

NOTIFICATION

No. 77/2017

Date : 6/07/2017

Subject :- Continuation of Prospectus No. 121741 prescribed for Sem. III & IV B.E. (CGS) for the session 2017-2018.

It is notified for general information of all concerned that the Prospectus No.121741 prescribed for Semester **III & IV B.E. (CGS)** for the session 2011-2012 and continued upto the session 2016-2017 shall be continued for the academic session 2017-2018 with following substitutions for the examinations B.E. Sem. III & IV (Civil) and B.E. Sem. III & IV (Electrical & Electronics) as per **Appendices A & B** appended herewith as given below :

Sd/-
Registrar
Sant Gadge Baba Amravati University

Appendix – A

3CE02: STRENGTH OF MATERIALS

Section-A

Unit-I:

1. Mechanical properties : Concept of direct, bearing and shear stresses and strains, stress-strain relations, Biaxial and triaxial loading, elastic constants and their relationship, stress-strain diagrams and their characteristics for mild steel, tor steel and concrete, Generalized Hook's law, factor of safety.
2. Uniaxial stresses and strains : Stresses and strains in compound bars in uni-axial tension and compression, temperature stresses in simple restrained bars and compoundbars of two metals only.

Unit-II :

Axial force, shear force & bending moment diagrams : Beams, loading and support conditions, bending moment, shear force and axial load diagrams for all types of loadings for simply supported beams, cantilevers and beams with overhangs, relation between shear force, bending moment and loading intensity.

Unit-III :

Stresses in beams (Bending, Shear), i) Bending: Theory of simple bending, section modulus, moment of resistance, bending stress distribution diagram in solid, hollow and built up section. ii) Shear : Distribution of shear stresses on beam cross sections. iii) Strain energy under uniaxial tension and compression, impact loads and instantaneous stresses.

Section - B

Unit-IV :

1. Torsion: Theory of torsion & assumptions, derivation of torsion equation, polar modulus, stresses in solid
2. & hollow circular shaft, power transmitted by shaft, closed coiled helical spring with axial load. Thin cylinders subjected to internal pressures.

Unit V :

1. Principal stresses : Biaxial stress system, principal stresses, principal planes, Mohr's circle of stresses, principal strains.
2. Combined direct & bending stresses : Combined direct and bending stresses, applications to short columns with eccentric loads.

Unit-VI :

Slope & deflection of beams :

1. Slope & deflection in statically determinate beams subjected to point loads, uniformly distributed loads, moments by Macauley's method.
2. Slope & deflection in statically determinate beams subjected to point loads, uniformly distributed loads, moments by Moment Area method.

Books Recommended:

1. E.P. Popov, Mechanics of Materials, Prentice Hall of India, New Delhi.
2. S. Timoshenko and O.H. Young, Elements of Strength of Materials, East West Press Private Ltd., New Delhi.
3. Ferdinand L. Singer, Strength of Materials, Harper and Row, New York
4. Shames, I. H., Introduction to solid mechanics, Prentice Hall of India, New Delhi
5. Natarajan, Mahadeoappa, Strength of materials
6. Junnarkar, S. B., Mechanics of materials
7. Mubeen, A., Mechanics of solids, Pearson education (Singapore) Pte. Ltd.
8. Beer and Johnston, Mechanics of materials, Mc-Graw Hill.
9. R.K. Bansal, Strength of materials,

3CE03 TRANSPORTATION ENGINEERING –I

Section-A

Unit-I: Highway: Development And Planning, Road Transport characteristics, classification of Roads, Road development plans & Salient features, Road pattern, Alignment principles, Egg. Survey for highway. Material And Testing. Various properties of aggregates and bituminous materials and Test, IRC, IS Specifications, bituminous mix design.

Unit-II: Geometric Design : cross sectional elements, Right of way, Camber, Gradient, Typical Highway cross section in embankment and in cutting, PIEV Theory, stopping sight distance, Overtaking sight distance, Horizontal alignment - curves, superelevation, Extra widening, transition curves, vertical alignment, Design of summit and valley curves, IRC Standards for Geometric design.

Unit-III: Pavement Design : Components of Flexible and Rigid pavement, Design factors, ESWL, Flexible pavement design by C.B.R. Method. Westergards analysis for wheel load & Temperature stresses in rigid pavement, Rigid pavement by IRC method (As per IRC-37), Combination of stresses, Joints in Rigid Pavement, Construction And Maintenance – WBM Surface dressing, Bituminous roads, cement concrete Pavement, construction procedure, construction of roads in expansive soil.

Section-B

Unit-IV: Traffic Engineering : Traffic Characteristics, Traffic studies, road parking system, accident study, traffic control devices, marking, signs, signals, island its type, At grade intersections – clover leaf, diamond, rotary intersections & design elements, 3 E's of traffic, regulation for driving motor vehicle, motor vehicle Act & Rule.

Unit-V: Bridge Engineering – Component, classification and identification, data collection, site selection, economic span, different structural form – culverts, causeways, major and minor bridges, types of foundation, abutments, piers and wing wall, bearing their types and choices, Erection of bridge super structure.

Unit-VI: Bridge Hydrology - Estimation of flood discharge, water way, scour depth, depth of foundation, Afflux, clearance and free board. Load, Forces, Stresses – Loads, forces, stresses acting on bridges. IRC Specification and code practices, critical combination. Rating And Maintenance – Methods and techniques of rating of existing bridges, repairs, maintenance, corrosion – causes and prevention, Strengthening of bridge superstructure.

BOOKS RECOMMENDED :-

- 1) Khanna S.K. & Justo C.E. : Highway Engineering
- 2) Rao G.V. : Principles of Transportation & Highway Engg.
- 3) Dr.Kadiyali L.R. : Traffic Engg. & Transport Planning.
- 4) Shharma S.K. : Principles, Practice & Design of Highway Engg.
- 5) Bindra S.P. : Principles & Practice of Bridge Engg.
- 6) Bindra S.P. : A Course in Highway Engg.
- 7) Duggal A.K. & Puri V.P. : Laboratory Manual in Highway Engg.

3 CE04 BUILDING CONSTRUCTION & MATERIALS

Section – A

Unit- I: Introduction : Definition, types of buildings as per national building code, components of buildings and their functions, Types of structure – load bearing structure & framed structures, their relative advantages & disadvantages, load bearing walls and partition walls, HDPE Wall panel. Foundation :- Definition and necessity, loads of foundation, Bearing Capacity soil, SBC values based on IS code, field methods of improving bearing capacity. Types of foundation – shallow foundation & deep foundations for buildings, spread footings for walls & columns, Raft foundations, Foundations in black cotton soils, under-reamed pile foundation, precautions to be taken. Causes of failure of foundations. Setting out for foundation, excavation for foundation.

Unit-II: Stone Masonry – Technical terms, General principles to be observed during construction, random rubble masonry, coursed and un- coursed rubble masonry, Selection of stone for masonry. Brick Masonry – Classification of bricks, manufacturing of clay bricks, tests on bricks, properties of burnt bricks, new trends in brick manufacturing such as use of fly ash, stabilized mud blocks. Brick masonry construction – Technical terms, general principles, commonly used types of bonds such as stretcher, header, English bond and Flemish bond, their suitability. Earthquake force, various features for making load bearing structure earthquake resistant.

Unit-III: Floors – Types of Floors – Basement floor, ground floor and upper floors, Types of upper floors – R.C.C. slab floor, R.C.C. slab & beam floor, R.C.C. ribbed floor, R.C.C. Grid floor, R.C.C. flat slab floor, Floor finishes – Types of flooring material, Sahabad, Kotta, Granite, Ceramic tiles, plain tiles, mosaic tiles, glazed tiles, different types of floor finishes, their suitability, method of construction, criteria for selection. Roofs – Flat & pitched roof, steel roof trusses – types and suitability, fixing details at supports, types of roof covering, AC & GI sheets, acrylic sheets, fixing details of roof covering. Formwork – Different types, their relative merits & demerits, period for removal of formwork for different members.

Section – B

Unit-IV: Doors & Windows – Different forms of commercial woodsplywood, particle-board, batten-board, block-board, novapan, sunmica, veneer sheets. Doors : Purpose, criteria for location, size of door, door frames & its types, methods of fixing, T Types of door shutters and their suitability, HDPE door shutter. Windows – Purpose, criteria for location, no. sizes & shapes of Windows, types of windows & their suitability. Ventilators – Types and their suitability. Fixtures & fastening for doors & windows. Glass – Types of glass & their suitability. Arches & lintels – Types & their suitability, details of R.C.C. lintels & chajja, precast lintels & arches.

Unit-V: Stairs – Function, technical terms, criteria for location, types of staircases, their suitability, principle of stair layout design. Lifts, ramps & escalators – suitability. Plastering & pointing- Necessity, types, processes of different types of plastering, defects in plastered work. Painting & Colouring – Necessity, types, processes of painting & colouring to wall surfaces, wooden surface, iron & steel surfaces, types of paints and their uses. Scaffolding – Purpose, types, suitability.

Unit-VI: Special Aspects of Construction – Damp proofing – causes of dampness, its effects, various methods of damp proofing, material used for damp proofing, details of cavity wall construction. Fire proof construction – Points to be observed during planning & construction. Fire protection requirements for a multistoried building. Sound proof Construction – Sound absorbants and their characteristic, factors affecting the acoustical design of an auditorium. Joints – Expansion & construction joints necessity, details of expansion joint at foundation level & roof level of load bearing structure and framed structure. Provision of construction joints in slabs, beams & columns.

BOOKS RECOMMENDED :

- 1) Mackay W.B. : Building Construction, Vol. I, II, III, Longmans.
- 2) Sushilkumar : Building Construction, Standard Publishers Distributors.
- 3) Deshpande R.S. and Vartak C.V. : A Treatise on Building Construction.
- 4) Sharma S.K. Kaul B.K. : A. T.B. of Building Construction, S. Chand & Co.
- 5) Gurucharan Sing : Building Construction Engg., Standard Book House, Delhi-6
- 6) Sane L.S. : Construction Engg., Manak Talas, Mumbai.
- 7) Chudley R. : Construction Technology, Vol. I, II, III & IV, Longmans Group Ltd.
- 8) ISE National Building Code of India, 1970.
- 9) Punmia B.C. : Building Construction.
- 10) A Manual of Earthquake Resistant, Non-Engineered Construction Indian Society of Earthquake Tech.

3CE05 ENGINEERING GEOLOGY

Unit-I : Introduction - Different branches of Geology and importance of Geology in Civil Engineering. Mineralogy - Study of common rock forming and ore minerals with reference to its physical properties. Petrology - rock cycle, rock weathering and soil formation, origin, classification and textures of igneous sedimentary and metamorphic rocks, study of common rock types.

Unit II: Structural Geology - outcrop, dip strike, elementary ideas about folds, faults, joints and unconformity, effect of these structures in foundation. Earthquake Engineering - earthquake waves, causes and effects, magnitude and intensity, earthquake zones of India, seismic coefficient. Geological investigation - surface and sub-surface investigation, direct and indirect.

Unit-III : Rock as a material of construction. Study of engineering properties of rocks and soils. Geological studies related to site selection for dams and reservoirs, tunnel alignment, hydroelectric plants, bridges, roads, air fields etc. Case histories of some major projects of tunnels, dams and reservoirs.

Books Recommended :

- 1) Parbin Singh: General & Engineering Geology.
- 2) Mukharjee : A Text Book of Geology.
- 3) Tyrell G.W. : The Principle of Petrology.
- 4) Wadia D.N. : Geology of India.
- 5) Krishan M.S. : Geology of India.
- 6) Date S.Y. & Mukharjee D.M. : Geological Maps.
- 7) Deshmukh D.N.: Engineering Geological Maps.
- 8) Gupte R.B. : Geology of Engineering.
- 9) Reddy Venkata : Engineering Geology.

3 CE06: STRENGTH OF MATERIALS -LAB

Practicals : Minimum seven out of following:

1. Tension test on metals.
2. Compression test on materials.
3. Shear test on steel bar.
4. Impact test on metals.
5. Hardness test on metals.
6. Torsion test on steel bar.
7. Deflection of beams.
8. Modulus of rupture test.
9. Buckling of columns.
10. Deflection of springs.

A journal/report on experiments conducted shall be submitted by each student. Practical examination shall be viva-voce based on above practical and the syllabus of the course.

3CE07 TRANSPORTATION ENGINEERING -I –LAB

PRACTICALS :

Based on the Transportation Engg.- I syllabus, following practical are required to be performed and a laboratory report be submitted by every student. Practical examination will be viva based on above system.

List of Experiments (Any Eight) :

1. Determination of Los Angeles value
2. Determination of Abrasion value of Aggregates by the use of devil machine
3. Determination of Aggregate Impact value
4. Determination of Aggregate Crushing value
5. Determination of Flakiness and Elongation Index of Aggregate.
6. Determination of penetration value of Bitumen
7. Determination of Viscosity of Bituminous material
8. Determination of softening point of bituminous material.
9. Determination of ductility of bitumen.
10. Determination of flash point and fire point of Bituminous material
11. Determination of marshal stability value
12. Field visit based on construction of Road

3CE08 BUILDING CONSTRUCTION & MATERIALS – LAB

Practicals :

1. Drawing of following building elements on A-2 size sheet.
 - a) Panelled door, flush door, glazed window.
 - b) Steel truss with details of joints, details & support, details of fixing of roof covering.
2. Planning & drawing of a staircase for the given data. [On A-2 size sheet, Design calculations, plan & section.]
3. Preparation of foundation plan from the given line plan of a two room building [On a A-2 size sheet.]
4. Layout of the above, in field.
5. Development of free hand sketches of components of building (any six) on sketch book
6. Fields visits to building under construction and its report writing.

3CE09 ENGINEERING GEOLOGY – LAB

Laboratory Work:-

- 1) Megascopic study of common rock forming and ore minerals.
- 2) Megascopic study of the common igneous, sedimentary and metamorphic rocks.
- 3) Geological map reading and construction of sections from simple geological maps with engineering problems (about 8 maps)
A report/journal on above practical conducted shall be submitted by each student. Practical examination shall be based on practical and viva-voce conducted on the above syllabus.
- 4) Field visit for identification of minerals, rocks and different geological structures.

SEMESTER – IV

4CE01: GEOTECHNICAL ENGINEERING – I

SECTION – A

Unit- I History of development of soil mechanics, formation of soil, its significance to the field problems. Soil properties and its classification, system: Definition of soil, soil as a three phase system, weight – volume relationship Index properties of coarse and fine grained soil BIS classification of fine grained & coarse grained soil.

Unit-II Concept of clay mineral, major soil minerals, their structural formation and properties. Mechanics of compaction, factors affecting compaction, Standard and modified Proctor test, their field Determination, zero air-void line, concept of wet of optimum, and dry of optimum, different structures of soil, field compaction & their control. CBR test and CBR value for soak and unsoak conditions.

Unit-III Absorbed water, surface tension, capillarity and its effect on Soil properties permeability of soil, Darcy's law and validity, Discharge and seepage velocity, factors affection Permeability, determination of coefficient of permeability laboratory and field methods. permeability for stratified deposits. Drainage and dewatering of soil and it's various methods.

SECTION – B

Unit-IV Laplace equation, its derivation in Cartesian co-ordinate system, its application for the computation of discharge seepage, seepage pressure, quick sand condition, concepts flow net, method to draw flow nets, characteristics and use of flow net, preliminary problem of discharge, estimation of discharge through homogenous earthen embankment, concept of effective neutral and total stress in soil mass, method of arresting seepage, design Terzaghi's criteria for graded filter, concept of piping and criteria of stability against piping.

Unit-V A physical concept of shear strength, Introduction of Mohr's stress diagram, Mohr's failure criteria, Mohr-Coulomb's theory and development of failure envelopes, Unconfined compression test, Laboratory measurement of shear strength for different drainage, conditions by direct shear test, Triaxial test for various drainage conditions, Merits and demerits of various shear strength tests. Concept of pore pressure coefficient shear characteristics of sand, NC and OC clays and partially saturated soil, Influence of soil structure and strain rate on shear strength.

Unit-VI State of stress at a point, stress distribution in soil mass, Boussinesq's theory and its applications, point load, uniformly loaded rectangular and circular area New-mark's chart, its preparation and use, equivalent point load Compression of laterally confined soil, concept of consolidation spring analogy , Terzaghi's theory of one dimensional consolidation. e-p curve, compression index, swelling index, coefficient of compressibility, Consoledometer-test, determination of C_v , Cassagrande's method for determination of pre-consolidation pressure.

BOOKS RECOMMENDED :

- 1) Craig R.F.: Soil Mechanics,
- 2) Lambe T.W. & Whitman R.V.: Soil Mechanics, John Wiley and Sons, 1969.
- 3) Terzaghi K. & Peck R.B.: Soil Mechanics in Engg. Practice, John Wiley & Sons, 1967.
- 4) Gulhati S.K.: Engg. Properties of Soils, Tata McGraw Hill, New Delhi, 1978.
- 5) Singh A.: Soil Engg. in Theory and Practice, Asia Publishing House, Mumbai.
- 6) Venkataramiah C.: Soil Mechanics and Foundation Engineering.
- 7) B. M. Das Advanced Soil Mechanics.
- 8) S. K. Garg: Soil Mechanics and Foundation Engineering.

4CE02 FLUID MECHANICS – I

SECTION - A

Unit I : Introduction: Definition of Fluid, physical properties of fluid mass density, unit weight, specific Gravity, dynamic viscosity, Kinematic Viscosity, Newton's law of viscosity, Rheological classification of fluids. Adhesion, Cohesion, surface tension, capillarity, pressure inside droplet & jet of liquid.

Fluid Statics I : Pressure at a point, Pascal's law, Equation of fluid static's & its integration, Measurement of pressure, absolute & gauge, types of manometers.

Unit II: Fluid Statics II : Forces on immersed areas – plane and curved, Buoyancy, equilibrium of floating bodies, metacenter, metacentric height, its determination by analytical method only. Kinematics : types of Flow – Eulerian approach of describing fluid motion, streamline, stream tube, streak line, Path line, substantive, local, convective acceleration, velocity potential, stream function, continuity equation of 2D & 3D flow in Cartesian coordinates.

Unit III : Fluid Dynamics : Eulers equation of motion along a streamline and its integration to prove Bernoulli's equation, HGL, EGL, velocity distribution, Average velocity, Kinetic – Energy correction factor, momentum correction factor (Definition only) Momentum equation (Statement Only) Forces on pipe bends.

SECTION - B

Unit IV: Fluid Measurement –I : Venturimeter, Orificemeter, Pitot tube, Prandtl Pitot tube, circular orifices & mouthpieces, time of emptying of cylindrical tanks by orifices at bottom.

Fluid Measurement – II: Notches & weirs, Definition, Types rectangular, triangular, trapezoidal, Cipolletti weir, end contractions, velocity of approach, Francis equation.

Unit V: Laminar flow through circular pipes, velocity distribution, Hagen-Poiseuille equation (no proof). Reynold's number, Boundary layer, definition, development along a flat plate, Nominal thickness, energy thickness, Momentum thickness, displacement thickness.

Unit VI : Flow around immersed bodies, drag, lift, different forms of drag, calculations of drag & lift on cylindrical bodies only. Pipe flow Darcy – Weisbach equation $hf = fL V^2/2gd$ (no proof) major & minor losses, pipes in series, pipes in parallel, equivalent pipe, pipe Network (Hardy – Cross method only). Introduction to water hammer in pipes.

BOOKS RECOMMENDED :

- 1) Modi P.N. & Seth S.M. : Hydraulics & Fluid Mechanics, SI Edition.
- 2) Dr. Jain A.K. : Fluid Mechanics.
- 3) Subramanya K. : Fluid Mechanics.
- 4) Streeter : Fluid Mechanics.
- 5) Garde & Mirajgaonkar : Fluid Mechanics.
- 6) Jagdish Lal; Hydraulics & Fluid Mechanics
- 7) K.C. Patra; Engineering Fluid Mechanics & Machines
- 8) Nagaratnam S.; Fluid Mechanics
- 9) Biswas Kharagpur; Fluid Mechanics
- 10) Mohanty; Fluid Mechanics
- 11) R.K. Rajput; Fluid Mechanics & Machines.

4CE03 : THEORY OF STRUCTURES – I

SECTION – A

Unit-I

1. Classification of Structures, Concept of statically indeterminate beam and frame, Analysis of fixed beam and propped cantilever, Rotation and sinking of support.
2. Analysis of Continuous beam by theorem of three moments, sinking of support.

Unit-II

1. Castigliano's theorem I, Unit load method, slope and deflection in determinate beams and portals.
2. Deflection in determinate trusses.

Unit-III

1. Influence line diagrams for reactions, bending moment and shear force for determinate beams.
2. Rolling loads on simply supported beams concentrated and uniformly distributed loads, maximum shear force and bending moment, focal length.

SECTION - B

Unit-IV :

1. Rolling loads on trusses, Influence line diagrams for forces in members of simple trusses.
2. Three hinged arches subjected to static loads, Bending moment, radial shear and axial thrust.

Unit-V Slope deflection method:

1. Analysis of continuous beams with and without sinking of support.
2. Analysis of portal frames without side sway.

Unit-VI Moment Distribution method:

1. Analysis of continuous beams with and without sinking of support.
2. Analysis of portal frames without side sway.

BOOKS RECOMMENDED:

1. Junnarkar, S. B., Mechanics of Structure, Volume I and II
2. Jain and Arya, Theory and Analysis of Structures
3. Reddy. C. S., Basic Structural Analysis, Tata – McGraw hill
4. Wang, C. K., Elementary Analysis of Structures
5. Norris and Wilbur, Elementary Structural analysis.

4CE04 SURVEYING –I

SECTION-A

Unit-I Introduction: Surveying – Necessity & purpose, Geodetic & plane surveying, classification of survey, principles of surveying. Instruments for measurement of distance, linear measurements, corrections to field measurements, ranging out, direct and indirect ranging. Chain surveying: basic definition, principle, selection of survey stations, offsets for locating details, limiting length of offsets, degree of accuracy of offsets, use of cross staff, optical square, obstacles in chaining, plotting of chain survey work, cross staff survey.

Unit-II Instruments for measurement of angles: Prismatic compass, surveyor's compass, their use and adjustments. Traversing with chain and compass, Reference meridians, bearing and azimuths. Local attraction, magnetic declination and its variation. Open & closed traverses. Adjustment of closed traverse - Bowditch's Graphical method.

Unit-III : Instruments for measurement of elevation: Dumpy level, tilting and automatic level. Details of their construction. Temporary and permanent adjustments of Dumpy and tilting level.

SECTION - B

Unit-IV: Leveling: Definition of terms, Principle, leveling methods, leveling staves, Booking and reduction of field notes, curvature and refraction, reciprocal leveling, plotting of profiles, errors in leveling. Contouring: Definition, Characteristics and uses of contour maps, methods of contouring.

Unit-V: Vernier and microscopic theodolite, their temporary adjustment. Permanent adjustment of vernier theodolite. Measurement of horizontal and vertical angle with transit theodolite by different methods. Other uses of theodolite. Theodolite traverse, Latitude and departure.

Unit-VI : Plane tabling : equipments, methods, two point and three point problems, Advantages & disadvantages of plane tabling, Lehman's rules. Total station – construction, working and uses. Digital planimeter-working and use

BOOKS RECOMMENDED :

1. D.Clark : Plane and Geodetic Surveying, Volume I & II Aisa Publication House.
2. T.P.Kanetkar & Kulkarni : Surveying and Leveling, Part I & II, Pune Vidharthi Griha Prakashan, Pune.
3. B.C.Punmia : Surveying I & II, Standard Book House Delhi.
4. R.C.Brinker and P.R.Wolf, Harper and Row: Elementary Surveying
5. Higher surveying: A.M. Chandra New Age International publishers.
6. Higher surveying: B.C. Punamia, Ashok jain, Arun k. jain Laxmi publications (P), Ltd.

4CE05 REINFORCED CEMENT CONCRETE – I

SECTION –A

Unit-I :

1. Cement: Physical properties of Portland cement, laboratory tests on cement, types of cements: Ordinary Portland cement, rapid hardening cement, sulphate resisting cement, Portland slag cement, quick setting cement, low heat cement, Portland pozzolana cement Aggregate: Classification of aggregate, physical properties, bulking and moisture content, specific gravity, bulk density, laboratory tests.
2. Properties of fresh concrete: Workability of concrete, methods of measuring workability, nominal mix, mixing, centering & formwork, placing, compaction and curing of concrete.

Unit II :

1. Properties of hardened concrete: Grades of concrete, properties of concrete, compressive, tensile, and shear strength, modulus of elasticity, creep, shrinkage.
2. Durability of concrete, laboratory tests on concrete.

Unit III :

1. Pozzolana and Admixtures: Plasticizer, retarders, accelerators, water proofing agents, mineral admixtures, IS code provisions.
2. Construction chemicals: concrete curing compounds, polymer bonding agent, surface retarders, bond aid for plastering, protective and decorative coating.

SECTION-B

Unit-IV :

Special concrete: Light weight concrete, fibre reinforced concrete, Roller compacted concrete, self compacted concrete, high strength concrete, high performance concrete, high volume fly ash concrete. Special concreting techniques: Guniting, grouting and shotcreting concrete, introduction & application of Ferrocement.

Unit-V :

Introduction of mix design, factors governing mix design, IScode method of mix design (IS:10262 – 1982) and ACI method.

Unit-VI :

Basic elastic theory and concept of reinforced concrete, types of reinforcement, Analysis of rectangular sections by working stress method, modes of failure, design of singly reinforced beams, one-way slabs (simply supported), lintels, and chajjas.

Students must be shown video CD, slides, transparencies, and photograph of actual structures.

BOOKS RECOMMENDED :

1. Lea, F. M. The Chemistry of Cement and Concrete, Edward Arnold(Publishers) ltd.
2. Neville, A. M.: Properties of Concrete, Pitman Publishing Company.
3. Neville, Brooks: Concrete Technology, ELBS
4. Gambhir, M. L.: Concrete Technology, DhanpatRai and Sons
5. Orchard D. F.: Concrete Technology, Applied Science Pub Ltd.
6. Shetty, M. S.: Concrete Technology, S. Chand
7. Varshney, R. S.: Concrete Technology, Oxford Pub. House.
8. IS: 456 – 2000,
9. IS: 10262 – 1982,
10. Krishna Raju: Design of Concrete Mixes, Mc – Graw Hill.
11. Shah and Kale: Reinforced Cement Concrete Design,
12. SushilKumar: Treasure of Reinforced Cement Concrete.

4CE06 GEOTECHNICAL ENGINEERING - I LAB

Practicals :-

Based on above syllabus, following ten practical are required to be performed and a laboratory report be submitted by very student. Practical examination will be viva based on above syllabus.

Experiments :-

1. Determination of specific gravity of soil solids by Pycnometer, density bottle.
2. Determination of moisture content by oven drying method.
3. Determination of field density of the soil by sand replacement / core cutter method.
4. Determination of grain size distribution by mechanical sieve analysis.
5. Determination of Atterbergs limits (LL, PL and SL)
6. Determination of Compaction properties (Standard Proctor Test)
7. Determination of permeability of soil by using falling head test
8. Determination of shear strength parameters by direct shear test
9. Determination of unconfined compressive strength of soil.
10. Determination of shear strength parameters by Triaxial test of UU type
11. C.B.R. test. Determination of C.B.R. value by conducting CBR test on soaked sample.
12. Determination of Coefficient of consolidation by conducting consolidation.

4CE07 FLUID MECHANICS – I – LAB

Practicals :-

Minimum 8 practicals out of the list given should be carried out. The practical examination shall consist of viva-voce based on theory & practical. Graphs are to be drawn wherever necessary.

1. Verification of Bernoulli's theorem.
2. Reynolds experiment to determine type of flow.
3. Determination of coefficient of discharge for Venturimeter
4. Determination of coefficient of discharge for Orificemeter
5. Determination of hydraulic coefficients of orifice.
6. Determination of metacentric height.
7. Determination of friction factor for GI pipe
8. Determination of coefficient of discharge for rectangular notch .
9. Determination of coefficient of discharge for triangular notch.
10. Determination of coefficient of discharge for trapezoidal notch.
11. Determination of coefficient of discharge for mouthpiece.
12. Determination of Viscosity of fluid at different temperatures.

4CE08 SURVEYING –I - LAB

Practicals :

Practicals mentioned below shall be performed by each student, Observations, calculations and relevant work shall be submitted as a term work.

1. Locating various objects by Chain and Cross Staff Surveying.
2. Locating details of building by chain and compass traversing (one A-1 size drawing sheet)
3. Determination of elevation of various points with dumpy level by Line of collimation method and Rise and fall method.
4. L-section and Cross section of the road for minimum 50m of length. (One A-1 size drawing sheet)
5. Measurement of horizontal angle and Vertical angle by using Theodolite
6. Locating details of building by Theodolite Traversing (One A-1 size drawing sheet)
7. Locating details of building by Plane table traversing. (One A-1 size drawing sheet)
8. To determine area of irregular figure by digital Planimeter.

(Practical examination shall consist of field exercise and viva voce based on the above syllabus and practical work.)

4CE09 REINFORCED CEMENT CONCRETE – I Lab.

Practicals :

- Compulsory Site visit and submission of site visit report.
- Minimum 8 out of following list.
 1. Fineness of cement
 2. Soundness of cement
 3. Consistency and setting time.
 4. Compressive strength of cement
 5. Sieve analysis of aggregate : Practical size distributions curve
 6. Bulking and silting of sand.
 7. Workability of concrete by slump cone test.
 8. Workability of concrete by compaction factor test.
 9. Compressive strength of concrete.
 10. Mix design by IS method.
 11. Tests on fresh SCC (Minimum one): Flowing ability, Passing ability and Segregation resistance.

Appendix – B

B.E. (Electrical & Electronics) SEMESTER – III

3EP02/3EX02/3EL02/3EE02 NETWORK ANALYSIS

Course Learning Objectives :

At the end of the course, students will be:

able to Interpret analytical circuits results to properly assign power, current, and voltage values to circuit graphical representations or from values of power, current and voltage students can design analytical circuit .An ability to use the techniques, skills,logics and modern engineering tools necessary for electrical engineering practice.

SECTION A

Unit I : a] Terminal Element Relationships: V-I relationship for Dependent&Independent Voltage and Current Sources.Source Functions: unit impulse, unit step, unit ramp and interrelationship, sinusoidal input, generalized exponential input.

b] Basic Nodal and mesh Analysis: Introduction, Nodal analysis, the super node, mesh analysis, the super mesh.

Unit-II :Graph Theory and Network Equation:- Graph of a networkTrees and loops, cut set of a network, Tie-set matrix and loop currents- analysis of network, Network equilibrium equation,duality-network transformation.

Unit III :Network Theorems :Source Transformations, SuperpositiontheoremThevinin's theorem , Norton's theorem, Maximum power transfer theorem,Reciprocity theorem, Milliaman's theorem, Substitution theorem, Compensation theorem, Tellegen's theorems.

SECTION- B

Unit IV :a] Time Domain Analysis of Circuits: Linear Differential Equations for Series RC, Parallel RC, Series RL, Parallel RL, Series RLC, Parallel RLC and Coupled Circuits-Complete Solution for step voltage/current inputs.Natural Response-Transient Response -Determination of initial conditions.

b]**Transformation of a Circuit into s-domain:**Review of Laplace Transforms with special emphasis on convolution theorem and convolution integral. Transformed equivalent of inductance, capacitance and mutual inductance -Impedance and admittance in the transform domain - Node Analysis and Mesh Analysis of the transformed circuit.

Unit V : Fourier Series: Fourier Series representation of non-sinusoidal periodic waveforms - Fourier Coefficients-Determination of Coefficients-Waveform Symmetry-Exponential Fourier Series Discrete Amplitude and Phase Spectra-Steady State Solution of Circuits with non-sinusoidal periodic inputs by Fourier Series.

Unit VI : Two Port Networks: Two port networks-characterizations in terms of impedance, admittance, hybrid and transmission parameters-inter relationships among parameter sets -Reciprocity Theorem-Interconnection of Two port networks: Series, Parallel and Cascade - Network Functions-Pole Zero plots and steady state response from pole-zero plots.

Books Recommended :-

TEXT BOOK :

- 1) NETWORKS & SYSTEMS by D. Roy Choudhury – New Age International Publishers.

REFERENCE BOOKS :

- 1) Circuits & Networks – Analysis, Design & Synthesis by M.S.Sukhija, T.K.Nagasarkar, Oxford University Press, 2010.
- 2) Circuit and Network Analysis By Sudhakar Shyammohan, Tata Mc Graw Hill, 2005.
- 3) Network Analysis, P. Ramesh babu, SCITECH Publications, Chennai, 2009.
- 4) Linear Circuit Analysis, 2/e – De Carlo and Lin, Oxford University Press, 2009.
- 5) Electrical Circuits – David Bell, Oxford University Press, 2008.
- 6) Engineering Circuit Analysis, 6/e By Hayt & Kemmerly, TataMcgraw Hill, 2004.
- 7) Network Analysis, By M.E. Van Valkenberg, PHI, 2005.

3 EP03/3EX03/3EL03/3EE 03 ENERGY RESOURCES AND GENERATION

Course Learning Outcomes-

After completion of this course, students will be able to:

Understand the sources of Energy and their contributions to the energy and power needs of the nation and the world&Calculate the basic performance parameters of a conventional generation system, such as efficiency and cost, Model renewable electrical energy systems for analysis and design.

SECTION A

Unit I : Thermal and Hydro Power plant: Selection of site, working of various parts: Economizer, air preheater, condenser, cooling tower, coal handling system, ash handling system, Classification of hydro power plant according to available head, nature of load, functions of different components and their working.

Unit II: Nuclear and Diesel Power plant: Methods of producing nuclear reactions, functions of different components of nuclear plant, functions of different components of diesel plant

Unit III : Solar Energy and its measurement: Solar constants, solar radiation at earth's surface, solar radiation geometry, solar radiation measurement, estimation of average solar radiation, solar radiation on tilted surface, principle of solar energy conversion in to heat, flat plate collectors, energy balance equation and collector efficiency

SECTION B

Unit IV : a) Fuel cells: Chemistry applied to fuel cells, principle and operation ,classification and types of fuel cells, performance characteristics of fuel cells, classification of fuel cells system

b) Wind Energy: Basic principle of wind energy conversion, wind data and energy estimation, selection of site, basic components of wind energy conversion system (WECS), classification of WEC systems, generating system, energy storage, application of wind energy.

Unit V : Ocean and tidal energy: Ocean energy resources, ocean energy routes, ocean thermal energy conversion, progressive wave, wave data collection, Basic principle of tidal power, components of tidal power plants, operation methods of utilization of tidal energy, estimation of power and energy in simple single basin tidal system.

Unit VI: Other non- conventional energy resources: Operating principle of energy from biomass, energy from biogas, geothermal energy, MHD power generation, energy from urban and rural waste, mini and micro hydroelectric power generation, principle and operation of fuel cells, classification and types of fuel cells, performance characteristics of fuel cells.

Text Book :

- 1) Power System By V.K.Mehta

References :

- 1) Renewable Energy – Power for Sustainable Future, Godfrey Boyle,Oxford University Press, 2004
- 2) Conventional Energy Technology By S.B.Pandya, Tata McGrawHill,2005
- 3) Conventional Energy Resources By B.H.Khan, Tata McGrawHill,2003.
- 4) Power plant engineering: - Domkundwar/Arora
- 5) Electrical power system: - Dr. S.L.Uppal.
- 6) Non Conventional Energy Resources By G.D.Rai, KhannaPublishers, 2001.

3EP04/3EX04/3EL04/3EE04 ELECTRONIC DEVICES AND CIRCUITS

Course Learning Objectives:

To enable the students to acquire fundamental knowledge of electronics devices and circuits so as to design various electronics based circuits such as rectifiers, voltage regulators, amplifiers, oscillators.

SECTION A

UNIT I : P-N Junction diode theory, Rectifiers - Half wave, full wave and bridge rectifier. Filters-C, LC and their analysis, Zener diode and its applications.

(As the above contents are most basic one we can keep them as it is no change)

UNIT-II : Theory and Analysis of Bipolar Junction transistor, 'h' Parameter, methods of biasing, their needs, 'Q' and stability factors.

UNIT-III : Study of typical transistor amplifier circuits :

- i) Emitter follower,
- ii) Darlington emitter follower.
- iii) RC coupled amplifier,
- iv) Transformer coupled amplifier,
- v) Cascaded amplifier,
- vi) Direct coupled amplifier,
- vii) Cascade stage.

SECTION B

UNIT-IV : Class 'A' 'B' 'AB' and 'C' amplifiers, configuration of audio amplifiers, Calculations of power gain, efficiency, dissipation and distortion, oscillators, their criteria, Hartley, Collpit and R-C oscillators, Crystal oscillator.

(All the contents are important as they have their utilization in further years)

UNIT-V : Theory, construction and applications of Schottky diode, Tunnel diode, Varactor diode, LED, Photo diode, PIN diode, photo-transistor.

UNIT-VI : FETs (JFET & MOSFET) : Types, Characteristics and parameters (u , g_m & R_{ds}), Applications of FET amplifiers, UJT: Characteristics, working, UJT as relaxation oscillator.

BOOKS RECOMMENDED:

TEXT BOOK :-

1. Electronic Devices and Circuits 5/e – David Bell Oxford University Press.

REFERENCE BOOKS :

- 1) Millman's Electronic Devices & Circuits by J. Millman, C. Halkias, Satyabrata Jit TMH 3rd ed, 2nd reprint 2011
- 2) Microelectronic Circuits 5/3 – Sedra nad Smith Oxford University Press.
- 3) Boylestad R. and "Electronics Devices & Circuits", Prentice Hall of India Pvt. Ltd., New Delhi (5th Edn.), 1993.

3 EP05/3EX05/3EL05/3EE05 ELECTRICAL MEASUREMENT AND INSTRUMENTATION

Course Learning Objectives:

Objective:- To Learn necessity and importance of Electrical Measurement devices, their characteristics, applications, advantages and their limitations. Also to know about all kinds of electrical parameter measurements and sensors for measurement of electro-mechanical quantities, temperature, pressure, etc.

SECTION A

Unit I: Measuring Instruments: Classification, deflecting, controlling, damping, breaking torques. Basic principles of operation of Ammeter & Voltmeter: PMMC, MI, Electro dynamic, Electrostatic: construction, Principle of operation, torque equation, Scale shape, errors, merits & demerits of each type.

Unit II: Watt meters & Energy meters: Electro dynamic & Induction type: construction, theory of operation, torque equation, errors & demerits, Electronic energy meter. Analysis of three phase balanced load, Blondel's Theorem, Measurement of active & reactive power & energy in single phase & three phase circuits.

Unit III: a) Instrument Transformer: Need of extension of range: extension using shunt & multipliers Instrument transformers CT & PT, Theory & construction, Phasor diagram, Ratio & Phase angle error, causes of error.

b) Special Measuring Instruments :- Maximum demand indicator, Frequency meter, P.F. meter, Phase sequence indicator.

SECTION B

Unit IV: Measurement of circuit parameters: Different methods of measurement of low, medium & high value of resistance, sensitivity & accuracy of different methods. AC & DC bridges : Wheatstone, Kelvin, Maxwell, Wein, Hay, Desauty, Anderson, Schearing

Unit V: Generalized instrumentation system , characteristics of measurement & instrumentation system Transducers : Definition, classification, specification, selection & loading effect, Displacement, Velocity, force, Resistive, Inductive, capacitive, Strain gauge, Piezoelectric, current & voltage transducers.

Unit VI: Transducers for pressure & temperature: Manometer, Elastic members (Bellows, Bourdon tube, Diaphragm), RTD, Thermocouple, Thermister, Infrared & Crystal Cathode ray oscilloscope: Time, frequency & phase angle measurement using CRO.

Text Book:

A course in Electrical, Electronics Measurement & Instrumentation, By A.K.Sawhney Dhanpat Rai & sons. 2006

Reference Books:

- 1) Instrumentation for scientists and Engineers – Turner Oxford University Press 2008.
- 2) Electronic Instrumentation & Measurement , David Bell Oxford University Press 2nd Ed.
- 3) Electrical measurement and measuring Instruments By Golding Wheeler Publishing 2003.
- 4) Electronic measurement and measuring Instruments By Co.

SEMESTER – IV

4 EP01/4EX01/4EL01/4EE01 ELECTRICAL MACHINES – I

Course Learning Objectives:-

To provide the students a detailed knowledge regarding energy conversion processes (Mechanical Energy into Electrical Energy and vice versa) and Energy Balance Equation also provides a detailed knowledge regarding electrical DC machines.

SECTION - A

Unit I : D.C. Machines

Construction, principle of operation, Emf equation, torque equation. Armature winding – Lap, wave, single layer, double layer. Armature reaction and commutation, method of improving commutation.

Unit II : D.C. Generators.

Types, characteristics and applications of d.c. shunt, series and compound generators.

Parallel operation of d.c. shunt, series and compound generators. Introduction for conducting and reporting the test on d.c. machines as per Indian standard.

Unit III: D.C. Motors

Characteristics, applications of d.c. shunt, series and compound motors, starting and speed control, losses, efficiency and testing.

SECTION - B

Unit IV: Single phase Transformer.

Heat run test, separation of core losses in to its component parallel operation, equivalent circuit. Autotransformer - construction, working, merits, demerits and application. Introduction for conducting and reporting the test on transformer as per Indian standard.

Unit V: Three phase Transformer:

Construction, working, types, connections, applications, testing, parallel operation, open delta, power transformer, distribution transformer construction.

Unit VI:

Three phase to single phase, two phase, six phase, twelve phase conversion. Three-winding transformer and tap changing transformer. Wave forms of no-load current and inrush current phenomenon.

BOOKS RECOMMENDED :

Text Book :

Electrical Machines by D.P.Kothari, I.J.nagrath TMH 4th edition, 2nd reprint 2011

Reference Books :

- 1) ELECTRIC MACHINERY and Transformer, 3E – Bhag S Guru Oxford University Press Advance
- 2) Electrical Technology By H.Cooton. 1999 Substation Equipment By Satnam and Gupta 2003.

4EP02/4EL02/4EE02/4EX02 ELECTROMAGNETIC THEORY

Course Learning Objectives: Students will learn scientific, mathematical and engineering principles that enable them to understand forces, fields, and waves; know how devices work that use those principles and phenomena; and be familiar with the historical context in which development of knowledge and devices occurred.

SECTION-A

- Unit I:** Review of Vector Analysis: Cartesian, cylindrical and spherical co-ordinate systems, vector algebra and vector calculus. Line integral and multiple integrals. Gauss theorem.
- Unit II:** Electrostatics: Coulomb's law, electric field, Gauss flux theorem in integral and differential form. Electrostatics potential, Poisson and Laplace equations.
- Unit III:** Electrostatics fields in dielectrics: electric dipole, polarization. P and D vectors, boundary conditions. Capacitance and electrical energy.

SECTION-B

- Unit IV:** Magnetic fields: Biot-Stewart law, Ampere's law in integral and differential form. Continuity equation, time of relaxation. Vector and Scalar magnetic potential, electric current, J vector.
- Unit V:** Magnetic fields in materials: magnetic dipole equivalent volume and plane section curve. H vector, magnetization vector M, boundary conditions between magnetic materials, inductance, Electromagnetic Energy.
- Unit VI:** Maxwell equations and wave equations: Displacement current, time varying fields and Maxwell's equations, plane uniform magnetic waves. Depth of penetration poynting vector.

Text-Book :

1. Dr. T. V. S. Arun Murthy, "Electromagnetic Fields (Theory & Problem)" (S. Chand Technical Publication).

Books Recommended :

- 1) Engineering Electromagnetic by W.H.Hayt, J.A.Buck, TMH 7th edition 2010.
- 2) Rohit Khurana, "Electromagnetic Field Theory" (Vikas Publication House Pvt. Ltd.)
- 3) Foundation of Electromagnetic Theory, John Reitz, F.J.Milford,R.W.Christy, PEARSON education 4th edition 2010
- 4) Elements of Engineering Electromagnetic, Nannapaneni Narayana Rao, PEARSON education 2006
- 5) Principles of Electromagnetic 4/e Mathew Sadiku Oxford University Press
- 6) Field Theory, D. Ganesh rao, C,K, Narayanapa PEARSON education , 2010.

4EX03 LINEAR INTEGRATED CIRCUITS

Course Learning Objectives :

To introduce the basic building blocks of linear integrated circuits, linear and non-linear applications of operational amplifiers also introduce a few special functions integrated circuits. And to empower students to understand the working of Analog filter, IC 555 and Voltage Regulator.

Unit I: Op-amp Fundamentals: Differential amplifiers, ac and dc analysis of differential amplifiers, Review of operation amplifier: block diagram representation, basic configurations, ideal op-amp, negative feedback, non – ideal closed loop characteristics.

Unit II: Basic op-amp Circuits: voltage follower, sign changer, adder, subtractor, I to V and V to I converters, difference amplifiers, instrumentation amplifiers and their applications, transducer bridge amplifier.

Unit III: Op-amp Parameters: Input bias and offset current, input offset voltage, input offset error compensation, slew rate, common mode rejection ratio, input and output impedance, frequency response, compensation techniques.

Unit IV: Non-linear Circuit Applications: Voltage comparator and its applications, Schmitt trigger and its application, precision rectifiers, limiters, analog switches, peak detectors, sample and hold circuits, integrator and differentiator, log/antilog amplifiers, practical log/antilog circuits, analog multipliers.

Unit V: Active Filters: Classification, Butter worth filters: low pass, high pass, band pass, band stop, notch and all pass.

Unit VI: Timer: IC 555, functional diagram, monostable and astable multivibrator.

Voltage regulators: Series op-amp regulators, IC voltage regulators, IC 723.

Text Book:

- 1) Op-amps and Linear Integrated Circuits Technology, R.A.Gaikwad, PHI publication, 1999

References :

- 1) Linear Integrated Circuits, D. Roy Chaudhari ,New Age International Publisher, 2005
- 2) Operational Amplifiers & Linear ICs by David A.Bell , Oxford University Press,2011.
- 3) OP- AMPs and Linear Integrated Circuits, Sanjay Sharma, S.K.Kataria & Sons, 2010 .

4EX04 SIGNALS AND SYSTEMS

Course Learning Objectives:

To enable the students to acquire fundamental knowledge of convolution, engineering transform, sampling so as to study and analyze various aspects of Signals and Systems.

SECTION A

Unit I : Introduction to Signals and Systems: •Signals and Systems, Classification of Signals Classification of Systems, Some Ideal Signals, Energy and Power Signals, Discretisation of Continuous-Time Signals ,Analysis of Continuous-Time Systems, Time Domain, Properties of Elementary Signals Linear Convolution Integral, Response of Continuous-Time Systems.

Unit II : Fourier series and Its Properties Fourier Transform Properties of Fourier Transform, Tables of Fourier Transform Pairs Fourier Transform of Periodic Signals, Frequency-Domain Analysis of Systems Fourier analysis of Sampled Signals

Unit III : Analysis of LTI Discrete-Time Systems: Time Domain and Frequency Domain, Properties of Discrete-Time Sequences Linear Convolution, Discrete-Time System Response.

SECTION B

Unit IV : Sampling: Representation of a continuous–Time Signal by its Samples; The Sampling Theorem; Reconstruction of Signals form its Samples using Interpolation; Effect of Under Sampling (Frequency Domain Aliasing); Discrete Time processing of Continuous–Time Signals

Unit V: The Z Transform: The Z Transform; The Region of Convergence for the Z- Transform; Geometric Evaluation of the Fourier Transform from the Pole-Zero Plot; Properties of Z-Transform; Analysis and Characterization of Discrete-Time LTI Systems using Z-Transform; System Transfer Function; Block Diagram Representation; The Unilateral Z-Transform; Solution of Difference Equation using the Unilateral Z-Transform.

Unit VI : Discrete Fourier Transform and Fast Fourier Transform Representation of Discrete-Time aperiodic signals and the Discrete-Time Fourier Transform; Fourier Transform for Periodic Signals; Properties of the Discrete-Time Fourier Transform; Discrete-Time LTI Systems and Discrete-Time Fourier Transform.

TEXT BOOK:

- 1) Signals and systems, Oppenheim and Schafer Prentice Hall India of India 2nd Edition 1997.

REFERENCE BOOKS:

- 1) PRINCIPLES OF LINEAR SYSTEMS AND SIGNALS,2E(international version) – Lathi B. P.Oxford University Press.
- 2) “Signals & Systems”, Smarajit Ghosh, PEARSON education, 2006.
- 3) “Signals & Systems”,D Ganesh rao, satish Tunga, PEARSON education 2010.
- 4) “Signals And Systems” , S.Haykin, 2nd Edition, John Wiley And Sons 1999 .

4EP05/4EX05/4EL05/4EE05 NUMERICAL METHODS AND COMPUTER PROGRAMMING

Course Learning Objectives:-

- To provide in depth knowledge about the various numerical methods for the solution of algebraic & transcendental equations, simultaneous algebraic equations, interpolation, numerical differentiation and integration, solution of ordinary differential equations, its numerical accuracy, numerical efficiency, numerical stability & its structured programming.

SECTION A

- UNIT I:** Solution of Algebraic & Transcendental equations : Floating point number representation, errors, accuracy, stability of algorithms. Bracketing methods : bisection method and False Position method. Open methods: Newton-Raphson method, Secant method and Successive Approximation method. Comparison of different iterative methods. Implementation of these methods in C.
- UNIT II:** Solution of Simultaneous Algebraic equations : Iterative methods : Jacobi's method and Gauss-Seidel method. Direct methods: Gaussian elimination method & Matrix Inverse method. Finding Eigen values of a matrix, determination of largest Eigen value. Implementation of these methods in C.
- UNIT III:** Interpolation : Evenly spaced points : formation of forward & backward difference table, Newton's forward & backward difference interpolation formulae. Unevenly spaced points: divided difference table and Newton's divided difference interpolation formula, Lagrange's method. Implementation of these methods in C.

SECTION-B

- UNIT IV:** Numerical Differentiation and Integration : Numerical differentiation: Taylor's series method, numerical differentiation using interpolation polynomial (first & second derivative near the beginning & end of the table). Numerical Integration :Trapezoidal Rule, Simpson's Rules, Romberg method, Gaussian quadrature method. Implementation of these methods in C.
- UNIT V:** Solution of ordinary differential equations : Initial value problem : Taylor's series method, Runge-Kutta methods - second & fourth order, Euler's method, Euler's modified method. Solution of simultaneous & higher order differential equations using Runge-Kutta fourth order method.. Boundary value problem : Finite difference method and Cubic spline method. Implementation of these methods in C.
- UNIT VI:** Principles of Object Oriented Programming : OOP paradigm, basic concepts of OOP, benefits of OOP, basic data types, users defined data types, derived data types, operators and control statements.

BOOKS RECOMMENDED:

Text Book:-Numerical Methods in Engg and Sci. with Programs in C & C++ by Grewal B.S., Khanna Pub.

Reference Books:

- 1) Balguruswami E. : Object Oriented Programming with C++, Tata McGraw Hill, New Delhi.
- 2) Introductory Methods of Numerical Analysis by Sastry S.S., Prentice-Hall of India Private Limited, 2006.
- 3) Numerical Methods with Programms in C by T. Veerarajan, T. Ramachandran TMH 2nd edn., 6th reprint 2011..
- 4) Computer Fundamentals and Programming in C – Dey and Ghosh Oxford University Press 2008.
