

Rajiv Gandhi Proudyogiki Vishwavidyalaya, Bhopal

Branch- Common to All Discipline

New Scheme Based On AICTE Flexible Curricula

BT301	Mathematics-III	3L-1T-0P	4 Credits
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OBJECTIVES: The objective of this course is to fulfill the needs of engineers to understand applications of Numerical Analysis, Transform Calculus and Statistical techniques in order to acquire mathematical knowledge and to solving wide range of practical problems appearing in different sections of science and engineering. More precisely, the objectives are:

- To introduce effective mathematical tools for the Numerical Solutions algebraic and transcendental equations.
- To enable young technocrats to acquire mathematical knowledge to understand Laplace transformation, Inverse Laplace transformation and Fourier Transform which are used in various branches of engineering.
- To acquaint the student with mathematical tools available in Statistics needed in various field of science and engineering.

Module 1: Numerical Methods – 1: (8 hours): Solution of polynomial and transcendental equations – Bisection method, Newton-Raphson method and Regula-Falsi method. Finite differences, Relation between operators, Interpolation using Newton's forward and backward difference formulae. Interpolation with unequal intervals: Newton's divided difference and Lagrange's formulae.

Module 2: Numerical Methods – 2: (6 hours): Numerical Differentiation, Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8 rules. Solution of Simultaneous Linear Algebraic Equations by Gauss's Elimination, Gauss's Jordan, Crout's methods, Jacobi's, Gauss-Seidal, and Relaxation method.,

Module 3: Numerical Methods – 3: (10 hours): Ordinary differential equations: Taylor's series, Euler and modified Euler's methods. RungeKutta method of fourth order for solving first and second order equations. Milne's and Adam's predictor-corrector methods. Partial differential equations: Finite difference solution two dimensional Laplace equation and Poission equation, Implicit and explicit methods for one dimensional heat equation (Bender-Schmidt and Crank-Nicholson methods), Finite difference explicit method for wave equation.

Module 4: Transform Calculus: (8 hours): Laplace Transform, Properties of Laplace Transform, Laplace transform of periodic functions. Finding inverse Laplace transform by different methods, convolution theorem. Evaluation of integrals by Laplace transform, solving ODEs by Laplace Transform method, Fourier transforms.

Module 5: Concept of Probability: (8 hours): Probability Mass function, Probability Density Function, Discrete Distribution: Binomial, Poisson's, Continuous Distribution: Normal Distribution, Exponential Distribution.

Textbooks/References:

1. P. Kandasamy, K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand & Company, 2nd Edition, Reprint 2012.
2. S.S. Sastry, Introductory methods of numerical analysis, PHI, 4th Edition, 2005.
3. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
4. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2010.
5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
6. Veerarajan T., Engineering Mathematics, Tata McGraw-Hill, New Delhi, 2008.
7. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 (Reprint).
8. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
9. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968. Statistics

Rajiv Gandhi Proudyogiki Vishwavidyalaya, Bhopal

New Scheme Based On AICTE Flexible Curricula

Civil Engineering, III-Semester

CE302 Construction Materials

UNIT-I

Stones, Brick, Mortar and Concrete:

Stones :Occurrence, Classification of Rocks, varieties, Characteristics and their testing, uses, quarrying and dressing of stones, Deterioration of Stones, Retardation of Decay of Stones, Preservation of Stones, Artificial Stones.

Brick : Manufacturing , characteristics, Classification and uses, Improved brick from inferior soils, Hand molding brick table, Clay-fly ash brick table

Concrete : Ingredients, Grades of Concrete ,Concrete Production ,Special Concrete

UNIT-II

Timber ,Glass , Steel and Aluminium :

Timber: Important timbers, their engineering properties and uses, defects in timber, seasoning and treatment, need for wood substitutes, ,Plywood, Particle Board ,Fibre Board, Applications of wood and wood products , Plaster Boards, Adhesives, types of Gypsum Board and their uses

Glass: What is glass , Nature of Glass, Structure of Glass, Macro Molecular Structure, Main Oxides in Glass, Thermal and Optical Properties ,Effect of Coating,

Steel : Physical Properties of Structural Steel, Grades of Steel

Aluminium : Properties ,Forms ,Uses, Advantages

UNIT-III

Flooring , Roofing ,Plumbing and Sanitary Material:

Flooring and Roofing tiles , Types of Flooring – Marble, Kota stone , wood etc. Type of Roofing , P.V.C. materials, CI , GI, Asbestos pipe , Stone ware pipes

UNIT-IV

Paints, Enamels and Varnishes:

Composition of oil paint, characteristic of an ideal paint, preparation of paint, covering power of paints, Painting: Plastered surfaces, painting wood surfaces, painting metal Surfaces. Defects, Effect of weather, enamels, distemper, water wash and colour wash, Varnish, French Polish, Wax Polish

UNIT-V

Miscellaneous Construction Materials:

Bitumen, Tar and Asphalt their characteristics and uses ,Ultra Poly Vinyl chloride Pipes, Thermal and sound insulating materials, and water proofing materials .

References Books:

1. Donald R Askeland, Pradeep P Fulay, Wendelin J Wright, The science and Engineering of Materials, Cengage Learning.
2. S K Duggal, Building Materials, New Age International.
3. P C Vaghese, Building Materials, PHI Learning.
4. S.C. Rangwala, Engineering Materials, Charotar.
5. M S Shetty, Concrete Technology, S. Chand Technical.
6. A M Neville, J J Brooks, Concrete Technology, Prentice Hall.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Civil Engineering, III-Semester

CE303 Surveying

UNIT-I

Surveying & Levelling :

Basic Definitions of Surveying, Principles , Classification of surveying ,Methods of Linear Measurement Ranging , Accessories for linear measurement ,Chain Surveying , Compass Surveying , Plane Table Surveying ,Correction and Errors Definition of Levelling , types of levelling operations ,Principles , Problems , Computation of Area and Volumes

Unit –II

Theodolite Traversing:

Types, Temporary Adjustment ,latitude & Departure ,plotting & Adjustment ,Omitted Measurements EDM , Trigonometric Levelling

Unit-III

Tacheometry:

Tachometric systems and principles, stadia system, uses of analytic lens, tangential system, subtense system, instrument constant, field work reduction, direct-reading tacheometer , use of tacheometry for traversing and contouring.

Unit-IV

Curves:

Classification and use; elements of circular curves, calculations, setting out curves by offsets and by theodolites, compound curves, reverse curves, transition curves, vertical curves, setting out.

Unit-V

Hydrographic Survey:

Soundings, methods of observations, computations and plotting. Principles of photographic surveying: aerial photography, tilt and height distortions, Setting out works

REFERENCES

1. B.C Punmia , Surveying Vol-II & III ,Laxmi Publication.
2. S.K. Duggal, Surveying Vol. II McGraw Hill Publishing Company Ltd.
3. Saikia MD, Das BM, Das MM, Surveying, McGraw hill
4. T.P. Kanetkar and S.V. Kulkarni Surveying and Leveling-Part-I & II , Pune VidyarthiGrihaPrakashan, Pune.

5. Gopi A, Satikumar R- Advance surveying, Pearson
6. Remote Sensing and image interpretation by Lillesand T.M. and Kiefer R.W.
7. R.Agor, Advance Surveying ,Khanna Publisher
8. Chandra AM, Higher Surveying, New Age International, new Dwlhi
9. Bhavikatti SS, Surveying and Levelling Vol. II, I.K International
10. Venkatramaiah, Surveying, University Press, Mumbai
11. BhattaBasudeb, , Remote Sensing and GIS, Oxford, New Delhi.
12. Subramanian, Surveying &levelling, Oxford, New Delhi.
13. Joseph George Fundamentals of Remote Sensing

New Scheme Based On AICTE Flexible Curricula

Civil Engineering, III-Semester

CE304 Building Planning & Architecture

UNIT-I

Drawing of Building Elements- Drawing of various elements of buildings like various types of footing, open foundation, raft, grillage, pile and well foundation, Drawing of frames of doors, window, various types of door, window and ventilator, lintels and arches, stairs and staircase, trusses, flooring, roofs etc.

UNIT-II

Building Planning- Classification of buildings, Provisions of National Building Codes and Rules, Building bye-laws, open area, Setbacks, FAR terminology, Design and drawing of Building, Design concepts and philosophies, Preparing sketch plans and working drawings of various types of buildings like residential building, institutional buildings and commercial buildings, site plans, presentation techniques, pictorial drawings, perspective and rendering, model making, introduction to computer aided design and drafting, Applying of principle of architectural composition (i.e. unity, contrast, etc.), Principles of planning, orientation in detailed drawings.

UNIT-III

Building Services- Introduction of Building Services like water supply, sewerage and drainage systems, sanitary fittings and fixtures, plumbing systems, principles of internal & external drainage systems, principles of electrification of buildings, intelligent buildings, elevators & escalators their standards and uses, air-conditioning systems, fire-fighting systems, building safety and security systems, ventilation and lightening and staircases, fire safety, thermal insulation, acoustics of buildings.

UNIT-IV

Principles of architectural design- Definition of architecture, factors influencing architectural development, characteristics features of style, historic examples, creative principles.

Principles of architectural composition– Unity, balance, proportion, scale, rhythm, harmony, Accentuation and contrast.

Organising principles in architecture– Symmetry, hierarchy, axis, linear, concentric, radial, and asymmetric grouping, primary and secondary masses, Role of colour, texture, shapes/ forms in architecture.

Architectural space and mass, visual and emotional effects of geometric forms, space activity and tolerance space. Forms related to materials and structural systems.

Elements of architecture : Functions – Pragmatic utility, circulatory function, symbolic function, Physiological function. Structure – Physical structure, Perceptual structure. Space in architecture Positive and negative space. Aesthetics: Visual perception. Protective: Protection from climate and other elements, architecture a part of the environment. Comfort factors.

UNIT-V

Perspective Drawing and Town Planning- Elements of perspective drawing involving simple problems, one point and two point perspectives, energy efficient buildings.

Concepts of master plan, structure plan, detailed town planning scheme and action plan, estimating future needs - planning standards for different land use, allocation for commerce, industries, public amenities, open areas etc., planning standards for density distributions, density zones, planning standards for traffic network, standard of roads and paths, provision for urban growth, growth models, plan implementation, town planning legislation and municipal acts, panning of control development schemes, urban financing, land acquisition, slum clearance schemes, pollution control aspects

References Books:

1. Shah, Kale & Patki; Building Design and Drawing; TMH
2. Malik & Meo; Building Design and Drawing
3. W B McKay, Orient Blackswan Building Construction Vol 1 -4, Pearson
4. Gurucharan Singh and Jagdish Singh, Building Planning, Designing and Scheduling, Standard Publishers Distributors.
5. Layal JS, Dongre A, Building Design and Drawing, Satya Prakashan
6. Ghose D.N., Civil Engineering Design and Drawing, CBS publisher
7. Das B M, Principles of Foundation Engineering, Cengage Learning.
8. Agrawal S. C., Architecture and Town Planning, Dhanpat Rai & Co.
9. S.C. Rangwala, Town Planning, Charotar Publishing House.
10. Lewis Keeble, Principles and Practice of Town and Country Planning.
11. Rame Gouda, Principles & Practices of Town Planning, University of Mysore, Manasa Gangotri.

List of Experiments

1. Sketches of various building components.
2. Drawing of various building components containing doors, windows ventilators, lintels and arches stairs foundations etc.
3. Drawings for services and interiors of buildings.
4. Drawings containing detailed planning of one/two bed room residential building (common to all student)
5. Drawing of residential and institutional building (Each student performs a different drawing).
6. Use of Auto CAD for preparation of drawings.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

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Civil Engineering, III-Semester

CE305 Strength of Materials

UNIT I

Simple Stress and Strains: Concept of Elastic body stress and Strain, Hooke's law, Various types of stress and strains, Elastic constants, Stresses in compound bars, composite and tapering bars, Temperature stresses. Complex Stress and Strains- Two dimensional and three dimensional stress system. Normal and tangential stresses, Principal Planes, Principal Stresses and Strains, Mohr's circle of stresses.

UNIT II

Bending and Shearing Stresses: Theory of simple bending, Concept of pure bending and bending stress, Equation of bending, Neutral axis, Section-Modulus, Differential equation of the elastic curve, Determination of bending stresses in simply supported, Cantilever and Overhanging beams subjected to point load and uniformly distributed loading, Bending stress distribution across a section of beam, Shearing Stress and shear stress distribution across a section in Beams.

UNIT III

Determination of Slope and Deflection of beams by Double Integration Method, Macaulay's Method, Area Moment Method, Conjugate Beam Method, and Strain Energy Method, Castiglione's Method, and Unit Load Method.

UNIT IV

Columns and Struts: Theory of columns, Slenderness ratio, Direct and bending stresses in short columns, Kern of a section. Buckling and stability, Euler's buckling/crippling load for columns with different end conditions, Rankin's formula, Eccentric loads and the Secant formula- Imperfections in columns. Thin Pressure Vessels: cylinders and spheres. Stress due to internal pressure, Change in diameter and volume. Theories of failure.

UNIT V

Torsion of Shafts: Concept of pure torsion, Torsion equation, Determination of shear stress and angle of twist of shafts of circular section, Torsion of solid and hollow circular shafts, Analyses of problems based on combined Bending and Torsion. Unsymmetrical Bending: Principal moment of Inertia, Product of Inertia, Bending of a beam in a plane which is not a plane of, symmetry. Shear center; Curved beams: Pure bending of curved beams of rectangular, circular and trapezoidal sections, Stress distribution and position of neutral axis.

Reference books:

1. Punmia B.C., Mechanics of Materials, Laxmi Publications (P) Ltd.
2. S.S Bhavikaati, Strength of Materials, Vikas Publisher, new Delhi
3. Rajput R. K., Strength of Materials, S. Chand.
4. S. Ramamrutham, R. Narayanan, Strength of Materials, Dhanpat Rai Publications.
5. R. Subramaniam, Strength of Materials, Oxford University Press.
6. Sadhu Singh, Strength of Material, Khanna Publishers
7. Mubeen A, Mechanics of solids, Pearsons

8. D.S PrakashRao, Strength of Material , University Press , Hyderabad
9. Debrath Nag, Strength of Material , Wiley
10. Jindal , Strength of Material , Pearsons.
11. Bansal R.K, Strength of Materials, Laxmi Publisher, New Delhi.
12. Nash, W.A., Strength of Materials, Mcgraw hills, New Delhi.
13. Chandramouli, Strength of Materials, PHI learning
14. Dongre A.P., Strength of Materials, Scitech, Chennai
15. Negi L. S ,Strength of Materials, McGraw Hill Professional.
16. Raj Puroshattam, Strength of Material , Pearsons
17. J.M. Gere,,J. G. Barry Mechanics of Material, Cengage Learning

List of Practical

1. Study of Universal testing machine
2. To determine the compressive and tensile strength of materials.
3. To determine the Brinell hardness of materials.
4. To determine the Rockwell hardness of materials
5. To determine the toughness of the materials.
6. To determine the stiffness of the spring.
7. To determine the deflection of beam by the use of deflection-beam apparatus.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Civil Engineering, III-Semester

CE306 Study of Historical & Ancient Civil Engineering Practices

Course Objective- To understand study the various aspects of civil engineering practices in ancient and historical structures.

Course Contents – 1. General Study of ancient monuments e.g. Forts, Bridges, Buildings and various other civil engineering related structures.
2. Environmental practices adopted in construction of historical structure during ancient/medieval period.
3. Construction techniques and materials used in historical structures.
4. Various planning aspects adopted in historical structures.
5. Visit of various historical structures and museums to understand history of civil engineering practices.

List of Practicals:-

1. Detailed study report on various aspects e.g. environmental practices, constructions techniques and materials, planning etc. of any one important ancient structure alongwith relevant sketches/drawings etc. and its presentation before departmental committee.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Civil Engineering, V-Semester

CE- 5001 Transportation Engineering

Unit I

Railway: Introduction, Tractive resistances & Permanent way: Principles of Transportation, transportation by Roads, railways, Airways, Waterways, their importance and limitations, Route surveys and alignment, railway track, development and gauges, Hauling capacity and tractive effort. i) Rails: types, welding of rails, wear and tear of rails, rail creep. ii) Sleepers: types and comparison, requirement of a good sleeper, sleeper density. iii) Rail fastenings: types, Fish plates, fish bolts, spikes, bearing plates, chain keys, check and guard rails. iv) Ballast: Requirement of good ballast, various materials used as ballast, quantity of ballast, different methods of plate laying, material trains, calculation of materials required, relaying of track

Unit II

Railway: Geometric Design; Station & Yards; Points and Crossings & Signaling and interlocking: Formation, cross sections, Super elevation, Equilibrium, Cant and Cant deficiency, various curves, speed on curves. Types, locations, general equipment, layouts, marshaling yards, Definition, layout details, design of simple turnouts, Types of signals in stations and yards, principles of signaling and inter-locking.

Unit-III

Bridges: Site Investigation and Planning; Loading Standards & Component parts: Selection of site, alignment, collection of bridge design data: essential surveys, hydraulic design, scour, depth of bridge foundation, Economical span, clearance, afflux, type of road & railway bridges. : Design loads and forces, Impact factor, Indian loading standards for Railways Bridges and Highway Bridges, Bridge super structure and sub-structures, abutments, piers, wing walls, return walls, approaches, floors & flooring system, choice of super structure. Bridge Foundations, Construction, Testing and Strengthening of Bridges : Different types of foundation: piles and wells, sinking of wells, coffer-dams. Choice of bridges and choice of materials, details of construction underwater and above water, sheet piles coffer dams, Erection of bridges, girders, equipments and plants. inspection and Data collection, strengthening of bridges, Bridge failure.

Unit-IV

Tunnels: 1. Selection of route, Engineering surveys, alignment, shape and size of tunnel, bridge action, pressure relief phenomenon, Tunnel approaches, Shafts, pilot shafts 2, Construction of tunnels in soft soil, hard soil and rock, Different types of lining, methods of lining, Mucking operation, Drainage and ventilation, Examples of existing important tunnels in India and abroad.

UNIT-V

Harbours and Docks: Types of Harbours; Harbours - layouts, shipping lanes, anchoring, location identification; Littoral transport with erosion and deposition; sounding methods; Dry and Wet docks, components and operational Tidal data and analyses. Inland waterways: advantages and disadvantages; Development in India. Inland water operation.

Reference

- 1.Chakraborty and Das; Principles of transportation engineering; PHI*
- 2.Rangwala SC; Railway Engineering; Charotar Publication House, Anand*
- 3.Rangwala SC; Bridge Engineering; Charotar Publication House, Anand*
- 4.Ponnuswamy; Bridge Engineering; TMH*
- 5.Railway Engineering by Arora & Saxena - Dhanpat Rai & Sons*
- 6.Railway Track by K.F. Antia*
- 7.Principles and Practice of Bridge Engineering S.P. Bindra - Dhanpat Rai & Sons*
- 8.Bridge Engineering - J.S. Alagia - Charotar Publication House, Anand*
- 9.Railway, Bridges & Tunnels by Dr. S.C. Saxena*
- 10.Harbour, Docks & Tunnel Engineering - R. Srinivasan*
- 11.Essentials of Bridge Engg. By I.J. Victor; Relevant IS & IRS codes*

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Civil Engineering, V-Semester

CE 5002 – Quantity surveying & Costing

Unit – I

Introduction: Purpose and importance of estimates, principles of estimating. Methods of taking out quantities of items of work. Mode of measurement, measurement sheet and abstract sheet; bill of quantities. Types of estimate, plinth area rate, cubical content rate, preliminary, original, revised and supplementary estimates for different projects.

Unit – II

Rate Analysis: Task for average artisan, various factors involved in the rate of an item, material and labour requirement for various trades; preparation for rates of important items of work. Current schedule of rates. (C.S.R.)

Unit – III

Detailed Estimates: Preparing detailed estimates of various types of buildings, R.C.C. works, earth work calculations for roads and estimating of culverts Services for building such as water supply, drainage and electrification.

Unit – IV

Cost of Works: Factors affecting cost of work, overhead charges, Contingencies and work charge establishment, various percentages for different services in building. Preparation of DPR.

Unit – V

Valuation: Purposes, depreciation, sinking fund, scrap value, year's purchase, gross and net income, dual rate interest, methods of valuation, rent fixation of buildings.

Suggested Books:

1. Quantity Surveying & Costing – B.N. Datta
2. Estimating & Costing for Civil Engg. – G.S. Birdi
3. Quantity surveying & costing – Chakraborty
4. Estimating & Costing – S.C. Rangawala

Practical & Sessional Works:

1. Preparation of detailed estimate.
2. Detailed estimate for services of plumbing and water supply or Electrification work.
3. Detailed estimate for earth work for the road construction or arched culvert.
4. Rate analysis for at least 8 items of construction.
5. Preparation of DPR of Civil Engineering Project.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Civil Engineering, V-Semester

CE 5003 –Structural Analysis –II

Unit. I

Moment distribution method in analysis of frames with sway, analysis of box frames, analysis of portals with inclined members, analysis of beams and frames by Kani's method.

Unit. II

Plastic analysis of beams and frames.

Unit. III

Analysis of tall frames, wind and earthquake loads, codal provisions for lateral loads. Approximate analysis of multistory frames for vertical and lateral loads.

Unit. IV

Matrix method of structural analysis: force method and displacement method.

Unit. V

Influence lines for intermediate structures, Muller Breslau principle, Analysis of Beam-Columns.

Reference Books :-

1. Wang C.K. Intermediate structural analysis, McGraw Hill, New York.
2. Kinney Streling J. Indeterminate structural Analysis, Addison Wesley.
3. Reddy C.S., Basic Structural Analysis, Tata McGraw Hill Publishing Company, New Delhi.
4. Norris C.H., Wilbur J.B. and Utkys. Elementary Structural Analysis, McGraw Hill International, Tokyo.
5. Weaver W & Gere JM, Matrix Methods of Framed Structures, CBS Publishers & Distributors, Delhi

List of experiments:

- (1) To verify the Betti's law.
- (2) Study of a three hinged arch experimentally for a given set of loading and to compare the results with those obtained analytically.
- (3) To obtain experimentally the influence line diagram for horizontal thrust in a three hinged arch and to compare the same with the theoretical value.
- (4) To determine the flexural rigidity of a given beam.
- (5) To study the behavior of different type of struts.
- (6) To verify moment area theorem for slopes and deflection of a beams.

W.E.F. July 2017

Academic Session 2017-18

- (7) To find the deflection of a pin-connected truss and to verify the results by calculation and graphically.
- (8) To determine the carry over factors for beam with rigid connections.
- (9) To determine the rotational stiffness of a beam when far end is (a) fixed (b) pinned.
- (10) Determine experimentally the horizontal displacement of the roller end of a two hinged arch for a given set of a loading and to compare the results with those obtained analytically.
- (11) To obtain experimentally the influence line diagram for horizontal thrust in a two hinged arch and to compare the same with the theoretical value.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Civil Engineering, V-Semester

CE- 5004 Construction Material & Techniques

A) Construction Materials:

Unit-I

Stones : Occurrence, varieties, Characteristics and their testing, uses, quarrying and dressing of stones. **Timber :** Important timbers, their engineering properties and uses, defects in timber, seasoning and treatment, need for wood substitutes, Alternate materials for shuttering doors/windows, Partitions and structural members etc. **Brick and Tiles:** Manufacturing, characteristics, Classification and uses, Improved brick from inferior soils, Hand molding brick table, Clay-fly ash brick table, Flooring tiles and other tiles and their characteristics.

Unit-II

Advance Construction Materials : Use of fly ash in mortars, concrete, Fly ash bricks, stabilized mud blocks, non-erodible mud plinth, D.P.C. materials, Building materials made by Industrial & agricultural waste, clay products P.V.C. materials, advance materials for flooring, doors & windows, facia material, interiors materials for plumbing, sanitation & electrification.

(B) Construction Techniques:

Unit-III

Foundation: Type of soils, bearing capacity, soil stablisation and improvement of bearing capacity, settlement and safe limits. Spread foundations, wall footings, grillage, foundations well foundation, causes of failure and remedial measures; under reamed piles, foundation on shrinkable soils, black cotton soil, timbering for trenches, dewatering of foundations. Hyperbolic parabolied footing, Brick arch foundation. Simple methods of foundation design, Damp proof courses, Repairs Techniques for foundations.

Unit-IV

Masonry and Walls : Brick masonry, Bonds, Jointing, Stone masonry, casting and laying, masonry construction, Brick cavity walls, code provisions regarding load bearing and non load bearing walls. Common defects in construction and their effect on strength and performance of walls, designed Brick masonry, precast stone masonry block, Hollow concrete block, plastering and pointing, white and color washing, distempering, dampness and its protection, Design of hollow block masonry walls. **Doors, Windows and Ventilators:** Types based on material etc., size location, fittings, construction sunshades, sills and jambs,

RCC doors/windows frames. Stairs types, rule of proportionality etc., Repairs techniques for masonry, walls, doors & windows.

Unit-V

Floors and Roofs : Types, minimum thickness, construction, floor finishes, Flat roofs, RCC jack arch, reinforced brick concrete, solid slab and timber roofs, pitched roofs, false ceiling, roof coverings, Channel unit, cored unit, Waffle unit, Plank and Joist, Brick panel, L-Panel, Ferrocement roofing units, water proofing .Services : Water supply & Drainage, Electrification, Fire protection, thermal insulation, Air Conditioning, Acoustics & Sound insulation, Repairs to damaged & cracked buildings, techniques and materials for low cost housing., Repairs techniques for floors & roofs.

References:

Grading IVth Semester w.e.f.2011-12

1. Mohan Rai & M.P. Jai Singh; Advance in Building Materials & Construction,.
2. S.C. Rangwala; Engineering Materials
3. Sushil Kumar; Building Construction,
4. B.C. Punmia; Building Construction ,.
5. Building Construction, Metchell
6. Construction Technology, Chudley R.
7. Civil Engineering Materials, N. Jackson.
8. Engineering Materials, Surendra Singh.

List of Experiments:

1. Tests on Bricks
2. Tests on Aggregates
3. Tests on Cement
4. Determination of workability by compacting factor apparatus.
5. Determination of workability by Vee Bee consistometer.
6. Tests on fine aggregate.
7. Design & drawing of various Building elements.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Civil Engineering, V-Semester

Elective – I CE- 5005 (1) Water Resources Engineering

Unit - I

Irrigation water requirement and Soil-Water-Crop relationship: Irrigation, definition, necessity, advantages and disadvantages, types and methods. Irrigation development. Soils - types and their occurrence, suitability for irrigation purposes, wilting coefficient and field capacity, optimum water supply, consumptive use and its determination. Irrigation methods surface and subsurface, sprinkler and drip irrigation. Duty of water, factors affecting duty and methods to improve duty, suitability of water for irrigation, crops and crop seasons, principal crops and their water requirement, crop ratio and crop rotation, intensity of irrigation.

Unit - II

Ground Water and Well irrigation:

Confined and unconfined aquifers, aquifer properties, hydraulics of wells under steady flow conditions, infiltration galleries. Ground water recharge-necessity and methods of improving ground water storage. Water logging-causes, effects and its prevention. Salt efflorescence causes and effects. reclamation of water logged and salt affected lands. Types of wells, well construction, yield tests, specific capacity and specific yield, advantages and disadvantages of well irrigation.

Unit-III

Hydrology : Hydrological cycle, precipitation and its measurement, recording and non recording rain gauges, estimating missing rainfall data, rain gauge net works, mean depth of precipitation over a drainage area, mass rainfall curves, intensity-duration curves, depth-area duration curves, Infiltration and infiltration indices, evaporation stream gauging, run off and its estimation, hydrograph analysis, unit hydrograph and its derivation from isolated and complex storms, S-curve hydrograph, synthetic unit hydrograph.

Unit - IV

Canals and Structures: Types of canals, alignment, design of unlined and lined canals, Kennedy's and Lacey's silt theories, typical canal sections, canal losses, lining-objectives, materials used, economics. Introductions to Hydraulic Structures viz. Dams, Spillways, Weirs, Barrages, Canal Regulation Structures.

Unit-V

Floods: Types of floods and their estimation by different methods, probability and frequency analysis, flood routing through reservoirs and channels, flood control measures, economics of flood control,

Suggested Books :-

1. Irrigation & Water Power Engg. by Punmia & Pandey B.B.Lal
2. Engg. Hydrology by K. Subhramanya - Tata Mc Graw Hills Publ. Co.
3. Engg. Hydrology - J.NEMEC - Prentice Hall
4. Hydrology for Engineers Linsley, Kohler, Paulnus - Tata Mc.Graw Hill.
5. Hydrology & Flood Control by Santosh Kumar - Khanna Publishers
6. Engg. Hydrology by H.M. Raghunath

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Civil Engineering, V-Semester

Elective – I CE- 5005 (2) Construction Planning & Management

Unit -I

Preliminary and detailed investigation methods: Methods of construction, form work and centering. Schedule of construction, job layout, principles of construction management, modern management techniques like CPM/PERT with network analysis.

Unit -II

Construction equipments: Factors affecting selection, investment and operating cost, output of various equipments, brief study of equipments required for various jobs such as earth work, dredging, conveyance, concreting, hoisting, pile driving, compaction and grouting.

Unit -III

Contracts: Different types of controls, notice inviting tenders, contract document, departmental method of construction, rate list, security deposit and earnest money, conditions of contract, arbitration, administrative approval, technical sanction.

Unit -IV

Specifications & Public Works Accounts: Importance, types of specifications, specifications for various trades of engineering works. Various forms used in construction works, measurement book, cash book, materials at site account, imprest account, tools and plants, various types of running bills, secured advance, final bill.

Unit-V

Site Organization & Systems Approach to Planning: Accommodation of site staff, contractor's staff, various organization charts and manuals, personnel in construction, welfare facilities, labour laws and human relations, safety engineering. Problem of equipment management, assignment model, transportation model and waiting line modals with their applications, shovel truck performance with waiting line method.

Reference Books :-

1. Construction Equipment by Peurify
2. CPM by L.S. Srinath
3. Construction Management by S. Seetharaman
4. CPM & PERT by Weist & Levy
5. Construction, Management & Accounts by Harpal Singh
6. Tendering & Contracts by T.A. Talpasai

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Civil Engineering, V-Semester

Elective – I CE- 5005 (3) Environmental Engineering

Unit I: Estimation of Water Quality and Population forecasting

Estimation of ground and surface water resources. quality of water from different sources, demand & quantity of water, fire demand, water requirement for various uses, fluctuations in demand, forecast of population.

Unit – II: Design of Sewer

Introduction of Water and Waste water. Estimation of Sewage Discharge. Design periods. Hydraulic Design of Sewers. Sewer Construction, Sewer Appurtenances. Intake structure, conveyance of water, pipe materials, pumps - operation & pumping stations

Unit III: Quality of water and Wastewater

Qualities of water and wastewater and their significance, Impurities of water and their significance, water-borne diseases, physical, chemical and bacteriological analysis of water and wastewater, water and wastewater standards for different uses.

Unit – IV : Treatment of Water

Water Treatment methods- theory and design of sedimentation, coagulation, filtration, disinfection, aeration & water softening, modern trends in sedimentation & filtration, miscellaneous methods of treatment. Layout and hydraulics of different distribution systems.

Unit – V : Treatment of Waste Water

Wastewater Treatment Technologies. Screening, Grit Chamber, Skimming Tank, Sedimentation, Sedimentation with Coagulation, Biological Filtration treatment of sewage. Oxidation Pond/ditch, Activated Sludge Process, Sludge Blanket Reactor.

Suggested Books and Reading Materials:-

1. Water Supply and Waste Water Engineering by B. C. Punmia - Laxmi Publications (P) Ltd. New Delhi
2. Water Supply & Sanitary Engg. by G.S. Birdi - Laxmi Publications (P) Ltd. New Delhi
3. Water & Waste Water Technology by Mark J. Hammer - Prentice - Hall of India, New Delhi
4. Environmental Engineering - H.S. Peavy & D.R. Rowe - Mc Graw Hill Book Company, New Delhi
5. Water Supply & Sanitary Engg. by S. K. Husain
6. Water & Waste Water Technology - G.M. Fair & J.C. Geyer
7. Sewage Disposal and Air pollution Engineering by S. K. Garg Khanna Publishers.
7. Relevant IS Codes .

W.E.F. July 2017

Academic Session 2017-18

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Civil Engineering, V-Semester

Elective – I CE- 5005 (4) Advance Fluid Mechanics

Unit-I: Water Power

Introduction. Sources of Energy. Status of Power in the world. Hydro Power. Place of Hydro Power in a power System. Transmission voltages and Hydro-Power. Estimation of Water Power Potential.

Unit-II: River Hydro-Power Plant

Types of Hydro Power plants. Runoff River Plants. Valley Dam Plants. Diversion Canal Plants. High Head Diversion. Storage and Pondage.

Unit-III: Pumped Storage Power Plant

Introduction of Pumped Storage power plants. Types of Pumped Storage plants. Advantages and disadvantages of pumped Storage power plants. Two unit and three unit arrangement. Reservoir and water conveyance.

Unit-IV: Hydraulic Machines –Centrifugal Pumps

Introduction of Centrifugal pump. Centrifugal pumps : Various types and their important components. Working principle of pump. Priming of a pump. Characteristic Curves of a centrifugal pump. Velocity triangle of centrifugal pump.

Unit V: Hydraulic Machines -Reciprocating pumps

Reciprocating pumps: Principle of working, Coefficient of discharge, slip, single acting and double acting pump, Manometric head, Acceleration head.

Suggested Books & Study Material:

1. Water Power Engineering – M M Dandekar and K N Sharma; Vikas Publishing House PVT LTD.
2. Fluid Mechanics - A.K. Jain - Khanna Publisher s, Delhi
3. Fluid Mechanics, Hydraulics & Hydraulic Machanics - K.R. Arora - Standard Publishers Distributors 1705- B, Nai Sarak, Delhi-6
4. Centrifugal & Axial Flow Pump By Stemanoff A.J. New York

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Civil Engineering, V-Semester

CE-5006 Civil Engineering Software Lab

Auto CAD

Laboratory Works/ Exercises

1. Introduction to tools of Auto CAD.
2. Formation of Layers
3. Draw Orthographic Drawings
4. Draw Isometric Drawings
5. Draw Perspective Drawings.
6. Scale setting & Plotting.
7. Drawing Plan of a building in Auto CAD
8. Drawing Section and Elevation of a building in Auto CAD
9. Section and Elevation of a building in Auto CAD
10. Detailing of building components like Doors, Windows, Roof Trusses

RAJIV GANDHI PROUDYOGIKI VISHWA VIDYALAYA, BHOPAL

Credit Based Grading System

Civil Engineering, VII-Semester

CE-7001 Advance Structural Design –I (RCC)

For credits & marks refer scheme

Unit - I

Design of Multistory Buildings - Sway and non-sway buildings, shear walls and other bracing elements.

Unit - II

Earth Retaining Structures: Cantilever and counter fort type retaining walls.

Unit - III

Water Tanks: Tanks on ground and underground tanks: square, rectangular, circular tanks, overhead tanks: circular and intze tanks.

Unit - IV

Silos and Bunkers: Introduction, design of rectangular, square and circular bunkers, design of silos by Airy's theory and Janssen's theory.

Unit - V

T-beam & Slab bridges- for highway loading (IRC Loads). Prestressing concepts materials, systems of prestressing & losses. Introduction to working and limit state design.

Reference books :

1. R.C.C. by O.P. Jain Vol. II
2. R.C.C. by B.C. Punmia
3. Essentials of Bridge Engineering – D.J. Victor
4. Bridge Engineering - Ponnuswamy
5. Advanced R.C.C. Design by N.K. RAJU
6. N.KrishnaRaju, Prestressed Concrete, Tata McGraw Hill, New Delhi.
7. Pre stresses concrete – T.Y. Lin

Relevant IS codes

Practical work:

The detailed design and drawing of various structural components given below as per the syllabus:

1. Design of multistory buildings (sway and non-sway buildings), shear walls and other bracing elements.

2. Cantilever and counterfort type of retaining walls
3. Water tanks: underground and on ground tanks (square, rectangular, circular), overhead tanks and intze tanks
4. Silos (rectangular, square and circular)
5. Bunkers (rectangular, square and circular)
6. T-beam
7. Slab bridges for highway as per IRC loading
8. Prestressed concrete members

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Credit Based Grading System

Civil Engineering, VII-Semester

CE-7002 Structural Design –II (Steel)

Unit I

Various loads and mechanism of the load transfer, partial load factors, structural properties of steel, Design of structural connections - bolted, riveted and welded connections.

Unit II

Design of compression members, tension members, roof trusses - angular & tubular, lattice girders.

Unit III

Design of simple beams, built-up beams, plate girders and gantry girders.

Unit IV

Effective length of columns, design of columns - simple and compound, lacings and battens. Design of footings for steel structures, grillage foundation.

Unit V

Design of industrial building frames, multistory frames, bracings for high rise structures, design of transmission towers.

NOTE: - All the designs for strength and serviceability should strictly be as per the latest version of IS:800.

References books

- i) Design of steel structures by Arya & Azmani Nemchand & Bros, Roorkee
- ii) Design of steel structures by P. Dayaratnam
- iii) Design of steel structures Vol. I & II by Ramchandra
- iv) Design of steel structures by L.S. Negi
- v) Design of steel structures by Ramammutham
- vi) Design of steel structures by Punmia
- vii) Design of steel structures – N. Subramanian
- viii) Relevant IS codes

Practical work:

The detailed design and drawing of various structural components given below as per the syllabus:

1. Riveted and welded connections
2. Design of compression
3. Design of tension members
4. Design of simple and compound beams
5. Design of lattice girder

6. Design of plate girder
7. Design of gantry girder
8. Design of simple and built-up/ compound column with lacing and battens
9. Design of various types of steel footings ex. slab base, gusseted base, grillage footing
10. Design of various types of bracing (as tension or compression members)
11. Design of industrial building frames, multistory frames.
12. Field/site visits.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Civil Engineering, VII-Semester

CE-7003 Modern Construction Technique & Equipment

Unit I Modern Construction Materials: Study of advance building materials like, aluminum, glass, fabric, various types of finishes & treatments, construction chemicals – sealants, engineering grouts, mortars , admixtures and adhesives

Unit II Polymers in civil engineering-structural plastics and composites- polymer membranes-coatings-adhesives, non - weathering materials-flooring and facade materials- glazed brick, photo catalytic cement, acid etched copper and composite fiber metals-metals and special alloys of steel - water jet cut stainless steel, mill slab steel, tension rods assemblies and cast iron, heat treatment in steels, tendons.

Unit III Construction methods: precast flat panel system, 3d volumetric construction, tunnel boring methods, slip form work, precast foundations .fabrication of pre cast and pre stressed components, reinforcing steel: types, bending, placing, splicing and spacing, tendons- soil improvement - mechanical, thermal and chemical.

Unit IV Construction Equipment's: equipment for excavating, dredging, trenching, tunneling, drilling, blasting-equipment for compaction-erection equipment- types of pumps used in construction-equipment for dewatering and grouting-foundation and pile driving equipment , forklifts and related equipment-portable material -conveyors-hauling equipment.

Unit V Smart Materials:concept and types, sensing technology-types of sensors -physical measurement using piezoelectric strain measurement, piezoelectric and electrostrictive material - magneto structure material, shape memory alloys, electro rheological fluids

References Books:

1. Shan Somayaji, Civil Engineering Materials 2nd Edition, Prentice Hall Inc., 2001.
2. Mamlouk M.S. and Zaniewski J.P., Materials for Civil and Construction Engineers, Prentice Hall Inc., 1999.
3. Derucher K., Korfiatis G. and Ezeldin S., Materials for Civil and Highway Engineers ", Prentice Hall Inc., 1999. 4th Edition
4. Peurifoy R.L., Ledbetter W. B.and Schexnayder C.,Construction Planning, Equipment and Methods ", 5th Edition, McGraw Hill, Singapore, 1995.
5. Sharma S.C. Construction Equipment and Management, Khanna Publishers New Delhi, 1988.

6. Deodhar S.V. Construction Equipment and Job Planning, Khanna Publishers, New Delhi, 1988.
7. Mahesh Varma, Construction Equipment and its Planning and Application, Metro-politan Book Company, New Delhi-, 1983
8. Srinivasan A.V and Michael McFarland. D, Smart Structures - Analysis and Design, Cambridge University Press.
9. Mukesh V. Gandhi, Brian S. Thompson, Smart Materials and Structures, Springer,

Practical work:

1. Study of basic properties and tests on modern materials
2. Collect the specification of various modern construction materials and equipment available in market
3. Prepare and give a presentation on any of the topic content in syllabus.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Civil Engineering, VII-Semester

Elective-III CE-7004 (1) Pavement Design

Unit -I.

Equivalent Single Wheel Load (ESWL): Definition, calculation of ESWL, repetition of loads and their effects on the pavement structures.

Unit -II.

Flexible Pavements: Component parts of the pavement structures and their functions, stresses in flexible pavements, Stress distribution through various layers, Boussinesque's theory, Burmister's two layered theory, methods of design, group index method, CBR method, Burmister's method and North Dakota cone method.

Unit -III.

Rigid Pavements: Evaluation of subgrade, Modulus-K by plate bearing test and the test details, Westergaard's stress theory stresses in rigid pavements, Temperature stresses, warping stresses, frictional stresses, critical combination of stresses, critical loading positions.

Unit -IV.

Rigid pavement design: IRC method, Fatigue analysis, PCA chart method, joints, design and construction & types, AASHTO Method, Reliability analysis.

Unit -V.

Evaluation and Strengthening of Existing Pavements: Benkleman beam method, Serviceability Index Method. Rigid and flexible overlays and their design procedures.

Reference Books:-

1. Principles of pavement design by E.J. Yoder & M.W. Witczak
2. AASHTO, "AASHTO Interim Guide for Design of Pavement Structures", Washington, D.C.
3. Portland Cement Association, Guidelines for Design of Rigid Pavements, Washington
4. DSIR, Conc. Roads Design & Construction
5. Srinivasan M. "Modern Permanent Way"

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Credit Based Grading System

Civil Engineering, VII-Semester

Elective-III CE-7004 (2) Marine Construction

1. History of water transportation at world level and at national level development and policy, classification of harbours, natural and artificial. Major ports in India, administrative set up.
2. Harbour Planning: Harbour components, ship characteristics, characteristics of good harbour and principles of harbour planning, size of harbour, site selection criteria and layout of harbours. Surveys to be carried out for harbor planning
3. Natural Phenomena: Wind, waves, tides formation and currents phenomena, their generation characteristics and effects on marine structures, silting, erosion and littoral drift.
4. Marine Structures: General design aspects, breakwaters -function, types general design principles, wharves, quays, jetties, piers, pier heads, dolphin, fenders, mooring accessories –function, types, suitability, design and construction features.
5. Docks and Locks: Tidal basin, wet docks-purpose, design consideration, operation of lock gates and passage, repair docks -graving docks, floating docks.

References books –

1. A COURSE IN DOCS AND HARBOURS: S. P. BINDRA
2. HARBOUR DOCS AND TUNNELIING: R. SRINIVASAN
3. DOC AND HARBOUR ENGINEERING: OZA

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Civil Engineering, VII-Semester

Elective-III CE-7004 (3) Air and Noise Pollution Control

UNIT I: INTRODUCTION TO AIR POLLUTION

Air Pollution, Definition, Air Pollution and Global Climate, Units of measurements of pollutants, Air quality criteria, emission standards, National ambient air quality standards, Air pollution episodes.

UNIT II: SOURCES, CLASSIFICATION AND EFFECTS

Sources and classification of air pollutants, Manmade, Natural sources, Type of air pollutants, Pollution due to automobiles, Analysis of air pollutants. Air pollution and its effects on human beings, plants and animals, Economic effects of air pollution.

UNIT III: AIR QUALITY SAMPLING AND MONITORING

Ambient air sampling, Stack sampling, instrumentation and methods of analysis of gaseous pollutants, Meteorology, legislation for control of air pollution and automobile pollution.

UNIT IV: AIR POLLUTION CONTROL MEASURES

Control equipment, Particulate control methods, Bag house filter, Settling chamber, cyclone separators, inertial devices, Electrostatic precipitator, scrubbers, Control of gaseous emissions, Absorption, Absorption equipment's, adsorption and combustion devices.

UNIT V: NOISE POLLUTION AND ITS CONTROL

Sources of noise, Units and Measurements of Noise, Characterization of Noise from Construction, Mining, Transportation and Industrial Activities, Airport Noise, Noise measuring equipment, Effects of noise pollution, Prevention and control of noise pollution.

References books –

1. C. S. Rao, "Environmental Pollution Control Engineering", Wiley Eastern Limited, 2000.
2. M. N. Rao, H. V. N. Rao, Air pollution, Tata McGraw Hill Pvt. Ltd, New Delhi, 1993.
3. G.K. Nagi, M.K. Dhillon, G.S. Dhaliwal, Commonwealth Publishers, Noise Pollution.
4. S.K. Garg, Khanna publishers, Sewage Disposal and Air Pollution Engineering.
5. S.M. Khopkar, Environmental pollution analysis, New Age International Publis.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Civil Engineering, VII-Semester

Elective-III CE-7004 (4) Cost-Effective & Eco-Friendly Construction

UNIT-I

Concepts of energy efficient & environment friendly materials and techniques:

Cost effective materials: Soil, Fly ash, Ferro-cement, Lime, Fibers, Stone Dust, Red mud, Gypsum, Alternate Wood, Polymer.

Energy Efficient & Environment friendly building material products:

Walls - Stabilized and sun dried, soil blocks & bricks, Solid & Hollow concrete blocks, stone masonry blocks, Ferro cement partitions.

Roofs – Pre-cast R.C. Plank & Joists roof, Pre-cast channel roof, Pre-cast L-panel roof, Pre-cast Funicular shells, Ferro cement shells, Filler Slab, SeasalFibre roof, Improved country tiles, Thatch roof, M.C.R. tile.

Green Materials, Green Buildings – Definition - Features- Necessity – Environmental benefit - Economical benefits - Health and Social benefits - Major Energy efficient areas for buildings – Embodied Energy in Materials

UNIT-II

Cost effective construction techniques and equipments:-

(a)Techniques: Rat trap bond construction, Energy Efficient roofings, Ferro cement technique, Mud Technology.

(b) Equipments: Brick moulding machine, Stabilized soil block making machine and plants for the manufacturing of concrete blocks, M.C.R. tile making machine, Ferro cement wall panel & Roofing channel making machine, R.C.C. Chaukhat making m/c.

UNIT-III

Cost effective sanitation:

(a)Waste water disposal system

(b)Cost effective sanitation for rural and urban areas

(c)Ferrocement Drains

UNIT-IV

Low Cost Road Construction:

Cost effective road materials, stabilization, construction techniques tests, equipment used for construction, drainage, maintenance.

UNIT-V

Cost analysis and comparison:

(a)All experimental materials

(b)All experimental techniques

Green Building rating systems

Reference books:

1. Alternative Building Materials and Technologies – K S Jagadeesh, B V Venkatta Rama Reddy & K S NanjundaRao – New Age International Publishers
2. Integrated Life Cycle Design of Structures – AskoSarja –CRC Press
3. Non-conventional Energy Resources –D S Chauhan and S K Sreevasthava – New Age International Publishers
4. Buildings How to Reduce Cost – Laurie Backer - Cost Ford
5. Lynne Elizabeth, Cassandra Adams Alternative Construction : Contemporary Natural BuildingMethods ”, Softcover, Wiley & Sons Australia, Limited, John,2005
6. Givoni, “Man, Climate, Architecture, Van Nostrand, New York, 1976.
7. Charles J. Kibert, Sustainable Construction: Green Building Design and Delivery,John Wiley & Sons,2005.
8. Eugene Eccli- Low Cost, Energy efficient shelter for owner & builder, Rodale Press, 1976

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Civil Engineering, VII-Semester

Elective-IV CE-7005 (1) Infrastructure Engineering

Unit I

Infrastructure: Definitions of infrastructure, Governing Features, Historical overview of Infrastructure development in India, Infrastructure Organizations & Systems.

Unit II

Infrastructure Planning: Typical infrastructure planning steps, Planning and appraisal of major infrastructure projects, Screening of project ideas, Life cycle analysis, Multi-criteria analysis for comparison of infrastructure alternatives, Procurement strategies, Scheduling and management of planning activities, Infrastructure Project Budgeting and Funding, Regulatory Framework, Sources of Funding.

Unit III

Project Management in Construction: Introduction to project management processes - Initiating, Planning, Executing, Controlling, and Closing processes; Project Integration Management - Project plan development, Project plan execution, and Overall change control; Project Scope Management - Initiation, Scope planning, Scope definition, Scope verification, and Scope change control.

Unit IV

Contracts and Management of Contracts: Engineering contracts and its formulation, Definition and essentials of a contract, Indian Contract Act 1872, types of contracts and clauses for contracts, Preparation of tender documents, Issues related to tendering process, Awarding contract.

Reference books:

1. A. S. Goodman and M. Hastak, Infrastructure planning handbook: Planning, engineering, and economics, McGraw-Hill, New York, 2006.
1. J. Parkin and D. Sharma, Infrastructure planning, Thomas Telford, London, 1999.
2. P. Chandra, Projects: Planning, analysis, selection, financing, implementation, and review, Tata McGraw-Hill, New Delhi, 2009.
3. S. M. Levy, Project management in construction, 5th ed., McGraw Hill, New York, 2007. • PMI, A guide to the project management body of knowledge, 3rd ed., Project Management Institute, Pennsylvania, 1996.
4. M. Mawdesley, W. Askew and M. O'Reilly, Planning and controlling construction projects, Addison Wesley Longman Limited, Essex, 1997.
5. Vasant Desai, "Project Management", Himalaya Publishing, 1st Edition, 2010

6. Ronald W Hudson, "Infrastructure Management: integrating design, Construction, maintenance, rehabilitation and renovation", MGH, 1st Edition, 1997
7. Codes of Practice and Standard Specifications" of AP PWD, CPWD, MES etc.
8. Grig N. S., "Infrastructure Engineering and Management", Wiley-Interseience.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Civil Engineering, VII-Semester

Elective-IV CE-7005 (2) Earthquake Resistant Design

Unit 1 Engineering Seismology

Introduction to engineering seismology, Geological and tectonic features of India, Origin and propagation of seismic waves, Earthquake measurement parameters, Characteristics of earthquake and its quantification- Magnitude and Intensity scales, Seismic instruments. Seismic zoning map of India.

Unit 2 Response Spectrum

Response history and strong motion characteristics. Response Spectrum- elastic and inelastic response spectra, tripartite (D-V-A) response spectrum, use of response spectrum in earthquake resistant design. Computation of seismic forces in multi-storeyed buildings - using procedures as per codal provisions.

Unit 3 Aseismic Structural Modelling

Structural configuration for earthquake resistant design, Concept of plan irregularities and vertical irregularities, Soft storey, Torsion in buildings. Design provisions for these in IS-1893. Effect of infill masonry walls on frames, modeling concepts of infill masonry walls. Behaviour of masonry buildings during earthquakes, failure patterns, strength of masonry in shear and flexure, Slenderness concept of masonry walls,

Unit 4 Design of structure for earthquake resistance

Seismic design philosophy, Load combinations, Ductility and energy absorption in buildings. Confinement of concrete for ductility, design of columns and beams for ductility, ductile detailing provisions as per IS-1893. Lateral load resisting structural systems.

Unit 5 Seismic control of structures

Introduction, concept and types of seismic control systems as active, passive and semi-active systems. Requirements of efficient earthquake resistant structural system, damping devices, base isolation systems. Retrofitting of structures.

Reference Books:

1. Chopra Anil Kumar, Dynamics of Structures - Theory and Application to Earthquake Engineering, Pearson Education.
2. Hosur Vinod, Earthquake Resistant Design of Building Structures, Wiley (India).
3. Duggal, S. K., Earthquake Resistant Design of Structures, Oxford University Press.
4. Agarwal Pankaj, Shrikande Manish, Earthquake resistant design of structures, Prentice Hall of India, New Delhi India.
5. Pauley & Priestly, Seismic design of reinforced concrete and masonry buildings, John Wiley & Sons.
6. Stratta. J. L, Manual of Seismic Design, Prentice-Hall India Pvt Ltd.
7. Kramer. S. L., Geotechnical Earthquake Engineering, Prentice-Hall India Pvt Ltd.
8. All relevant IS codes.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Civil Engineering, VII-Semester

Elective-IV CE-7005 (3) Urban & Town Planning

UNIT-I

Definition and classification of urban areas - Trend of urbanization - Planning process - Various stages of the planning process - Surveys in planning. Plans - Delineation of planning areas. utility of spaces, future growth etc. Role of “Urban Planner ”in planning and designing in relation with spatial organization, utility, demand of the area and supply

UNIT-II

Plan implementation- Urban Planning agencies and their functions - Financing- Public, private, Nongovernmental organizations- Public participation in Planning. Development control regulations. sustainability and rationality in planning, Components of sustainable urban and regional development, Emerging Concepts: Global City, inclusive city, Safe city, etc. City of the future, future of the city.

UNIT-III

Town and country planning act- Building bye-laws. Elements of City Planning, Zoning and land use, Housing. Introduction to landscaping, importance, objectives, principles, elements, Urban Planning standards Urban renewal for quality of life and livability.

UNIT-IV

Traffic transportation systems: urban road, hierarchy, traffic management, Intelligent Transport Systems. Legal Issues in Planning and Professional Practice, Concepts and contents related to planning provision regarding property rights, Concept of Arbitration, State and Central government to deal with various matters concerning Town and Country Planning.

mechanism for preparation of DP: Land Acquisition Rehabilitation and Resettlement Act 2013.

UNIT-V

Types of Development plans: Master Plan, City Development Plan, Structure Plan ,housing, land use, Water Supply & sanitation, etc., Planning agencies for various levels of planning. Their organization and purpose (CIDCO-MHADA-MIDC, MMRDA/PMRDA etc).,

References:-

1. Urban Planning: Theory & Practice By M. Pratap Rao
2. Urban Transportation: Planning, Operation and Management by S. Ponnuswamy, D. Johnson Victor
3. Sustainable Urban Planning in India by Joy Sen
4. Urban Planning in India by Amiya Kumar Das

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Credit Based Grading System

Civil Engineering, VII-Semester

Elective-IV CE-7005 (4) Life Cycle Costing of Structures

UNIT 1

Introduction ,Life-Cycle Cost Analysis (Lcca) Method, Costs ,Initial Costs-Purchase, Acquisition, Construction Costs, Fuel Costs, Operation, Maintenance, And Repair Costs ,Replacement Costs, Residual Values—Resale Or Salvage Values Or Disposal Costs, Finance Charges—Loan Interest Payments ,Non-Monetary Benefits Or Costs

UNIT 2

Parameters for Present-Value Analysis, Discount Rate, Cost Period(S), Discounting Convention, Treatment of Inflation

UNIT 3

Life-Cycle Cost Calculation, Supplementary Measures, Evaluation Criteria, Uncertainty Assessment in Life-Cycle Cost Analysis, sensitivity Analysis, Break-Even Analysis

UNIT 4

Design and Analysis Tools, Applications, Relevant Codes and Standards, LCCA Guidelines for OMB Projects, LCCA Guidelines for FEMP Projects

UNIT 5

Case study for application of LCC techniques and use of various software for LCC.

Books

1. Life Cycle Costing For Construction by [J.W. Bull](#) , Taylor & Francis.
2. A Life Cycle Approach to Buildings By Niklaus Kohler, Holger König, Johannes Kreissig, Thomas Lützkendorf
3. Life-Cycle Cost Analysis of Built Assets by Whyte Andrew