`

BACHELOR OF TECHNOLOGY (CSE)

Academic Annexure

(Admission, Study, Curriculum & Examination)

Programme Code:CSEB

Duration: 4 Years

EFFECTIVE FROM SESSION: 2022-2023

Department of Computer Science Engineering

Faculty of Engineering & Technology

CHHATRAPATI SHIVAJI MAHARAJ UNIVERSITY PANVEL, NAVI MUMBAI

(STATE PRIVATE UNIVERSITY ESTABLISHED UNDER ACT XXXII OF GOVT. OF MAHARASHTRA 2018 AND RECOGNIZED BY THE UGC)

SEMESTER I									
Course Type	**Course Code**	**Course Name**	**L**	**T**	**P**	**IA**	**UE**	**Total Marks**	**Credits**
BS	MTHG1000	Engineering Mathematics- I	3	1	-	30	70	100	4
BS	PHYG1000	Engineering Physics	3	1	-	30	70	100	4
ES	CSEG1000	Programming for Problem Solving	3	-	-	30	70	100	3
HSM	ENGG1000	English Communication Skill	2	-	-	30	70	100	2
HSM	ENGG1001	English Communication Skill lab	-	-	2	15	35	50	1
ES	MECG1000	Engineering Mechanics	3	1	-	30	70	100	4
BS	PHYG1001	Engineering Physics Lab	-	-	4	15	35	50	2
ES	CSEG1001	Programming for Problem Solving Lab	-	-	4	15	35	50	2
MC		Induction Program*	3 weeks duration						0
		Total	**14**	**3**	**10**	**195**	**455**	**650**	**22**

Engineering Mathematics-I

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
MTHG1000	Engineering Mathematics-I	1 Hrs/Week	4	30 Marks	70 Marks

Prerequisites:

Differentiation, Integration, Maxima and Minima, Determinants and Matrices.

Course Objectives:

To make the students familiarize with concepts and techniques in Calculus, Complex number and Matrices. The aim is to equip them with the techniques to understand advanced level mathematics and its applications that would enhance analytical thinking power, useful in their disciplines.

Course Outcomes (COs): The students will be able to learn

1. Apply the concepts of complex numbers to the engineering problems.
2. Apply the knowledge of nth order derivatives of standard functions to engineering problems.
3. Apply the principles of basic operations of matrices to the engineering problems.
4. Apply the basic principles of partial differentiation to engineering problems.
5. Apply concepts of partial differentiation (maxima and minima), expansion of functions as an application of successive differentiation.

Course Contents

UNIT-1: Matrices(10 Hrs)

Review on matrices: Definition of matrix ,types of matrix ,Algebra of matrices ,Adjoint of matrix, inverse of matrix ,Unitary & Orthogonal matrices ,Echelon form ,Rank of a matrix, Normal form , PAQ normal form. System of homogeneous & Non homogeneous equations, Conditions of their consistency & Inconsistency & solutions. Solution of system of linear algebraic equations, by (1)Gauss Elimination Method (2) Guass Jordan Method (3) Jacobi iteration (4) Gauss Seidal Method

UNIT-2:Complex Numbers(15 Hrs)

Definition of Complex number ,Algebra of complex number ,Representation of complex number on complex plane, D'Moivre's Theorem.Powers and roots of Exponential & Trigonometric functions. Expansion of sinn,cosn in terms of sines and cosines of multiples of θ and Expansion of sinnθ, cosnθ in powers of sinθ, cosθ . Circular functions of complex number and Hyperbolic functions. Inverse Circular and Inverse Hyperbolic functions. Logarithmic functions. Separation of real and Imaginary parts of all types of Functions.

UNIT-3: Numerical Integration (07 Hrs)

Numerical integration-Different type of operators such as shift, forward, backward difference and their relation, Interpolation, Newton Interpolation,. Integration by (a) Trapezoidal (b) Simpson's 1/3rd (c)Simpson's 3/8th rule.

UNIT-4 : Partial Differential Equation (08 Hrs)

Partial derivatives of first and higher order, total differentials, differentiation of composite and implicit functions, Euler's Theorem on Homogeneous functions with two and three independent variables (with proof).Deductions from Euler's Theorem.

UNIT-5: Application of Partial Differentiation, Indeterminate forms and curve fitting (08 Hrs)

Maxima and Minima of a function of two independent variables, Indeterminate forms, L-Hospital rule, Fitting of curves by least square method for line ,parabola & exponential

Recommended Books:

1. A text book of Applied Mathematics, P.N.Wartikar and J.N.Wartikar,Vol – I and –II by Pune Vidyarthi Graha.
2. Higher Engineering Mathematics, Dr.B.S.Grewal, Khanna Publication
3. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley EasternLimited,9thEd.
4. Matrices by Shanti Narayan.
5. Numerical by S.S.Sastry, Prentice Hall.

Engineering Physics

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
PHYG1000	Engineering Physics	1 Hrs/Week	4	30 Marks	70 Marks

Course Objectives:

The objectives of this course are

1. To impart the ideas of Modern physics and Quantum Mechanics
2. To impart the knowledge of Semiconductor Physics and electronic devices
3. To make students learn about the mechanism and devices of Lasers and Optical fibers.
4. To make students learn the basics of crystal structure and Solid State Physic
5. To impart the knowledge of Nanomaterials and basics of Nanotechnology.

Course Outcomes:

At the end of this course students will demonstrate the ability to:

1. Learn and understand more about basic principles and to develop problem solving skills and implementation in technology.
2. Gain Knowledge about Modern physics and quantum mechanics will update the basic concepts to implement the skills.
3. Study of material properties and their applications is the prime role to understand and use in engineering applications and studies.
4. Study Lasers and Optical fibers and its applications are to import knowledge and to develop skills and to use modern instruments in the engineering applications.
5. Understand Basics of Solid State Physics, viz, Crystal structure and applications are to boost the technical skills and its applications.
6. Understand basic concepts of nanomaterials and nanotechnology.

Course Contents

Unit 1: Modern Physics and Quantum Mechanics (10 Hrs)

Black body radiation spectrum, Assumptions of quantum theory of radiation, Plank's law, Wien's law and Rayleigh Jeans law, for shorter and longer wavelength limits. Wave Particle dualism, de Broglie hypothesis, Compton Effect Matter waves and their Characteristic properties, Definition of Phase velocity and group velocity, Relation between phase velocity and group velocity, Relation between group velocity and particle velocity, Heisenberg's uncertainty principle and its application, (Non-existence of electron in the nucleus).Wave function, Properties and physical significance of wave function, Probability density and Normalization of wave function. Setting up of one dimensional time independent Schrodinger wave equation, Eigenvalues and Eigen functions, Application of Schrodinger wave equation for a particle in a potential well of infinite depth and for free particle.

Unit 2: Semiconductor Physics: (10 Hrs)

Band theory, Direct & indirect band gap semiconductor; Fermi level; Fermi dirac distribution; Fermi energy level in intrinsic & extrinsic semiconductors; effect of impurity concentration and temperature on fermi level; mobility, current density; Hall Effect; Fermi Level diagram for p-n junction (unbiased, forward bias, reverse bias); Basics of Transistors. Applications of semiconductors: LED, Zener diode, Photovoltaic solar cell.

Unit 3: Lasers and Optical Fibres: (10 Hrs)

Einstein's coefficients (expression for energy density), Requisites of a Laser system, Condition for laser action. Principle, Construction and working of CO2 laser and semiconductor Laser, Applications of Laser – Laser welding, cutting and drilling, Measurement of atmospheric pollutants, Holography–Principle of Recording and reconstruction of images,

Propagation mechanism in optical fibers, Angle of acceptance, Numerical aperture, Types of optical fibers and modes of propagation. Attenuation, Block diagram discussion of point to point communication, applications,

Unit 4: Solid State Physics: (10 Hrs)

Space lattice, Bravais lattice–Unit cell, primitive cell, Lattice parameters, Crystal systems, Direction and planes in a crystal, Miller indices, Expression for inter – planar spacing. Coordination number, Atomic packing factors (SC, FCC, BCC), Bragg's law, Determination of crystal structure using Bragg's X–ray diffractometer, Polymorphism and Allotropy, Crystal Structure of Diamond, qualitative discussion of Perovskites.

Unit 5: Nanotechnology: (10 Hrs.)

Introduction to Nano Science, Density of states in 1D, 2D and 3D structures, Nanomaterials Properties (Optical, electrical, magnetic, structural, mechanical) and applications, Surface to volume ratio; Two main approaches in nanotechnology -Bottom up technique and Top down technique; Tools for characterization of Nanoparticles: Scanning Electron Microscope (SEM), Transmission Electron Microscope (TEM), Atomic Force Microscope (AFM). Methods to synthesize Nanomaterials: Ball milling, Sputtering, Vapour deposition, Sol-gel method,

Programming for Problem Solving

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEG1000	Programming for Problem Solving	3 Hrs/ Week	3	30 Marks	70 Marks

Prerequisites:

Differentiation, Integration, Maxima and Minima, Determinants and Matrices.

Course Objectives: To learn the fundamentals of computers and understand the various steps in program development. Learn the syntax and semantics of C programming language. To learn the usage of structured programming approach in solving problems.

Course Outcomes (COs): The students will be able to learn

1. To develop simple algorithms for arithmetic and logical problems.
2. To translate the algorithms to programs & execution (in C language).
3. To implement conditional branching, iteration and recursion.
4. To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
5. To use arrays, pointers and structures to develop algorithms and programs.

Unit 1: Introduction to Programming: (08 Hrs)
Introduction to components of a computer system: Memory, processor, I/O Devices, storage, operating system, Concept of assembler, compiler, interpreter, loader and linker. Idea of Algorithm: Representation of Algorithm, Flowchart, Pseudo code with examples, From algorithms to programs, source code. Programming Basics: Structure of C program, writing and executing the first C program, Syntax and logical errors in compilation, object and executable code, Components of C language, Standard I/O in C , Fundamental data types, Variables and memory locations, Storage classes.

Unit 2: Arithmetic expressions & Conditional Branching: (08 Hrs)
Arithmetic expressions and precedence : Operators and expression using numeric and relational operators, mixed operands, type conversion, logical operators, bit operations, assignment operator, operator precedence and associatively. Conditional Branching: Applying if and switch statements, nesting if and else, use of break and default with switch.

Unit 3: Loops & Functions: (08 Hrs)
Iteration and loops: use of while, do while and for loops, multiple loop variables, use of break and continue statements. Functions: Introduction, types of functions, functions with array, passing parameters to functions, call by value, call by reference, recursive functions.

Unit 4: Arrays & Basic Algorithms: (08 Hrs)
Arrays: Array notation and representation, manipulating array elements, using multi dimensional arrays. Character arrays and strings, Structure, union, enumerated data types, Array of structures, passing arrays to functions. Basic Algorithms: Searching &Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, Notion of order of complexity. Distributed Database: distributed data storage, concurrency control, directory system

Unit 5: Pointer & File Handling: (8Hrs.)

Pointers: Introduction, declaration, applications, Introduction to dynamic memory allocation (malloc, calloc, realloc, free), Use of pointers in self-referential structures, notion of linked list (no implementation) File handling: File I/O functions, Standard C preprocessors, defining and calling macros, command-line arguments.

Text /Reference Books:

1. Schaum's Outline of Programming with C by Byron Gottfried , McGraw-Hill.
2. The C programming by Kernighan Brain W. and Ritchie Dennis M., Pearson Education
3. Computer Basics and C Programming by V.Rajaraman , PHI Learning Pvt. Limited, 2015.
4. Computer Concepts and Programming in C, E Balaguruswami, McGraw Hill
5. Computer Science- A Structured Programming Approach Using C, by Behrouz A. Forouzan, Richard F. Gilberg, Thomson, Third Edition , Cengage Learning - 2007.
6. Let Us C By Yashwant P. Kanetkar.
7. Problem Solving and Program Design in C, by Jeri R. Hanly, Elliot B. Koffman, Pearson Addison-Wesley, 2006.
8. Programming in C by Kochan Stephen G. Pearson Education – 2015.
9. Computer Concepts and Programming in C by D.S. Yadav and Rajeev Khanna, New Age International Publication .
10 Computer Concepts and Programming by Anami, Angadi and Manvi, PHI Publication
11 Computer Concepts and Programming in C by Vikas Gupta, Wiley India Publication
12 Computer Fundamentals and Programming in C. Reema Thareja, Oxford Publication

English Communication Skill

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
ENGG1000	English Communication Skill	3 Hrs/Week	3	15 Marks	35 Marks

Course Objective:

1. To acquaint the students with appropriate language skills with the purpose of improving the existing ones – LSRW.
2. To make the learners understand the importance and effective use of non-verbal communication.
3. To make the learner proficient in public speaking and presentation skills.
4. To guide and teach the students to utilize the principles of professional business and technical writing for effective communication in the global world.
5. To deploy technology to communicate effectively in various situations.

Course Outcomes.

The students will be able to-

1. Understand and evaluate information they listen to and express their ideas with greater clarity.
2. Speak and respond effectively along the various channels of communication in a business organization.
3. Speak convincingly before an audience with the help of an expanded vocabulary and enhanced digital content.
4. Communicate through result oriented writing both within and outside the organization.
5. Write a set of effective and easy to understand technical description, instructions.

Course Content

UNIT-1: Communication and Communication Process:

Introduction to Communication, Forms and functions of Communication, Barriers to Communication ((linguistic and semantic, psychological, physical, mechanical, cultural), and overcoming them, Types of communication: verbal and non-verbal communication.

Reading: Introduction to Reading, Barriers to Reading, Types of Reading: Skimming, Scanning, Fast Reading, Strategies for Reading, Comprehension.

Listening : Importance of Listening, Types of Listening, Barriers to Listening.

UNIT-2: Writing Skills, Reading Skills & Listening Skills:

Features of Good Language, Technical Style of writing, Writing Emails and it's etiquettes, Technical Reports: Report Writing: Types, Format and Structure of reports.

UNIT-3: Letter Writing:

Types of letters: Job application letter, complaint letter, enquiry letter, reply to enquiry, sales letter, Essential and non-essential parts of letters, formats of letters.

UNIT-4 : Grammar:
Types of sentences, Antonyms and Synonyms, Use of Auxiliaries and Modal Auxiliaries, Synonyms and Antonyms, Pairs of confused words, Common Errors in sentences

UNIT-5: Soft Skills:
Body language, Team work and skills, Decision making ability, Negotiation skills and Interview skills.

UNIT-6: Dialogues Writing and Speaking:
Greeting someone and responding to greet, Thanking someone and responding to thanks, Making inquiry and responding to enquiry on telephone, Making request and responding to request.

Reference Books:

1. Communication in Organizations by Dalmar Fisher, Jaico Publishing House
2. Communication Skills by Meenakshi Raman & Sangeeta Sharma, Oxford University Press.
3. Business Correspondence & Report-writing by R.C. Sharma& Krishna Mohan, Tata McGraw-Hill Education.
4. Effective Technical Communication by Ashraf Rizvi, Tata McGraw-Hill.
5. Technical Writing & Professional Communication for non-native speakers of English by
6. Thomas N. Huckin & Leslie A. Olsen, McGraw –Hill.
7. Mastering Communication by Nicky Stanton, Palgrave Master Series
8. www.buisnesscommunicationskills.com
9. www.kcitraing.com
10. www.mindtools.com

Engineering Mechanics

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
MECG1000	Engineering Mechanics	4 Hrs/Week	4	30 Marks	70 Marks

Course Objective:

1. To introduce the basic principles of engineering mechanics with emphasis on their analysis and application to practical engineering problems
2. To understand the representation of forces and moments
3. To describe static equilibrium of particles and rigid bodies
4. To comprehend the effect of Friction on general plane motion
5. To analyse the properties of surfaces & solids in relation to moment of inertia
6. To illustrate the laws of motion, kinematics of motion and their interrelationship

Course Outcomes:

On successful completion of this course, a student would be able to identify and analyze the problems by applying the fundamental principles of engineering mechanics and to proceed to design and development of the mechanical systems

UNIT 1: **Introduction** (8 lectures)

Transformation of scalars and vectors under Rotation transformation; Forces in Nature; Newton's laws and its completeness in describing particle motion; Form invariance of Newton's Second Law; Solving Newton's equations of motion in polar coordinates; Problems including constraints and friction; Extension to cylindrical and spherical coordinates

UNIT 2: (7 lectures)

Potential energy function; F = - Grad V, equipotential surfaces and meaning of gradient; Conservative and non-conservative forces, curl of a force field; Central forces; Conservation of Angular Momentum; Energy equation and energy diagrams; Elliptical, parabolic and hyperbolic orbits; Kepler problem; Application: Satellite maneuvers;

UNIT 3: (5 lectures)

Non-inertial frames of reference; Rotating coordinate system: Five-term acceleration formula. Centripetal and Coriolis accelerations; Applications: Weather systems, Foucault pendulum;

UNIT 4: (6 lectures)

Harmonic oscillator; Damped harmonic motion – over-damped, critically damped and lightly-damped oscillators; Forced oscillations and resonance.

UNIT 5: (5 lectures)

Definition and motion of a rigid body in the plane; Rotation in the plane; Kinematics in a coordinate system rotating and translating in the plane; Angular momentum about a point of a rigid body in planar motion; Euler's laws of motion, their independence from Newton's laws, and their necessity in describing rigid body motion; Examples Introduction to three-dimensional rigid body motion — only need to highlight the distinction from two-dimensional motion in terms of (a) Angular velocity vector, and its rate of change and (b) Moment of inertia tensor; Three-dimensional motion of a rigid body wherein all points move in a coplanar manner:

Reference Books

1. Engineering Mechanics, 2nd ed. — MK Harbola
2. Introduction to Mechanics — MK Verma
3. An Introduction to Mechanics — D Kleppner& R Kolenkow
4. Principles of Mechanics — JL Synge & BA Griffiths
5. Mechanics — JP Den Hartog
6. Engineering Mechanics - Dynamics, 7th ed. - JL Meriam
7. Mechanical Vibrations — JP Den Hartog (
8. Theory of Vibrations with Applications — WT Thomson

Engineering Physics Lab

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
PHYG1001	Engineering Physics Lab	4 Hrs/Week	2	15 Marks	35 Marks

Course objectives:

1. To gain practical knowledge by applying the experimental methods to correlate with the Physics theory.
2. To learn the usage of electrical and optical systems for various measurements.
3. Apply the analytical techniques and graphical analysis to the experimental data.
4. To develop intellectual communication skills and discuss the basic principles of scientific concepts in a group.

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

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

List of Laboratory Experiments

1. Measurement Show the variation of specific rotation of polarization with the concentration of a sugar solution polarizer.
2. Determine Planck's constant using LED illumination method.
3. Observe the EMF generation of a thermocouple as a function of temperature.
4. Show the temperature dependence of resistivity of given semiconductor using four probe method.
5. Observe the variation of magnetic field due to a current loop.
6. Find out the diffraction angles of four visible light wavelengths using given diffraction grating.
7. Plot the Hall voltage to ascertain Hall Effect for the given semiconductor.
8. Plot the forward and Reverse Bias of a diode.
9. Characteristics of a transistor (NPN and PNP)
10. Design half-wave, full-wave and bridge rectifiers with diodes and study their characteristics.

Text /Reference Books:

1. Engineering Physics, Avadhanulu, Kshirsagar, S. Chand Publications
2. A textbook of optics – N Subrahmanyam and BriLal , S. Chand Publications
3. Engineering Physics, Gaur, Gupta, Dhanpat Rai and Sons Publications
4. Fundamentals of Physics, Resnick and Halliday (John Wiley and Sons)
5. Optics, Jenkins and White (Tata Mcgraw Hill)
6. Principles of Physics, Serway and Jewett (Saunders college publishing)

7. Introduction to Solid State Physics, C. Kittel (Wiley and Sons)
8. Principles of Solid State Physics, H. V. Keer, New Age International
9. Laser and Non-Linear Optics, B. B. Laud (Oscar publication)
10 Nanotechnology: Principles and Practices, Dr. S. K. Kulkarni (Capital Publishing Company.

Programming for Problem Solving Lab

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEG1001	Programming for Problem Solving Lab	2 Hrs/Week	1	15 Marks	35 Marks

Laboratory Outcomes:

1. To formulate the algorithms for simple problems.
2. To translate given algorithms to a working and correct program.
3. To be able to correct syntax errors as reported by the compilers.
4. To be able to identify and correct logical errors encountered at run time
5. To be able to write iterative as well as recursive programs.
6. To be able to represent data in arrays, strings and structures and manipulate them through a program.
7. To be able to declare pointers of different types and use them in defining self referential structures.
8. To be able to create, read and write to and from simple text files.

List of Experiments:

1. WAP that accepts the marks of 5 subjects and finds the sum and percentage marks obtained by the student.
2. WAP that calculates the Simple Interest and Compound Interest. The Principal, Amount, Rate of Interest and Time are entered through the keyboard.
3. WAP to calculate the area and circumference of a circle.
4. WAP that accepts the temperature in Centigrade and converts into Fahrenheit using the formula C/5=(F32)/9.
5. WAP that swaps values of two variables using a third variable.
6. WAP that checks whether the two numbers entered by the user are equal or not.
7. WAP to find the greatest of three numbers.
8. WAP that finds whether a given number is even or odd.
9. WAP that tells whether a given year is a leap year or not.
10. WAP that takes two operands and one operator from the user and perform the operation and prints the result by using Switch statement.
11. WAP to print the sum of all numbers up to a given number.
12. WAP to find the factorial of a given number.
13. WAP to print sum of even and odd numbers from 1 to N numbers.
14. WAP to print the Fibonacci series.
15. WAP to check whether the entered number is prime or not.
16. WAP to find the sum of digits of the entered number.
17. WAP to find the reverse of a number.
18. WAP to print Armstrong numbers from 1 to 100.
19. WAP to convert binary number into decimal number and vice versa.
20. WAP that simply takes elements of the array from the user and finds the sum of these elements.
21. WAP that inputs two arrays and saves sum of corresponding elements of these arrays in a third array and prints them.
22. WAP to find the minimum and maximum element of the array.
23. WAP to search an element in a array using Linear Search.

24. WAP to sort the elements of the array in ascending order using Bubble Sort technique.
25. WAP to add and multiply two matrices of order nxn.
26. WAP that finds the sum of diagonal elements of a mxn matrix.
27. WAP to implement strlen (), strcat (),strcpy () using the concept of Functions.
28. WAP to swap two elements using the concept of pointers.
29. WAP to compare the contents of two files and determine whether they are same or not.
30. WAP to check whether a given word exists in a file or not. If yes then find the number of times it occurs.

SEMESTER II									
Course Type	**Course Code**	**Course Name**	**L**	**T**	**P**	**IA**	**UE**	**Total Marks**	**Credits**
BS	MTHG2000	Applied Mathematics II	3	1	-	30	70	100	4
BS	CHYG2000	Engineering Chemistry	4	-	-	30	70	100	4
ES	ELEG2000	Basic Electrical Engineering	3	1	-	30	70	100	4
ES	MTEG2000	Engineering Graphics	1	-	4	30	70	100	3
MC	EVSG2000	Environmental Sciences	1	-		15	35	50	0
BS	CHYG2001	Engineering Chemistry Lab	-	-	4	15	35	50	2
ES	MTEG2001	Workshop/Manufacturing Practices	1	-	4	30	70	100	3
ES	ELEG2001	Basic Electrical Engineering Lab	-	-	2	15	35	50	1
		Total	**13**	**2**	**14**	**195**	**455**	**650**	**21**

Engineering Mathematics- II

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
MTHG2000	Engineering Mathematics-II	4 Hrs/Week	4	30 Marks	70 Marks

Course Objectives:

1. To provide students with sound foundation in applied mathematics to solve real life problems in industry.
2. To understand the concept of Differential equation to the engineering problems.
3. To learn vector algebra and vector calculus.

Course Outcomes:

Learner will be able to:

1. Apply the knowledge of nth order derivatives of standard functions to engineering problems
2. Apply the concepts of First Order and first degree Differential equation to the engineering problems.
3. Apply the concepts of Higher Order Linear Differential equation to the engineering problems.
4. Apply concepts of Beta and Gamma function to the engineering Problems.
5. Apply concepts of Double integral of different coordinate systems to the engineering problems.
6. Apply concepts of triple integral of different coordinate systems to the engineering problems.

UNIT 1: Beta and Gamma functions, and exact differential equation

Beta function and its properties, Gamma functions and its properties, Differential Equation of first order and first degree-Exact differential, equations, Equations reducible to exact equations by using integrating factors.

UNIT 2: Differential Calculus

Linear differential equations of the type $dydx+Py=Q$, equation reducible to linear form, Bernoulli's equation. Higher order Linear Differential Equation with constant coefficient- Complimentary function, particular integrals of differential equation of the type f(D)y = X where X is eax , sin(ax+b), cos(ax+b), x^n, eaxV, xV. Successive differentiation: nth derivative of standard functions, Leibnitz's Theorem and problems.

UNIT 3: Vector Algebra& Vector Calculus

Definition of vector, Dot product, Cross product, Vector triple product ,Product of four vectors Scalar point function ,Vector point function ,Vector differential operator ∇(del) . Gradient, Divergence, Curl their properties & related problems. Applications- Normal, Directional derivatives, Solenoidal & Irrotational fields

UNIT 4 : Double Integration

Definition, Evaluation of Double Integrals, Change of order of integration, Evaluation of double integrals by changing the order of integration and changing to polar form.

UNIT 5: Triple Integration & Application of Double Integration& Triple Integration

Definition and evaluation (Cartesian, cylindrical and spherical polar coordinates). Application to double integrals to compute Area, Mass, Volume, Application of triple integral to compute volume

Recommended Books:

1. A text book of Applied Mathematics, P. N. Wartikar and J. N. Wartikar, Vol –I and II by Pune Vidyarthi Graha.
2. Higher Engineering Mathematics, Dr.B. S. Grewal, Khanna Publication
3. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley Eastern Limited,9th Ed.
4. Numerical Analysis by S.S.Sastry, Prentice Hall
5. Differential Equations, Sheply Ross, Wiley India
6. Vector analysis- Murray R-Spiegal-Scharn series

Engineering Chemistry

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CHYG2000	Engineering Chemistry	4 Hrs/Week	4	30 Marks	70 Marks

Course Objectives:

To bring adaptability to the concepts of chemistry and to acquire the required skills to become a perfect engineer.

1. To impart the basic knowledge of atomic, molecular and electronic modifications which makes the student to understand the technology based on them.
2. To acquire the knowledge of electrochemistry, corrosion and water treatment which are essential for the Engineers and in industry.
3. To acquire the skills pertaining to spectroscopy and to apply them for medical field etc.
4. To impart then knowledge of stereochemistry and synthetic aspects useful for understanding reaction pathways

Course Outcomes:

The basic concepts included in this course will help the student to gain:

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

Unit 1: Water and its treatment: (9L)

Introduction – Chemistry of Water Molecule, hardness of water, Types of hardness: temporary and permanent (Numerical Based on Hardness). Units of hardness, Estimation of hardness of water by complexometric method, Methods of softening of water: Lime Soda Process(Numerical), Zeolite Process & ion exchange process (Numericals). Softening of Water Potable water and its specifications. Steps involved in treatment of water – Disinfection of water by chlorination and ozonization, Desalination of water – Reverse osmosis. Numerical problems.

Unit 2: Energy Sources: (9L)

Fuels- Definition, classification (solid, liquid & gaseous fuels) - characteristics of a good fuel; Coal - analysis of coal - proximate and ultimate analysis and their significance; Petroleum - refining, knocking - octane and cetane number, cracking - fluid bed catalytic cracking; Natural gas, LPG, CNG - constituents, characteristics and uses, Numericales.

Unit 3: Molecular structure and Theories of Bonding: (8L)

Atomic and Molecular orbitals. Linear Combination of Atomic Orbitals (LCAO), molecular orbitals of diatomic molecules, molecular orbital energy level diagrams of N2, O2 and F2 molecules. π Molecular orbitals of butadiene and benzene.
Crystal Field Theory (CFT): Salient Features of CFT – Crystal Field Splitting of transition metal ion d- orbitals in Tetrahedral, Octahedral and square planar geometries.

Unit 4: Corrosion: (9L)

Corrosion: Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion. Types of corrosion: Galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current cathodic methods. Surface coatings – metallic coatings –Methods of coating- Hot dipping, cementation – methods of application, Electro plating and Electro plating of Copper

Unit 5: Stereochemistry, Reaction Mechanism and synthesis of drug molecules: (10L)

Introduction to representation of 3-dimensional structures, Structural and stereoisomers, configurations, symmetry and chirality, Enantiomers, diastereomers, optical activity and Absolute configuration, Conformation al analysis of n- butane.
Substitution reactions: Nucleophilic substitution reactions: Mechanism of SN1, SN2 reactions. Electrophilic and nucleophilic addition reactions: Addition of HBr to propene. Markownikoff and anti Markownikoff's additions, Grignard additions on carbonyl compounds, Elimination reactions: Dehydro halogenation of alkylhalides, Saytzeff rule. Oxidation reactions: Oxidation of alcohols using KMnO4 and chromic acid.
Reduction reactions: reduction of carbonyl compounds using LiAlH4 & NaBH4. Hydroboration of olefins, Structure, synthesis and pharmaceutical applications of Paracetamol and Aspirin

Reference Books:

1. Physical Chemistry, by P.W. Atkins
2. Engineering Chemistry (NPTEL Web-book), by B.L. Tembe, Kamaluddin and M.S. Krishnan
3. University Chemistry, by B.H. Mahan
4. Fundamentals of Molecular Spectroscopy, by C.N. Banwell
5. Organic Chemistry: Structure and Function by K.P.C. Volhardt and N.E.Schore, 5th Edition.

Basic Electrical Engineering

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
ELEG2000	Basic Electrical Engineering	4 Hrs/Week	4	30 Marks	70 Marks

Course Objectives:

The course objectives are:

1. Impart a basic knowledge of electrical quantities such as current, voltage, power, energy and frequency to understand the impact of technology in a global and societal context.
2. Provide working knowledge for the analysis of basic DC and AC circuits used in electrical and electronic devices.
3. To explain the working principle, construction, applications of DC machines, AC machines & measuring instruments.
4. Highlight the importance of transformers in transmission and distribution of electric power.

Course Outcomes:

1. To understand and analyze basic electric and magnetic circuits
2. To study the working principles of electrical machines and power converters.
3. To introduce the components of low voltage electrical installations

Unit 1: DC Circuits (8 hours)

Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, analysis of simple circuits with dc excitation, Superposition, Thevenin and Norton Theorems, Time-domain analysis of first-order RL and RC circuits

Unit 2: AC Circuits (8 hours)

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

Unit 3: Transformers (6 hours)

Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections

Unit 4: Electrical Machines (8 hours)

Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor, Single-phase induction motor. Construction, working, torque speed characteristic and speed control of separately excited dc motor, Construction and working of synchronous generators

Unit 5: Power Converters (7 hours)

DC-DC buck and boost converters, duty ratio control. Single-phase and three-phase voltage source inverters; sinusoidal modulation

Unit 6: Electrical Installations (8 hours)

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing, Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

Text / Reference Books

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
2. Ashfaq Hussain, Basic Electrical Engineering, S. Chand Publication.
3. V. Mittle & Arvind Mittal, Basic Electrical Engineering, TMH.
4. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
5. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
6. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
7. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.
8. J.B. Gupta, Basic Electrical Engineering, Kataria & Sons .

Engineering Graphics

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
MTEG2001	Engineering Graphics	3 Hrs/Week	3	30 Marks	70 Marks

Course Objective:

1.To impart and inculcate proper understanding of the theory of projection.
2.To impart the knowledge of reading a drawing.
3.To improve the visualization skill.
4.To teach basic utility of computer aided drafting (CAD) tool.

Course Outcomes:

Learner will be able to,

1. Apply the basic principles of projections in 2D drawings.
2. Apply the basic principles of projections in converting 3D view to 2D drawings.
3. Read a given drawing.
4. Visualize an object from the given two views.
5. Use CAD tool to draw different views of an object

UNIT-1: Drafting Technology and Introduction to Any Drafting Software/Package

Layout of drawing sheets, sizes of drawing sheets, different types of lines used in drawing practice, Dimensioning – linear, angular, aligned system, unidirectional system, parallel dimensioning, chain dimensioning, location dimension and size dimension. Tolerances – methods of representing tolerances, unilateral and bilateral tolerances, tolerance on linear and angular dimensions, geometrical tolerances. Symbols used on drawing, surface finish symbols, welding symbols.

Advantages of using Computer Aided Drafting (CAD) packages, applications of CAD, basic operation of drafting packages, use of various commands for drawing, dimensioning, editing, modifying, saving and printing/plotting the drawings. Introduction to 3D primitives.

UNIT-2: Projection of Points and Lines

Lines inclined to both the Reference Planes (Excluding Traces of lines) and simple application based problems on Projection of lines. **Projection of Planes**:- Triangular, Square, Rectangular, Pentagonal, Hexagonal and Circular planes inclined to either HP or VP only. (Exclude composite planes)

UNIT-3: Engineering Curves

Ellipse, Parabola, Hyperbola, normal and tangents to these curves, Involute, Cycloid, Epi-cycloid, Hypo-cycloid, Archimedean Spiral, Helix on cone and cylinder

UNIT-4 : Orthographic Projections & Isometric Projections

Reference planes, types of orthographic projections – First angle projections, Third angle projections, methods of obtaining orthographic views by First angle method, Sectional orthographic projections – full section, half section, offset section. Isometric view, Isometric scale to draw Isometric projection, Non-Isometric lines, construction of Isometric view from given orthographic views and to construct Isometric view of a Pyramid, Cone, Sphere.

UNIT-5: Auxiliary Projections

Auxiliary planes – Auxiliary Vertical Plane (AVP), Auxiliary Inclined Plane (AIP), symmetrical auxiliary view, unilateral auxiliary view, bilateral auxiliary view

Free hand sketching -- FV and TV of standard machine parts – Hexagonal headed nut and bolt, foundation bolts, shafts, keys, couplings, springs, screw thread forms, welded joints, riveted joints.

PART I: Drawing sheet

Five drawing sheets to be prepared on half imperial drawing sheet: (TO be completed in 30 Hrs.)

Sheet No.1: Curves (2 problems) & projections of lines (2 problems)
Sheet No. 2: Projections of solids (2 problems) & section of solids (1 problem)
Sheet No.3: Orthographic projections (1 problem) & sect. ortho. Projections (1 problem)
Sheet No.4: Reading of orthographic projections (2 problems)
Sheet No.5: Isometric view (2 problems) & free hand sketches of fasteners.
Home –Work: one sketch book, A-3 consisting of minimum 3 problems from each module. Duly signed sketch book is part of term –work.

PART II: Computer Aided Drawing (Auto –CAD)

Practice on Auto –cad: Theory and practice to be completed during practical sessions.

1 Introduction to Auto –Cad.
2 Fundamental of 2 –D Constructions.
3 Orthographic projections.
4 Sectional orthographic projections.
5 Reading of Orthographic projections.
6 Fundamental of 3 –D drawing Isometric view.

Printout of problems solved in the practical class to be attached in the Term work (on Sr. No. 3, 4, 5 & 6)

Environmental Studies

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
EVSG2000	Environmental Studies	3 Hrs/Week	0	15 Marks	35 Marks

Course Objective:

1. To acquire a basic understanding and knowledge about the environment and its allied problems
2. Realize the importance of ecosystem and biodiversity for maintaining ecological balance
3. Develop the ability to evaluate measures for the improvement and protection of environment
4. To develop analytical skills, critical thinking, and demonstrate problem-solving skills using scientific techniques towards solutions of current problems and prevention of future problems.

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

1. Understand environmental problems arising due to developmental activities.
2. Identify the natural resources and suitable methods for conservation and sustainable development.
3. Realize the importance of ecosystem and biodiversity for maintaining ecological balance.
4. Identify the environmental pollutants and abatement devices.

Unit 1: Multidisciplinary nature of environmental studies (2 lectures)
Definition, scope and importance, Need for public awareness.

Unit 2 : Natural Resources :(8 lectures)
Renewable and non-renewable resources:
Natural resources and associated problems.
a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.
b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies.
f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
• Role of an individual in conservation of natural resources.
• Equitable use of resources for sustainable lifestyles.

Unit 3: Ecosystems(6 lecture)
• Concept of an ecosystem.
• Structure and function of an ecosystem.
• Producers, consumers and decomposers.
• Energy flow in the ecosystem.
• Ecological succession.
• Food chains, food webs and ecological pyramids.
• Introduction, types, characteristic features, structure and function of the
Following ecosystem:-

a. Forest ecosystem
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit 4: Biodiversity and its conservation (8 lectures)
• Introduction – Definition: genetic, species and ecosystem diversity.
• Biogeographical classification of India
• Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic
And option values
• Biodiversity at global, National and local levels.
• India as a mega-diversity nation
• Hot-sports of biodiversity.
• Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.
• Endangered and endemic species of India
• Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Unit 5: Environmental Pollution(8 lectures)
Cause, effects and control measures of:-

a) Air pollution
b) Water pollution
c) Soil pollution
d) Marine pollution
e) Noise pollution
f) Thermal pollution
g) Nuclear hazards

• Solid waste Management: Causes, effects and control measures of urban and
Industrial wastes.
• Role of an individual in prevention of pollution.
• Pollution case studies.
• Disaster management: floods, earthquake, cyclone and landslides.

Unit 6: Social Issues and the Environment(7 lectures)
• From Unsustainable to Sustainable development
• Urban problems related to energy
• Water conservation, rain water harvesting, watershed management
• Resettlement and rehabilitation of people; its problems and concerns. Case Studies
• Environmental ethics: Issues and possible solutions.
• Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, Case Studies.
• Wasteland reclamation.
• Consumerism and waste products.
• Environment Protection Act.
• Air (Prevention and Control of Pollution) Act.
• Water (Prevention and control of Pollution) Act
• Wildlife Protection Act
• Forest Conservation Act

• Issues involved in enforcement of environmental legislation.
• Public awareness.

Unit 7 : Human Population and the Environment(6 lectures)
• Population growth, variation among nations.
• Population explosion – Family Welfare Programme.
• Environment and human health.
• Human Rights.
• Value Education.
• HIV/AIDS.
• Women and Child Welfare.
• Role of Information Technology in Environment and human health.
• Case Studies.

Unit 8 : Field work (Field work Equal to 5 lecture hours)
• Visit to a local area to document environmental assets: river/ forest/grassland/hill/mountain
• Visit to a local polluted site-Urban/Rural/Industrial/Agricultural
• Study of common plants, insects, birds.
• Study of simple ecosystems-pond, river, hill slopes, etc.

Textbook:
Textbook for Environmental Studies for undergraduate courses of all branches of Higher Education, Erach Bharucha, Published by University Grants Commission.
E-copy: https://www.ugc.ac.in/oldpdf/modelcurriculum/env.pdf

Engineering Chemistry Lab

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CHYG2001	Engineering Chemistry Lab	4 Hrs/Week	2	15 Marks	35 Marks

Laboratory Objectives

The chemistry laboratory course consists of experiments related to the principles of chemistry required to the engineering student. The course will make the student to learn:

1. Estimation of hardness and chloride content in water to check its suitability for drinking purpose.
2. To determine the rate constant of reactions from concentrations as an function of time.
3. The measurement of physical properties like adsorption and viscosity.
4. To synthesize the drug molecules and check the purity of organic molecules by thin layer chromatographic (TLC) technique.

Laboratory Outcomes

The experiments included in the chemistry laboratory will make the student to gain the skills on

1. Determination of parameters like hardness and chloride content in water.
2. Estimation of rate constant of a reaction from concentration – time relationships.
3. Determination of physical properties like adsorption and viscosity.
4. Calculation of Rf values of some organic molecules by TLC technique

List of Experiments

1. Determination of total hardness of water by complexometric method using EDTA
2. Determination of chloride content of water by Argentometry
3. Estimation of an HCl by Conductometric titrations
4. Estimation of Acetic acid by Conductometric titrations
5. Estimation of HCl by Potentiometric titrations
6. Estimation of Fe^{2+} by Potentiometry using $KMnO_4$
7. Determination of rate constant of acid catalysed hydrolysis of methyl acetate
8. Synthesis of Aspirin and Paracetamol
9. Thin layer chromatography calculation of R_f values. eg ortho and para nitro phenols
10. Determination of acid value of coconut oil
11. Verification of freundlich adsorption isotherm-adsorption of acetic acid on charcoal
12. Determination of viscosity of castor oil and ground nut oil by using Ostwald's viscometer.
13. Determination of partition coefficient of acetic acid between n-butanol and water.
14. Determination of surface tension of a give liquid using stalagmometer.

References

1. Senior practical physical chemistry, B.D. Khosla, A. Gulati and V. Garg (R. Chand & Co., Delhi)
2. An introduction to practical chemistry, K.K. Sharma and D. S. Sharma (Vikas publishing, N. Delhi)
3. Text book on Experiments and calculations in Engineering chemistry – S.S. Dara

Workshop/Manufacturing Practices

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
MTEG2001	Workshop/ Manufacturing Practices	4 Hrs/Week	3	30 Marks	70 Marks

Course Outcomes:

1. Study and practice on machine tools and their operations
2. Practice on manufacturing of components using workshop trades including pluming, fitting, carpentry, and foundry, house wiring and welding.
3. Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
4. Apply basic electrical engineering knowledge for house wiring practice

Lab List

1. Prepare carpentry and fitting shop layout.
2. Demonstrate use of different fitting tools –like work holding, marking, measuring, cutting, finishing and miscellaneous. Student will also prepare the report with sketch, specifications and applications of fitting tools demonstrated.
3. Prepare one simple and another male-female type fitting jobs as per given drawings- 2 jobs.
4. Demonstrate use of different tin smithy tools. Student will also prepare the report with sketch, specifications and applications of tin smithy tools demonstrated.
5. Prepare one tin smithy job as per drawing having shearing, bending, joining and riveting.
6. Demonstrate use of different carpentry tools. Student will also prepare the report with sketch, specifications and applications of carpentry tools demonstrated.
7. Prepare two wooden joints as per given drawings.
8. Demonstrate use of different pipe fitting tools. Student will also prepare the report with sketch, specifications and applications of pipe fitting tools demonstrated.
9. Prepare pipe fitting jobs as per drawings-two jobs.
10. Demonstrate use of different welding transformers and consumables. Also demonstrate arc welding, gas cutting, soldering and brazing operations. Student will also prepare the report with sketch, specifications and applications of fitting tools demonstrated.
11. Prepare jobs using arc welding, gas cutting, spot welding, brazing and soldering process- three jobs.

    PROBLEM BASED LEARNING: Group of 6 students will take rejected workpieces in workshop practice (at least two in each fitting, carpentry, tin smithy, pipe fitting and welding). Group will draw the workpieces, will identify type of defects and will discuss the reasons of such defects. Outcome of discussion has to be written in logbook and report.

    SCHOOL WITHIN SCHOOL: i: Each student will demonstrate and explain at least one tool (to be assigned by teacher) to all batch colleagues. ii: Each student will share his/her student activities outcome. He/she will also share the experience for the student activities he/she has carried out.

Text Books:

1. Mechanical workshop practice. K.C. John PHI.
2. Workshop familiarization. E.Wilkinson Pitman engineering craft series.
3. Workshop Technology-I. Hazra and Chaudhary Media promoters & Publisher private limited.
4. Workshop Technology-I. W.A. J. Chapman Taylor & Francis.
5. Comprehensive Workshop Technology (Manufacturing Processes). S.K. Garg Laxmi publications.
6. I.T.B. Handbook. - Engineering industry Training Board.
7. Workshop practice manual. K.Venkata Reddy B.S.Publications.

Basic Electrical Engineering Lab

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
ELEG2000	Basic Electrical Engineering Lab	2 Hrs/Week	1	15 Marks	35 Marks

Laboratory Objectives:

1. To Design Electrical Systems.
2. To Analyze A Given Network By Applying Various Network Theorems.
3. To Expose The Students To The Operation Of DC Generator
4. To Expose The Students To The Operation Of DC Motor and Transformer.
5. To Examine The Self Excitation In DC Generators.

Laboratory Outcomes

After successfully studying this course, students will:

1. Explain the concept of circuit laws and network theorems and apply them to laboratory measurements.
2. Be able to systematically obtain the equations that characterize the performance of an electric circuit as well as solving both single phase and DC Machines
3. Acknowledge the principles of operation and the main features of electric machines and their applications.
4. Acquire skills in using electrical measuring devices.

List of experiments/demonstrations:

1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.
2. Verification of KVL and KCL.
3. Verification of Thevenin's theorem.
4. Verification of Norton's theorem.
5. Verification of Superposition theorem.
6. Verification of Maximum power transfer theorem.
7. Verification of Reciprocity theorem.
8. Magnetization characteristics of DC shunt generator.
9. Swinburne's test on DC shunt machine.
10. Brake test on DC shunt motor.
11. OC & SC tests on single phase transformer.
12. Load test on single phase transformer.
13. Demonstration of (a) dc-dc converters (b) dc-ac converters – PWM waveform (c) the use of dc-ac converter for speed control of an induction motor and (d) Components of LT switchgear.

SEMESTER III											
Course Type	**Course Code**	**Course Title**	**Hours/ Week**			**Theory Marks**		**Practical Marks**		**Total Marks**	**Credit**
			L	**T**	**P**	**IA**	**ESE**	**IA**	**ESE**		
BS	MTHG3000	Engineering Mathematics- III	2	-	-	30	70	-	-	100	3
DC	CSEB3010	Data Structure With C++	3	-		30	70			100	3
DC	CSEB3030	Analog Electronic Circuits	3	-		30	70			100	3
EC	EETB3110	Digital Logic Design	3	-		30	70			100	3
HM	HUMG3000	Management Inform System	3	-	-	30	70	-	-	100	3
DC	CSEB3011	Data Structure With C++ Lab			4			15	35	50	2
DC	CSEB3021	Open source Tech Lab	-	-	4	-	-	15	35	50	2
EC	CSEB3031	Analog Electronic Circuits Lab			4			15	35	50	2
EC	EETB3111	Digital Logic Design Lab			4			15	35	50	2
	TOTAL		**14**	**-**	**16**	**150**	**350**	**60**	**140**	**700**	**23**

Engineering Mathematics III

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEB3010	Engineering Mathematics III	3 Hrs/Week	3	30 Marks	70 Marks

Course Objectives:

1. To provide sound foundation in the mathematical fundamentals necessary to formulate, solve and analyze engineering problems.
2. To understand the concept of Fourier series, its complex form and enhance the problem solving skill.
3. To learn the Laplace Transform, Inverse Laplace Transform of various functions, application
4. To understand the concept of Correlation and Regression to the engineering problem
5. To understand the concept of Z - transformation.
6. To understand the concept of probability.

Outcomes: Learner should be able to ….

1. Demonstrate the ability of using Laplace Transform and Fourier Series in solving th Ordinary Differential Equations and Partial Differential Equations.
2. Use matrix algebra with its specific rules to solve the system of linear equations.
3. Apply the concept of Correlation and Regression to the engineering problems.
4. Apply the concept of Z- transformation and its inverse of the given sequence
5. Expand the periodic function by using Fourier series.
6. Apply the concept of probability and probability distribution in engineering problems

Course Content

UNIT-I

Laplace Transform, Introduction, Definition of Laplace transform, Laplace transform of constant, trigonometrical, exponential functions, Important properties of Laplace transform: Change of scale property, First shifting theorem, Laplace transform of $L\{t^n f(t)\}$, $L\{ f(t)/t\}$,Laplace transform of integral $\int_0^t f(u)du$ *or* $\int_0^t f(t)dt$, Laplace transform of derivatives, Inverse Laplace transform of standard functions, related problems , Inverse Laplace transform with Partial fraction and Convolution theorem, Application to solve initial and boundary value problem involving ordinary differential equations with one dependent variable and constant coefficients.

UNIT-II

Fourier series, Dirichlet's conditions, Fourier series of periodic functions with period 2π and 2L.Fourier series for even and odd functions.Half range sine and cosine Fourier series, Parseval's identities.

UNIT-III

Matrices, Eigen values and Eigen vectors, Cayley-Hamilton theorem(without proof). Similar matrices, Diagonalizable of matrix, Derogatory and non-derogatory matrices

UNIT-IV

Correlation & Regression Karl Pearson's coefficient of correlation, covariance, Spearman's Rank correlation, Lines of Regression

UNIT-V

Probability and Probability Distribution, Concepts of Probability - Additive and Multiplicative Laws- Bayes' Decision Rule, Random variable, discrete & continuous random variables, Expectation, Probability Distributions: Binomial, Poisson and Normal Distribution.

UNIT-VI

Z TRANSFORM, Z-transform of standard functions such as $Z(a^n)$, Properties of Z-transform :Linearity, Change of scale, Shifting property, Multiplication of K. Convolution theorem, Inverse Z transform: Binomial Expansion and Method of Partial fraction.

Recommended Books:

1. A text book of Applied Mathematics, P.N.Wartikar and J.N.Wartikar,Vol – I and –II by Pune Vidyarthi Graha.
2. Higher Engineering Mathematics, Dr.B.S.Grewal, Khanna Publication
3. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley EasternLimited,9thEd.
4. Matrices by Shanti Narayan.
5. Numerical by S.S.Sastry, Prentice Hall
6.Dass, H.K., and Er. Rajnish Verma," Higher Engineering Mathematics", S. Chand Private Ltd.

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Data Structures using C++

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEB3020	Data Structures using c++	3 Hrs/Week	3	30 Marks	70 Marks

Prerequisites:

Problem Solving and Computer Programming

Course Objectives: Students will try to learn

1. To impart the basic concepts of data structures and algorithms.
2. To understand concepts about searching and sorting techniques.
3. To Understand basic concepts about stacks, queues, lists, trees and graphs.
4. To understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures.

Course Outcomes:

1. **Distinguish between procedures and object-oriented programming.**
2. Apply advanced data structure strategies for exploring complex data structures.
3. Compare and contrast various data structures and design techniques in the area of Performance.
4. Implement data structure algorithms through C++, Incorporate data structures into the applications such as binary search trees, AVL and B Trees
5. Implement all data structures like stacks, queues, trees, lists and graphs and compare their Performance and trade offs

Course Content

UNIT-I: Introduction

Introduction to Data Structures, Concept of Abstract Data Types(ADT), An Introduction to C++ Class- Declaring Class Objects and Invoking Member Functions, The Array as an Abstract Data Type, Sparse Matrices Introduction- Sparse Matrix Representation- Transposing a Matrix- Matrix Multiplication.

SORTING AND SEARCHING TECHNIQUES

Insertion Sort, Quick Sort, Merge Sort, Heap Sort.

Hashing-Concept, Hash Functions, Collision resolution Techniques

UNIT-II: STACKS AND QUEUES

Introduction, ADT of Stack, application of stack. Introduction of Double Ended Queue, Applications of Queue. Evaluation of Expressions, Expression- Postfix Notation- Infix to Postfix.

UNIT-III: LINKED LISTS

Introduction of Linked List v/s Array, Types of Linked List, Circular Linked List, Doubly Linked List, Operations on Doubly Linked List, Stack and Queue using Singly Linked List, Singly Linked List Application-Polynomial Representation and Addition.

UNIT-IV: TREES

Introduction, Tree Operations on Binary Search Tree, Applications of Binary Tree, Huffman Encoding, Search Trees-AVL, rotations in AVL Tree, operations on AVL Tree, Introduction of B Tree, B+ Tree.

UNIT-V: GRAPHS

Introduction of Graph Terminologies, Graph Traversals-Depth First Search (DFS) and Breadth First Search (BFS), Graph Application-Topological Sorting.

Reference Books

1. Data structures, Algorithms and Applications in C++, S.Sahni, University Press (India) Pvt.Ltd, 2nd edition, Universities Press, Pvt. Ltd.
2. Data structures and Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education. Ltd., Second Edition.
3. Data structures and Algorithms in C++, Michael T.Goodrich, R.Tamassia and .Mount, Wiley student edition, John Wiley and Sons.
4. Problem-solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.
5. Data structures and algorithms in C++, 3rd Edition, Adam Drozdek, Thomson
6. A Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PH

Analog Electronic Circuits

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEB3030	Analog Electronic Circuits	3 Hrs/Week	3	30 Marks	70 Marks

Prerequisites:

None

Course Objectives: Students will try to learn

1. Understand the characteristics of transistors.
2. Design and analyze various rectifier and amplifier circuits.
3. Design sinusoidal and non-sinusoidal oscillators.
4. Understand the functioning of OP-AMP and design OP-AMP based circuits.

Course Outcomes (COs): The students will be able to learn

1. Understand the concepts of various components to design stable analog circuits.
2. Represent numbers and perform arithmetic operations.
3. Minimize the Boolean expression using Boolean algebra and design it using logic gates.
4. Analyze and design combinational circuit.
5. Design and develop sequential circuits.

Course Contents

Unit I: Diode circuits (4 Hours)

P-N junction diode, I-V characteristics of a diode; review of half-wave and full-wave rectifiers, Zener diodes, clamping and clipping circuits

Unit II: BJT circuits (8 Hours)

Structure and I-V characteristics of a BJT; BJT as a switch, BJT as an amplifier: small-signal model, biasing circuits, current mirror; common-emitter, common-base and common- collector amplifiers; Small signal equivalent circuits, high-frequency equivalent circuits

Unit III: MOSFET circuits (8 Hours)

MOSFET structure and I-V characteristics, MOSFET as a switch, MOSFET as an amplifier: small-signal model and biasing circuits, common-source, common-gate and common-drain amplifiers; small signal equivalent circuits - gain, input and output impedances, trans- conductance, high frequency equivalent circuit.

Unit IV: Differential, multi-stage and operational amplifiers (8 Hours)

Differential amplifier; power amplifier; direct coupled multistage amplifier; internal structure of an operational amplifier, ideal op-amp, non-idealities in an op-amp (Output offset voltage, input bias

current, input offset current, slew rate, gain bandwidth product)

Unit V: Linear applications of op-amp (8 Hours)

Idealized analysis of op-amp circuits, Inverting and non-inverting amplifier, differential amplifier, instrumentation amplifier, integrator, active filter, P, PI and PID controllers and lead/lag compensator using an op-amp, voltage regulator, oscillators (Wein bridge and phase shift), Analog to Digital Conversion.

Unit VI: Nonlinear applications of op-amp (6 Hours)

Hysteretic Comparator, Zero Crossing Detector, Square-wave and triangular-wave generators. Precision rectifier, peak detector, Monoshot

Text/References:

1. A. S. Sedra and K. C. Smith, "Microelectronic Circuits", New York, Oxford University Press, 1998.
2. J. V. Wait, L. P. Huelsman and G. A. Korn, "Introduction to Operational Amplifier theory and applications", McGraw Hill U. S., 1992.
3. J. Millman and A. Grabel, "Microelectronics", McGraw Hill Education, 1988.
4. P. Horowitz and W. Hill, "The Art of Electronics", Cambridge University Press, 1989.
5. P.R. Gray, R.G. Meyer and S. Lewis, "Analysis and Design of Analog Integrated Circuits", John Wiley & Sons, 2001.

Digital Logic Design

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
EETB3110	Digital logic design	3 Hrs/Week	3	30 Marks	70 Marks

Prerequisites:

None

Course Objectives: Students will try to learn

1. The concept of various components.
2. The concepts that underpin the disciplines of analog and digital electronic logic circuits
3. Various Number system and Boolean algebra.
4. Design and implementation of combinational circuits.
5. Design and implementation of Sequential circuits.
6. Hardware description language.

Course Outcomes (COs): The students will be able to learn

1. Understand the concepts of various components to design stable analog circuits.
2. Represent numbers and perform arithmetic operations.
3. Minimize the Boolean expression using Boolean algebra and design it using logic gates.
4. Analyze and design combinational circuit.
5. Design and develop sequential circuits.

Course Contents

Unit I Digital Design and Binary Numbers: (08 Hrs)

Binary Arithmetic, Negative Numbers and their Arithmetic, Floating point representation, Binary Codes, Cyclic Codes, Error Detecting and Correcting Codes, Hamming Codes. Minterm and Maxterm Realization of Boolean Functions, Gate-level minimization: The map method up to four variable, don't care conditions, SOP and POS simplification, NAND and NOR implementation, Quine Mc- Cluskey Method (Tabular method).

Unit II Combinational Logic: (08 Hrs)

Combinational Circuits, Analysis Procedure, Design Procedure, Binary Adder-Subtractor,

Code Converters, Parity Generators and Checkers, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers, Hazards and Threshold Logic

Unit III Memory and Programmable Logic Devices: (08 Hrs)

Semiconductor Memories, RAM, ROM, PLA, PAL, Memory System design.

Unit IV Synchronous Sequential Logic: (8 Hrs)

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 Counter

Unit V Asynchronous Sequential Logic (08)

Analysis procedure, circuit with latches, design procedure, reduction of state and flow table, race free assignment, hazards.

Text Books

1. M. Morris Mano and M. D. Ciletti, "Digital Design", Pearson Education.
2. A.K .Singh, "Foundation of Digital Electronics and Logic design", New Age international.
3. M. Rafiquzzaman, "Fundamentals of Digital Logic and Microcomputer Design", Wiley Dreantech Publication.

Reference Books:

1. C.H Roth,Jr., "Fundamentals of Logic Design", ,Jaico Publishing.
2. Rajaraman & Radhakrishnan, "Digital Logic and Computer Organization", PHI Learning Private Limited, Delhi India.
3. Donald D. Givone, "Digital Principles and Design", Tata McGraw Hill.
4. Marcovitz: Introduction to logic Design ,Tata McGraw-Hill Education (India) Pvt. Ltd

Management Information System

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
HUMG3000	Management Information System	3 Hrs/Week	3	30 Marks	70 Marks

Course Objective:

1. Provide students with comprehensive knowledge and technical skills needed to successfully participate in and support the increasingly applied role of information technology in corporate decision making,
2. Enable graduates to conceptualize and manage the specification, design and implementation of applied information systems,
3. Provide the knowledge of contemporary issues related to the field of managing information systems
4. Develop knowledge and skills required to work effectively in a profession,
5. Enhance self-confidence, ability to make proper decisions and effective communication, and Pursue lifelong learning and continuing education.

Course Outcomes:

1. Apply modern tools, techniques, and technology in a functional and productive manner in their professional activities,
2. Analyze, design, construct, implement and maintain, usable, reliable, and cost-effective Information Systems (IS) that support operational, managerial, and strategic activities of organizations,
3. Analyze, design, manipulate, and implement relational databases on which most IS are built upon,
4. Plan, coordinate, monitor, and control IS development projects,
5. Study and evaluate existing manual and automated business processes, and identify opportunities for re-engineering and/or automation,
6. Coordinate confidently and competently with the user community in IS requirements analysis/design activities, and provide guidance and technical support to end user computing activities,

Course Content

Unit 1

Organizations and Computing: Introduction, Modern Organization-IT enabled- Networked-Dispersed- Knowledge Organization, Information Systems in Organizations- what are information systems?, Brief history of computing- ENIAC: Way to commercial computers-Advent of artificial intelligence- advent of personal computing-Free Software Movement-Advent of Internet, The role of internet- Internet and Web: they are different-the internet changes everything

Unit 2

Managing Information Systems in Organizations: Introduction, Managing in the Internet Era, Managing Information Systems in Organization the IT interaction model, Challenges for the manager-what information to build? -how much to spend on information systems? -what level of capabilities should be created with information systems? -how centralized should the services be? -what security levels are required? - Technology road map for the organization.

Unit 3

Data and Information: Introduction, data and information- measuring data, information as a resource, information in organizational functions, types of information technology, types of information systems- transaction processing systems-management information systems.

Unit 4

Business Process Integration with IT: Introduction, Business Process Integration- Business processes-example of a complex process, Motivation for Enterprise Systems, Enterprise Resource Planning systems- finance and accounting module-human resource management module-manufacturing and operations module- sales and marketing module.

Unit 5

Managing Data Resources: Introduction , The Need for Data Management- History of data use, Challenges of Data Management- data independence- reduced data redundancy- data consistency- data access- data administration- managing concurrency-managing security-recovery from crashes-application development, Database Concepts- fields, records and files-basic architecture, Data Warehouses- data mining uses.

Reference Books:

1. Management Information Systems, A O'Brien.
2. Management Information System, W S Jawadekar.
3. Management Information Systems, Laaudon and Ludon.
4. Management Information Systems , Robert Schultheis and Mary Summer

Data Structures using C++ Lab

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEB3011	Data Structures using C++ Lab	4 Hrs/Week	2	15 Marks	35 Marks

Lab Objectives:

1. To write and execute programs in C++ to solve problems using data structures such as arrays, linked lists, stacks, queues, trees, graphs, hash tables and search trees.
2. To learn to write C++programs to implement various sorting and searching algorithms

Lab Outcomes:

1. Able to identify the appropriate data structures and algorithms for solving real world problems.
2. Able to implement various kinds of searching and sorting techniques.
3. Able to implement data structures such as stacks, queues, Search trees, and hash tables to solve various computing problems.

Lab List

1. Write a C++ programs to implement recursive and non recursive

   i) Linear search

   ii) Binary search

2. Write a C++ programs to implement the following using an array.

   a) Stack ADT

   b) Queue ADT

3. Write a C++ programs to implement list ADT to perform following operations

   a) Insert an element into a list.

   b) Delete an element from list

   c) Search for a key element in list

   d)count number of nodes in list

4. Write C++ programs to implement the dequeue (double ended queue) ADT using a doubly linked list and an array.

5. Write a C++ program to perform the following operations:

   a) Insert an element into a binary search tree.

   b) Delete an element from a binary search tree.

   c) Search for a key element in a binary search tree.

6. Write C++ programs for implementing the following sorting methods:

a) Merge sort

b) Heap sort

7. Write C++ programs that use recursive functions to traverse the given binary tree in

a) Preorder

b) inorder

c) postorder.

8. Write a C++ program to perform the following operations

a) Insertion into a B-tree

b) Deletion from a B-tree

9. Write a C++ program to perform the following operations

a)Insertion into an AVL-tree

b) Deletion from an AVL-tree

TEXT BOOKS :

1. Data structures, Algorithms and Applications in C++, S.Sahni, University Press (India) Pvt.Ltd, 2nd edition, Universities Press Orient Longman Pvt. Ltd.

2. Data structures and Algorithms in C++, Michael T.Goodrich, R.Tamassia and .Mount, Wiley student edition, John Wiley and Sons.

3. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PH

Open Source Tech Lab

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEB3021	Open source Tech Lab	4 Hrs/Week	2	15 Marks	35 Marks

Prerequisites:

Knowledge of some programming language like C, Java

Course Objective:

1. The course aims to introduce open source software concept to students.
2. Students will study and learn to setup open source account, OSS license, understand Project structure and enhance open source projects.
3. It will develop skill to make a significant contribution to open source community.

Course Outcome:

On successful completion of this course, the students should be able to:

1. Set up GitHub Account, Use git commands to manage files and support version control.
2. Apply a mix of Client, Server and Database technologies to solve Open Source Software issues/ to enhance projects.
3. Develop Server side programs using python with Database Servers- SQL, MongoDb.
4. Develop Server side programs using PHP with Database Server-SQL and Apache/Tomcat as web Server
5. Develop J2EE Programs using JDBC Connectivity with SQL Database and Apache/ Glassfish as web servers.
6. Contribute to open source community GitHub by providing enhanced versions.

Content:

1. Python basics Data types in python ,Operators in python, Input and Output, Control statement, Arrays in python, String and Character in python, Functions, List and Tuples, Dictionaries Exception, Introduction to OOP, Classes , Objects , Interfaces, Inheritance
2. Advanced Python Files in Python, Directories, Building Modules, Packages, Text Processing, Regular expression in python.
3. Data Structure in Python Link List, Stack, Queues, Dequeues
4. Python Integration Primer Graphical User interface ,Networking in Python , Python database connectivity, Introduction to Django
5. Basics of Perl Perl Overview, Variables, Control Statements, Subroutines, Objects, Packages and Modules
6. Perl advanced Working with Files, Data manipulation, Database Systems, Networking

Text Books:

1. Core Python Programming, Dr. R. Nageswara Rao, Dreamtech Press
2. Beginning Python: Using Python 2.6 and Python 3.1. James Payne, Wrox publication
3. Perl: The Complete Reference. Second Edition. Martin C. Brown, McGraw-Hill
4. Introduction to computing and problem solving using python , E Balagurusamy, McGraw Hill Education

Analog Electronic Circuits Lab

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEB3031	Analog Electronic Circuits Lab	4 Hrs/Week	2	15 Marks	35 Marks

Lab Objective

1. To illustrate the students different electronic circuit and their application in practice.
2. To impart knowledge on assessing performance of electronic circuit through monitoring of sensitive parameters.
3. To evaluate the use of computer-based analysis tools to review performance of semiconductor device circuit

Lab Outcome

1. Design amplifier circuits using BJTs in different configurations and determine fL and fH from the frequency response characteristics.
2. Design multistage amplifier circuits using BJTs and determine fL and fH from the frequency response characteristics.
3. Analyze and Design feedback amplifiers.
4. Analyze and Design tuned voltage amplifiers to determine the resonance frequency.
5. Analyze and Design sinusoidal oscillator circuits

Lab List

1. Frequency Response of CE Amplifier
2. Two Stage R-C Coupled Amplifier
3. Frequency Response Of Common Source FET Amplifier
4. Parameters Calculation Of a Current Series Feedback Amplifier
5. Frequency Response Of Voltage Shunt Amplifier
6. Tuned Voltage Amplifier
7. Colpitts Oscillator
8. Hartley Oscillator
9. RC-Phase Shift Oscillator
10. Wien Bridge Oscillator

Digital logic design Lab.

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
EETB3111	Analog Electronic Circuits Lab	4 Hrs/Week	2	15 Marks	35 Marks

Lab Objective:
To provide practical experience with the implementation of digital circuits, Gives a good basis for studying computer engineering.

Lab Outcomes: A student who successfully fulfills the course requirements will have demonstrated:
An ability to operate laboratory equipment. 2. An ability to construct, analyzes, and troubleshoots simple combinational and sequential circuits. 3. An ability to design and troubleshoot a simple state machine. 4. An ability to measure and record the experimental data, analyze the results, and prepare a formal laboratory report.

List of Programs

1. Introduction to digital electronics lab- nomenclature of digital ICs, specifications, study of the data sheet, concept of Vcc and ground, verification of the truth tables of logic gates using TTL ICs.
2. Implementation of the given Boolean function using logic gates in both SOP and POS forms.
3. Verification of state tables of RS, JK, T and D flip-flops using NAND & NOR gates.
4. Implementation and verification of Decoder/De-multiplexer and Encoder using logic gates.
5. Implementation of 4x1 multiplexer using logic gates.
6. Implementation of 4-bit parallel adder using 7483 IC.
7. Design, and verify the 4-bit synchronous counter.
8. Design, and verify the 4-bit asynchronous counter.

Note: The Instructor may add/delete/modify/tune experiments, wherever he/she feels in a justified manner.

SEMESTER IV											
Course Type	**Course Code**	**Course Title**	**Hours/ Week**			**Theory Marks**		**Practical Marks**		**Total Marks**	**Credit**
			L	**T**	**P**	**IA**	**ESE**	**IA**	**ESE**		
DC	CSEB4010	Computer Organization Architecture	3	-		30	70			100	3
DC	CSEB4020	Operating System	3	-		30	70			100	3
DC	CSEB4030	DBMS	3	-		30	70			100	3
DC	CSEB4040	Microprocessor	3	-	-	30	70	-	-	100	3
DC	CSEB4050	Discrete Mathematics	3	1	-	30	70	-	-	100	4
DC	CSEB4011	CO & A Lab			2	-	-	15	35	50	1
DC	CSEB4021	Operating System Lab			4			15	35	50	2
DC	CSEB4031	DBMS Lab			4			15	35	50	2
DC	CSEB4041	Microprocessor Lab		-	4	-	-	15	35	50	2
	TOTAL		**15**	**1**	**14**	**150**	**350**	**60**	**140**	**700**	**23**

Computer Organization and Architecture

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEB4010	Computer Organization Architecture	3 Hrs/Week	3	30 Marks	70 Marks

Prerequisites:

Fundamentals of elementary formal logic; strategies to compare relative efficiency of algorithms.

Course Objectives: Students will try to learn

1. Discuss the basic concepts and structure of computers.
2. Understand concepts of register transfer logic and arithmetic operations.
3. Explain different types of addressing modes and memory organization.
4. Learn the different types of serial communication techniques.
5. Summarize the Instruction execution stages problems with the help of fundamental data structures.

Course Outcomes (COs): The students will be able to learn

1. Understand the theory and architecture of central processing unit.
2. Analyze some of the design issues in terms of speed, technology, cost, performance.
3. Design a simple CPU with applying the theory concepts.
4. Use appropriate tools to design verify and test the CPU architecture.
5. Learn the concepts of parallelprocessing, pipelining and inter process communication.
6. Understand the architecture and functionality of central processing unit.
7. Exemplify in a better way the I/O and memory organization.

Course Contents

Unit I (08 Hrs)

Introduction: Functional units of digital system and their interconnections, buses, bus architecture, types of buses and bus arbitration. Register, bus and memory transfer. Processor organization, general registers organization, stack organization and addressing modes.

Unit II (08 Hrs)

Arithmetic and logic unit: Look ahead carries adders. Multiplication: Signed operand multiplication, Booths algorithm and array multiplier. Division and logic operations, Floating point arithmetic operation, Arithmetic & logic unit design, IEEE Standard for Floating Point Numbers

Unit III (08 Hrs)

Control Unit: Instruction types, formats, instruction cycles and sub cycles (fetch and execute etc), micro operations, execution of a complete instruction. Program Control, Reduced Instruction Set Computer, Pipelining. Hardwire and micro programmed control: micro programme sequencing, concept of horizontal and vertical microprogramming.

Unit IV (08 Hrs)

Memory: Basic concept and hierarchy, semiconductor RAM memories, 2D & 2 1/2D memory organization, ROM memories. Cache memories: concept and design issues & performance, address mapping and replacement Auxiliary memories: magnetic disk, magnetic tape and optical disks Virtual memory: concept implementation

Unit V (08 Hrs)

Input / Output: Peripheral devices, I/O interface, I/O ports, Interrupts: interrupt hardware, types of interrupts and exceptions. Modes of Data Transfer: Programmed I/O, interrupt initiated I/O and Direct Memory Access., I/O channels and processors. Serial Communication: Synchronous & asynchronous communication, standard communication interfaces.

References:

1. Computer System Architecture - M. Mano
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky Computer Organization, McGraw-Hill, Fifth Edition, Reprint 2012
3. John P. Hayes, Computer Architecture and Organization, Tata McGraw Hill, Third Edition, 1998. Reference books
4. William Stallings, Computer Organization and Architecture-Designing for Performance, Pearson Education, Seventh edition, 2006.
5. Behrooz Parahami, “Computer Architecture”, Oxford University Press, Eighth Impression, 2011.
6. David A. Patterson and John L. Hennessy, “Computer Architecture-A Quantitative Approach”, Elsevier, a division of reed India Private Limited, Fifth edition, 2012
7. Structured Computer Organization, Tannenbaum(PHI)

Operating System

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEB4020	Operating System	3 Hrs/Week	3	30 Marks	70 Marks

Prerequisites:

Data structures (stack, queue, linked list, tree, graph), hashing, File structures, Any structured Programming Language (like C).

Course Objective:

1. Students will learn how Operating System is Important for Computer System.
2. To make aware of different types of Operating System and their services.
3. To learn different process scheduling algorithms and synchronization techniques to achieve better performance of a computer system.
4. To know virtual memory concepts.
5. To learn secondary memory management.

Course Outcome: The students will be able to learn

1. To understands the different services provided by Operating System at different level.
2. To develop real life applications of Operating System in every field. Understands the use of different process scheduling algorithm and synchronization techniques to avoid deadlock.
3. To understand different memory management techniques like paging, segmentation and demand paging etc.

Course Contents

Unit-I (04)

Operating system Overview, Introduction, Objectives, Functions and Evolution of Operating System, Operating system structures: Layered, Monolithic and Microkernel, Linux Kernel, Shell and System Calls

Unit-II(09)

Process and Process Scheduling, Concept of a Process, Process States, Process Description, Process Control Block, Uniprocessor Scheduling-Types: Preemptive and Non-preemptive scheduling algorithms (FCFS, SJF, SRTN, Priority, RR), Threads: Definition and Types, Concept of Multithreading

Unit-III(09)

Process Synchronization and Deadlocks, Concurrency: Principles of Concurrency, Inter-Process Communication, Process Synchronization, Mutual Exclusion: Requirements, Hardware Support (TSL), Operating System Support (Semaphores), Producer and Consumer problem. Principles of Deadlock: Conditions and Resource, Allocation Graphs, Deadlock Prevention, Deadlock Avoidance: Banker's Algorithm, Deadlock Detection and Recovery, Dining Philosophers Problem.

Unit-IV(09)

Memory Management, Memory Management Requirements, Memory Partitioning: Fixed, Partitioning, Dynamic Partitioning, Memory Allocation Strategies: Best-Fit, First Fit, Worst Fit, Paging and Segmentation, TLB, Virtual Memory: Demand Paging, Page Replacement Strategies: FIFO, Optimal, LRU, Thrashing

Unit-V(04)

File Management, Overview, File Organization and Access, File Directories, File Sharing

Unit-VI(06)

I/O management, I/O devices, Organization of the I/O Function, Disk Organization, I/O Management and Disk Scheduling: FCFS, SSTF, SCAN, CSCAN, LOOK, C-LOOK

Textbooks:

1 William Stallings, Operating System: Internals and Design Principles, Prentice Hall, 8th Edition, 2014, ISBN-10: 0133805913 • ISBN-13: 9780133805918.

2 Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, Operating System Concepts, John Wiley & Sons, Inc., 9thEdition, 2016, ISBN 978-81-265-5427-0

Database Management System

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEB4030	Database Management System	3 Hrs/Week	3	30 Marks	70 Marks

Prerequisites:

Relational Algebra.

Course Objectives: Students will try to learn

1. To describe a sound introduction to the discipline of database management
2. To give a good on the relational model of data and usage of Relational Algebra.
3. To introduce the concepts of basic SQL as a universal
4. To demonstrate the principles behind systematic database design approaches by covering conceptual design, logical design through normalization.

Course Outcomes (COs): The students will be able to learn

1. Explain the features of database management systems and Relational database.
2. Design conceptual models of a database using ER modeling for real life applications and also construct queries in Relational Algebra.
3. Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database.

Course Contents

Unit I Introduction: (08 Hrs)

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 using the Entity Relationship Model: ER model concepts, 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.

Unit II Relational data Model and Language: (08 Hrs)

Relational data model concepts, integrity constraints, entity integrity, referential integrity, Keys constraints, Domain constraints, relational algebra, relational calculus, tuple and domain calculus. Introduction on SQL: Characteristics of SQL, advantage of SQL. SQL data type and literals. Types of SQL commands. SQL operators and their procedure. Tables, views and indexes. Queries and sub queries. Aggregate functions. Insert, update and delete operations, Joins, Unions, Intersection, Minus, Cursors, Triggers, Procedures in SQL/PL SQL

Unit III Data Base Design & Normalization: (08 Hrs)

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.

Unit IV Transaction Processing Concept: (08 Hrs)

Transaction system, Testing of serializability, serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures, log based recovery, checkpoints, deadlock handling. Distributed Database: distributed data storage, concurrency control, directory system

Unit V Concurrency Control Techniques: (08 Hrs)

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.

References:

1. Korth, Silbertz, Sudarshan," Database Concepts", McGraw Hill
2. Date C J, " An Introduction to Database Systems", Addision Wesley
3. Elmasri, Navathe, " Fundamentals of Database Systems", Addision Wesley
4. O'Neil, Databases, Elsevier Pub

Microprocessor

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEB4040	Microprocessor	3 Hrs/Week	3	30 Marks	70 Marks

Prerequisites: Basic digital integrated circuits - AND/OR/NOT gates, latches, demultiplexer. basic structure of a **processor** - arithmetic registers, address registers, basic addressing modes. basic assembly language programming.

Course Objectives: Students will try to learn

1. Understand embedded C and assembly language program by using 8051
2. Instruction sets and addressing modes.
3. Know the various peripheral devices such as 8255, 8279, 8251, 8253, 8259 and 8237.
4. Understand microcontroller based system design for various applications.

Course Outcomes (COs): The students will be able to learn

1. Recall and apply a basic concept of digital fundamentals to Microprocessor based personal computer system.
2. Identify a detailed s/w & h/w structure of the Microprocessor.
3. Illustrate how the different peripherals (8255, 8253 etc.) are interfaced with Microprocessor.

Course Contents

Unit I (08 Hrs)

Microprocessor evolution and types, microprocessor architecture and operation of its components, addressing modes, interrupts, data transfer schemes, instruction and data flow, timer and timing diagram, Interfacing devices.

Unit II (08 Hrs)

Pin diagram and internal architecture of 8085 microprocessor, registers, ALU, Control & status, interrupt and machine cycle. Instruction sets. Addressing modes. Instruction formats Instruction Classification: data transfer, arithmetic operations, logical operations, branching operations, machine control and assembler directives.

Unit III (08 Hrs)

Architecture of 8086 microprocessor: register organization, bus interface unit, execution unit, memory addressing, and memory segmentation. Operating modes. Instruction sets, instruction format, Types of instructions. Interrupts: hardware and software interrupts.

Unit IV (08 Hrs)

Assembly language programming based on intel 8085/8086. Instructions, data transfer, arithmetic, logic, branch operations, looping, counting, indexing, programming techniques, counters and time delays, stacks and subroutines, conditional call and return instructions

Unit V (08 Hrs)

Peripheral Devices: 8237 DMA Controller, 8255 programmable peripheral interface, 8253/8254 programmable timer/counter, 8259 programmable interrupt controller, 8251 USART and RS232C.

Text books:

1. Gaonkar, Ramesh S , "Microprocessor Architecture, Programming and Applications with 8085", Penram International Publishing.
2. Ray A K , Bhurchandi K M , "Advanced Microprocessors and Peripherals", TMH
3. Hall D V ,"Microprocessor Interfacing', TMH
4. Liu and, " Introduction to Microprocessor", TMH
5. Brey, Barry B, "INTEL Microprocessors", PHI
6. Renu Sigh & B.P. Gibson G A , " Microcomputer System: The 8086/8088 family'' ,PHI
7. Aditya P Mathur Sigh, "Microprocessor, Interfacing and Applications M Rafiqzzaman, "Microprocessors, Theory and Applications
8. J.L. Antonakos, An Introduction to the Intel Family of Microprocessors, Pearson, 1999

Discrete Mathematics

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEB4050	Discrete Mathematics	3 Hrs/Week	3	30 Marks	70 Marks

Prerequisites:

Basic Mathematics

Course Objective:

1. Decimal number system, binary number system, octal number system and hexadecimal number system.
2. Conversion of numbers from one system to other system.
3. Binary arithmetic - addition, subtraction, multiplication and division.

Course Outcomes:

At the end of the course student will be able to

1. Understand the notion of mathematical thinking, mathematical proofs and to apply them in problem solving.
2. Ability to reason logically.
3. Ability to understand relations, Diagraph and lattice.
4. Ability to understand use of functions, graphs and their use in programming applications.
5. Understand use of groups and codes in Encoding-Decoding
6. Apply discrete structures into other computing problems such as formal specification, verification, artificial intelligence, cryptography, Data Analysis and Data Mining etc.

Course Contents

Unit-I

Number System: Decimal Number Systems, Binary Number System, Hexadecimal Number Systems Octal Number Systems, Binary Arithmetic

Unit-II

Propositions and Logical Operations Notation, Connections, Normal forms, Truth Tables Equivalence and Implications Theory of inference for statement calculus, Predicate calculus Rules of Logic, Mathematical Induction and Quantifiers

Unit-III

Sets, Relations and Diagraphs, Review of set concepts, Relations and digraphs, Properties of relations, Equivalence relations, Computer representation of relations and digraphs,

Manipulation of relations, Partially Ordered sets (Posets)

Unit-IV

Recurrence Relations, Towers of Hanoi, Iterations, Homogeneous linear equations, with constant coefficients, particular solution, difference table, finite order differences, Line in a plane in general position

Unit-V

Groups and Applications Monoids, semi groups, Product and quotients of algebraic structures, Isomorphism, homomorphism, auto morphism, Normal subgroups, Codes and group codes

Unit-VI

Classification of Languages Overview of Formal Languages: Representation of regular languages and grammars, finite state machines

Reference:

1. "Discrete Mathematical Structures": Tremblay and Manohar, Tata McGraw Hill
2. "Discrete Mathematics": 1st edition by Maggard, Thomson
3. "Discrete Mathematics": Semyour Lipschutz, Varsha Patil IInd Edition Schaum's Series TMH
4. "Discrete Mathematical Structures": Kolman, Busby and Ross, Prentice Hall India, Edition 3

Computer Organization and Architecture Lab

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEB4010	Computer Organization Architecture Lab	2Hrs/Week	1	15 Marks	35 Marks

Course Objective:

1. The goal of this course is to have students understand and appreciate the principles of computing hardware and how it interfaces to software.
2. It would provide the students the understanding of system-level programming and provide a high-level understanding of the role played by compilers, assemblers, instruction sets, and hardware.

Course Outcome:

The lab classes will mainly consist of

(a) Assembly language programming using MIPS and ARM instruction set

(b) Design and Simulation of Data Path and Control of CPUs

(c) Parallel Programming on multicore architecture / GPU Programming It is expected that students perform the lab assignments seriously to have a more refined knowledge of the topics.

Suggested List of Experiments

1. Implementing HALF ADDER, FULL ADDER using basic logic gates
2. Implementing Binary -to -Gray, Gray -to -Binary code conversions.
3. Implementing 3-8 line DECODER.
4. Implementing 4x1 and 8x1 MULTIPLEXERS.
5. Verify the excitation tables of various FLIP-FLOPS.
6. Design of an 8-bit Input/ Output system with four 8-bit Internal Registers.
7. Design of an 8-bit ARITHMETIC LOGIC UNIT.
8. Design the data path of a computer from its register transfer language description.
9. Design the control unit of a computer using either hardwiring or microprogramming based on its register transfer language description.
10. Implement a simple instruction set computer with a control unit and a data path.

Operating System Lab

Course		Teaching Scheme		ıation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEB4022	Operating System Lab	4Hrs/Week	2	15 Marks	35 Marks

Lab Objective:

1. To gain practical experience with designing & implementing concepts of operating systems such as system calls, CPU scheduling, process management, memory management, file system & deadlock handling using C language in Linux environment.
2. To familiarize students with architecture of Linux OS.
3. To provide necessary skill for developing & debugging in Linux environment.
4. To learn programmatically to implement simple operation system mechanism.

Lab Outcomes:

1. Appreciate the advantages of Unix OS
2. Develop and debug C programs created on UNIX platforms.
3. Use and if necessary install standard libraries

Suggested List of Experiments

1 Explore Linux Commands, Explore usage of basic Linux Commands and system calls for file, directory and process management. For eg: (mkdir, chdir, cat, ls, chown, chmod, chgrp, ps etc. system calls: open, read, write, close, getpid, setpid, getuid, getgid, getegid, geteuid. sort, grep, awk, etc.)
2 Linux shell script, Write shell scripts to do the following:
a. Display OS version, release number, kernel version
b. Display top 10 processes in descending order
c. Display processes with highest memory usage.
d. Display current logged in user and log name.
Display current shell, home directory, operating system type, current path setting, current working directory.
3 Linux- API, Implement any one basic commands of linux like ls, cp, mv and others using kernel APIs.
4 Linux- Process
a. Create a child process in Linux using the fork system call. From the child process obtain the process ID of both child and parent by using getpid and getppid system call.
b. Explore wait and waitpid before termination of process.
5 Process Management: Scheduling
a. Write a program to demonstrate the concept of non-preemptive scheduling algorithms.
b. Write a program to demonstrate the concept of preemptive scheduling algorithms
6 Process Management: Synchronization
a. Write a C program to implement solution of Producer consumer problem through Semaphore
7 Process Management: Deadlock
a. Write a program to demonstrate the concept of deadlock avoidance through Banker's Algorithm
b. Write a program demonstrate the concept of Dining Philospher's Problem

8 Memory Management

a. Write a program to demonstrate the concept of MVT and MFT memory management techniques

b. Write a program to demonstrate the concept of dynamic partitioning placement algorithms i.e. Best Fit, First Fit, Worst-Fit etc.

9 Memory Management: Virtual Memory

a. Write a program to demonstrate the concept of demand paging for simulation of Virtual Memory implementation b. Write a program in C demonstrate the concept of page replacement policies for handling page faults eg: FIFO, LRU etc.

10 File Management & I/O Management

a. Write a C program to simulate File allocation strategies typically sequential, indexed and linked files

b. Write a C program to simulate file organization of multi-level directory structure.

c. Write a program in C to do disk scheduling - FCFS, SCAN, C-SCAN

Database Management System Lab

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEB4033	Database Management System Lab	4Hrs/Week	2	15 Marks	35 Marks

Prerequisite: Discrete Structures

Lab Objectives:
1 To explore design and develop of relational model
2 To present SQL and procedural interfaces to SQL comprehensively
3 To introduce the concepts of transactions and transaction processing

Lab Outcomes: At the end of the course. The students will be able to
1. Design ER /EER diagram and convert it to relational model for the real world application.
2. Apply DDL, DML, DCL and TCL commands
3. Write simple and complex queries
4. Use PL / SQL Constructs.
5. Demonstrate the concept of concurrent transactions execution and frontend-backend connectivity

Database Management System Lab List of Programs

1. Installing oracle.
2. Creating Entity-Relationship Diagram using case tools.
3. Writing SQL statements Using ORACLE/MYSQL:
    a. Writing basic SQL SELECT statements.
    b. Restricting and sorting data.
    c. Displaying data from multiple tables.
    d. Aggregating data using group function.
    e. Creating and managing tables.
4. Normalization in ORACLE.
5. Creating cursor in oracle.
6. Creating procedure and functions in oracle.
7. Creating packages and triggers in oracle

Microprocessor Lab

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEB4044	Microprocessor Lab	4Hrs/Week	2	15 Marks	35 Marks

Prerequisite: Basic knowledge digital integrated circuits.

Lab Objective:

1. To emphasize on use of assembly language programming.
2. To develop and execute variety of assembly language programs of Intel 8086 including arithmetic and logical, sorting, searching, and string manipulation operations.
3. To develop and execute the assembly language programs for interfacing Intel 8086 with peripheral devices.

Lab Outcomes:

1. The student will learn the internal organization of popular 8086/8051 microprocessors.
2. The student will learn hardware and software interaction and integration.
3. To apply the concepts in the design of microprocessor/microcontroller based systems in real time applications

Suggested List of Experiments

1. Write a program using 8085 Microprocessor for Decimal, Hexadecimal addition and subtraction of two Numbers.
2. Write a program using 8085 Microprocessor for addition and subtraction of two BCD numbers.
3. To perform multiplication and division of two 8 bit numbers using 8085.
4. To find the largest and smallest number in an array of data using 8085 instruction set.
5. To write a program to arrange an array of data in ascending and descending order.
6. To convert given Hexadecimal number into its equivalent ASCII number and vice versa using 8085 instruction set.
7. To write a program to initiate 8251 and to check the transmission and reception of character.
8. To interface 8253 programmable interval timer to 8085 and verify the operation of 8253 in six different modes.
9. To interface DAC with 8085 to demonstrate the generation of square, saw tooth and triangular wave.
10. Serial communication between two 8085 through RS-232 C port.

SEMESTER V											
Course Type	**Course Code**	**Course Title**	**Hours/ Week**			**Theory Marks**		**Practical Marks**		**Total Marks**	**Credit**
			L	**T**	**P**	**IA**	**ESE**	**IA**	**ESE**		
DC	CSEB5010	Formal Language & Automata Theory	3	1	-	30	70	-	-	100	4
DC	CSEB5020	Introduction to Soft Computing	3	-	-	30	70	-	-	100	3
DC	CSEB5030	Design & Analysis of Algorithms	3	-		30	70	-	-	100	3
DC	CSEB5040	Object Oriented Programming	3	-		30	70	-	-	100	3
DC	CSEB5050	Software Engineering	3	-	-	30	70	-	-	100	3
DE	***	Elective-I	3	-	-	30	70	-	-	100	3
MC	LLBB1050	Constitutional Law -I	1	-	-	15	35	-	-	-	0
DC	CSEB5031	DAA Lab	-	-	4			15	35	50	2
DC	CSEB5041	OOP Lab using JAVA			4			15	35	50	2
	TOTAL		**19**	**1**	**8**	**195**	**455**	**30**	**70**	**700**	**23**

Elective-I CSEB 5910 / 5510
1. Web Designing
2. Computer Graphics

Elective -I

Formal Languages & Automata Theory

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEB5010	Formal Language & Automata Theory	3 Hrs/Week	3	30 Marks	70 Marks

Prerequisites:

None.

Course Objectives

This course focuses on the basic theory of Computer Science and formal methods of computation like automata theory, formal languages, grammars and Turing Machines. The objective of this course is to explore the theoretical foundations of computer science from the perspective of formal languages and classify machines by their power to recognize languages

Course Outcomes (COs): The students will be able to learn

1. Analyze and design finite automata, pushdown automata, Turing machines, formal languages, and grammars
2. Analyze and design, Turing machines, formal languages, and grammars
3. Demonstrate the understanding of key notions, such as algorithm, computability, decidability, and complexity through problem solving
4. Prove the basic results of the Theory of Computation.
5. State and explain the relevance of the Church-Turing thesis

Course Contents

Unit 1: Basic Concepts and Automata Theory

Introduction to Theory of Computation- Automata, Computability and Complexity, Alphabet, Symbol, String, Formal Languages, Deterministic Finite Automaton (DFA)- Definition, Representation, Acceptability of a String and Language, Non Deterministic Finite Automaton (NFA), Equivalence of DFA and NFA, NFA with ε-Transition, Equivalence of NFA's with and without ε-Transition, Finite Automata with output- Moore Machine, Mealy Machine, Equivalence of Moore and Mealy Machine, Minimization of Finite Automata, Myhill-Nerode Theorem, Simulation of DFA and NFA

Unit 2: Regular Expressions and Languages

Regular Expressions, Transition Graph, Kleen's Theorem, Finite Automata and Regular Expression- Arden's theorem, Algebraic Method Using Arden's Theorem, Regular and Non-Regular Languages- Closure properties of Regular Languages, Pigeonhole Principle, Pumping Lemma, Application of Pumping Lemma, Decidability- Decision properties, Finite Automata and Regular Languages, Regular Languages and Computers, Simulation of Transition Graph and Regular language. Unit 3: Fuzzy Logic-I (Introduction)

Unit 3: Regular and Non-Regular Grammars

Context Free Grammar (CFG)-Definition, Derivations, Languages, Derivation Trees and Ambiguity, Regular Grammars-Right Linear and Left Linear grammars, Conversion of FA into CFG and Regular grammar into FA, Simplification of CFG, Normal Forms- Chomsky Normal Form (CNF), Greibach Normal Form (GNF), Chomsky Hierarchy, Programming problems based on the properties of CFGs.

Unit 4: Push Down Automata and Properties of Context Free Languages

Nondeterministic Pushdown Automata (NPDA)- Definition, Moves, A Language Accepted by NPDA, Deterministic Pushdown Automata (DPDA) and Deterministic Context free Languages (DCFL), Pushdown Automata for Context Free Languages, Context Free grammars for Pushdown Automata, Two stack Pushdown Automata, Pumping Lemma for CFL, Closure properties of CFL, Decision Problems of CFL, Programming problems based on the properties of CFLs.

Unit 5: Turing Machines and Recursive Function Theory

Basic Turing Machine Model, Representation of Turing Machines, Language Acceptability of Turing Machines, Techniques for Turing Machine Construction, Modifications of Turing Machine, Turing Machine as Computer of Integer Functions, Universal Turing machine, Linear Bounded Automata, Church's Thesis, Recursive and Recursively Enumerable language, Halting Problem, Post's Correspondance Problem, Introduction to Recursive Function Theory.

Text book:

1. Introduction to Automata theory, Languages and Computation, J.E.Hopcraft, R.Motwani, and Ullman. 2nd edition, Pearson Education Asia

2. Introduction to languages and the theory of computation, J Martin, 3rd Edition, Tata McGraw Hill

3. Elements and Theory of Computation, C Papadimitrou and C. L. Lewis, PHI

4. Mathematical Foundation of Computer Science, Y.N.Singh, New Age Internationa

Introduction to Soft Computing

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEB5020	Introduction to Soft Computing	3 Hrs/Week	3	30 Marks	70 Marks

Prerequisites:

None.

Course Objectives

To introduce the concepts in Soft Computing such as Artificial Neural Networks, Fuzzy logic-based systems, genetic algorithm-based systems and their hybrids

Course Outcomes (COs): The students will be able to learn

1. Recognize the feasibility of applying a soft computing methodology for a particular problem.
2. Understand the concepts and techniques of soft computing and foster their abilities in designing and implementing soft computing-based solutions for real-world and engineering problems.
3. Apply neural networks to pattern classification and regression problems and compare solutions by various soft computing approaches for a given problem.
4. Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems.
5. Apply genetic algorithms to combinatorial optimization problem Course Contents

Course Contents

Unit 1: Neural Networks-I (Introduction & Architecture)

Neuron, Nerve structure and synapse, Artificial Neuron and its model, activation functions, Neural network architecture: single layer and multilayer feed forward networks, recurrent networks. Various learning techniques, perception and convergence rule, Auto-associative and hetero-associative memory

Unit 2: Neural Networks-II (Back propagation networks)

Architecture: perceptron model, solution, single layer artificial neural network, multilayer perception model; back propagation learning methods, effect of learning rule co-efficient ;back propagation algorithm, factors affecting backpropagation training, applications.

Unit 3: Fuzzy Logic-I (Introduction)

Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory and operations, Properties of fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion.

Unit 4: Fuzzy Logic –II (Fuzzy Membership, Rules)

Membership functions, interference in fuzzy logic, fuzzy if-then rules, Fuzzy implications and Fuzzy algorithms, Fuzzifications & Defuzzificataions, Fuzzy Controller, Industrial applications

Unit 5: Genetic Algorithm (GA)

Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators, Mutation, Generational Cycle, applications

Text book:

1. . S. Rajsekaran & G.A. Vijayalakshmi Pai, “Neural Networks,Fuzzy Logic and Genetic Algorithm:Synthesis and Applications” Prentice Hall of India.

2. N. P. Padhy, "Artificial Intelligence and Intelligent Systems” Oxford University Press. Reference Books:

3. Siman Haykin, "Neural Networks”, Pearson Education

4. Timothy J. Ross, “Fuzzy Logic with Engineering Applications” Wiley India.

5. Kumar Satish, “Neural Networks” McGraw HillSignals & Systems Lab List of Programs

Design & Analysis of Algorithm

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEB5030	Design & Analysis Algorithm	3 Hrs/Week	3	30 Marks	70 Marks

Prerequisites:

Data structures (stack, queue, linked list, tree, graph), hashing, File structures, Any structured Programming Language (like C).

Course Objectives: Students will try to learn

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

Course Outcomes (COs): The students will be able to learn

1. Ability to analyze the performance of algorithms.
2. Analyze Ability to choose appropriate algorithm design techniques for solving problems.
3. Ability to understand how the choice of data structures and the algorithm design methods impact the performance of programs.

Course Contents

Unit I Introduction: (08 Hrs)

Algorithms, Analyzing Algorithms, Complexity of Algorithms, Growth of Functions, Performance Measurements, Sorting and Order Statistics - Shell Sort, Quick Sort, Merge Sort, Heap Sort, Comparison of Sorting Algorithms, Sorting in Linear Time.

Unit II Advanced Data Structures: (08 Hrs)

Red-Black Trees, B – Trees, Binomial Heaps, Fibonacci Heaps, Tries, Skip List

Unit III Divide and Conquer: (08 Hrs)

Divide and Conquer with Examples Such as Sorting, Matrix Multiplication, Convex Hull and Searching. Greedy Methods with Examples Such as Optimal Reliability Allocation, Knapsack, Minimum Spanning Trees – Prim's and Kruskal's Algorithms, Single Source Shortest Paths - Dijkstra's and Bellman Ford Algorithms.

Unit IV Dynamic Programming: (08 Hrs)

Dynamic Programming with examples such as Knapsack, All Pair Shortest Paths – Warshal's and Floyd's Algorithms, Resource Allocation Problem, Backtracking, Branch and Bound with Examples Such as Travelling Salesman Problem, Graph Coloring, n-Queen Problem, Hamiltonian Cycles and Sum of Subsets

Unit V Selected Topics: (08 Hrs)

Selected Topics: Algebraic Computation, Fast Fourier Transform, String Matching, Theory of NP-Completeness, Approximation Algorithms and Randomized Algorithms

Reference Books:

1. Thomas H. Coreman, Charles E. Leiserson and Ronald L. Rivest, “Introduction to Algorithms”, Printice Hall of India.
2. E. Horowitz & S Sahni, "Fundamentals of Computer Algorithms",
3. Aho, Hopcraft, Ullman, “The Design and Analysis of Computer Algorithms” Pearson Education, 2008.
4. LEE "Design & Analysis of Algorithms (POD)",McGraw Hill
5. Gajendra Sharma, Design & Analysis of Algorithms, Khanna Publishing House
6. Richard E.Neapolitan "Foundations of Algorithms" Jones & Bartlett Learning
7. Jon Kleinberg and Éva Tardos, Algorithm Design, Pearson, 2005.
8. Michael T Goodrich and Roberto Tamassia, Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition, Wiley, 2006.
9. Harry R. Lewis and Larry Denenberg, Data Structures and Their Algorithms, Harper Collins, 1997
10. Robert Sedgewick and Kevin Wayne, Algorithms, fourth edition, Addison Wesley, 2011.
11. Harsh Bhasin,”Algorithm Design and Analysis”,First Edition,Oxford University Press.
12. Gilles Brassard and Paul Bratley,Algorithmics:Theory and Practice,Prentice Hall,1995

Object Oriented Programming

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEB5030	Object Oriented Programming	3 Hrs/Week	3	30 Marks	70 Marks

Prerequisites:

Concept of C-Programming

Course Objectives: Students will try to learn

The course will introduce standard tools and techniques for software development, using object oriented approach, use of a version control system, an automated build process, an appropriate framework for automated unit and integration tests.

Course Outcomes (COs): The students will be able to learn

1. Specify simple abstract data types and design implementations, using abstraction functions to document them.
2. Recognize features of object-oriented design such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity.
3. Name and apply some common object-oriented design patterns and give examples of their use.
4. Design applications with an event-driven graphical user interface.

Course Contents

Unit I Introduction: (08 Hrs)

The meaning of Object Orientation, object identity, Encapsulation, information hiding, polymorphism, generosity, importance of modeling, principles of modeling, object oriented modeling, Introduction to UML, conceptual model of the UML, Architecture.

Unit II Basic Structural Modeling: (08 Hrs)

Classes, Relationships, Common Mechanisms, and diagrams, 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, call-back mechanism, broadcast messages, Basic Behavioral Modeling: Use cases, Use case Diagrams, Activity Diagrams, State Machine, Process and thread, Event and signals, Time diagram, interaction diagram, Package diagram. Architectural Modeling: Component, Deployment, Component diagrams and Deployment diagrams.

Unit III Object Oriented Analysis: (08 Hrs)

Object oriented design, Object design, Combining three models, Designing algorithms, design optimization, Implementation of control, Adjustment of inheritance, Object representation, Physical packaging, Documenting design considerations. 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

Unit IV C++ Basics: (08 Hrs)

Overview, Program structure, namespace, identifiers, variables, constants, enum, operators, typecasting, control structures, C++ Functions**:** Simple functions, Call and Return by reference, Inline functions, Macro Vs. Inline functions, Overloading of functions, default arguments, friend functions, virtual functions

Unit V Objects and Classes: (08 Hrs)

Basics of object and class in C++, Private and public members, static data and function members, constructors and their types, destructors, operator overloading, type conversion. Inheritance: Concept of Inheritance, types of inheritance: single, multiple, multilevel, hierarchical, hybrid, protected members, overriding, virtual base class, Polymorphism: Pointers in C++, Pointes and Objects, this pointer, virtual and pure virtual functions, implementing polymorphism

Text Books

1. James Rumbaugh et. al, “Object Oriented Modeling and Design”, Pearson Education
2. Grady Booch, James Rumbaugh, Ivar Jacobson, “The Unified Modeling Language User Guide”, Pearson Education
3. Object Oriented Programming With C++, E Balagurusamy, McGraw Hill.
4. C++ Programming, Black Book, Steven Holzner, dreamtech
5. Object Oriented Programming in Turbo C++, Robert Lafore, Galgotia
6. Object Oriented Programming with ANSI and Turbo C++, Ashok Kamthane, Pearson
7. The Compete Reference C++, Herbert Schlitz, McGraw Hill.

Software Engineering

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEB5050	Software Engineering	3 Hrs/Week	3	30 Marks	70 Marks

Prerequisites:

None

Course Objectives: Students will try to learn

The software engineering Subject provides project-rich learning experiences to educate software engineering for success in a rapidly evolving computing field. The program faculty help students lay the foundation for achievement of the objectives and outcomes described below.

Course Outcomes (COs): The students will be able to learn

1. Explain various software characteristics and analyze different software Development Models.
2. Demonstrate the contents of a SRS and apply basic software quality assurance practices to ensure that design, development meet or exceed applicable standards.
3. Compare and contrast various methods for software design
4. Formulate testing strategy for software systems, employ techniques such as unit testing, Test driven development and functional testing.
5. Manage software development process independently as well as in teams and make use of various software management tools for development, maintenance and analysis.

Course Contents

Unit I Introduction: (08 Hrs)

Introduction to Software Engineering, Software Components, Software Characteristics, Software Crisis, Software Engineering Processes, Similarity and Differences from Conventional Engineering Processes, Software Quality Attributes. Software Development Life Cycle (SDLC) Models: Water Fall Model, Prototype Model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models.

Unit II Software Requirement Specifications (SRS): (08 Hrs)

Requirement Engineering Process: Elicitation, Analysis, Documentation, Review and Management of User Needs, Feasibility Study, Information Modelling, 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.

Unit III Software Design: (08 Hrs)

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: Halstead's Software Science, Function Point (FP) Based Measures, Cyclomatic Complexity Measures: Control Flow Graphs.

Unit IV Software Testing: (08 Hrs)

Testing Objectives, Unit Testing, Integration Testing, Acceptance Testing, Regression Testing, Testing for Functionality and Testing for Performance, TopDown and BottomUp Testing Strategies: Test Drivers and Test Stubs, Structural Testing (White Box Testing), Functional Testing (Black Box Testing), Test Data Suit Preparation, Alpha and Beta Testing of Products. Static Testing Strategies: Formal Technical Reviews (Peer Reviews), Walk Through, Code Inspection, Compliance with Design and Coding Standards

Unit V Software Maintenance and Software Project Management: (08 Hrs)

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

Text books:

1.RS Pressman, Software Engineering: A Practitioners Approach, McGraw Hill.
2. Pankaj Jalote, Software Engineering, Wiley
3. Rajib Mall, Fundamentals of Software Engineering, PHI Publication.
4. KK Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers.
5. Ghezzi, M. Jarayeri, D. Manodrioli, Fundamentals of Software Engineering, PHI Publication.
6. Ian Sommerville, Software Engineering, Addison Wesley.
7. Kassem Saleh, "Software Engineering", Cengage Learning.
8. P fleeger, Software Engineering, Macmillan Publication

Department Elective

Web Designing

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEB5910	Web Designing	3 Hrs/Week	3	30 Marks	70 Marks

Prerequisites:

None

Course Objectives

1. Understand the principles of creating an effective web page, including an in-depth consideration of information architecture.
2. Become familiar with graphic design principles that relate to web design and learn how to implement theories into practice.
3. Develop skills in analyzing the usability of a web site.
4. Understand how to plan and conduct user research related to web usability.
5. Learn the language of the web: HTML and CSS.
6. Learn CSS grid layout and flexbox.

Course Outcomes (COs): The students will be able to learn

1. Understand principle of Web page design and about types of websites
2. Visualize and Recognize the basic concept of HTML and application in web designing
3. Recognize and apply the elements of Creating Style Sheet (CSS).
4. Understand the basic concept of Java Script and its application.
5. Introduce basics concept of Web Hosting and apply the concept of SEO

Course Contents

Unit I Introduction: (08 Hrs)

Basic principles involved in developing a web site, Planning process, Domains and Hosting, Responsive Web Designing, Types of Websites (Static and Dynamic Websites), Web Standards and W3C recommendations, **Introduction to HTML:** What is HTML, HTML Documents, Basic structure of an HTML document, Creating an HTML document, Mark up Tags, Heading-Paragraphs, Line Breaks.

Unit II Elements of HTML (08 Hrs)

HTML Tags., Working with Text , Working with Lists, Tables and Frames, Working with Hyperlinks, Images and Multimedia, Working with Forms and controls.

Unit III Concept of CSS: (08 Hrs)

Creating Style Sheet, CSS Properties, CSS Styling (Background, Text Format, Controlling Fonts) , Working with block elements and objects , Working with Lists and Tables , CSS Id and Class, Box Model(Introduction, Border properties, Padding Properties, Margin properties) CSS Advanced(Grouping, Dimension, Display, Positioning, Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute sector) , CSS Color , Creating page Layout and Site Designs.

Unit IV Introduction to Client-Side Scripting: (08 Hrs)

Introduction to Client-Side Scripting, Introduction to Java Script, Javascript Types, Variables in JS, Operators in JS, Conditions Statements, Java Script Loops, JS Popup Boxes, JS Events, JS Arrays, Working with Arrays, JS Objects, JS Functions, Using Java Script in Real time, Validation of Forms, Related Examples

Unit V Web Hosting: (08 Hrs)

Web Hosting Basics, Types of Hosting Packages, Registering domains, Defining Name Servers, Using Control Panel, Creating Emails in Cpanel , Using FTP Client, Maintaining a Website

Concepts of SEO: Basics of SEO, Importance of SEO, Onpage Optimization Basics

Text books:

1. Steven M. Schafer, “HTML, XHTML, and CSS Bible, 5ed”, Wiley India
2. Ian Pouncey, Richard York, “Beginning CSS: Cascading Style Sheets for Web Design”, Wiley India

Computer Graphics

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEB5510	Computer Graphics	3 Hrs/Week	3	30 Marks	70 Marks

Prerequisites:

None

Course Objectives

1. The main objective of the course is to introduce students with fundamental concepts and theory of computer graphics.
2. It presents the important drawing algorithm, polygon fitting, clipping and 2D transformation curves and an introduction to 3D transformation.
3. It provides the basics of OpenGL application programming interface which allows students to develop programming skills in CG.

Course Outcomes (COs): The students will be able to learn

1. Understand the graphics hardware used in field of computer graphics
2. Understand the concept of graphics primitives such as lines and circle based on different algorithms.
3. Apply the 2D graphics transformations, composite transformation and Clipping concepts.
4. Apply the concepts of and techniques used in 3D computer graphics, including viewing transformations.
5. Perform the concept of projections, curve and hidden surfaces in real life.

Course Contents

Unit I Introduction and Line Generation: (08 Hrs)

Types of computer graphics, Graphic Displays- Random scan displays, Raster scan displays, Frame buffer and video controller, Points and lines, Line drawing algorithms, Circle generating algorithms, Mid-point circle generating algorithm, and parallel version of these algorithms.

Unit II Transformations (08 Hrs)

Basic transformation, Matrix representations and homogenous coordinates, Composite transformations, Reflections and shearing, Windowing and Clipping: Viewing pipeline, Viewing transformations, 2-D Clipping algorithms, Line clipping algorithms such as Cohen Sutherland line clipping algorithm, Liang-barsky algorithm, Line clipping against non-rectangular clip windows; Polygon clipping – Sutherland Hodgeman polygon clipping, Weiler and Atherton polygon clipping, Curve clipping, Text clipping

Unit III Three Dimensional: (08 Hrs)

3-D Geometric Primitives, 3-D Object representation, 3-D Transformation, 3- D viewing, projections, 3-D Clipping.

Unit IV Curves and Surfaces: (08 Hrs)

Quadric surfaces, Spheres, Ellipsoid, Blobby objects, introductory concepts of Spline, Bspline and Bezier curves and surfaces.

Unit V Hidden Lines and Surfaces: (08 Hrs)

Back Face Detection algorithm, Depth buffer method, A- buffer method, Scan line method, basic illumination models– Ambient light, Diffuse reflection, Specular reflection and Phong model, Combined approach, Warn model, Intensity Attenuation, Color consideration, Transparency and Shadows.

Text books:

1. Donald Hearn and M Pauline Baker, “Computer Graphics C Version”, Pearson Education
2. Foley, Vandam, Feiner, Hughes – “Computer Graphics principle”, Pearson Education.
3. Rogers, “ Procedural Elements of Computer Graphics”, McGraw Hill
4. W. M. Newman, R. F. Sproull – “Principles of Interactive computer Graphics” – McGraw Hill.
5. Amrendra N Sinha and Arun D Udai,” Computer Graphics”, McGraw Hill.
6. R.K. Maurya, “Computer Graphics ” Wiley Dreamtech Publication.
7. Mukherjee, Fundamentals of Computer graphics & Multimedia, PHI Learning Private Limited.
8. Donald Hearn and M Pauline Baker, “Computer Graphics with Open GL”, Pearson education

Constitutional Law-I

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
LLBB1050	Constitutional Law-I	1Hrs/Week	0	15 Marks	35 Marks

Course Objectives:

1 To realize the significance of constitution of India to students from all walks of life and help them to understand the basic concepts of Indian constitution.

2 To identify the importance of fundamental rights aswell as fundamental duties.

3 To understand the functioning of Union, State and Local Governments in Indian federal system.

4 To learn procedure and effects of emergency, composition and activities of election commission and amendment procedure.

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

1. Understand and explain the significance of Indian Constitution as the fundamental law of the land.
2. Exercise his fundamental rights in proper sense at the same time identifies his responsibilities in national building.
3. Analyse the Indian political system, the powers and functions of the Union, State and Local Governments in detail
4. Understand Electoral Process, Emergency provisions and Amendment procedure.

Course Content

UNIT-I (07)

Introduction to Constitution: Meaning and importance of the Constitution, salient features of Indian Constitution, Preamble of the Constitution, Fundamental rights- meaning and limitations, Directive principles of state policy and Fundamental duties -their enforcement and their relevance

UNIT-II (06)

Union Government: Union Executive- President, Vice-president, Prime Minister, Council of Ministers, Union Legislature- Parliament and Parliamentary proceedings, Union Judiciary- Supreme Court of India – composition and powers and functions

UNIT-III (07)

State and Local Governments: State Executive- Governor, Chief Minister, Council of Ministers, State Legislature-State Legislative Assembly and State Legislative Council, State Judiciary- High court. Local Government-Panchayat raj system with special reference to 73rd and Urban Local Self Govt. with special reference to74th Amendment

UNIT-IV (06)

Election provisions, Emergency provisions, Amendment of the constitution Election Commission of India-composition, powers and functions and electoral process, Types of emergency-grounds, procedure, duration and effects, Amendment of the constitution- meaning, procedure and limitations. Total:L-26 Hours

Textbooks

1. M.V.Pylee, “Introduction to the Constitution of India”,4th Edition, Vikas publication,2005.
2. Durga Das Basu(DD Basu) , “Introduction to the constitution of India”,(Student Edition),19th edition,Prentice-Hall EEE, 2008.

Reference Book

1. Merunandan, “Multiple Choice Questions on Constitution of India”, 2 nd Edition,Meraga publication,2007.

OOP using Java Lab

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEB5031	OOP using Java Lab	3 Hrs/Week	3	30 Marks	70 Marks

Lab Objective

The objectives of the course are to have students identify and practice the object- oriented programming concepts and techniques, practice the use of C++ classes and class libraries, arrays, vectors, inheritance and file I/O stream concepts.

Lab Outcomes: Ability to:

1. Creating simple programs using classes and objects in C++.
2. Implement Object Oriented Programming Concepts in C++.
3. Develop applications using stream I/O and file I/O.
4. Implement simple graphical user interfaces.
5. Implement Object Oriented Programs using templates and exceptional handling concepts.

List of Programs

1. Write a Program to perform various operations on complex numbers
2. Prepare salary chart of an employee using Structures.
3. Write code to demonstrate the creation of class & object.
4. Programs to define Class using constructor & destructor.(Default constructor, Multiple constructor, Copy constructor, Overloaded constructor)
5. Write a Program to maintain employee record using Classes.
6. Write a Program to illustrate Multiple Inheritance.
7. Demonstrate the concept of overloading unary & binary operators.
8. Write a program to show the concept of function overloading.
9. Write A Program to illustrate Dynamic Memory Allocation using Pointers.
10. Write code to show compile time polymorphism (static binding)
11. Write code to show run time polymorphism (dynamic binding)
12. Create a class code & illustrate the use of THIS pointer.
13. Demonstrate the formatting of output using manipulators.
14. Create templates & demonstrate their use.
15. Write code to demonstrate exception handling

SEMESTER VI											
Course Type	**Course Code**	**Course Title**	**Hours/ Week**			**Theory Marks**		**Practical Marks**		**Total Marks**	**Credit**
			L	**T**	**P**	**IA**	**ESE**	**IA**	**ESE**		
DC	CSEB6010	System Programming Compiler Design	3	1	-	30	70	-	-	100	4
DC	CSEB6020	Computer Network	3	-	-	30	70	-	-	100	3
DE	***	Elective-II	3	-	-	30	70	-	-	100	3
DC	CSEB6030	Data Mining Warehousing	3	-	-	30	70	-	-	100	3
OE	***	Open Elective-I	3	-	-	30	70	-	-	100	3
DC	CSEB6044	Mini Project	-	-	6	-	-	50	50	100	3
DC	CSEB6021	Computer Network Lab			4			15	35	50	2
DC	CSEB6011	Data mining Lab using R			4			15	35	50	2
	TOTAL		**15**	**1**	**14**	**150**	**350**	**80**	**120**	**700**	**23**

Elective -II

Elective-II CSEB 6710/6720
1. Adhoc Wireless networks
2. High Performance Computing

Open Elective-I CSEB 6410/6420
1. Cyber Law and Ethics
2. Disaster Management

Open

System Programming & Compiler Construction

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEB6010	System Programming & Compiler Construction	3Hrs/Week	4	30 Marks	70 Marks

Prerequisite: Data Structures, Theoretical computer science, Operating system. Computer Organization and Architecture, Microprocessor Module

Course objectives:

1 To understand the role and functioning of various system programs over application program.

2. To understand basic concepts and designing of assembler, Macro processor and role of static and dynamic loaders, and linkers.

3. To understand the need to follow the syntax in writing an application program and to learn the how the analysis phase of compiler is designed to understand the programmer's requirements without ambiguity.

4. To synthesize the analysis phase outcomes to produce the object code that is efficient in terms of space and execution time.

Course outcomes:

On successful completion of course students will be able to:

l. Identify the relevance of different system programs.

2. Describe the various data structures and passes of assembler design.

3. Identify the need for different features and designing of macros.

4. Distinguish different loaders and linkers and their contribution in developing efficient user applications.

5. Construct different parsers for given context free grammars.

6. Justify the need synthesis phase to produce object code optimized in terms of high execution speed and less memory usage

Course Content

Unit-I(02)

Introduction to System Software, Concept of System Software, Goals of the system software, system program and system programming, Introduction to various system programs such as Assembler, Macro processor, Loader, Linker, Compiler, Interpreter, Device Drivers, Operating system, Editors, Debuggers.

Unit-II (10)

Assemblers, Elements of Assembly Language programming, Assembly scheme, pass structure of assembler, Assembler Design: Two-pass assembler Design and single-pass Assembler Design for Hypothetical / X86 family processor, data structures used.

Unit-III (8)

Macros and Macro Processor, Introduction, Macro definition and call, Features of Macro, facility: Simple, parameterized, conditional and nested. Design of single pass macro processor, data structures used.

Unit-IV (8)

Loaders and Linkers, Introduction, functions of loaders, Relocation and Linking concept, Different loading schemes: Relocating loader, Direct Linking Loader, Dynamic linking and loading.

Unit-V (12)

Compilers: Analysis Phase Introduction to compilers, Phases of compilers: Lexical Analysis- Role of Finite State Automata in Lexical Analysis, Design of Lexical analyser, data structures used. Syntax Analysis- Role of Context Free Grammar in Syntax analysis, Types of Parsers: Top down parser- LL(1), Bottom up parser- Operator precedence parser, SLR, Semantic Analysis, Syntax directed definitions.

Unit-VI (12)

Compilers: Synthesis phase, Intermediate Code Generation: Types of Intermediate codes: Syntax tree; Postfix notation, Three address codes: Triples and Quadruples. Code Optimization: Need and sources of optimization, Code optimization techniques: Machine Dependent and Machine Independent. Code Generation: Issues in the design of code generator, code generation algorithm, Basic block and flow graph.

Text Books:

l. D. M Dhamdhere: Systems programming, TataMcGraw Hill

2. A. V. Aho, R. Shethi, Monica Lam, J.D. Ulman : Compilers Principles, Techniques and Tools , Pearson Education, Second Edition.

3. J. J. Donovan: Systems Programming Tata McGraw Hill Publishing Company

Computer Network

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEB6020	Computer Networks	3Hrs/Week	3	30 Marks	70 Marks

Course Objective:

1. To develop an understanding of computer networking basics.
2. To develop an understanding of different components of computer networks, various protocols, modern technologies and their applications.

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

1. Characterize and appreciate computer networks from the view point of components and from the view point of services.
2. Display good understanding of the flow of a protocol in general and a network protocol in particular.
3. Model a problem or situation in terms of layering concept and map it to the TCI/IP stack.
4. Select the most suitable Application Layer protocol (such as HTTP, FTP, SMTP, DNS, Bit torrent) as per the requirements of the network application and work with available tools to demonstrate the working of these protocols.
5. Design a Reliable Data Transfer Protocol and incrementally develop solutions for the requirements of Transport Layer.
6. Describe the essential principles of Network Layers and use IP addressing to create subnets for any specific requirements

Course Content

Unit –I

Computer Network: Definitions, goals, components, Architecture, Classifications & Types. Layered Architecture: Protocol hierarchy, Design Issues, Interfaces and Services, Connection Oriented & Connectionless Services, Service primitives, Design issues & its functionality. ISO-OSI Reference Model: Principle, Model, Descriptions of various layers and its comparison with TCP/IP. Principals of physical layer: Media, Bandwidth, Data rate and Modulations

Unit-II

Data Link Layer: Need, Services Provided, Framing, Flow Control, Error control. Data Link Layer Protocol: Elementary & Sliding Window protocol: 1-bit, Go-Back-N, Selective Repeat, Hybrid ARQ. Protocol verification: Finite State Machine Models & Petri net models. ARP/RARP/GARP

Unit-III

MAC Sub layer: MAC Addressing, Binary Exponential Back-off (BEB) Algorithm, And And Distributed Random Access Schemes/Contention Schemes: for Data Services (ALOHA and Slotted- ALOHA), for Local-Area Networks (CSMA, CSMA/CD, CSMA/CA), Collision Free Protocols: Basic Bit Map, BRAP, Binary Count Down, MLMA Limited Contention Protocols: Adaptive Tree Walk, Performance Measuring Metrics, IEEE Standards 802 series & their variant.

Unit-IV

Network Layer: Need, Services Provided, Design issues, Routing algorithms: Least Cost Routing algorithm, Dijkstra's algorithm, Bellman-ford algorithm, Hierarchical Routing, Broadcast Routing, Multicast Routing. IP Addresses, Header format, Packet forwarding, Fragmentation and reassembly, ICMP, Comparative study of IPv4 & IPv6

Unit-V

Transport Layer: Design Issues, UDP: Header Format, Per-Segment Checksum, Carrying Unicast/Multicast Real-Time Traffic, TCP: Connection Management, Reliability of Data Transfers, TCP Flow Control, TCP Congestion Control, TCP Header Format, TCP Timer Management. Application Layer: WWW and HTTP, FTP, SSH, Email (SMTP, MIME,IMAP), DNS, Network Management (SNMP).

References:

1.Andrew S. Tanenbaum, David J. Wetherall, “Computer Networks” Pearson Education.

2 Douglas E Comer, “Internetworking With Tcp/Ip Principles, Protocols, And Architecture - Volume-I” 6th Edition, Pearson Education

3.DimitriBertsekas, Robert Gallager, “Data Networks”, PHI Publication, Second Edition.

4.Kaveh Pahlavan, Prashant Krishnamurthy, “Networking Fundamentals”, Wiley Publication.

5.Uyless Black, “Computer Networks”, PHI Publication, Second Edition.

6.Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, “Computer Networks: An Open Source Approach”, McGraw Hill.

Data Mining & Ware Housing

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEB6030	Data Mining & Ware Housing	3Hrs/Week	3	30 Marks	70 Marks

Course objectives:

1. To identify the scope and essentiality of Data Warehousing and Mining.
2. To analyze data, choose relevant models and algorithms for respective applications.
3. To study spatial and web data mining.
4. To develop research interest towards advances in data mining.

Course outcomes: On successful completion of course learner will be able to:

1. Understand Data Warehouse fundamentals, Data Mining Principles
2. Design data warehouse with dimensional modeling and apply OLAP operations.
3. Identify appropriate data mining algorithms to solve real world problems
4. Compare and evaluate different data mining techniques like classification, prediction, clustering and association rule mining
5. Describe complex data types with respect to spatial and web mining.
6. Benefit the user experiences towards research and innovation. Prerequisite: Basic database concepts, Concepts of algorithm design and analysis.

Course Content

Unit-I(08)

Introduction to Data Warehouse and Dimensional modeling: Introduction to Strategic Information, Need for Strategic Information, Features of Data Warehouse, Data warehouses versus Data Marts, Top-down versus Bottom-up approach. Data warehouse architecture, metadata, E-R modeling versus Dimensional Modeling, Information Package Diagram, STAR schema, STAR schema keys, Snowflake Schema, Fact Constellation Schema, Factless Fact tables, Update to the dimension tables, Aggregate fact tables.

Unit-II(08)

ETL Process and OLAP: Major steps in ETL process, Data extraction: Techniques, Data transformation: Basic tasks, Major transformation types, Data Loading: Applying Data, OLTP Vs OLAP, OLAP definition, Dimensional Analysis, Hypercubes, OLAP operations: Drill down, Roll up, Slice, Dice and Rotation, OLAP models: MOLAP, ROLAP.

Unit-III(10)

Introduction to Data Mining, Data Exploration and Preprocessing: Data Mining Task Primitives, Architecture, Techniques, KDD process, Issues in Data Mining, Applications of Data Mining, Data Exploration :Types of Attributes, Statistical Description of Data, Data Visualization, Data Preprocessing: Cleaning, Integration, Reduction: Attribute subset selection, Histograms, Clustering and Sampling, Data Transformation & Data Discretization: Normalization, Binning, Concept hierarchy generation, Concept Description: Attribute oriented Induction for Data Characterization.

Unit-IV(12)

Classification, Prediction and Clustering: Basic Concepts, Decision Tree using Information Gain, Induction: Attribute Selection Measures, Tree pruning, Classifier Rule - Based Classification: Using IFTHEN Rules for classification, Prediction: Simple linear regression, Multiple linear regression Model Evaluation & Selection: Accuracy and Error measures, Holdout, Random Sampling, Cross Validation, Bootstrap, Clustering: Distance Measures, Partitioning Methods (k-Means, k-Medoids), Hierarchical Methods(Agglomerative, Divisive)

Unit-V(08)

Mining Frequent Patterns and Association Rules: Market Basket Analysis, Frequent Item sets, Closed Item sets, and Association Rule, Frequent Pattern Mining, Efficient and Scalable Frequent Item set Mining Methods: Apriori Algorithm, Association Rule Generation, Improving the Efficiency of Apriori, FP growth, Mining frequent Item sets using Vertical Data Format, Introduction to Mining Multilevel Association Rules and Multidimensional Association Rules

Text Books:

1. PaulrajPonniah, ―Data Warehousing: Fundamentals for IT Professionals‖, Wiley India.

2. Han, Kamber, "Data Mining Concepts and Techniques", Morgan Kaufmann 3rd edition.

3. Reema Thareja ―Data warehousing‖, Oxford University Press.

4. M.H. Dunham, "Data Mining Introductory and Advanced Topics", Pearson Education.

OPEN ELECTIVES

Cyber Law & Ethics

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEB6410	Cyber Law & Ethics	3Hrs/Week	3	30 Marks	70 Marks

Course Objectives: The objective of this course is to

1) Equip students with basic concepts of technology and law, digital contracts, rights of netizens and E-governance and provide knowledge of cybercrime and Policies of internet law.

2) Impart knowledge of Information Technology Act and legal frame work of Right to Privacy, Data Security and Data Protection, Forensic analysis , inner investigation models for overcoming cybercrimes.

3) To identify the processes involved in collecting and presenting electronic evidence.

4) Develop competencies for dealing with frauds and deceptions (confidence tricks, scams) and other cyber-crimes for example, child pornography etc. that are taking place via the Internet;

5) Emphases upon studying cyber space and various aspects of cyber laws and regulating them through relevant Acts.

6) Understand the range of options which may be available for dealing with online disputes, and how to choose amongst them

Course Outcomes: Students will be able to

1) Learn law and legal policies associated with the internet.

2) Understand IT security Policies, Business law and contracting for data security.

3) Apply law to emerging dangers.

4) Carry out investigations so that they will be judged as ethical and credible.

5) Bridge gaps between security professionals, law enforcement and prosecutors.

6) Evaluate the role and meaning of contracts for technology, including services, software and outsourcing. Prerequisite: System and Web Security

Course Content

Unit-I (12)

Fundamentals of Cyber law Regulation of Information Society, Need for Cyber Laws, ICANN, UNCITRAL, Indian Scenario in regulation, Investigation and Ethics: Cyber Crime, Information Security and Law, Types & overview of Cyber Crimes, Cyber Law Issues in E-Business Management Indian IT Act, ISP and Intellectual property issues, Cyber squatters and Copy Right Protection , Patents, Data privacy and protection, Domain Name, Software piracy, Plagiarism, Issues in ethical hacking.

Unit-II(06)

IT Security Law and Policy Security Policy, Ethical issues in data and software privacy, Computer Crime Laws, Honeypots & Entrapment, Active Defenses, Hacking Back.

Unit-III(06)

Electronic Records and Signature Vicarious Liability, E-Discovery, Records Retention, Destruction, Email Retention, Forensics, Privacy Policies, Evidence Law, Signatures

Unit-IV(08)

Contracts and formal legal documents in the Infotech World Click Through Agreements, Contract Formation, Battle of the Forms, Liability, Breach, Bonds, Assent, Warranty, Remedies, Liens, Ownership Issues, Subpoenas, Documentation, Audits, Exceptions, Maintenance, Termination, Escrow, Competition, Disputes, Non- Disclosure.

Unit-V(08)

Investigation and Ethics Cooperation with investigations, Live Vs Post mordem investigation ,Numerous Examples of Fraud (Post-Mordems), Sarbanes-Oxley Act , Securities Fraud, Federal Sentencing Guidelines, IT Codes of Ethics, Hotlines, Reporting, Whistleblowing , Employee Monitoring, Entrapment, Raids & Seizures.

Unit-VI(08)

Cyber Defence Sony Root Kit Case Study, Crisis Communications, Choicepoint Case Study, Relationship with Law Enforcement, TJX Case Study, Publicity, Safely Monitoring Threats w/o Incurring Liability, Factors Mitigating Legal Risk, Public Accountability, Political Diplomacy, Strategic Legal Procedures, Competitive Boundaries.

Text Books:

1) Vivek Sood, “Cyber Laws Simplified”, Mc Graw Hill

2) Anthony Reyes, “Cyber Crime Investigations: Bridging the Gaps Between Security Professionals, Law Enforcement, and Prosecutors.

3) Brian Craig, “Cyberlaw: The Law of the Internet and Information Technology”, 1st ed., Prentice Hall, 2012.

4) Faiyaz Ahamad, “ Cyber Law and Information Security” , Dreamtech Press.

Disaster Management

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEB6420	Disaster Management	3Hrs/Week	3	30 Marks	70 Marks

Course Objective

1. To provide students an exposure to disasters, their significance and types.
2. To ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction
3. To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR)
4. To enhance awareness of institutional processes in the country and
5. To develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity

Course Outcome

1. Get to know natural as well as manmade disaster and their extent and possible effects on the economy.
2. Plan of national importance structures based upon the previous history.
3. Get acquainted with government policies, acts and various organizational structure associated with an emergency.
4. Get to know the simple do's and don'ts in such extreme events and act accordingly.

Course Content

UNIT - I

Introduction to disasters, Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types of disasters – Earthquake, Landslide, Flood, Drought, Fire etc - Classification, Causes, Impacts including social, economic, political, environmental, health, psychosocial, etc.- Differential impacts- in terms of caste, class, gender, age, location, disability - Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change- Do’s and Dont’s during various types of Disasters

UNIT- II

Approaches to Disaster Risk Reduction, Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, Roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stake-holders- Institutional Processes and Framework at

State and Central Level- State Disaster Management Authority (SDMA) –Early Warning System – Advisories from Appropriate Agencies.

UNIT- III

Inter-Relationship Between Disasters And Development, Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc.- Climate Change Adaptation- IPCC Scenario and Scenarios in the context of India - Relevance of indigenous knowledge, appropriate technology and local resources

UNIT-IV

Disaster Risk Management In India, Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy - Other related policies, plans, programmes and legislation – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment

UNIT-V

Disaster Management: Applications And Case Studies And Fieldworks, Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

Text Books

1. Singhal J.P, Disaster Management, Laxmi Publications.

2. Tushar Bhattacharya, Disaster Science and Management, McGraw Hill India.

3. Govt. of India, Disaster Management, Government of India.

DEPARTMENT ELECTIVES

Ad Hoc Wireless Network

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEB6710	Ad-Hoc Wireless Network	3Hrs/Week	3	30 Marks	70 Marks

Prerequisite: Computer Network

Course objectives:

1. To Identify the major issues associated with ad-hoc networks

2. To identify the requirements for protocols for wireless ad-hoc networks as compared to the protocols existing for wired networks.

3. To explore current ad-hoc technologies by researching key areas such as algorithms, protocols, hardware, and applications.

4. To Provide hands-on experience through real-world programming projects

5. To provide advanced in-depth networking materials to graduate students in networking research.

Course outcomes: On successful completion of course learner will be able to:

1. Identify the characteristics and features of Ad Hoc Networks.

2. Understand the concepts & be able to design MAC protocols for Ad Hoc networks

3. Implement protocols to Carry out simulation of routing protocols of Ad Hoc Networks

4. Interpret the flow control in transport layer of Ad Hoc Networks

5. Analyze security principles for routing of Ad Hoc Networks

6. Utilize the concepts of Adhoc Networks in VANETs

Course Content

Unit I

Introduction, Introduction to wireless Networks. Characteristics of Wireless channel, issues in Ad hoc wireless networks, Adhoc Mobility Models:- Indoor and outdoor models, Introduction to Ad Hoc networks - definition, characteristics, features, applications.

Unit-II

MAC protocols for Wireless Ad-hoc Networks, Issues in designing MAC for Wireless Ad-Hoc Networks, Design Goals and classification of MAC for Wireless Ad-Hoc Networks, Contention based MAC protocols for Wireless Ad-Hoc Networks, with reservation mechanisms, scheduling Mechanisms, MAC protocols using directional antennas, Other MAC Protocols, IEEE standards MAC Protocols: 802.15.1(WPAN based on Bluetooth), 802.1 5.4 (WSN/Zigbee), 802.1 5.6 (WBAN).

Unit-III

Routing Protocols for Wireless Ad-hoc Networks, Introduction, issues in designing a routing protocol for Wireless Ad-Hoc Networks, Classification of routing protocols, Table driven routing protocols like DSDV, WRP, On- demand routing protocols like ABR, DSR, TORA, AODV, etc. Hybrid Routing Protocols: ZRP, Routing Protocols with efficient flooding mechanism, Hierarchical Routing Protocols, Power aware routing protocols

Unit-IV

Transport Layer, Transport layer protocols for Ad hoc wireless Networks: Introduction, Issues in designing a transport layer protocol for Ad hoc wireless Networks, Design goals of a transport layer protocol for Ad hoc wireless Networks, Classification of transport layer solutions: Split Approach , End-to-End approach :TCP-F,TCP-ELFN, Ad-Hoc TCP, TCP Buffering capability and Sequencing information, End-to-End Quality of Service

Unit-V

Security, Security attacks in wireless Ad hoc wireless Networks, Network security requirements, Issues & challenges in security provisioning, Link Layer security attacks: 802.11 MAC , WPA and variations, Network Security Attacks: Routing Protocol Attacks: attacks using falsifying route errors and broadcasting falsifying routes, spoofing attacks, Rushing attacks, Secure routing in Ad hoc wireless Networks

Unit-VI

Vehicular Ad-Hoc Network (VANET), Introduction: Challenges and Requirements, Layered architecture for VANETs, DSRC /WAVE standard (IEEE 802.11), IEEE 802.11 protocol Stack (PHY & MAC) , A Survey on Proposed MAC Approaches for VANETs like TDMA, SDMA and CDMA based approaches, DSRC MAC & LLC, Geo routing: CBF, Flooding with broadcast suppression, Delay Tolerant Network, Introduction to Opportunistic Networking in Delay Tolerant Vehicular Ad Hoc Networks.

Text Books:

1. Siva Ram Murthy and B.S. Manoj , "Ad hoc Wireless Networks Architectures and protocols,,,2nd. edition, Pearson Education, 2007 (Tl)

2. C. K. Toh,'oAdhoc Mobile Wireless Networks", Pearson Education, ZOO2 (T2)

3. Charles E. Perkins, "Adhoc Networking", Addison - Wesley, 2000 (T3)

4. Dipankar Raychaudhuri, Mario Gerla, "Erlerging Wireless Technologies and the Future Mobile Internet, D, Cambridge. (Ta)

High Performance Computing

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEB6720	High Performance Computing	3Hrs/Week	3	30 Marks	70 Marks

Prerequisites:

Computer Architecture, Elementary Algorithms

Course Objectives: Students will try to learn

1. Students are able to distinguish between the different High Performance Computing architectures
2. Students can design algorithms specifically for any given architecture.
3. Students learn Parallel programming

Course Outcomes (COs): The students will be able to learn

1. Understanding the basic concepts of computational programming and its applications
2. Understanding the core of high end computers, components and their capacities.
3. Understand the need for parallel algorithms and learn on various parallel programming application
4. Knowing the various challenges involved in achieving high performance with the available computational systems

Unit-I (9)

Introduction: Computational Science and Engineering: Computational Science and Engineering Applications; characteristics and requirements, Review of Computational Complexity, Performance: metrics and measurements, Granularity and Partitioning, Locality: temporal/spatial/stream/kernel, Basic methods for parallel programming, Real-world case studies.

Unit-II(9)

High-End Computer Systems: Memory Hierarchies, Multi-core Processors: Homogeneous and Heterogeneous, Shared-memory Symmetric Multiprocessors, Vector Computers, Distributed Memory Computers, Supercomputers and Petascale Systems, Application Accelerators / Reconfigurable Computing, Novel computers: Stream, multithreaded, and purpose-built.

Unit-III(10)

Parallel Algorithms: Parallel models: ideal and real frameworks, Basic Techniques: Balanced Trees, Pointer Jumping, Divide and Conquer, Partitioning, Regular Algorithms: Matrix operations and Linear Algebra, Irregular Algorithms: Lists, Trees, Graphs, Randomization: Parallel Pseudo-Random Number Generators, Sorting, Monte Carlo techniques.

Unit-IV(10)

Parallel Programming: Revealing concurrency in applications, Task and Functional Parallelism, Task Scheduling, Synchronization Methods, Parallel Primitives (collective operations), SPMD Programming (threads, OpenMP, MPI), I/O and File Systems, Parallel Matlabs (Parallel Matlab, Star-P, Matlab MPI), Partitioning Global Address Space (PGAS) languages (UPC, Titanium, Global Arrays)

Unit-V(7)

Performance Measurement, Achieving Performance: Measuring performance, Identifying performance bottlenecks, restructuring applications for deep memory hierarchies, Partitioning applications for heterogeneous resources, using existing libraries, tools, and frameworks

REFERENCES

1. Introduction to Parallel Computing, Ananth Grama, Anshul Gupta, George Karypis, and Vipin Kumar, 2nd edition, Addison-Welsey, 2003.
2. Petascale Computing: Algorithms and Applications, David A. Bader (Ed.), Chapman &Hall/CRC Computational Science Series, 2007.

Mini Project

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEB6044	Mini Project	6Hrs/Week	3	50 Marks	50 Marks

Lab Outcome: After successful completion of this Lab student will be able to

1. Acquire practical knowledge within the chosen area of technology for project development.

2. Identify, analyze, formulate and handle programming projects with a comprehensive and systematic approach

3. Contribute as an individual or in a team in development of technical projects

4. Develop effective communication skills for presentation of project related activities

Description:

Mini project may be carried out in one or more form of following: Product preparations, prototype development model, fabrication of set-ups, laboratory experiment development, process modification/development, simulation, software development, integration of software and hardware, statistical data analysis, creating awareness in society, etc.

Guidelines:

- A project to be developed based on one or more of the following fields-Advance Database Management System, Enterprise Resource Planning, Advanced Operating System, Advance Computer Network, etc.
- Mini project may be carried out a group of 2 to 3 students. The student is required to submit a report based on the work. The evaluation of the project shall be on continuous basis.

Computer Network Lab

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEB6021	Computer Networks Lab	4Hrs/Week	2	15 Marks	35 Marks

Lab Objectives:

1. Learn basic concepts of computer networking and acquire practical notions of protocols with the emphasis on TCP/IP.
2. A lab provides a practical approach to Ethernet/Internet networking: networks are assembled, and experiments are made to understand the layered architecture and how do some important protocols work.

Lab Outcomes: After completing the course, students will be able to:

1. Understand the structure and organization of computer networks; including the division into network layers, role of each layer, and relationships between the layers.
2. Understand the basic concepts of application layer protocol design; including client/server models, peer to peer models, and network naming.
3. In depth understanding of transport layer concepts and protocol design; including connection oriented and connectionless models, techniques to provide reliable data delivery and algorithms for congestion control and flow control.

Suggested List of Experiments:

1. Study of Different Type of LAN& Network Equipment's.

2. Study and Verification of standard Network topologies i.e. Star, Bus, Ring etc.

3. LAN installations and Configurations.

4. Write a program to implement various types of error correcting techniques.

5. Write a program to Implement various types of framing methods.

6. Study of Tool Command Language (TCL).

7 . Study and Installation of Standard Network Simulator: N.S-2, N.S3.OpNet,QualNetetc .

8. Study & Installation of ONE (Opportunistic Network Environment) Simulator for High Mobility Networks .

9. Configure 802.11 WLAN.

10. Implement & Simulate various types of routing algorithm.

11. Study & Simulation of MAC Protocols like Aloha, CSMA, CSMA/CD and CSMA/CA using Standard Network Simulators.

12. Study of Application layer protocols-DNS, HTTP, HTTPS, FTP and TelNet.

Data mining Lab using R

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEB6031	Data Mining Lab using R	4Hrs/Week	2	15 Marks	35 Marks

Lab Objective:

1. Practical exposure on implementation of well known data mining tasks.
2. Exposure to real life data sets for analysis and prediction.
3. Learning performance evaluation of data mining algorithms in a supervised and an unsupervised setting.
4. Handling a small data mining project for a given practical domain.

Lab Outcome:

1. The data mining process and important issues around data cleaning, pre-processing and integration.
2. The principle algorithms and techniques used in data mining, such as clustering, association mining, classification and prediction

Suggested List of Experiments:

1 Build Data Warehouse/Data Mart for a given problem statement

i) Identifying the source tables and populating sample data

ii) Design dimensional data model i.e. Star schema, Snowflake schema and Fact Constellation schema (if applicable)

2. To perform various OLAP operations such as slice, dice, drilldown, rollup, pivot

3. Perform data Pre-processing task and demonstrate performing classification, clustering, association algorithm on data sets using data mining tool.

4. Implementation of classification algorithm (Decision Tree/ Bayesian)

5 Implementation of Linear Regression.

6 Implementation of Clustering algorithm (K-means/ Agglomerative).

7 Implementation of Association Rule Mining algorithm(Apriori).

SEMESTER VII										
Course Category	**Course Code**	**Course Title**	**Hours/ Week**			**Theory Marks**		**Practical Marks**		**Total Marks**	**Credit**
			L	**T**	**P**	**IA**	**ESE**	**IA**	**ESE**		
DC	CSEB7010	Cryptography Network Security	3	-	-	30	70	-	-	100	3
DC	CSEB7020	Artificial Intelligence	2	1	-	30	70	-	-	100	3
DE	***	Elective-III	3	-	-	30	70	-	-	100	3
OE	***	Open Elective-II	3	-	-	30	70	-	-	100	3
DC	CSEB7033	Major Project-I	-	-	12	-	-	50	150	200	6
	TOTAL		**11**	**1**	**12**	**120**	**280**	**50**	**150**	**600**	**18**

Elective-III CSEB 7730/7740
1. Cloud Computing
2. Block Chain

Elective -III

Open Elective-II HUMB7410/7420
1.Introduction to Philosophical Thoughts
2**. Big Data Architecture & Eco System**

Open Elective -II

Cryptography & Network Security

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEB7010	Cryptography & Network Security	3Hrs/Week	3	30 Marks	70 Marks

Prerequisites:

Programming Concept

Course Objectives:

1. This Course focuses towards the introduction of network security using various cryptographic algorithms.
2. Underlying network security applications.
3. It also focuses on the practical applications that have been implemented and are in use to provide email and web security.

Course Outcomes (COs): The students will be able to learn

1. Describe network security services and mechanisms.
2. Symmetrical and Asymmetrical cryptography.
3. Data integrity, Authentication, Digital Signatures.
4. Various network security applications, IPSec, Firewall, IDS, Web security, Email security, and Malicious software etc.

Course Contents

Unit I (08 Hrs)

Introduction to security attacks, services and mechanism, Classical encryption techniques substitution ciphers and transposition ciphers, cryptanalysis, steganography, Stream and block ciphers. Modern Block Ciphers: Block ciphers principles, Shannon's theory of confusion and diffusion, feistel structure, Data encryption standard (DES), Strength of DES, Idea of differential cryptanalysis, block cipher modes of operations, Triple DES

Unit II (08 Hrs)

Introduction to group, field, finite field of the form GF(p), modular arithmetic, prime and relative prime numbers, Extended Euclidean Algorithm, Advanced Encryption Standard (AES) encryption and decryption Fermat's and Euler's theorem, Primarily testing, Chinese Remainder theorem, Discrete Logarithmic Problem, Principals of public key crypto systems, RSA algorithm, security of RSA

Unit III (08 Hrs)

Message Authentication Codes: Authentication requirements, authentication functions, message authentication code, hash functions, birthday attacks, security of hash functions, Secure hash algorithm (SHA) Digital Signatures: Digital Signatures, Elgamal Digital Signature Techniques, Digital signature standards (DSS), proof of digital signature algorithm,

Unit IV(08 Hrs)

Key Management and distribution: Symmetric key distribution, Diffie-Hellman Key Exchange, Public key distribution, X.509 Certificates, Public key Infrastructure. Authentication Applications: Kerberos, Electronic mail security: pretty good privacy (PGP), S/MIME.

Unit V (08 Hrs)

IP Security: Architecture, Authentication header, Encapsulating security payloads, combining security 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.

References:

1. William Stallings, "Cryptography and Network Security: Principals and Practice", Pearson Education.
2. Behrouz A. Frouzan: Cryptography and Network Security, Tata McGraw Hill
3. C K Shyamala, N Harini, Dr.T.R.Padmnabhan Cryptography and Security ,Wiley
4. Bruce Schiener, "Applied Cryptography". John Wiley & Sons
5. Bernard Menezes," Network Security and Cryptography", Cengage Learning.
6. AtulKahate, "Cryptography and Network Security", Tata McGraw Hill

Artificial Intelligence

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEB7020	Artificial Intelligence	3Hrs/Week	3	30 Marks	70 Marks

Prerequisites:

None

Course Objectives: Students will try to learn

1. To create appreciation and understanding of both the achievements of AI and the theory underlying those achievements.
2. To introduce the concepts of a Rational Intelligent Agent and the different types of Agents that can be designed to solve problems.
3. To review the different stages of development of the AI field from human like behavior to Rational Agents.
4. To impart basic proficiency in representing difficult real life problems in a state space representation so as to solve them using AI techniques like searching and game playing.

Course Outcomes (COs): The students will be able to learn

1. Demonstrate knowledge of the building blocks of AI as presented in terms of intelligent agents.
2. Analyze and formalize the problem as a state space, graph, design heuristics and select amongst different search or game based techniques to solve them.
3. Develop intelligent algorithms for constraint satisfaction problems and also design intelligent systems for Game Playing.
4. Attain the capability to represent various real life problem domains using logic based techniques and use this to perform inference or planning.
5. Formulate and solve problems with uncertain information using Bayesian approaches

Course Contents

Unit I (08 Hrs)

Introduction : Introduction to Artificial Intelligence, Foundations and History of Artificial Intelligence, Applications of Artificial Intelligence, Intelligent Agents, Structure of Intelligent Agents. Computer vision, Natural Language Possessing.

Unit II (08 Hrs)

Introduction to Search : Searching for solutions, Uniformed search strategies, Informed search strategies, Local search algorithms and optimistic problems, Adversarial Search, Search for games, Alpha – Beta pruning.

Unit III (08 Hrs)

Knowledge Representation & Reasoning: Propositional logic, Theory of first order logic, Inference in First order logic, Forward & Backward chaining, Resolution, Probabilistic reasoning, Utility theory, Hidden Markov Models (HMM), Bayesian Networks.

Unit IV (08 Hrs)

Machine Learning : Supervised and unsupervised learning, Decision trees, Statistical learning models, Learning with complete data - Naive Bayes models, Learning with hidden data - EM algorithm, Reinforcement learning,

Unit V (08 Hrs)

Pattern Recognition : Introduction, Design principles of pattern recognition system, Statistical Pattern recognition, Parameter estimation methods - Principle Component Analysis (PCA) and Linear Discriminant Analysis (LDA), Classification Techniques – Nearest Neighbor (NN) Rule, Bayes Classifier, Support Vector Machine (SVM), K – means clustering

References:

1. Stuart Russell, Peter Norvig, “Artificial Intelligence – A Modern Approach”, Pearson Education
2. Elaine Rich and Kevin Knight, “Artificial Intelligence”, McGraw-Hill
3. E Charniak and D McDermott, “Introduction to Artificial Intelligence”, Pearson Education Dan W. Patterson, “Artificial Intelligence and Expert Systems”, Prentice Hall of

Department Elective

Cloud Computing

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEB7730	Cloud Computing	3Hrs/Week	3	30 Marks	70 Marks

Prerequisites:

Hardware infrastructure, Software infrastructure, Data center facilities Virtualization technologies, Software engineering concepts

Course Objectives: Students will try to learn

1. To provide students with the fundamentals and essentials of Cloud Computing.
2. To provide students a sound foundation of the Cloud Computing so that they are able to start using and adopting Cloud Computing services and tools in their real life scenarios.
3. To enable students exploring some important cloud computing driven commercial systems and applications.
4. To expose the students to frontier areas of Cloud Computing and information systems, while providing sufficient foundations to enable further study and research.

Course Outcomes (COs): The students will be able to learn

1. Gain knowledge about basic concepts of Cloud Computing
2. Identify Cloud Computing techniques suitable for a given problem.
3. Solve the problems using various Cloud Computing techniques.
4. Design application using Cloud Computing techniques

Course Contents

Unit I (08 Hrs)

Introduction to Cloud Computing – Definition of Cloud – Evolution of Cloud Computing – Underlying Principles of Parallel and Distributed Computing – Cloud Characteristics – Elasticity in Cloud – On-demand Provisioning.

Unit II (08 Hrs)

Service Oriented Architecture – REST and Systems of Systems – Web Services – Publish Subscribe Model – Basics of Virtualization – Types of Virtualization – Implementation Levels of Virtualization – Virtualization Structures – Tools and Mechanisms – Virtualization of CPU – Memory – I/O Devices –Virtualization Support and Disaster Recovery.

Unit III (08 Hrs)

Layered Cloud Architecture Design – NIST Cloud Computing Reference Architecture – Public, Private and Hybrid Clouds – IaaS – PaaS – SaaS – Architectural Design Challenges – Cloud Storage – Storage-as-a-Service – Advantages of Cloud Storage – Cloud Storage Providers – S3.

Unit IV (08 Hrs)

Inter Cloud Resource Management – Resource Provisioning and Resource Provisioning Methods – Global Exchange of Cloud Resources – Security Overview – Cloud Security Challenges – Software-as-a-Service Security – Security Governance – Virtual Machine Security – IAM – Security Standards.

Unit V (08 Hrs)

Hadoop – MapReduce – Virtual Box — Google App Engine – Programming Environment for Google App Engine — Open Stack – Federation in the Cloud – Four Levels of Federation – Federated Services and Applications – Future of Federation.

Text Books:

1. Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012

2. Rittinghouse, John W., and James F. Ransome, ―Cloud Computing: Implementation, Management and Security, CRC Press, 2017.

3. Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi, ―Mastering Cloud Computing, Tata Mcgraw Hill, 2013.

4. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing – A Practical Approach, Tata Mcgraw Hill, 2009.

5. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud: Transactional Systems for EC2 and Beyond (Theory in Practice), O'Reilly, 2009.

Block Chain

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEB7740	Block Chain	3Hrs/Week	3	30 Marks	70 Marks

Prerequisites:

Concept of DBMS, data structure

Course Objectives: Students will try to learn

1. Be familiar with mathematical foundations of data mining tools
2. Understand and implement classical models and algorithms in data warehouses and data mining
3. Characterize the kinds of patterns that can be discovered by association rule mining, classification and clustering.
4. Master data mining techniques in various applications like social, scientific and environmental context.
5. Develop skill in selecting the appropriate data mining algorithm for solving practical problems.

Course Outcomes (COs): The students will be able to learn

1. Understand the functionality of the various data mining and data warehousing component.
2. Appreciate the strengths and limitations of various data mining and data warehousing models.
3. Explain the analyzing techniques of various data.
4. Describe different methodologies used in data mining and data warehousing.
5. Compare different approaches of data ware housing and data mining with various technologies.

Course Contents

Unit I (12 Hrs)

Introduction to Blockchain: Digital Money to Distributed Ledgers , Design Primitives: Protocols, Security, Consensus, Permissions, Privacy. Blockchain Architecture and Design: Basic crypto primitives: Hash, Signature,) Hashchain to Blockchain, Basic consensus mechanisms

Unit II (12 Hrs)

Consensus: Requirements for the consensus protocols, Proof of Work (PoW), Scalability aspects of Blockchain consensus protocols Permissioned Blockchains:Design goals, Consensus protocols for Permissioned Blockchains

Unit III (12 Hrs)

Hyperledger Fabric (A): Decomposing the consensus process , Hyperledger fabric components, Chaincode Design and Implementation Hyperledger Fabric (B): Beyond Chaincode: fabric SDK and Front End (b) Hyperledger composer tool

Unit IV (12 Hrs)

Use case 1 : Blockchain in Financial Software and Systems (FSS): (i) Settlements, (ii) KYC, (iii) Capital markets, (iv) Insurance Use case 2: Blockchain in trade/supply chain: (i) Provenance of goods, visibility, trade/supply chain finance, invoice management discounting, etc

Unit V (12 Hrs)

Use case 3: Blockchain for Government: (i) Digital identity, land records and other kinds of record keeping between government entities, (ii) public distribution system social welfare systems Blockchain Cryptography, Privacy and Security on Blockchain

References:

1. Mstering Bitcoin: Unlocking Digital Cryptocurrencies, by Andreas Antonopoulos

2. Blockchain by Melanie Swa, O'Reilly

3. Hyperledger Fabric - https://www.hyperledger.org/projects/fabric

4. Zero to Blockchain - An IBM Redbooks course, by Bob Dill, David Smits - https://www.redbooks.ibm.com/Redbooks.nsf/RedbookAbstracts/crse0401.html

OPEN ELECTIVES
Introduction to Philosophical Thoughts

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
HUMB7410	Introduction to Philosophical Thoughts	3Hrs/Week	3	30 Marks	70 Marks

Course Objective
Knowledge of basic concepts and theories in philosophy.

Course Outcomes
1. Ability to identify and critically evaluate philosophical arguments made by others.
2. Ability to construct one's own philosophical arguments and defend them from criticism, both orally and in writing.
3. Ability to explain and analyze the key philosophical concepts of determinism, free will, the existence of God, personality identity, skepticism, and ethics.

Unit-I:
Definition, Nature & Function of Philosophy, and Philosophy in relation to other modes of thinking like Science & Religion.

Unit-II:
Metaphysics: Monism, Pluralism, Realism, Idealism, Metaphysical issues: Substance, Universal, Mind & Body**.**

Unit-III:
Problem of knowledge: What is knowledge? Sources of knowledge: Empiricism, Rationalism, Theories of Truth: Correspondence, coherence and pragmatic theory

Unit-IV:
Problems of Ethics: (1) Theories of Goodness: The good and the evil (2) Theories of conduct: Egoism & Altruism.

Text Book:
1. John Hospers: An Introduction to Philosophical Analysis (relevant portions)
2. J.N. Sinha : Introduction to Philosophy

Reference book:
(1) G.T.W. Patrick: Introduction to Philosophy
(2) A.C. Ewing: The Fundamental Questions of Philosophy
(3) G.W. Cunningham: Problems of Philosophy
(4) Richard Taylor: Metaphysics
(5) D.W. Hamlyn: Metaphysics

Big Data Architecture & Ecosystem – Hadoop

Course Objectives:

1. Learn Injecting data into Hadoop

2. Learn to build and maintain reliable, scalable, distributed systems with Hadooop

3. Able to apply Hadoop ecosystem components.

Unit 1:

Introduction to big data

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.

Unit 2

Introduction to HADOOP

Big Data, Apache Hadoop & Hadoop Ecosystem, Moving Data in and out of Hadoop,

Understanding inputs and outputs of MapReduce, Data Serialization.

Unit 3

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

Unit 4 Hadoop Setup & Administration

Setup – SSH &Hadoop Configuration – HDFS Administering –Monitoring & Maintenance.

Unit 5

HADOOP ecosystem and yarn

Hadoop ecosystem components - Schedulers - Fair and Capacity, Hadoop 2.0 New Features NameNode High Availability, HDFS Federation, MRv2, YARN, Running MRv1 in YARN.

Reference Books:

1. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, “Professional Hadoop Solutions”,

Wiley, ISBN: 9788126551071, 2015.

2. Chris Eaton, Dirk deroos et al. “Understanding Big data ”, McGraw Hill, 2012.

3. Tom White, “HADOOP: The definitive Guide”, O Reilly 2012.

4. MapReduce Design Patterns (Building Effective Algorithms & Analytics for Hadoop) by

Donald Miner & Adam Shook

Major Project-I

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEB7033	Major Project-I	12Hrs/Week	6	50 Marks	150 Marks

Objective:

The Project work enables students to develop further skills and knowledge gained during the programme by applying them to the analysis of a specific problem or issue, via a substantial piece of work carried out over an extended period. For students to demonstrate proficiency in the design of a research project, application of appropriate research methods, collection and analysis of data and presentation of results.

Guidelines:

l. Project Topic:

- To proceed with the project work it is very important to select a right topic. project can undertaken on any subject addressing IT programme.
- Research and development projects problems of practical and theoretical interest should be encouraged.
- Project work must be carried out by the group of at least two students and maximum three and must be original.
- Students can certainly take ideas from anywhere, but be sure that they should evolve them in the unique way to suit their project requirements.
- The project work can be undertaken in a research institute or organization/company/any business establishment.
- Student must consult internal guide along with external guide (if any) in selection of topic.
- Head of department and senior staff in the department will take decisions regarding selection of projects. .
- Student has to submit a weekly progress report to the internal guide and where as keep track on the progress of the project and also has to maintain attendance report can be used for awarding term work marks.
- In case of industry projects, visit by internal guide will be prefened.

2. Project Report Format: At the end of semester a project report should preferably contain at least following details:-

- Abstract
- Introduction
- Literature Survey
- Survey Existing system
- Limitation Existing system or research gap
- Problem Statement and Objective

- Scope . Proposed System
- Analysis/Framework/Algorithm
- Details of Hardware & Software
- Design details
- Methodology (your approach to solve the problem) be on , internal guide has to report. This progress. . implementation Plan for next semester .
- Conclusion
- Reference

SEMESTER VIII											
Course Category	**Course Code**	**Course Title**	**Hours/ Week**			**Theory Marks**		**Practical Marks**		**Total Marks**	**Credit**
			L	**T**	**P**	**IA**	**ESE**	**IA**	**ESE**		
DC	CSEB8010	Digital Signal & Image Processing	3	-	-	30	70	-	-	100	3
DE	***	Elective -IV	3	-	-	30	70	-	-	100	3
OE	***	Open Elective -III	3	-	-	30	70	-	-	100	3
DC	CSEB8033	Major Project-II	-	-	12	-	-	50	150	200	6
	TOTAL		**9**	**-**	**12**	**90**	**210**	**50**	**150**	**500**	**15**

Elective -IV

Elective-IV CSEB 8950/8630
1. Embedded Systems
2. Big Data Analytics

OpenElective-III HUMG8000/ITEB8320
1. Economic Policies in India
2. **System Security & Digital Forensic**

Open Elective -III

Digital Signal & Image Processing

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEB8010	Digital Signal & Image Processing	3Hrs/Week	3	30 Marks	70 Marks

Prerequisites:

Applied Mathematics

Course Objectives: Students will try to learn

1. To understand the fundamental concepts of digital signal processing and Image processing.
2. To explore DFT for 1-D and 2-D signal and FFT for 1-D signal
3. To apply processing techniques on 1-D and Image signals.
4. To apply digital image processing techniques for edge detection.

Course Outcomes (COs): The students will be able to learn

1. Apply the concept of DT Signal and DT Systems.
2. Classify and analyze discrete time signals and systems
3. Implement Digital Signal Transform techniques DFT and FFT.
4. Use the enhancement techniques for digital Image Processing
5. Differentiate between the advantages and disadvantages of different edge detection techniques
6. Develop small projects of 1-D and 2-D Digital Signal Processing.

Course Contents

Unit I Discrete-Time Signal and Discrete-Time System: (14 Hrs)

Introduction to Digital Signal Processing, Sampling and Reconstruction, Standard DT Signals, Concept of Digital Frequency, Representation of DT signal using Standard DT Signals, Signal Manipulations (shifting, reversal, scaling, addition, multiplication). Classification of Discrete-Time Signals, Classification of Discrete- Systems Linear Convolution formulation for 1-D and 2-D signal (without mathematical proof), Circular Convolution (without mathematical proof), Linear convolution using Circular Convolution. Auto and Cross Correlation formula evaluation, LTI system, Concept of Impulse Response and Step Response, Output of DT system using Time Domain Linear Convolution.

Unit II Discrete Fourier Transform: (08 Hrs)

Introduction to DTFT, DFT, Relation between DFT and DTFT, IDF. Properties of DFT without mathematical proof (Scaling and Linearity, Periodicity, Time Shift and Frequency Shift, Time Reversal, Convolution Property and Parseval's Energy Theorem). DFT computation using DFT properties, Transfer function of DT System in frequency domain using DFT. Linear and Circular Convolution using DFT, Convolution of long sequences, Introduction to 2-D DFT

Unit III Fast Fourier Transform: (06 Hrs)

Need of FFT, Radix-2 DIT-FFT algorithm, DIT-FFT Flow graph for N=4 and 8, Inverse FFT

algorithm. Spectral Analysis using FFT

Unit IV Digital Image Fundamentals: (08 Hrs)

Introduction to Digital Image, Digital Image Processing System, Sampling and Quantization, Representation of Digital Image, Connectivity, Image File Formats: BMP, TIFF and JPEG.

Unit V Image Enhancement in Spatial domain: (10 Hrs)

Gray Level Transformations, Zero Memory Point Operations, Histogram Processing, Histogram equalization, Neighborhood Processing, Spatial Filtering, Smoothing and Sharpening Filters, Median Filter

Unit VI Image Segmentation: (06 Hrs)

Segmentation based on Discontinuities (point, Line, Edge), Image Edge detection using Robert, Sobel, Previtt masks, Image Edge detection using Laplacian Mask.

Text Books:

1. John G. Proakis, Dimitris and G.Manolakis, Digital Signal Processing: Principles, Algorithms, and Applications‘ 4th Edition 2007, Pearson Education.
2. A. Anand Kumar, _Digital Signal Processing‘, PHI Learning Pvt. Ltd. 2013.
3. Rafel C. Gonzalez and Richard E. Woods, _Digital Image Processing‘, Pearson Education Asia, 3rd Edition, 2009,
4. S. Sridhar, _Digital Image Processing‘, Oxford University Press, Second Edition, 2012.

DEPARTMENT ELECTIVES

Embedded Systems

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEB8950	Embedded System	3Hrs/Week	3	30 Marks	70 Marks

Course Objectives:

1. This course emphasizes on comprehensive treatment of embedded hardware and real time operating systems along with case studies, in tune with the requirements of Industry.
2. The objective of this course is to enable the students to understand embedded-system programming and apply that knowledge to design and develop embedded solutions.

Course Outcomes: The student will be able to:

1. Understand the concept of embedded system, microcontroller, different components of microcontroller and their interactions.
2. Get familiarized with programming environment to develop embedded solutions. Program ARM microcontroller to perform various tasks.
3. Understand the key concepts of embedded systems such as I/O, timers, interrupts and interaction with peripheral devices.

Course Content

Unit - I

Introduction to Embedded Systems: Definition, Applications of ES, Embedded Hardware Units and Devices, Embedded Software, Design Metrics in ES, Challenges in ES Design.

Unit- II

Architecture of 8051: 8051 Micro controller Hardware, Input/output Ports and Circuits, External Memory, Counter and Timers, Serial data Input/output, Interrupts and Programming 8051.

Unit –III

ARM- Embedded Processor: History, Architecture, Interrupt vector, Programming the ARM, ARM Assembly language, Instruction set, Conditional Execution, Arithmetic and Logical Compare.

Unit – IV ARM PROGRAMMING: Assembly programming, General structure of assembly language, Writing programs, Branch instructions, Loading constrains, load and store instructions, Read only and read/write Memory, Multiple Register Load and Store.

UNIT – V

REAL TIME OPERATING SYSTEMS: Introduction, Tasks and Task States, Tasks and Data, Reentrancy, Semaphores and Shared Data, Inter Process Communication-Message Queues, Mailboxes and Pipes.

TEXT BOOKS:

1. Raj Kamal, “Embedded Systems”, 2nd edition, Tata McGraw Hill, 2009.

2. Lyla B Das, “Embedded Systems an Integrated Approach”, 1st edition, Pearson, 2012.

3. David E. Simon, “An Embedded Software Primer”, 1st edition, Pearson Education, 2008.

Big Data Analytics

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEB8630	Big Data Analytics	3Hrs/Week	3	30 Marks	70 Marks

Prerequisites:

Should have knowledge of one Programming Language (Java preferably), Practice of SQL (queries and sub queries), exposure to Linux Environment

Course Objectives: Students will try to learn

1. To provide an overview of an exciting growing field of big data analytics.
2. To introduce the tools required to manage and analyze big data like Hadoop, NoSql Map-Reduce.
3. To teach the fundamental techniques and principles in achieving big data analytics with scalability and streaming capability.
4. To enable students to have skills that will help them to solve complex real-world problems in for decision support.

Course Outcomes (COs): The students will be able to learn

1. Understand the key issues in big data management and its associated applications in intelligent business and scientific computing.
2. Acquire fundamental enabling techniques and scalable algorithms like Hadoop, Map Reduce and NO SQL in big data analytics.
3. Interpret business models and scientific computing paradigms, and apply software tools for big data analytics.
4. Achieve adequate perspectives of big data analytics in various applications like recommender systems, social media applications etc.

Course Contents

Unit I (02 Hrs)

Introduction to Big Data, Big Data characteristics, Type of Big Data, Traditional vs. Big Data business approach, Ref. Case Study of Big Data Solutions

Unit II (02 Hrs)

Introduction to Hadoop- What is Hadoop? Core Hadoop Components, Hadoop Ecosystem, Physical Architecture, Hadoop limitations

Unit III (04 Hrs)

NoSQL, What is NoSQL? NoSQL business drivers, NoSQL case studies, NoSQL data architecture patterns: Key-value stores, Graph stores, Column family (Bigtable) stores, Document stores, Variations of NoSQL architectural patterns; Using NoSQL to manage big data: What is a big data NoSQL solution? Understanding the types of big data problems; Analyzing big data with a shared-nothing architecture; Choosing distribution models: master-slave versus peer-to-peer; Four ways that NoSQL systems handle big data problems

Unit IV (06 Hrs)

MapReduce and Distributed File Systems: Physical Organization of the New Software Compute Nodes, Large-Scale File-System Organization. Stack MapReduce: The Map Tasks, Grouping by Key, The Reduce Tasks, Combiners, Details of MapReduce Execution, Coping With Node Failures. Algorithms Using MapReduce: Matrix-Vector Multiplication by MapReduce, Relational-Algebra Operations, Computing Selections by MapReduce, Computing Projections by MapReduce, Union, Intersection, and Difference by MapReduce, Computing Natural Join by MapReduce, Grouping and Aggregation by MapReduce, Matrix Multiplication, Matrix Multiplication with One MapReduce Step.

Unit V(03 Hrs)

Finding Similar Applications of Near-Neighbor Search, Jaccard, Items Similarity of Sets, Similarity of Documents, Collaborative Filtering as a Similar-Sets Problem . Distance Measures: Definition of a Distance Measure , Euclidean Distances, Jaccard Distance, Cosine Distance, Edit Distance, Hamming Distance.

Unit VI (06 Hrs)

Mining Data The Stream Data Model: A Data-Stream-Management, Streams System, Examples of Stream Sources, Stream Query, Issues in Stream Processing. Sampling Data in a Stream : Obtaining a Representative Sample , The General Sampling Problem, Varying the Sample Size, Filtering Streams: The Bloom Filter, Analysis. Counting Distinct Elements in a Stream The Count-Distinct Problem, The Flajolet-Martin Algorithm, Combining Estimates, Space Requirements, Counting Ones in a Window: The Cost of Exact Counts, The Datar-Gionis-IndykMotwani Algorithm, Query Answering in the DGIM Algorithm, Decaying Windows.

Unit VII (05 Hrs)

Link Analysis PageRank Definition, Structure of the web, dead ends, Text 05 Using Page rank in a search engine, Efficient Book 1 computation of Page Rank: PageRank Iteration Using MapReduce, Use of Combiners to Consolidate the Result Vector. Topic sensitive Page Rank, link Spam, Hubs and Authorities.

Unit VIII (05 Hrs)

Frequent Item sets Handling Larger Datasets in Main Memory , Algorithm of Park, Chen, and Yu, The Multistage, Algorithm, The Multihash Algorithm. The SON Algorithm and MapReduce Counting Frequent Items in a Stream Sampling Methods for Streams, Frequent Itemsets in Decaying Windows

References:

1. Data Warehousing in the Age of Big Data by Krish Krishnan, Morgan Kaufmann.
2. A.Ohri, “R for Business Analytics”, Springer, 2012.
3. Big Data Analytics with R and Hadoop by Vignesh Prajapati
4. Principles of Big Data Preparing, Sharing, and Analyzing Complex Information, 1st Edition, by J Berman, published by Morgan Kaufmann
5. “Big Data Analytics - From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph” By David Loshin, Morgan Kaufmann
6. Big Data Imperatives: Enterprise 'big Data' Warehouse, 'BI' Implementations and Analytics by Soumendra Mohanty, Apress
7. Big Data Analytics Using Splunk By Peter Zadrozny , Raghu Kodali, Apress

OPEN ELECTIVES

Economic Policies in India

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
HUMG8000	Economic Policies in India	3Hrs/Week	3	30 Marks	70 Marks

Course Objectives:

1. To enable students to understand how optimum real life decisions are taken by individuals under situations of scarcity.
2. 2. To enable students to understand how optimum decisions are taken by firms in the economy.

Course Outcome: On completion of the course students will be able to:

1. Develop ideas of the basic characteristics of Indian economy, its potential on natural resources.
2. Understand the importance, causes and impact of population growth and its distribution, translate and relate them with economic development.
3. Grasp the importance of planning undertaken by the government of India, have knowledge on the various objectives, failures and achievements as the foundation of the ongoing planning and economic reforms taken by the government.
4. Understand agriculture as the foundation of economic growth and development, analyze the progress and changing nature of agricultural sector and its contribution to the economy as a whole.
5. Not only be aware of the economy as a whole, they would understand the basic features of Mizoram's economy, sources of revenue, how the state government finance its programmes and projects

Course Content

Unit –I

Basic features and problems of Indian Economy: - Nature of Indian Economy, demographic features and Human Resource Development (HDI), Problems of Poverty, Unemployment, Inflation, income inequality, Black money in India.

Unit-II

Sectoral composition of Indian Economy: - Issues in Agriculture sector in India ,land reforms Green Revolution and agriculture policies of India , Industrial development , small scale and cottage industries, industrial Policy, Public sector in India, service sector in India.

Unit-III

Economic Policies :- Economic Planning in India , Planning commission v/s NITI Aayog, monetary policy in India, Fiscal Policy in India, Centre state Finance Relations, Finance commission in India, LPG policy in India.

Unit-IV

External sector in India: - India's foreign trade value composition and direction, India Balance of payment since 1991, FDI in India, Impact of Globalization on Indian Economy, WTO and India.

Text book :

1. Dutt Rudder and K.P.M Sunderam (2001): Indian Economy, S Chand & Co. Ltd. New Delhi.

2. Mishra S.K & V.K Puri (2001) "Indian Economy and –Its development experience",

Himalaya Publishing House.

3. KapilaUma: Indian Economy: Policies and Performances, Academic Foundation

4. Bardhan, P.K. (9th Edition) (1999), The Political Economy of Development in India, Oxford University Press, New Delhi.

5. Jalan, B. (1996), India's Economic Policy- Preparing for the Twenty First Century, Viking, New Delhi.

System Security & Digital Forensic

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
ITEB8320	**System Security & Digital Forensic**	3Hrs/Week	3	30 Marks	70 Marks

Course Objectives:

1. To understand cyber-attacks and defense strategies.
2. To understand underlying principles of access control mechanisms.
3. To explore software vulnerabilities, attacks and protection mechanisms of wireless networks and protocols, mobile devices and web applications.
4. To develop and mitigate security management and policies.
5. To understand and explore techniques used in digital forensics.

Course Outcomes: At the end of the course leaner will able to

1. Understand cyber attacks and apply access control policies and control mechanisms.
2. Identify malicious code and targeted malicious code.
3. Detect and counter threats to web applications.
4. Understand the vulnerabilities of Wi-Fi networks and explore different measures to secure wireless protocols, WLAN and VPN networks.
5. Understand the ethical and legal issues associated with cyber crimes and be able to mitigate impact of crimes with suitable policies.
6. Use different forensic tools to acquire and duplicate data from compromised systems and analyse the same.

Course Content

Unit-I (08)

Introduction & Access Control, Cyber-attacks, vulnerabilities, Defence Strategies and Techniques, Authentication Methods and Protocols, Defence in Depth Strategies. Access control Policies: DAC. MAC, Multilevel Security Models: Biba Model, Bell La Padula Model, Single sign on, Federated Identity

Unit-II (08)

Program & OS Security, Malicious and Non-Malicious programming, codes: Salami Attack, Linearization Attack, against Program threats. errors, Targeted Malicious, Covert Channel, Control, operating system Security: Memory and Address protection, File, Protection Mechanism, User Authentication. Linux and Windows: Vulnerabilities, File System Security.

Unit-III (12)

Web Application Security, OWASP, web security considerations, user Authentication and Session, Management, Cookies, SSL, HTTPS, SSH, Privacy on Web, Web Browser, Attacks, Account Harvesting, Web Bugs, Clickjacking, Cross-Site Request, Forgery, Session Hijacking and Management, Phishing and pharming, Techniques, Web Service Security, OAuth 2.0.

Unit-IV(08)

Wireless Security, Wi-Fi Security, WEP, WPA, WPA-2, Mobile Device Security-Security

Threats, Device Security, GSM and UMTS Security, IEEE 802.11/ 802.11i, Wireless LAN Security, VPN Security.

Unit-V (06)

Legal and Ethical issues, Cybercrirne and its types, Intellectual property, Privacy, Ethical issues. Protecting Programs and Data, Information and the Law, Rights of Employees and Employers, Redress for Software Failures, Computer Crime, Ethical Issues in Computer Security, case studies of ethics.

Unit-VI (10)

Digital Forensic, Introduction to Digital Forensics, Acquiring Volatile Data from Windows and Unix systems, Forensic Duplication Techniques, Analysis of forensic images using open source tools like Autopsy and SIFT, Investigating logs from Unix and windows systems, Investigating Windows Registry.

Text Books:

1. L Computer Security Principles and Practice, William Stallings, Sixth Edition, Pearson Education
2. Security in computing, charles P. Pfleeger; Fifth Edition, pearson Education
3. Network Security and Cryptography, Bernard Menezes, Cengage Learning
4. Network Security Bible, Eric Cole, Second Edition, Wiley

Major Project-II

Course		Teaching Scheme		Evaluation Scheme	
Code	**Name**	**Lectures**	**Total Credits**	**Internal Assessment Test**	**End-Semester Examination**
CSEB8033	Major Project-I	12Hrs/Week	6	50 Marks	150 Marks

Objective: The primary objective is to meet the milestones formed in the overall project plan decided in Project - I. The idea presented in Project -I should be implemented in Project -II with results, conclusion and future work. The project will culminate in the production of a thesis by each individual student.

Guidelines: Project Report Format: At the end of semester a student need to prepare a project report should be prepared as per the guidelines issued by the University. Along with project report , CD containing: project documentation, Implementation code, required utilities, Software's and user Manuals need to be attached.

Term Work: Student has to submit weekly progress report to the internal guide and whereas internal guide has to keep track on the progress of the project and also has to maintain attendance report. This progress report can be used for awarding term work marks. In case of industry projects, visit by internal guide will be preferred to get the status of project.

Distribution of marks for term work shall be as follows:
a) Weekly Attendance on Project Day
b) Project work contributions as per objective
c) Project Report (Hard Bound)
d) Term End Presentation (internal) the final certification and acceptance of TW ensures the satisfactory performance on the above aspects