SYLLABUS COPY OF EMPLOYABILITY COURSES

CIVIL ENGINEERING

SYLLABUS: ADVANCED MATHEMATICS (M17 ST 1101)

UNIT-I

Applied partial Differential Equations: One-dimensional Heat equation Cartesian, cylindrical andspherical coordinates (problems having axi-symmetry). Two-dimensional Laplace Equation inCartesian, cylindrical and spherical coordinates (problems having axi-symmetry) – Analytical solution by separation of variables technique.

UNIT-II

Numerical solutions to Heat and Laplace Equations in Cartesian coordinates using finite–differences. Implicit methods, Crank Nicholsen Method, Jacobi Method, Guass Seidal method.

UNIT-III

Applied Statistics: Regression and correlation analysis–Method of Least squares–Curve fitting – Curvilinear Regression – Non-linear curves – correlation coefficient – Correlation of grouped bi-variate data–coefficient of determination Multiple Regression–partial Regression coefficients.

UNIT-IV

Tests of significance –Analysis of variancefor regression– Multiple correlation coefficients–Multiplelinear regression with two independentvariables.

UNIT-V

Linear Programming Problem Formation, Graphical Method, Simplex method, artificial variable method-Big-M method-Two Phase Method. Non Linear Programming Problem Gradient method, Steepest Ascent Descent Methods

Course Outcomes for First Year First Semester Course	
Course Code: M17 ST 1101	
Course Title: Advanced Mathematics	
CO-1	Obtain analytical solution of the two-dimensional partial differentials they come across in simple applications.
CO-2	Get numerical solutions for One – dimensional heat and two-dimensional Laplace equations by different methods.
CO-3	Perform correlation and regression analysis for different types of data they come across.
CO-4	Formulate a linear programming problem and solve it by an appropriate method. Analyse non-linear programming problems by some specific methods.
CO-5	Obtain analytical solution of the two-dimensional partial differentials they come across in simple applications.

SYLLABUS: THEORY OF ELASTICITY (M17 ST 1102)

UNIT-I

Elasticity – Notation for forces and stresses – components of stresses and strains – Hooke‟s Law - Plane Stress – Plane strain – Differential Equations of equilibrium – Boundary conditions – Compatibility equations - Stress function – Boundary Conditions.

UNIT-II

Two dimensional problems in rectangular co-ordinates – Solution by polynomials – Saint Venant‟s principle – Determination of displacements – Bending of simple beams – Application of Fourier series for two dimensional problems for gravity loading

UNIT-III

Two dimensional problems in polar co-ordinates - General equations in polar co-ordinates – Stress distribution for problems having symmetrical about an axis - Strain components in polar coordinates – Displacements for symmetrical stress distributions - Stresses for plates with circular holes subjected to far field tension – stress concentration factor.

UNIT-IV

Analysis of stress and strain in three dimension - Principal stresses – Stress ellipsoid and stress director surface – Determination of principal stresses - Maximum shear stress – Homogeneous Deformation – General Theorems - Differential equations of equilibrium – Conditions of compatibility – Equations of equilibrium in terms of displacements– Principle of superposition – Uniqueness of solution –Reciprocal theorem

UNIT-V

Torsion of prismatical bars – Bars with elliptical cross section – Other elementary solution –Membrane analogy – Torsion of rectangular bars – Solution of torsional problems by energymethod.

Course Outcomes for First Year First Semester Course	
Course Code: M17 ST 1102	
Course Title: Theory of Elasticity	
CO-1	Analyze the stresses and strains for two dimensional and three dimensional elements.
CO-2	Understand the equilibrium and compatibility conditions.
CO-3	Solve the problems on Torsion for different shaped bars.

SYLLABUS: MATRIX METHODS OF STRUCTURAL ANALYSIS (M17ST1103)

UNIT-I

Introduction of matrix methods of analysis – Static and kinematic indeterminacy – Degree of freedom – Structure idealization-stiffness and flexibility methods – Suitability: Element stiffness matrix for truss element, beam element and Torsional element- Element force – displacement equations

UNIT-II

Stiffness method – Element and global stiffness equation – coordinate transformation and globalassembly – structure stiffness matrix equation – analysis of simple pin jointed trusses – continuousbeams–rigid jointed planeframes

UNIT-III

Stiffness method for Grid elements – development of stiffness matrix – coordinate transformation. Examples of grid problems– tapered and curved beams

UNIT-IV

Additional topics in stiffness methods – discussion of band width – semi band width – static condensation – sub structuring –Loads between joints-Support displacements- inertial and thermal stresses-Beamson elastic foundation by stiffness method.

UNIT-V

Space trusses and frames - Member stiffness for space truss and space frame– Transformation matrix from Local to Global – Analysis of simple trusses, beams and frames

Course Outcomes for First Year First Semester Course	
Course Code:M17 ST 1103	
Course Title:Matrix methods of Structural Analysis	
CO-1	Analyze various beams by the matrix methods at different loading conditions.
CO-2	Analyze various Plane truss problems by the matrix methods.
CO-3	Analyze Plane Frames by the matrix methods at different loading conditions.

SYLLABUS: STRUCTURAL DYNAMICS (M17 ST 1104)

UNIT-I

Introduction to Structural Dynamics: Fundamental objective of Dynamic analysis – Types of prescribed loadings – methods of Discretization – Formulation of the Equations of Motion.

UNIT-II

Theory of Vibrations: Introduction – Elements of a Vibratory system– Degrees of Freedom ofcontinuous systems - Oscillatory motion – Simple Harmonic Motion– Free Vibrations of Single Degree of Freedom (SDOF) systems – Undamped and Damped – Critical damping – Logarithmicdecrement – Forced vibrations of SDOF systems – Harmonic excitation – Dynamic magnificationfactor–Bandwidth.

UNIT-III

Single Degree of Freedom System: Formulation and Solution of the equation of Motion –Freevibration response – Response to Harmonic, Periodic, Impulsive and general dynamic loadings –Duhamel integral.

UNIT-IV

Multi Degree of Freedom System: Selection of the Degrees of Freedom– Evaluation of Structural Property Matrices – Formulation of the MDOF equations of motion - Undamped free vibrations –Solution of Eigen value problem for natural frequencies and mode shapes – Analysis of dynamic response-Normal coordinates.

UNIT-V

Continuous Systems: Introduction – Flexural vibrations of beams – Elementary case –Equation ofmotion – Analysis of undamped free vibration of beams in flexure – Natural frequencies and mode shapes of simple beams with different end conditions.

Course Outcomes for First Year First Semester Course	
Course Code:M17 ST 1104	
Course Title: Structural Dynamics	
CO-1	Solve the problems on Single degree of freedom.
CO-2	Understand the difference between harmonic loading and impulse loading and the related analysis procedures.
CO-3	Evaluate the structural properties, mode shapes for different structures.

SYLLABUS: SUB-STRUCTURE DESIGN (M17 ST 1105)

(ELECTIVE-I)

UNIT-I

Soil Exploration – Importance, Terminology, planning - Geophysical methods. Borings, location, spacing and depth, methods of boring including drilling, stabilization of boreholes, boring records

UNIT-II

Soil sampling – Methods of sampling -Types of samples and samplers-cleaning of bore holes, preservation, labeling and shipment of samples - Design considerations of open drive samplers..

UNIT-III

Shallow Foundations –Bearing capacity – General bearing capacity equation, Meyer hof‟s, Hansen‟s and Vesic‟s bearing capacity factors - Bearing capacity of stratified soils - Bearing capacity based on penetration resistance- safe bearing capacity and allowable bearing pressure. (Ref: IS -2131 & IS 6403)

UNIT-IV

Types and choice of type. Design considerations including location and depth, Proportioning of shallow foundations- isolated and combined footings and mats - Design procedure for mats. Floating foundation-Fundamentals of beams on Elastic foundations..(Ref: IS -456 & N.B.C. relevant volume).

UNIT-V

Pile foundations-Classification of piles-factors influencing choice-Load -carrying capacity of single piles in clays and sands using static pile formulae- á - â - and λ - methods –Dynamic pile formulae-limitations-Monotonic and cyclic pile load tests – Under reamed piles. Pile groups -Efficiency of pile groups- Different formulae-load carrying capacity of pile groups in clays and sands – settlement of pile groups in clays and sands – Computation of load on each pile in a group.

Course Outcomes for First Year First Semester Course	
Course Code:M17 ST 1105	
Course Title:Sub-Structure Design (ELE- I)	
CO-1	Plan a detailed soil exploration programme.
CO-2	Apply various methods for estimating bearing capacity of different types of foundations.
CO-3	Estimate load capacity of single piles and groups of piles

SYLLABUS: EXPERIMENTAL STRESS ANALYSIS (M17 ST 1106)

(ELECTIVE-I)

UNIT-I

Introduction and Strain measurement methods – Model & Prototype– Dimensional analysis Factors influencing model design – Scale factors and Model material properties – Methods of model design. Definition of strain and its relation to experimental determinations - properties of strain gauge systems – Mechanical, Optical, Acoustic and Pneumatic types.

UNIT-II

Electrical resistance strain gages: Introduction – gauge construction– strain gauge adhesives -mounting methods – gauge sensitivities and gage factor – performance characteristics of wire andfoil strain gauges – environmental effects. Analysis of strain gauge data– the three elementrectangularrosette– thedeltarosette– correction fortransversesensitivity.

UNIT-III

Non – destructive testing: Introduction – objectives of non-destructive testing. Ultrasonic pulsevelocity method – Rebound Hammer method (Concrete hammer) – Acoustic Emission-applicationtoassessment ofconcretequality.

UNIT-IV

Theory of photo elasticity: Introduction – temporary double refraction– Index ellipsoid and stressellipsoid– thestressopticlaw–effectsofstressedmodelinapolariscopeforvariousarrangements-fringesharpening.

UNIT-V

Two dimensional photo elasticity: Introduction – iso-chromatic fringe patterns – isoclinic fringepatterns – compensation techniques – calibration methods – separation methods – materials forphoto-elasticity– properties of photo-elastic materials.

Course Outcomes for First Year First Semester Course	
Course Code:M17 ST 1106	
Course Title:Experimental Stress Analysis (ELE- I)	
CO-1	Know the working principle of strain gauges.
CO-2	Do the model analysis using different theorems.
CO-3	Know the concepts of photo elasticity and its applications.

SYLLABUS: ADVANCED REINFORCED CONCRETE DESIGN (M17ST1107)
(ELECTIVE-I)

UNIT-I

Deflection of Reinforced Concrete Beams and Slabs: Introduction, Short-term deflection of beams and slabs, Deflection due to imposed loads, Short-term deflection of beams due to applied loads, Calculation of deflection by IS 456, Deflection of continuous beams by IS 456, Deflection of slabs.

UNIT-II

Estimation of Crack width in Reinforced Concrete Members: Introduction, Factors affecting crack width in beams, Mechanisms of flexural cracking, Calculation of crack width, Simple empirical method, Estimation of crack width in beams by IS 456, Shrinkage and thermal cracking.

UNIT-III

Redistribution of Moments in Reinforced Concrete Beams: Introduction, Redistribution of moments in fixed beam, Positions of points of contraflexures, Conditions for moment redistribution, Final shape of redistributed bending moment diagram, Moment redistribution for a two-span continuous beam, Advantages and disadvantages of moment redistribution, Modification of clear distance between bars in beams (for limiting crack width) with), Relation of reinforced concrete sections.ψredistribution, Moment-curvature (M - Approximation Analysis of Grid Floors: Introduction, Analysis of flat grid floors, Analysis of rectangular grid floors by Timoshenko"s plate theory. Analysis of grid by stiffness matrix method, Analysis of grid floors by equating joint deflections, Comparison of methods of analysis, Detailing of steel in flat grids..

UNIT-IV

Design of Flat Slabs: Introduction, Proportioning of Flat Slabs, Determination of Bending moment and Shear Force, Direct Design method, Equivalent Frame method, Slab Reinforcement.

UNIT-V

Design of Reinforced Concrete Members for Fire Resistance: Introduction, ISO 834 standard heating conditions, Grading or classifications, Effect of high temperature on steel and concrete, Effect of high temperatures on different types of structural members, Fire resistance by structural detailing from tabulated data, Analytical determination of the ultimate bending moment, Capacity of reinforced concrete beams under fire, Other considerations..

Course Outcomes for First Year First Semester Course	
Course Code: M17 ST 1107	
Course Title: Advanced Reinforced concrete Design (ELE- I)	
CO-1	Estimate the crack width and deflection with regard to the serviceability.
CO-2	Analyze and design a grid floor system.
CO-3	Analyze and design a flat slab system.
CO-4	Analyze and design of concrete structures against fire resistance, according to ISO834 standards.

SYLLABUS: PLASTIC ANALYSIS AND DESIGN (M17 ST 1108)

(ELECTIVE-II)

UNIT-I

Introduction and basic hypothesis: Concepts of stress and strain – relation of steel Moment curvature relation-basic difference between elastic and plastic analysis with examples- Yield condition, idealizations, collapse criteria- Virtual work in the elastic-plastic state-Evaluation of fully plastic moment and shape factors for the various practical sections

UNIT-II

Method of Limit Analysis: Introduction to limit analysis of simply supported fixed beams and continuous beams, Effect of partial fixity and end, invariance of collapse loads, basic theorems of limit analysis, rectangular portal frames, gable frames, grids, superposition of mechanisms, drawing statistical bending moment diagrams for checks.

UNIT-III

Limit design Principles: Basic principles, limit design theorems, application of limit design theorems, trial and error method, method of combining mechanisms, plastic moment distribution method, load replacement method, continuous beams and simple frames designs using above principles.

UNIT-IV

Deflection in Plastic beams and frames: Load deflection relations for simply supported beams, deflection of simple pin based and fixed based portal frames, method of computing deflections.

UNIT-V

Minimum weight Design: Introduction to minimum Weight and linear Weight functions-Foulkes theorems and its geometrical analogue and absolute minimum weight design.

Course Outcomes for First Year First Semester Course	
Course Code: M17 ST 1108	
Course Title:Plastic Analysis and Design (ELE- II)	
CO-1	Analyze the S.S.B and fixed beams by limit design.
CO-2	Design the continuous beams and simple frames.
CO-3	To compute the deflections for S.S.B,fixed portal frames.

SYLLABUS: ANALYSIS AND DESIGN OF TALL BUILDINGS(M17 ST 1109)
(ELECTIVE-II)

UNIT-I

Design Criteria Philosophy, Materials – Modern concepts – High Performance Concrete, Fibre Reinforced Concrete, Light weight concrete, Self Compacting Concrete

UNIT-II

Gravity Loading – Dead load, Live load, Impact load, Construction load, Sequential loading. Wind Loading – Static and Dynamic Approach, Analytical method, Wind Tunnel Experimental methods.Earthquake Loading – Equivalent lateral Load analysis, Response Spectrum Method, Combination ofLoads.

UNIT-III

Behavior of Structural Systems- Factors affecting the growth, height and structural form, Behaviour of Braced frames, Rigid Frames, In-filled frames, Shear walls, Coupled Shear walls, Wall–Frames, Tubular, Outrigger braced, Hybrid systems.

UNIT-IV

Analysis and Design- Modeling for approximate analysis, Accurate analysis and reduction techniques, Analysis of structures as an integral unit, Analysis for member forces, drift and twist. Computerized 3D analysis. Design for differential movement, Creep and Shrinkage effects, Temperature Effects and Fire Resistance.

UNIT-V

Stability Analysis- Overall buckling analysis of frames, wall–frames, Approximate methods, Second order effect of gravity loading, P–Delta Effects, Simultaneous first order and P-Delta analysis, Translational instability, Torsional Instability, Out of plumb effects, Effect of stiffness of members and foundation rotation in stability of structures.

Course Outcomes for First Year First Semester Course	
Course Code: M17 ST 1109	
Course Title: Analysis and Design of Tall Buildings (ELE- II)	
CO-1	Know the types of tall buildings.
CO-2	Analyze the plane frame systems by different methods.

REPAIR AND REHABILITATION OF STRUCTURES (M17 ST 1110)
(ELECTIVE-II)

UNIT-I

Materials for repair and rehabilitation -Admixtures- types of admixtures-purposes of using admixtures-chemical composition- Natural admixtures- Fibres- wraps- Glass and Carbon fibre wraps- Steel Plates-Non destructive evaluation: Importance- Concrete behavior under corrosion, disintegrated mechanisms- moisture effects and thermal effects – Visual investigation Acoustical emission methods- Corrosion activity measurement- chloride content– Depth of carbonation- Impact echo methods- Ultrasound pulse velocity methods- Pull out tests.

UNIT-II

Strengthening and stabilization- Techniques- design considerations-Beam shear capacity strengthening- Shear Transfer strengthening-stress reduction techniques- Column strengthening flexural strengthening- Connection stabilization and strengthening, Crack stabilization.

UNIT-III

Bonded installation techniques- Externally bonded FRP- Wet layup sheet, bolted plate, near surface mounted FRP, fundamental debonding mechanisms-intermediate crack debonding-CDC debonding- plate end debonding- strengthening of floor of structures.

UNIT-IV

Fibre reinforced concrete- Properties of constituent materials- Mix proportions, mixing and casting methods-Mechanical properties of fiber reinforced concrete- applications of fibre reinforced concretes-Light weight concrete- properties of light weight concrete- No fines concrete- design of light weight concrete- Flyash concrete-Introduction- classification of fly ash properties and reaction mechanism of flyash- Properties of flyash concrete in fresh state and hardened state- Durability of flyash concretes.

UNIT-V

High performance concretes- Introduction- Development of high performance concretes Materials of high performance concretes-Properties of high performance concretes- Self Consolidating concrete-properties-qualifications.

Course Outcomes for First Year First Semester Course	
Course Code: M17 ST 1110	
Course Title: Repair and Rehabilitation of Structures (ELE- II)	
CO-1	Assess the damage intensity.
CO-2	Select proper rehabilitation and repair measures for different types of deteriorations.
CO-3	Apply the Seismic Retrofitting techniques on reinforced concrete building.

ADVANCED STRUCTURAL ENGINEERING LABORATORY (M17 ST 1111)

1. Strain measurement-Electrical resistance strain gauges
2. Nondestructive testing- Impact Hammer test, UPV test
3. Qualifications tests on Self compaction concrete-LBox test, J Box test, U box test, SlumpTest.
4. Tests on Buckling of columns–South well plot
5. Repair and rehabilitation of concrete beams
6. Chemical Analysis of water for suitability in concreting with and without Reinforcement.
7. Chemical Analysis of sand and Aggregate for Suitability in Construction.

NOTE: A minimum of five experiments from the above set have to be conducted.

Course Outcomes for First Year First Semester Course	
Course Code: M17 ST 1111	
Course Title: Advanced Structural Engineering Laboratory	
CO-1	Measure strains in concrete elements by Electrical resistance strain gauges.
CO-2	Conduct qualifying tests for Self compaction concrete.
CO-3	Conduct Chemical Analysis of water and Aggregate for Suitability in concreting with and without Reinforcement.

SYLLABUS:THEORY OF PLATES AND SHELLS (M17 ST 1201)

UNIT-I

Derivation of governing differential equation for plate– in plane bending and transverse bending effects- Rectangular plates: Plates under various loading conditions like concentrated, uniformly distributed load and hydrostatic pressure. Navier and Levy"s type of solutions for various boundary condition.

UNIT-II

Circular plates: Symmetrically loaded, circular plates under various loading conditions, Annular plates..

UNIT-III

Introduction to Shells- Single and double curvature- Equations of Equilibrium of Shells: Derivation of stress resultants, Principles of membrane theory and bending theory.

UNIT-IV

Cylindrical Shells: Derivation of the governing DKJ equation for bending theory, details of Schorer"s theory. Application to the analysis and design of short and long shells. Use of ASCE Manual coefficients for the design.

UNIT-V

Beam theory of cylindrical shells: Beam and arch action. Design of diaphragms – Geometry analysis and design of elliptic Paraboloid, Conoidal and Hyperbolic Paraboloid shapes by membrane theory.

Course Outcomes for First Year Second Semester Course	
Course Code:M17ST 1201	
Course Title: Theory of Plates and Shells	
CO-1	Analyze and design for plates for different loadings.
CO-2	Analyze and design of shells.
CO-3	Explain the concept of theory of cylindrical shells.

SYLLABUS: FINITE ELEMENT METHODS OFANALYSIS (M17ST1202)

UNIT-I

Introduction: Review of stiffness method- Principle of Stationary potential energy-Potential energy of an elastic body- Rayleigh-Ritz method of functional approximation – variational approaches-weighted residual methods.

UNIT-II

Finite Element formulation of truss element: Stiffness matrix- properties of stiffness matrix – Selection of approximate displacement functions-solution of a plane truss- transformation matrix and stiffness matrix for a 3-D truss- Inclined and skewed supports- Galerkin‟s method for 1-D truss – Computation of stress in a truss element.

UNIT-III

Finite element formulation of Beam elements: Beam stiffness-assemblage of beam stiffness matrix- Examples of beam analysis for concentrated and distributed loading- Galerkin‟s method - 2-D Arbitrarily oriented beam element – inclined and skewed supports – rigid plane frame examples

UNIT-IV

Finite element formulation for plane stress, plane strain and axisymmetric problems Derivation of CST and LST stiffness matrix and equations-treatment of body and surface forces-Finite Element solution for plane stress and axi symmetric problems- comparison of CST and LST elements –convergence of solution-interpretation of stresses

UNIT-V

Iso-parametric Formulation: An iso parametric bar element- plane bilinear iso parametric element – quadratic plane element - shape functions, evaluation of stiffness matrix, consistent nodal load vector - Gauss quadrature- appropriate order of quadrature – element and mesh instabilities – spurious zero energy modes, stress computation- patch test.

Course Outcomes for First Year Second Semester Course	
Course Code:M17ST 1202	
Course Title:Finite Element Methods of Analysis	
CO-1	Understand the fundamentals of Finite element method.
CO-2	Derive the solution of the problems of 1D and 2D beefed.
CO-3	Apply the concept of iso-parametric formulation for solving problems.
CO-4	Derive the shape functions for higher order elements.

SYLLABUS: EARTH QUAKE RESISTANT DESIGN OF STRUCTURES

(M17 ST 1203)

UNIT-I

Engineering seismology – rebound theory – plate tectonics – seismic waves - earthquake size and various scales – local site effects – Indian seismicity – seismic zones of India – theory of vibrations– near ground and far ground rotation and their effects.

UNIT-II

Seismic design concepts – EQ load on simple building – load path – floor and roof diaphragms–seismic resistant building architecture – plan configuration – vertical configuration – poundingeffects – mass and stiffness irregularities– torsion in structural system-Provision of seismiccode (IS1893 & 13920)– Building system– frames – shear wall– braced frames– layoutdesign of Moment Resisting Frames(MRF) – ductility of MRF – Infill wall – Non-structuralelements.

UNIT-III

Calculation of EQ load – 3D modeling of building systems and analysis (theory only) Designand ductile detailing of Beams and columns of frames Concept of strong column weak beams,Designand ductile detailingof shear walls

UNIT-IV

Cyclic loading behavior of RC, steel and pre- stressed concrete elements - modern concepts-Base isolation – Adaptive systems–case studies.

UNIT-V

Retrofitting and restoration of buildings subjected to damage due to earthquakes- effects ofearthquakes – factors related to building damages due to earthquake- methods of seismic retro fitting-restoration of buildings.

Course Outcomes for First Year Second Semester Course	
Course Code: M17ST 1203	
Course Title:Earthquake Resistant Design of Structures	
CO-1	Describe various terms of engineering seismology.
CO-2	Design earthquake-resistant structures.
CO-3	Gain the knowledge on seismic code provisions and detailing.
CO-4	Acquire the knowledge in structural irregularities in seismic planning and shear wall concept.

SYLLABUS: STRUCTURAL STABILITY (M17 ST 1204)

UNIT-I

Beam columns: Differential equation for beam columns – Beams column with concentrated loads – continuous lateral load– couples –Beam column with built in ends– continuousbeams with axial load – application of Trigonometric series – Determination of allowable stresses.

UNIT-II

Elastic buckling of bars: Elastic buckling of straight columns – Effect of shear stress on buckling – Eccentrically and laterally loaded columns –Sway & Non Sway mode - Energy methods – Buckling of a bar on elastic foundation – Buckling of bar with intermediate compressive forces and distributed axial loads – Buckling of bars with change in cross section– Effect of shear force on critical load – Built up columns– Effect of Initial curvature on bars – Buckling of frames – Sway & Non Sway mode.

UNIT-III

In-elastic buckling: Buckling of straight bars – Double modulus theory Tangent modulus theory. Experiments and design formulae: Experiments on columns – Critical stress diagram –Empirical formulae of design – various end conditions – Design of columns based onbuckling. Mathematical Treatment of stability problems: Buckling problem orthogonality relation – Ritz method –Stiffness method and formulation of Geometric stiffness matrix-Applications to simple frames.

UNIT-IV

Torsional Buckling: Pure torsion of thin walled bars of open cross section – Non uniform torsion of thin walled bars of open cross section - Torsional buckling – Buckling of Torsion and Flexure.

UNIT-V

Lateral Buckling of simply supported Beams: Beams of rectangular cross section subjected for pure bending, Buckling of I Section subjected to pure bending.

Course Outcomes for First Year Second Semester Course	
Course Code: M17ST 1204	
Course Title:Structural Stability	
CO-1	Analyze structures with linear and nonlinear behaviour.
CO-2	Gain the knowledge on Stability of Continuous systems.
CO-3	Distinguish elastic buckling and in elastic buckling.

SYLLABUS: RELIABILITY ANALYSIS AND DESIGN (M17 ST 1205)

(ELECTIVE–III)

UNIT-I

Concepts of Structural Safety: General, Design methods. Basic Statistics: Introduction, Data reduction, Histograms, Sample correlation. Probability Theory: Introduction, Random events, Random variables, Functions of random variables, Moments and expectation, Common probability distribution, Extremal distribution.

UNIT-II

Resistance Distributions and Parameters: Introduction, Statistics of properties of concrete, Statistics of properties of steel, Statistics of strength of bricks and mortar, Dimensional variations, Characterization of variables, Allowable stresses based on specified reliability.

UNIT-III

Probabilistic Analysis of Loads: Gravity loads, Wind load. Basic Structural Reliability: Introduction, Computation of structural reliability. Monte Carlo Study of Structural Safety: General, Monte Carlo method, Applications.

UNIT-IV

Level 2 Reliability Methods: Introduction, Basic variables and failure surface, First-order second-moment methods (FOSM)

UNIT-V

Reliability Based Design: Introduction, Determination of partial safety factors, Safety checking formats, Development of reliability based design criteria, Optimal safety factors, Summary of results of study for Indian standard – RCC design. Reliability of Structural Systems: Preliminary concepts as applied to simple structures.

Course Outcomes for First Year Second Semester Course	
Course Code:M17 ST 1205	
Course Title:Reliability Analysis and Design	
CO-1	Understand the importance of reliability in Civil engineering.
CO-2	Apply the concepts of computation of structural reliability for solving engineering problems.
CO-3	Gain the knowledge of reliability based structural design.

SYLLABUS: PRESTRESSED CONCRETE (M17 ST 1206)

(ELECTIVE–III)

UNIT-I

General principles of Pre-stressing- Pre-tensioning and Post tensioning - Pre tensioning and Post tensioning methods- Different systems of Pre-stressing- Analysis of prestress and Bending stresses– Resultant– stress at a section – pressure line – concept of load balancing – stresses in tendons.

UNIT-II

Losses of Pre-stressing- Loss of Pre-stress in pre-tensioned and post tensioned members due to various causes -Elastic shortening of concrete, shrinkage of concrete, creep of concrete, Relaxation of steel, slip in anchorage, differential shrinkage- bending of members and frictional losses- Long term losses

UNIT-III

Flexural, shear; torsional resistance and design of Prestressed concrete section. Types of flexural failure – code procedures-shear and principal stresses – Prestressed concrete members in torsion – Design of sections for flexure, Axial Tension, Compression and bending, shear, Bond

UNIT-IV

Analysis of continuous beams –Elastic theory- Linear transformation and Concordant tendons Deflections of pre-stressed concrete beams: Importance of control of deflections- factors influencing deflections-short term deflections of un-cracked member – prediction of long term deflections

UNIT-V

Analysis of end blocks: By Guyon‟s method and Magnel‟s method, Anchorage zone stresses Approximate method of design- anchorage zone reinforcement- transfer of pre stresses- pre tensioned members-Composite sections: Introduction-Analysis for stresses- differential shrinkage- general design considerations

Course Outcomes for First Year Second Semester Course	
Course Code:M17 ST 1206	
Course Title:Pre-stressed Concrete	
CO-1	Analyze and design pre-stressed concrete members.
CO-2	Gain the knowledge on materials, pre-stressing Systems, end anchorages.
CO-3	Gain the knowledge on losses of pre-stress.
CO-4	Analyze and design of sections for flexure.

SYLLABUS: OPTIMIZATION TECHNIQUES (M17 ST 1207)

(ELECTIVE–III)

UNIT-I

Introduction: Need and scope for optimization – statements of optimization problems-Objectivefunction and its surface design variables- constraints and constraint surface-Classification ofoptimization problems (various functions continuous, discontinuous and discrete) and function behavior (monotonic and unimodal)

UNIT-II

Classical optimization techniques: Differential calculus method, multi variable optimization by method of constrained variation and Lagrange multipliers (generalized problem) Khun-Tucker conditions of optimality - Fully stressed design and optimality criterion based algorithms introduction, characteristics of fully stressed design theoretical basis-examples

UNIT-III

Non-Liner programming: Unconstrained minimization- Fibonacci, golden search, Quadratic and cubic interpolation methods for a one dimensional minimization and univariate method, Powel‟s method, Newton‟s method and Davidon Fletcher Powell‟s method for multivariable optimization- Constrained minimization- Cutting plane method- Zoutendjik‟s method- penalty function methods

UNIT-IV

Linear programming: Definitions and theorems- Simplex method-Duality in Linear programming-Plastic analysis and Minimum weight design and rigid frame

UNIT-V

Introduction to quadratic programming: Geometric programming- and dynamic programming Design of beams and frames using dynamic programming technique

Course Outcomes for First Year Second Semester Course	
Course Code: M17 ST 1207	
Course Title:Optimization Techniques	
CO-1	Derive optimized structure using classical and modern methods of optimization.
CO-2	Gain the knowledge on Formulation of Structural Optimization problems.
CO-3	Gain the knowledge on the concept of classical methods of optimization for multivariable
CO-4	With equality or inequality constraints: solution by method of Lagrange Multiplier – Applications in structural engineering, Kuhn-Tucker conditions.

SYLLABUS: INDUSTRIAL STRUCTURES (M17 ST 1208)
(ELECTIVE–IV)

UNIT-I

Planning and functional requirements- classification of industries and industrial structures planning for layout- requirements regarding lighting ventilation and fire safety- protection against noise and vibrations

UNIT-II

Industrial buildings- roofs for industrial buildings (Steel) - design of gantry girder

UNIT-III

Design of Folded plates- Design considerations- analysis of folded plates- analysis of multi bay folded plates- design of diaphragm beam

UNIT-IV

Power plant structures- Bunkers and silos- chimney and cooling towers-Nuclear containment structures. Power transmission structures- transmission line towers- tower foundations- testing tower

UNIT-V

Light gauge steel structures: Local buckling of thin sections, Post packing of thin elements, Light gaugesteel columns and compression members, Form factor for columns and compression members, Stiffenedcompression elements,Multiple stiffened compression elements, Unstiffened compression elementseffective length of light gauge steel compression members, Basic design stress, Allowable design stress,Light gauge steel beams, Laterally supported light gauge steel beams web crippling. Allowable designstressin beams, Beams subjected to combinedaxial end bendingstress, connections

Course Outcomes for First Year Second Semester Course	
Course Code: M17 ST 1208	
Course Title: Industrial Structures	
CO-1	Know the requirements of various industries.
CO-2	Design the roofs and Gantry girder for Industrial buildings.
CO-3	Design the Folded plates and Bunkers and silos.
CO-4	Design the Chimneys, cooling towers and Transmission of towers.

SYLLABUS: BRIDGE ENGINEERING (M17 ST 1209)

(ELECTIVE–IV)

UNIT-I

Masonry arch Bridge design details- Rise, radius, and thickness of arch- Arch ring-Dimensioning of sub structures- Abutments pier and end connections.(Ref: IRC- SP-13)

UNIT-II

Super Structure: Slab bridge- Wheel load on slab- effective width method- slabs supported on twoedges- cantilever slabs- dispersion length- Design of interior panel of slab- Pigeaud"s method- design of longitudinal girders- Guyon-Messonet method- Hendry Jaegar method-Courbon"s theory. (Ref: IRC-21),voided slabs, T-Beam bridges.

UNIT-III

Plate girder bridges- Elements of plate girder and their design-web-flange- intermediate stiffenervertical stiffeners- bearing stiffener-design problem

UNIT-IV

Prestressed Concrete and Composite bridges- Preliminary dimensions-flexural and torsional parameters- Courbon"s Theory – Distribution coefficients by exact analysis- design of girder section- maximum and minimum prestressing forces- eccentricity- live load and dead load shear forces- cable zone in girder-check for stresses at various sections- check for diagonal tension- diaphragms and end block design- shorttermandlongtermdeflections-Compositeactionofcompositebrides-shearconnectors-compositeor transformed section-design problem. (Ref:IRC: Section-VI)

UNIT-V

Sub structure- Abutments- Stability analysis of abutments- piers- loads on piers – Analysis of piers-Design problem(Ref: IRC-13, IRC-21, IRC-78)- Pipe culvert- Flow pattern in pipe culvers- culvertalignment- culvertentrancestructure-Hydraulicdesignandstructuraldesignofpipeculverts-reinforcementsin pipes .(Ref:IRC: SP-13)

Course Outcomes for First Year Second Semester Course	
Course Code: M17 ST 1209	
Course Title:Bridge Engineering	
CO-1	Apply the IS code of practice for the design of steel bridges.
CO-2	Analyze and design of Plate girder Bridges.

SYLLABUS: EARTH RETAINING STRUCTURES (M17 ST 1210)

(ELECTIVE–IV)

UNIT-I

Earth pressures – Different types and their coefficients- Classical Theories of Earth pressure – Rankine‟s and Coulomb‟s Theories for Active and Passive earth pressure- Computation of Lateral Earth Pressure in Homogeneous and Layered soils- Graphical solutions for Coulomb‟s Theory in active and passive conditions..

UNIT-II

Retaining walls – different types - Type of Failures of Retaining Walls– Stability requirements– Drainagebehind Retainingwalls– Provision of Joints– Relief Shells.

UNIT-III

Sheet Pile Structures – Types of Sheet piles – Cantilever sheet piles in sands and clays – Anchored sheetpiles – Free earth and Fixed earth support methods – Row‟s moment reduction method – Location ofanchors, Forces in anchors.

UNIT-IV

Soil reinforcement – Reinforced earth - Different components – their functions – Mechanics of reinforced earth – Failure modes-Failure theories – Design of Embankments on problematic soils.

UNIT-V

Braced cuts and Cofferdams: Lateral Pressure in Braced cuts – Design of Various Components of a Braced cut – Stability of Braced cuts – Bottom Heave in cuts. – types of cofferdam, suitability, merits and demerits – Design of single – wall cofferdams and their stability aspects– TVA method and Cummins‟ methods

Course Outcomes for First Year Second Semester Course	
Course Code: M17 ST 1210	
Course Title: Earth Retaining Structures	
CO-1	Design the different types of Retaining walls and sheet piles using earth pressure theories.
CO-2	Design the reinforced earth structures, Braced cuts and cofferdams.

SYLLABUS: COMPUTER APPLICATIONS IN STRUCTURAL ENGINEERING LAB (M17 ST 1211)

Analysis and Design using STADD, STRAP, STRUDS, ANSYS

1. Programming for beams subject to different loading (mandatory).
2. Analysis of reinforced concrete multi storied building
3. Analysis of steel transmission line tower
4. Analysis of plane and space truss
5. Analysis of plane and space frame
6. Determination of mode shapes and frequencies of tall buildings using lumped mass (stick model) approximation
7. Wind analysis on tall structure
8. Analysis of prestressed concrete bridge girder
9. Analysis of Cylindrical shell
10. Modal Analysis of a Cantilever Beam

NOTE: A minimum of eight (including item1) from the above set have to be conducted.

Course Outcomes for First Year Second Semester Course	
Course Code: M17 ST 1211	
Course Title:Computer applications in structural Engineering Lab	
CO-1	Analyze the structural elements using software designs.
CO-2	Design the structures fir the dynamic loads using of tware's.
CO-3	Solve the finite elements application problems of structural engineering by software's.

COMPUTER SCIENCE AND ENGINEERING

COMPUTER SCIENCE & ENGINEERING (COMPUTER SCIENCE & TECHNOLOGY)

SYLLABUS: ADVANCEDDATA STRUCTURES ANDALGORITHM ANALYSIS

(M17 CST 1101)

UNIT-I:

Introduction to Data Structures, Singly Linked Lists, Doubly Linked Lists, Circular Lists-Algorithms.Stacksand Queues: AlgorithmImplementation usingLinkedLists.

UNIT-II:

Searching-Linear and Binary Search Methods Sorting-Bubble Sort, Selection Sort, Insertion Sort, QuickSort, Merge Sort. Trees- Binary trees, Properties, Representation and Traversals (DFT, BFT), ExpressionTrees(Infix,prefix,postfix).Graphs-BasicConcepts, StorageStructures andTraversals.

UNIT-III:

Dictionaries, ADT, The List ADT, Stack ADT, Queue ADT, Hash Table Representation, Hash Functions,CollisionResolution-SeparateChaining, OpenAddressing-Linear Probing,DoubleHashing.

UNIT-IV:

Priority queues- Definition, ADT, Realizing a Priority Queue Using Heaps, Definition, Insertion, Deletion, Search Trees- Binary Search Trees, Definition, ADT, Implementation, Operations-Searching, Insertion, Deletion.

UNIT–V:

Search Trees- AVL Trees, Definition, Height of AVL Tree, Operations, Insertion, Deletion and Searching. Search Trees- Introduction to Red-Black and Splay Trees, B-Trees, Height of B-Tree, Insertion, Deletion and Searching, Comparison of Search Trees.

Course Outcomes for First Year First Semester Course	
Course Code: M17CST 1101	
Course Title:ADVANCED DATA STRUCTURES AND ALGORITHM ANALYSIS	
CO-1	Could be able to write programs and class libraries given a specification.
CO-2	Implement various data structures.
CO-3	Implement and analyze various sorting algorithms.
CO-4	Understand abstract data types.
CO-5	Know how they are implemented in C++ programming language

SYLLABUS: MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE (M17 CST 1102)

UNIT-I:

Mathematical Logic: Statements and notations, Connectives, Well-formed formulas, Truth Tables, tautology, equivalence implication, Normal forms, Theory of inference for the statement calculus, Rules of inference, Consistency of premises and indirect method of proof, Automatic Theorem Proving Predicate calculus: Predicates, statement functions, variables and quantifiers, predicate formulas, free & bound variables, universe of discourse, inference theory of predicate calculus

UNIT-II:

Set theory & Relations: Introduction, Relations and ordering, Properties of binary Relations, Equivalence,Compatibility Relations, Partial ordering, Hasse diagram. Functions: composition of functions, Inverse

Function, Recursive Functions, Lattice and its Properties, Pigeon hole Principles and its application.Algebraic structures: Algebraic systems, Examples and general properties, Semi groups and Monoids,groups,sub groups,Definitions,Examples,homomorphism,Isomorphismandrelatedproblems.

UNIT-III:

ElementaryCombinatorics:Basisofcounting,EnumerationofCombinations&Permutations,Enumerating of Combinations& Permutations with repetitions and constrained repetitions, Binomial Coefficients, Binomial Multinomial theorems, principles of Inclusion–Exclusion.

UNIT-IV:

Recurrence Relations: Generating Function of Sequences, Calculating Coefficient of generating functions, Recurrence relations, Solving recurrence relation by substitution and Generating functions, The method of Characteristic roots, Solution of Inhomogeneous Recurrence Relation.

UNIT-V:

Graph Theory: Representation of Graph, Spanning Trees, BFS, DFS, Kruskals Algorithm, Binary trees,Planar Graphs, Graph Theory and Applications, Basic Concepts, Isomorphism and Sub graphs, Multigraphsand Euler circuits,Hamiltoniangraphs, Chromatic Numbers

Course Outcomes for First Year First Semester Course	
Course Code: M17 CST 1102	
Course Title:MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE	
CO-1	Critical, logical-mathematical reasoning
CO-2	Ability to apply mathematical knowledge and logic in solving problems
CO-3	Students develops the ability to illustrate basic terminology of functions, relations and demonstrate knowledge of their associated operations.
CO-4	Able to demonstrate practical applications and use of basic counting principles of permutations and combinations
CO-5	Able to represent and apply theory in solving computer science applications

SYLLABUS: COMPUTERORGANIZATION ANDARCHITECTURE (M17CST1103)

UNIT – I

Number System and Computer Arithmetic Signed and Unsigned Numbers, Additional and Subtraction,Multiplication, Division, Floating Point Representation Logical operations, Gray Code, BCD Code, ErrorDetectingCode,BooleanAlgebra, Simplification ofBooleanExpressions –Maps.

UNIT – II

Combinational and Sequential Circuits, Decoders, Encoders, Multiplexers, Half and Full adders, ShiftRegisters, Flip-Flops,BinaryCounters, MemoryUnit.

UNIT -III

MemoryOrganization,MemoryHierarchy,MainMemory,AuxilaryMemory,AssociativeMemory,CacheMemory VirtualMemoryconcept.

UNIT – IV

Arithmetic and Logic Unit Design, Addition and Subtraction, Sign and Unsigned Numbers, MultiplicationandDivision algorithms,BCD adders.

UNIT – V

Input – Output organization peripheral Devices, Input – Output Interface, Asynchronous data transfer,ModesofTransfer,PriorityInterrupts, DMA,Input–Output Processor, SerialCommunication.

Course Outcomes for First Year First Semester Course	
Course Code: M17 CST 1103	
Course Title:COMPUTER ORGANIZATION AND ARCHITECTURE	
CO-1	Apply the basic knowledge about Different Number Systems, Digital logic to the Functional components of computer.
CO-2	Students will be able to Describe the major components of a computer.
CO-3	Students will be able to classify different Computer Instructions.
CO-4	Students will be able to Describe Instruction set architecture.
CO-5	Recognize the importance of peripheral devices
CO-6	Students should be able to classify Computer memories

SYLLABUS: DATA BASE MANAGEMENT SYSTEMS (M17 CST1104)

UNIT-I:

Database System Applications, Purpose of Database Systems, View of Data – Data Abstraction, Instances and Schemas, Data Models – the ER Model, Relational Model, Other Models – Database Languages – DDL, DML, Database Access from Applications Programs, Transaction Management, Data Storage and Querying, Database Architecture, Database Users and Administrators, History of Database Systems. Introduction to Database design, ER diagrams, Beyond ER Design, Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER Model, Conceptual Design with the ER Model, Conceptual Design for Large enterprises. Relational Model: Introduction to the Relational Model – Integrity Constraints over Relations, Enforcing Integrity constraints, Querying relational data, Logical database Design, Introduction to Views–Destroying/altering Tables and Views

UNIT-II:

Relational Algebra and Calculus: Relational Algebra – Selection and Projection, Set operations, Renaming, Joins, Division, Examples of Algebra Queries, Relational calculus – Tuple relational Calculus – Domain relational calculus – Expressive Power of Algebra and calculus. Form of Basic SQL Query – Examples of Basic SQL Queries, Introduction to Nested Queries, Correlated Nested Queries, Set – Comparison Operators, Aggregate Operators, NULL values – Comparison using Null values – Logical connectives – AND, OR and NOT – Impact on SQL Constructs, Outer Joins, Disallowing NULL values, Complex Integrity Constraints in SQL Triggers and Active Databases.

UNIT-III:

Introduction to Schema Refinement – Problems Caused by redundancy, Decompositions – Problem related to decomposition, Functional Dependencies - Reasoning about FDS, Normal Forms – FIRST, SECOND, THIRD Normal forms – BCNF –Properties of Decompositions- Loss-less join Decomposition, Dependency preserving Decomposition, Schema Refinement in Database Design – Multi valued Dependencies – FOURTH Normal Form, Join Dependencies, FIFTH Normal form, Inclusion Dependencies..

UNIT-IV:

Overview of Transaction Management: The ACID Properties, Transactions and Schedules, ConcurrentExecution of Transactions – Lock Based Concurrency Control, Deadlocks – Performance of Locking –Transaction Support in SQL. Concurrency Control: Serializability, and recoverability – Introduction toLock Management – Lock Conversions, Dealing with Dead Locks, Specialized Locking Techniques – Concurrency Control without Locking. Crash recovery: Introduction to Crash recovery, Introduction toARIES, the Log , Other Recovery related Structures, the Write-Ahead Log Protocol, Check pointing,recoveringfrom aSystem Crash, Mediarecovery

UNIT-V:

Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing – Clustered Indexes, Primary and Secondary Indexes, Index data Structures – Hash Based Indexing, Tree based Indexing, Comparison of File Organizations. Storing data: Disks and Files: The Memory Hierarchy – Redundant Arrays of Independent Disks. Tree Structured Indexing: Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM) B+ Trees: A Dynamic Index Structure, Search, Insert, Delete. Hash Based Indexing: Static Hashing, Extendable hashing, Linear Hashing, Extendable vs. Linear Hashing.

Course Outcomes for First Year First Semester Course	
Course Code: M17CST1104	
Course Title:DATABASE MANAGEMENT SYSTEMS	
CO-1	To construct SQL commands for creating database objects, populating tables, and retrieve data
CO-2	To prepare queries in formal query languages
CO-3	To explore the features of RDBMS
CO-4	To apply conceptual database design
CO-5	To apply logical database design
CO-6	To normalize the tables.
CO-7	To know different protocols of Concurrency control
CO-8	To apply Recovery techniques of DBMS
CO-9	To understand different indexing techniques

SYLLABUS:ADVANCED OPERATING SYSTEMS (M17 CST1105)

UNIT -I:

Architectures of Distributed Systems - System Architecture types - issues in distributed operating systems - communication networks - communication primitives. Theoretical Foundations - inherent limitations of a distributed system - lamp ports logical clocks - vector clocks - casual ordering of messages - global state - cuts of a distributed computation - termination detection. Distributed Mutual Exclusion - introduction - the classification of mutual exclusion and associated algorithms - a comparative performance analysis.

UNIT -II:

Distributed Deadlock Detection -Introduction - deadlock handling strategies in distributed systems - issues in deadlock detection and resolution - control organizations for distributed deadlock detection - centralized and distributed deadlock detection algorithms -hierarchical deadlock detection algorithms. Agreement protocols - introduction-the system model, a classification of agreement problems, solutions to the Byzantine agreement problem, applications of agreement algorithms. Distributed resource management: introduction-architecture - mechanism for building distributed file systems - design issues - log structured file systems.

UNIT -III:

Distributed shared memory-Architecture- algorithms for implementing DSM - memory coherence and protocols - design issues. Distributed Scheduling - introduction - issues in load distributing - components of a load distributing algorithm - stability - load distributing algorithm - performance comparison - selecting a suitable load sharing algorithm - requirements for load distributing -task migration and associated issues. Failure Recovery and Fault tolerance: introduction- basic concepts - classification of failures - backward and forward error recovery, backward error recovery- recovery in concurrent systems - consistent set of check points - synchronous and asynchronous check pointing and recovery - check pointing for distributed database systems- recovery in replicated distributed databases.

UNIT -IV:

Protection and security -preliminaries, the access matrix model and its implementations. -safety in matrix model-advanced models of protection. Data security-cryptography: Model of cryptography, conventional cryptography- modern cryptography, private key cryptography, data encryption standard-publickeycryptography-multipleencryption-authentication in distributedsystems.

UNIT -V:

Multiprocessor operating systems - basic multiprocessor system architectures - inter connection networks for multiprocessor systems - caching - hypercube architecture. Multiprocessor Operating System - structures of multiprocessor operating system, operating system design issues- threads- process synchronization and scheduling. Database Operating systems :Introduction- requirements of a database operating system Concurrency control : theoretical aspects - introduction, database systems - a concurrency control model of database systems- the problem of concurrency control - serializability theory- distributed database systems, concurrency control algorithms - introduction, basic synchronization primitives, lock based algorithms- timestamp based algorithms, optimistic algorithms - concurrency control algorithms, data replication.

Course Outcomes for First Year First Semester Course	
Course Code:M17 CST 1105	
Course Title: ADVANCED OPERATING SYSTEMS	
CO-1	To understands the concept of Distributed systems
CO-2	To understand the concepts of shared memory and process synchronization
CO-3	To handle deadlocks in distributed systems
CO-4	To understand failures and Recovery in distributed systems
CO-5	To understand File and directory structure in Distributes operating systems

SYLLABUS: DATA WAREHOUSING AND DATA MINING (M17 CST1106)

UNIT I: DATAWARE HOUSING:

Data warehousing components –Building a Data warehouse –- Mapping the Data Warehouse to a Multiprocessor Architecture – DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools–Metadata

UNIT II:BUSINESS ANALYSIS:

Reporting and Query tools and Applications – Tool Categories – The Need for Applications – Cognos Impromptu – Online Analytical Processing (OLAP) – Need – Multidimensional Data Model – OLAP Guidelines – Multidimensional versus Multirelational OLAP – Categories of Tools – OLAP Tools and the Internet..

UNIT III:DATA MINING:

Introduction – Data – Types of Data – Data Mining Functionalities – Interestingness of Patterns – Classification of Data Mining Systems – Data Mining Task Primitives –Integration of a Data Mining System with a Data Warehouse – Issues –Data Preprocessing..

UNIT IV:ASSOCIATION RULE MINING AND CLASSIFICATION:

Mining Frequent Patterns, Associations and Correlations – Mining Methods – Mining various Kinds ofAssociation Rules – Correlation Analysis – Constraint Based Association Mining – Classification andPrediction–BasicConcepts–DecisionTreeInduction–BayesianClassification–RuleBasedClassification– ClassificationbyBackpropagation–SupportVectorMachines–AssociativeClassification–LazyLearners –Other Classification Methods– Prediction.

UNIT V:CLUSTERING AND TRENDS IN DATA MINING:

Mining Frequent Patterns, Associations and Correlations – Mining Methods – Mining various Kinds of Association Rules – Correlation Analysis – Constraint Based Association Mining – Classification and Prediction – Basic Concepts – Decision Tree Induction – Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines –Associative Classification – Lazy Learners – Other Classification Methods – Prediction.

Course Outcomes for First Year First Semester Course	
Course Code:M17 CST 1106	
Course Title:DATA WAREHOUSING AND DATA MINING	
CO-1	Extract knowledge using data mining techniques
CO-2	At the closing stage of the course, students will be able to analyse different operations and techniques involved in data mining.
CO-3	Evaluate Classification algorithms.
CO-4	Evaluate Clustering algorithms
CO-5	Describe Multidimensional data model and data mining primitive.

SYLLABUS:CST LAB-1(M17 CST1107)

DataStructuresPrograms:

1. To implement Stacks & Queues using Arrays & Linked Lists
2. To implement Stack ADT, Queue ADT using arrays &Linked Lists
3. To implement Dequeue using Double Linked List& Arrays
4. Toperformvarious Recursive&Non-recursiveoperations onBinarySearchTree
5. ToimplementBFS &DFS foragraph
6. ToimplementMerge &Heap sortof givenelements
7. Toperformvariousoperations onAVLtrees
8. To implement Krushkal"s algorithm to generate a min-costs panning tree
9. To implement Prim"s algorithm to generate min-costs panning tree.
10. To implement functions of DictionaryusingHashing

Operatingsystemprograms:

1. Program to implement FCFS (First Come Firs Serve)scheduling Algorithms
2. Program to implement SJF(Shortest Job First) Scheduling Algorithm
3. Program to implement Priority Scheduling algorithm
4. Program to implement Round Robin Scheduling algorithm
5. Program to implement FIFO(First In First Out)Page Replacement Algorithm
6. Program to implement LRU(least Recently used)Page Replacement Algorithm
7. Program to implement LFU(Least Frequently used)Page Replacement Algorithm
8. Write a program to implement how Disk Scheduling is done in operating system
9. Draw the appropriate C.P.U performance graphs for SJF Scheduling Algorithm

Course Outcomes for First Year First Semester Course	
Course Code: M17 CST 1107	
Course Title:Advanced Data structures and Algorithm Analysis Lab	
CO-1	Implement Linear data structures
CO-2	Non-linear data structures
CO-3	Sorting techniques Design of various projections
CO-4	Use of an operating system to develop software
CO-5	Write software systems based on multiple cooperating processes or threads
CO-6	Implement file organization techniques
CO-7	Implement file allocation strategies
CO-8	Implement process scheduling & synchronization algorithms
CO-9	Implement memory management scheme like best fit, worse fit etc.

SYLLABUS:CST LAB-2(M17 CST1108)

ListofExperiments:

1. SQL commands (DDL, DML and DCL)
2. Functions and Procedures
3. Triggers, views and sequences
4. Practice to create Forms
5. PracticetocreateReports
6. Implement aMiniProject
    A. Writeproblemstatement
    B. DrawERdiagrams
    C. ConverttoTables
    D. Normalization
    E. Insertappropriatedata
    F. Securitydesign
    G. Forms
    H. Reports

Course Outcomes for First Year First Semester Course	
Course Code: M17 CST 1108	
Course Title:DATABASE MANAGEMENT SYSTEMS lab	
CO-1	To create tables and views.
CO-2	To execute SQL queries
CO-3	To modify the data and structure of tables and views.
CO-4	To apply triggers for data modification events
CO-5	To create procedures and functions using PL/SQL.
CO-6	To design a database mini-project.
CO-7	To implement a mini-project

SYLLABUS: CYBER SECURITY (M17 CST1201)

UNIT I:

Introduction:

Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

UNITII:

Conventional Encryption: Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC

UNITIII:

Number Theory: Prime and Relatively Prime Numbers, Modular Arithmetic, Fermat"s and Euler"s Theorems, The Chinese Remainder theorem, Discrete logarithms Public key: Public key cryptography principles, public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service

UNITIV:

IP Security: IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management Transport Level Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction(SET) Email Privacy: Pretty Good Privacy (PGP) and S/MIME.

UNITV:

Intrusion Detection: Intruders, Intrusion Detection systems, Password Management. Malicious Software: Viruses and related threats & Countermeasures. Fire walls: Firewall Design principles, Trusted Systems

Course Outcomes for First Year First Semester Course	
Course Code: M17 CST 1201	
Course Title: CYBER SECURITY	
CO-1	Able to understand the basic concepts and goals of Information security
CO-2	Able to examine different classical cryptosystems.
CO-3	Able to understand the ideas of public key cryptosystems and digital signature schemes.
CO-4	Able to examine different network security protocols.
CO-5	Able to understand access control and authentication mechanisms.
CO-6	Able to understand appropriate procedures required to secure networks.

SYLLABUS:COMPUTER NETWORKS (M17 CST1202)

UNIT – I

Introduction: Network Topologies WAN, LAN, MAN. Reference models- The OSI Reference Model- the TCP/IP Reference Model - A Comparison of the OSI and TCP/IP Reference Models

UNIT – II

Physical Layer – Fourier Analysis – Bandwidth Limited Signals – The Maximum Data Rate of a Channel - Guided Transmission Media, Digital Modulation and Multiplexing: Frequency Division Multiplexing, Time Division Multiplexing, Code Division Multiplexing, Data Link Layer Design Issues, Error Detection and Correction, Elementary Data Link Protocols, Sliding Window Protocols

UNIT – III

The Data LinkLayer - Services Provided to the Network Layer– Framing – Error Control – FlowControl, Error Detection and Correction – Error-Correcting Codes – Error Detecting Codes, ElementaryData Link Protocols- A Utopian Simplex Protocol-A Simplex Stop and Wait Protocol for an Error free channel-A Simplex Stop and Wait Protocol for a Noisy Channel, Sliding Window Protocols-A One BitSlidingWindow Protocol-A ProtocolUsingGo-Back-N-AProtocol Using SelectiveRepeat

UNIT – IV

The Medium Access Control Sub layer-The Channel Allocation Problem-Static Channel Allocation Assumptions for Dynamic Channel Allocation, Multiple Access Protocols-Aloha-Carrier Sense Multiple Access Protocols-Collision-Free Protocols-Limited Contention Protocols-Wireless LAN Protocols, Ethernet-Classic Ethernet Physical Layer-Classic Ethernet MAC Sub layer Protocol-Ethernet Performance-Fast Ethernet Gigabit Ethernet-10-Gigabit Ethernet-Retrospective on Ethernet, Wireless LANs-The 802.11 Architecture and Protocol Stack-The 802.11 Physical Layer-The802.11 MAC Sub layer Protocol-The 805.11 Frame Structure-Services

UNIT – V

Design Issues-The Network Layer Design Issues – Store and Forward Packet Switching-Services Provided to the Transport layer- Implementation of Connectionless Service-Implementation of Connection Oriented Service-Comparison of Virtual Circuit and Datagram Networks, Routing Algorithms-The Optimality Principle-Shortest Path Algorithm, Congestion Control Algorithms Approaches to Congestion Control-Traffic Aware Routing-Admission Control-Traffic Throttling-Load Shedding.

Course Outcomes for First Year First Semester Course	
Course Code: M17 CST 1202	
Course Title: COMPUTER NETWORKS	
CO-1	Independently understand basic computer network technology.
CO-2	Identify the different types of network topologies and protocols.
CO-3	Explain various transmission media and implement various multiplexing techniques.
CO-4	Implement various Link layer protocols like flow control and error control.
CO-5	Implement various medium access control mechanisms and protocols
CO-6	Understand Wireless LAN protocols and architectures
CO-7	Implement Network layer design issues like switching mechanisms, routing and traffic management.

SYLLABUS: BIG DATA ANALYTICS (M17 CST1203)

UNIT-I

Data structures in Java: Linked List, Stacks, Queues, Sets, Maps; Generics: Generic classes and Type parameters, Implementing Generic Types, Generic Methods, Wrapper Classes, Concept of Serialization

UNIT-II

Working with Big Data: Google File System, Hadoop Distributed File System (HDFS) – Building blocks of Hadoop (Namenode, Datanode, Secondary Namenode, Job Tracker, Task Tracker), Introducing and Configuring Hadoop cluster (Local, Pseudo-distributed mode, Fully Distributed mode), Configuring XMLfiles.

UNIT-III

Writing Map Reduce Programs: A Weather Dataset, Understanding Hadoop API for Ma pReduce Framework (Old and New), Basic programs of Hadoop Map Reduce: Driver code, Mapper code, Reducer code, Record Reader, Combiner, Partitioner

UNIT-IV

Hadoop I/O: The Writable Interface, Writable Comparable and comparators, Writable Classes: Writable wrappers for Java primitives, Text, Bytes Writable, Null Writable, Object Writable and Generic Writable, Writable collections, implementing a Custom Writable: Implementing a Raw Comparator for speed, Custom comparatorS

UNIT-V

Pig: Hadoop Programming Made Easier: Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin Applying Structure to Hadoop Data with Hive: Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Da

Course Outcomes for First Year First Semester Course	
Course Code: M17 CST 1203	
Course Title:BIGDATA ANALYTICS	
CO-1	Implement data structures and map reduce paradigm using java
CO-2	Configure Hadoop distributed file system
CO-3	Understand Hadoop I/O
CO-4	Write scripts using PIG and run them in local and distributed modes
CO-5	Apply structure to Hadoop data with HIVE

SYLLABUS:MACHINE LEARNING (M17 CST1204)

UNIT -I: The ingredients of machine learning, Tasks: the problems that can be solved with machinelearning, Models: the output of machine learning, Features, the workhorses of machine learning. **Binary classification and related tasks:** Classification, Scoring and ranking, Class probability estimation

UNIT- II: Beyond binary classification: Handling more than two classes, Regression, Unsupervisedand descriptive learning. **Concept learning**: The hypothesis space, Paths through the hypothesis space, Beyond conjunctive concepts

UNIT- III: Tree models: Decision trees, Ranking and probability estimation trees, Tree learning asvariance reduction. **Rule models:** Learning ordered rule lists, Learning unordered rule sets, Descriptiverulelearning,First-orderrulelearning

UNIT -IV: Linear models: The least-squares method, The perceptron: heuristic learning algorithmfor linear classifiers, Support vector machines, obtaining probabilities from linear classifiers, Goingbeyond linearity with kernel methods. **Distance Based Models:** Introduction, Neighbors and exemplars,NearestNeighborsclassification, Distance BasedClustering,HierarchicalClustering.

UNIT-V: Probabilistic models: Probabilistic models: The normal distribution and its geometric interpretations, Probabilistic models for categorical data, Discriminative learning by optimizing conditional likelihood Probabilistic models with hidden variables. Features: Kinds of feature, Feature transformations, Feature construction and selection. Model ensembles: Bagging and random forests, Boosting

Course Outcomes for First Year First Semester Course	
Course Code: M17 CST 1204	
Course Title: MACHINE LEARNING	
CO-1	The student will be able understand the two main areas of Machine Learning i.e. Supervised and unsupervised learning
CO-2	To understand main models and algorithms for Regression, Classification particularly beyond binary classification
CO-3	To understand variety of learning algorithms
CO-4	To evaluate and compare the performance of learning algorithms
CO-5	To understand support vector machine.

SYLLABUS: SOFTWARE ENGINEERING (M17 CST1205)
(ELECTIVE-I)

UNIT-I:

Software and Software Engineering: The Nature of Software, The Unique Nature of Web Apps, Software Engineering, Software Process, Software Engineering Practice, Software Myths. Process Models: A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal and Team Process Models, Process Terminology, Product and Process

UNIT-II:

Requirements Analysis and Specification: Requirements Gathering and Analysis, Software Requirement Specification (SRS), Formal System Specification. Software Design: Overview of the Design Process, How to Characterize of a Design? Cohesion and Coupling, Layered Arrangement of Modules, Approaches to Software Design

UNIT – III:

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

UNIT – IV:

Coding And Testing: Coding, Code Review, Software Documentation, Testing, Unit Testing, Black Box Testing, White-Box Testing, Debugging, Program Analysis Tool, Integration Testing, Testing Object-Oriented Programs, System Testing, Some General Issues Associated with Testing

UNIT –V:

Software Reliability And Quality Management: Software Reliability, Statistical Testing, Software Quality, Software Quality Management System, ISO 9000, SEI Capability Maturity Model. Computer Aided Software Engineering: Case and its Scope, Case Environment, Case Support in Software Life Cycle, Other Characteristics of Case Tools, Towards Second Generation CASE Tool, Architecture of a Case Environment

Course Outcomes for First Year First Semester Course	
Course Code:M17 CST 1205	
Course Title:SOFTWARE ENGINEERING (E-1)	
CO-1	Understand the nature of software and various software process models
CO-2	Gather, analyse and Specify Software Requirements for any system
CO-3	Design various aspects of the system like System design, Database design, User Interface design etc., by following Structural Design of Object Oriented Design
CO-4	Apply various Software testing techniques to increase the reliability of the system
CO-5	Understand various Software Quality Management Techniques
CO-6	Use various Computer Aided Software Engineering (CASE) Tools.

SYLLABUS: ARTIFICIAL INTELLIGENCE (M17 CST1206)
(ELECTIVE-I)

UNIT-I:

Introduction to artificial intelligence: Introduction, history, intelligent systems, foundations of AI, applications, tic-tac-tie game playing, development of ai languages, current trends in AI

UNIT-II:

Problem solving: state-space search and control strategies: Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative-deepening a*, constraint satisfaction Problem reduction and game playing: Introduction, problem reduction, game playing, alpha-beta pruning, two-player perfect information games

UNIT-III:

Logic concepts: Introduction, propositional calculus, proportional logic, natural deduction system, axiomatic system, semantic tableau system in proportional logic, resolution refutation in proportional logic, predicate logic

UNIT-IV:

Knowledge representation: Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames advanced knowledge representation techniques: Introduction, conceptual dependency theory, script structure, cyc theory, case grammars, semantic web.

UNIT-V:

Expert system and applications: Introduction phases in building expert systems, expert system versus traditional systems, rule-based expert systems blackboard systems truth maintenance systems, application of

expert systems, list of shells and tools

Course Outcomes for First Year First Semester Course	
Course Code:M17 CST 1206	
Course Title:ARTIFICIAL INTELLIGENCE (E-1)	
CO-1	Able to learn artificial intelligence techniques
CO-2	Understand the concept of knowledge representation
CO-3	Able to apply logic concepts to ascertain facts
CO-4	Able to apply heuristic search methods in reaching the goal
CO-5	Able to solve problems using advanced knowledge representation methods
CO-6	Able to understand expert systems

COMPILER DESIGN (M17 CST1207)

(ELECTIVE-I)

UNIT – I

Introduction Language Processing, Structure of a compiler the evaluation of Programming language, The Science of building a Compiler application of Compiler Technology Programming Language Basics. Lexical Analysis-: The role of lexical analysis buffing, specification of tokens. Recognitions of tokens the lexical analyzer generator lexical

UNIT –II

Syntax Analysis: The Role of a parser, Context free Grammars Writing A grammar, top down parsingbottom up parsing, ,Shift Reduce parser, Operator Precedence Parser, Predictive Parser, Introduction toLR Parser.

UNIT–III

More Powerful LR parser (SLR, CLR, LALR), Using Armigers Grammars Equal Recovery in Lr parser, Syntax Directed Transactions Definition, Evolution order of SDTS Application of SDTS. Syntax Directed Translation Schemes.

UNIT – IV

Intermediated Code: Generation Variants of Syntax trees 3 Address code Quadruples, Triples and IndirectTriples, Types and Deceleration, Translation of Expressions, Type Checking, code optimization, Theprinciplesources ofoptimization, Loop Optimization,DAG, Global dataflow analysis.

UNIT – V

Code Generation: A simple code generator, Register allocation and assignment, Code generation fromDAG, Peep hole optimization, Symbol table, Activation Record, Runtime Environments, Stack allocation of space, access to Non Local date on the stack Heap Management code generation

Course Outcomes for First Year First Semester Course	
Course Code: M17 CST 1207	
Course Title:COMPILER DESIGN (E-1)	
CO-1	To acquire the knowledge of modern compiler & its features
CO-2	To use the knowledge of patterns, tokens & regular expressions
CO-3	To learn the new code optimization techniques to improve the performance of a program in terms of speed & space
CO-4	Able to design and implement parsers
CO-5	Able to compile simple C programs using their own designed compiler

SYLLABUS: EMBEDDED SYSTEMS (M17 CST1208)

(ELECTIVE-I)

UNIT I:

Examples of Embedded Systems – Typical Hardware – Memory – Microprocessors – Busses – Direct Memory Access – Introduction to 8051 Microcontroller – Architecture-Instruction set – Programming-MicroprocessorArchitecture –InterruptBasics–TheShared-Dataproblem –InterruptLatency.

UNIT II:

Round–Robin Architecture - Round–Robin with Interrupts Architecture - Function-Queue- Scheduling Architecture– Real-Time Operating Systems Architecture– Selection of Architecture.

UNIT III:

Tasks and Task States – Tasks and Data – Semaphores and Shared Data – Semaphore Problems –Semaphore variants, Message Queues – Mailboxes – Pipes – Timer Functions – Events – MemoryManagement– InterruptRoutines in RTOSEnvironment.

UNIT IV:

RTOS design – Principles – Encapsulation Semaphores and Queues – Hard Real-Time Scheduling Considerations – Saving Memory Space – Saving Power.

UNIT V:

Host and Target Machines – Linker/Locator for Embedded Software- Getting Embedded Software into theTarget System, Testing on your Host Machine – Instruction Set Simulators – Laboratory Tools used forDebugging.

Course Outcomes for First Year First Semester Course	
Course Code: M17 CST 1208	
Course Title:EMBEDDED SYSTEMS (E-1)	
CO-1	To describe the differences between general computing system and Embedded System.
CO-2	To recognize the classification of Embedded System.
CO-3	To understand various architectures of Embedded System
CO-4	To design Real Time Embedded System using the concepts of RTOS.
CO-5	To load embedded software on Host machine.
CO-6	To test Host machine.

SYLLABUS: IMAGE PROCESSING (M17 CST 1209)
(ELECTIVE-II)

UNITI:

Introduction: Digital Image representation, fundamentals steps in Digital Image Processing, Applications of Computer graphics and Image Processing, Fundamentals on Pixel concepts,,

UNITII:

Transformations: Translations, Scaling, rotation, reflection and shear transformations, Homogeneous coordinates, **Composite Transformations-** Reflection about an arbitrary line; Windowing and clipping, viewing transformations, Cohen- Sutherland clipping algorithm

UNITIII:

Digital Image Properties: Metric and topological properties of Digital Images, Histogram, entropy, Visual Perception, Image Quality, Color perceived by humans, Color Spaces, Palette Images, color Constancy Color Images: Pixel brightness transformations, Local Preprocessing, image smoothing, Edge detectors, Robert Operators, Laplace, Prewitt, Sobel, Fri-chen, Canny Edge detection

UNIT IV:

Mathematical Morphology: Basic Mathematical Concepts, Binary dilation and Erosion, Opening and closing, Gray Scale dilation and erosion, Skeleton, Thinning, Thickening Ultimate erosion, Geodesic transformations, Morphology and reconstruction, Morphological Segmentation

UNIT V:

SEGMENTATION: Threshold detection methods, Optimal Thresholding, Edge based Segmentation Edge image thresholding, Edge relaxation, Border tracing, Hough Transforms, Region based segmentation: Region Merging Region Splitting, Splitting and Merging, Watershed Segmentation. **Image Data Compression**: Image data Properties, Discrete Image Transformations in data compression, Discrete Cosine and Wavelet Transforms, Types of DWT and merits; Predicative Compression methods, Hierarchical and Progressive Compression methods, Comparison of Compression methods, JPEGMPEG Image Compression methods.

Course Outcomes for First Year First Semester Course	
Course Code: M17 CST 1209	
Course Title:IMAGE PROCESSING (E-2)	
CO-1	Demonstrated understanding of the basic concepts of two-dimensional signal acquisition, sampling, and quantization
CO-2	Demonstrated understanding of spatial filtering techniques, including linear and nonlinear methods.
CO-3	Demonstrated understanding of 2D Fourier transform concepts, including the 2D DFT and FFT
CO-4	Uses of Fourier transform in frequency domain filtering.
CO-5	Demonstrated understanding of the fundamental image enhancement algorithms such as histogram modification, contrast manipulation, and edge detection.

SYLLABUS: PARALLEL ALGORITHMS (M17 CST1210)

(ELECTIVE-II)

UNIT I: Introduction:

Computational demand in various application areas, advent of parallel processing, terminology pipelining, Data parallelism and control parallelism-Amdahl"s law.

UNIT II: Scheduling:

Organizational features of Processor Arrays, Multi processors and multi-computers. Mapping and scheduling aspects of algorithms. Mapping into meshes and hyper cubes-Load balancing-List scheduling algorithm Coffman-graham scheduling algorithm for parallel processors.

UNIT III: Algorithms:

Elementary Parallel algorithms on SIMD and MIMD machines, Analysis of these algorithms. Matrix Multiplication algorithms on SIMD and MIMD models. Fast Fourier Transform algorithms. Implementation on Hyper cube architectures. Solving linear system of equations, parallelizing aspects of sequential methods back substitution and Tri diagonal..

UNITIV: Sorting:

Parallel sorting methods, Odd-even transposition Sorting on processor arrays, Bitonic, merge on shuffle-exchange network,2D-Mesh processor and Hypercube Processor network. Parallel Quicksort on Multi processors. Hyper Quicks ort on hypercube multi computers. Parallel search operations. Ellis algorithm and Manber and Ladner"s Algorithms for dictionary operations.

UNITV: Searching

Parallel algorithms for Graph searching, All Pairs shortest paths and minimum cost spanning tree. Parallelization aspects of combinatorial search algorithms with Focus on Branch and Bound Methods and Alpha-beta Search methods.

Course Outcomes for First Year First Semester Course	
Course Code: M17 CST 1210	
Course Title:PARALLEL ALGORITHMS (E-2)	
CO-1	Recall fundamental concepts of parallelism
CO-2	Design and analyze the parallel algorithms for real world problems
CO-3	Implement parallel algorithms on available parallel computer systems.
CO-4	Ability to analyse parallel algorithms for sorting and searching on different parallel architectures
CO-5	Try to utilize Multi core Architectures.

SYLLABUS: CLOUD COMPUTING (M17 CST1211)
(ELECTIVE-II)

UNIT I:

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

UNIT II:

Cloud Infrastructure: At Amazon, The Google Perspective, Microsoft Windows Azure, Open Source Software Platforms, Cloud storage diversity, Inter cloud, energy use and ecological impact, responsibility sharing, user experience, Software licensing.

Cloud Computing : Applications and Paradigms: Challenges for cloud, existing cloud applications and new opportunities, architectural styles, workflows, The Zookeeper, The Map Reduce Program model, HPC on cloud, biological research

UNIT III:

Cloud Resource virtualization: Virtualization, layering and virtualization, virtual machine monitors,virtual machines, virtualization- full and para, performance and security isolation, hardware support for virtualization, Case Study: Xen, v Blades

Cloud Resource Management and Scheduling: Policies and Mechanisms, Applications of control theory to task scheduling, Stability of a two-level resource allocation architecture, feedback control based on dynamic thresholds, coordination, resource bundling, scheduling algorithms, fair queuing, start timefair queuing, cloud scheduling subject to deadlines, Scheduling Map Reduce applications, Resource management and dynamic application scaling

UNIT IV:

Storage Systems: Evolution of storage technology, storage models, file systems and database, distributed file systems, general parallel file systems. Google file system. Apache Hadoop, Big Table, Megastore (textbook 1), Amazon Simple Storage Service (S3)(Text book 2)

Cloud Security: Cloud security risks, security – atop concern for cloud users, privacy and privacy impactassessment,trust, OS security, Virtual machine security, Securityrisks

UNIT V:

Cloud Application Development: Amazon Web Services : EC2 – instances, connecting clients, security rules, launching, usage of S3 in Java, Installing Simple Notification Service on Ubuntu 10.04, Installing Hadoop on Eclipse, Cloud based simulation of a Distributed trust algorithm, Cloud service for adaptive data

streaming (Text Book1)

Google: Google App Engine, Google Web Toolkit (TextBook2)

Micro Soft: Azure Services Platform, Windows live, Exchange Online, Share Point Services, MicrosoftDynamicsCRM (Text Book 2)

Course Outcomes for First Year First Semester Course	
Course Code: M17 CST 1211	
Course Title: CLOUD COMPUTING (E-2)	
CO-1	Understanding the protocols and mechanisms that support cloud computing
CO-2	Understanding the hardware necessary for cloud computing
CO-3	Understanding Cloud Resource Virtualization
CO-4	Understanding Cloud Resource Management and Scheduling
CO-5	Understand cloud security
CO-6	Develop a novel cloud application

SYLLABUS: MOBILE COMPUTING (M17 CST1212)
(ELECTIVE-II)

UNIT-I

Introduction: Mobile Communications, Mobile Computing – Paradigm, Promises/Novel Applicationsand Impediments and Architecture; Mobile and Handheld Devices, Limitations of Mobile and HandheldDevices.

GSM – Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover,Security,New Data Services, GPRS.

UNIT –II

(Wireless) Medium Access Control (MAC): Motivation for a specialized MAC (Hidden and exposedterminals, Near andfarterminals), SDMA, FDMA, TDMA, CDMA, WirelessLAN/(IEEE802.11)

UNIT –III

MobileNetworkLayer:IPandMobileIPNetworkLayers,PacketDeliveryandHandoverManagement, Location Management, Registration, Tunneling and Encapsulation, Route Optimization,DHCP.

UNIT –IV

Mobile Transport Layer: Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP,OtherTransportLayer Protocols forMobile Networks.

Database Issues: Database Hoarding & Caching Techniques, Client-Server Computing & Adaptation, Transactional Models, Query processing, Data Recovery Process &QoS Issues.

UNIT-V

Data Dissemination and Synchronization: Communications Asymmetry, Classification of Data Delivery Mechanisms, Data Dissemination, Broadcast Models, Selective Tuning and Indexing Methods, Data Synchronization–Introduction, Software, and Protocols.

Mobile Adhoc Networks (MANETs): Introduction, Applications & Challenges of a MANET, Routing, Classification of Routing Algorithms, Algorithms such as DSR, AODV, DSDV, etc. , MobileAgents,ServiceDiscovery.

Protocols and Platforms for Mobile Computing: WAP, Bluetooth, XML, J2ME, Java Card, Palm OS, Windows CE, Symbian OS, Linux for Mobile Devices, Android.

Course Outcomes for First Year First Semester Course	
Course Code: M17 CST 1212	
Course Title: MOBILE COMPUTING (E-2)	
CO-1	A working understanding of the characteristics and limitations of mobile hardware devices including their user-interface modalities
CO-2	The ability to develop applications that are mobile-device specific and demonstrate current practice in mobile computing contexts.
CO-3	A comprehension and appreciation of the design and development of context-aware solutions for mobile devices.
CO-4	A student will be able to understand various protocols for mobile computing
CO-5	A student will be able to understand various platforms for mobile computing
CO-6	A student will be able to understand various routing algorithm

SYLLABUS: CST LAB-3(M17 CST1213)
(OBJECT ORIENTED SOFTWARE ENGINEERING LAB)

LIST OF EXPERIMENTS IN OOSE LAB:

The course is realized as a project-like assignment that can, in principle, by a team of three/four studentsworking full time. Typically, the assignments have been completed during the semester. The projectdeliverablesinclude

1. Documentation including
2. A problem statement
    i. A requirements document
    ii. A Requirements Analysis Document.
3. ASystemRequirements Specification.
4. Adesigndocument
    i. A Software Design Description and a System Design Document.
5. Atestspecification.
6. Manuals/guidesfor
    i. Users and associated help frames
    ii. Programmers
    iii. Administrators (installation instructions)
7. A project plan and schedule setting out milestones, resource usage and estimated costs.
8. A quality plan setting out quality assurance procedures
9. An implementation.

Course Outcomes for First Year First Semester Course	
Course Code: M17 CST 1213	
Course Title: OBJECT ORIENTED SOFTWARE ENGINEERING LAB	
CO-1	To familiarize with modern software engineering methods and tools
CO-2	To design complex software solutions.
CO-3	To implement complex software solutions.
CO-4	To test software.
CO-5	To document software
CO-6	To work as part of a software team
CO-7	To develop significant projects

SYLLABUS: CST LAB-4(M17 CST1214)

DATA ANALYTICS LAB LIST OF EXPERIMENTS:

1. Introduction to exploratory data analysis using R

Load the „iris. CSV" file and display the names and type of each column.

Find statistics such as min, max, range, mean, median, variance, standard deviation for each column of data. Generate histograms and density plots for each sepal length, sepal width, petal length, petal width. Generate box plots for each of the numerical attributes. Identify the attribute with the highest variance.

2. Study of homogeneous and heterogeneous data structures such as vector, matrix, array, list, data frame in R.

3. Introduction to regression using R

Air Velocity(cm/sec)	20,60,100,140,180,220,260,300,340,380
Evaporation Coefficient(mm2 /sec)	0.18, 0.37, 0.35, 0.78, 0.56, 0.75, 1.18, 1.36, 1.17, 1.65

Use R to perform linear regression on the given the data.

Analyze the significance of residual standard-error value, R-squared value,F-statistic. Find the correlation coefficient for this data and analyze the significance of the correlation value.

Use a Quantile-Quantile plot to determine whether the residuals are normally distributed.

Perform a log transformation on the „Air Velocity"column, perform linear regression again, and analyze all the relevant values.

4. Introduction to the Weka machine learning tool kit

Create an ARFF (Attribute-Relation File Format) file and read it in WEKA. Explore the purpose of each button under the preprocess panel after loading the ARFF file. Also, try to interpret using a different ARFF file, weather .arff, provided with WEKA.

5. Perform data preprocessing inWeka–Part1

Study **Unsupervised Attribute Filters** such as **Replace Missing Values** to replacemissing values in the given dataset, **Add** to add the new attribute Average,**Discretize** to discretize the attributes into bins. Explore **Normalize** and **Standardize** options on a dataset with numerical attributes.

6. Perform data preprocessing in Weka – Part2 Study the Unsupervised Instance Filters such as Remove Range filter to remove the last two instances, R

7. Classification using the Weka toolkit–Part1

Demonstration of classification process using id3 algorithm on categorical dataset(weather).
Demonstration of classification process using naïve Bayes algorithm on categorical dataset („vote").
Demonstration of classification process using Random Forest algorithm on datasets containing large number of attributes.

8. Classification using the Weka toolkit–Part 2

Demonstration of classification process using J48 algorithm on mixed type of dataset after discretizing numeric attributes.
Perform cross-validation strategy with various fold levels. Compare the accuracy of the results.

9. Performing clustering in Weka

Apply hierarchical clustering algorithm on numeric dataset and estimate cluster quality. Apply DBSCAN algorithm on numeric dataset and estimate cluster quality. Apply COBWEB clustering algorithm on categorical

Dataset and estimate cluster quality.

10. Association rule analysis in Weka

Demonstration of Association Rule Mining on supermarket dataset using A priori Algorithm. Demonstration of Association Rule Mining on supermarket dataset using FP-Growth Algorithm.

INFORMATION SECURITY LAB LIST OF EXPERIMENTS:

1. Learnto installVirtual Boxoranyother equivalentsoftwareon thehost OS.
2. Perform an experiment to grab a banner with telnet and perform the task using Netcat.
3. Perform an experiment for Port Scanning with nmap.
4. Using nmap
   i)Find Open ports on a system.
   ii) Find machines which are active.
   iii) Findtheversionof remoteOS onother systems.
   iv) Find the version of s/w installed on other system using nmap.

5. Perform an experiment on Active and Passive finger printing using XProbe2and nmap.
6. Perform an experiment to demonstrate how to sniff or router traffic by using the tool wire shark.
7. Perform wireless audit of an access point/router and decrypt WEP and WPA (softwares-net stumble roar sniff).
8. Install J Crypttool and demonstrate Asymmetric, Symmetric crypto algorithm, Hash and Digital signatures studied in theory Network Security and Management.
9. DemonstrateIntrusionDetectionSystem(IDS)usingtoolSnort.

Course Outcomes for First Year First Semester Course	
Course Code: M17 CST 1214	
Course Title: Big Data Analytics lab	
CO-1	Able to install Virtual Box or any other equivalent software on the host OS.
CO-2	Able to use tool NMAP for information gathering.
CO-3	Conduct-network based attacks on networking infrastructure (Routing, Firewalls) using WIreshark.
CO-4	Conduct attacks on wireless networks.
CO-5	Install and configure intrusion detection systems.
CO-6	Able to use R in various applications
CO-7	Performing data preprocessing using Weka
CO-8	Performing classification using Weka
CO-9	Performing Clustering using Weka

ELECTRONICS AND COMMUNICATIONS ENGINEERING

SYLLBUS: DETECTION & ESTIMATION THEORY (M17 CS 1101)

UNITI:

RandomProcesses:

Discrete Linear Models, Markov Sequences and Processes, Point Processes, and Gaussian Processes.

UNITII:

DetectionTheory:

Basic Detection Problem, Maximum A posteriori Decision Rule, Minimum Probability of Error Classifier, Bayes Decision Rule, Multiple-Class Problem (Bayes)- minimum probability error with and without equal a priori probabilities, Neyman-Pearson Classifier, General Calculation of Probability of Error, General Gaussian Problem, Composite Hypothese

UNIT–III:

LinearMinimumMean-SquareError Filtering:

Linear Minimum Mean Squared Error Estimators, Nonlinear Minimum Mean Squared Error Estimators. Innovations, Digital Wiener Filters with Stored Data, Real-time Digital Wiener Filters, Kalman Filters.

UNIT–IV:

Statistics:

Measurements, Nonparametric Estimators of Probability Distribution and Density Functions, Point Estimators of Parameters, Measures of the Quality of Estimators, Introduction to Interval Estimates, Distribution of Estimators, Tests of Hypotheses, Simple Linear Regression, Multiple Linear Regression.

UNIT–V:

EstimatingtheParametersofRandomProcessesfromData:

Tests for Stationarity and Ergodicity, Model-free Estimation, Model-based Estimation of Autocorrelation Functions, Power Special Density Functions.

Course Outcomes for First Year First Semester Course	
Course Code: M17 CS 1101	
Course Title:DETECTION & ESTIMATION THEORY	
CO-1	Understand the basic concepts of signal detection and estimation
CO-2	Understand different hypotheses in detection and estimation problems
CO-3	Understand the conceptual basics of detection and estimation of signals in white and non-white Gaussian noise
CO-4	Understand the detection of random signals
CO-5	Understand the time varying waveform detection and its estimation
CO-6	Appreciate the need for estimation techniques in Communication and Signal Processing problems and acquire expertise in Classical and Bayesian estimation techniques for parameters and signals, and Detection of signals in the presence of white Gaussian noise.
CO-7	Conduct in-depth analysis of estimation problems and apply suitable estimation and detection techniques that meet the constraints of the problem such as performance, bandwidth and power overheads and computational complexity.

SYLLABUS: DIGITAL DATA COMMUNICATIONS (M17 CS 1102)

UNIT-I:

Digital Modulation Schemes:

BPSK, QPSK, 8PSK, 16PSK, 8QAM, 16QAM, DPSK – Methods, Band Width Efficiency,CarrierRecovery, ClockRecovery.

UNIT-II:

Basic Concepts of Data Communications, Interfaces and Modems:

Data Communication Networks, Protocols and Standards, UART, USB, Line Configuration,Topology, TransmissionModes, DigitalData Transmission, DTE-DCE interface, CategoriesofNetworks – TCP/IP Protocolsuite and Comparison withOSImodel.

UNIT-III:

Error Correction: Types of Errors, Vertical Redundancy Check (VRC), LRC, CRC, Checksum, Error Correction using Hamming code

Data Link Control: Line Discipline, Flow Control, Error Control

Data Link Protocols: Asynchronous Protocols, Synchronous Protocols, Character Oriented Protocols, Bit-Oriented Protocol, Link Access Procedures.

UNIT-IV:

Multiplexing: Frequency Division Multiplexing (FDM), Time Division Multiplexing (TDM), Multiplexing Application, DSL.

Local Area Networks: Ethernet, Other Ether Networks, Token Bus, Token Ring, FDDI. Metropolitan Area Networks: IEEE802.6, SMDS

Switching: Circuit Switching, Packet Switching, Message Switching.

Networking and Interfacing Devices: Repeaters, Bridges, Routers, Gateway, Other Devices.

UNIT-V:

Multiple Access Techniques:

Frequency- Division Multiple Access (FDMA), Time - Division Multiple Access (TDMA), Code - Division Multiple Access (CDMA), OFDM and OFDMA. Random Access, Aloha Carrier Sense Multiple Access (CSMA)- Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA), Controlled Access-Reservation- Polling- Token Passing, Channelization.

Course Outcomes for First Year First Semester Course	
Course Code: M17 CS 1102	
Course Title: DIGITAL DATA COMMUNICATIONS	
CO-1	Understand the basic concepts of LAN and WAN technologies and topologies.
CO-2	Demonstrate an understanding of the elements of a protocol, and the concept of layering.
CO-3	Recognize the importance of networking standards, and their regulatory committees.
CO-4	Develop an understanding of the seven layers of the OSI model.
CO-5	Understand signals and signal encoding methods to communication service methods and data transmission modes.
CO-6	Demonstrate an understanding of basic concepts of error detection and correction at the data link layer and below.
CO-7	Develop an understanding of Data Link Layer protocols and technologies.
CO-8	Demonstrate an understanding of the differences between circuit switching and packet switching.

SYLLABUS: CODING THEORY &APPLICATIONS (M17 CS 1103)

UNIT–I:

Coding for Reliable Digital Transmission and Storage:

Mathematical model of Information, A Logarithmic Measure of Information, Average and Mutual Information and Entropy, Types of Errors, Error Control Strategies.

LinearBlockCodes:

Introduction to Linear Block Codes, Syndrome and Error Detection, Minimum Distance of aBlock code, Error-Detecting and Error-correcting Capabilities of a Block code, Standard arrayand Syndrome Decoding, Probability of an undetected error for Linear Codes over a BSC, Hamming Codes. Applications of Block codes for Error control in data storage system

UNIT–II: Cyclic Codes:

Description, Generator and Parity-check Matrices, Encoding, Syndrome Computation and Error Detection, Decoding ,Cyclic Hamming Codes, Shortened cyclic codes, Error-trapping decoding for cyclic codes, Majority logic decoding for cyclic codes.

UNIT–III: Convolutional Codes:

Encoding of Convolutional Codes, Structural and Distance Properties, maximum likelihood decoding, Sequential decoding, Majority- logic decoding of Convolution codes. Application of Viterbi Decoding and Sequential Decoding, Applications of Convolutional codes in ARQsystem.

UNIT–IV:

Burst–Error-CorrectingCodes:

Decoding of Single-Burst error Correcting Cyclic codes, Single-Burst-Error-Correcting Cyclic codes, Burst-Error-Correcting Convolutional Codes, Bounds on Burst Error-Correcting Capability, Interleaved Cyclic and Convolutional Codes, Phased-Burst –Error-Correcting Cyclic and Convolutional codes..

UNIT-V: BCH-CODES

BCH code- Definition, Minimum distance and BCH Bounds, Decoding Procedure for BCH Codes- Syndrome Computation and Iterative Algorithms, Error Location Polynomials and Numbers for single and double error correction

Course Outcomes for First Year First Semester Course	
Course Code:M17 CS 1103	
Course Title:CODING THEORY & APPLICATIONS	
CO-1	Analyze the information theoretic problems from various disciplines like computer science, mathematics, statistics and communication engineering.
CO-2	Apply coding techniques in various communication systems like wireless communications to achieve coding gain at low SNR values.
CO-3	Build new structures for encoder and decoder to address the issues in evaluating performance of communication system.
CO-4	Implement coding techniques in real time systems

SYLLABUS: ADVANCED DIGITAL SIGNAL PROCESSING (M17 CS 1104)

UNIT–I:

Review of DFT, FFT, IIR Filters and FIR Filters:

Multi Rate Signal Processing: Introduction, Decimation by a factor D, Interpolation by afactor I, Sampling rate conversion by a rational factor I/D, Multistage Implementation of Sampling Rate Conversion, Filter design & Implementation for sampling rate conversion

UNIT–II:

Applications of Multi Rate Signal Processing:

Design of Phase Shifters, Interfacing of Digital Systems with Different Sampling Rates,Implementation of Narrow Band Low Pass Filters, Implementation of Digital Filter Banks,Sub-band Coding of Speech Signals, Quadrature Mirror Filters, Trans-multiplexers, OverSamplingA/Dand D/AConversion.

UNIT-III:

Non-Parametric Methods of Power Spectral Estimation: Estimation of spectra from finite duration observation of signals, Non-parametric Methods: Bartlett, Welch & Blackman-Tukey methods, Comparison of all Non-Parametric methods

UNIT–IV:

Implementation of Digital Filters:

Introduction to filter structures (IIR & FIR), Frequency sampling structures of FIR, Lattice structures, Forward prediction error, Backward prediction error, Reflection coefficients for lattice realization, Implementation of lattice structures for IIR filters, Advantages of lattice structures.

UNIT–V:

Parametric Methods of Power Spectrum Estimation: Autocorrelation & Its Properties, Relation between auto correlation & model parameters, AR Models - Yule-Walker & Burg Methods, MA & ARMA models for power spectrum estimation, Finite word length effect in IIR digital Filters – Finite word-length effects in FFT algorithms.

Course Outcomes for First Year First Semester Course	
Course Code:M17 CS 1104	
Course Title:ADVANCED DIGITAL SIGNAL PROCESSING	
CO-1	Demonstrate advanced knowledge in Filter banks and Wavelets, Efficient power Spectral Estimation Techniques, Adaptive filters.
CO-2	To design adaptive filters for a given application
CO-3	To design multi rate DSP systems
CO-4	Learn Applications of Multi rate signal processing
CO-5	Analyze complex engineering problems critically for conducting research in Adaptive filter design
CO-6	Solve engineering problems by designing computationally efficient DSP algorithms for feasible and optimal solutions in digital signal processing field
CO-7	Contribute to scientific research in signal processing and inter disciplinary areas like cellular mobile communications, multi rate signal processing and spectral analysis

SYLLABUS: RADAR SIGNAL PROCESSING (M17 CS 1105)
(ELECTIVE-I)

UNIT-I:

Introduction:

Radar Block Diagram, Bistatic Radar, Monostatic Radar, Radar Equation, Information Available from Radar Echo. Review of Radar Range Performance– General Radar Range Equation, Radar Detection with Noise Jamming, Beacon and Repeater Equations, MTI and Pulse Doppler Radar. Matched Filter Receiver – Impulse Response, Frequency Response Characteristic and its Derivation, Matched Filter and Correlation Function, Correlation Detection and Cross Correlation Receiver, Efficiency of Non-Matched Filters, Matched Filter for Non-White Noise.

UNIT-II:

Detection of Radar Signals in Noise:

Detection Criteria – Neyman-Pearson Observer, Likelihood-Ratio Receiver, Inverse Probability Receiver, Sequential Observer, Detectors–Envelope Detector, Logarithmic Detector, I/Q Detector. Automatic Detection-CFAR Receiver, Cell Averaging CFAR Receiver, CFAR Loss, CFAR Uses in Radar. Radar Signal Management–Schematics, Component Parts, Resources and Constraints

UNIT-III:

Wave form Selection:

Radar Ambiguity Function and Ambiguity Diagram – Principles and Properties; Specific Cases –Ideal Case, Single Pulse of Sine Wave, Periodic Pulse Train, Single Linear FM Pulse, Noise LikeWaveforms, Waveform Design Requirements, Optimum Waveforms for Detection in Clutter,Familyof Radar Waveforms.

UNIT-IV:

Pulse Compression in Radar Signals:

Introduction,Significance,Types,LinearFMPulseCompression–BlockDiagram,Characteristics, Reduction of Time Side lobes, Stretch Techniques, Generation and Decoding ofFM Waveforms – Block Schematic and Characteristics of Passive System, Digital Compression,SAWPulse Compression.

UNITV:

Phase Coding Techniques:

Principles, Binary Phase Coding, Barker Codes, Maximal Length Sequences (MLS/LRS/PN), Block Diagram of a Phase Coded CW Radar. Poly Phase Codes : Frank Codes, Costas Codes, Non-Linear FM Pulse Compression, Doppler Tolerant PC Waveforms – Short Pulse, Linear Period Modulation (LPM/HFM), Sidelobe Reduction for Phase Coded PC Signals.

Course Outcomes for First Year First Semester Course	
Course Code:M17 CS 1105	
Course Title:RADAR SIGNAL PROCESSING (ELECTIVE-I)	
CO-1	Demonstrate knowledge in Characteristics of matched filter, Detection criteria of radar signals in noise environment, Radar waveform design requirements, Pulse compression techniques, Different coding techniques.
CO-2	Develop skills in designing Radar systems in different noise environments
CO-3	Apply appropriate techniques for radar signal de-noising.

SYLLABUS: OPTICAL COMMUNICATION TECHNOLOGY (M17 CS 1106)
(ELECTIVE-I)

UNIT–I:

Signal propagation in Optical Fibers:

Geometrical Optics approach and Wave Theory approach, Loss and Bandwidth, Chromatic Dispersion, Non Linear effects- Stimulated Brillouin and Stimulated Raman Scattering, Propagation in a Non-Linear Medium, Self-Phase Modulation and Cross Phase Modulation, Four Wave Mixing, Principle of Solitons.

UNIT–II:

Fiber Optic Components for Communication &Networking:

Couplers, Isolators and Circulators, Multiplexers, Bragg Gratings, Fabry-Perot Filters, Mach Zender Interferometers, Arrayed Waveguide Grating, Tunable Filters, High Channel Count Multiplexer Architectures, Optical Amplifiers, Direct and External Modulation Transmitters, Pump Sources for Amplifiers, Optical Switches and Wavelength Converters.

UNIT–III:

Modulation and Demodulation:

Signal formats for Modulation, Subcarrier Modulation and Multiplexing, Optical Modulations – Duobinary, Single Side Band and Multilevel Schemes, Ideal and Practical receivers for Demodulation, Bit Error Rates, Timing Recovery and Equalization, Reed-Solomon Codes for Error Detection and Correction.

UNIT-IV:

Transmission System Engineering:

System Model, Power Penalty in Transmitter and Receiver, Optical Amplifiers, Crosstalk and Reduction of Crosstalk, Cascaded Filters, Dispersion Limitations and Compensation Techniques.

UNIT–V:

Fiber Non-linearities and System Design Considerations:

Limitation in High Speed and WDM Systems due to Non-linearities in Fibers, Wavelength Stabilization against Temperature Variations, Overall System Design considerations – Fiber Dispersion, Modulation, Non-Linear Effects, Wavelengths, All Optical Networks.

Course Outcomes for First Year First Semester Course	
Course Code:M17 CS 1106	
Course Title:OPTICAL COMMUNICATION TECHNOLOGY (ELECTIVE-I)	
CO-1	Demonstrate Knowledge in Linear and Non-linear Characteristics of Optical fiber, Fiber design considerations, Minimization of Losses in Cable design, Understanding the operation of advanced fiber optic components, Modulation and demodulation techniques, Access networks.
CO-2	Analyze complex engineering problems critically in the domain of optical communication for conducting research.
CO-3	Formulate solutions to problems related to optical communication to meet societal and industrial needs.
CO-4	Apply appropriate techniques to complex engineering activities in the field of communication networks.

ADVANCED COMPUTER NETWORKS (M17 CS 1107)

(ELECTIVE-I)

UNIT-I:

Congestion and Quality of Service (QoS):

Data traffic, Congestion, Congestion Control, Two examples, Quality of Service, Techniques to improve QOS, Integrated Services and Differential services. **Queue Management:** Passive-Drop trial, Drop front, Random drop, Active- early Random drop, Random Early detection

UNIT-II:

X.25 Standards: X.25 Layers, X.21 Protocol , **Frame Relay**: Introduction, Frame relay operation, Frame relay layers, Congestion control, Leaky Bucket algorithms, ATM: Design goals, ATM architecture, Switching, Switch Fabric, ATM layers, Service classes, ATM applications

UNIT-III:

Interconnection Networks: Introduction, Banyan Networks, Properties, Crossbar switch, Three stage Class networks, Rearrangeble Networks, Folding algorithm, Benes Networks, Lopping algorithm, Bit allocation algorithm. SONET/SDH: Synchronous Transport signals, Physical configuration, SONET layers, SONET Frame.

UNIT-IV:

Spread Spectrum: Introduction, Basic concept, Protection against Jamming, Spreading codes (PN sequence), Generation, Properties, Types of Spread Spectrum Modulation, Application of Spread Spectrum. **Private Networks**: Virtual Private Networks, Network Address Translation **Next Generation**: IPV6 Transition from IPV4 to IPV6, **Mobile IP:** Addressing, Agents, Three phases, Inefficiency in Mobile IP

UNIT-V:

Wireless Networks: Wireless LAN: IEEE802.11, Architecture, MAC Sub Layer, Addressing Mechanism, Physical Layer. **Bluetooth:** Architecture, Bluetooth layers, Radio layer, Base band layer, L2CAP, **Wireless WAN:** The Cellular Concept, Cell, Frequency reuse, Principle, Channel Assignment Strategies, Interference and system capacity, Types of interference, Improving capacity in cellular system, Handoff, AMPS, D-AMPS, GSM, CDMA, GPRS, 3G & 4G technologies..

Course Outcomes for First Year First Semester Course	
Course Code: M17 CS 1107	
Course Title:ADVANCED COMPUTER NETWORKS (ELECTIVE-I)	
CO-1	Configure PCs running Linux so that they receive IP addresses, have default routes, can resolve host names, and so on. (And similarly for Windows, if time permits.)
CO-2	Apply knowledge of the TCP/IP layering model to intelligently debug networking problems.
CO-3	Use Linux commands to understand how a PC is configured.
CO-4	Differentiate between different LAN-based forwarding devices so that they can make thoughtful suggestions on how to build a network.
CO-5	Write networking code that uses TCP and UDP in client-server applications.

WIRELESS LANS AND PANS (M17 CS 1108)

(ELECTIVE-II)

UNIT–I:

Wireless System & Random Access Protocols:

Introduction, First and Second Generation Cellular Systems, Cellular Communications from 1G to 3G, Wireless 4G systems, The Wireless Spectrum; Random Access Methods: Pure ALOHA, Slotted ALOHA, Carrier Sense Multiple Access (CSMA), Carrier Sense Multiple Access with Collision Detection (CSMA/CD), Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA).

UNIT–II:

Wireless LANs:

Introduction, importance of Wireless LANs, WLAN Topologies, Transmission Techniques: Wired Networks, Wireless Networks, comparison of wired and Wireless LANs; WLAN Technologies: Infrared technology, UHF narrowband technology, Spread Spectrum technology

UNIT–III:

The IEEE 802.11 Standard for Wireless LANs:

Network Architecture, Physical layer, The Medium Access Control Layer; MAC Layer issues:Hidden Terminal Problem, Reliability, Collision avoidance, Congestion avoidance, Congestioncontrol,Security, TheIEEE 802.11eMACprotocol

UNIT–IV:

Wireless PANs:

Introduction, importance of Wireless PANs, The Bluetooth technology: history and applications, technical overview, the Bluetooth specifications, piconet synchronization and Bluetooth clocks, Master-Slave Switch; Bluetooth security; Enhancements to Bluetooth: Bluetooth interference issues, Intra and Inter Piconet scheduling, Bridge selection, Traffic Engineering, QoS and Dynamics Slot Assignment, Scatternet formation.

UNIT–V:

The IEEE 802.15 working Group for WPANs:

The IEEE 802.15.3, The IEEE 802.15.4, ZigBee Technology, ZigBee components and network topologies, The IEEE 802.15.4 LR-WPAN Device architecture: Physical Layer, Data Link Layer, The Network Layer, Applications; IEEE 802.15.3a Ultra wideband.

Course Outcomes for First Year First Semester Course	
Course Code: M17 CS 1108	
Course Title:WIRELESS LANS AND PANS (ELECTIVE-II)	
CO-1	Able to understand the second generation cellular networks, third generation wireless networks, wireless in local loop, wireless local area networks, Bluetooth and personal area networks.
CO-2	Able to understand the concepts of spectrum allocation, basic cellular system, frequency reuse, channel assignment strategies, handoff strategies, interference, improving coverage and capacity, cell splitting.
CO-3	Able to understand various multiple accesses techniques: FDMA, TDMA, spread spectrum multiple access, SDMA.
CO-4	Able to understand the communication in the infrastructure , iIS-95 CDMA forward channel, IS-95 CDMA risers channel, packet and frame formats in IS-95,IMT -20000, forward channel in W-CDMA.
CO-5	Able to understand the Historical overviews of the land industry, evolution of the wan industry, wireless home networking IEEE 802.11 the physical layer, MAC layer wireless ATM.

SYLLABUS: MOBILE COMPUTING TECHNOLOGIES (M17 CS 1109)
(ELECTIVE-II)

UNIT–I:

Introduction to Mobile Computing Architecture:

Mobile Computing – Dialog Control – Networks – Middleware and Gateways – Application and Services – Developing Mobile Computing Applications – Security in Mobile Computing – Architecture for Mobile Computing – Three Tier Architecture – Design considerations for Mobile Computing – Mobile Computing through Internet – Making existing Applications Mobile Enabled..

UNIT–II:

Cellular Technologies: GSM, GPS, GPRS, CDMA and 3G

Bluetooth – Radio Frequency Identification – Wireless Broadband – Mobile IP – Internet Protocol Version 6 (IPv6) – Java Card – GSM Architecture – GSM Entities – Call Routing in GSM – PLMN Interfaces – GSM addresses and Identifiers – Network aspects in GSM – Authentication and Security – Mobile computing over SMS – GPRS and Packet Data Network – GPRS Network Architecture – GPRS Network Operations – Data Services in GPRS – Applications for GPRS – Limitations of GPRS – Spread Spectrum technology – Is-95 – CDMA Versus GSM – Wireless Data – Third Generation Networks – Applications on 3G

UNIT–III:

Wireless Application Protocol (WAP) and Wireless LAN:

WAP – MMS – Wireless LAN Advantages – IEEE 802.11 Standards – Wireless LAN Architecture – Mobility in wireless LAN

Intelligent Networks and Interworking:

Introduction – Fundamentals of Call processing – Intelligence in the Networks – SS#7 Signaling – IN Conceptual Model (INCM) – soft switch – Programmable Networks – Technologies and Interfaces for IN

UNIT–IV:

Client Programming, Palm OS, Symbian OS, WinCE Architecture:

Introduction – Moving beyond the Desktop – A Peek under the Hood: Hardware Overview – Mobile phones – PDA – Design Constraints in Applications for Handheld Devices – Palm OS architecture – Application Development – Multimedia – Symbian OS Architecture – Applications for Symbian, Different flavors of Windows CE -Windows CE Architecture

J2ME: JAVA in the Handset – The Three-prong approach to JAVA Everywhere – JAVA 2 Micro Edition (J2ME) technology – Programming for CLDC – GUI in MIDP – UI Design Issues – Multimedia – Record Management System – Communication in MIDP – Security considerations in MIDP – Optional Packages

UNIT–V:

Voice over Internet Protocol and Convergence:

Voice over IP- H.323 Framework for Voice over IP – Session Initiation Protocol – Comparision between H.323 and SIP – Real Time protocols – Convergence Technologies – Call Routing – VoiceoverIPApplications–IPmultimediasubsystem(IMS) –MobileVoIP

Security Issues in Mobile Computing: Introduction–Information Security–Security Techniques and Algorithms – Security Protocols– Public Key Infrastructure – Trust – Security Models– Security frame works for Mobile Environment

Course Outcomes for First Year First Semester Course	
Course Code: M17 CS 1109	
Course Title: **MOBILE COMPUTING TECHNOLOGIES (ELECTIVE-II)**	
CO-1	Apply advanced data communicating methods and networking protocols for wireless and mobile environments
CO-2	Utilize and employ application frameworks for developing mobile applications including under disconnected and weakly connected environment
CO-3	Create web sites suitable for mobile environments
CO-4	Select components and networks for particular application
CO-5	Creatively analyze mobile and wireless networks
CO-6	Critically analyze security issues of mobile and wireless computing systems

SYLLABUS: NETWORK SECURITY &CRYPTOGRAPHY (M17 CS 110)
(ELECTIVE-II)

UNIT-I:

Introduction:

Attacks, Services and Mechanisms, Security attacks, Security services, A Model for Internetwork security. Classical Techniques: Conventional Encryption model, Steganography, Classical Encryption Techniques.

Modern Techniques:

Simplified DES, Block Cipher Principles, Data Encryption standard, Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles and Modes of operations.

UNIT-II:

Encryption Algorithms:

Triple DES, International Data Encryption algorithm, Blowfish, RC5, CAST-128, RC2, Characteristics of Advanced Symmetric block cifers. Conventional Encryption :Placement of Encryption function, Traffic confidentiality, Key distribution, Random Number Generation..

UNIT-III:

Public Key Cryptography: Principles, RSA Algorithm, Key Management, Diffie-Hellman Key exchange, Elliptic Curve Cryptograpy. Number Theory: Prime and Relatively prime numbers, Modular arithmetic, Fermat's and Euler's theorems, Testing for primality, Euclid's Algorithm, the Chinese remainder theorem, Discrete logarithms.

UNIT-IV:

Message Authentication and Hash Functions: Authentication requirements and functions, Message Authentication, Hash functions, Security of Hash functions and MACs. Hash and Mac Algorithms: MD File, Message digest Algorithm, Secure Hash Algorithm, RIPEMD-160, HMAC. Digital signatures and Authentication protocols: Digital signatures, Authentication Protocols, Digital signature standards

Authentication Applications: Kerberos, X.509 directory Authentication service. Electronic Mail Security: Pretty Good Privacy,S/MIME.

UNIT–V:

IP Security: Overview, Architecture, Authentication, Encapsulating Security Payload, Combining securityAssociations, Key Management. Web Security: Web Security requirements, Secure sockets layerandTransport layer security, SecureElectronicTransaction.

Intruders, Viruse sand Worms

Intruders, Viruses and Related threats.

Fire Walls: Firewall Design Principles, Trusted systems.

Course Outcomes for First Year First Semester Course	
Course Code: M17 CS 1110	
Course Title: NETWORK SECURITY & CRYPTOGRAPHY (ELECTIVE-II)	
CO-1	Acquire thorough knowledge about Encryption Algorithms
CO-2	Acquire thorough knowledge about cryptography
CO-3	Acquire thorough knowledge about techniques for access control and Email security.
CO-4	Develop security algorithms in the network.

SYLLABUS: OPTICAL& DATA COMMUNICATIONS LABORATORY

(M17 CS 1111)

OPTICAL COMMUNICATIONS EXPERIMENTS

1. D.C Characteristics of light sources /detectors (LED, Laser diode and PIN photo diode.)
2. Measurement of Numerical aperture, Propagation and Bending Loss in fiber.
4. Analog link set up using a fiber
5. Digital link set up using a fiber
6. Set up of time division multiplexing using fiber optics
7. Digital Fiber Optical Transmitter and Receiver

DATA COMMUNICATIONS EXPERIMENTS

8. Study of serial interface RS – 232
9. Study of pc to pc communication using parallel port
10. To establish pc-pc communication using LAN
11. Study of LAN using star topology, bus topology and tree topology
12. Study and configure modem of a computer
13. To configure a hub/switch
14. To study the interconnections of cables for data communication
15. Study of a wireless communication system

Course Outcomes for First Year First Semester Course	
Course Code: M17 CS 1111	
Course Title: **OPTICAL & DATA COMMUNICATIONS LABORATORY**	
CO-1	Students can identify the type of fiber optical cable and test their applications.
CO-2	Students will have the awareness to select appropriate optical source and detector for different applications
CO-3	Students can operate and modify the setting in any kind of microwave equipment
CO-4	Understand the fundamental concepts of data communications and networking
CO-5	Identify different components and their respective roles in a computer communication system.
CO-6	Apply the knowledge, concepts and terms related to data communication and networking.
CO-7	Solve problems in networking by referring to problems solving steps through relevant information by choosing suitable techniques.
CO-8	Acquaint them-selves with networking software simulation tools, configuring of networking devices and understand their functionality.
CO-9	Know the strategies for securing network applications
CO-10	Appreciate usefulness and importance of computer communication in today life and society.

SYLLABUS: RF CIRCUIT DESIGN (M17 CS 1201)

UNIT-I:

Introduction to RF Electronics:

The Electromagnetic Spectrum, units and Physical Constants, Microwave bands– RF behavior of Passive components: Tuned resonant circuits, Vectors, Inductors and Capacitors - Voltage andCurrentin capacitorcircuits– TunedRF/IFTransformers.

UNIT-II:

Transmission Line Analysis: Examples of transmission lines- Transmission line equations and Biasing- Micro Strip Transmission Lines- Special Termination Conditions- sourced and Loaded Transmission Lines. Single And Multiport Networks: The Smith Chart, Interconnectivity networks, Network properties and Applications, Scattering Parameters.

UNIT-III:

Matching and Biasing Networks:

Impedance matching using discrete components – Micro strip line matching networks, Amplifierclasses of Operation and Biasing networks.RF Passive & Active Components: Filter Basics –Lumped filter design – Distributed Filter Design – Diplexer Filters- Crystal and Saw filters-Active Filters - Tunable filters – Power Combiners / Dividers – Directional Couplers – HybridCouplers–Isolators.RF Diodes – BJTs-FETs-HEMTs andModels.

UNIT-IV:

RF Transistor Amplifier Design: Characteristics of Amplifiers - Amplifier Circuit Configurations, Amplifier Matching Basics, Distortion and noise products, Stability Considerations, Small Signal amplifier design, Power amplifier design, MMIC amplifiers, Broadband High Power multistage amplifiers, Low noise amplifiers, VGA Amplifiers.

UNIT-V:

Oscillators: Oscillator basics, Low phase noise oscillator design, High frequency Oscillator configuration, LC Oscillators, VCOs, Crystal Oscillators, PLL Synthesizer, and Direct Digital Synthesizer. **RF Mixers:** Basic characteristics of a mixer - Active mixers- Image Reject and Harmonic mixers, Frequency domain considerations.

Course Outcomes for First Year Second Semester Course	
Course Code: M17 CS 1201	
Course Title:RF CIRCUIT DESIGN	
CO-1	Demonstrate advanced knowledge in RF Electronics Transmission line analysis, Matching and biasing networks, RF Passive and Active component, RF Transistor amplifier design, Oscillators and RF Mixers
CO-2	Analyze complex problems critically in the domains of RF field, RF Passive and Active components as well as a smart antenna techniques for better spectrum exploitation for conducting research
CO-3	Solve engineering problems to arrive at optimal solutions in compliance with public health and safety, cultural, societal and environmental factors in the core areas of RF Circuit design

SYLLABUS: WIRELESS COMMUNICATIONS AND NETWORKS (M17 CS 1202)

UNIT-I:

The Cellular Concept-System Design Fundamentals:

Introduction, Frequency Reuse, Interference and system capacity – Co channel Interference andsystem capacity, Channel planning for Wireless Systems, Adjacent Channel interference , PowerControl for Reducing interference, Improving Coverage & Capacity in Cellular Systems- CellSplitting, Sectoring, Channel Assignment Strategies, Handoff Strategies- Prioritizing Handoffs, Practical Hand off Considerations, Trunking and Grade of Service

UNIT–II:

Mobile Radio Propagation: Large-Scale Path Loss:

Introduction to Radio Wave Propagation, Free Space Propagation Model, Relating Power toElectric Field, Basic Propagation Mechanisms, **Reflection**: Reflection from Dielectrics, BrewsterAngle, Reflection from prefect conductors, Ground Reflection (Two-Ray) Model, **Diffraction**: Fresnel Zone Geometry, Knife-edge Diffraction Model, Multiple knife-edge Diffraction, Scattering, Outdoor Propagation Models- Longley-Ryce Model, Okumura Model, Hata Model, PCS Extension to Hata Model, Walfisch and Bertoni Model, Wideband PCS Microcell Model,Indoor Propagation Models-Partition losses (Same Floor), Partition losses between Floors, Log-distance path loss model, Ericsson Multiple Breakpoint Model, Attenuation Factor Model, Signalpenetrationinto buildings, RayTracingand SiteSpecific Modeling.

UNIT–III:

Mobile Radio Propagation: Small–Scale Fading and Multipath

Small Scale Multipath propagation-Factors influencing small scale fading, Doppler shift, Impulse Response Model of a multipath channel- Relationship between Bandwidth and Received power, Small-Scale Multipath Measurements-Direct RF Pulse System, Spread Spectrum Sliding Correlator Channel Sounding, Frequency Domain Channels Sounding, Parameters of Mobile Multipath Channels-Time Dispersion Parameters, Coherence Bandwidth, Doppler Spread and Coherence Time, Types of Small-Scale Fading-Fading effects Due to Multipath Time Delay Spread, Flat fading, Frequency selective fading, Fading effects Due to Doppler Spread-Fast fading, slow fading, Statistical Models for multipath Fading Channels-Clarke's model for flat fading, spectral shape due to Doppler spread in Clarke's model, Simulation of Clarke and Gans Fading Model, Level crossing and fading statistics, Two-ray Rayleigh Fading Model.

UNIT-IV:

Equalization and Diversity

Introduction, Fundamentals of Equalization, Training a Generic Adaptive Equalizer, Equalizers in a communication Receiver, Linear Equalizers, Non-linear Equalization-Decision Feedback Equalization (DFE), Maximum Likelihood Sequence Estimation (MLSE) Equalizer, Algorithms for adaptive equalization-Zero Forcing Algorithm, Least Mean Square Algorithm, Recursive least squares algorithm. Diversity -Derivation of selection Diversity improvement, Derivation of Maximal Ratio Combining improvement, Practical Space Diversity Consideration-Selection Diversity, Feedback or Scanning Diversity, Maximal Ratio Combining, Equal Gain Combining, Polarization Diversity, Frequency Diversity, Time Diversity, RAKE Receiver

UNIT-V:

Wireless Networks

Introduction to wireless Networks, Advantages and disadvantages of Wireless Local Area Networks, WLAN Topologies, WLAN Standard IEEE 802.11, IEEE 802.11 Medium Access Control, Comparison of IEEE 802.11 a,b,g and n standards, IEEE 802.16 and its enhancements, Wireless PANs, HiperLan, WLL

Course Outcomes for First Year Second Semester Course	
Course Code: M17 CS 1202	
Course Title: WIRELESS COMMUNICATIONS AND NETWORKS	
CO-1	Understand the basics of Wireless Communication Networks.
CO-2	Learn about path losses in Mobile Radio Propagation and different path loss models.
CO-3	Learn different types of small scale fading and simulation of different fading models.
CO-4	Learn different Equalization and Diversity algorithms.
CO-5	Learn advantages and disadvantages of WLAN and various IEEE standards

SYLLABUS: IMAGE AND VEDIO PROCESSING (M17 CS 1203)

UNIT–I:

Fundamentals of Image Processing and Image Transforms:

Introduction, Image sampling, Quantization, Resolution, Image file formats, Elements of image processing system, Applications of Digital image processing, Introduction, Need for transform, image transforms, Fourier transform, 2 D Discrete Fourier transform and its transforms, Importance of phase, Walsh transform, Hadamard transform, Haar transform, slant transform Discrete cosine transform, KL transform, singular value decomposition, Radon transform, comparison of different image transforms..

UNIT–II:

ImageEnhancement:

Spatial domain methods: Histogram processing, Fundamentals of Spatial filtering, Smoothing spatial filters, Sharpening spatial filters. Frequency domain methods: Basics of filtering in frequency domain, image smoothing, image sharpening, Selective filtering.

Image Restoration:

Introduction to Image restoration, Image degradation, Types of image blur, Classification of image restoration techniques, Image restoration model, Linear and Nonlinear image restoration techniques, Blind de convolution

UNIT–III:

Image Segmentation:

Introduction to image segmentation, Point, Line and Edge Detection, Region based segmentation., Classification of segmentation techniques, Region approach to image segmentation, clustering techniques, Image segmentation based on thresholding, Edge based segmentation, Edge detection and linking, Hough transform, Active contour

Image Compression:

Introduction, Need for image compression, Redundancy in images, Classification of redundancy in images, image compression scheme, Classification of image compression schemes, Fundamentals of information theory, Run length coding, Shannon – Fano coding, Huffman coding, Arithmetic coding, Predictive coding, Transformed based compression, Image compression standard, Wavelet-based image compression, JPEG Standards.

UNIT-IV:

Basic Steps of Video Processing:

Analog Video, Digital Video. Time-Varying Image Formation models: Three-Dimensional Motion Models, Geometric Image Formation, Photometric Image Formation, Sampling of Video signals, Filtering operations.

UNIT–V:

2-D Motion Estimation:

Optical flow, General Methodologies, Pixel Based Motion Estimation, Block- Matching Algorithm, Mesh based Motion Estimation, Global Motion Estimation, Region based Motion Estimation, Multi resolution motion estimation, Waveform based coding, Block based transform coding, Predictive coding, Application of motion estimation in Video coding.

Course Outcomes for First Year Second Semester Course	
Course Code:M17 CS 1203	
Course Title:IMAGE AND VEDIO PROCESSING	
CO-1	Demonstrate sufficient understanding of theory of image and video processing including image/video representation, image /video filtering, image/video compression, and transport over the Internet.
CO-2	Analyze and interpret the results of image processing methods and algorithms.
CO-3	Demonstrate the ability to implement basic image/video processing operations using MATLAB.
CO-4	Implement a complete image processing system to achieve a specific task, and analyze and interpret the results of this system.

SYLLABUS: SOFTWARE DEFINED RADIO (M17 CS 1204)

UNIT-I:

Introduction:

The Need for Software Radios, What is Software Radio, Characteristics and benefits of software radio- Design Principles of Software Radio, RF Implementation issues- The Purpose of RF Front – End, Dynamic Range- The Principal Challenge of Receiver Design – RF Receiver Front- End Topologies- Enhanced Flexibility of the RF Chain with Software Radios-Importance of the Components to Overall Performance- Transmitter Architectures and Their Issues- Noise and Distortion in the RF Chain, ADC and DAC Distortion

UNIT-II:

Multi Rate Signal Processing:

Introduction- Sample Rate Conversion Principles- Polyphase Filters- Digital Filter Banks Timing Recovery in Digital Receivers Using Multirate Digital Filters.

Digital Generation of Signals:

Introduction- Comparison of Direct Digital Synthesis with Analog Signal Synthesis-Approachesto Direct Digital Synthesis- Analysis of Spurious Signals- Spurious Components due to Periodicjitter- Band Pass Signal Generation- Performance of Direct Digital Synthesis Systems- HybridDDS-PLL Systems- Applications of Direct Digital Synthesis- Generation of Random Sequences-ROMCompression Techniques.

UNIT-III:

Analog to Digital and Digital to Analog Conversion:

Parameters of ideal data converters- Parameters of Practical data converters- Analog to Digital and Digital to Analog Conversion- Techniques to improve data converter performance-Common ADC and DAC architectures.

UNIT-IV:

Digital Hardware Choices:

Introduction- Key Hardware Elements- DSP Processors- Field Programmable Gate Arrays Trade-Offs in Using DSPs, FPGAs, and ASICs- Power Management Issues- Using a Combination of DSPs, FPGAs, and ASICs..

UNIT-V:

Object–Oriented Representation of Radios and Network Resources:

Networks- Object Oriented Programming- Object Brokers- Mobile Application Environments-Joint Tactical Radio System.

Case Studies in Software Radio Design: Introduction and Historical Perspective, Speak-easy-JTRS, Wireless Information Transfer System, SDR-3000 Digital Transceiver Subsystem, Spectrum Ware, CHARIOT.

Course Outcomes for First Year Second Semester Course	
Course Code:M17 CS 1204	
Course Title:SOFTWARE DEFINED RADIO	
CO-1	Understanding of analog RF components as front end block in implementation of SDR.
CO-2	Design circuits at different multi rate signaling technique for frequency conversion and Sampling issues.
CO-3	Understanding of ADC and DAC technology.
CO-4	Knowledge of Hardware and software development methods for embedded wireless systems
CO-5	Make system-level decisions for software defined radio technology and products.

SYLLABUS: SOFT COMPUTING TECHNIQUES
(M17 CS 1205)
(ELECTIVE-III)

UNIT–I:

Introduction:

Approaches to intelligent control, Architecture for intelligent control, Symbolic reasoning system, Rule-based systems, the AI approach, Knowledge representation - Expert systems

UNIT–II:

ArtificialNeuralNetworks:

Concept of Artificial Neural Networks and its basic mathematical model, McCulloch-Pitts neuron model, simple perceptron, Adaline and Madaline, Feed-forward Multilayer Perceptron, Learning and Training the neural network, Data Processing: Scaling, Fourier transformation, principal-component analysis and wavelet transformations, Hopfield network, Self-organizing network and Recurrent network, Neural Network based controller.

UNIT–III:

FuzzyLogicSystem:

Introduction to crisp sets and fuzzy sets, basic fuzzy set operation and approximate reasoning, Introduction to fuzzy logic modeling and control, Fuzzification, inferencing and defuzzification, Fuzzy knowledge and rule bases, Fuzzy modeling and control schemes for nonlinear systems, Self-organizing fuzzy logic control, Fuzzy logic control for nonlinear timedelay system.

UNIT–IV:

Genetic Algorithm:

Basic concept of Genetic algorithm and detail algorithmic steps, Adjustment of free parameters, Solution of typical control problems using genetic algorithm, Concept on some other search techniques like Tabu search and and-colony search techniques for solving optimization problems.

UNIT–V:

Applications:

GA application to power system optimisation problem, Case studies: Identification and control of linear and nonlinear dynamic systems using MATLAB-Neural Network toolbox, Stability analysis of Neural-Network interconnection systems, Implementation of fuzzy logic controller using MATLAB fuzzy-logic toolbox, Stability analysis of fuzzy control systems

Course Outcomes for First Year Second Semester Course	
Course Code:M17 CS 1205	
Course Title: SOFT COMPUTING TECHNIQUES (ELECTIVE-III)	
CO-1	Differentiate between Soft Computing and hard computing.
CO-2	Understand and apply Artificial Neural Networks, Fuzzy Logic, and Genetic algorithms for different applications.
CO-3	Understand various applications of soft computing

SYLLABUS: SMART ANTENNAS (M17 CS 1206)
(ELECTIVE-III)

UNIT I

Introduction: Basic Idea of Smart Antenna, Benefits of Smart Antenna System, The Historical Development of Smart Antennas, Emerging fields of Smart Antennas. Early Forms of Spatial Processing, Review of Fundamentals of Electromagnetic Fields and Antennas. Array Fundamentals: Array Weighting-Blackman weights, Hamming Weights, Gaussian Weights, Kaiser Bessel Weights. Fixed Beam Arrays, Fixed Side lobe Cancelling, Retro directive Arrays.

UNIT II

Principles of Random Variables and Process: Definition of Random Variables, Probability Density Functions, Expectation and Moments, Common Probability Density Functions, Stationarity and Ergodicity, Autocorrelation and Power Spectral Density, Correlation Matrix. Fixed Weight Beam forming Basics: Maximum S/I Ratio, Minimum Mean Square Error, Maximum Likelihood, and Minimum Variance. Diversity, Secrorization. Adaptive Beam forming: Least Mean Squares (LMS), Sample Matrix Inversion (SMI), Recursive Least Squares (RLS), Constant Modulus (CM), Least Squares Constant Modulus, Conjugate Gradient (CG) Method, Spreading Sequence Array Weights, Description of the new SDMA receiver.

UNIT III

Angle of Arrival Estimation-I: Fundamentals of Matrix Algebra, Array Correlation Matrix, Non-Blind Beam forming, Blind Beam Forming, Angle of Arrival Estimation Methods: Bartlett AOA Estimate, Capon AOA Estimate, Linear Prediction AOA Estimate.

UNIT IV

Angle of Arrival Estimation-II: Maximum Entropy Angle of Arrival Estimate, Pisarenko Harmonic decomposition AOA Estimate, Min-Norm AOA Estimate, MUSIC AOA Estimate, ESPRIT AOA Estimate.

UNIT V

Smart Antenna Performance: Beam forming Array Performance, Receive Diversity Performance, Combined Diversity and Beam forming Performance, Choosing a Spatial Processing Technique, MultiUser Modulation Schemes.

Course Outcomes for First Year Second Semester Course	
Course Code:M17 CS 1206	
Course Title: SMART ANTENNAS (ELECTIVE-III)	
CO-1	Understand the applications of smart antennas.
CO-2	Know the various processing techniques.
CO-3	Discuss about design and simulation of various AOA estimation techniques using software
CO-4	Know the different diversity combining techniques and their significance.
CO-5	Know the Adaptive Algorithm Classification
CO-6	Know Direction of Arrival Estimation methods

SYLLABUS: SECURE COMMUNICATIONS (M17 CS 1207)
(ELECTIVE-III)

UNIT-I

Security concepts: Introduction to the Concept of Security, threats, security services, security mechanisms. Basic encryption techniques, Concept of cryptanalysis, Shannon's theory , Perfectsecrecy, Block ciphers, Cryptographic algorithms, Features of Data Encryption Standard, Linearand Differential Cryptanalysis, Advanced Encryption Standard, Stream ciphers, Pseudo randomsequence generators.

UNIT-II

Database Security: Security policies, Policy enforcement & related issues, Design principles, Multilevel relational data models, Security impact on database function, inference problem Public Key Infrastructure (PKI), Internet Security Protocols, Network Security.

UNIT-III

Software Security: Defining a discipline, A Risk Management Framework, Code review with atools, Architectural risk analysis, Software penetrating testing, Risk Based security Testing, AnEnterpriseS/Wsecurityprogram, Securityknowledge.

UNIT-IV

Intrusion detection: Defining Intrusion Detection, Security concepts intrusion Detection concept, determining strategies for Intrusion Detection, Responses, Technical issues.

UNIT-V

Biometric Security: Biometric Fundamentals, Types of Biometrics, Fingerprints and Hand Geometry, Facial and Voice Recognition, Iris and Retina scanning, Signature Recognition and Keystroke Dynamics, Behavioural and Esoteric Biometric Technologies, Issues Involving Biometrics, Privacy

Course Outcomes for First Year Second Semester Course	
Course Code:M17 CS 1207	
Course Title: SECURE COMMUNICATIONS (ELECTIVE-III)	
CO-1	Conceptualize the necessity of Security.
CO-2	Understand the process involved in data modeling.
CO-3	Analyze and handle security risks.
CO-4	Understand latest technologies on security.

SYLLABUS: OPTICAL NETWORKS (M17 CS 1208)
(ELECTIVE-IV)

UNIT–I:

Client Layers of Optical Networks:

SONET / SDH – Multiplexing, Frame Structure, Physical Layer, Infrastructure, ATM – Functions, Adaptation layers, QoS, Flow Control Signaling and Routing, IP – Routing, QoS, MPLS, Storage Area Networks – ESCON, Fiber Channel, HIPPI, Gigabit Ethernet.

UNIT-II:

WDM network Elements and Design:

Optical Line Terminals and Amplifiers, Add/Drop Multiplexers, Optical Cross Connects, Costtrade-offs in Network Design, LTD and RWA Problems, Dimensioning – Wavelength Routing Networks, Statistical and Maximum Load Dimensioning Models.

UNIT–III:

Network Control and Management:

Network Management Functions, Optical Layer Services and Interfacing, Layers within Optical Layer, Multivendor Interoperability, Performance and Fault Management, Configuration Management, Optical Safety.

UNIT–IV:

Network Survivability:

Basic Concepts of Survivability, Protection in SONET/SDH Links and Rings, Protection in IP Networks, Optical Layer Protection–Service Classes, Protection Schemes, Inter working between Layers.

UNIT–V:

Access Networks and Photonic Packet Switching:

Network Architecture, Enhanced HFC, FTTC, Photonic Packet Switching – OTDM, Synchronization, Header Processing, Buffering, Burst Switching, Test Beds.

Course Outcomes for First Year Second Semester Course	
Course Code: M17 CS 1208	
Course Title:OPTICAL NETWORKS (ELECTIVE-IV)	
CO-1	Solve a simple WDM network design and optimization problem.
CO-2	Define the main limitations and possibilities of the optical network technologies.
CO-3	Define the main differences between optical networking and traditional networking.
CO-4	Explain the benefits of optical layer survivability.
CO-5	Describe the main issues in management and control of optical networks.

SYLLABUS: DIGITAL SIGNAL PROCESSORS AND ARCHITECTURES (M17 CS 1209)
(ELECTIVE-IV)

UNIT–I:

Introduction to Digital Signal Processing:

Introduction, A Digital signal-processing system, The sampling process, Discrete time sequences. Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), Linear time-invariant systems, Digital filters, Decimation and interpolation

Computational Accuracy in DSP Implementations:

Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors, Compensating filter..

UNIT–II:

Architectures for Programmable DSP Devices:

Basic Architectural features, DSP Computational Building Blocks, Bus Architecture andMemory, Data Addressing Capabilities, Address Generation UNIT, Programmability and Program Execution, Speed Issues, Features for External interfacing.

UNIT-III:

Programmable Digital Signal Processors:

Commercial Digital signal-processing Devices, Data Addressing modes of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX Processors, Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX instructions and Programming, On-Chip Peripherals, Interrupts of TMS320C54XX processors, Pipeline operation of TMS320C54XX Processors..

UNIT–IV:

Analog Devices Family of DSP Devices:

Analog Devices Family of DSP Devices – ALU and MAC block diagram, Shifter Instruction, Base Architecture of ADSP 2100, ADSP-2181 high performance Processor. Introduction to Blackfin Processor - The Blackfin Processor, Introduction to Micro Signal Architecture, Overview of Hardware Processing Units and Register files, Address Arithmetic Unit, Control Unit, Bus Architecture and Memory, Basic Peripherals.

UNIT–V:

Interfacing Memory and I/O Peripherals to Programmable DSP Devices:

Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, ProgrammedI/O, Interrupts andI/O, Direct memory access(DMA).

Course Outcomes for First Year Second Semester Course	
Course Code: M17 CS 1209	
Course Title: DIGITAL SIGNAL PROCESSORS AND ARCHITECTURES (ELECTIVE-IV)	
CO-1	Apply DFT and FFT algorithms for DSP application
CO-2	Apply the number format, dynamic range and various sources of errors in DSP system
CO-3	Implement application programs on a DSP processor
CO-4	Implement various DSP algorithms on TMS processors
CO-5	Implement FFT algorithms on TMS320C54XXDSP algorithm.

SYLLABUS: INTERNET OF THINGS (M17 CS 1210)

(ELECTIVE-IV)

UNIT– I

Introduction: IoT overview, The IoT paradigm, Smart objects, IoT Platforms (like Aurdino, ARM Cortex, Raspberry Pi / Intel Galileo), Bits and atoms, Convergence of Technologies. Introduction to Internet and web networking basics: HTTP, Rest, JSON, XML, Interfacing to Cloud Harnessing mobile computing for IoT

UNIT– II

Introduction to Technologies behind IoT: RFID, NFC, Mobil Data Technologies (GPRS, 3G, 4G), Wifi. Powering the IoT using low power wireless technologies like Bluetooth smart technology, Zigbee. WSN. RTLS + GPS Agents and Multi agent systems.

UNIT– III

IoT Architecture: Machine to Machine, Web of Things, IoT protocols (The Layering concepts , IoT Communication Pattern, IoT protocol Architecture, The 6LoWPAN - IPv6 over Low power Wireless Personal Area Networks)

UNIT– IV

IoT Applications and issues: Combination scenarios. Breaking assumptions. IoT in retail, IoT in healthcare, IoT in manufacturing. Prototyping Connected Objects: Open source prototype platforms, Arduino based internet communication. Integrating and accessing Internet services, Rasberry PI / Beagle board based Gateways, Data Analysis Techniques.

UNIT– V

Case Studies and Guest lectures from Industry (for different verticals like Retail, Healthcare, Home Automation etc).

Course Outcomes for First Year Second Semester Course	
Course Code: M17 CS 1210	
Course Title: INTERNET OF THINGS (ELECTIVE-IV)	
CO-1	Identify and describe different kinds of Internet-connected product concepts.
CO-2	Analyze design and develop prototypes models of Internet-connected products using various tools.
CO-3	Understand the challenges and apply right techniques for user-interaction with connected-objects.

SYLLABUS: ADVANCED COMMUNICATIONS LABORATORY (M17 CS 1211)

Note:

A. Minimum of 10 Experiments have to be conducted

B. All Experiments may be Simulated using MATLAB and to be verified using related training kits

1. Measurement of Bit Error Rate using Binary Data
2. Verification of minimum distance in Hamming code
3. Determination of output of Convolutional Encoder for a given sequence
4. Determination of output of Convolutional Decoder for a given sequence
5. Efficiency of DS Spread- Spectrum Technique
6. Simulation of Frequency Hopping (FH) system
7. Effect of Sampling and Quantization of Digital Image
8. Verification of Various Transforms (FT / DCT/ Walsh / Hadamard) on a given Image (Finding Transform and Inverse Transform)
9. Point, Line and Edge detection techniques using derivative operators.
10. Implementation of FIR filter using DSP Trainer Kit (C-Code/ Assembly code)
11. Implementation of IIR filter using DSP Trainer Kit (C-Code/ Assembly code)
12. Determination of Losses in Optical Fiber
13. Observing the Waveforms at various test points of a mobile phone using Mobile Phone Trainer
14. Study of Direct Sequence Spread Spectrum Modulation & Demodulation using CDMA-DSS-BER Trainer
15. Study of ISDN Training System with Protocol Analyzer
16. Characteristics of LASER Diode

Course Outcomes for First Year Second Semester Course	
Course Code: M17 CS 1211	
Course Title: ADVANCED COMMUNICATIONS LABORATORY	
CO-1	Calculate BER using binary data
CO-2	Understand the importance of various filter implementations using DSP trainer kit
CO-3	Understanding the Waveforms at various test points of a mobile phone using Mobile Phone Trainer
CO-4	Studying the Performance of spread spectrum communication system.

ELECTRICAL AND ELECTRONICS ENGINEERING

SYLLABUS: ADVANCED POWER SYSTEM OPERATION AND CONTROL (M17PS1101)

UNIT-I:

Generation with limited Energy supply: Take-or-pay fuel supply contract, composite generation production cost function. Solution by gradient search techniques, Base point and participation factor method, hard limits and slack variables, Fuel scheduling by linear programming. Hydroelectric plant models –short term hydrothermal scheduling problem – gradient approach.

UNIT-II:

Unit commitment problem: Constraints in UCP, UC solutions. UC Methods-priority list method, Forward Dynamic programming Approach and Lagrange Relaxation method.

UNIT-III:

Optimal power flow: Solution of OPF, gradient method, Newton‟s method, linear programming method with only real power variables, linear programming with AC power flow variables,security-constrainedoptimal power flow.

UNIT-IV:

Single area & Two areas Load Frequency Control: concept of single & two area Load frequency control: uncontrolled case and controlled case, tie-line bias control. Optimal two-area LF control steady state representation, performance Index and optimal parameter adjustment.

UNIT-V:

Interchange Evaluation and Power Pools Economy Interchange, Economy interchange Evaluation, Interchange Evaluation with unit commitment, Multiple Interchange contracts. After the- fact production costing, Transmission Losses in transaction Evaluation, other types of Interchange, power pools.

Course Outcomes for First Year First Semester Course	
Course Code: M17 PS 1101	
Course Title: ADVANCED POWER SYSTEM OPERATION AND CONTROL	
CO-1	Know the effect of generation with limited energy supply.
CO-2	Develop generation dispatching scheme for thermal and hydro units.
CO-3	Determine the unit commitment problem for economic load dispatch.
CO-4	Get the knowledge of load frequency control of single area and two area systems with and without control.
CO-5	Determine the interchange evaluation in interconnected power systems.

SYLLABUS: HVDS TRANSMISSION (M17PS1102)

UNIT-I:

Limitation of EHV AC Transmission, Advantages of HVDC Technical economical reliability aspects. HVDC Transmission: General considerations, Power Handling Capabilities of HVDC Lines, Basic Conversion principles, static converter configuration. Types of HVDC links Apparatus and its purpose.

UNIT-II:

Static Power Converters: 6-pulse bridge circuit and 12-pulse converters, converter station and Terminal equipment, commutation process, Rectifier and inverter operation, equivalent circuit for converter – special features of converter transformers. Comparison of the perform of diametrical connection with 6-pulse bridge circuit.

UNIT-III:

Control of HVDC Converters and systems: constant current, constant extinction angle and constant Ignition angle control. Individual phase control and equidistant firing angle control, DC power flow control. Factors responsible for generation of Harmonics voltage and current harmonics effect of variation of α and μ. Filters Harmonic elimination.

UNIT-IV:

Interaction between HV AC and DC systems – Voltage interaction, Harmonic instability problems and DC power modulation. Development of DC circuit Breakers, Multi-terminal DC links and systems; series, parallel and series parallel systems, their operation and control.

UNIT-V:

Transient over voltages in HV DC systems: Over voltages due to disturbances on DC side, over voltages due to DC and AC side line faults. Converter faults and protection in HVDC Systems: Converter faults, over current protection - valve group, and DC line protection, circuit breakers. Over voltage protection of converters, surge arresters.

Course Outcomes for First Year First Semester Course	
Course Code: M17 PS 1102	
Course Title: HVDC TRANSMISSION	
CO-1	Understand the various schemes of HVDC transmission.
CO-2	Understand the basic HVDC transmission equipment.
CO-3	Understand the control of HVDC systems.
CO-4	Understand the interaction between HVAC and HVDC system.
CO-5	Understand the various protection schemes of HVDC engineering.

SYLLABUS: REACTIVE POWER COMPENSATION & MANAGEMENT

(M17PS1103)

UNIT-I: Load Compensation

Objectives and specifications – reactive power characteristics – inductive and capacitive approximate biasing – Load compensator as a voltage regulator – phase balancing and power factor correction of unsymmetrical loads- examples.

UNIT-II: Reactive power compensation in transmission system:

Steady state -Uncompensated line – types of compensation – Passive shunt and series and dynamic shunt compensation – examples Transient state - Characteristic time periods – passive shunt compensation – static compensations- series capacitor compensation –compensation using synchronous condensers – examples

UNIT-III: Reactive power coordination:

Objective – Mathematical modeling – Operation planning – transmission benefits – Basic concepts of quality of power supply – disturbances- steady –state variations – effects of under voltages – frequency – Harmonics, radio frequency and electromagnetic interferences

UNIT-IV: Distribution side Reactive power Management:

System losses –loss reduction methods – examples – Reactive power planning – objectives – Economics Planning capacitor placement – retrofitting of capacitor banks

User side reactive power management: KVAR requirements for domestic appliances – Purpose of using capacitors – selection of capacitors – deciding factors – types of available capacitor, characteristics and Limitations

UNIT-V: Reactive power management in electric traction systems and are furnaces: Typical layout of traction systems – reactive power control requirements – distribution transformers- Electric arc furnaces – basic operations- furnaces transformer –filter requirements – remedial measures –power factor of an arc furnace

Course Outcomes for First Year First Semester Course	
Course Code: M17 PS 1103	
Course Title:REACTIVE POWER COMPENSATION & MANAGEMENT	
CO-1	Learn various load compensations.
CO-2	Obtain the mathematical model of reactive power compensating devices.
CO-3	Get application of reactive power compensation in electrical traction & arc furnaces.

SYLLABUS: ANALYSISOF POWER ELECTRONIC CONVERTERS

(M17PS1104)

UNIT-I: AC voltage Controllers

Single Phase AC Voltage Controllers with RL and RLE loads-ac voltage controller"s with PWM control-Effects of source and load inductances –synchronous tap changers Application numerical problems Three Phase AC Voltage controllers-Analysis of Controllers with star and delta connected resistive, resistive – inductive loads-Effects of source and load inductances– Application numerical problems

UNIT-II: AC-DC converters

Single phase Half controlled and Fully controlled Converters with RL load– Evaluation of input power factor and harmonic factor-Continuous and Discontinuous load current-Power factor improvements-Extinction angle control-symmetrical angle control-PWM single phase sinusoidal PWM-Single phase series converters-numerical problems. Three Phase ac-dc Converters- Half controlled and fully controlled Converters with RL load– Evaluation of input power factor and harmonic factor-Continuous and Discontinuous load current-three phase dual converters-Power factor improvements-three phase PWM-twelve pulse converters- numerical problems

UNIT-III: Power Factor Correction Converters

Single-phase single stage boost power factor corrected rectifier, power circuit principle of operation, and steady state- analysis, three phase boost PFC converter

UNIT-IV: PWM Inverters

Principle of operation-Voltage control of single phase inverters - sinusoidal PWM – modified PWM – phase displacement Control – Trapezoidal, staircase, stepped, harmonic injection and delta modulation – numerical problems. Voltage Control of Three-Phase Inverters- Sinusoidal PWM- 600 PWM- Third Harmonic PWM-Space Vector Modulation- Comparison of PWM Techniques-current source inverters-Variable dc link inverter - numerical problems

UNIT-V: Multi level inverters Introduction, Multilevel Concept, Types of Multilevel Inverters Diode-Clamped Multilevel Inverter, Principle of Operation, Features of Diode-Clamped Inverter, Improved Diode-Clamped Inverter- Flying-Capacitors Multilevel Inverter- Principle of Operation, Features of Flying-Capacitors Inverter- Cascaded Multilevel Inverter- Principle of Operation- Features of Cascaded Inverter-Switching Device Currents-DC-Link Capacitor Voltage Balancing- Features of Multilevel Inverters-Comparisons of Multilevel Converters

Course Outcomes for First Year First Semester Course	
Course Code:M17 PS 1104	
Course Title: ANALYSIS OF POWER ELECTRONIC CONVERTERS	
CO-1	Have the knowledge on principle of ac voltage controller and their control techniques.
CO-2	Convert ac voltage to dc voltage and different control strategies of the converter.
CO-3	Control the power factor of single phase and three phase ac to dc converters.
CO-4	Understand the conversion of dc to ac and their control strategies.
CO-5	Analyze different multilevel inverters to improve the quality of the output voltage of the inverter.

SYLLABUS: MODERN CONTROL THEORY (M17PS1105)
(ELECTIVE-I)

UNIT–I: State Variable Analysis

The concept of state – State Equations for Dynamic systems – State diagram - Linear Continuous time model for physical systems – Existence and Uniqueness of Solutions to Continuous – Time State Equations – Solutions – Linear Time Invariant Continuous – Time State Equations – State transition matrix and it"s properties

UNIT–II: State Variable Techniques

General concept of Controllability - General concept of Observability Controllability tests for Continuous &Time Invariant systems - Observability tests for Continuous &Time Invariant systems – Controllability and Observability of state model in Jordan Canonical form - Controllability and Observability Canonical forms of State model – State feedback controller design through pole assignment.

UNIT–III: Non Linear Systems–I

Introduction – Non Linear Systems – Types of Non – Linearities – Saturation – Dead – Zone –Backlash – Jump Phenomenon etc; - Singular Points – Introduction to Linearization of nonlinearsystems, properties of Non Linear Systems – Describing function – describing function analysis of nonlinear systems-Stability analysis of Non–Linear systems through describing functions.

UNIT–IV: Non Linear Systems–II

Introduction to phase – plane analysis, Method of Isoclines for Constructing Trajectories, singular points, phase – plane analysis of nonlinear control systems.

UNIT–V: Stability Analysis

Stability in the sense of Lyapunov, Lyapunov"s stability and Lyapunov"s instability theorems – Stability Analysis of the Linear Continuous time invariant systems by Lyapunov second method – Generation of Lyapunov functions – Variable gradient method – Krasooviski"s method.

Course Outcomes for First Year First Semester Course	
Course Code: M17 PS 1105	
Course Title: MODERN CONTROL THEORY (ELECTIVE-I)	
CO-1	Understanding the state variable approach is suitable for higher order.
CO-2	To analyze the concepts of controllability and observability.
CO-3	To analyze the various non-linearities through describing functions and phase plane analysis.
CO-4	Typical issues of stability and instability of continuous time in variant systems.

SYLLABU: POWER SYSTEM SECURITY (M17PS1106)
(ELECTIVE-I)

UNIT-I:

Short circuit analysis techniques in AC power Systems- Simulation of short circuit and open circuit faults using network theorems- fixed impedance short circuit analysis techniques time domain short circuit analysis in large scale power systems- analysis of time variation of AC and DC short circuit components

UNIT-II:

Fixed impedance Short circuit analysis of large scale power systems-general analysis of balanced, unbalanced and open circuit faults- 3-phase short circuit analysis in large scale power systems, Network equivalents and practical short circuit current assessments in large scale Ac power systems-general studies- uncertainties in short circuit current calculations-probabilistic Short circuit analysis

UNIT-III:

Risk assessment and safety considerations-control and limitation of high short circuit currents limitation of short circuit currents in power system operation, design and planning, Types of short circuit fault current limiters- earthing resistor or reactor connected to transformer neutral pyrotechnic fault current limiters- series resonant current limiters- saturable reactor limiters-other types of fault current limiters and their applications..

UNIT-IV:

Power System Security analysis- concept of security- security analysis and monitoring factors affecting power system security- detection of network problems –overview, contingency analysis for generator and line outages by ILPF method – fast decoupled inverse Lemma-based approach, network sensitivity factors – contingency selection –concentric relaxation and bounding

UNIT-V:

Computer control power systems – need for real time and computer control of power systems operating states of power system – SCADA- implementation considerations – software requirements for implementing above functions.

Course Outcomes for First Year First Semester Course	
Course Code: M17 PS 1106	
Course Title: POWER SYSTEM SECURITY (ELECTIVE-I)	
CO-1	Analyze the balanced and unbalanced power system under short circuit conditions.
CO-2	Understand how to minimize the short circuit effect on the power System.
CO-3	Design the power system with more security with real time control.
CO-4	Implant SCADA for power system security.

SYLLABUS: OPTIMIZATION TECHNIQUES (M17PS1107)
(ELECTIVE-I)

UNIT-I:

Introduction to Optimization: Introduction, Historical Development, Engineering applications of Optimization, Statement of Optimization Problem.

UNIT-II:

Classical Optimization Techniques: Introduction, Single variable optimization, Multi variable optimization with no constraints; Multivariable optimization with Equality constraints - Solution by Direct Substitution method, Method of Lagrangian multipliers; Multivariable optimization with inequality constraints: Kuhn-Tucker conditions.

UNIT-III:

Linear Programming: Introduction, Applications of Linear Programming, Standard Form of a Linear Programming, Basic Terminology and Definitions, Exceptional cases, Simplex method, Big-M method, Two-phase method, Revised Simplex method, Duality, Degene -racy Principle.

UNIT-IV:

Non–Linear Programming-I: Unconstrained One Dimensional Minimization Methods- Fibonacci Method, Quadratic Interpolation Method Non- Linear Programming: Un Constrained Optimnization: Univariate Method, Pattern Directions, Powell‟s Method, Cauchy‟s Method Or Steepest Descent Method, Powell‟s Conjugate Direction Method.

UNIT-V:

Non-Linear Programming-II: Constrained Optimization- Characteristics Of A Constrained Problem, Classification- Direct Methods, Indirect Methods- Interior Penalty Function Method, Exterior Penalty Function Method,

Course Outcomes for First Year First Semester Course	
Course Code: M17 PS 1107	
Course Title: OPTIMIZATION TECHNIQUES (ELECTIVE-I)	
CO-1	After learning the techniques they can apply to engineering and other problems.

SYLLABUS: GENERATION &MEASUREMENTS OF HIGH VOLTAGES (M17PS1108)
(ELECTIVE-I)

UNIT-I: Electrostatic fields and field stress control:

Electric fields in homogeneous Isotropic materials and in multi dielectric media-Simple configurations-field stress control. Methods of computing electrostatic fields-conductive analogues-Impedance networks Numerical techniques finite difference method-finite element method and charge simulation method.

UNIT-II: Generation of HighAC&DCVoltages:

Direct Voltages: AC to DC conversion methods electrostatic generators-Cascaded Voltage Multipliers. Alternating Voltages: Testing transformers-Resonant circuits and their applications, Tesla coil.

UNIT-III: Generation of Impulse Voltages:

Impulse voltage specifications-Impulse generations circuits-Operation, construction and design of Impulse generators-Generation of switching and long duration impulses. Impulse Currents: Generation of High impulse currents and high current pulses.

UNIT-IV: Measurement of High AC& DC Voltages:

Measurement of High D.C. Voltages: Series resistance meters, voltage dividers and generating voltmeters. Measurement of High A.C. Voltages: Series impedance meters electrostatic voltmeters potential transformers and CVTS-voltage dividers and their applications

UNIT-V: Measurement of Peak Voltages:

Sphere gaps, uniform field gaps, rod gaps. Chubb-Fortesque methods. Passive and active rectifier circuits for voltage dividers. Measurement of Impulse Voltages : Voltage dividers and impulse measuring systems generalized voltage measuring circuits-transfer characteristics of measuring circuits-L.V. Arms for voltage dividers-compensated dividers. Measurement of Impulse Currents : Resistive shunts-current transformers-Hall Generators and Faraday generators and their applications-Impulse Oscilloscopes.

Course Outcomes for First Year First Semester Course	
Course Code: M17 PS 1108	
Course Title: GENERATION & MEASUREMENTS OF HIGHVOLTAGES (ELECTIVE-I)	
CO-1	Understand numerical computation of electrostatic problems
CO-2	Understand numerical computation of electrostatic problems.
CO-3	Understand the techniques of generation of high AC, DC and transient voltages.
CO-4	Measure high AC, DC and transient voltages.

SYRLLABUS: RENEWABLE ENERGY SYSTEMS(M17PS1109)
(ELECTIVE-II)

UNIT-I:

Energy and Electricity: The World Energy Scene, the Environmental Impact of Energy Use, Generating Electricity, The Electrical Power System.

UNIT-II:

Features of Conventional and Renewable Generation: Introduction, Conventional Sources: Coal, Gasand Nuclear, Hydroelectric Power, Wind Power, PV and Solar Thermal Electricity, Tidal Power, Wave Power, Biomass, Summary of Power Generation Characteristics, Combining Sources.

UNIT-III:

Power Balance/Frequency Control: Introduction, Electricity Demand, Power Governing, Dynamic Frequency Control of Large Systems, Impact of Renewable Generation on Frequency Control and Reliability, Frequency Response Services from Renewable, Frequency Control Modelling, Energy Storage.

UNIT-IV:

Renewable Energy Generation in Power Systems: Distributed Generation, Voltage Effects, Thermal Limits, Other Embedded Generation Issues, Islanding, Fault Ride-through, Generator and Converter Characteristics.

UNIT-V:

Power System Economics and the Electricity Market: Introduction, The Costs of Electricity Generation, Economic Optimization in Power Systems., External Costs, Effects of Embedded Generation, Support Mechanisms for Renewable Energy, Electricity Trading. The Future–Towards a Sustainable Electricity Supply System: Introduction, The Future of Wind Power, The Future of Solar Power, The Future of Bio fuels, The Future of Hydro and Marine Power, Distributed Generation and the Shape of Future Networks.

Course Outcomes for First Year First Semester Course	
Course Code: M17 PS 1109	
Course Title: RENEWABLE ENERGY SYSTEMS (ELECTIVE-II)	
CO-1	Students will be able to understand the World Energy Generation and consumption Over the past and present;
CO-2	Students will be able to outline the technologies that are used to harness the Energy from Conventional and Non-conventional Sources.
CO-3	Students will be able to understand power governing, dynamic frequency control of large systems, Impact of Renewable generation on Frequency control
CO-4	Students will be able to explain the Issues Regarding Renewable Energy System in Power System
CO-5	Students will be able to outline the Power system economics and Electricity Market
CO-6	Students will have vision towards sustainable supply systems in Future.

ADVANCED DIGITAL SIGNAL PROCESSING (M17PS1110)
(ELECTIVE-II)

UNIT-I: Digital Filter Structure

Block diagram representation-Equivalent Structures-FIR and IIR digital filter Structures All pass Filters-tunable IIR Digital Filters-IIR tapped cascaded Lattice Structures-FIR cascaded Lattice structures-Parallel-Digital Sine-cosine generator-Computational complexity of digital filter structures.

UNIT-II: Digital filter design

Preliminary considerations-Bilinear transformation method of IIR filter design-design of Low pass high pass-Band pass, and Band stop- IIR digital filters-Spectral transformations of IIR filters, FIR filter design-based on Windowed Fourier series- design of FIR digital filters with least –mean- Square-error-constrained Least-square design of FIR digital filters

UNIT-III: DSP algorithm implementation

Computation of the discrete Fourier transform- Number representation-Arithmetic operations handling of overflow-Tunable digital filters-function approximation

UNIT-IV: Analysis of finite Word length effects

The Quantization process and errors- Quantization of fixed -point and floating -point Numbers Analysis of coefficient Quantization effects - Analysis of Arithmetic Round-off errors, Dynamic range scaling-signal- to-noise ratio in Low -order IIR filters-Low-Sensitivity Digital filters Reduction of Product round-off errors using error feedback-Limit cycles in IIR digital filters Round-off errors in FFT Algorithms.

UNIT V: Power Spectrum Estimation

Estimation of spectra from Finite Duration Observations signals – Non-parametric methods forpower spectrum Estimation – parametric method for power spectrum Estimation, Estimation ofspectral form-Finite duration observation of signals-Non-parametric methods for power spectrumestimation-Walshmethods-Blackman &torchymethod.

Course Outcomes for First Year First Semester Course	
Course Code: M17 PS 1110	
Course Title: ADVANCED DIGITAL SIGNAL PROCESSING (ELECTIVE-II)	
CO-1	Understand reliability analysis applied to power systems.
CO-2	Understand Markov Chains and application to power systems.
CO-3	Perform stability analysis of generation systems.
CO-4	Understand decomposition techniques applied to power system.

SYLLABUS: POWER SYSTEM RELIABILITY (M17PS1111)

(ELECTIVE-II)

UNIT-I:

Basic probability theory – rules for combining probabilities of events – Bernoulli`s trials –probability density and distribution functions – binomial- distributions – expected value and standard deviation of binomial Distribution.

UNIT-II:

Network Modelling and Reliability Analysis of Series, Parallel, Series-Parallel networks – complex networks – decomposition method Reliability functions F(t), F(t), R(t), h(t) and their relationship – exponential distributions – Expected value and standard deviation of exponentional distribution – Bath tub curve – reliability analysis of series parallel networks using exponential distribution – reliability measures MTTF, MTTR, MTBF

UNIT-III:

Markov chains – concept of stochastic transitional probability Matrix, Evaluation of limiting state Probabilities – Markov processes one component repairable system – time dependent probability evaluation using Laplace transform approach – evaluation of limiting state probabililties using STPM – two component repairable models – Frequency and duration concept – Evaluation of frequency of encountering state, mean cycle time, for one, two component repairable models – evaluation of cumulative probability and cumulative frequency of encountering merged states

UNIT-IV:

Generation system reliability analysis – reliability model of a generation system – recursive relation for unit addition and removal – load modelling – merging of generation load model – evaluation of transition rates for merged state model – cumulative Probability, cumulative frequency of failure evaluation – LOLP, LOLE.

UNIT-V:

Composite system reliability analysis decomposition method – distribution system reliability analysis – radial networks – weather effects on transmission lines – Evaluation of load and energy indices.

Course Outcomes for First Year First Semester Course	
Course Code: M17 PS 1111	
Course Title: POWER SYSTEM RELIABILITY (ELECTIVE-II)	
CO-1	Know the various components and usage of each component.
CO-2	Derive stat space model for a given systems and Apply the concept of Observability and Controllability for LTI system.
CO-3	Apply Z- transform in Engineering application related to digital control systems.
CO-4	Design classical controller based on bode plots and modern controllers based on the state space techniques
CO-5	Test the digital system which is useful after designing a particular system with respect to the stability point of view.

ELECTRICAL DISTRIBUTION SYSTEMS (M17PS1112)
(ELECTIVE-II)

UNIT-I: Distribution System Basics:

Brief description about electrical power transmission and distribution systems, Different types of distribution sub-transmission systems, Substation bus schemes, Factors effecting the substation location, Factors effecting the primary feeder rating, types of primary feeders, Factors affecting the primary feeder voltage level, Factors affecting the primary feeder loading.

UNIT-II: Distribution System Loads:

Various types of loads, Definitions of various terms related to system loading, Detailed description of distribution transformer loading, feeder loading, Modelling of star and delta connected loads, two-phase and single-phase loads, shunt capacitors

UNIT-III: Substations and feeders:

Rating of a distribution substation for square and hexagonal shaped distribution substation service area, Derivation of K constant, Radial feeder with uniformly and non-uniformly distributed loading..

UNIT-IV: Distribution System Load Flow:

Exact line segment model, Modified line model, approximate line segment model, Review of the two-winding transformer theory, two-winding auto transformer, Step-Voltage Regulators, Line drop compensator, Forward/Backward sweep distribution load flow algorithm.

UNIT-V: Voltage Drop and Power loss Calculation:

Detailed analysis of non-three phase primary lines, concepts of four-wire multi-grounded common-neutral distribution system, Percent power loss calculation, Distribution feeder cost calculation methods, Capacitor installation types, types of three-phase capacitor-bank connections, Economic justification for capacitors. Advanced topics in Distribution Systems: Basic reliability indices, Calculation of SAIDI and SAIFI, Distribution automation communication protocols: MODBUS, DNP 3.0, IEC 60870-5- 101, UCA 2.0, IEC 61850; Brief description of Smart-grid, Micro-grid, and Nano-grid with simple exaples, Concepts of distributed generation.

Course Outcomes for First Year First Semester Course	
Course Code: M17 PS 1112	
Course Title: ELECTRICAL DISTRIBUTION SYSTEMS (ELECTIVE-II)	
CO-1	Analyze a distribution system.
CO-2	Design equipment for compensation of losses in the distribution system.
CO-3	Design protective systems and co-ordinate the devices.
CO-4	Understand of capacitive compensation.
CO-5	Understand of voltage control.

SYLLABUS: SIMULATION LABORATORY (M17PS1113)

LIST OF EXPERIMENTS:

1. Formation of Y- Bus by Direct-Inspection Method.
2. Load Flow Solution Using Gauss Siedel Method
3. Load Flow Solution Using Newton Raphson Method
4. Load Flow Solution Using Fast Decoupled Method
5. Formation of Z-Bus by Z-bus building algorithm
6. Symmetrical Fault analysis using Z-bus
7. Unsymmetrical Fault analysis using Z-bus
8. Economic Load Dispatch with & without transmission losses
9. Transient Stability Analysis Using Point By Point Method
10. Load Frequency Control of Single Area Control& Two Area Control system with and without controllers.

Course Outcomes for First Year First Semester Course	
Course Code: M17 PS 1113	
Course Title: SIMULATION LABORATORY	
CO-1	After the completion of the lab they will verify the theoretical concepts of various aspects of Power System analysis.
CO-2	Graduate will demonstrate the ability to identify, formulate and solve Power System engineering problems.
CO-3	Graduate will demonstrate the ability to design and conduct experiments, analyze and interpret data.
CO-4	Graduates will demonstrate the ability to design a electrical systems or process as per needs and specifications.
CO-5	Graduate will demonstrate the skills to use modern engineering tools, software "sand equipment to analyze problem.

SYLLABUS: POWER SYSTEM DYNAMICS & STABILITY (M17PS1201)

UNIT-I:

System Dynamics: Synchronous machine model in state space from computer representation for excitation and governor system –modeling of loads and induction machines.

UNIT-II:

Steady state stability – steady state stability limit – Dynamics Stability limit – Dynamic stability analysis – State space representation of synchronous machine connected to infinite bus time response – Stability by eigh value approach.

UNIT-III:

Digital Simulation of Transient Stability: Swing equation machine equations – Representation of loads – Alternate cycle solution method – Direct method of solution – Solution Techniques: Modified Euler method – RungeKutta method – Concept of multi machine stability..

UNIT-IV:

Effect of governor action and excite on power system stability effect of saturation, saliency & automatic voltage regulators on stability.

UNIT-V:

Excitation Systems : Rotating Self-excited Exciter with direct acting Rheostatic type voltage regulator – Rotating main and Pilot Exciters with Indirect Acting Rheostatic Type Voltage Regulator – Rotating Main Exciter, Rotating Amplifier and Static Voltage Regulator – Static excitation scheme – Brushless excitation system

Course Outcomes for First Year Second Semester Course	
Course Code: M17 PS 1201	
Course Title: POWER SYSTEM DYNAMICS & STABILITY	
CO-1	Able to determine the model of synchronous machines.
CO-2	Able to know the stability studies of synchronous machines.
CO-3	Able to get the knowledge of solution methods of transient stability.
CO-4	Able to know the effect of different excitation systems in power systems.

SYLLABUS: REAL TIME CONTROL OF POWER SYSTEMS (M17PS1202)

UNIT-I:

State Estimation: Different types of State Estimations, Theory of WLS state estimation, sequential and non-sequential methods to process measurements. Bad data Observability, Bad data detection, identification and elimination.

UNIT-II:

Security and Contingency Evaluation : Security concept, Security Analysis and monitoring, Contingency Analysis for Generator and line outages by iterative linear power flow method, Fast Decoupled model, and network sensitivity methods.

UNIT-III:

Computer Control of Power Systems: Need for real time and computer control of power systems, operating states of a power system, SCADA - Supervisory control and Data Acquisition systems implementation considerations, energy control centres, software requirements for implementing the above functions.

UNIT-IV:

Voltage Stability, voltage collapse, and voltage security, relation of voltage stability to rotor angle stability. Voltage stability analysis Introduction to voltage stability analysis `P-V" curves and `Q-V" curves, voltage stability in mature power systems, long-term voltage stability, power flow analysis for voltage stability, voltage stability static indices and Research Areas.

UNIT-V:

Application of AI and ANN in Power System: Basic concepts and definitions, algorithms for load flow, short term load forecasting, fault diagnosis and state estimation.

Course Outcomes for First Year Second Semester Course	
Course Code: M17 PS 1202	
Course Title: REAL TIME CONTROL OF POWER SYSTEMS	
CO-1	Understand state estimation, security and contingency evaluation.
CO-2	Understand about Supervisory control and data acquisition.
CO-3	Real time software application to state estimation.
CO-4	Understand application of AI in power system.

SYLLABUS: ARTIFICIAL INTELLIGENCE TECHNIQUES (M17PS1203)

UNIT-I: Introduction to Neural Networks

Introduction, Humans and Computers, Biological Neural Networks, Historical development of neural network, Terminology and Topology, Biological and artificial neuron models, Basic learning laws

UNIT-II: Feed Forward Neural Networks

Introduction, Perceptron models: Discrete, continuous and multi-category, Training algorithms: Discrete and Continuous Perceptron Networks, Perceptron convergence theorem, Limitations and applications of the Perceptron model, Generalized delta learning rule, Feed forward recall and error back propagation training-Radial basis function algorithms-Hope field networks..

UNIT-III: Genetic algorithms& Modelling

Introduction-encoding-fitness function-reproduction operators-genetic operators-cross over and mutation-generational cycle-convergence of genetic algorithm

UNIT-IV: Classical and Fuzzy Sets

Introduction to classical sets - properties, operations and relations; Fuzzy sets, membership,Uncertainty, operations, properties, fuzzy relations, cardinalities, membership functions. Fuzzy Logic System Components-Fuzzification, Membership value assignment, development of rule base and decision making system, defuzzification to crisp sets, defuzzification methods.

UNIT-V: Application of AI Techniques-load forecasting-load flow studies-economic load dispatch-load frequency control-reactive power control-speed control of dc and ac motors

Course Outcomes for First Year Second Semester Course	
Course Code: M17 PS 1203	
Course Title: ARTIFICIAL INTELLIGENCE TECHNIQUES	
CO-1	Understand neural networks and analyze different types of neural networks.
CO-2	Design training algorithms for neural networks.
CO-3	Develop algorithms using genetic algorithm for optimization.
CO-4	Analyze and design fuzzy logic systems.
CO-5	Apply AI Techniques in electrical engineering.

SYLLABUS: FLEXIBLE AC TRANSMISSION SYSTEMS
(M17PS1204)

UNIT-I:

FACTS concepts, Transmission interconnections, power flow in an AC System, loading capability limits, Dynamic stability considerations, importance of controllable parameters, basic types of FACTS controllers, benefits from FACTS controllers.

UNIT-II:

Basic concept of voltage and current source converters, comparison of current source converters with voltage source converters. Static shunt compensation : Objectives of shunt compensation, midpoint voltage regulation, voltage instability prevention, improvement of transient stability, Power oscillation damping, methods of controllable var generation, variable impedance type static var generators, switching converter type var generators, hybrid var generators.

UNIT-III:

SVC and STATCOM: The regulation and slope transfer function and dynamic performance, transient stability enhancement and power oscillation damping, operating point control and summary of compensation control.

UNIT-IV:

Static series compensators: Concept of series capacitive compensation, improvement of transient stability, power oscillation damping, functional requirements. GTO thyristor controlled series capacitor (GSC), thyristor switched series capacitor (TSSC), and thyristor controlled series capacitor (TCSC), control schemes for GSC, TSSC and TCSC

UNIT-V:

Unified Power Flow Controller: Basic operating principle, conventional transmission control capabilities, independent real and reactive power flow control, comparison of the UPFC to series compensators and phase angle regulators.

Course Outcomes for First Year Second Semester Course	
Course Code: M17 PS 1204	
Course Title:FLEXIBLE AC TRANSMISSION SYSTEMS	
CO-1	Know the performance improvement of transmission system with FACTS.
CO-2	Get the knowledge of effect of static shunt and series compensation.
CO-3	Know the effect of UPFC.
CO-4	Determine an appropriate FACTS device for different types of applications.

SYLLABUS: SMART GRID TECHNOLOGIES (M17PS1205)
(ELECTIVE-III)

UNIT-I:

Introduction to Smart Grid: Evolution of Electric Grid, Concept of Smart Grid, Definitions, Need of Smart Grid, Functions of Smart Grid, Opportunities & Barriers of Smart Grid, Difference between conventional & smart grid, Concept of Resilient &Self Healing Grid, Present development & International policies on Smart Grid. Case study of Smart Grid.

UNIT-II:

Smart Grid Technologies: Part 1: Introduction to Smart Meters, Real Time Prizing, Smart Appliances, Automatic Meter Reading(AMR), Outage Management System(OMS), Plug in Hybrid Electric Vehicles(PHEV), Vehicle to Grid, Smart Sensors, Home & Building Automation, Phase Shifting Transformers..

UNIT-III:

Smart Grid Technologies: Part 2: Smart Substations, Substation Automation, Feeder Automation. Geographic Information System(GIS), Intelligent Electronic Devices(IED) & their application for monitoring & protection, Smart storage like Battery, SMES, Pumped Hydro, Compressed Air Energy Storage, Wide Area Measurement System(WAMS), Phase Measurement Unit(PMU).

UNIT-IV:

Microgrids and Distributed Energy Resources: Concept of micro grid, need & applications of microgrid, formation of microgrid, Issues of interconnection, protection & control of microgrid. Plastic & Organic solar cells, Thin film solar cells, Variable speed wind generators, fuelcells, microturbines, Captive power plants, Integration of renewable energy sources..

UNIT-V:

Power Quality Management in Smart Grid: Power Quality & EMC in Smart Grid, Power Quality issues of Grid connected Renewable Energy Sources, Power Quality Conditioners for Smart Grid, Web based Power Quality monitoring, Power Quality Audit. Information and Communication Technology for Smart Grid: Advanced Metering Infrastructure (AMI), Home Area Network (HAN), Neighborhood Area Network (NAN), Wide Area Network (WAN)

Course Outcomes for First Year Second Semester Course	
Course Code: M17 PS 1205	
Course Title: SMART GRID TECHNOLOGIES (ELECTIVE-III)	
CO-1	Understand smart grids and analyse the smart grid policies and developments in smart grids.
CO-2	Develop concepts of smart grid technologies in hybrid electrical vehicles etc.
CO-3	Understand smart substations, feeder automation, GIS etc.
CO-4	Analyse micro grids and distributed generation systems.
CO-5	Analyse the effect of power quality in smart grid and to understand latest developments in ICT for smart grid

SYLLABUS: POWER QUALITY (M17PS1206)
(ELECTIVE-III)

UNIT-I: Introduction

Overview of Power Quality - Concern about the Power Quality - General Classes of Power Quality Problems – Transients -Long-Duration Voltage Variations - Short-Duration Voltage Variations - Voltage Unbalance - Waveform Distortion - Voltage fluctuation - Power Frequency Variations - Power Quality Terms - Voltage Sags and Interruptions - Sources of Sags and Interruptions – Nonlinear loads.

UNIT-II: Transient over Voltages

Source of Transient Over Voltages - Principles of Over Voltage Protection - Devices for Over Voltage Protection - Utility Capacitor Switching Transients - Utility Lightning Protection – Load Switching Transient Problems - Computer Tools for Transient Analysis

UNIT-III: Harmonic Distortion and solutions

Voltage vs. Current Distortion - Harmonics vs. Transients - Power System Quantities under Nonsinusoidal Conditions - Harmonic Indices – Sources of harmonics - Locating Sources of Harmonics – System Response Characteristics - Effects of Harmonic Distortion – Inter harmonics - Harmonic Solutions Harmonic Distortion Evaluation - Devices for Controlling Harmonic Distortion - Harmonic Filter Design - Standards on Harmonics

UNIT-IV: Long Duration Voltage Variations

Principles of Regulating the Voltage - Device for Voltage Regulation - Utility Voltage Regulator Application - Capacitor for Voltage Regulation - End-user Capacitor Application – Regulating Utility Voltage with Distributed Resources – Flicker

UNIT-V: Distributed Generation and Power Quality

Resurgence of Distributed Generation - DG Technologies - Interface to the Utility System Power Quality Issues - Operating Conflicts - DG on Low Voltage Distribution Networks - Interconnection standards - Wiring and Grounding - Typical Wiring and Grounding Problems - Solution to Wiring and grounding Problems

Course Outcomes for First Year Second Semester Course	
Course Code: M17 PS 1206	
Course Title: POWER QUALITY (ELECTIVE-III)	
CO-1	Have the knowledge on causes of power quality, power quality parameters.
CO-2	Understand sources of transient over voltages and providing protection to transient over voltages.
CO-3	Understand effects of harmonics, sources of harmonics and harmonic minimization.
CO-4	Analyze long duration voltage variations and regulation of voltage variations.
CO-5	Describe power quality aspects in distributed generation and develop solutions to wiring and grounding problems.

SYLLABUS: ADVANCED POWER SYSTEM PROTECTION

(M17 PS1207)

(ELECTIVE-III)

UNIT-I:

Static Relays classification and Tools : Comparison of Static with Electromagnetic Relays, Basic classification, Level detectors and Amplitude and phase Comparators – Duality – Basic Tools – Schmitt Trigger Circuit, Multivibrators, Square wave Generation – Polarity detector – Zero crossing detector – Thyristor and UJT Triggering Circuits. Phase sequence Filters – Speed and reliability of static relays.

UNIT-II:

Amplitude and Phase Comparators (2 Input) : Generalized equations for Amplitude and Phase comparison – Derivation of different characteristics of relays – Rectifier Bridge circulating andopposed voltage type amplitude comparators–Averaging & phase splitting type amplitude comparators – Principle of sampling comparators. Phase Comparison: Block Spike and phaseSplitting Techniques – Transistor Integrating type, phase comparison, Rectifier Bridge TypeComparison– Vector product devices.

UNIT-III:

Static over current (OC) relays – Instantaneous, Definite time, Inverse time OC Relays, static distance relays, static directional relays, static differential relays, measurement of sequence impedances in distance relays, multi input comparators, elliptic & hyperbolic characteristics, switched distance schemes, Impedance characteristics during Faults and Power Swings,

UNIT-IV:

PILOT Relaying schemes: Wire pilot protection: circulating current scheme – balanced voltage scheme – translay scheme – half wave comparison scheme - carrier current protection: phase comparison type – carrier aided distance protection – operational comparison of transfer trip and blocking schemes – optical fibre channels.

UNIT-V:

Microprocessor based relays andNumerical Protection: Introduction – over current relays – impedance relay – directional relay – reactance relay. Numerical Protection: Introduction - numerical relay - numerical relaying algorithms – mannmorrison technique - Differential equation technique and discrete fourier transform technique - numerical over current protection - numerical distance protection.

Course Outcomes for First Year Second Semester Course	
Course Code: M17 PS 1207	
Course Title: ADVANCED POWER SYSTEM PROTECTION (ELECTIVE-III)	
CO-1	Know the classifications and applications of static relays.
CO-2	Understand the application of comparators.
CO-3	Understand the static version of different types of relays.
CO-4	Understand the numerical protection techniques.

SYLLABUS: EHVAC TRANSMISSION (M17PS1208)

(ELECTIVE-III)

UNIT-I:

E.H.V. A.C. Transmission , line trends and preliminary aspects ,standard transmission voltages – power handling capacities and line losses – mechanical aspects. Calculation of line resistance and inductance: resistance of conductors, temperature rise of conductor and current carrying capacity. Properties of bundled conductors and geometric mean radius of bundle, inductance of two conductor lines and multi conductor lines, Maxwell"s coefficient matrix. Line capacitance calculation.capacitance of two conductor line, and capacitance of multi conductor lines, potential coefficients for bundled conductor lines, sequence inductances and capacitances and diagonalization.

UNIT-II:

Calculation of electro static field of AC lines - Effect of high electrostatic field on biologicalorganisms and human beings. Surface voltage Gradient on conductors, surface gradient on twoconductor bundle and cosine law, maximum surface voltage gradient of bundle with more than 3subconductors, Mangolt formula.

UNIT-III:

Corona : Corona in EHV lines – corona loss formulae – attenuation of traveling waves due tocorona – Audio noise due to corona, its generation, characteristics and limits, measurement of audio noise.

UNIT-IV:

Power Frequency voltage control : Problems at power frequency, generalized constants, No load voltage conditions and charging currents, voltage control using synchronous condenser, cascade connection of components : Shunt and series compensation, sub synchronous resonance in series – capacitor compensated lines

UNIT-V:

Static reactive compensating systems: Introduction, SVC schemes, Harmonics injected into network by TCR, design of filters for suppressing harmonics injected into the system.

Course Outcomes for First Year Second Semester Course	
Course Code: M17 PS 1208	
Course Title: EHVAC TRANSMISSION (ELECTIVE-III)	
CO-1	Calculate the transmission line parameters.
CO-2	Calculate the field effects on EHV and UHV AClines.
CO-3	Determine the corona, RI and audible noise in EHV and UHVlines.
CO-4	Analyze voltage control and compensation problems in EHV and UHV transmission systems

POWER SYSTEM DE REGULATION (M17PS1209)
(ELECTIVE-IV)

UNIT-I:

Need and conditions for deregulation. Introduction of Market structure, Market Architecture,Spot market, forward markets and settlements. Review of Concepts marginal cost of generation,least-costoperation, incrementalcost ofgeneration.Power System Operation.

UNIT-II:

Electricity sector structures and Ownership /management, the forms of Ownership and management. Different structure model like Monopoly model, Purchasing agency model, wholesale competition model, Retail competition model.

UNIT-III:

Framework and methods for the analysis of Bilateral and pool markets, LMP based markets, auction models and price formation, price based unit commitment, country practices

UNIT-IV:

Transmission network and market power. Power wheeling transactions and marginal costing, transmission costing. Congestion management methods- market splitting, counter-trading; Effect of congestion on LMPs-country practices

UNIT-V:

Ancillary Services and System Security in Deregulation. Classifications and definitions, AS management in various markets- country practices. Technical, economic, & regulatory issues involved in the deregulation of the power industry.

Course Outcomes for First Year Second Semester Course	
Course Code: M17 PS 1209	
Course Title: POWER SYSTEM DEREGULATION (ELECTIVE-IV)	
CO-1	Understand of operation of deregulated electricity market systems
CO-2	Typical issues in electricity markets
CO-3	To analyze various types of electricity market operational and control issues using new mathematical models.

SYLLABUS: HIGH VOLTAGE TESTING TECHNIQUES (M17PS1210)
(ELECTIVE-IV)

UNIT-I:

Non Destructive Testing Techniques : Measurement of DC Resistivity – Dielectric loss and dielectric constant of insulating materials – Schering bridge method – Transformer ratio arm bridge for high voltage and high current applications – null detectors

UNIT-II:

High Voltage Testing of Power Apparatus: Need for testing standards – Standards for porcelain/Glass insulators-Classification of porcelain/glass insulator tests – Tests for cap and pin porcelain/Glass insulators

UNIT-III:

High voltage AC testing methods-Power frequency tests-Over voltage tests on insulators, Isolators, Circuit Breakers and power cables. Artificial Contamination Tests : Contamination flashover phenomena-Contamination Severity-Artificial contamination tests-Laboratory Testing versus in-Service Performance-Case study.

UNIT-IV:

Impulse Testing: Impulse testing of transformers, insulators, Surge diverters, Bushings, cables, circuit breakers.

UNIT-V:

Partial Discharge Measurement: PD equivalent model-PD currents-PD measuring circuits Straight and balanced detectors-Location and estimation of PD in power apparatus-PD measurement by non electrical methods-Calibration of PD detectors. RIV Measurements: Radio Interference – RIV – Measurement of RI and RIV in laboratories and in field. Different test arrangements and their limitations.

Course Outcomes for First Year Second Semester Course	
Course Code: M17 PS 1210	
Course Title: HIGH VOLTAGE TESTING TECHNIQUES (ELECTIVE-IV)	
CO-1	Understand different testing procedures on electrical a) Insulating materials b) Insulation Systems. c) Power apparatus.
CO-2	Learn the different testing techniques adopted on electrical power apparatus

SYLLABUS: POWER SYSTEM TRANSIENTS
(M17 PS 1211)
(ELECTIVE-IV)

UNIT-I:

Basic Concepts and Simple Switching Transients;- Switching an LR,LC,RLC circuits Transients Analysis of Three-Phase power Systems: – Symmetrical components in three-phase Systems, Sequence Components for Unbalanced Network Impedances, the Sequence Networks, analysis of Unsymmetrical Three-Phase Faults-single line-to-Ground Fault, Three phase to ground fault.

UNIT-II:

Travelling Waves:- Velocity of Travelling waves and Characteristic Impedance, Energy Contents of Travelling Waves, Attenuation and Distortion of Electromagnetic Waves, telegraph equations-lossless line, distortion less line, Reflection and Refraction of Travelling Waves, Reflection of Travelling Waves against Transformer-and-Generator-windings, the Origin Transient Recovery voltages, bewley-lattice diagram. travelling waves and multi conductor system..

UNIT-III:

Switching Transients: arc interruption in circuit breaker , transient recovery voltage, arc-circuit interaction, interruption of capacitive currents, interruption of inverse currents, interruption of fault current in transmission line and transformers.

UNIT-IV:

Power System Transient Recovery Voltages:- Characteristics of the Transient Voltage- Short circuit test duties based on IEC 60056 (1987),ANSI/IEEE Standards, the Harmonization between IEC and ANSI/IEEE Standards with respect to Short-circuit Test duties, transient recovery voltage for Different types of faults.

UNIT-V:

Lightning –Induced Transients:- Mechanism of Lightning, wave shape of the lightning current, Direct lighting Stroke to transmission line towers, direct lightening stroke to a line, lightning protection scheme. Numerical simulation of electrical transients, The Electromagnetic Transient Program, principles of numerical techniques used in transient simulation

Course Outcomes for First Year Second Semester Course	
Course Code: M17 PS 1211	
Course Title: POWER SYSTEM TRANSIENTS (ELECTIVE-IV)	
CO-1	Understand the severity of over voltages due to faults on a given power system.
CO-2	To limit the effects of lightning over voltages in power systems.
CO-3	Understand the various transient over voltages and their effects on power system.

SYLLABUS: VOLTAGE STABILITY (M17PS1212)

(ELECTIVE-IV)

UNIT-I:

Reactive Power flow and voltage stability in power systems: Physical relationship indicating dependency of voltage on reactive power flow - reactive power, transient stability; Q V curve; definition of voltage stability, voltage collapse and voltage security. Voltage collapse phenomenon, Factors of voltage collapse, effects of voltage collapse, voltage collapse analysis.

UNIT-II:

Power system loads: Load characteristics that influence voltage stability such as – Discharge lighting, Induction motor, Air conditioning and heat pumps, Electronic power supplies, Over Head lines and cables.

UNIT-III:

Reactive Power compensation: Generation and absorption of reactive power – Reactive power compensators & voltage controllers: - shunt capacitors, synchronous phase modifier – static VAR system – on load tap changing transformer, booster transformers.

UNIT-IV:

Voltage stability static indices: Development of voltage collapse index – power flow studies –singular value decomposition – minimum singular value of voltage collapse – condition numberas voltagecollapse index.

UNIT-V:

Voltage stability margins & Improvement of voltage stability: Stability margins, voltage stability margin of un compensated and compensated power system. Dynamic voltage stability – voltage security, Methods of improving voltage stability and its practical aspects.

Course Outcomes for First Year Second Semester Course	
Course Code: M17 PS 1212	
Course Title: VOLTAGE STABILITY (ELECTIVE-IV)	
CO-1	**Interpret** the importance of reactive power and its compensation in transmission lines.
CO-2	**Summarize** the characteristics of TCR, TSR, FC-TCR and TSC.
CO-3	**Examine** the functional operation of SVC, STATCOM, TCSC & SSSC and their comparison.
CO-4	**Inspect** SVC &STATCOM for their applications in improvement of transient stability, Steady-State Power- Transfer Capacity, and SSR mitigation.
CO-5	**Inspect** TCSC & SSSC for their applications in improvement of system stability limit**,** system damping, Power flow control, and SSR mitigation.

SYLLABUS: POWER SYSTEMS LABORATORY (M17PS1213)

List of Experiments:

1. Determination of Sequence Impendence of an Alternator by direct method.
2. Determination of Sequence impedance of an Alternator by fault Analysis.
3. Measurement of sequence impedance of a three phase transformer.

   (a). by application of sequence voltage.

   (b). using fault analysis
4. Power angle characteristics of a salient pole Synchronous Machine.
5. Poly-phase connection on three single phase transformers and measurement of phase displacement.
6. Determination of equivalent circuit of 3-winding Transformer.
7. Measurement of ABCD parameters on transmission line model.
8. Performance of long transmission line without compensation.
9. Study of Ferranti effect in long transmission line.
10. Performance of long transmission line with shunt compensation..

Course Outcomes for First Year Second Semester Course	
Course Code: M17 PS 1213	
Course Title:POWER SYSTEMS LABORATORY	
CO-1	After the Completion of lab they will understand procedure for determination of various parameters used in power system as well as performance of transmission line.

INFORMATION TECHNOLOGY

SYLLABUS: ADVANCED DATA STRUCTURES (M17 IT1101)

UNIT I:

Introduction to Data Structures, Singly Linked Lists, Doubly Linked Lists, Circular Lists Algorithms. Stacks and Queues: Algorithm Implementation using Linked Lists.

UNIT II:

Searching-Linear and Binary Search Methods. Sorting-Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort. Trees-Binary trees, Properties, Representation and Traversals (DFT, BFT),Expression Trees(Infix, prefix, postfix). Graphs-Basic Concepts, Storage Structures and Traversals.

UNIT III:

Dictionaries, ADT, The List ADT, Stack ADT, Queue ADT, Hash Table Representation, Hash Functions, Collision Resolution-Separate Chaining, Open Addressing-Linear Probing, Double Hashing.

UNIT IV:

Priority queues-Definition, ADT, Realising a Priority Queue Using Heaps, Definition, Insertion, Deletion. Search Trees-Binary Search Trees, Definition, ADT, Implementation, Operations-Searching, Insertion, Deletion.

UNIT V:

Search Trees-AVL Trees, Definition, Height of AVL Tree, Operations-, Insertion, Deletion and Searching. Search Trees-Introduction to Red-Black and Splay Trees, B-Trees, Height of B-Tree, Insertion, Deletion and Searching, Comparison of Search Trees.

Course Outcomes for First Year First Semester Course	
Course Code: M17 IT 1101	
Course Title: ADVANCED DATA STRUCTURES	
CO-1	Basic ability to analyze algorithms and to determine algorithm correctness and time efficiency class.
CO-2	Master a variety of advanced abstract data type (ADT) and data structures and their implementations. 3. Master different algorithm design techniques.
CO-3	Ability to apply and implement learned algorithm design techniques and data structures to solve problems.

SYLLABUS: DISTRIBUTED SYSTEMS (M17 IT 1102)

UNIT-I:

Characterization of Distributed Systems: Introduction, Examples of Distributed Systems, Resource Sharing and the Web, Challenges. System Models: Introduction, Architectural Models-Software Layers, System Architecture, Variations, Interface and Objects, Design Requirements for Distributed Architectures, Fundamental Models-Interaction Model, Failure Model, Security Model.

UNIT-II:

Inter-process Communication: Introduction, The API for the Internet Protocols- The Characteristics of Inter-process communication, Sockets, UDP Datagram Communication, TCP Stream Communication; External Data Representation and Marshalling; Client Server Communication; Group Communication-IP Multicast- an implementation of group communication, Reliability and Ordering of Multicast.

UNIT-III:

Distributed Objects and Remote Invocation: Introduction, Communication between Distributed Objects-Object Model, Distributed Object Modal, Design Issues for RMI, Implementation of RMI, Distributed Garbage Collection; Remote Procedure Call, Events and Notifications, Case Study: JAVA RMI

UNIT-IV:

Operating System Support: Introduction, The Operating System Layer, Protection, Processes and Threads – Address Space, Creation of a New Process, Threads.

UNIT-V:

Distributed File Systems: Introduction, File Service Architecture; Peer-to-Peer Systems: Introduction, Napster and its Legacy, Peer-to-Peer Middleware, Routing Overlays. Coordination and Agreement: Introduction, Distributed Mutual Exclusion, Elections, Multicast Communication. Transactions & Replications: Introduction, System Model and Group Communication, Concurrency Control in Distributed Transactions, Distributed Dead Locks, Transaction Recovery; Replication-Introduction, Passive (Primary) Replication, Active Replication.

Course Outcomes for First Year First Semester Course	
Course Code: M17 IT 1102	
Course Title: DISTRIBUTED SYSTEMS	
CO-1	Explain various architectures used to design distributed systems, such as client-server and Peer-to-peer.
CO-2	Build distributed systems using various inter-process communication techniques, such as remote method invocation, remote events, and tuple spaces.
CO-3	Build distributed systems using various techniques for tolerating partial failures, such as leasing and replication.
CO-4	Build distributed systems using various inter process coordination techniques, such as distributed mutual exclusion, distributed monitors, and tuple spaces.
CO-5	Explain various distributed algorithms, such as logical clocks and leader election.
CO-6	Analyze and explain current distributed systems research literature.

SYLLABUS: SOFTWARE REQUIREMENTS AND ESTIMATION (M17 IT 1103)

UNIT I:

SoftwareRequirements: What and Why Essential Software requirement, Good practices for requirements engineering, Improving requirements processes, Software requirements and risk management

UNIT II:

Software Requirements Engineering : Requirements elicitation, requirements analysis documentation, review, elicitation techniques, analysis models, Software quality attributes, risk reduction through prototyping, setting requirements priorities, verifying requirements quality Software Requirements Modeling: Use Case Modeling, Analysis Models, Dataflow diagram, state transition diagram, class diagrams, Object analysis, Problem Frames

UNIT III:

Software Requirements Management: Requirements management Principles and practices, Requirements attributes, Change Management Process, Requirements Traceability Matrix, Links in requirements chain Requirements Management Tools: Benefits of using a requirements management tool, commercial requirements management tool, Rational Requisite pro, Caliber – RM, implementing requirements management automation

UNIT IV:

Software Estimation: Components of Software Estimations, Estimation methods, Problems associated with estimation, Key project factors that influence estimation. Size Estimation: Two views of sizing, Function Point Analysis, Mark II FPA, Full Function Points, LOC Estimation, Conversion between size measures,

UNIT V:

Effort, Schedule and Cost Estimation: What is Productivity? Estimation Factors, Approaches to Effort and Schedule Estimation, COCOMO II, Putnam Estimation Model, Algorithmic models, Cost Estimation Software Estimation Tools: Desirable features in software estimation tools, IFPUG, USC‟s COCOMO II, SLIM (Software Life Cycle Management) Tools

Course Outcomes for First Year First Semester Course	
Course Code: M17 IT 1103	
Course Title: SOFTWARE REQUIREMENTS AND ESTIMATION	
CO-1	Understand what software engineering is and why it is important.
CO-2	Understand the concept of software processes and software process models.
CO-3	Understand the principles of object orientation.
CO-4	Understand the principle of software development on reusable technology.
CO-5	Understand the type of software requirements (Functional & Non Functional).
CO-6	Understand that the effective requirements management can be accomplished only by an effective software team.

SYLLABUS: DATAMINING AND KNOWLEDGE DISCOVERY (M17 IT 1104)

UNIT I:

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

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

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

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

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

Course Outcomes for First Year First Semester Course	
Course Code:M17 IT 1104	
Course Title: DATAMINING AND KNOWLEDGE DISCOVERY	
CO-1	At the end of the course the student will be able to
CO-2	Explain the fundamental concepts of Data mining & Knowledge discovery.
CO-3	Understand the data preprocessing techniques.
CO-4	Understand Machine Learning algorithms and strategies to discovery and to deploy the discovered results.

ADVANCED COMPUTER NETWORKS (M17 IT 1105)

UNIT-I:

Network layer: Network Layer design issues: store-and forward packet switching, services provided transport layers, implementation connection less services, implementation connection oriented services, comparison of virtual –circuit and datagram subnets. Routing Algorithm –shortest path routing, flooding, distance vector routing, link state routing, Hierarchical routing, Broadcast routing, Multicasting routing, routing for mobiles Hosts, routing in Adhoc networks-congestion control algorithms-Load shedding, Congestion control in Data gram Subnet.

UNIT-II:

IPV4 Address address space, notations, classful addressing, classless addressing network addressing translation(NAT) , IPV6 Address structure address space, Internetworking need for network layer internet as a data gram, internet as connection less network. IPV4 datagram, Fragmentation, checksum, options. IPV6 Advantages, packet format, extension Headers, Transition form IPV4 to IPV6

UNIT–III:

Process to process delivery: client/server paradigm, multiplexing and demultiplexing connectionless versus connection oriented services, reliable versus reliable. UDP: well known ports for UDP, user data gram, check sum, UDP operation, and uses of UDP TCP: TCP services, TCP features, segment, A TCP connection, Flow control, error control, congestion control. SCTP: SCTP services SCTP features, packet format, An SCTP association, flow control, error control. Congestion control: open loop congestion control, closed loop congestion control, Congestion control in TCP, frame relay, QUALITY OF SERVICE: flow characteristics, flow classes TECHNIQUES TO IMPROVE QOS: scheduling, traffic shaping, resource reservation, admission control.

UNIT–IV:

Multimedia: introduction digital a audio , Audio compression, streaming audio, internet radio, voice over IP, introduction to video, video compression, video on demand, the MB one the multicast back bone

UNIT–V: : Emerging trends Computer Networks: Mobile Ad hoc networks: applications of Ad hoc networks, challenges and issues in MANETS,MAC layers issues, routing protocols in MANET, transport layer issues, Ad Hoc networks security. Wireless sensors networks: WSN functioning, operation system support in sensor devices, WSN Characteristics, sensor network operation, sensor Architecture: cluster management; Wireless mesh networks WMN design, Issues in WMNs;

Course Outcomes for First Year First Semester Course	
Course Code: M17 IT 1105	
Course Title: ADVANCED COMPUTER NETWORKS	
CO-1	To identify and discuss the concepts underlying IPv6 protocol, and their main characteristics and functionality.
CO-2	To understand the principles and functionality of mobile IP, explaining its concretization in IPv6; to understand the needs of optimization of the mobility mechanisms and description of some extensions that aim to reduce handover latency and requirements from terminals.
CO-3	To recognize the need for service integration and discuss how it can be accomplished;
CO-4	To explain and exemplify current QoS architectures and mechanisms, and the QoS support challenges in future networks.

SYLLABUS: WEB TECHNOLOGIES (M17 IT 1106)

UNIT-I:

Java script : The Basic of Java script: Objects, Primitives Operations and Expressions, Screen Output and Keyboard Input, Control Statements, Object Creation and Modification, Arrays, Functions, Constructors, Pattern Matching using Regular Expressions

UNIT-II:

XML: Document type Definition, XML schemas, Document object model, SLT, DOM and SAX Approaches, AJAX A New Approach: Introduction to AJAX, Integrating PHP and AJAX.

UNIT-III:

PHP Programming: Introducing PHP: Creating PHP script, Running PHP script. Working with variables and constants: Using variables, Using constants, Data types, Operators. Controlling program flow: Conditional statements, Control statements, Arrays, functions. Working with forms and Databases such as My SQL.

UNIT-IV:

PERL: Introduction to PERL, Operators and if statements, Program design and control structures, Arrays, Hashs and File handling, Regular expressions, Subroutines, Retrieving documents from the web with Perl.

UNIT-V:

RUBY: Introduction to Ruby, Variables, types, simple I/O, Control, Arrays, Hashes, Methods, Classes, Iterators, Pattern Matching. Overview of Rails.

Course Outcomes for First Year First Semester Course	
Course Code: M17 IT 1106	
Course Title: WEB TECHNOLOGIES	
CO-1	Develop a dynamic webpage by the use of java script and DHTML.
CO-2	Write a well formed / valid XML document.
CO-3	Connect to database and perform data manipulations.
CO-4	Write programs in PERL.
CO-5	Develop Ruby applications.

SYLLABUS: IT LAB 1(M17 IT 1107)

1. Write a c program to implement one to one chat application using sockets?
2. Write a c program to implement redundancy check using CRC?
3. Write a java program to implement simulation of sliding window protocol?
4. Write a java program to get the MAC or Physical address of the system using Address Resolution Protocol?
5. By using Data mining tool Demonstration of preprocessing on dataset student.arff?
6. By using Data mining tool Demonstration of classification rule process on dataset employee.arff using j48 algorithm
7. By using Data mining tool Demonstration of Association rule process on dataset test.arff using apriori algorithm?
8. By using Data mining tool Demonstration of classification rule process on dataset employee.arff using naïve baye"s algorithm?
9. By using Data mining tool Demonstration of clustering rule process on dataset iris.arff using simple k-means algorithms.
10. To perform various Recursive & Non-Recursive operations on Binary Search Tree
11. To implement BFS & DFS for a Graph
12. To implement Merge & Heap Sort of given elements
13. To perform various operations on AVL trees.
14. To implement Krushkal"s algorithm to generate a min-cost spanning tree
15. To implement Prim"s algorithm to generate a min-cost spanning tree
16. To implement functions of Dictionary using Hashing

Course Outcomes for First Year First Semester Course	
Course Code: M17 IT 1107	
Course Title: IT LAB 1	
CO-1	Student able to execute programmers' in computer networks.
CO-2	Student able to know use of different data mining tools.
CO-3	Student able to execute programmers' on data structures.

SYLLABUS: ADVANCED UNIX PROGRAMMING (M17 IT 1201)

UNIT-I

Introduction to unix-Brief History-What is Unix-Unix Components-Using Unix-Commands in Unix-Some Basic Commands-Command Substitution-Giving Multiple Commands

UNIT-II

The File system –The Basics of Files-What"s in a File-Directories and File Names Permissions-I Nodes-The Directory Hierarchy, File Attributes and Permissions-The File Command knowing the File Type-The Chmod Command Changing File Permissions-The Chown Command Changing the Owner of a File-The Chgrp Command Changing the Group of a File.

UNIT-III

Using the Shell-Command Line Structure-Met characters-Creating New Commands Command Arguments and Parameters-Program Output as Arguments-Shell Variables--More on I/O Redirection-Looping in Shell Programs.

UNIT-IV

Filters-The Grep Family-Other Filters-The Stream Editor Sed-The AWK Pattern Scanning and processing Language-Good Files and Good Filters.

UNIT-V

Shell Programming-Shell Variables-The Export Command-The Profile File a Script Run During Starting-The First Shell Script-The read Command-Positional parameters-The $? Variable knowing the exit Status-More about the Set Command-The Exit Command Branching Control Structures-Loop Control Structures-The Continue and Break Statement The Expr Command: Performing Integer Arithmetic-Real Arithmetic in Shell Programs-The here Document(<

Course Outcomes for First Year Second Semester Course	
Course Code:M17 IT 1201	
Course Title:ADVANCED UNIX PROGRAMMING	
CO-1	Able to understand and reason out the working of Unix Systems.
CO-2	Able to build an application/service over a Unix system.
CO-3	Describe the architecture and features of UNIX Operating System and distinguish it from
CO-4	Other Operating System Understanding.
CO-5	Demonstrate UNIX commands for file handling and process control Applying.
CO-6	Write Regular expressions for pattern matching and apply them to various filters for a

SYLLABUS: CYBER SECURITY (M17 IT 1202)

UNITI:

Introduction: Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

UNIT II:

Conventional Encryption: Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC

UNIT III:

Number Theory: Prime and Relatively Prime Numbers, Modular Arithmetic, Fermat"s and Euler"s Theorems, The Chinese Remainder theorem, Discrete logarithms Public key: Public key cryptography principles, public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service

UNIT IV:

IP Security: IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management Transport Level Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET) Email Privacy: Pretty Good Privacy (PGP) and S/MIME.

UNIT V:

Intrusion Detection: Intruders, Intrusion Detection systems, Password Management. Malicious Software: Viruses and related threats & Countermeasures. Fire walls: Firewall Design principles, Trusted Systems.

Course Outcomes for First Year Second Semester Course	
Course Code: M17 IT 1202	
Course Title: CYBER SECURITY	
CO-1	Will have knowledge and understanding of: Classical encryption techniques, Block ciphers and the Data Encryption Standard Key management, Public key cryptosystems, Message authentication, Hash functions and algorithms,
CO-2	Will have understanding of: Digital signatures and authentication protocols, Network security practice, Applications, E
CO-3	Will develop their skills in: The programming of symmetric and/or asymmetric ciphers and their use in the networks.
CO-4	Will learn protocols used in Web Security and Transport layer Security

SYLLAUS: BIG DATA ANALYTICS (M17 IT 1203)

UNIT-I

Data structures in Java: Linked List, Stacks, Queues, Sets, Maps; Generics: Generic classes and Type parameters, Implementing Generic Types, Generic Methods, Wrapper Classes, Concept of Serialization

UNIT-II

Working with Big Data: Google File System, Hadoop Distributed File System (HDFS) – Building blocks of Hadoop (Namenode, Datanode, Secondary Namenode, Job Tracker, Task Tracker), Introducing and Configuring Hadoop cluster (Local, Pseudo-distributed mode, Fully Distributed mode), Configuring XML files.

UNIT-III

Writing Map Reduce Programs: A Weather Dataset, Understanding Hadoop API for Map Reduce Framework (Old and New), Basic programs of Hadoop Map Reduce: Driver code, Mapper code, Reducer code, Record Reader, Combiner, Partitioner

UNIT-IV

Hadoop I/O: The Writable Interface, Writable Comparable and comparators, Writable Classes: Writable wrappers for Java primitives, Text, Bytes Writable, Null Writable, Object Writable and Generic Writable, Writable collections, Implementing a Custom Writable: Implementing a Raw Comparator for speed, Custom compare

UNIT-V

Pig: Hadoop Programming Made Easier Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin Applying Structure to Hadoop Data with Hive: Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data

Course Outcomes for First Year Second Semester Course	
Course Code: M17 IT1203	
Course Title: BIG DATA ANALYTICS	
CO-1	Understand the concept and challenge of big data and why existing technology is inadequate to analyze the big data.
CO-2	Collect, manage, store, query, and analyze various form of big data
CO-3	Gain hands-on experience on large-scale analytics tools to solve some open big data problems
CO-4	Understand the impact of big data for business decisions and strategy.

SYLLABUS: CLOUD COMPUTING (M17 IT 1204)

UNIT I:

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

UNIT II:

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

UNIT III:

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

UNIT IV:

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

UNIT V:

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

Course Outcomes for First Year Second Semester Course	
Course Code: M17 IT 1204	
Course Title: CLOUD COMPUTING	
CO-1	Understanding the key dimensions of the challenge of Cloud Computing.
CO-2	Assessment of the economics, financial, and technological implications for selecting cloud computing for own organization.
CO-3	Assessing the financial, technological, and organizational capacity of employer's for actively initiating and installing cloud-based applications.
CO-4	Assessment of own organizations" needs for capacity building and training in cloud computing-related IT areas.

SYLLABUS: ADHOC& SENSOR NETWORKS (M17 IT 1205)
(ELECTIVE-I)

UNIT I:

Introduction to AdHoc Wireless Networks

Cellular and Ad Hoc Wireless Networks, Characteristics of MANETs, Applications of MANETs, Issues and Challenges of MANETs, Ad Hoc Wireless Internet, MAC protocols for Ad hoc Wireless Networks-Issues, Design Goals and Classifications of the MAC Protocols

UNIT II:

Routing Protocols for Ad Hoc Wireless Networks

Issues in Designing a Routing Protocol, Classifications of Routing Protocols, Topology-based versus Position-based Approaches, Issues and design goals of a Transport layer protocol, Classification of Transport layer solutions, TCP over Ad hoc Wireless Networks, Solutions for TCP over Ad Hoc Wireless Networks, Other Transport layer protocols.

UNIT III:

Security protocols for Ad hoc Wireless Networks

Security protocols for Ad hoc Wireless Networks Security in Ad hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management, Secure Routing in Ad hoc Wireless Networks, Cooperation in MANETs, Intrusion Detection Systems.

UNIT IV:

Basics of Wireless Sensors and Applications

The Mica Mote, Sensing and Communication Range, Design Issues, Energy Consumption, Clustering of Sensors, Applications, Data Retrieval in Sensor Networks-Classification of WSNs, MAC layer, Routing layer, Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs.

UNITV:

Security in WSNs

Security in WSNs, Key Management in WSNs, Secure Data Aggregation in WSNs, Sensor Network Hardware-Components of Sensor Mote, Sensor Network Operating Systems– TinyOS, LA-TinyOS, SOS, RETOS, Imperative Language-nesC, Dataflow style language: Tiny GALS, Node-Level Simulators, NS-2 and its sensor network extension, TOSSIM.

Course Outcomes for First Year Second Semester Course	
Course Code: M17 IT 1205	
Course Title: ADHOC & SENSOR NETWORKS (ELECTIVE-I)	
CO-1	Students will be able to describe the unique issues in ad-hoc/sensor networks. This will be accessed through assignments and labs.
CO-2	Students will be able to describe current technology trends for the implementation and deployment of wireless ad-hoc/sensor networks. This will be assessed through assignments, and classroom interaction.
CO-3	Students will be able to discuss the challenges in designing MAC, routing and transport protocols for wireless ad-hoc/sensor networks. This will be assessed through assignments, labs, and classroom interaction.
CO-4	Students will be able to build and configure a test bed for a sensor network. This will be assessed through labs.
CO-5	Students will be able to describe and implement protocols on a sensor test bed network. This will be assessed through assignments, labs, and classroom interaction.

SYLLABUS: SEMANTIC WEB SERVICES (M17 IT 1206)
(ELECTIVE-I)

UNIT I:

Web Intelligence: Thinking and Intelligent Web Applications, The Information Age, The World Wide Web, Limitations of Today"s Web, The Next Generation Web, Machine Intelligence, Artifical Intelligence, Ontology, Inference engines, Software Agents, Berners Lee www, Semantic Road Map, Logic on the semantic Web.

UNIT II:

Knowledge Representation for the Semantic Web Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web – Resource Description Framework(RDF) / RDF Schema, Ontology Web Language(OWL), UML, XML/XML Schema.

UNIT III:

Ontology Engineering: Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping, Logic, Rule and Inference Engines..

UNIT IV:

Semantic Web Applications, Services and Technology: Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base, XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods,

UNIT V:

Social Network Analysis and semantic web: What is social Networks analysis, development of the social networks analysis, Electronic Sources for Network Analysis – Electronic Discussion networks, Blogs and Online Communities, Web Based Networks. Building Semantic Web Applications with social network features

Course Outcomes for First Year Second Semester Course	
Course Code:M17 IT 1206	
Course Title: SEMANTIC WEB SERVICES (ELECTIVE-I)	
CO-1	Understand the rationale behind Semantic Web.
CO-2	Model on topologies using Resource Description Framework (RDF).
CO-3	Design RDF Schemas for on tologies.
CO-4	Model and design on tologies using Web Ontology Language (OWL)
CO-5	Query on tologies using SPARQL.
CO-6	Understand and reflect on the principles of Ontology Engineering.
CO-7	Make an association between Semantic web and Web 2.0.
CO-8	Apply Semantic web technologies to real world applications.

SYLLABUS: PRINCIPLES OF PROGRAMMING LANGUAGES (M17 IT 1207)
(ELECTIVE-I)

UNIT I:

Syntax and semantics: Evolution of programming languages, describing syntax, context, free grammars, attribute grammars, describing semantics, lexical analysis, parsing, recursive - decent bottom - up parsing

UNIT II:

Data, data types, and basic statements: Names, variables, binding, type checking, scope, scope rules, lifetime and garbage collection, primitive data types, strings, array types, associative arrays, record types, union types, pointers and references, Arithmetic expressions, overloaded operators, type conversions, relational and boolean expressions , assignment statements , mixed mode assignments, control structures – selection, iterations, branching, guarded Statements

UNIT III:

Subprograms and implementations: Subprograms, design issues, local referencing, parameter passing, overloaded methods, generic methods, design issues for functions, semantics of call and return, implementing simple subprograms, stack and dynamic local variables, nested subprograms, blocks, dynamic scoping

UNIT IV:

Object-orientation, concurrency, and event handling: Object – orientation, design issues for OOP languages, implementation of object, oriented constructs, concurrency, semaphores, Monitors, message passing, threads, statement level concurrency, exception handling, event handling

UNIT V:

Functional programming languages: Introduction to lambda calculus, fundamentals of functional programming languages, Programming with Scheme, – Programming with ML, Logic programming languages: Introduction to logic and logic programming, –Programming with Prolog, multi - paradigm languages

Course Outcomes for First Year Second Semester Course	
Course Code: M17 IT 1207	
Course Title: PRINCIPLES OF PROGRAMMING LANGUAGES (ELECTIVE-I)	
CO-1	Understand the fundamental principles underlying various programming languages.
CO-2	Understand the basic algorithms in implementing simple programming languages.
CO-3	Understand some principles in the design of programming languages.

INTERNET OF THINGS
(M17 IT 1208)
(ELECTIVE-I)

UNIT I:

The Internet of Things: An Overview of Internet of things, Internet of Things Technology, behind IoTs Sources of the IoTs, M2M Communication, Examples OF IoTs, Design Principles For Connected Devices Internet Connectivity Principles, Internet connectivity, Application Layer Protocols: HTTP, HTTPS, FTP, Telnet.

UNIT II:

Business Models for Business Processes in the Internet of Things ,IoT/M2M systems LAYERS AND designs standardizations ,Modified OSI Stack for the IoT/M2M Systems ,ETSI M2M domains and High-level capabilities ,Communication Technologies, Data Enrichment and Consolidation and Device Management Gateway Ease of designing and affordability

UNIT III:

Design Principles for the Web Connectivity for connected-Devices, Web Communication protocols for Connected Devices, Message Communication protocols for Connected Devices, Web Connectivity for connected-Devices.

UNIT IV:

Data Acquiring, Organizing and Analytics in IoT/M2M, Applications/Services/Business Processes, IOT/M2M Data Acquiring and Storage, Business Models for Business Processes in the Internet Of Things, Organizing Data, Transactions, Business Processes, Integration and Enterprise Systems.

UNIT V:

Data Collection, Storage and Computing Using a Cloud Platform for IoT/M2M Applications/Services, Data Collection, Storage and Computing Using cloud platform Everything as a service and Cloud Service Models, IOT cloud-based services using the Xively (Pachube/COSM), Nimbits and other platforms Sensor, Participatory Sensing, Actuator, Radio Frequency Identification, and Wireless, Sensor Network Technology, Sensors Technology ,Sensing the World.

Course Outcomes for First Year Second Semester Course	
Course Code: M17 IT 1208	
Course Title: INTERNET OF THINGS (ELECTIVE-I)	
CO-1	Interpret the vision of IoT from a global context.
CO-2	Determine the Market perspective of IoT.
CO-3	Compare and Contrast the use of Devices, Gateways and Data Management in IoT
CO-4	Implement state of the art architecture in IoT.
CO-5	Illustrate the application of IoT in Industrial Automation and identify Real World Design constraints.

SYLLABUS: MACHINE LEARNING (M17 IT 1209)
(ELECTIVE-II)

UNIT-I:

The ingredients of machine learning, Tasks: the problems that can be solved with machine learning, Models: the output of machine learning, Features, the workhorses of machine learning. Binary classification and related tasks: Classification, Scoring and ranking, Class probability estimation

UNIT-II:

Beyond binary classification: Handling more than two classes, Regression, Unsupervised and descriptive learning. Concept learning: The hypothesis space, Paths through the hypothesis space, Beyond conjunctive concepts

UNIT-III:

Tree models: Decision trees, Ranking and probability estimation trees, Tree learning as variance reduction. Rule models: Learning ordered rule lists, Learning unordered rule sets, Descriptive rule learning, First-order rule learning

UNIT-IV:

Linear models: The least-squares method, The perceptron: a heuristic learning algorithm for linear classifiers, Support vector machines, obtaining probabilities from linear classifiers, Going beyond linearity with kernel methods. Distance Based Models: Introduction, Neighbours and exemplars, Nearest Neighbours classification, Distance Based Clustering, Hierarchical Clustering

UNIT-V:

Probabilistic models: The normal distribution and its geometric interpretations, Probabilistic models for categorical data, Discriminative learning by optimising conditional likelihood Probabilistic models with hidden variables. Features: Kinds of feature, Feature transformations, Feature construction and selection. Model ensembles: Bagging and random forests, Boosting

Course Outcomes for First Year Second Semester Course	
Course Code: M17 IT 1209	
Course Title: MACHINE LEARNING (ELECTIVE-II)	
CO-1	Develop an appreciation for what is involved in learning from data
CO-2	Understand a wide variety of learning algorithms
CO-3	Understand how to apply a variety of learning algorithms to data.
CO-4	Understand how to perform evaluation of learning algorithms and model selection.

SYLLABUS: INFORMATION RETRIEVAL SYSTEM (M17 IT 1210)
(ELECTIVE-II)

UNIT I:

Introduction to Information storage and retrieval systems: Domain Analysis of IR systems, IR and other types of Information Systems, IR System Evaluation Introduction to Data structures and algorithms related to Information Retrieval: Basic Concepts, Data structures, Algorithms.

UNIT II:

Inverted Files and Signature Files: Introduction, Structures used in Inverted Files, Building an Inverted file using a sorted array, Modifications to the Basic Techniques. Signature Files: Concepts of Signature files, Compression, Vertical Partitioning, Horizontal Partitioning.

UNIT III:

New Indices for Text, Lexical Analysis and Stop lists: PAT Trees and PAT Arrays: Introduction, PAT Tree structure, Algorithms on the PAT Trees, Building PAT Trees as PATRICA Trees, PAT representation as Arrays. Stop lists.

UNIT IV:

Stemming Algorithms and Thesaurus Construction: Types of Stemming algorithms, Experimental Evaluations of Stemming, Stemming to Compress Inverted Files. Thesaurus Construction: Features of Thesauri, Thesaurus Construction, Thesaurus construction from Texts, Merging existing Thesauri..

UNIT V:

String Searching Algorithms: Introduction, Preliminaries, The Naive Algorithm, The Knutt Morris-Pratt Algorithm, The Boyer-Moore Algorithm, The Shift-Or Algorithm, The Karp Rabin Algorithm.

Course Outcomes for First Year Second Semester Course	
Course Code: M17 IT 1210	
Course Title: INFORMATION RETRIEVAL SYSTEM (ELECTIVE-II)	
CO-1	Identify Data Base Management systems and data ware houses
CO-2	Use knowledge of data structures and indexing methods in information retrieval Systems
CO-3	Choose clustering and searching techniques for different data base systems

SYLLABUS: IMAGE PROCESSING &PATTERN RECOGNITION
(M17 IT 1211)
(ELECTIVE-II)

UNIT I:

Pattern Recognition: machine perception, pattern recognition example, pattern recognition systems, the design cycle, learning and adaptation. Bayesian Decision Theory: Introduction, continuous features-two categories classifications, minimum error rate classification-zero-one loss function, classifiers, discriminate functions, and decision surfaces

UNIT II:

Normal density: Univariate and multivariate density, discriminate functions for the normal density-different cases, Bayes decision theory – discrete features, compound Bayesian decision theory and context. Component analyses: Principal component analysis, non-linear component analysis, Low dimensional representations, and multi dimensional scaling.

UNIT III:

Digitized Image and its properties: Basic concepts, Image Functions, the dirac distribution and convolution, the Fourier transform, Images as a Stochastic process, Images as linear systems. Image Digitization: Sampling, Quantization, Colour Images. Digital Image Properties: Metric and topological properties of Digital Images, Histograms, Visual perception of the Image, Image quality, Noise in Images..

UNIT IV:

Data Structures for Image Analysis: Levels of Image Data representation, traditional Image Data Structures-Matrices, Chains, Topological Data Structures, Relational Structures.

UNIT V:

Image Pre-processing: Pixel brightness transformation – Position dependent brightness correction, Gray scale transformation. Geometric Transformations --Pixel co-ordinate transformation, Brightness interpolation. Local Pre-processing – Image smoothing, Edgedetectors, Zero crossings of the second deritives, scale in Image processing, canny edge detection, parametric edge models, edges in multi spectral images, other local pre-processing operators, adaptive neighborhood pre-processing

Course Outcomes for First Year Second Semester Course	
Course Code: M17 IT 1211	
Course Title: IMAGE PROCESSING & PATTERN RECOGNITION (ELECTIVE-II)	
CO-1	Identify areas where Pattern Recognition and Machine Learning can offer a solution
CO-2	Describe the strength and limitations of some techniques used in computational Machine Learning for classification, regression and density estimation problems
CO-3	Describe genetic algorithms, validation methods and sampling techniques
CO-4	Describe some discriminative, generative and kernel based techniques

SYLLABUS: SOFTWARE TESTING METHODOLOGIES (M17 IT 1212)

(ELECTIVE-II)

UNIT-I:

Introduction: Purpose of Testing, Dichotomies, Model for Testing, Consequences of Bugs, Taxonomy of Bugs. Flow graphs and Path testing: Basics Concepts of Path Testing, Predicates, Path Predicates and Achievable Paths, Path Sensitizing, Path Instrumentation, Application of Path Testing.

UNIT-II:

Transaction Flow Testing: Transaction Flows, Transaction Flow Testing Techniques. Dataflow testing: Basics of Dataflow Testing, Strategies in Dataflow Testing, Application of Dataflow Testing.

UNIT-III:

Domain Testing: Domains and Paths, Nice & Ugly Domains, Domain testing, Domains and Interfaces Testing, Domain and Interface Testing, Domains and Testability. Paths, Path products and Regular expressions: Path Products & Path Expression, Reduction Procedure, Applications, Regular Expressions & Flow Anomaly Detection.

UNIT-IV:

Logic Based Testing: Overview, Decision Tables, Path Expressions, KV Charts, and Specifications. State, State Graphs and Transition Testing: State Graphs, Good & Bad State Graphs, State Testing, and Testability Tips. Graph Matrices and Application:-Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm.

UNIT–V:

Software Testing Tools: Introduction to Testing, Automated Testing, Concepts of Test Automation, Introduction to list of tools like Win runner, Load Runner, Jmeter, About Win Runner ,Using Win runner, Mapping the GUI, Recording Test, Working with Test, Enhancing Test, Checkpoints, Test Script Language, Putting it all together, Running and Debugging Tests, Analyzing Results, Batch Tests, Rapid Test Script Wizard.

Course Outcomes for First Year Second Semester Course	
Course Code: M17 IT 1212	
Course Title: SOFTWARE TESTING METHODOLOGIES (ELECTIVE-II)	
CO-1	Understand the myths and facts of software testing. Analyze and design test cases using black box testing technique which includes decision tables domain testing and transition testing.
CO-2	Analyze and design test cases for a white box testing technique which includes path¬ testing, data flow graphs and matrix representation for a given problem.
CO-3	Compute the path product and construct Regular Expression which is used to i identify¬ the alternate paths from source node to destination node for any application.
CO-4	Execute how to run test script wizard and Execute how to do performance testing using¬ testing tools including Win runner and Meter respectively.
CO-5	Demonstrate the importance of testing and its role in need of software development.

SYLLABUS: IT LAB2 (M17 IT 1213)

1. Write a Program to count the number of words and lines supplied at standard input using UNIX shell programming?
2. Write a shell script to find the factorial of a number entered through keyboard?
3. Write a shell script to find the gross salary given that if the basic salary is less then 1500 then HRA =10% of basic salary and DA=90% if the basic salary is greater then or equal to 1500 then HRA=500 and DA=98% of basic salary. The employee"s basic salary is the input through keyboard?
4. Write a shell script to display following information using case statement?

a) List users

b) Show date

c) Display file

d) Change working directory

e) Return to original directory

f) Quit

5. Write a c program to implement one to one chat application using sockets?
6. Write a c program to implement redundancy check using CRC?
7. Write a java program to implement simulation of sliding window protocol?
8. Write a java program to get the MAC or Physical address of the system using Address Resolution Protocol?
9. Write a java program to implement Play Fair Cipher to encrypt and decrypt a given message?
10. Write a java program to demonstrate public-key based asymmetric algorithms for encryption-based security of information?
11. Write a java program that implement secured Internet Protocol (IP) communications by using Internet Protocol Security (IPSec)?
12. Write a java program to implement RSA algorithm?

Course Outcomes for First Year Second Semester Course	
Course Code:M17 IT 1213	
Course Title: IT LAB 2	
CO-1	Student able to execute programmes in UNIX
CO-2	Student able to excute programmes on JAVA
CO-3	Student able to excute programmes on Network programming

EMPLOYBILITY COURSES

MECHANICAL ENGINEERING

SYLLABUS: INDUSTRIAL ROBOTICS (M17 CAD1101)

INDUSTRIAL ROBOTICS

UNIT-I

INTRODUCTION: Automation and Robotics, Robot anatomy, robot configuration, motions joint notation scheme, work volume, robot drive systems, control systems and dynamic performance, precision of movement. CONTROL SYSTEM AND COMPONENTS: basic concepts and motion controllers, control system analysis, robot actuation and feedback components, Positions sensors, velocity sensors, actuators, power transmission systems, robot joint control design.

UNIT-II

MOTION ANALYSIS AND CONTROL: Manipulator kinematics, position representation, forward and inverse transformations, homogeneous transformations, manipulator path control, robot arm dynamics, configuration of a robot controller.

UNIT-III

END EFFECTORS: Grippers-types, operation, mechanism, force analysis, tools as end effectors consideration in gripper selection and design. SENSORS: Desirable features, tactile, proximity and range sensors, uses sensors in robotics. MACHINE VISION: Functions, Sensing and Digitizing-imaging devices, Lighting techniques, Analog to digital single conversion, image storage: Image processing and Analysis-image data reduction, Segmentation, feature extraction, Object recognition. Training the vision system, Robotic application..

UNIT-IV

ROBOT PROGRAMMING: Lead through programming, Robot program as a path in space, Motion interpolation, WAIT, SIGNAL AND DELAY commands, Branching, capabilities and Limitations of lead through methods. ROBOT LANGUAGES: Textual robot Languages, Generations of robot programming languages, Robot language structures, Elements and function.

UNIT-V

ROBOT CELL DESGIN AND CONTROL: Robot cell layouts-Robot centered cell, In-line robot cell, Considerations in work design, Work and control, Inter locks, Error detection, Work cell controller. ROBOT APPLICATION: Material transfer, Machine loading/unloading, Processing operation, Assembly and Inspection, Future Application.

Course Outcomes for Final Year First Semester Course	
Course Code: M17 CAD 1101	
Course Title: Industrial Robotics	
CO-1	Distinguish between fixed automation and programmable automation.
CO-2	Identify various components of robot.
CO-3	Select appropriate type of actuator for a joint.
CO-4	Illustrate robot applications in manufacturing.
CO-5	Analyze kinematics of a robot.
CO-6	Derive equations of motion of a manipulator for a particular application.

SYLLABUS: COMPUTER AIDED MANUFACTURING (M17 CAD1102)

UNIT-I

COMPUTER AIDED PROGRAMMING: General information, APT programming, Examples Apt programming problems (2D machining only). NC programming on CAD/CAM systems, the design and implementation of post processors .Introduction to CAD/CAM software, Automatic Tool Path generation.

UNIT-II

TOOLING FOR CNC MACHINES: Interchangeable tooling system, preset and qualified toois, coolant fed tooling system, modular fixturing, quick change tooling system, automatic head changers. DNC Systems and Adaptive Control: Introduction, type of DNC systems, advantages arid disadvantages of DNC, adaptive control with optimization, Adaptive control with constrains, Adaptive control of machining processes like turning, grinding.

UNIT-III

POST PROCESSORS FOR CNC: Introduction to Post Processors: The necessity of a Post Processor, the general structure of a Post Processor, the functions of a Post Processor, DAPP —based- Post Processor: Communication channels and major variables in the DAPP —based Post Processor, creation of a DAPP — Based Post Processor.

UNIT-IV

MICRO CONTROLLERS: Introduction, Hardware components, I/O pins, ports, external memory:, counters, timers and serial data I/O interrupts. Selection of Micro Controllers Embedded Controllers, Applications and Programming of Micro Controllers. Programmable Logic Controllers (PLC' s): Introduction, Hardware components of PLC, System, basic structure, principle of operations, Programming mnemonics timers, Internal relays and counters, Applications of PLC's in CNC Machines.

UNIT-V

COMPUTER AIDED PROCESS PLANNING: Hybrid CAAP System, Computer Aided Inspection and quality control, Coordinate Measuring Machine, Limitations of CMM, Computer Aided Testing, Optical Inspection Methods, Artificial Intelligence and expert system: Artificial Neural Networks, Artificial Intelligence in CAD, Experts systems and its structures.

Course Outcomes for Final Year First Semester Course	
Course Code: M17 CAD 1102	
Course Title: Computer Aided Manufacturing	
CO-1	Understand the principles of Numerical Control (NC) technology and describe the range of machine tools to which it is applied.
CO-2	Outline the various routs for part programming in NC and CNC.
CO-3	Explain the application of CNC for Machining & Turning Centers.
CO-4	Apply the use of various transducers, Micro controllers encoders and feedback devices in CAM.
CO-5	Apply the principles of Computer Aided Process Planning in CAM.

SYLLABUS: SPECIAL MANUFACTURING PROCESSESS (M17 CAD 1103)

UNIT-I

SURFACE TREATMENT: Scope, Cleaners, Methods of cleaning, Surface coating types, and ceramic and organic methods of coating, economics of coating. Electro forming, Chemical vapor deposition, thermal spraying, Ion implantation, diffusion coating, Diamond coating and cladding

UNIT-II

PROCESSING OF CERAMICS: Applications, characteristics, classification .Processing of particulate ceramics, Powder preparations, consolidation, Drying, sintering, Hot compaction, Area of application, finishing of ceramics. Processing of Composites: Composite Layers, Particulate and fiber reinforced composites, Elastomers, Reinforced plastics, MMC, CMC, Polymer matrix composites.

UNIT-III

FABRICATION OF MICRO ELECTRONIC DEVICES: Crystal growth and wafer preparation, Film Deposition oxidation, lithography, bonding and packaging, reliability and yield, Printed Circuit boards, computer aided design in micro electronics, surface mount technology, Integrated circuit economics.

UNIT-IV

ADVANCED MACHINING PROCESSES: EDM, Wire EDM, ECM, LBM, EBM, AJM, WJM – Principle, working, limitations and applications.

UNIT-V

RAPID PROTOTYPING: Working Principles, Methods, Stereo Lithography, Laser Sintering, Fused Deposition Method, Applications and Limitations, Rapid tooling, Techniques of rapid manufacturing

Course Outcomes for Final Year First Semester Course	
Course Code: M17 CAD 1103	
Course Title: Special Manufacturing Processes	
CO-1	Describe the principle and operation of common manufacturing and rapid prototyping processes for product development.
CO-2	Decide on the use of appropriate manufacturing processes in the manufacture of a product at the design stage.
CO-3	Apply up-to-date technology in manufacturing products with considerations of safety and environmental factors.
CO-4	Apply the reverse engineering process for product development.
CO-5	Appreciate and report on the common practice in the product development industry.
CO-6	Develop a prototype with modern prototyping techniques.

COMPUTATIONAL METHODS IN ENGINEERING

(M17 CAD 1105)

(ELECTIVE-I)

UNIT– I

Introduction to numerical methods applied to engineering problems: : Examples, solving sets of equations – Matrix notation – Determinants and inversion – Iterative methods – Relaxation methods – System of non-linear equations. Least square approximation fitting of non-linear curves by least squares –regression analysis- multiple linear regression, non linear regression -computer programs.

UNIT– II

Boundry value problems and charecteristic value problems: Shooting method – Solution through a set of equations – Derivative boundary conditions – Rayleigh – Ritz method – Characteristic value problems..

UNIT– III

Transformation Techniques: Continuous fourier series, frequency and time domains, laplace transform, fourier integral and transform, discrete fourier transform (DFT), Fast fourier transform (FFT).

UNIT– IV

Numerical solutions of partial differential equations: Laplace's equations – Representations as a difference equation – Iterative methods for Laplace's equations – poisson equation –Examples – Derivative boundary conditions – Irregular and non – rectangular grids – Matrix patterns, sparseness – ADI method – Finite element method.

UNIT– V

Partial differential equations: Explicit method – Crank-Nickelson method – Derivative boundary condition – Stability and convergence criteria. Solving wave equation by finite differences-stability of numerical method –method of characteristics-wave equation in two space dimensions-computer programs.

Course Outcomes for Final Year First Semester Course	
Course Code:M17 CAD 1105	
Course Title: Computational Methods in Engineering(Elective-I)	
CO-1	Find the solutions of system of linear and non linear equations.
CO-2	Solve ordinary and partial differential equations numerically.
CO-3	Find correlation coefficient and regression.
CO-4	Use a computer language of their choice to solve problems using numerical methods covered in the course.

SYLLABUS: THEORY OF ELASTICITY &PLASTICITY (M17 CAD1106)

(ELECTIVE-I)

UNIT-I

Elasticity: Two dimensional stress analysis - Plane stress - Plane strain - Equations of compatibility - Stress function - Boundary conditions. Problem in Rectangular Coordinates - Solution by polynomials - Saint Venent's principles - Determination of displacement - Simple beam problems. Problems in Polar Coordinates - General equations in polar coordinates - Stress distribution symmetrical about axis - Strain components in polar coordinates - Simple and symmetric problems.

UNIT-II

Analysis of Stress and Strain in Three Dimensions: Principle stresses - Homogeneous deformations - Strain spherical and deviatoric stress - Hydrostatic strain. General Theorems: Differential equations of equilibrium and compatibility - Displacement - Uniqueness of solution - Reciprocal theorem.

UNIT-III

Bending of Prismatic Bars: Stress function - Bending of cantilever beam - Beam of rectangular cross-section - Beams of circular cross-section.

UNIT-IV

Plasticity: Plastic deformation of metals - Structure of metals - Deformation - Creep stress relaxation of deformation - Strain rate condition of constant maximum shear stress - Condition of constant strain energy - Approximate equation of plasticity.

UNIT-V

Methods of Solving Practical Problems: The characteristic method - Engineering method - Compression of metal under press - Theoretical and experimental data drawing

Course Outcomes for Final Year First Semester Course	
Course Code: M17 CAD 1106	
Course Title: Theory of Elasticity & Plasticity(Elective-I)	
CO-1	Understand the stress and strain tensor field.
CO-2	Understand the contact stresses analysis problem in bearing.
CO-3	Understand advanced concepts of plasticity and plastic deformation analysis
CO-4	Students can demonstrate Idealized stress-strain diagrams for different material models and demonstrate experimental verification of the Prandtl-Reuss equation.

SYLLABUS: NANO TECHNOLOGY (M17 CAD1107)

(ELECTIVE-I)

UNIT-I

Introduction, Size and shape dependence of material properties at the nano scale, scaling relations, can nano robots walk and nano planes fly, Nano scale elements in conventional technologies, Mechanics at nano scale Enhancement of mechanical properties with decreasing size, Nano electromechanical systems, nano machines, Nano fluidics, filtration, sorting, Molecular motors, Application of Nano Technology.

UNIT-II

Nano material Synthesis Techniques: Top-down and bottom-up nanofabrication, Synthesis of nano composites, The Intel-IBM approach to nanotechnology: lithography, etching, ion implantation, thin film deposition, nano coatings and nano indentation, Electron beam lithography, Soft lithography: nano imprinting and micro-contact printing, Solution/plasma phase nanofabrication, sol-gel methods, template techniques.

UNIT-III

Imaging/characterization of nanostructures General considerations for imaging, Scanning probe techniques: XRD, SEM, TEM, AFM and NSOM.

UNIT-IV

Metal and semiconductor nano particles Synthesis, stability, control of size, Optical and electronic properties, Ultra-sensitive imaging and detection with nano particles, bioengineering applications, Catalysis. Semiconductor and metal nano wires Vapor/liquid/solid growth and other synthesis techniques, Nano wire transistors and sensors..

UNIT-V

Carbon nano tubes, Structure and synthesis, Electronic, vibrational, and mechanical properties, How can C nano tubes enable faster computers, brighter TV screens, and stronger mechanical reinforcement?

Course Outcomes for Final Year First Semester Course	
Course Code: M17 CAD 1107	
Course Title: Nano Technology(Elective-I)	
CO-1	Understand the fundamental principles of nanotechnology and their application.
CO-2	Apply engineering and physics concepts to the nano-scale and non-continuum domain.
CO-3	Demonstrate a comprehensive understanding of nano-fabrication methods.
CO-4	Evaluate processing conditions to engineer functional nano materials.
CO-5	Practice and explain state-of-the-art characterization methods for nano materials, understanding and critiquing nano material safety and handling methods required during characterization

SYLLABUS: DESIGN FOR MANUFACTURING &ASSEMBLY (M17 CAD1108)

(ELECTIVE-II)

UNIT-I

Introduction to DFM, DFMA: How Does DFMA Work? Reasons for Not Implementing DFMA,What Are the Advantages of Applying DFMA During Product Design?, Typical DFMA Case Studies, Overall Impact of DFMA on Industry. Design for Manual Assembly: General Design Guidelines for Manual Assembly, Development of the Systematic DFA Methodology, Assembly Efficiency, Effect of Part Symmetry, Thickness, Weight on Handling Time, Effects of Combinations of Factors, Application of the DFA Methodology.

UNIT-II

Machining processes: Overview of various machining processes-general design rules for machining-dimensional tolerance and surface roughness-Design for machining – ease – redesigning of components for machining ease with suitable examples. General design recommendations for machined parts.

UNIT-III

Metal casting: Appraisal of various casting processes, selection of casting process,-general design considerations for casting-casting tolerance-use of solidification, simulation in casting design-product design rules for sand casting. Extrusion & Sheet metal work: Design guide lines extruded sections-design principles for punching, blanking, bending, deep drawing-Keeler Goodman forging line diagram – component design for blanking

UNIT-IV

Metal joining: Appraisal of various welding processes, factors in design of weldments – general design guidelines-pre and post treatment of welds-effects of thermal stresses in weld joints design of brazed joints. Forging: Design factors for forging – closed die forging design – parting lines of dies – drop forging die design – general design recommendations

UNIT– V

Design for Assembly Automation: Fundamentals of automated assembly systems, System configurations, parts delivery system at workstations, various escapement and placement devices used in automated assembly systems, Quantitative analysis of Assembly systems, Multi station assembly systems, single station assembly lines.

Course Outcomes for Final Year First Semester Course	
Course Code: M17 CAD 1108	
Course Title: Design for Manufacturing &Assembly (Elective-II)	
CO-1	Select the design principle, suitable material, mechanism, fit and tolerance for designing a product/component.
CO-2	Select the appropriate material, proper working principle and a feasible design.
CO-3	Design (optimum) a component which requires less material removal, easy to machine, assemble, access and cost effective.
CO-4	Redesign the uneconomical casting design and know the applications of DFMA.
CO-5	Incorporate the Environmental Objectives, issues and guidelines into the design.

SYLLABUS: MECHATRONICS

(M17 CAD 1109)

ELECTIVE-II

UNIT-I

Mechatronics systems, elements, levels of mechatronics system, Mechatronics design process, system, measurement systems, control systems, microprocessor-based controllers, advantages and disadvantages of mechatronics systems. Sensors and transducers, types, displacement, position, proximity, velocity, motion, force, acceleration, torque, fluid pressure, liquid flow, liquid level, temperature and light sensors.

UNIT-II

Solid state electronic devices, PN junction diode, BJT, FET, DIA and TRIAC. Analog signal conditioning, amplifiers, filtering. Introduction to MEMS & typical applications.

UNIT-III

Hydraulic and pneumatic actuating systems, Fluid systems, Hydraulic and pneumatic systems, components, control valves, electro-pneumatic, hydro-pneumatic, electro-hydraulic servo systems, Mechanical actuating systems and electrical actuating systems..

UNIT-IV

Digital electronics and systems, digital logic control, micro processors and micro controllers, programming, process controllers, programmable logic controllers, PLCs versus computers, application of PLCs for control..

UNIT-V

System and interfacing and data acquisition, DAQS, SCADA, A to D and D to A conversions; Dynamic models and analogies, System response. Design of mechatronics systems & future trends..

Course Outcomes for Final Year First Semester Course	
Course Code: M17 CAD 1109	
Course Title: Mechatronics(Elective-II)	
CO-1	Model and analyze electrical and mechanical systems and their interconnection.
CO-2	Integrate mechanical, electronics, control and computer engineering in the design of mechatronics systems.
CO-3	Do the complete design building, interfacing and actuation of a mechatronic system for a set of specifications

SYLLABUS: COMPUTER AIDED PROCESS PLANNING (M17 CAD1110)

(ELECTIVE-II)

UNIT-I

Introduction to CAPP: Information requirement for process planning system, Role of process planning, advantages of conventional process planning over CAPP, Structure of Automated process planning system, feature recognition, methods

UNIT-II

Generative CAPP system: Importance, principle of Generative CAPP system, automation of logical decisions, Knowledge based systems, Inference Engine, implementation, benefits. Retrieval CAPP system: Significance, group technology, structure, relative advantages, implementation, and applications.

UNIT– III

Selection of manufacturing sequence Significance, alternative manufacturing processes, reduction of total set-up cost for a particular sequence, quantitative methods for optimal selection, examples. Determination of machining parameters: reasons for optimal selection of machining parameters, effect of parameters on production rate, cost and surface quality, different approaches, advantages of mathematical approach over conventional approach, solving optimization models of machining processes.

UNIT–IV

Determination of manufacturing tolerances: design tolerances, manufacturing tolerances, methods of tolerance allocation, sequential approach, integration of design and manufacturing tolerances, advantages of integrated approach over sequential approach.

UNIT–V

Generation of tool path: Simulation of machining processes, NC tool path generation, graphical implementation, determination of optimal index positions for executing fixed sequence, quantitative methods. Implementation techniques for CAPP: MIPLAN system, Computer programming languages for CAPP, criteria for selecting a CAPP system and benefits of CAPP. Computer integrated planning systems, and Capacity planning system.

Course Outcomes for Final Year First Semester Course	
Course Code: M17 CAD 1110	
Course Title: Computer Aided Process Planning(Elective-II)	
CO-1	Generate the structure of automated process planning system and uses the principle of generative and retrieval CAPP systems for automation.
CO-2	Select the manufacturing sequence and explains the reduction of total set up cost for a particular sequence.
CO-3	Predict the effect of machining parameters on production rate, cost and surface quality and determines the manufacturing tolerances.
CO-4	Explain the generation of tool path and solve optimization models of machining processes.
CO-5	Create awareness about the implementation techniques for CAPP

SYLLABUS: COMPUTER AIDED DESIGN LAB (M17 CAD1111)

2D and 3D modelling and assembly modelling using modelling packages like AutoCAD, Auto Desk Mechanical desktop, Pro-Engineer, IDEAS. Linear and non-linear static and dynamic analysis using any FEA package ANSYS / CAEFEM / NASTRAN.

Course Outcomes for Final Year First Semester Course	
Course Code: M17 CAD 1111	
Course Title: Computer Aided Design Lab	
CO-1	Find the solutions of system of linear and non linear equations.
CO-2	Solve ordinary and partial differential equations numerically.
CO-3	Find correlation coefficient and regression.
CO-4	Use a computer language of their choice to solve problems using numerical methods covered in the course.

MODELLINGAND SIMULATION OF MANUFACTURING SYSTEMS (M17 CAD 1201)

UNIT-I

Introduction to System and simulation: Concept of system and elements of system, Discrete and continuous system, Models of system and Principles of modeling and simulation, Monte carlo simulation, Types of simulation, Steps in simulation model, Advantages, limitations and applications of simulation, Applications of simulation in manufacturing system..

UNIT-II

Review of statistics and probability: Types of discrete and continuous probability distributions such as Geometric, Poisson, Uniform, Geometric distribution with examples, Normal, Exponential distribution with examples.

UNIT-III

Random numbers: Need for RNs, Technique for Random number generation such as Mid product method, Mid square method, and Linear congruential method with examples Test for Random numbers: Uniformity - Chi square test or Kolmogorov Smirnov test, Independency Auto correlation test Random Variate generation: Technique for Random variate generation such as Inverse transforms technique or Rejection method.

UNIT-IV

Analysis of simulation data: Input data analysis, Verification and validation of simulation models, Output data analysis Simulation languages: History of simulation languages, Comparison and selection of simulation languages Design and evaluation of simulation experiments: Development and analysis of simulation models using simulation language with different manufacturing systems..

UNIT-V

Queueing models: An introduction, M/M/1 and M/M/m Models with examples, Open Queueing and Closed queueing network with examples Markov chain models and others: Discrete time markov chain with examples, Continues time markov chain with examples, stochastic process in manufacturing, Game theory.

Course Outcomes for First Year Second Semester Course	
Course Code: M17 CAD 1201	
Course Title: Modelling& Simulation of Manufacturing Systems	
CO-1	Students gain knowledge on various types of simulation and simulation languages steps in simulation and applications of simulation.
CO-2	Students gain knowledge on parameter estimation and hypothesis.
CO-3	Students can build simulation model and also can validation and verify model.
CO-4	Students can gain knowledge on Generation of random variants and variables.

SYLLABUS: OPTIMIZATION & RELIABILITY (M17 CAD1202)

UNIT-I

CLASSICAL OPTIMIZATION TECHNIQUES: Single variable optimization with and without constraints, multi – variable optimization without constraints, multi – variable optimization with constraints – method of Lagrange multipliers, Kuhn-Tucker conditions, merits and demerits of classical optimization techniques.

UNIT-II

NUMERICAL METHODS FOR OPTIMIZATION: Nelder Mead's Simplex search method, Gradient of a function, Steepest descent method, Newton's method, Pattern search methods, conjugate method, types of penalty methods for handling constraints, advantages of numerical methods.

UNIT-III

GENETIC ALGORITHM (GA): Differences and similarities between conventional and evolutionary algorithms, working principle, reproduction, crossover, mutation, termination criteria, different reproduction and crossover operators, GA for constrained optimization, draw backs of GA, **GENETIC PROGRAMMING (GP):** Principles of genetic programming, terminal sets, functional sets, differences between GA & GP, random population generation, solving differential equations using GP. **MULTI-OBJECTIVE GA**: Pareto's analysis, Non-dominated front, multi – objective GA, Non-dominated sorted GA, convergence criterion, applications of multi-objective problems

UNIT– IV

APPLICATIONS OF OPTIMIZATION IN DESIGN AND MANUFACTURING SYSTEMS: Some typical applications like optimization of path synthesis of a four-bar mechanism, minimization of weight of a cantilever beam, optimization of springs and gears, general optimization model of a machining process, optimization of arc welding parameters, and general procedure in optimizing machining operations sequence.

UNITV

RELIABILITY: Concepts of Engineering Statistics, risk and reliability, probabilistic approach to design, reliability theory, design for reliability, numerical problems, hazard analysis.

Course Outcomes for First Year Second Semester Course	
Course Code: M17 CAD 1202	
Course Title: Optimization & Reliability	
CO-1	Have a basic understanding of conventional, unconventional optimization algorithms and concepts of reliability.
CO-2	Formulate engineering design problems as mathematical optimization problems and solve them by using suitable optimization technique(s).
CO-3	Use mathematical software for the solution of engineering problems.
CO-4	Several homework assignments delving on core concepts and reinforcing analytical skills learned in class.

SYLLABUS: COMPUTER GRAPHICS (M17 CAD1203)

UNIT-I

Raster scan graphics: Raster scan and random scan architecture, Line drawing algorithms –DDA & Bresenham algorithms, circle generation, general function rasterization, displaying lines, characters and polygons.

Filling algorithms: polygon filling, edge fill algorithm, seed fill algorithm, fundamentals of anti aliasing and half toning.

UNIT-II

Line CLIPPING: Simple visibility algorithm, Cohen-Sutherland subdivision line clipping algorithm, midpoint sub division algorithm.

Polygon clipping: polygon clipping, reentrant polygon clipping – Sutherland – Hodgeman algorithm, character clipping, 3D-clipping.

UNIT-III

Rendering: Hidden line removal algorithms, surface removal algorithms, painters, Warnock, Zbuffer algorithm.

Shading algorithms: Constant intensity algorithm, Phong's shading algorithm, gour and shading algorithm, Comparison of shading algorithms.

UNIT-IV

Computer Animation: Design of animation sequence, general computer animation functions, raster animation, computer animation language, key frame system, motion specification

UNIT– V

Introduction to Multimedia: Introduction, multimedia- systems, technology, architecture, trade-offs, contents, PC, Applications, data compressions, authoring system.

Multimedia Authoring Tools: Introduction, Types of authoring tools, Package based- in card authoring tools, Icon based authoring tools, Time based and presentation tools, object oriented authoring tools, author ware professional for windows (APW).

Course Outcomes for First Year Second Semester Course	
Course Code:M17 CAD 1203	
Course Title: Computer Graphics	
CO-1	Understand the contemporary graphics hardware and terminology.
CO-2	Implement graphics primitives, line clipping, polygon clipping, rendering and shading algorithms.
CO-3	Design and implement an application which illustrates the use of output primitives and 3D viewing model.
CO-4	Gain knowledge on computer animation and multimedia tools used for the computer representation of objects.

SYLLABUS: FINITE ELEMENT METHODS (M17 CAD1204)

UNIT-I

Formulation Techniques: Methodology, Engineering problems and governing differential equations , finite elements, Variational methods-potential energy method, Raleigh Ritz method, strong and weak forms, Galerkin and weighted residual methods, calculus of variations, Essential and natural boundary conditions.

UNIT– II

One-dimensional elements: Bar trusses, beams and frames, displacements, stresses and temperature effects.

UNIT– III

Two dimensional problems: CST, LST, four noded and eight nodded rectangular elements, Lagrange basis for triangles and rectangles, serendipity interpolation functions. Axisymmetric Problems: Axisymmetric formulations, Element matrices, boundary conditions.

UNIT– IV

Isoparametric formulation: Concepts, sub parametric, super parametric elements, numerical integration, Requirements for convergence, h-refinement and p-refinement, complete and incomplete interpolation functions, Pascal's triangle, Patch test. Heat Transfer problems: Conduction and convection, examples: - two-dimensional fin.

UNIT– V

Finite elements in Structural Analysis: Static and dynamic analysis, eigen value problems, and their solution methods, case studies using commercial finite element packages.

Course Outcomes for First Year Second Semester Course	
Course Code: M17 CAD 1204	
Course Title: Finite Element Methods	
CO-1	Apply variational and weighted residual methods to solve differential equations.
CO-2	Analyze 1-D bar, truss, beam and heat conduction problems using finite element method.
CO-3	Develop finite element formulations and solve 2-D structural problems using triangular and rectangular elements.
CO-4	Analyze vibration problems for frequencies and mode shapes.

QUALITY ENGINEERING MANUFACTURING (M17 CAD1205)

(ELECTIVE-III)

UNIT-I

QUALITY VALUE AND ENGINEERING: An overall quality system, quality engineering in production design, quality engineering in design of production processes. Loss Function and Quality Level: Derivation and use of quadratile loss function, economic consequences of tightening tolerances as a means to improve quality, evaluations and types tolerances. (N-Type, type and L-type)

UNITII:

TOLERANCE DESIGN AND TOLERANCING: Functional limits, tolerance design for Ntype. L-type and S-type characteristics, tolerance allocation fbr multiple components. Parameter and Tolerance Design: Introduction to parameter design, signal to noise ratios, Parameter design strategy, some of the case studies on parameter and tolerance designs.

UNIT– III

ANALYSIS OF VARIANCE (ANOVA): Introduction to ANOVA, Need for ANOVA, NOway ANOVA, One-way ANOVA, Two-way ANOVA, Critique of F-test, ANOVA for four level factors, multiple level factors.

UNIT-IV

ORTHOGONAL ARRAYS: Typical test strategies, better test strategies, efficient test strategies, steps in designing, conducting and analyzing an experiment. Interpolation of Experimental Results: Interpretation methods, percent contributor, estimating the mean.

UNIT-V

SIX SIGMA AND THE TECHNICAL SYSTEM: Six sigma DMAIC methodology, tools for process improvement, six sigma in services and small organizations, statistical foundations, statistical methodology.

Course Outcomes for First Year Second Semester Course	
Course Code: M17 CAD 1205	
Course Title: Quality Engineering in Manufacturing(Elective-III)	
CO-1	Explain quality standards and need for standardization
CO-2	Implement quality measurement systems in various applications
CO-3	Implement six sigma approach for various industrial applications
CO-4	Gain knowledge on Analysis of Variance, Orthogonal Arrays and statistical methodology.

SYLLABUS: MECHANICAL VIBRATIONS (M17 CAD1206)

(ELECTIVE-III)

UNIT-I

Single degree of Freedom systems: Undamped and damped free vibrations: forced vibrations ; coulomb damping; Response to harmonic excitation; rotating unbalance and support excitation, Vibration isolation and transmissibility, Vibrometers, velocity meters & accelerometers.

UNIT-II

Response to Non Periodic Excitations: unit Impulse, unit step and unit Ramp functions; response to arbitrary excitations, The Convolution Integral; shock spectrum; System response by the Laplace Transformation method.

UNIT-III

Multi degree freedom systems: Principal modes – undamped and damped free and forced vibrations; undamped vibration absorbers, Matrix formulation, stiffness and flexibility influence coefficients; Eigen value problem; normal modes and their properties; Free and forced vibration by Modal analysis; Method of matrix inversion; Torsional vibrations of multi – rotor systems and geared systems; Discrete-Time systems.

UNIT IV

Numerical Methods: Rayliegh's, Stodola's, Matrix iteration, Rayleigh-Ritz Method and Holzer's methods

UNIT V

Application of concepts: Free vibration of strings – longitudinal oscillations of bars transverse vibrations of beams- Torsional vibrations of shafts. Critical speeds without and with damping, secondary critical speed.

Course Outcomes for First Year Second Semester Course	
Course Code: M17 CAD 1206	
Course Title: Mechanical Vibrations(Elective-III)	
CO-1	Develop a mathematical model for a physical system and derive the governing differential equations.
CO-2	Determine the natural frequencies of single and two degrees of freedom systems without and with damping.
CO-3	Determine and analyze the response of machine members or structures in forced vibration with different excitation frequencies.
CO-4	Apply the techniques of vibration isolation to minimize the transmission of vibrating forces.
CO-5	Determine the natural frequencies and mode shapes of bars in elongation and torsion and beams in bending.

SYLLABUS: CONCURRENT ENGINEERING (M17 CAD1207)

(ELECTIVE-III)

UNIT I:

INTRODUCTION

Extensive definition of CE - CE design methodologies - Organizing for CE - CE tool box collaborative product development

USE OF INFORMATION TECHNOLOGY

IT support - Solid modeling - Product data management - Collaborative product commerce - Artificial Intelligence - Expert systems - Software hardware co-design

UNIT II:

DESIGN STAGE

Life-cycle design of products - opportunity for manufacturing enterprises - modality of Concurrent Engineering Design –Automated analysis idealization control - Concurrent engineering in optimal structural design -Real time constraints.

UNIT III:

MANUFACTURING CONCEPTS AND ANALYSIS

Manufacturing competitiveness - Checking the design process - conceptual design mechanism –Qualitative, physical approach - An intelligent design for manufacturing system

UNIT IV:

JIT system - low inventory - modular - Modeling and reasoning for computer based assembly planning- Design of Automated manufacturing.

PROJECT MANAGEMENT

Life Cycle semi realization - design for economics - evaluation of design for manufacturing cost

UNIT V

Concurrent mechanical design - decomposition in concurrent design - negotiation in concurrent engineering design studies - product realization taxonomy - plan for Project Management on new product development – bottleneck technology development.

Course Outcomes for First Year Second Semester Course	
Course Code: M17 CAD 1207	
Course Title: Concurrent Engineering(Elective-III)	
CO-1	Understand the concepts of concurrent engineering and its application in design and manufacturing of a product
CO-2	Know how to solve issues arising during design and manufacturing of a product
CO-3	Understand the importance of tolerances in product design and manufacturing
CO-4	Understand how to automate a work station& fabrication system.
CO-5	Understand the importance of human resource management

SYLLABUS: MECHANICS &MANUFACTURING METHODS OF COMPOSITES
(M17 CAD1208)
(ELECTIVE-IV)

UNIT– I

Basic concepts and characteristics: Geometric and Physical definitions, natural and manmade composites, Aerospace and structural applications, types and classification of composites, Fibres- Glass, Silica, Kevlar, carbon, boron, silicon carbide, and born carbide fibres. Particulate composites, Polymer composites, Thermoplastics, Thermosetts, Metal matrix and ceramic composites.

UNIT– II

Micromechanics: Unidirectional composites, constituent materials and properties, elastic properties of a lamina, properties of typical composite materials, laminate characteristics and configurations. Characterization of composite properties.

Coordinate transformations: Hooke's law for different types of materials, Hooke's law for two dimensional unidirectional lamina, Transformation of stress and strain, Numerical examples of stress strain transformation, Graphic interpretation of stress– strain relations. Off-axis, stiffness modulus, off-axis compliance.

UNIT– III

Elastic behavior of unidirectional composites: Elastic constants of lamina, relationship between engineering constants and reduced stiffness and compliances, analysis of laminated composites, constitutive relations.

Strength of unidirectional lamina: Micromechanics of failure, Failure mechanisms, Strength of an orthotropic lamina, Strength of a lamina under tension and shear maximum stress and strain criteria, application to design. The failure envelope, first ply failure, free-edge effects. Micro mechanical predictions of elastic constants.

UNIT– IV

Analysis of laminated composite plates

Introduction, thin plate theory, especially orthotropic plate, cross and angle ply laminated plates, problems using thin plate theory.

UNIT– V

Manufacturing methods: Autoclave, tape production, moulding methods, filament winding, handla yup, pultrusion, RTM.

Course Outcomes for First Year Second Semester Course	
Course Code: M17 CAD 1208	
Course Title: Mechanics & Manufacturing Methods of Composites(Elective-IV)	
CO-1	Gain knowledge on fiber characteristics and methods of production of fibers1
CO-2	Identify the suitable composite manufacturing process when designing intricate and critical parts made of composites
CO-3	Analyse the elastic behaviour of composites and composite laminated plates.
CO-4	Gain knowledge on the failure of composites and the production of quality composites.

SYLLABUS: MATERIALS TECHNOLOGY (M17 CAD1209)

(ELECTIVE-IV)

UNITI:

Elasticity in metals, mechanism of plastic deformation, slip and twinning, role of dislocations, yield stress, shear strength of perfect and real crystals, strengthening mechanism, work hardening, solid solution, grain boundary strengthening. Poly phase mixture, precipitation, particle, fiber and dispersion strengthening, effect of temperature, strain and strain rate on plastic behavior, super plasticity, Yield criteria: Von-mises and Tresca criteria.

UNIT II:

Griffth's Theory, stress intensity factor and fracture Toughness, Toughening Mechanisms, Ductile and Brittle transition in steel, High Temperature Fracture, Creep, Larson – Miller parameter, Deformation and Fracture mechanism maps.

UNIT III:

Fatigue, fatigue limit, features of fatigue fracture, Low and High cycle fatigue test, Crack Initiation and Propagation mechanism and paris Law, Effect of surface and metallurgical parameters on Fatigue, Fracture of non-metallic materials, fatigue analysis, Sources of failure, procedure of failure analysis. Motivation for selection, cost basis and service requirements, Selection for Mechanical Properties, Strength, Toughness, Fatigue and Creep.

UNIT IV:

MODERN METALLIC MATERIALS: Dual Steels, Micro alloyed, High Strength Low alloy (HSLA) Steel, Transformation induced plasticity (TRIP) Steel, Maraging Steel, Inter metallics, Ni and Ti Aluminides. Processing and applications of Smart Materials, Shape Memory alloys, Metallic Glass Quasi Crystal and Nano Crystalline Materials.

UNIT V:

NON METALLIC MATERIALS: Polymeric materials and their molecular structures, Production Techniques for Fibers, Foams, Adhesives and Coatings, structure, Properties and Applications of Engineering Polymers, Advanced Structural Ceramics WC, TiC, TaC, A12O3, SiC, Si3N4, CBN and Diamond – properties, Processing and applications..

Course Outcomes for First Year Second Semester Course	
Course Code: M17 CAD 1209	
Course Title: Materials Technology(Elective-IV)	
CO-1	Gain knowledge on mechanism of plastic deformation and strengthening mechanism.
CO-2	Learn the structure, properties and applications of modern metallic materials, smart materials non-metallic materials and advanced structural ceramics.
CO-3	Understand the importance of advanced composite materials in application to sophisticated machine and structure of components.

SYLLABUS: INTELLIGENT MANUFACTURING SYSTEMS (M17 CAD1210)
(ELECTIVE-IV)

UNIT I:

COMPUTER INTEGRATED MANUFACTURING SYSTEMS: structure and functional areas of cim system- CAD, CAPP, CAM, CAQC, ASRS. Advantages of CIM. Manufacturing Communication Systems - MAP/TOP, OSI Model, Data Redundancy, Top down and Bottom-up Approach, Volume of Information. Intelligent Manufacturing System Components, System Architecture and Data Flow, System Operation.

UNIT II:

COMPONENTS OF KNOWLEDGE BASED SYSTEMS - Basic Components of Knowledge Based Systems, Knowledge Representation, Comparison of Knowledge Representation Schemes, Interference Engine, Knowledge Acquisition.

UNIT III:

MACHINE LEARNING - Concept of Artificial Intelligence, Conceptual Learning, Artificial, Neural Networks - Biological Neuron, Artificial Neuron, Types of Neural Networks, Applications in Manufacturing.

UNIT IV:

AUTOMATED PROCESS PLANNING - Variant Approach, Generative Approach, Expert Systems for Process Planning, Feature Recognition, Phases of Process planning. Knowledge Based System for Equipment Selection (KBSES) - Manufacturing system design. Equipment Selection Problem, Modeling the Manufacturing Equipment Selection Problem, Problem Solving approach in KBSES, Structure of the KRSES.

UNIT V:

GROUP TECHNOLOGY: Models and Algorithms Visual Method, Coding Method, Cluster Analysis Method, Matrix Formation - Similarity Coefficient Method, Sorting-based Algorithms, Bond Energy Algorithm, Cost Based method, Cluster Identification Method, Extended CI Method. Knowledge Based Group Technology - Group Technology in Automated Manufacturing System. Structure of Knowledge based system for group technology (KBSCIT) — Data Base, Knowledge Base, Clustering Algorithm.

Course Outcomes for First Year Second Semester Course	
Course Code:M17 CAD 1210	
Course Title: Intelligent Manufacturing Systems(Elective-IV)	
CO-1	Students will get knowledge on Computer Integrated Manufacturing Systems and Manufacturing Communication Systems.
CO-2	Students will be able to learn the Components of Knowledge Based Systems, Machine Learning and Knowledge Based System for Equipment Selection.
CO-3	Students will be able to understand and solve the group technology problems by using knowledge based system.

SYLLABUS: COMPUTER AIDED MANUFACTURING LAB (M17 CAD 1211)

Manual and computer assisted part programming exercises on CNC machine tools. Surface generation, Tool selection, NC code generation and Tool path simulation for turning and milling operations using CAM packages like CATIA, Gibbs CAM, Master CAM. Robot programming off-line and on-line.

Course Outcomes for First Year Second Semester Course	
Course Code:M17 CAD 1211	
Course Title: COMPUTER AIDED MANUFACTURING LAB	
CO-1	Illustrate the importance of NC and CNC technology in manufacturing industry.
CO-2	Generate Part Programming with application of CAD/CAM systems in particular for complex models.
CO-3	Identify and select proper NC toolings