

NOTIFICATION

No. 53/2019

Date : 06/06/2019

**Subject :- Continuation of Prospectus No. 181711 prescribed for Sem. VII & VIII B.E. (CGS)
for the session 2019-2020.**

It is notified for general information of all concerned that the Prospectus No. **181711** prescribed for Semester **VII & VIII B.E. (CGS)** for the session 2013-2014 and continued upto the session 2018-2019 shall be continued for the academic session 2019-2020 with following substitutions for the examinations B.E. Sem. **VII & VIII** (Civil) and B.E. Sem. **VII & VIII** Electrical (E &) and B.E. (Electrical & Electronics) as per **Appendices A & B** appended herewith as given below :

Sd/-
Registrar
Sant Gadge Baba Amravati University

Appendix – A

7CE01: THEORY OF STRUCTURES – II

SECTION - A

Unit-I :

1. Moment distribution method, application to portal frames with sway. Multibay, multistoried, symmetrical frames subjected to symmetric loads only.
2. Slope deflection method: Application to portal frames with side sway.

Unit-II :

1. Kani's method: Continuous beams and single bay single storey portal frames with side sway.
2. Multi- bay, multi storeyed frames subjected to symmetric loads.

Unit-III :

1. Castigliano's second theorem, principle of least work, Analysis of redundant frames. (up to two degree redundancy).
2. Analysis of redundant trusses (up to second degree of redundancy).

SECTION - B

Unit-IV :

1. Muller - Breslau's principle, Influence linediagrams for continuous beams, upto two spanwith simple end supports.
2. Tension coefficient method & its applications to simple space trusses.

Unit-V :

1. Flexibility method, static redundancy, flexibility coefficients, compatibility condition application to beams.
2. Introduction to plastic analysis of steel structure, shape factor, plastic section modulus, upper and lower bound theorems, collapse loads for beams, single bay, single storey portals.

Unit-VI :

Stiffness method, kinematic redundancy, stiffness coefficients, direct stiffness approach, application to continuous beams and single - bay, single - storey portal frame.

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

7CE02: GEOTECHNICAL ENGINEERING – II

SECTION – A

Unit I :

Exploratory Programme : Field exploration, objectives and methods of exploration planning of exploration programme soil boring, hand augers, percussion boring, rotary wash boring, collection of sample, split spoon sampler, disturbed and undisturbed samples and their criteria SPT test, field vane shear test, geophysical methods, electrical resistivity and soil refraction methods. Soil log bore presentation and interpretation exploration data.

Ground Improvement : Methods of soil stabilization use of admixture (lime, cement, flyash) in stabilization) Mechanism of reinforced soil, use of Geo synthetics material and its function, vibroflotation, sand drain and preloading techniques.

Unit II :

Bearing Capacity of Shallow foundation :- Concept of local and general shear failure, Different theories: Terzaghi's Skempton's, Meyerhof's, BIS method for bearing capacity, determination bearing capacity of granular soils based on SPT value. Concept of raft foundation and floating foundation.

In situ methods of evaluation of bearing capacity, plate load test, static cone penetrometer, pressure meter test, contact pressure distribution diagram below the base of footing.

Unit III :

Earth pressure: Earth pressure at rest, & plastic equilibrium of soil, Rankine's and Coulomb's theory of active and passive earth pressure on retaining wall. Influence of surcharge, water table, Rebhann's and Culmann's simple graphical methods. Introduction to sheet pile and bulkhead and their classifications, (No design criteria) Cofferdam purpose, various types and their suitability.

SECTION – B

Unit IV :

Pile foundation : Classification of piles and their uses, static analysis, formula for determination of pile capacity for driven and bored pile in sandy and in clayey soil, dynamic pile formula Negative skin friction, factors affecting it, piles in group and their capacity, group efficiency, factors affecting group efficiency, behaviour of group of pile in sandy and in clayey soil, pile load test, effect of pile cap. Criteria for spacing and depth of piles. BIS design criterion for underreamed Pile in clays and sands.

Unit V

Settlement Evaluation: Immediate, primary and secondary settlement for footing resting on homogenous isotropic, cohesive and cohesion less soils related to single footing, combined footing, & raft foundation etc., concept of differential settlement factors and causes for differential settlement, BIS requirement for total as well as differential settlement, service loads, proportioning of footing for uniform settlement, Computation of total and differential settlement of a single pile and group of piles in sandy and clayey soil.

Unit VI

Well foundation: Component & their function, sinking of well, types of force system, and their computation, design criteria for various components of wells, tilting and shifting Bearing capacity of well as per BIS.

Stability analysis : Stability analysis of infinite and finite slope, causes of failure of slopes, Stability analysis of infinite and finite slope in cohesive and non cohesive soils, Taylor's stability number, Friction circle method and Swedish circle method.

BOOKS RECOMMENDED :

- 1) Craig : Soil Mechanics.
- 2) Bowles J.E. : Foundation Design Analysis.
- 3) Hanson : Theoretical Soil Mechanics.
- 4) Peck and Hanson : Foundation Engineering.
- 5) Tomlinson : Foundation Engineering.
- 6) Leoner : Foundation Engineering.
- 7) Bramha : Foundation Engineering.
- 8) Prakash S. : Analysis and Design of Foundation and Retaining Structure.
- 9) Kasmalkar : Foundation Engineering.
- 10) Arora K.R. : Foundation Engineering.
- 11) Venkataramiah : Soil Mechanics and Foundation Engineering.
- 12) Rao G.V. : Engineering with Geosynthetics.
- 13) S. K. Garg : Soil Mechanics and Foundation Engineering.
- 14) P. P. Raj : Geotechnical Engineering.

7CE03: DESIGN OF STEEL STRUCTURES

(Steel structures by Limit State method using IS 800: 2007)

SECTION A

Unit I : 1. Introduction to WSM, LSM & plastic analysis.
2. Design of bolted & welded connections subjected to axial loading.

Unit II : 1. Design of compression & tension member subjected to axial loading.
2. Design of roof truss.

SECTION B

Unit III : 1. Design of simple & compound columns for axial & eccentric loading.
2. Design of column bases (Slab base & Gusseted base) subjected to axial load.

Unit IV : 1. Design of simple Beams.
2. Design of compound Beams.

Books Recommended:

1. Duggal, S. K., Design of Steel Structures, Tata McGraw Hill Pub. Company Ltd.
2. N. Subramanyam, Design of Steel Structures, Oxford University Press, 2008.
3. Shah & Karve, Design of steel structures.
4. Sheyakar, Design of steel structure.
5. Bhavikatti, Design of steel structure.

7CE04: ENVIRONMENTAL ENGINEERING – I

SECTION - A

Unit-I : Quantity Estimation of water: Demand of water. Consumption for various purposes. Fire Demand, Per capita demand. Factors affecting consumption. Fluctuation in demand. Design period, forecasting population. Sources: Surface sources, ground water sources, Infiltration Galleries, Relative merits of sources, assessment & suitability, selection.

Unit-II : Water quality: Impurities in water, their effects and significance water borne diseases, collection of water samples. Water analysis- physical, chemical and bacteriological. Water quality standards: I.S. & WHO, Flow diagrams and layouts of different water treatment works. Intakes- type, location, requirement & features.

Unit-III: Aeration: Purpose, types of gravity aerators & spray aerators. Sedimentation: Plain and with coagulation, different coagulants used, dose of coagulant, Jar test, Flocculation, clarrifloculator. Design criteria for sedimentation tanks, surface loading, simple problems on design of sedimentation tanks.

SECTION – B

Unit-IV: Filtration :- Rapid sand and slow sand filters, filter media, Rate of filtration, under drainage system and washing process. Control system, Negative head, operating difficulties, pressure filter; Simple design problems on rapid sand filters.

Unit V: Disinfection :- Requirement of good disinfectant, methods of disinfection. Chlorination: Methods, prechlorination, post chlorination. Break point chlorination and super chlorination, forms of chlorine. Use of bleaching powder - Simple problems. Introduction to tertiary treatments-Softening and Defloridation.

Unit-VI: Distribution system: - Types of supply: Continuous, and intermittent. Types of system: Gravity, Pumping and combined gravity and pumping, Layouts of distributions system. Maintenance of distribution system. Equalising storage, Type of storage reservoirs, capacity. Types of conduits, joints, appurtenances. Pipe laying and testing.

Books Recommended:

1. Steel E. W., Water Supply and Sewerage, Mc-Graw Hill.
2. Kshirsagar S. R., Water Supply Engineering, Roorkee Pub house, Roorkee.
3. Birde G. S. , Water Supply and Sanitary Engineering, Dhanpat Rai and Sons, Delhi.
4. Punmia B. C. Water Supply Engineering.

7CE05 PROF ELECT: – I (i) ADVANCED WATER TREATMENT

SECTION-A

Unit I : Requirements of water treatment facilities different unit operations and unit processes. Coordination of unit operations. Common attributes of water affected by conventional unit operations and processes. Aeration: rate of gas absorption and desorption, objectives of aeration, gravity aerators and spray aerators, governing factors, design of aerators, removal of methane, CO₂, H₂S taste, design and odour.

Unit-II : Objectives of flocculation, chemical coagulation, concept of surface charge, coagulating effects of electrolytes, zeta potential, coagulants and coagulant aids, factors affecting coagulation.

Perikinetic and orthokinetic flocculation - mixing and stirring devices, flash mixing flocculators, construction and operation of flocculators, problems on design of flocculators. Pebbled bed flocculator.

Unit-III : Sedimentation: objectives, theory of sedimentation discrete settling and hindered settling, settling of flocculant suspension. Ideal settling basin and its efficiency. Design, construction and operation of sedimentation tanks. Inlet and outlet hydraulics, sludge, removal and disposal, tube and plate settlers. Problems on design of sedimentation tanks.

SECTION-B

Unit-IV : Filtration: objectives, design, construction and operation of rapid and slow sand filters, filtering sand, grain size and size distribution, preparation of filter sand, hydraulics of filtration. Hydraulics of fluidized beds. Scour intensification, high rate, declined rate, upflow biflow, dual media, diatomaceous earth filters.

Unit-V : Disinfection : objectives, different disinfectants, chemical disinfection, theory, factors governing, and kinetics. Disinfection by Ozone. Disinfection by chlorine; free available and combined. available chlorine, break point chlorination, chemical technology and other uses of chlorine, manageable variables.

Unit-VI : Miscellaneous methods of treatment : Water softening: limesoda and zeolite process, split treatment problems on calculation of dose of lime and soda ash. Iron and Manganese Removal : Fluoridation and defluoridation. Desalination. Taste and Odour Removal.

BOOKS RECOMMENDED :

- 1) Fiar, Geyer & Okun : Water and Waste Water Engg., John Wiley & Sons.
- 2) Mark J. Hammer : Water and Waste Water Technology, John Wiley & Sons.
- 3) Steel E.W. & Ghee M.C. : Water Supply & Sewerage, McGraw Hill Co.

7CE05: PROFESSIONAL ELECTIVE – I (ii) ADVANCED GEOTECHNICAL ENGINEERING

SECTION-A

Unit I : Clay mineralogy: Introduction, atomic bonds, classification and nomenclature, structure of clay mineral, Kaolinite. Illite and Montmorillonite groups, physical properties, clay-water relations, diffused double layer, thixotropy, base exchange capacity formation of different structure in soil deposites, electrical effects, electroosmosis, electrophoresis, stemming potential, zeta potential, clay mineral identification, DTA analysis, X ray diffraction method.

Unit II :

Seepage : Flownet for anisotropic soil media, construction of flownet for hydraulic structure on non- homogenous soil, directional variation of permeability in anisotropic medium. Numerical analysis of seepage in layered soil computation of seepage force, seepage through earthen dam resting on confined and unconfined medium entrance discharge and Transfer condition of line of seepage through earth dam.

Unit-III : Three dimensional consolidation. Equation, solution of 3dimensional consolidation equation, consolidation by vertical sand drain and its design aspect, free strain consolidation with no smear, effect of smear zone on radial consolidation. Calculation of the degree of consolidation with radial drains and solutions of problems based on this.

SECTION – B

Unit IV : Expansive soils: orgin of soil, intensification of expansive soil, swelling potential, factors affecting the swelling, different systems of classification, concept of swelling pressure and its measurements in the laboratory, special constructional measures adopted for the construction on expansive soils, special foundations adopted for the construction in expansive soils, concept of cohesive non-swelling techniques and its effect on expansive soil.

Unit V : Soil stabilization concept of mechanical stabilization, physical and chemical stabilization with organic and inorganic material like lime, cement, lime, fly ash and mechanisms, various factors affecting stabilization, determination of bearing capacity of stabilized soil, laboratory and field methods of stabilization, On various properties of soil.

Unit VI : Geotextile: types, specifications, functions and various applications in the field of Geotechnical engineering. Reinforced earth, mechanism of reinforced earth, various constructional methods and its effect towards altering, the properties of soil, field situations for application of this techniques. Theory of Arching, effect of arching, design of yield strip, computation of vertical stresses.

BOOKS RECOMMENDED :

- 1) Scoth R.F. : Principles of Soil Mechanics.
- 2) Das B.M. : Advanced Soil Mechanics.
- 3) Terzaghi : Theoretical Soil Mechanics.
- 4) Proceedings of Indian Geotechnical Conference, Dec. 22-24, 2013, Roorkee
- 5) Proceedings of first Indian Geotextile Conference, Dec. 08-09, 1988, IIT, Bombay.
- 6) Soil Mechanics for Road Engineers, AMSO Series.

7CE05: PROFESSIONAL ELECTIVE – I (iii) WATER POWER ENGINEERING

SECTION - A

Unit I: Water Power: Introduction, sources of energy, importance of water power, estimation of water power potential, primary and secondary power, load factor, pondage and pondage factor, load curve, numericals.

Type of hydropower plants:- low and high head, run of river, valley dam, diversion canal, high head diversion, pumped storage underground, general description, layout, topographical requirements of each of above.

Unit-II: Penstocks: general classification, design criteria, economical dia, anchorages and accessories.

Water hammer : - meaning, rigid and elastic water column theory, Allievi's charts, numericals.

Unit-III: Surge tanks: Necessity, types, function, location, effect of sudden load change, Hydraulic design of simple surge tanks, stability of surge tanks, numericals.

SECTION – B

Unit-IV: Intakes: types, locations, requirements, trashrack and other components, control gates, emergency gates, Air Entrainment.

Unit-V: Hydrel Channel:- power canal and forebay, general principles of alignment and capacity, balancing tank.

Turbines:-types, hydraulic features, size, general description of components and layout, specific speed, choice and selection of turbines, approximate costs, numericals on specific speed only.

Unit-VI : Power house:- types, general layout and approximate dimensions, advantages and disadvantages of underground power stations.

Non conventional sources of energy: - tidal power, wind power, geothermal power, solar power, elementary principles and description, application of water power in drilling and blasting of rocks.

Note : Technical visit to nearby hydro power station is compulsory.

BOOKS RECOMMENDED :

- 1) Dandekar M.M. & Sharma : Water Power Engineering, Vikas Pub. House, Delhi.
- 2) Brown J.G., Blackie and Practice : Hydro Electric Engg., Vol. I, II & III, W. Sons, London.
- 3) Mosonyi E. : Water Power Development, Hungarian Academic Sciences, Budapest.
- 4) Deshmukh M.M. : Water Power Engineering.
- 5) Davin C. and Sorenson K.C. : Hand Book of Applied Hydraulics, McGraw Hill.
- 6) Barrows H.K., Water Power Engineering, McGraw Hill.

7CE05 PROF. ELECTIVE – I (vi) ADVANCED CONCRETE TECHNOLOGY

SECTION – A

Unit-I: Admixtures and construction chemicals: Introduction, admixtures, plasticizers (Water reducers), action of plasticizers, dispersion, retarding effect, superplasticizers (High range water reducers), site problems in the use of plasticizers, retarders, accelerators, air-entraining admixtures, pozzolanic or mineral admixtures, fly ash, silica fume, rice husk ash, metakaolin, ground granulated blast furnace slag (GGBFS), damp and water proofing admixtures, protective materials and their properties as moisture barrier systems, above-grade and below grade water proofing of concrete structures, thermal protection coating, IS code provisions for admixtures.

Unit-II: Durability of concrete: Introduction, strength and durability relationship, volume change in concrete, significance of durability, impact of water cement ratio on durability, factors affecting durability, methods of predicting durability, IS code provisions for durability of concrete. Interaction between permeability, volume change and cracking.

Unit-III: Deformation in concrete: Introduction, deformation of concrete in Indian climate, permeability, interaction between permeability, volume change and cracking, factors contributing cracks in concrete, sulphate attack, alkali aggregate reaction, corrosion of embedded steel, controlling measures, corrosion inhibitors, coatings to embedded reinforcement, corrosion resistant steels, cathodic protection systems.

SECTION – B

Unit-IV: Special concrete and concreting techniques: Introduction to special concrete, Lightweight, aerated, no-fines, high density, fibre reinforced, polymer, prepacked, self-compacted (self leveled), and high volume fly ash (HVFA) concrete. Introduction to special concreting techniques, Guniting or shotcrete, ferrocement, roller compacted concrete, and ready mix concrete casting and applications.

Unit-V: Repairs and rehabilitations: Introduction, need for repairs, crack width, construction chemicals- curing compounds, surface hardners, polymer modified mortar, bond aid for plasters, guniting aid, silicon based water repellent materials, protective and decorative coatings, injection grout for cracks, coatings for embedded reinforcement, concrete repair systems, stages of repair works.

Unit-VI: Non-destructive testing of concrete: Introduction, rebound hammer, limitations, rebound number and strength of concrete, penetration technique, pullout test, resonant frequency, pulse velocity method, corrosion analyser, rebar locators.

Introduction to precast concrete, materials and their characteristics, features, Precast concrete structure, type of structure, various precast element and their uses, types of connection.

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

BOOKS RECOMMENDED :

1. Concrete Repair and Maintenance : Peter H Emmons and Gajanan M. Sabnis, Galgotia Publication.
2. Repairs and Rehabilitation - Compilation from Indian Concrete Journal - ACC Publication.
3. Guide to Concrete Repair and Protection, HB94-2006 A joint publication of Australia Concrete Repair Association, CSIRO and Standards Australia.
4. CPWD hand book on Repair and Rehabilitation of RCC buildings published by DG (Works), CPWD. Government of India (Nirman Bhawan), <http://www.cpwd.gov.in/handbook.pdf>
5. Guide to Concrete Repair, Glenn Smoak, US Department of the Interior Bureau of Reclamation, Technical Service Center, <http://books.google.co.in>
6. Management of Deteriorating Concrete Structures: George Somerville, Taylor and Francis publication.
7. Concrete Building Pathology: Susan Macdonald, Blackwell Publishing.
8. Testing of Concrete in Structures: John H. Bungey, Stephen G. Millard & Michael G. Grantham, Taylor & Francis Publication.
9. Durability of concrete and cement composites: C.L. Page & M.M. Page, woodhead Publishing.
10. Lea, F. M.: The Chemistry of Cement and Concrete, Edward Arnold (Publishers) Ltd.
11. Neville, A. M. : Properties of Concrete, Pitman Publishing Company.
12. Neville, Brooks : Concrete Technology, ELBS
13. Orchard, D. F. : Concrete Technology, Applied Science Pub Ltd.
14. Shetty, M. S. : Concrete Technology, S. Chand
15. Varshney, R. S. : Concrete Technology, Oxford Pub. House.
16. Krishna Raju : Design of Concrete Mixes, McGraw Hill.
17. Shah and Kale : Reinforced Cement Concrete Design,
18. Sushil Kumar : Treasure of Reinforced Cement Concrete.

7CE05 PROF. ELECT I (vii) ENVIRONMENTAL POLLUTION & RURAL SANITATION

SECTION-A

Unit I : General components of environment. Nature and scope of Environmental pollution, population growth, Degradation due to human activity. Episodes of Environmental pollution.

Unit-II : Water pollution-sources of water pollution, effects on water bodies, D.O. sag curve, pollution control measures, water pollution act.

Noise pollution: sources of noise pollution, human tolerance levels, levels of exposure due to various sources, preventive and curative methods.

Unit-III : Report of field visit to municipal waste water treatment plant/ Industrial Effluent treatment plant.

SECTION-B

Unit-IV : Land pollution: solids its effect on the environment, various methods of collection, treatment and disposal of solid waste, Hazardous waste and risk analysis.

Unit V : Environmental Impact assessment : Need for EIA, elements of EIA, Environmental attributes, Nature of Impact -Primary, Secondary, Tertiary, Short Term & Long terms, Local & Regional.

Unit-VI : 1) Rural Sanitation ó Collection & disposal of night soil, Sanitary Latrines.

2) Biogas plant - Capacity & Design.

BOOKS RECOMMENDED :

- 1) Mishra P.C. : Fundamentals of Air & Water Pollution.
- 2) Mohan I. : Environmental Pollution & Management, Ashish Pub. House, New Delhi-110026
- 3) Gilbert M. Masters : Introduction to Environmental Engg. & Science.

7CE06 COMPUTER AIDED ANALYSIS AND DESIGN – Lab.

1) Analysis of simple structures (2D) like portal frames, Beams (1D) with different support conditions. Correlations of the same manually as well as by readymade software like STAAD Pro., SAP, ETABS, ANSYS etc.

2) Calculation of deflection and stresses in truss by using readymade software like STAAD Pro., SAP, ETABS, ANSYS etc.

3) Analysis and design of 3D (G+2) structure by using software like STAAD Pro., SAP, ETABS, ANSYS etc.

7CE07: GEOTECHNICAL ENGINEERING- II – Lab.

List Of Experiments: (Any six)

1. To determine the shear strength by conducting Field Vane shear test.
2. To identify the subsoil strata by conducting soil resistivity / seismic refractivity method
3. To determine the soil characteristics by conducting standard penetration test
4. To determine the bearing capacity of soil by conducting standard penetration test
5. To determine the soil properties by conducting the static cone penetration test.
6. Computation of bearing capacity by analytical approach to verify with field test
7. To determine the soil characteristic with respect to soil log bore

Compulsory: Introduction to Geotechnical Software, determination of bearing capacity , earth pressure etc. professional this software.

7CE08: DESIGN OF STEEL STRUCTURES – LAB.

Practicals :

1. Candidates are required to prepare at least two designs of steel structures based on theoretical course detailed workings are necessary.
 2. A compulsory site visit for studying the various aspect and prepare a report.
- 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.

7CE09: PROJECT & SEMINAR

Seminar based on Project shall be delivered in Seventh Semester only. 50 marks shall be given through the internal evaluation done by three member committee one of them will be guide.
Seminar shall be delivered with POWER POINT presentation.

SEMESTER – VIII

8CE01: WATER RESOURCES ENGINEERING - II

SECTION-A

Unit-I : Reservoir Planning : Investigations, selection of site, fixing control levels, Reservoir Capacity, Reservoir Sedimentation, Calculation of life of Reservoir. Reservoir & Channel routing.

Dams: Definition, Classification, Site selection, factors governing the selection of types of dam.

Earth Dams: Types of dams, causes of failures, design of earth dam, phreatic line, stability analysis, seepage control measures.

Unit II: Gravity Dams: Types of dams, forces acting, modes of failure, Elementary and practical profile, Stability analysis method, Galleries, foundation treatment, Earthquake and its effect on dams.

Unit-III Diversion Head Works: Selection of site, components of diversion head works, design of weirs on permeable foundations.

Spillways: Necessity, Requirements, Components, Types of spillway, Spillway crest gates.

Energy dissipators- meaning, JHC & TWRC curves, stilling basins, bucket type energy dissipators.

SECTION-B

Unit-IV : Canal Irrigation: Types of canals, Canal alignment, Design of unlined and lined Canals, Balancing depth, cross section of canal, canal linings, water logging and drainage.

Unit-V : Canal Masonry Works: Types and only design principles and description of -

1. Regulation works: Canal fallø, Head Regulator, Cross regulator, Canal escapes and canal outlets.

2. Cross drainage works: Aqueduct, Syphon aqueducts, super passage, canal siphon, level crossing

Unit-VI : Water Management:Water management and distribution, co-operative water userø organization, warabandi, conjunctive use of water, rehabilitation of irrigation project.

Water shed Management: Need of water and soil conservation, integrated watershed development, village as a unit for watershed development.

River Training Works: Need and types of river training works.

BOOKS RECOMMENDED :

- 1) Dr. Modi P.N. : Irrigation, Water Resources & Water Power Engg.
- 2) Punmia : Irrigation & Water Power Engg.
- 3) Garg S.K. : Irrigation & Water Power Engg.
- 4) Dahigaonkar J.G. : T.B. of Irrigation Engg., Wheeler & Co.
- 5) Varshaney R.S. : Theory of Irrigation Structures, Vol. I & II, Nemchand, Roorkee.
- 6) Birdie G.S., Das R.C. : Irrigation Engg., Dhanpatrai & Sons.
- 7) Michael A. M. : Irrigation (Theory & Practice)
- 8) Dr. K.R. Arora, Irrigation, water power & Water Resources Engineering.

8CE 05: WATER RESOURCES ENGINEERING – II – Lab

TERM WORK: Five problems from the following to be worked out by the students, whenever necessary scale drawing on half empirical size must be drawn:

Practical examination shall consist of viva ó voce.

1. Fixing control levels of Reservoir from given data.
2. Cross section, plan, L-section of Earth dam showing all components;
Details of drainage of downstream casing.
3. Design and Drawing of elementary and practical profile of gravity dam.
4. Design and drawing of diversion weir on permeable foundation.
5. Design and Drawing of ogee spillway with energy dissipaters.
6. Computer Aided design of unlined and lined canal.
7. Drawing of any four canal structure (No design)
8. Technical Field visit.

8CEO2: ENVIRONMENTAL ENGINEERING – II

SECTION –A

Unit-I

Quantity of storm water, DWF, variation of sewage, flow systems of sewerage - separate combined and partially combined, layouts of sewerage system, capacity of sewers design of sewers Laying out of circular sewers-Boning rod and sight rail method, Testing & maintenance of sewers.

Unit-II

Waste water characteristic, sampling of sewage, physical chemical and biological examinations, B.O.D. and C.O.D., B.O.D. equation, problems on B.O.D Pollution due to domestic and industrial waste. Treatment of sewage - purpose of treatment, preliminary treatment, primary treatment and secondary treatment. Flow diagram for conventional sewage treatment plant. Preliminary Treatment:- Screening, Grit chamber, detritus tank. Primary Treatment:- Sedimentation of sewage.

Unit-III

Biological treatment: Trickling filters, low rate & high rate tricking filters, construction details, Re- circulation Modification of trickling filters Activated sludge process - Process description, Methods of aeration, loading rates, Different modified forms of A.S.P.,MLSS & SVI, F/M.

SECTION –B

Unit-IV

Low cost waste treatments - Oxidation ponds, Aerated Lagoon, Treatment and Disposal of sludge - Digestion of sludge, sludge disposal Septic tank, working and design, Disposal of septic tank effluent Disposal of sewage on land and in stream. Effluent standards for disposal on land, into stream and into sewers. MINAS. Self purification capacity of stream

Unit-V

Characteristics of solid waste:- Physical, chemical, biological Analysis.

Collection of solid waste:- Types of collection system and services, frequency of collection, methodology involved in setting up collection bins Disposal of solid wastes:- Different methods, sanitary land fill, composting, incineration.

Unit-VI

Air pollution: Introduction to air pollution, various pollutants their sources and their effects on man and material, prevention or air pollution at sources, introduction to control devices electrostatic precipitator & cyclones only human tolerance level Introduction to EIA and Environmental Audit.

Books Recommended :

- 1) Kshirsagar S.R. : Sewerage and Sewage Treatment, Roorkee Pub House, Roorkee.
- 2) Steel E.W. Steel : Water Supply & Sewerage, McGraw Hill Book Co.
- 3) Birdie G.S. : Water Supply and Sanitary Engineering, Dhanpat Rai & Sonø.
- 4) Garg S.K. : Waste Water Engineering.
- 5) Dr. Bhide A.D., Sunderson B.B. : Solid Waste Management in Developing Countries.
- 6) Rao H.V.N. : Air Pollution.
- 7) Stern, Wohlers, Boobel, Lowry : Fundamentals of Air Pollution, Academic Press, 1973.

8CE03: PROJECT PLANNING & MANAGEMENT

SECTION-A

Unit-I :Project, Project Stakeholders, Project life cycle - Conceptual Phase, Planning Phase, Execution Phase, Termination phase.

Conceptual Phase - Concept of feasibility study, Budgeting, Cash Flow, Risk assessment plan.

Project planning- Steps, work break down structure, Scheduling. Project Monitoring & Controlling- Concept of Tracking, Reviewing and Rescheduling.

Planning Tools: Basic concept of Gantt Chart, Bar Chart, Mile stone chart ,their advantage , limitations and overcoming measures ,

Unit II: Networking ó Activity ,Event, dummy Activity, Fulersonø numbering rule, Geometrical consideration. Critical Path Method: Concept, technique, Critical path, Numerical on Time and Floats computation, concept of Updating Network and its numerical for computation.

Unit III: PERT: Concept, technique, three time estimates, average time, Critical path, slack computation, S.D, Variance, Probability factor, crash programme, normal and crash cost, normal and crash time, cost slope, Numerical on Probability computation, crashing .

SECTION – B

Unit–IV: Concept of resource smoothening and leveling, Cost Curves, Numerical of it. Introduction to Planning softwares. Various stages and process for Work Breakdown structure, planning, scheduling and resource allocation for project by software. One Compulsory assignment for planning, scheduling and resource allocation for construction project using software.

Unit-V: Management- Feyolø Principal of Management, Functions of management, organization definition, type line, line and staff, functional organization, quality control, ISO. Safety management, construction hazards in multistage building, method of prevention of accident, injury rate, injury severity rate, injury index, National safety council, its role, recommendation, Material management, Objective, Functions, Inventory, Need for inventory, ABC, EOQ analysis.

Unit VI: Equipment Management:

É Power shovel: Construction, working, Output, factors affecting, cycle time, Problem on Output, payback period of equipments

É Dragline: Construction, working, output, factor affect ting output, cycle time , Problem on output .

É Concrete mixer, Tilting and non-tilting type construction working.

Project appraisal : study of project feasibility report, detail project report.

BOOKS RECOMMENDED :

- 1) Peurifoy R.L.: øConstruction Planning, Equipment & Methodö.
- 2) Srinath L.S.: øPERT & CPMö.
- 3) Punmia & Khandelwal: øPERT & CPMö.
- 4) Khanna S.K.: øIndustrial Organization & Managementö.
- 5) Satyanarayan: øOperations Reserachö.

8CE04: PROF. ELECTIVE – II (i) ADVANCED DESIGN OF STEEL STRUCTURES

SECTION - A

(By Limit State Method)

Unit-I : (a) Design of foot bridge (N-Truss or Pratt)

(b) Analysis and design for transmission tower lines

Unit-II : (a) Design of self supporting steel chimney and its foundation.

(b) Design of through type truss bridge member for dead loadand equivalent live load including top, bottom bracings and open web girder bridges of pratt trusses and portal bracing.

SECTION – B

Unit-III : Design of industrial buildings including gantry girder, gantry column.

Unit-IV : a) Design of north light trusses and lattice girder.

b) Design of elevated, square pressed steel tanksand staging

Books Recommended:

1. Ramchandra, Design of Steel Structure, Volume - I and II.
2. Arya, Ajmani, Design of Steel Structures.
3. Duggal, Design of Steel Structures by Limit state method.
4. N. Subbramanyam, Design of Steel Structures, Oxford University Press,2008.
5. Shah and Gore, Design of Steel Structures by Limit state method.

8CE04: PROF ELECT – II

(ii) ADVANCED WASTE WATER & INDUSTRIAL WASTE TREATMENT

SECTION - A

Unit-I

1. Physical unit process: screening, mixing, flocculation, sedimentation, floatation.
2. Design of Grit Chambers and Screens.
3. Chemical Unit Processes: precipitation, gas transfer, adsorption

Unit-II

Biological Unit Process: fundamentals of biological treatment. Design of trickling filter & activated sludge process.

Unit-III

1. Low cost waste water treatment: design of oxidation pond and aerated lagoon.
2. Oxidation ditch. Design of Secondary Settling Tank.
3. Methods of disposal of industrial wastes. Equalization tank, Neutralization.

SECTION – B

Unit-IV

General : Effect of discharge of industrial wastewaters on streams, land and environment. Importance and scope. Problems involved in treatment. Variation in quality and quantity of industrial wastewaters. Standards & Criteria Indian standards for discharge of treated waste water on land, into municipal sewers and natural water courses. Sampling of Waste Water : Representative sampling. Grab and composite samples.

Unit-V

General Approaches to Planning of Industrial Wastewater Treatment and disposal. Equalization and proportioning Neutralization. Treating different effluent streams separately. Including/ excluding domestic wastewater along with the industrial waste. Treating industrial wastewater along with town waste.

Unit-VI

Process flow diagram, characteristics and treatment of various industrial wastes. Industrial wastes of pulp and paper, textiles, tannery, food, canning, sugar mills, distillery, dairy, Pharmaceutical, Electroplating etc. Case study of any one industry.

Books Recommended :

- 1) Matcalf and Eddy : Waste Water Treatment, Disposal and Reuse, McGraw Hill Pub. Co., New Delhi.
- 2) Rao and Datta : Waste Water Treatment, Oxford & IBH Pub. Co. Pvt. Ltd., New Delhi.

8CE04: PROF. ELECTIVE – II (iii) FINITE ELEMENT METHOD

SECTION - A

Unit- I

Continuum structures, discretisation, finite elements, nodes, variational principle, minimum potential theorem, relation to Rayleigh-Ritz method.

Unit-II

Interpolation, Lagrangian shape functions, natural coordinates, area and volume coordinates, coordinate and derivative transformations.

Unit-III

2-D plane stress and plane strain analysis, constant strain triangle, rectangle. 3D analysis, tetrahedron & parallelepiped elements.

SECTION - B

Unit-IV

Isoparametric elements, plane stress, plane strain and solids, numerical integration.

Unit-V

Beam straight with C^0 and C^1 continuity, numerical integration to cater for membranes, bending and torsion combination.

Unit-VI

Programming aspects, geometry, connectivity, code numbers alternate data types, half band data preparation, flow charts, typical subroutine for assembly, shape functions, solution of equations, stiffness matrix.

BOOKS RECOMMENDED:

- 1.Desai, C. S., Abel, Introduction to Finite Element Method
- 2.Cook, Concept and application of Finite Element Method
- 3.Patwardhan, N. R. Illustrated Finite Element Method
- 4.Krishnamurthi, C. S., Finite Element Analysis ó Theory and Programming
- 5.A. S. Meghre & K. N. Kadam, Finite Element Method in Structural Analysis, Khanna Publications, New Delhi.

8CE04: PROFESSIONAL ELECTIVE – II (iv) DAM ENGINEERING

SECTION – A

Unit- I: Introduction to Dam Engineering : Different classification for dams, relative advantages and disadvantages of various dam selection or types of dam, Investigation of dam sites, Engineering surveys, geological investigation, subsurface exploration programme, economic height of dam, Construction machinery, material, money, inventory.

Unit-II: Rockfill dam : Introduction, general characteristics, materials and testing of rockfill material, foundation of rockfill dam, design, rockfill placement, examples.

Unit-III: Arch dam :- components, types, methods for design.

Buttress dam : components, types, forces acting, Buttress spacing, Master curve for economic spacing, preliminary design
Solid Gravity dams : Analysis & Design of gravity dam.

SECTION –B

Unit-IV: Spillways: choice of types, crest gates, hydraulic design, comparison, approach and tail channel, J.H.C. & tail water rating curve
Energy Dissipaters: types, components, design of hydraulic jump type, basins, ski-bucket type, roller bucket.

Unit- V: Head Regulators : requirements, types, foundation treatment including uplift consideration, Bank connection, energy dissipation, hydraulic design of opening and barrel, ventilation, types of gates.

Approach Channel, case study for one on rock foundation and one on permeable foundation.

Model Studies: scales design principles, materials, scale effects for model of dams spillways.

Unit-VI: Instrumentation : In earth dam and solid gravity dams, piezo meters, settlement, gauges, (surface monuments, base plate, cross arm) strain meters joint meters, thermometers, stress meters, pore pressure cells, plumb-bob
Seismograph. Water level gauges (description, object, location, working, installation of each, design not expected)

Special problems: increasing height of masonry and concrete dams, strengthening, repairs and maintenance, leakage, evaporation controls. evaporation controls.

Books Recommended :

- 1) Sharma H.D : Concrete Dams, Metropolitan Book Co, Delhi.
- 2) Varshney R.S. : Concrete Dam, Ox IBH, Mumbai.
- 3) Sherard et al : Earth and Rockfill Dam, John Wiley, New York.
- 4) USBR : Design of Small Dams.
- 5) USBR : Design of Large Dams.
- 6) Peurifoy R.L. : Construction, Planning and Equipments, McGraw Hill Book Co.
- 7) Satyanarayanan : Construction, Planning & Equipment, Standard Pub.
- 8) USBR : Design of Gravity Dam.

8CE04 : PROF. ELECTIVE – II (v) ADVANCED ENGINEERING GEOLOGY

SECTION – A

Unit I : A) Geology & engineering characters of Basalts & other rock formations : study of rock formations of Maharashtra older than Deccantrap from Civil engineering point of view, field characters of basalt flows and older formations which are significant from dam foundation, tunnelling work, watershed development including percolation tanks and construction material.

(B) Geology of dam & reservoirs : bearing capacity & water tightness of different types of rocks occurring in Maharashtra from construction of gravity dam with important case histories of different dam sites in Maharashtra whose geological problems were encountered and remedial measures were adopted. Set of geological conditions which lead to tail channel erosion with case histories of different dam sites.

(C) Geology of tunnel alignment : geological factors responsible for overbreaks & percolation of water, various geological structures which affects the tunnelling works. Case histories of tunnels & hydro-electric projects, roads, railways & canals driven through different types of Basalts & other rocks occur in Maharashtra.

Unit II: (A) Seismological studies : factors to be to safeguard gravity dams. Detailed studies of active & dead faults. Type & design aspect of the dam to be constructed in seismic zone with case histories.

(B) Percolation tanks : importance of geological studies for the selection of sites for percolation tanks, geological studies of watershed development projects in Maharashtra including Raleganshindi & Vidarbha region.

(C) Ground water studies : water bearing characters of different types of Basalts. Soil & water preservation techniques of civil engineering significance and under ground bandhara. Exploration of tubewells in alluvium and sandy & alluvium substrata for drinking water uses procedures and need thereof. Deciding aquifers for tubewell exploration & development of tubewells conducting yield tests of tubewell.

Unit III: (A) Geology of soil formation : geological factors which govern the engineering characters of soils. Soil derived from different types of rocks which can be used for casing & hearting of earthen dams. Nature of river alluvium in Maharashtra. Problem water logging & its remedial measures.

(B) Construction material : properties of different types of rocks that can be used as rubble for masonry, road metal, railway ballast, concrete aggregates etc. Problem of alkali aggregate reaction. Scaricity of sand in Deccan trap region, suitability of compact & gabbroic basalt as a substitute of sand after crushing.

(C) Geology of cut-off trench: geological logging and mapping of cut off trench of irrigation projects. Applicability of grouting in irrigation projects & different grouting techniques.

SECTION - B

Unit IV: (A) Drilling and logging : different methods of drilling. Precautions to be taken during drilling, preservation of cores. Recording of drilling data. Geological logging of the drill & its interpretation. Methods of water intake tests.

(B) Aerial photo interpretation : interpretation of aerial photos from the point of view of rock types, geological structures, selection of dam sites and alignment of roads, railways & ghat interpretation of lineaments for groundwater.

(C) Town planning : role of geology in town planning. Important case histories of the old town planning.

Unit V: Geophysical principle of electrical resistivity survey, its utility in determining the depth of overburden, foundation grade rocks, gullies & other geological structures by having case histories of dams & tunnels, significance of electrical resistivity survey in ground water studies, brief introductory ideas regarding seismic, magnetic and gravity surveys and their applications in various fields.

Unit VI: (A) Rock Mechanics : Engineering properties of rocks, general properties, strength of rocks, elasticity of rocks. Residual stresses in rock masses, classification system in rock engineering - Terzaghi's load classification, Lauffer-Pacher classification. Rock quality gnation (RQD), rock structure rating (RSR), concept of Wickham et al (1972)

(B) Environmental Geology : role of geology in environmental engineering, geo-environmental : soils as resources, wind erosion, erosion by moving water, predicting & controlling erosion, soil erosion & land use decisions, problem soils. Reactivation of pre faults, earthquakes in Peninsular India, intensity & magnitude, assessment, Himalayan earthquakes, landslides - characterisation, landslide analysis, dimensions of landslide hazard, landslide potential, case histories, subsidence, response to subsidence prediction, costs of subsidence, case histories.

Books Recommended :

- 1) P.W.D. Hand Book, Chapter No. 6.
- 2) Geological Survey of India - Engineering Geology Case Histories, Parts I & II.
- 3) Auden J.B. : Indian Society of Engineering Geology, Commemoration Volume.
- 4) Wahlstrom E.E. : Tunnelling in Rocks.
- 5) Wahlstrom E.E. : Dams, Dam Foundations and Reservoir Sites.
- 6) Goodman R.E. : Introduction to Rock Mechanics.
- 7) Bieniawski Z.T. : Rock Mechanics Design in Mining and Tunnelling.
- 8) Lama R.D. & Vutukuri V.S. : Hand Book of Mechanical Properties.
- 9) Gupta R.B. : A Text Book of Engineering Geology, Pune Griha Prakashan.
- 10) Miller : Principles of Remote Sensing.
- 11) Pandey S.N. : Text Book of Photo Geology.
- 12) Lundgren L. : Environmental Geology, Prentice Hall Pvt. Ltd.
- 13) Patwardhan A.M. : The Dynamic Earth System, Prentice Hall Pvt. Ltd.

8CE04: PROF. ELECTIVE – II (vi) MATRIX COMPUTER ANALYSIS OF STRUCTURES

SECTION - A

Unit- I : Solution of simultaneous algebraic equations, Gaussian elimination method, Half-band matrices, computer programme.

Unit-II : Finite difference method, application to plate deflection problems for fixed and simply support conditions.

Unit-III : Flexibility method, static redundancy, flexibility coefficients, compatibility conditions, application to continuous beams, single-bay single story portals, pin joined plane trusses.

SECTION-B

Unit-IV : Stiffness method, kinematic redundancy, equilibrium equations, member stiffness matrix and structure stiffness matrix, assembly procedure, application to continuous beams, pin jointed plane truss, numerical examples up to three unknowns.

Unit- V : Stiffness matrix of plane frame member with axial deformation (6x6), Grid member (6x6), transformation of forces and displacements, member and global coordinate system.

Unit-VI : Data and program organization for stiffness method, various coding systems, member-joint and joint-coordinate relations, member-displacement relations, code number approach, methods of introducing boundary conditions for restrained displacements.

Books Recommended:

1. Gere, Weaver, Analysis of framed structures
2. Rubinstein, M. F., Matrix computer analysis of structures
3. Matrin, M. C., Introduction to matrix methods of structural analysis.

8CE04: PROF. ELECTIVE – II (viii) ROCK MECHANICS

SECTION - A

Unit I: Introduction, properties and testing, Introduction to Rock Mechanics and its field applications, identification of common rocks, physical & mechanical characteristics of rock material. Field & Laboratory testing of rocks. Classification of rock masses for engineering purpose.

Unit II: Rock excavation : Blasting - objectives, blasting materials, blasting methods, open cut blasting. control blasting operation, precautions. Drilling, braking & cutting. Machines used for rock excavation.

Unit III: Rock reinforcement & Grouting : Rock bolting ó bolting methods & materials. High capacity of rock anchors - types of rock anchors, anchor grouting, civil engineering applications. Bolted & anchor supports. Rock grouting - objectives, types of treatment, grouting material, grouting methods, quality control & monitoring of grouting.

SECTION-B

Unit IV: Rock strength & deformability : modes of rock failure, stress- strain behaviour in compression, Mohr- Coloumb failure criteria, Griffiths crack theory, empirical criteria for failure, effect of size on strength. Plane of weakness in rocks, joint orientation & roughness. Deformability of rocks - elastic & non- elastic behaviour, influence of time on rock deformation, viscous behaviour & creep.

Unit V: Rock foundation & slope stability : rock foundation ó allowable bearing pressures, stress & deflection in rock under footing, failure mechanisms, subsiding & swelling rocks, base heave & remedies, foundation anchoring. Rock slopes - modes of failure, factors affecting, analysis of slopes.

Unit VI: Underground opening : types of boring machine, cutting tools, muck handling. Opening in competent rock, horizontally layered rocks & rock with inclined layers, plastic behavior around tunnels, time dependent behaviour of tunnels, underground opening in blocky rocks - Block theory. Review of design methods of tunnels - Empirical & semi-empirical methods. Support & stabilisation.

Books Recommended :

- 1) Goodman R.E. : Introduction to Rock Mecanics.
- 2) Franklin J.A., Dusseault M.B. : Rock Engineering.
- 3) Franklin J.A., Dusseault M.B. : Rock Engineering Applications.
- 4) Stagg K.G., Zienkiewicz O.C. : Rock Mechanics in Engineering Practice.

8CE04: PROF. ELECTIVE - II (ix) ADVANCED DESIGN OF R. C. C. STRUCTURES

SECTION - A

[BY LIMIT STATE METHOD]

Unit-I :

- 1) Design of Portal frame up to two bay two storied symmetricalframe for symmetrical loading.
- 2) Design of circular slab for uniformly distributed load only.

Unit-II :

- 1) Design of a footbridge and simply supported slab deck bridgefor I.R.C.class A loading.
- 2) Design of RCC girder (T beam) bridge for I.R.C.class A loading.

SECTION – B

Unit-III :

- 1) Structural response to earth quake, Analysis of multistoried frame by seismic coefficient method.
- 2) Design of square bunkers using Rankine theory. Design of Silos.

Unit-IV :

- 1) Design of R.C.C. Intze tanks.
- 2) Design of staging for Intze tanks with raft foundation.

BOOKS RECOMMENDED:

1. Suhil Kumar, Treasure of R. C. C. Design
2. Jain, A. K., Reinforced Concrete (Limit State Method)
3. Shah, Karve, Design of R. C. C. Structures
4. N. Krishna Raju, Advanced R. C. C. Design
5. Rajgopalan, K., Storage Structures.

8CE04: PROF. ELECTIVE – II (x) LATERAL LOAD ANALYSIS

SECTION-A

Unit-I :

Interior of earth, Engineering geology of earthquakes, plate tectonics, Seismicity of the world, tectonics features of India, Faults, Propagation of earthquake waves, Quantification of earthquake (magnitude, energy, intensity of earthquake), Measurements of earthquake (accelerograph, accelerogram recording), Determination of magnitude, Epicentral distance, focal depth, etc. Ground motion and their characteristics, Factors affecting ground motions, Inertia forces, horizontal & vertical shaking.

Unit-II :

Guidelines for achieving efficient seismic resistant planning, selection of sites, importance of architectural features in earthquake resistant buildings, continuity of construction, projection & suspended parts, special construction features like separation of adjoining structure, stair case etc, twisting of building, seismic design philosophy for building.

Unit-III :

Importance of flexible and ductile structures, Effect of earthquake on RCC Building, How Beam, Column & Beam Column joint resist earthquake, Effect of open ground story, Effect of short column, Use of shear wall, latest technique used to reduce earthquake effect on building (Base Isolation). Behavior of R.C. building in past earthquakes.

SECTION-B

Unit-IV :

Introduction to IS:1893:-

Soft Story, Weak Story, Story Drift, Design Horizontal Acceleration, Zone factor, Importance factor, Response Reduction Factor, Natural Time Period, Base Shear, Earthquake eccentricity, Earthquake load combination, Diaphragm, Centre of mass & rigidity, Seismic mass & weight, P-ê Effect, Calculation of nodal loads due to earthquake.

Unit-V : Intoduction to Structural Dynamic:-

Sources of vibration, types of excitations, Spring action and damping; Degrees of freedom; Application of Newton's laws, D'Alembert's principle, Single degree of freedom systems; Mathematical model of physical systems; free vibrations, damped free vibrations, critical damping, and response, periodic loading expressed in harmonics, dynamic load factor.

Unit-VI :

Wind load Calculation for Multy-story Building as per IS 875-Part-3.

Books:

- 1) Duggal S.K. Earthquake Resistant Design of Structures , Oxford University Press 2007.
- 2) PankajAgrawal , Manish Shrikhande Earthquake resistant design of Structures, Prentice Hall India.

8CE04 PROF. ELECTIVE -II (X) : ARCHITECTURE AND TOWN PLANNING

SECTION A

Unit I:

Elements of Design: Line direction. Shape, size, texture, value and colour, balance, scale and proportion. Focal point, vista, image ability, visual survey, figure-background relationship.

Unit II:

Principles of Design: Repetition, gradation, harmony, contrast and unity, creation of 2 D and 3 D compositions. Barrier Free Design : Concept of housing; neighbourhood concept; site planning principles; housing typology; housing standards; housing infrastructure.

Unit III:

The Industrial Revolution: The age of revivals, the emergence of engineer, new materials and techniques and the evolution of balloon frame and steel frame. Indian Indus valley, Vedic, Buddhist, Indo-Aryan, Dravidian and Mughal periods; European Egyptian, Greek, Roman, medieval and renaissance periods- construction and architectural styles; vernacular and traditional architecture. Origin of Modern Architecture: definition and concept of modern architecture, various pioneers of modern architecture.

SECTION B

Unit IV

Town Planning: Definition and meaning, age of planning, scope and motives of planning, brief history of town planning & its origin and growth, historically development of town planning in ancient valley civilizations. Indus Nile Tigris and Euphrates, Greek Roman, Medieval and Renaissance town planning.

Unit V

New Concepts: Garden city movement, Linear city and concentric city concepts, Neighbourhood and Radburn, La-cite industrille, Radiant city to present day planning.

Planning Principles: Types of town and their functions, types of town planning & Grid Iron, Radial, Spider webs, Irregular and Mixed, their advantages and disadvantages. principles of Ekistics; rural-urban migration; urban conservation; urban renewal; Five-year plan; structural and sectoral plan. Eco-city concept; sustainable development. Smart Cities Concept.

Unit VI

Planning Practice and Techniques: Zoning & its definition, procedure and districts, height and bulk zoning, F. A. R., Master Plan & Meaning, preparation and realization, the scope of city planning & city rehabilitation and slum clearance. statistical methods of data analysis; application of G.I.S and remote sensing techniques in urban and regional planning; d

Books Recommended:

1. Barrister Fletcher History of World Architecture, Taraporwalas Publishers.
2. Cherry, Gordon, "Urban Planning Problems", Board Hill, London, 1974.
3. Sundaram, K. V., "Urban and Regional Planning in India" Vikas Publishing house (P) Ltd., New Delhi, 2000.
4. Gallion A B., Eisner S., "The Urban Pattern" Van Nostrand reinhold, New York, 1993.
5. Jon Lang, "A concise history of Modern Architecture in India", Permanent Black Publishers, New York, 1998.
6. Taurus Parke, "A City with view Florence", I.B. Taurus Publishers, New York, 1994.
7. S C Rangwala : Architecture & Town Planning, Dhanpatrai & Sons
8. C. Rangwala, Town Planning, Charter Publishing House,
9. Braodbent, Theory of Architecture, John Willey & Sons.

8CE 05: WATER RESOURCES ENGINEERING - II - Lab

TERM WORK: Five problems from the following to be worked out by the students, whenever necessary scale drawing on half empirical size must be drawn:

Practical examination shall consist of viva-voce.

1. Fixing control levels of Reservoir from given data.
2. Cross section, plan, L-section of Earth dam showing all components;
Details of drainage of downstream casing.
3. Design and Drawing of elementary and practical profile of gravity dam.
4. Design and drawing of diversion weir on permeable foundation.
5. Design and Drawing of ogee spillway with energy dissipaters.
6. Computer Aided design of unlined and lined canal.
7. Drawing of any four canal structure (No design).
8. Technical Field visit.

8CE06: ENVIRONMENTAL ENGINEERING – II- Lab.

- 1) Analysis of waste water (any four) ó BOD (for domestic waste), COD (for industrial waste), Solids (Volatile), SVI, Nitrogen, Chlorides.
- 2) Air sampling & Analysis of SPM.
- 3) Physical characteristic of solid waste.
- 4) Sketches of sewers appurtenances ó Manholes ó different types storm water inlets, overflows, inverted siphons, automatic flushing tanks, ventilation in sewers.
- 5) Report of Field visit to Municipal wastewater treatment plant/Industrial Effluent treatment

Appendix – B

B.E. (ELECTRICAL & ELECTRONICS) SEMESTER – VII

7EX01 UTILISATION OF ELECTRICAL ENERGY

Course Learning Objective: This subject gives a comprehensive idea in utilization of electrical power such as drives, electric heating, electric welding and illumination, electric traction, electrolysis, refrigeration air conditioning and automobile electric system.

SECTION A

Unit I : Concept of electrical drive, classification, advantages of electrical drive, selection criterion for electrical motor, size, specification and type of motor, mechanical features of motor, transmission of drive, industrial application, Textile mill, Paper mill, Cement mill, Coal mining, Sugar mill.

Unit II: Types of duties, continues, intermittent and short time, heating and colling of motor, rating calculations for these duties, use of fly wheel and fly wheel calculations.

Unit III: Characteristics of DC motors, three-phase induction motors, single-phase induction motors. Starting methods, different methods of speed control, braking of motors, plugging, rheostatic and regenerative braking.

SECTION B

Unit IV: Requirement of ideal traction system, system of track electrification and their comparison, speed time curves, energy consumption calculation, calculation of tractive efforts.

Unit V : Traction motors, general features and types, characteristics, control of locomotive motor coaches, series-parallel control. Overhead equipments, collector gear for overhead equipments.

Unit VI: Nature of light-units, luminous efficiency, Glare production of light, Polar curves, control of light by reflection, refraction and diffusion. Lighting calculations, flood lighting, street lighting.

TEXT BOOK : J. B. Gupta : Utilization of Electric Power and electric Traction, s. K. Kataria & sons.

REFERENCE BOOKS :

- 1) S.K.Pillai : A First Course in Electrical Drives, published by New Age International.
- 2) C.L.Wadhwa : Generation Distribution and Utilization of Electrical Energy, published by New Age International Pvt. Ltd.
- 3) E.O.Taylor : Utilization of Electric Energy in SI Units, published by Orient Longman Ltd.

7EX02 ELECTRONIC COMMUNICATION

Course Learning Objectives:

To introduce the concepts and techniques associated with Wireless Cellular Communication systems.

Unit I :

Signal and Noise : - Bandwidth, bandwidth requirement for different types of signals such as telegraph, telephone speech, music and video Noise: External and internal noise, noise figure, signal to noise ratio, noise figure measurement.

Unit II: Modulation Techniques : - Amplitude modulation theory, Frequency spectrum representation of AM, Modulation index side bands, power relations, current relations and voltage relation in the AM wave. Frequency modulation and phase modulation, frequency deviation, modulation index, frequency spectrum.

Unit III:

AM Transmitters : - Principles of DSB-FC, DSB-SC, SSB-SC modulation and their comparison, Details of DSB-FC transmitter, Generation of DSB-SC by using balanced modulators (FETs), DSB-SC transmitter. Generation of SSB-SC by phase-shift method.

Unit IV :

AM Receivers: - TRF receiver, superhetrodyne receiver, details of each block such as RF amplifier, Oscillator, IF amplifier, Diode detector, audio amplifier. Mixer: Principle, Need and type of AGC, Practical radio receiver circuit with AGC, characteristics such as selectivity, sensitivity, and fidelity communication receiver.

Unit V :

FM Transmitter: - Circuits for direct FM generation using FET and varactor diode. Circuit & analysis of Indirect FM generation, Narrow band and wide band FM, their comparison, de-emphasis and pre-emphasis. FM transmitter.

Unit VI :

FM Receivers :- Details of FM receiver, blocks such as RF amplifier, local oscillator, IF amplifier, Mixer, audio Ampl. AGC, limiter, FM discriminator, single slope and balanced slope detector, analysis of Foster seeley and ratio detectors.

Text Book : Kennedy G.: Electronics Communication System, Tata McGraw Hill Co.New Delhi.

Reference Books :

- 1.Young P.H.: Electronics Communication Techniques, A Bell and Howell Co. Indiana.
- 2.Martin James. : Telecommunication and the Computer, Prentice Hall Inc. New Jersey.
- 3.Roddey D. Coolen S.: Electronics Communication, Prentice Hall India Pvt. Ltd.
- 4.Beck, Robert and J.Schoen: Electronics Communication, Modulation and Transmission, A Bell and Howell Co.

7EX03 COMPUTER ORGANISATION

Course Learning Objectives: A student should grasp the basic concepts of computer architecture and organization, and understand the key skills of constructing cost-effective computer systems. A student should learn how to quantitatively evaluate different designs and organizations, and provide quantitative arguments in evaluating different designs.

Unit-I: Basic structure of computer: Hardware & software.Addressing methods. Program sequencing. concept of memory locations & address. Main memory operation. Instructions & instruction sequencing. Addressing modes. Basic I/O operations. Stacks. Queues & subroutines.

Unit-II: Processing Unit: fundamental concepts. execution of a complete instruction. hardwired control, performance consideration. Microprogrammed control; microinstructions, microprogram sequencing, microinstruction prefetching, emulation.

Unit-III: I/O organization: accessing I/O devices,interrupts, direct memory access:bus arbitration. I/O hardware:processor bus and interfacing circuits,standard I/O interfaces: SCSI bus, backplane bus standard.

Unit-IV: Memory Unit: basic concepts,semiconductor RAM memories,internal organization, static & dynamic RAMs, ROMs. speed, size & cost considerations.Cache memories: performance considerations. Virtual memories, address translation,memory management requirements.

Unit-V: Arithmetic; number representation. design of fast adders,signed addition and subtraction. Multiplication of positive numbers, Booth's algorithm, Integer division.Floating-point numbers and related operations.

Unit-VI: Computer Peripherals: Input-output devices like video displays,video terminals, graphics input devices,printers.Online storage devices: magnetic disks,magnetic tape systems, CD-ROM systems. Communication devices: Modems.

Text Book:

V.Carl Hamacher & S. Zaky's Computer Organization (4/e) McGraw-Hill(ISE).

References:

1. Stallings. W. 's Computer Organization & Architecture (5/e) (Pearson Education).
2. Tanenbaum A.S.'s Structured Computer Organization (5/e) (Pearson Education).
3. Hayes J.P. 's Computer Architecture & Organization (4/e) (McGraw- Hill).

7EX04 POWER ELECTRONICS - II

Course Learning Objectives :

To enable the student to acquire fundamental knowledge of Electric Drive systems, classification of electric drives, DC drives, AC drives and their role in various applications and to making Electric Drives an enabling technology.

SECTION-A

UNIT I : Introduction to Electrical Drives: Concept, Classification and Advantages. Basic elements, Components of load torque, Torque equation, Equivalent values of drive parameters. Types of mechanical loads. Selection of motor and Controller, Classes of duty, Stability of an electrical drive. Comparison of AC and DC drives.

UNIT II :

Starting and Braking of Electrical Drives: Solid-state starters, soft starting, Calculation of starting/acceleration/ reversal time and energy loss during starting. Types, advantages, limitations and purposes/objectives of electrical braking, braking of d c and induction motors.

UNIT III : DC Drive Control Basic machine equations, scheme of control, Single phase separately excited drives, single phase- series motor drives, power factor improvement, Three-phase separately excited drive, closed loop control, PLL control, microcomputer control.

SECTION-B

UNIT IV :

Chopper Control of D.C. Drives- Principle of operation and control techniques, motoring operation of separately excited and series excited motors, multi quadrant control of chopper-fed motors.

UNIT-V :

Ac drive control: Basic principle of operation, speed control of induction motor, stator voltage control, variable frequency control, Rotor resistance control, slip-power recovery scheme, Synchronous motor drive, Microprocessor controlled AC Drive.

UNIT-VI :

Study of electrical drives in rolling mills, paper mills, cement mills, sugar mills, textile mills, traction and machine tool applications.

BOOKS RECOMMENDED :

Text Book : G. K. Dubey, Fundamentals of Electric Drives, 2nd Edition, Narosa Publishing House.

Reference Books :

1. V.Subrahmanyam Electric Drives-Concepts and Applications, TMH Pub,2004
2. B.K. Bose : Modern Power Electronics and AC Drive, Pearson Education
3. Power Electronics : M.H. Rashid ó Pearson Education.
4. A first course in electrical drives: S. K. Pillai, Published by New Age international Publishers

7EX05 Prof.Elect.-I(III) / 8EP02/8EL02/8EE02/

HIGH VOLTAGE ENGINEERING

Course Learning Objective:

- Able to describe the principles of generation and measurement of high voltage AC, DC and impulse voltages and also the fundamentals of breakdown and partial discharge in insulating solid and gas at high voltages. We can select appropriate hardware for certain applications in power system protection and high voltage engineering.

SECTION-A

Unit I: Breakdown in Gases Insulating materials Classification, Gases as insulating media, Ionization and decay process, Breakdown in gases, Townsend's law, Streamer mechanism of spark pashan's law, Corona discharge, Electronegative gases.

Unit II: Breakdown in Liquid and Solid Dielectrics, Breakdown in pure and commercial liquids, Solid dielectrics and composite dielectrics, High voltage bushings, Guarding, Shielding, Field plotting.

Unit III: Lightning and Switching over Voltage and Protection Lightning strokes to lines and towers; Mechanism, Characteristics and protection of transmission lines from lightning; Lightning arrestors, Insulation co-ordination of HV and EHV power system and substation.

SECTION-B

Unit IV: High Voltage and Current Generation, Generation of high D.C, A.C and impulse voltages, Standard impulse wave shapes, Switching surges, and High impulse generator.

Unit V: High Voltage and Current Measurement Peak voltage, Impulse voltage and High direct measurement methods, Nondestructive measurement and testing, high voltage dielectrics loss and capacitance measurement, Radio frequency and Partial discharge measurement.

Unit VI: High Voltage Testing and E.H.V.Lines Design. Basic terminology, Testing of Insulators, Bushings, Cables, Transformers, Surge diverters and Isolators; Electric shock and threshold current, Capacitance of long objects, Electromagnetic interference, E.H.V. line insulation design based upon transient over voltage.

BOOKS RECOMMENDED :

Text Book: M.S.Naidu and V.Kamraju of High Voltage Engineering, Tata McGraw Hill Pub. Company, New Delhi.

Reference Books:

- 1 Rokosh Das Begamudre- EHV AC. Transmission Engineering, Wiley Easter Ltd. New Delhi.
- 2 High Voltage Engineering by C.L. wadhawa New Age international (P) Ltd. Publications.

SEMESTER : VIII

8EX01/7EP02/7EL02/7EE02

POWER SYSTEM OPERATION AND CONTROL

Course Learning Objective:

Able to create equivalent circuit of a given power system for power flow analysis, Economic dispatch controller and solution of coordinate equation by iteration method, generation and absorption of Reactive power and the methods of voltage control and also Knowledge of modern control application and natural torsional oscillatory modes in power system.

SECTION A

Unit I: Economic Operation – Part I: Meaning of optimum scheduling, UCP and LSP; Input of Output characteristics, Heat rate characteristic, Incremental fuel rate, Incremental fuel cost; Methods of obtaining incremental fuel costs; Conditions for incremental loading; Optimum scheduling of generation between different units (Only Two plant system without transmission loss).

Unit II: Economic Operation – Part II

Transmission loss as a function of plant generation; Calculation of loss co-efficient (Two plant system); Incremental transmission loss; Optimum scheduling of generation between different plants including transmission loss; Concept and significance of penalty factor; Automatic load dispatch: Operation and Functions.

Unit III: A. Generator Control Loops

Concept of real and reactive power; Effect of real and reactive power on system parameters; Philosophy of real and reactive power control; Basic generator control loops.

B. Automatic Voltage Regulator (AVR)

Functions of AVR; Types of Exciter; Brushless AVR loop: Exciter modeling, Generator modeling, Transfer function block diagram representation, Static performance, dynamic response, Stability compensation, Effect of generator loading.

SECTION B

Unit IV: Automatic Load Frequency Control

Automatic generation control (AGC); Speed governing system; Transfer function modeling: Governor, Hydraulic valve actuator, Turbine, Generator, Load; Transfer function representation of an isolated generator; Static performance of speed governor; Closing of ALFC loop.

Unit V: Control Area

Meaning; Primary ALFC Loop: Static response, Dynamic response, physical interpretation of results; Secondary ALFC loop; Integral Control; Pool operation; Tie-line Modeling; Two area system of Dynamic response; Tie-line bias control.

Unit VI: Steady-State Instabilities

Natural torsional oscillatory modes in power system; Natural mode of a single generator operating onto infinite bus; Effect of damper winding; Effect of changing excitation; Power system stabilizer; Introduction to modern control application.

Text Book:

O. L. Elgerd of Electric Energy Systems Theory: An Introduction of Second edn., McGraw-Hill Book Comp. N. Y. 1987.

Reference Books:

- 1) Power System Operation & Control, N.V.Ramana, PEARSON education, 2010.
- 2) I. J. Nagrath, D. P. Kothari of Modern Power System Analysis of Second edition, Tata Mc Graw Hill Publishing Company, New Delhi
- 3) P. S. R. Murty of Power System Operation and Control of Tata Mc- Graw Hill Publishing Company, New Delhi.

8EX02 SWITCHGEAR & PROTECTION

Course learning objective: To develop an ability and skill to design the feasible protection systems needed for each main part of a power system in students.

SECTION-A

Unit I Circuit Interruption Circuit breaker control circuit, Fault clearing process, Auto-reclosure, Arc phenomenon-maintenance and interruption theories; AC circuit breakers- current interruption, transient recovery voltage (TRV), rate of rise of TRV, factors affecting TRV, ratings; Inductive and Capacitive current interruptions, current chopping.

Unit II: A. Fuses Types, Constructional features, operation, Characteristics and Applications
B. Circuit Breaker (Part of I) Air break, Air blast, Bulk oil and minimum oil-types, constructional features, operation and application.

Unit III Circuit Breaker (Part of II) SF₆, Vacuum, Miniature, Earth leakage and Moulded Case of types, Constructional features, operation and application; Testing, Installation and Maintenance.

SECTION-B

Unit IV A. Relaying Principle Components, Essential features, Characteristics, Terminology, CTs and PTs, Relay classification.
B. Electromagnetic Relays Overcurrent, Directional, Distance and Differential of types, constructional features, operation, characteristics and application.

Unit V : Protection of Transmission Lines
Relaying schemes of overcurrent, earth fault, directional, distance and differential; Parallel feeders and ring mains protection, Carrier current relaying, Overload and Power swing.

Unit VI : A. Other Power System Elements Protection Transformers, Motors, Generators and Buses.
B. Static Relaying - Basic concepts, equipments, comparators, Characteristics realization of overcurrent, directional, differential and distance relay. Microprocessor based relay introduction.

Text Book:- Sunil S. Rao of Switchgear and Protection of Khanna Publications New Delhi

Reference Books: -

- 1 C. R. Mason of The Art and Science of Protective Relaying of .
- 2 Badri Ram and B. N. Vishwkarma of Power System Protection and Switchgear of Tata Mc-Graw Hill Publishing Company Limited, New Delhi.
- 3 B. Ravindranath and M Chander of Power System Protection and Switchgear of Wiley Eastern Ltd, New Delhi.

8EX03 EMBEDDED SYSTEMS

Course Learning Objectives: To introduce students to the modern embedded systems and to show how to understand and program such systems using a concrete platform built around

Unit-I : Introduction: Embedded systems design, Embedded system architecture, Embedded systems model, An Overview of Programming Languages and Examples of Their Standards, Standards and Networking, Multiple Standards-Based Device Example: Digital Television (DTV).

Unit-II: Embedded Hardware Building Blocks and the Embedded Board, powering the hardware, Instruction Set Architecture (ISA) architecture model, internal processor design and its performance.

Unit-III: Memory: ROM, RAM and auxiliary memory, Memory Management of External Memory, Performance of memory. I/O : Managing Data: Serial vs. Parallel I/O, Interfacing the I/O Components, I/O performance. Buses: arbitration, timing and performance.

Unit-IV: Device Drivers: Device Drivers for Interrupt-Handling, Memory Device Drivers, On-board Bus Device Drivers, Board I/O Driver. Embedded OS: Multitasking and Process Management, Memory Management, .

Unit-V: Embedded OS : I/O and File System Management, OS Standards: POSIX, OS Performance Guidelines. Middleware : meaning and examples. Application layer software: meanings and examples.

Unit-VI: Embedded system design & implementation: Defining the System-Creating the Architecture and Documenting the Design, Stages in creating an Embedded System Architecture. Implementing the Design. Quality Assurance and Testing of the Design.

Text Book: Tammy Noergaard of Embedded Systems Architecture of Elsevier Newnes Publication.

Reference Books:

1. Rajkamal, of Embedded Systems, Architecture, Programming & Design of TMH.
2. Jane W. S. Liu of Real Time Systems of, Pearson Education.

8EX04 PROF. ELECTIVE II (iv) POWER QUALITY

Course Learning Objective: To study and understand, various power quality problems, their mitigation and measuring techniques.

SECTION A

- Unit I** **Introduction** Power Quality Definition, Need for Power Quality, Sensitive Loads, Nonlinear Loads, Interconnected Power System, Deregulation, Utilities, End Users, Lawyers,
- Unit II** **Power Quality Characteristics** Power Quality Theory, Types of power Quality Problems, Voltage Swells, Long-Duration Over voltages, Under voltages, Interruptions, Transients, Voltage Unbalance, Voltage Fluctuations, Harmonics, Electrical Noise, Sources of Power Quality Problems, Utility Side of the meter, End-User Side of the meter, Effects of Power Quality Problems, Power Quality Problem-Solving Procedures, Power Quality Solutions,
- Unit III** **Power Quality Standards** Power Quality Standards Organizations, Institute of Electrical & Electronics Engineers (IEEE), American National Standards Institute(ANSI), International Electrotechnical Commission(IEC Other International Standards Organizations, Purpose of Power Quality Standards, Types of Power Quality Standards, Voltage Sag (Dip) Standards, Transients of Surges, Voltage Unbalance, Voltage Fluctuation or Flicker Standards, Harmonics Standards, Transformer Overheating Standards, Natural Conductor Loading Standards, Static Electricity, Telephone Power Quality Standards, Grounding and Wiring Standards, Sensitive Electronics Equipments Standards, Trends in Power Quality Standards.

SECTION-B

- Unit IV** Power Quality Solutions , Reduce Effects on Sensitive Equipment, Reduce or Eliminate Cause, Reduce or Eliminate Transfer Medium, Install Power Conditioning Equipments, , Surge Suppressors, Noise Filters, Isolation Transformers, Line-Voltage Regulators, Motor-Generator Sets, Magnetic Synthesizers, Static VAR Compensators (SVCs), Uninterruptible Power Supply (UPS), Solid-State Switches, Harmonics Solutions, Selection of Appropriate Power Conditioning Equipment, Grounding and Wiring Solutions
- Unit V** Wiring and Grounding Wiring Principles, Grounding Principles, Power System, Utility Power System Grounding, Telecommunication System Grounding, End-User Power System Grounding, Wiring and Grounding Problems, Ground Loops, Electromagnetic Interference (EMI) Noise, Loose Connections, Grounding for Lightning and Static Electricity, Attack of the Triplens, Solutions That Cause Problems, Wiring Solutions, Separation, Selection of Wire and Cables, Shielding, Grounding Solutions, Ground Rods, Ground Ring, Ground and Reference Signal Grids, Other Grounding Systems, Isolated Grounds, Multipoint Grounding, Separately Derived Source Grounding, Reference
- Unit VI** Power Quality Measurement Tools & Power Quality Surveys Kilowatt-Hour Meter, Multimeters, Average-responding versus True RMS Meters, Crest Factor and Bandwidth, Other Selection Considerations, Oscilloscopes, Disturbance Analyzers, Harmonics Analyzers, Purpose of a Power Quality Surveys (Checkup or Examination), Planning a power Quality Surveys.

Text Book : Barry W. Kennedy: Power Quality Primer, McGraw-Hill.

Reference Books :

1. Electrical Power System quality by R.C.Dugan, M.F.McGranghan, S.Santoso, H.W.Beaty TMH 2nd Edition, 2011.
2. G.T. Heydt: Power Quality Stars in a circle Publication, Indiana, 1991.
