation of large scale molecular biology data. Applications of Bioinformatics.

MODULE II

Unit II Biological Database and its Types Introduction to data types and Source. Population and sample, Classification and Presentation of Data. Quality of data, private and public data sources. General Introduction of Biological Databases; Nucleic acid databases (NCBI, DDBJ, and EMBL). Protein databases . Specialized Genome databases: Structure databases, Data storage and retrieval and Interoperability Flat files, relational, object oriented databases and controlled vocabularies. File Format.

MODULE III

Introduction to Metadata and search; Indices, Boolean, Fuzzy, Neighboring search. The challenges of data exchange and integration. Ontologies, interchange languages and standardization efforts. General Introduction to XML, UMLS, CORBA, PYTHON and OMG/LIFESCIENCE. Sequence Alignments and Visualization Introduction to Sequences, alignments and Dynamic Programming; Local alignment and Global alignment, Pairwise alignment and multiple sequence alignment.

CO:-

CO1	Develop Knowledge and competence on various Legal issues pertaining to Intellectual
CO2	Property Rights with the utility in engineering perspectives
CO3	Learn about opportunity discovery and evaluation of viable business ideas for new venture creation.

CO 3.

Text Books:

1. Attwood, T.K. and Parry-Smith, D. J. Introduction to Bioinformatics, Longmans

2. S. Sundara Rajan, R. Balaji, Introduction to Bioinformatics, Himalaya Pub

BCS-085	DIGITAL IMAGE PROCESSING	L T P 3 1 0	4 Credits

Pre-requisites: students should know about the AI.

Course Objectives:

To learn the advanced concepts of image processing and its implementation.

Detailed Syllabus

MODULE I

Introduction and Fundamentals Motivation and Perspective, Applications, Components of Image Processing System, Element of Visual Perception, A Simple Image Model, Sampling and Quantization. Image Enhancement in Frequency Domain Fourier Transform and the Frequency Domain, Basis of Filtering in Frequency Domain, Filters – Low-pass, High-pass; Correspondence Between Filtering in Spatial and Frequency Domain; Smoothing Frequency Domain Filters – Gaussian Lowpass Filters; Sharpening Frequency Domain Filters – Gaussian Highpass Filters; Homomorphic Filtering.

MODULE II

Image Enhancement in Spatial Domain Introduction; Basic Gray Level Functions – Piecewise-Linear Transformation Functions: Contrast Stretching; Histogram Specification; Histogram Equalization; Local Enhancement; Enhancement using Arithmetic/Logic Operations – Image Subtraction, Image Averaging; Basics of Spatial Filtering; Smoothing - Mean filter, Ordered Statistic Filter; Sharpening – The Laplacian.

MODULE III

Image Restoration A Model of Restoration Process, Noise Models, Restoration in the presence of Noise only-Spatial Filtering – Mean Filters: Arithmetic Mean filter, Geometric Mean Filter, Order Statistic Filters – Median Filter, Max and Min filters; Periodic Noise Reduction by Frequency Domain Filtering – Bandpass Filters; Minimum Mean-square Error Restoration.

CO:-

CO1	To acquire the knowledge of soft computing and hard computing
CO2	To develop skill in soft computing methodology
CO3	To acquire the knowledge of the fuzzy Neural network and Genetic Language
CO4	To analyze and optimized the problem of real-life applications

Comprehend the need and usage of concepts of image processing.

2. Enhance the visual quality of given grey/color image using well known transformations and

filters.

3. Distinguish between lossy and lossless image compression prototypes.

4. Segment the regions of given image using various feature extraction algorithms in order to recognize object.

5. Demonstrate the use of MATLAB to create correlative image processing applications

Text Books:

1. Digital Image Processing 2nd Edition, Rafael C. Gonzalvez and Richard E. Woods.

Published by: Pearson Education.

2. Digital Image Processing and Computer Vision, R.J. Schalkoff. Published by: John Wiley and Sons, NY. 3. Fundamentals of Digital Image Processing, A.K. Jain. Published by Prentice Hall, Upper Saddle River, NJ. E

BCS-086	COMPUTATIONAL GEOMETRY	**L T P** **3 1 0**	**4 Credits**

Pre-requisites: students shold know about the computer graphics.

Course Objectives:

2. Introduce rigorous algorithmic analysis for problems in Computational Geometry.
3. Discuss applications of Computational Geometry to graphical rendering.
4. Introduce the notions of Voronoi diagrams and Delaunay Triangulations.
5. Develop expected case analyses for linear programming problems in small dimensions.

Detailed Syllabus

MODULE-I

Introduction, Application domains of computational geometry, Limitations of computational geometry, Convex hulls, Jarvish March method, Graham's scan method, Planar Graphs, Regions, Dual of a graph, Geometric Dual, Triangulations: polygon triangulations, guarding, Art Gallery problem.

MODULE-II

Voronoi diagrams: construction and applications, Delauney triangulations, Divide and conquer approach, Flip and incremental algorithms, duality of Voronoi diagrams, min-max angle properties. Geometric searching: point-location, Trapezoidal maps, Fractional cascading, Finger trees, Segment trees, Interval trees, Visibility: weak and strong.

MODULE-III

Arrangements of lines: zone theorem, Combinatorial geometry: Ham-sandwich cuts. Sweep techniques: plane sweep for segment intersections, Fortune's sweep for Voronoi diagrams, Topological sweep for line arrangements.

CO:-

CO1	Analyze randomized algorithms for small domain problems.
CO2	Use line-point duality to develop efficient algorithms.
CO3	Apply geometric techniques to real-world problems in graphics.
CO4	Solve linear programs geometrically.

Text Books:

1. Franco P. Preparata and Michael Ian Shamos, "Computational Geometry: An Introduction", Springer.

2. Mark de Berg, Marc van Kreveld, Mark Overmars, and Otfried Cheong, "Computational Geometry: Algorithms and Applications", Springer.

Reference Books:

1. Ketan Mulmuley, "Computational Geometry: An Introduction Through Randomized Algorithms", Prentice-Hall.

2. Joseph O'Rourke, "Computational Geometry in C", Cambridge University Press.

BCS-087	COMPUTATIONAL COMPLEXITY	L T P 3 1 0	4 Credits

Pre-requisites: students should know about that how to calculate the complexity of the programs

Course Objectives:

1.To introduce the fundamentals of computational complexity theory.
2 To discuss basic concepts such as computational models, computational complexity measures (e.g., time and space complexity measures), complexity classes, reducibility and completeness notions.
3. To familiarize the concepts of randomized and approximation algorithms and discuss the related complexity classes

Detailed Syllabus

MODULE-I

Models of Computation, resources (time and space), algorithms, computability, complexity. Complexity classes, P/NP/PSPACE, reduction s, hardness, completeness, hierarchy, relationships between complexity classes.

MODULE-II

Randomized computation and complexity; Logical characterizations, incompleteness; Approximability. Circuit complexity, lower bounds; Parallel computation and complexity; Counting problems; Interactive proofs.

MODULE-III

Probabilistically checkable proofs; Communication complexity; Quantum computation.

Text Books:

1 Christos H. Papadimitriou., Combinatorial Optimization: Algorithms and Complexity

,Prentice-Hall

CO:-

CO1	The students will able to determine whether a problem is computable, and prove that some problems are not computable.
CO2	The students will able to categorize problems into appropriate complexity classes
CO3	The students will able to classify problems based on their computational complexity using reductions
CO4	The students will able to analyze optimization problems using the concept of interactive proofs

Reference Books:

1. SanjeevArora and Boaz Barak , Complexity Theory: A Modern Approach,

CambridgeUniversity Press

2. Steven Homer , Alan L. Selman , Computability and Complexity Theory , Springer

BCS-088	IT IN FORENSIC SCIENCE	**L T P** **3 1 0**	**4 Credits**

Pre-requisites: students shold know about the security of any system.

Students should know abou the symmetric and non symmetric technique.

Course Objectives:

: To understand the nature, meaning and significance of forensic science and its relation to crime and criminal.

Detailed Syllabus

MODULE-I

Overview of Biometrics: Biometric Identification, Biometric Verification, Biometric Enrollment, Biometric System Security. Authentication and Biometrics: Secure Authentication Protocols, Access Control Security Services, Matching Biometric Samples, Verification by humans.Common biometrics: Finger Print Recognition, Face Recognition, Speaker Recognition, Iris Recognition, Hand Geometry, Signature Verification. Introduction to Information Hiding: Technical Steganography, Linguistic Steganography, Copy Right Enforcement, Wisdom from Cryptography.

MODULE-II

Principles of Steganography: Framework for Secret Communication, Security of Steganography System, Information Hiding in Noisy Data , Adaptive versus non-Adaptive Algorithms, Active and Malicious Attackers, Information hiding in Written Text. A Survey of Steganographic Techniques: Substitution systems and Bit Plane Tools, Transform Domain Techniques: - Spread Spectrum and Information hiding, Statistical Steganography, Distortion

Techniques, Cover Generation Techniques. Steganalysis: Looking for Signatures: - Extracting hidden Information, Disabling Hidden Information.

MODULE-III

Watermarking and Copyright Protection: Basic Watermarking, Watermarking Applications, Requirements and Algorithmic Design Issues, Evaluation and Benchmarking of Watermarking system. Computer Forensics, Rules of evidence, Evidence dynamics, Evidence collection, Data recovery, Preservation of digital evidence, surveillance tools for future warfare, cyber crime, types of cyber crimes, Digital evidence, nature of digital evidence, precautions while dealing with digital evidence.

CO:-

CO1	List the services performed by a crime investigators, crime laboratories and medical examiners.
CO2	Review the history and development of the forensic science sub-disciplines covered.
CO3	Discuss the role of a forensic scientist.
CO4	Familiarize oneself with the organization of a forensic science laboratory.

Text Book:

1. Katzendbisser, Petitcolas, " Information Hiding Techniques for Steganography and DigitalWatermarking", Artech House.

BCS-089	ADVANCED COMPUTER NETWORK	L T P 3 1 0	4 Credits

Pre-requisites: 1.students should have the basic knowledge of computer network.

2.Students should knowledge of protocols.

Course Objectives:

1. To build an understanding of the fundamental concepts of computer networking.
2. To introduce the basic taxonomy and terminology of computer networking.
3. To introduce advanced networking concepts.

Detailed Syllabus

MODULE-I

Introduction: Uses of computer Networks, Reference Models, Channel allocation problem, Multiple access Protocols, Ethernet, Wireless LANs, Broadband Networks, Structure Overlay Networks, P2P Computing

MODULE-II

Network Layer Design Issues, Addressing: Internet Address, Classful Addressing, Subnetting, Supernetting, Classless Addressing, dynamic Address Configuration, Network Layer Protocol: ARP, ICMP, IPV4 and IPV6.

MODULE-III

Transport Service, Elements of transport protocol, Process to Process Delivery, Internet Transport Protocols UDP, Internet Transport Protocols TCP, Performance Issues. The Application Layer: Client Server Model, Socket Interface: sockets, Connectionless interactive server, Connection-Oriented concurrent server,

CO:-

CO1	Enables the students to visualize the different aspects of networks, protocols and network design models.
CO2	Enables the students to examine various Data Link layer design issues and Data Link protocols.
CO3	Enables the students to analyze and compare different LAN protocols. Level 2,4
CO4	Enables the students to compare and select appropriate routing algorithms for a network

Text Books:

1. Computer Networks and Internets - Douglas E. Comer; PE.

2. Communication Networks - Leon-Garcia-Widjaja; TMH.

3. Internetworking with TCP / IP - Douglas E .Comer; PE.

4. TCP/IP protocol suite - ForouzanBehrouz A; TMH.

5. Computer Networks – Andrew S. Tannenbaum; PHI.

6. Data and Computer Communication - William Stallings; PHI

BCS-090	BIG DATA ANALYSIS	**L T P** **3 1 0**	**4 Credits**

Pre-requisites: students should know about the data base.

Students should know about the data mining.

Course Objectives:

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

Detailed Syllabus

MODULE 1

Introduction – distributed file system – Big Data and its importance, Four Vs, Drivers for Big data, Big data analytics, Big data applications. Algorithms using map reduce, Matrix- Vector Multiplication by Map Reduce INTRODUCTION HADOOP Big Data – Apache Hadoop & Hadoop EcoSystem – Moving Data in and out of Hadoop.

MODULE 2

HADOOP ARCHITECTURE Hadoop Architecture, Hadoop Storage: HDFS, Common Hadoop Shell commands , Anatomy of File Write and Read., NameNode, Secondary NameNode, and DataNode, Hadoop MapReduce paradigm, Map and Reduce tasks, Job, Task trackers - Cluster Setup – SSH & Hadoop Configuration – HDFS Administering –Monitoring & Maintenance

MODULE 3

HADOOP ECOSYSTEM AND YARN Hadoop ecosystem components - Schedulers – Fair and Capacity, Hadoop 2.0 New FeaturesNameNode High Availability, HDFS Federation, MRv2, YARN, Running MRv1 in YARN, Hive Architecture and Installation, Comparison with Traditional Database, HiveQL - Querying Data - Sorting And Aggregating

CO;-

CO1	Analyze Infosphere BigInsights Big Data Recommendations.
CO2	Manage Job Execution in Hadoop Environment
CO3	Develop Big Data Solutions using Hadoop Eco System
CO4	Apply Machine Learning Techniques using R.

Text Books:

1. The Big Data-Driven Business: How to Use Big Data to Win Customers, Beat Competitors, and Boost Profits Russell Glass,Sean Callahan.

2. Data Fluency: Empowering Your Organization with Effective Data Communication, Zach Gemignani,Chris Gemignani,Richard Galentino.

3. Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data,Gebundene Ausgabe,von EMC Education Services (Herausgeber)

4. Hadoop: The Definitive GuideAuthor: Tom White Publisher: Hadoop: The Definitive Guide

5. Hadoop in Action Author: Chuck Lam Publisher: Manning