

**PUNYASHLOK AHILYADEVJI HOLKAR
SOLAPUR UNIVERSITY, SOLAPUR**



FACULTY OF SCIENCE & TECHNOLOGY

CIVIL ENGINEERING

Syllabus for

B.E. (Civil Engineering)

Choice Based Credit System (CBCS)

With Effect from Academic Year 2019-20

w. e. f. Academic Year 2019-20

**PUNYASHLOK AHILYADEVI HOLKAR
SOLAPUR UNIVERSITY, SOLAPUR**

FACULTY OF SCIENCE & TECHNOLOGY

**Program Educational Objectives (PEOs):
B. E. (Civil Engineering)**

The Program Educational Objectives for B. Tech. Civil Engineering program are designed to produce competent civil engineers who are ready to contribute effectively to the advancement of civil engineering and to fulfill the needs of the community. These objectives are as follows:

1. Graduates will be prepared with strong engineering fundamentals leading to excellent performance in professional career in planning, designing, construction, operation & maintenance of the built environment and global infrastructure that meet the societal needs.
2. Graduates will exhibit strong technical ability to create and synthesize data using relevant tools and concepts, for providing sustainable solutions to civil engineering problems and projects.
3. Graduates will exhibit excellent interpersonal communication and resource management skills as leaders in the civil engineering profession while working as a part of multidisciplinary team.
4. Graduates will be prepared with sound foundation in mathematics, science and in Civil Engineering to prepare them for higher studies and research.
5. Graduates will possess a breadth of knowledge and engage themselves in the life-long learning to meet challenges of globalization.
6. Graduates will have a sense of responsibility, respect towards society & its heritage and will follow the professional ethics.

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Program Outcomes (POs)
B. E. (Civil Engineering)

The program outcomes of B. Tech. Civil Engineering Program are summarized as following:

- a) Students will demonstrate the basic knowledge of mathematics, science and engineering.
- b) Students will demonstrate ability to design and conduct experiments, interpret & analyze data and report results.
- c) Students will demonstrate an ability to design a system, component, or a process that meets desired specifications within realistic constraints.
- d) Students will demonstrate an ability to function in multidisciplinary team.
- e) Students will demonstrate the ability to identify, formulate and solve Civil engineering problems.
- f) Students will demonstrate the understanding of their professional Responsibilities ethically.
- g) Students will be able to communicate effectively to all concerned.
- h) Students will have the confidence to apply engineering solutions in global and social context.
- i) Students will recognize the need for and an ability to engage in life-long learning.
- j) Students will have broad education for understanding the impact of engineering solutions in a global, economic, environmental, and societal context.
- k) Students will possess an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

PROGRAM SPECIFIC OUTCOMES (PSOs)

B. E. Civil Engineering

- a) Graduates will be able to survey, conduct geo-technical investigations, plan, analyse, design, estimate and construct residences, public buildings, industrial buildings, townships and infrastructural projects by adopting appropriate construction methods.
- b) Graduates will analyse and design the water resources systems, municipal and industrial waste treatment plants with due consideration to pollution free environment.
- c) Graduates will use appropriate application software, develop skills necessary for professional practice as a Civil Engineer and prepare themselves for competitive examinations for higher education & for public service commissions.

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Faculty of Science & Technology

Choice Based Credit System structure of B. E. Civil –I; Semester – VII, W. E.F. 2019-2020

Theory Course Name	Hrs./week				Credits	Examination Scheme				
	L	T	P	D		ISE	ESE	ICA	Total	
Design of Concrete Structures-I	3	1	-	-	4	30	70	25	125	
Quantity Surveying & Valuation	3	-	-	-	3	30	70	-	100	
Earthquake Engg.	3	-	-	-	3	30	70	-	100	
Engineering Management- II	3	-	-	-	3	30	70	-	100	
Elective - II	3	-	-	-	3	30	70	-	100	
Total	15	1	-	-	16	150	350	25	525	
Laboratory/Drawings:							POE	OE		
Quantity Surveying & Valuation	-	-	4	-	2	-	50	-	50	100
Earthquake Engg.	-	-	2	-	1	-	-	-	50	50
Engineering Management- II	-	-	2	-	1	-	-	25	-	25
Elective - II	-	-	2	-	1	-	-	25	25	50
Seminar	-	-	2	-	1	-	-	-	50	50
a) Project work	-	-	2	-	1	-	-	-	25	25
b) Assessment of report on field training-II	-	-	-	-	1	-	-	-	25	25
Total	-	-	14	-	8	-	100	225	325	
Grand Total	15	1	14	-	24	150	450	250	850	

Abbreviations: L- Lectures, P –Practical, T- Tutorial, D- Drawing, ISE -Internal Tests, ESE - University Examination (Theory &/ POE &/Oral examination), ICA- Internal Continuous Assessment.

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Choice Based Credit System structure of B. E. Civil –II, Semester – VIII, W. E.F. 2019-2020

Theory Course Name	Hrs./week				Credits	Examination Scheme				
	L	T	P	D		ISE	ESE	ICA	Total	
Design of Concrete Structures-II	4	-	-	-	4	30	70	-	100	
Construction Practices and Town Planning	4	-	-	-	4	30	70	25	125	
Transportation Engineering-II	4	-	-	-	4	30	70	25	125	
Elective - III	4	-	-	-	4	30	70	-	100	
Total	16	-	-	-	16	120	280	50	450	
Laboratory/Drawings							POE	OE		
Design of Concrete Structures-II	-	-	2	-	1	-	-	-	50	50
Elective - III	-	-	2	-	1	-	-	25	25	50
Project on R. C. C. Structures	-	-	-	4	2	-	-	50	50	100
Project work	-	-	6	-	3	-	-	100	100	200
Total	-	-	10	4	7	-	175	225	400	
Grand Total	16	-	10	4	23	120	455	275	850	

Abbreviations: L- Lectures, P –Practical, T- Tutorial, D- Drawing, ISE -Internal Tests, ESE - University Examination (Theory &/ POE &/Oral examination), ICA- Internal Continuous Assessment.

.Note:

- (1) Project group be of @ 7 students.
- (2) Elective subject can be offered from the following list, if minimum 15 students opt for that subject.
- (3) Term work assessment: Term Work assessment shall be a continuous process based on the performance of the student in assignments, class tests, quizzes, attendance and interaction during theory and lab sessions, journal writing, report presentation etc., as applicable.

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LIST OF ELECTIVE SUBJECTS

B. E. Civil Part-I		B. E. Civil Part-II	
ELECTIVE II		ELECTIVE III	
1	Open Channel & River Hydraulics	1	Advanced Engg. Geology
2	Air Pollution & Control	2	Ground improvement Techniques
3	Design of Foundations	3	Traffic Engg. & Control
4	Advanced Design of Concrete Structures	4	Infrastructural Engineering
5	Managerial Techniques	5	Project Appraisal
6	Computer Applications in Civil Engg.	6	Solid and Hazardous & Waste Management
7	Advanced structures	7	Dynamics of Structures
8	Entrepreneurship	8	Environmental Management
9	Remote Sensing and GIS Applications	9	Design of Bridges

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. B.E. CIVIL – PART- I (CBCS)

1. DESIGN OF CONCRETE STRUCTURES – I

Teaching Scheme:

Lectures – 3 Hrs/Week, 3 Credits

Tutorial – 1 Hrs/Week, 1 Credits

Examination Scheme:

ISE – 30 Marks

ESE –70 Marks

ICA –25 Marks

Course objectives: At the end of course, students will be made familiar with

- 1) Philosophies of design and their relative advantages and disadvantages.
- 2) Analysis and design of flexural members such as RCC Beams and Slab by Limit State Method.
- 3) Analysis and Design of rectangular RCC Beam subjected to combined actions of Bending and Torsion by Limit State Method.
- 4) Analysis and Design of RCC Columns by Limit State Method

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

- 1) Implement suitable design philosophy for designing RCC structural elements
- 2) Identify the action of Beams and Slabs and carry out its analysis and design by Limit State Method.
- 3) Analyze and design rectangular RCC beam subjected to combined Bending and Torsion by Limit State Method.
- 4) Analyze and design RCC Columns by Limit State Method

SECTION I

Unit 1: Introduction

(5)

Philosophies of design and their relative advantages and disadvantages, Types and classification of limit states, Characteristics strength and characteristics load, load factor, Partial safety factors. Limit State of Serviceability – Significance of deflection, I.S. Recommendations.

Unit 2: Design of Slabs (Limit state method)

(6)

One Way, One way continuous, Two Way slabs with different end conditions as per IS Code, cantilever slab.

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Unit 3: Limit state of Collapse (Flexure, Shear and Bond) (6)

Analysis and Design of singly and doubly reinforced rectangular sections.

Unit 4: Analysis and Design of Flanged Sections (6)

Analysis and Design of Singly and doubly Reinforced T & L Beams for flexure .

SECTION II

Unit 5: Design of Continuous beams (6)

Design of continuous beams by Limit State Method.

Unit 6: Limit State of Collapse (Torsion): (6)

Behavior of R.C. rectangular sections subjected to torsion, Design of sections subjected to combined bending and torsion, combined shear and torsion, Design of beams for torsion.

Unit 7: Design of columns: (10)

Analysis and Design of axially and eccentrically (uni-axial) loaded Circular and Rectangular Columns, Introduction to biaxial bending of columns, Interaction diagrams, Circular columns with helical reinforcement.

Note:

1. Problems based on above syllabus shall be covered in tutorials.
2. Only IS: 456-2000 shall be allowed in University Exam.
3. Unless otherwise mentioned separately, all the design should be by Limit State method.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

The ICA shall consist the assignment based on above topics

Text Books:

1. Limit State Theory & design –Karve & Shah Structures Pub., Pune
2. Reinforced Concrete Design (Limit State) - A.K. Jain

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3. Reinforced Cement Concrete - B.C. Punmia
4. Design of R.C.C. structural elements by S.S. Bhavikatti (Volume I & II).

Reference Books:

1. IS: 456-2000
2. Fundamentals of Reinforced Concrete- Sinha & Roy
3. Limit State Design of Reinforced Concrete - P.C. Varghese, Prentice Hall of India, New Delhi.
4. Handbook of Reinforced Concrete: SP- 16



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B. E. (CIVIL) PART – I (CBCS)

2. QUANTITY SURVEYING & VALUATION

Teaching Scheme:

Lectures – 3 Hrs/Week, 3 Credits

Practical – 4 Hrs/Week, 2 Credits

Examination Scheme:

ISE – 30 Marks

ESE –70 Marks

ICA –50 Marks

ESE (POE) – 50 Marks

Course objectives:

- 1) To study writing specifications for different items and preparing estimates of Civil Engineering works.
- 2) To learn methodology of rate analysis for different items of work
- 3) To grasp various approaches for valuation of land and buildings
- 4) To grasp the idea of professional ethics.

Course outcomes:

On completion of the course, the students will be able to:

- 1) Write specifications and prepare estimates for various Civil Engineering works.
- 2) Carry out analysis of rates for various items of works of construction.
- 3) Carry out valuation of land and buildings.
- 4) Exercise professional ethics in Civil Engineering sector.

SECTION – I

Unit 1:

(06)

- a) General introduction to Quantity surveying – purpose of estimates. Types of estimates, Various items to be included in estimates, Principles in selecting units of measurement for items, Various units and modes of measurement for different trades, Administrative approval and technical sanction to estimates. I.S. 1200, Introduction to D.S.R.
- b) Specifications – Purpose and basic principles of general and detailed specifications; detailed specifications for various items of work.

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Unit 2:**(07)**

- a) Prime cost, provisional sums and provisional quantities, taking out quantity –P.W.D. method, Centre line method. Measurement sheet, abstract sheet and recording.
- b) Analysis of rates, factors affecting the cost of materials, labour. Task work, schedule as basis of labour costs. Plants and equipment - hourly costs based on total costs and outputs. Transports, octroi. Overhead charges, rates for various items of construction of civil engineering works. Standard schedule of rate, price escalation.

Unit 3:**(08)**

- a) Approximate estimates- purpose, various methods used for buildings and other civil engineering works such as bridge, water supply, drainage, road- railway projects, school buildings, industrial sheds.
- b) Detailed estimate of buildings, Factory shed including structural steel truss, R.C.C works, culverts, earthwork for canals. Roads including hill roads and other civil engineering works. Preparing bar bending schedule.
- c) Different methods of executing works. Essentials of legally valid contract. Contract between engineer and Employers, Contract between Employer and Contractor, Appointment and authority of Engineer for executing civil construction works.

Unit 4:**(02)**

Material survey-Thumb rules for computation of materials requirement for different materials for buildings, percentage breakup of the cost.

SECTION – II**Unit 5:****(08)**

- a) Competitive bidding- Local competitive bidding, global bidding, item rate contract, percentage rate contract and Lump sum contract. Preparing tender papers- Invitation of tenders, tender notice, tender documents, various terms and conditions to contracts, E-tendering submission, Scrutiny and acceptance, Two envelope method, Award of jobs, Rights and responsibilities of parties to contracts.

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b) Negotiated contracts, Cost plus percentage. Cost plus fixed fees, Cost plus sliding scale of fees. Target cost as based on sharing risk and profits. Turnkey contracts, More than two party contracts. Introduction to BOT, BOOT, BOLT, etc.

c) Introduction to acts pertaining to- Minimum wages, Workman's compensation, Contracts, Arbitration, Easement rights.

Unit 6:

(05)

a) Principles of valuation, definition of value, price and cost. Attributes of value, Different types of values- Book value, salvage value, scrap value, replacement value, reproduction value, earning value, Market value, Potential value, Distress value, Speculation value, Sentimental value. Accommodation value, Essential characteristics of market value.

b) Valuer and his duties, purpose of valuation and its function. Factors affecting the valuation of properties- tangible and intangible properties, Landed properties- free hold and leasehold properties, different types of lease.

Unit 7:

(04)

a) Rental method of valuation. Form of rent, different types of rent, standard rent. b) Value of land, belting method of valuation, Valuation based on land and building- item wise, carpet area basis, unit basis, cubic content basis.

c) Development method of valuation for building estate.

d) Valuation on profit basis for lodges, cinema theatres, hotels, motels etc. valuation for compulsory acquisition of land, structure by the Government. Valuation for rating purpose, Methods for assessing ratable value of property, Rental method, Comparison method, fundamental principles of rating valuation.

Unit 8:

(05)

a) Valuation from yield and from life, gross yield and net yield, outgoing, capitalized value, Year's purchases- Single rate and dual rate, reversion value of land, annuity-perpetual, whole life, deferred, Sinking fund.

b) Depreciation and different methods of calculating depreciation (straight line method, declining balance method, sinking fund method, quantity survey method), Depreciated cost, Obsolescence.

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INTERNAL CONTINUOUS ASSESSMENT (ICA)

The ICA shall consist the following

1) Reading the Drawings (Plan and section) Minimum 3- drawings need to be given for (reading only) such as

- a) Watchman's cabin
- b) Compound wall.
- c) Septic tank / water tank.
- d) Building drainage system.
- e) Kitchen platform.
- f) Cement godown.
- g) Staircase block.
- h) A small culvert

2) Market survey of basic material rates and labour wages

3) Detailed specification for minimum five civil engineering items. (One each from Roads, Irrigation works, Water Supply & Sanitation & three from buildings)

4) **Computer aided**

a) Detailed estimate for a two storied building

- i) Selecting the items from drawing.
- ii) Preparing abstract as per DSR or standard building items.
- iii) Take of quantities related to buildings (all items need to be taken)
- iv) Preparing the bill of quantity (BOQ).

Note: Estimate shall include compound wall with gate, sanitary schedule and electrification schedule.

b) Estimate for structural steel shed.

5) Rate Analysis: (Civil engineering items.)

One each from (Road, Irrigation work, Water supply and sanitation) and five from buildings.

6) Schedule of reinforcement any two of the following

- a) Column and column footing.
- b) Beam and Slab
- c) Staircase.

7) Valuation reports for any two of the following:

- a) A building for residential purpose or commercial purpose.
- b) A hotel.
- c) A theater
- d) Any one construction machine.

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The report shall include valuation certificate also.

TEXT BOOKS:

1. A Textbook of Estimating , Costing & Accounts (Civil), R.C.Kohli, S. Chand Publishing New Delhi
2. Civil Estimating and Costing, A. K. Upadhyay, S. K. Katuria and Sons
3. Elements of Estimating and Costing – S. C. Rangwala - Charotar Publication
4. Civil Engineering Contracts and Estimates – B. S. Patil- Orient Blackswan publication
5. Professional Practice (Estimating and Valuation) – Roshan Nanavati – Lakhani Book Depot.
6. Estimating and Costing – B. N. Dutta- UBS publishers
7. Estimating, Costing , Specification and valuation in civil engineering, Chakroborty M, Khanna Publishers
8. Valuation of real Properties – S. C. Rangwala- Charotar Publishing House Ltd.

REFERENCE BOOKS:

1. Relevant Indian Standard Specifications (IS 1200)
2. World Bank Approved Contract Documents.
3. FIDIC Contract Conditions.
4. Acts Related to Minimum Wages, Workman's Compensation, Contract, and Arbitration.
5. C.P.W.D. specifications
6. C.P.W.D. schedule of rates.
7. Standard specifications Volumes I & II (P. W. D. Maharashtra)

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B.E. CIVIL – PART I (CBCS)

3. EARTHQUAKE ENGINEERING

Teaching Scheme:

Lectures – 3 Hrs/Week, 3 Credits

Practical – 2 Hrs/Week, 1 Credits

Examination Scheme:

ISE – 30 Marks

ESE –70 Marks

ICA –50 Marks

Course objectives:

- 1) To introduce the basics of development of seismic forces in the structure due to earthquake.
- 2) To acquaint student the engineering seismology, building geometrics & characteristics, structural irregularities.
- 3) To learn the codal provisions and their application on different types of structures.
- 4) To study incorporation of features for making the structure earthquake resistant.

Course Outcomes:

On completion of the course, the students will be able to:

- 1) Apply the principles of Earthquake resistant philosophy in planning, design and construction of building.
- 2) Perform the dynamic analysis of structures under earthquake load.
- 3) Incorporate Earthquake resistant features for various types of construction.
- 4) Adopt the provisions of IS 1893-2016 and IS 13920- 2016 Codes.
- 5) Incorporate Ductility features in the structures.

SECTION – I

Unit: 1 Elements of Seismology (5)

General effects of an earthquake, terminology, structure of earth, causes of an earthquake, plate tectonic theory, seismic waves, magnitude and intensity, methods of measurement, energy released, seismograph, strong motion earthquakes, accelerogram, soil liquefaction, prominent earthquakes of India.

Unit: 2 Free vibrations of single degree-of-freedom systems (8)

Dynamic loads and dynamic analysis, degrees of freedom, Undamped free vibrations,
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multiple elastic forces, viscously damped vibrations, equations of motion and solution, logarithmic decrement.

Unit: 3 Forced vibrations of single degree-of-freedom systems (8)

Forced vibrations (harmonic loading) of single degree of freedom systems. Undamped and viscously damped vibrations, equations of motion and solution, Force transmitted to foundation, transmissibility, response to harmonic support excitations.

Unit: 4 Response spectrum theory: (5)

Response to general dynamic loading, Duhamel's integral, rectangular and triangular loading, Earthquake response spectrum, tripartite spectrum, construction of design response spectrum, effect of foundation and structural damping on design spectrum.

SECTION – II

Unit: 5 Principles of earthquake resistant design (5)

Planning aspects, symmetry, simplicity, regularity. Resistance of structural elements and structures for dynamic load, design criteria, strength and deflection.

Unit: 6 Evaluations of Seismic Forces (5)

Philosophy of earthquake resistant design, Provisions of IS 1893 (All Parts), Soft storey, Design spectrum of IS 1893-2016, evaluation of lateral loads due to earthquake on multistory buildings.

Unit: 7 Ductile detailing of RCC members- (5)

Concept of ductility, different ways of measuring ductility, factors affecting ductility, energy absorption, provisions of IS 13920-2016.

Unit: 8 Earthquake resistant construction - (5)

Failure mechanism of different types of masonry construction, Construction aspects of Masonry and Timber structures, Retrofitting and strengthening techniques of low cost and low rise buildings. Provisions of I.S. 4326 and IS 13935.

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INTERNAL CONTINUOUS ASSESSMENT (ICA)

The ICA shall consist of at least one assignment on each unit.

TEXT BOOKS:

1. Elements of Earthquake Engineering – Jai Krishna, South Asian Pub. New Delhi
2. Earthquake Resistant, Design of Masonry and Timber Structures – A.S. Arya
3. Earthquake Resistant Design of R. C. C. Structures – S. K. Ghosh

REFERENCE BOOKS:

1. Dynamics of Structures –A.K. Chopra
2. Structural Dynamics - Mario Paz CBS Publication
3. Earthquake Resistant Structures –D.J. Dowrick John Wiley Publication
4. Dynamics of Structures – R. M. Clough and Penzian ,McGraw Hill co.New Delhi
5. Mechanical Vibrations – G. R. Grover Roorkee University, Roorkee
6. Analysis and Design of Foundations for Vibrations – P. J. Moove. Oxford and I. B. H. Publication, Delhi
7. Foundation Design Manual – N. V. Nayak, Dhanpatrai and sons, Delhi
8. Manual of Earthquake Resistant Non engineering Construction, University of Roorkee
9. Elements Seismology – Rochter
10. IS 1893-2016 –Part I, IS 13920-2016, IS: 4326 and IS 13935.
11. Earthquake Tips published by NICEE, IIT Roorkee.
12. Government of Maharashtra Earthquake resistant Design of house guiding lines and assessment of damages.

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B.E. CIVIL – PART I (CBCS)

4. ENGINEERING MANAGEMENT – II

Teaching Scheme:

Lectures – 3 Hrs/Week, 3 Credits

Practical – 2 Hrs/Week, 1 Credits

Examination Scheme:

ISE – 30 Marks

ESE –70 Marks

ESE (OE) – 25 Marks

Course objectives

1. To study various activities and their relationship with resources such as time, money, material, machine and manpower
2. Apply various tools for project scheduling such as Bar Chart, CPM and PERT Networks to plan, track, update and optimize the resources
3. To appraise alternative investment proposals, concept of Life Cycle Cost and Value Engineering
4. To provide hands on experience on project management application software's for civil engineering projects

Course outcomes

At the end of this course the students will be able to

1. Plan the project and prepare Bar chart and Network to optimize the project duration and cost
2. Update the network and re evaluate the resources.
3. Demonstrate the decision making abilities based on economics in projects and to appraise alternative projects
4. Analyze life cycle cost and value of the project.
5. Use appropriate project management application software for planning, tracking and reporting progress of civil engineering projects

SECTION I

Unit 1

(08)

Project Management: Introduction, Steps in Project Management, work break down structure. Bar Chart, Mile stone chart.

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Development of network: Representation by Activity on Arrow (AOA) and Activity on Node (AON), Fulkerson's Rule.

Critical Path Method (CPM): Introduction, Time estimates, floats, critical path.

Unit 2 (08)

Network compression: - Least Cost and Optimum Duration.

Resource allocation: Smoothing and leveling.

Updating: Need, steps, project duration, and calculation for updated network.

Unit 3 (06)

Performance Evaluation and Review Techniques (PERT)

Concept of probability, Normal and Beta Distribution, Central limit theorem. Time estimates and calculations of project duration, critical path, slack, probability of project completion.

Precedence Network (only concept)

Unit 4 (04)

Project Management Software (PMS): Introduction to applications of PMS (such as MS Excel, MS Project, Primavera, and PRINCE) and Open Source software. Reports generated by the software and its interpretation.

Management Information system: Role of information in decision making, Information system planning, Design and implementation, Evaluation and effectiveness of MIS.

SECTION – II

Unit 5 (07)

Engineering economics: Importance, demand and supply, types of costs, Interest- Simple, compound, continuous, and effective interest. Value of money - time and equivalence, tangible and intangible factors, Introduction to inflation. Cash flow diagram. Interest factors – Uniform series factors, derivations.

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Unit 6**(06)**

Economic comparisons: Discontinuing methods- Present Worth method, equivalent annual cost method, capitalized cost method, Net Present Value, Internal Rate of Return and Benefit Cost ratio. Non discontinuing criteria: Payback and urgency criteria.

Unit 7**(04)**

Life cycle costing: Definition, purpose and implications, economic principles for life cycle costing, types of life cycle costs. Economic considerations: Build Operate and Transfer (BOT) contracts and toll collection.

Unit 8**(02)**

Value Engineering: Definitions: Value, value engineering, value analysis, value management, habits, road blocks and attitudes and their relation to value engineering

INTERNAL CONTINUOUS ASSESSMENT (ICA)

The ICA shall consist:

1. At least two exercises on each unit except unit no.4, 7 and 8.
2. Civil Engg. Problems on Bar chart, CPM, PERT, Precedence, engineering economics to be solved preferably using relevant software. Reports to be attached in the termwork.
3. Visit report covering project management.
4. A case study of
 - a. project management software reports and its interpretation – Status report, Risk report, Executive report and Resource report
 - b. Life cycle costing
 - c. Value engineering

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TEXT BOOKS

- 1 A Management Guide to PERT/CPM: Weist J. D. ,Levy, Prentice Hall of India, New Delhi, 2nd Ed. 1982
- 2 PERT and CPM Principles and Applications: Srinath L. S., East West Publication, New Delhi, 3rd Ed. 1995.
- 3 PERT and CPM- B. C. Punmia, K. K. Khandelwal, Laxmi Publications, New Delhi, 4th Ed. 2012.
- 4 Computerized Project Management Technique for Manufacturing and construction: Samaras T.T., Kim Yensueng, Prentice Hall of India, New Delhi, 1979.
- 5 Principles of Construction Management: Roy Pilcher , Tata McGraw Hill Publications.
- 6 Principles of Engineering Economy- E. L. Grant, W. G. Ireson, R. S. Leavenworth, Wiley International Education, 7th Ed.
- 7 Management Information System- Davis G. B., Margrethe H . Olson, Tata McGraw Hill New Delhi, 2nd 1985.
- 8 Value Engineering: L.W. Zimmerman, G. D. Hart, CBS publishers & distributors.

REFERENCE BOOKS

- 1 CPM in Construction Practice, Antill J. M., John Wiley and Sons.
- 2 Construction Project Management – Planning, Scheduling and Control- Chitkara K.K., Tata McGraw Hill Publications New Delhi, 4th Ed. 2002.
- 3 Construction Planning and Management through System Techniques: Verma M., Metropolitan Publication, 3rd Ed. 1985.
- 4 Construction Project Management- Bennett J. M. Clough R. H., Butterworth's Wiley John, New Delhi, 1972.
- 5 Construction Scheduling with Primavera Enterprise- Marchman D.A., Thomson/Brooks- Cole.

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- 6 Engineering Economics - L.P. DeGarmo, W.G.Sullivan,
J.A.Bantadelli, McMillan India Co. New Delhi, 8th Ed. 1984.
- 7 Manual of Construction Project Management- S. K. Guha, Thakurti, K. R. Shah, MultiTech Publishers.
- 8 Management Information System- Gupta R.C., CBS, New Delhi.
- 9 Value Engineering in the Construction Industry: Dell'Isola, A. J., Construction Publication Company.
- 10 Value Analysis in Design & Construction: O'brien J. J., McGraw Hill Publications
- 11 Value Engineering in Project Management: P. Krishnan, K R Saxena, Oxford And IBH Publishing Co. Pvt. Ltd., 1995



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B.E. (CIVIL) PART – I (CBCS)

5. ELECTIVE II

5.1 OPEN CHANNEL AND RIVER HYDRAULICS

Teaching Scheme:

Lectures – 3 Hrs/Week, 3 Credits

Practical – 2 Hrs/Week, 1 Credits

Examination Scheme:

ISE – 30 Marks

ESE –70 Marks

ICA –25 Marks

ESE (OE) – 25 Marks

Course Objectives:

- 1) To learn principles of flow in open channels, conservation laws and various types of flow
- 2) To learn analytical and numerical techniques for flow analysis
- 3) To study the fundamental principles governing open channel hydraulics for the design of engineering systems.
- 4) To develop the skills needed for systematic decomposition and solution of real world problems.

Course Outcomes:

At the end of course, the students will be able to

- 1) Demonstrate basic principles of the open channel flow.
- 2) Analyze the various types of flows viz. uniform flow, gradually varied flows rapidly varied flow etc.
- 3) Apply the knowledge of open channel hydraulics to river engineering.
- 4) Perform model analysis studies.

SECTION – I

Unit 1:

(5)

Basic fluid flow concepts, Classification of open channel flow, Velocity and pressure distribution. Energy and Momentum Equation applied to open channel flow, Energy and momentum coefficients, Channel Geometry and geometrical elements.

w. e. f. Academic Year 2019-20

Unit 2: (5)
Uniform and critical flow computations: Energy depth relationships, Resistance formulae, Concepts of First and Second hydraulic exponent, Determination of critical and normal depth, hydraulically most efficient channel sections, Channel transitions.

Unit 3: (6)
Gradually varied flow: Different equation governing GVF, Classification analysis and control sections of profiles, Computation of GVF profiles by different methods.

Unit 4: (6)
Rapid varied flow: Type, Analysis and characteristics of Hydraulic jump in rectangular channels, Location of jump, Introduction to jump in non-rectangular channel and on sloping floor, Use of jump as Energy dissipater. Flow Measurement –Weir, spillways, critical depth flumes.

SECTION – II

Unit 5: (5)
River gauging: Dominant discharge, Methods of gauging, current meter rating curve, automatic water level recorder, stage discharge relationship of a river.

Unit 6: (7)
Fluvial Hydraulics- Sediment transport, Mode of sediment motion and formation, Threshold movement, Total sediment load, Suspended and bed load Theories, Reservoir Sedimentation.

Unit 7: (6)
River Management and Training:
Type of river, river morphology, meandering and braiding of River training work-
Classification Types-Guide banks, Groynes, Deflectors, Embankments, Cut-offs, Bank
Protection Stable channel nature river training works, river morphology.

Unit 8: (5)
Similitude and model analysis: Basic principles, fixed bed and models, distorted models.

w. e. f. Academic Year 2019-20

INTERNAL CONTINUOUS ASSESSMENT (ICA)

The ICA shall consist the assignment based on above topics

TEXT BOOKS:

- 1) Open channel Hydraulics - Ven Te Chaw, McGraw Hill book Co. New York.
- 2) Flow through open channel - Ranga Raju
- 3) Flow in open channel –K. Subramanya, Tata McGraw Hill Publications
- 4) Mechanics of Sediment transport and alluvial river problems-R. J. Garde New Age Publications New Delhi.

REFERENCE BOOKS:

- 1) Open Channel Flow-F. M. Henderson.
- 2) River Gauging –Chitale and Hiranandani
- 3) River Mechanics-Vol. I &II, Hsieh Wen Shen.

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B.E. (CIVIL) PART – I (CBCS)

5. ELECTIVE- II

5.2 AIR POLLUTION AND CONTROL

Teaching Scheme:

Lectures – 3 Hrs/Week, 3 Credits

Practical – 2 Hrs/Week, 1 Credits

Examination Scheme:

ISE – 30 Marks

ESE –70 Marks

ICA –25 Marks

ESE (OE) – 25 Marks

Course Objectives:

1. To study Sources, Causes & effects of Air Pollution.
2. To study the relation between Meteorology and Air Pollution.
3. To learn methods used for controlling air pollution.
4. To study Air pollution Prevention and legislation.

Course Outcomes:

On successful completion of this course the students will be able to

1. Identify the sources of air pollutants and their effect on human, plants and materials.
2. Apply knowledge of meteorology for controlling air pollution
3. Design air pollution controlling equipments.
4. Apply knowledge of legislation for prevention and control of air pollution.

SECTION –I

Unit 1: Introduction

(3)

The Structure of the atmosphere, Composition of dry ambient air and properties of air. BIS Definition and scope of Air Pollution, Scales of air pollution, Types of exposures.

Unit 2: Air pollution sources

(5)

Air Pollutants, Classifications, Natural and Artificial, Primary and Secondary, point and Non-Point, Line and Area Sources of air pollution. Stationary and mobile sources. composition of particulate & gaseous pollutant, units of measurement.

Unit 3: Effects of Air pollutants

(6)

Effect of different air pollutants on man, animals, vegetation, property, aesthetic value and visibility, air pollution episodes. Global effects of air pollution- global warming,

w. e. f. Academic Year 2019-20

ozonedepletion, acid rain and heat island effect.

Unit 4: Meteorology and Air pollution (8)

Solar radiation, wind circulation, factors affecting dispersion of pollutants, Lapse rate, stability conditions, wind velocity profile, Maximum mixing depth (MMD), visibility, Wind rose diagram, General characteristics of stack plume (Plume behaviour). Gaussian diffusion model for finding ground level concentration. Plume rise. Formulae for stack height and determination of minimum stack height.

SECTION –II

Unit 5: Air sampling and analysis (5)

Air pollution survey, basis and statistical considerations of sampling sites. Devices and methods used for sampling gases and particulates. Stack emission monitoring, isokinetic sampling. Analysis of air samples chemical and instrumental methods. Ambient air quality monitoring.

Unit 6: Photochemical smog, Odour pollution and Indoor pollution (6)

Chemistry of air pollution, Chain reactions of hydrocarbons, nitrogen oxide, Sulphuric oxides and intermediates, photochemical smog formation, air pollution indices -aerosols, fog, smog index.

Odour pollution: Theory, sources, measurement and methods of control of odour pollution.

Indoor air pollution: Causes of air pollution, sources and effects of indoor air pollutants, changes in indoor air quality, control of indoor air pollutants and air cleaning systems.

Unit 7: Control of air pollution (8)

By process modification, change of raw materials, fuels, process equipment and process operation by use of air pollution control equipment for particulate and gaseous pollutants. Design of control equipment as Settling chamber, cyclone, fabric filter, Electro static precipitator and Wet scrubber.

Unit 8: Control of gaseous pollutants and Legislation (4)

Principles of removal of gaseous pollutants, design of incineration, absorption adsorption

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systems. Control of air pollution from automobiles. Vehicular pollution, composition, quantity and control.

Air (Prevention and Control) Pollution Act, 1981. Emission standards for stationary and mobile sources. National Ambient air quality standards, 2009 (NAAQS).

INTERNAL CONTINUOUS ASSESSMENT (ICA)

The ICA shall consist:

1. Assignments / problems on Air pollution.
2. Sampling and analysis of Ambient Air
3. Sampling and analysis of Automobile exhaust
4. Demonstration of stack gas monitoring

Viva/Oral examination will be based on above theory syllabus and term work

TEXT BOOKS:

- i. Air pollution – Wark and Warner
- ii. Air Pollution – Rao and Rao, TMH
- iii. Environmental Engineering – by Peavy and Rowe, TMH.
- iv. Air Pollution and Control- Murali Krishna, Jain Brothers

REFERENCE BOOKS:

- i. Air pollution – Martin Crawford
- ii. Air Pollution and Control Technologies- Y. Anjaneyulu, Allied Publishers
- iii. Fundamentals of Air Pollution- Raju BSN, IBH Publisher
- iv. An Introduction to Air Pollution- R. K. Trivedi and Goyal, BS Publications.

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B.E. (CIVIL) PART-I (CBCS)

5. ELECTIVE- II

5.3 DESIGN OF FOUNDATIONS

Teaching Scheme:

Lectures – 3 Hrs/Week, 3 Credits

Practical – 2 Hrs/Week, 1 Credits

Examination Scheme:

ISE – 30 Marks

ESE –70 Marks

ICA –25 Marks

ESE (OE) – 25 Marks

Course objectives:-

1. To study the requirements of foundations for satisfactory performance to satisfy strength and settlement criteria under the give loading.
2. To acquaint students with various methods of evaluation of safe bearing capacity
3. To judge suitability of various shallow and deep foundations for the given loading and field conditions.
4. To learn the constructional procedure of various types of foundations.

Course outcome:-

By the end of the course students should be able to

1. Evaluate the bearing capacity of soil analytically as well as by field test such as plate load test, Standard Penetration test etc.
2. Design the different shallow foundation and deep foundation to meet the site requirement and loading conditions
3. Apply suitable soil improvement techniques such as soil isolation, Geotextiles or use of CNS soil for the give field condition.
4. Design the simple machine foundations using codal provision.

SECTION – I

Unit 1:

(6)

Soil Investigation: Object of soil investigation for new and existing structures. Depth of exploration for different structures. Spacing of bore Holes. Methods of soil exploration and relative merits and demerits. Types of soil sample. Design features of sampler affecting

w. e. f. Academic Year 2019-20

sample disturbance. Essential features and application of the following types of samples. Open Drive samples, Stationery piston sampler, Rotary sampler, Geophysical exploration by seismic and resistivity methods. Bore Hole log for S.P.T.

Unit 2: (10)

Bearing Capacity: Types of failure, Terzaghi's formula, Meyerhoff formula, Skempton's formula, BIS formula, Vesic's formula, Hansen's formula – Effect of water table, eccentricity of load, Bearing Capacity evaluation- Plate Load Test and SPT, Housel's perimeter shear concept. Bearing capacity of layered soil, Methods of improving bearing capacity.

Stress distribution, consolidation settlement, immediate settlement, Study of Elastic mechanism, undrained case for clays and drained case for sands. Corrections to computed settlements, Rigidity of the footings, location of footing below ground water surface, variability in E and μ .

Unit 3: (4)

Raft foundations: Types of rafts, Bearing capacity and settlements of raft, Design consideration and I.S. Code method of analysis and Design

Unit 4: (4)

Foundation on expansive soil - Characteristics of B. C. soils, problems of foundations in B.C. soils, foundation techniques in B.C. soils

SECTION – II

Unit 5: (8)

Pile Foundations: Classification, Load carrying capacity, Static and dynamic methods, Negative skin friction, Batter piles, Pile Caps, Pile Load tests, Rock Socketing, Pull out resistance, Laterally Loaded piles, Special piling systems-Granular Piles / Stone Columns, Bored Precast Piles, Element piles, Bored Compaction Piles, Micro piles, Lime Piles. Pile Groups: Design of pile groups - Group Efficiency, Pile spacing, Pile cap (2 piles, 3 piles); Under-reamed piles- Single and Multi-Bulb, URP's, Equipment, construction and precautions, Design.

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Unit 6: (2)

Shoring and underpinning

Requirements for shoring and under-pinning, Methods of shoring, Methods of underpinning.

Unit 7: (4)

Well Foundations: Types of well foundations, open well, box and Pneumatic caisson foundations , Design of well foundations, analysis of Lateral Stability , Construction of open and Pneumatic wells.

Unit 8: (07)

Machine Foundations- Dynamic response of soil, Types of machine foundations, Study of stress v/s strain under applied static and oscillatory stresses, Permissible amplitude, Criteria for satisfactory machine foundations, Introduction to analysis and design of simple machine foundations using I.S. Code, Vibration isolation

INTERNAL CONTINUOUS ASSESSMENT (ICA)

The ICA shall consist of Minimum 8 sets of exercise based on each of the theory part of syllabus.

TEXT BOOKS:

1. Soil Mechanics and Foundation Engineering”- B.C. Punmia, Laxmi Publications Pvt.Ltd
2. “Foundation Engineering” by B.J. Kasmalkar, Pune Vidyarthi Griha Prakashan
3. “Soil Dynamics and machine foundation”, Swami Saran, Galgotia Publications Pvt. Ltd., New Delhi
4. “Foundation Analysis and Design” by J.E. Bowles, Tata McGraw Hill Book Company.
5. Foundation Engineering by Kameshwar Rao, John Wiley

REFERENCE BOOKS:

1. “Foundation Engineering Hand Book” by Winterkorn H.F. and Fang H.Y, VanNostand Reinhold Company, 1975
2. “Foundation Design Manual” by N.V .Naik, Dhanpat Rai and sons

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3. "Pile Foundation Analysis and Design", by Poulos, H.G. and Davis, E.H., JohnWiley and Sons, New York.
4. Mohan, Dinesh (1990). "Pile Foundations", Oxford & IBH Publishing Co. Pvt. Ltd.New Delhi.
5. W. C. Teng, "Foundation Design", Prentice Hall of India Pvt. Ltd., New Delhi
6. P. Shrinivasu "Hand Book of Machine Design" Tata McGraw Hill Book Company"
7. Ronald F. Scott "Foundation Analysis", Prentice Hall Inc.



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B. E. (CIVIL) PART – I (CBCS)

5. ELECTIVE – II

5.4 ADVANCED DESIGN OF CONCRETE STRUCTURES

Teaching Scheme:

Lectures – 3 Hrs/Week, 3 Credits

Practical – 2 Hrs/Week, 1 Credits

Examination Scheme:

ISE – 30 Marks

ESE –70 Marks

ICA –25 Marks

ESE (OE) – 25 Marks

Course objectives: At the end of this course, students will be made familiar with

- 1) Analysis and design of Flat, Grid and Circular RCC Slabs.
- 2) Analysis and design of RCC Combined Footing and Raft footing.
- 3) Analysis and design of RCC Pile foundation with Pile cap.
- 4) Analysis and design of RCC Deep beams.
- 5) Analysis and design of RCC Rectangular and Circular ESR and USR.

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

- 1) Analyze and design Flat, Grid and Circular RCC Slabs.
- 2) Analyze and design RCC Combined Footing and Raft footing.
- 3) Analyze and design RCC Pile foundation with Pile cap.
- 4) Analyze and design RCC Deep beams.
- 5) Analyze and design RCC Rectangular and Circular ESR and USR.

SECTION – I

Unit 1: (7)

Analysis and Design of Flat Slab, Grid Slab and Circular Slab.

Unit 2: (8)

Analysis and Design of Combined Footing and Raft Foundation.

Unit 3: (7)

Analysis and Design of pile foundation with pile cap.

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SECTION – II

Unit 4 : Analysis and Design of Deep beams (6)

Unit 5: (8)

Design of rectangular and circular E.S.R by approximate method and I. S. Code method.

Unit 6: (8)

Design of underground Rectangular and circular water tanks.

Note: Use of IS 3370 part II and IV and IS 456-2000 is allowed in the examination.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

The ICA shall consist the assignment based on above topics

TEXT BOOKS:

1. Reinforced Concrete, Limit State Design by Ashok K. Jain, New Chand and Bros.
Roorkee.
2. Advanced Reinforced Concrete Design by N. Krishnaraju- CBS Publishers & Distributors.
3. Reinforced Concrete Structures Vol. I & Vol. II by Jain and Jaikrishna
4. Reinforced Concrete Structures Vol. I & Vol. II by B.C. Punmia, A. K. Jain, Arun K. Jain

REFERENCE BOOKS:

1. Advanced Reinforced Concrete Design by P.C. Varghese- Prentice Hall of India.
2. IS: 456-2000
3. Fundamentals of Reinforced Concrete- Sinha & Roy
3. Limit State Design of Reinforced Concrete - P.C. Varghese, Prentice Hall of India,
New Delhi.
5. Handbook of Reinforced Concrete: SP- 16

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B. E. (CIVIL) PART – I (CBCS)

ELECTIVE – II

5.5 MANAGERIAL TECHNIQUES

Teaching Scheme:

Lectures – 3 Hrs/Week, 3 Credits

Practical – 2 Hrs/Week, 1 Credits

Examination Scheme:

ISE – 30 Marks

ESE –70 Marks

ICA –25 Marks

ESE (OE) – 25 Marks

Course Objectives:

- 1) To acquaint and develop the student knowledge to the fundamental concepts of Work Study Method.
- 2) To develop an understanding of total quality management principles, frameworks, tools and techniques for Civil Engineering works.
- 3) To introduce students to the fundamental concepts of statistical process control, total quality management, six sigma and the application of these concept to Civil Engineering industry.
- 4) To acquaint the students with reliability analysis, value analysis and value engineering.

Course Outcomes:

Upon successful completion of course the students will be able to:

- 1) Apply the acquainted knowledge of Work Study Methods in civil engineering industry.
- 2) Exhibit understanding on Total Quality management philosophies and frameworks
- 3) Apply quality tools and techniques in civil engineering industry
- 4) Apply reliability analysis principles and cost reduction technique for civil engineering works

SECTION – I

Unit 1:

(06)

Introduction: Productivity, work study and its applications to civil engineering. Method study: Recording techniques, critical examination methods, development activity charts, diagrams process charts.

w. e. f. Academic Year 2019-20

Unit 2: (07)

Time study, time allowance standard time, predetermined motion time standards, Analytical estimation, work specification, production studies. Job evaluation and wages, role of trade unions and human behaviour in Context to Work study.

Applications of work study to civil engineering works like brick laying, brick work, Prefabricated building units, concreting etc.

Unit 3: (07)

Total Quality management: Philosophy and concept by Dr J.M. Juran, Deming, Febingham, Elements of TQM, Implementation Strategies, Introduction to 5S Techniques, Kaizen

Unit 4: (04)

TQM, implementation strategies of TQM, steps in TQM, 5S techniques, contribution by Juran.

SECTION – II

Unit 5: (07)

Work sampling techniques, Purpose principles. Statistical basis, normal, binormal, Poisson's distribution, accuracy, confidence. Random numbers and application.

Unit 6: (07)

Reliability analysis – Evaluation of reliability analysis and distribution or changes of failure of products standard deviation, failure probability, reliability, curves, reliability assurance of sampling reliability design single, double limit operations, Redundancy, application of civil engineering.

Unit 7: (07)

Value analysis and value engineering – Value analysis as a cost reduction technique information, search analysis creative thinking and judgment types of value, value Analysis procedure and applications in value engineering value control.

w. e. f. Academic Year 2019-20

INTERNAL CONTINUOUS ASSESSMENT (ICA)

The ICA shall consist:

- A) Work study procedures in building unit manufacture element.
- B) Preparation of flow Process charts.
- C) Motion study of:
 - 1. Concreting.
 - 2. Erection of roof trusses.
 - 3. Factory sheds.
 - 4. Brick laying.
 - 5. Flooring etc. preparation of flow processes charts.
- D) Actual working stoppage utilization. Avoidable stoppages time sampling, frequency and control charts calculations (from civil engineering works).
- E) Work sampling in increasing the productivity, finding idle timings and efficiency of items of works in a small civil engineering works.
- F) One problem on Reliability Analysis.
- G) Value Analysis and Value Engineering.

TEXT BOOKS:

- 1. Work Study Applied to Building – Geary
- 2. Work Study – R. M. Currie, the English language book co.
- 3. Motion and time Study – Marvind Mandel, Prentice hall of India ltd.
- 4. Quality Control and Reliability – N. L. Enrick
- 5. Work Sampling – M. V. V. Raman
- 6. Value Engineering – Miles

REFERENCE BOOKS:

- 1. Work Study- I. L. G., Universal pub. corporation
- 2. Value Engineering – A practical approach for owners – Designers and Constructors –
- 3. Larry Zimmerman and Glent Hart, CBJ pub.& Distributors

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B. E. (CIVIL) PART – I (CBCS)

5. ELECTIVE –II

5.6 COMPUTER APPLICATION IN CIVIL ENGINEERING

Teaching Scheme:

Lectures – 3 Hrs/Week, 3 Credits

Practical – 2 Hrs/Week, 1 Credits

Examination Scheme:

ISE – 30 Marks

ESE –70 Marks

ICA –25 Marks

ESE (OE) – 25 Marks

Course Objectives:

- 1) To develop the proficiency to write computer programs for design of steel structures
- 2) To learn coding for R.C.C. design of structures with help of computers
- 3) To learn structural drafting using software tools
- 4) To develop acquaintance with popular structural analysis application software

Course Outcomes:

By the end of the course students should be able to

- 1) Write computer programmes for analysis and design of variety of structural elements.
- 2) Use relevant application software for the analysis of structures
- 3) Use computer aided design and drafting software tools using suitable application.
- 4) Develop elementary application software tools for Civil Engineering applications

SECTION-I

Unit 1: (10)

Computer aided design of steel structures: Development of software for basic structural Elements such as beam, column base, gantry girder, using IS: 800 specifications.

Unit 2: (12)

Computer aided design of R.C.C. Structures: Development of software for basic Structural elements such as rectangular beam, T beam, one – way and two – way slabs, Columns and isolated column footings using IS: 456.

w. e. f. Academic Year 2019-20

SECTION – II

Unit 3: (11)

Structural Drafting: Structural drafting and detailed drawings of components design using AutoCAD, AUTOLISP and WINDOWS, application of simple structural steel and R.C.C. elements, drawings of plan elevation of structures

Unit 4: (12)

Use of software for analysis of structures, preparation of input data, output and interpretation of results, application of software for plane trusses, portal frames. Term work shall consist of at least two applications on each of the units based on theory of syllabus

INTERNAL CONTINUOUS ASSESSMENT (ICA)

The ICA shall consist the assignment based on above topics

REFERENCE BOOKS:

1. Matrix Operations on Computer – L. L. Bhirud, Oxford and IBM Pub. Co.
2. Matrix, Finite Element, Computer and Structural Analysis – Madhujit Mukhopadhyaya, Oxford and IBM Pub. Co.
3. Mastering in AutoCAD by George Omura.
4. Reference Manual of AutoCAD by Autodesk

TEXT BOOKS:

1. Numerical Concrete, Fundamental approach – Edward G. Nawy- Prentice Hall New Jersey.
2. Numerical Algorithm – E. V. Krishnamurthy & S. K. Sen, Affiliated Best West Press Pvt. Ltd.
3. AutoCAD 3D – by Geoge Head.

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B. E. (CIVIL) PART – I (CBCS)

5. ELECTIVE –II

5.7 ADVANCED STRUCTURES

Teaching Scheme:

Lectures – 3 Hrs/Week, 3 Credits

Practical – 2 Hrs/Week, 1 Credits

Examination Scheme:

ISE – 30 Marks

ESE –70 Marks

ICA –25 Marks

ESE (OE) – 25 Marks

Course objectives:

- 1) To Study basics of Influence lines diagrams for various types of beams
- 2) To develop an ability to analyze beams curved in plan and fixed arches
- 3) To Learn approximate methods for analysis of portal frames subjected to lateral loads
- 4) To Study analysis of plane frames and space trusses

Course outcomes:

By the end of the course students will be able to

- 1) Draw influence line diagrams for various types of beams
- 2) Analyze beams curved in plan and fixed arches
- 3) Implement approximate methods for analysis of portal frames subjected to lateral loads
- 4) Analyze plane frames and space trusses

SECTION – I

Unit 1:

(6)

Influence lines: Muller Breslau principle, I.L.D. for propped cantilever, fixed beam, continuous beam

Unit 2:

(5)

Beams curved in plan.

Unit 3:

(5)

Fixed arches elastic center method.

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Unit 4: (6)
Approximate methods for analysis of portal frames subjected to lateral loads -Portal and Cantilever method

SECTION – II

Unit 5: (6)
Analysis of Secondary Stresses in Plane Frames

Unit 6: . (6)
Analysis of space trusses by tension coefficient method.

Unit 7: (6)
Beams on elastic foundations.

Unit 8: (5)
Unsymmetrical Bending & Shear center

INTERNAL CONTINUOUS ASSESSMENT (ICA)

The ICA shall consist the assignment based on above topics

TEXT & REFERENCE BOOKS:

- i) Advanced Structural Analysis – Vazirani and Ratwani
- ii) Design of Steel Structures – Ramachandra Vol. II, Standard book house Delhi
- iii) Strength of Materials – Vol. II Timoshenko, East-West Press ltd. Delhi
- iv) Mechanics of Structures – S. B. Junnarkar Vol. III, Charotar pub. House Anand

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B.E. Civil (Part-I) (CBCS)

5. ELECTIVE – II

5.8 ENTREPRENEURSHIP

Teaching Scheme:

Lectures – 3 Hrs/Week, 3 Credits

Practical – 2 Hrs/Week, 1 Credits

Examination Scheme:

ISE – 30 Marks

ESE –70 Marks

ICA –25 Marks

ESE (OE) – 25 Marks

Course Objectives:

1. To familiarize the students with the concept of Entrepreneurship, Entrepreneur and Women Entrepreneur opportunities in the country.
2. To acquaint the student's innovative business ideas in emerging industrial scenario with 'small scale industries' policy resolutions.
3. To introduce the student's with finance and accounting aspects, Industrial and commercial tax laws
4. To acquaint the students to marketing management of entrepreneurship.

Course outcomes:

By the end of the course the students will be able to

- 1) Exhibit skills necessary to craft strategies and initiatives which can enable growth and sustainability in an entrepreneurial venture.
- 2) Prepare preliminary and final project report
- 3) Exhibit higher-level critical thinking skills, evidenced by analysis, evaluation, and synthesis.
- 4) Demonstrate skills to establish and manage the accounting process, to employ break even and cost-volume-profit tools.

SECTION – I

Unit 1:

(08)

Meaning, Definition and concept of Enterprise, Entrepreneurship and Entrepreneurship Development, Evolution of Entrepreneurship, risks involved with entrepreneurship, barriers to Entrepreneurship, Factors affecting entrepreneurial growth.

w. e. f. Academic Year 2019-20

Entrepreneur, qualities of a successful entrepreneur, types of entrepreneurs (on basis of business, motivation, stages of development, entrepreneurial activity), functions of an entrepreneur, entrepreneurial competencies, types of entrepreneurial competencies. Concepts of Intrapreneurship, Entrepreneur v/s Intrapreneur, Entrepreneur Vs. Entrepreneurship, Entrepreneur Vs. Manager, Role of Entrepreneurship in Economic Development, Factors affecting Entrepreneurship, Problems of Entrepreneurship. Creativity and Innovation, Innovation and Entrepreneurship.

Unit 2:

(06)

Women Entrepreneurship:- Meaning, Characteristic features, Problems of Women Entrepreneurship in India, Developing Women Entrepreneurship in India, reasons for the slow growth of women entrepreneurship, remedies to solve the problems of women entrepreneurs. Measures taken for the development of women.

Entrepreneurship In India:- Training of Rural Youth For Self Employment, BANKS, NABARD, Industrial Policy, FICCI Ladies Organization (FLO), National Alliance of Young Entrepreneurs (NAYE).

Unit 3:

(08)

Role of Government in promoting Entrepreneurship, MSME policy in India, Agencies for Policy Formulation and Implementation: District Industries Centres (DIC), Small Industries Service Institute (SISI), Entrepreneurship Development Institute of India (EDII), National Institute of Entrepreneurship & Small Business Development (NIESBUD), National Entrepreneurship Development Board (NEDB).

Financial Support System: Forms of Financial support, Long term and Short term financial support, Sources of Financial support, Development Financial Institutions, Investment Institutions. Finance, Institutional finance to Entrepreneurs, Preparation of Business Plans, Commercial Banks, Other financial institutions like IDBI, IFCI, ICICI, IRBI, LIC, UTI, SFCs, SIDCs, SIDBI, EXIM.

Bank Institution Support to Entrepreneurs: Need for Institutional support - Small Entrepreneurs: NSIC, SIDO, SSIB, SSICS, SISI, DICs, Industrial Estates Specialized Institutions.

w. e. f. Academic Year 2019-20

SECTION – II

Unit 4: (08)

Finance Analysis and accountancy: Estimation of cost of project and means of financing, working capital requirement and its financing, estimates of working results working capital and fixed capital assessment incentives from financial institutions and government, financial ratios, their significance, break even analysis cash flow charts financial statements.

Unit 5: (07)

Project Report: Preliminary and final project report preparation, financial technical commercial and economic viability project implementation process project profiles.

Unit 6: (08)

Introduction to Marketing, Market study, Goal sitting, Sale and Sales Promotion. Industrial and commercial tax laws (major features only), Risk and Risk analysis, goal setting and decision making, Communication skills development and barriers.

Note: The subject may be taught with respect to suitable case studies and industrial visits. Audio video films shall be used on the above topics.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

The ICA shall consist :

1. Preparation of preliminary and final project report of anyone small scale industry from civil Engineering field.
2. Report based on two industrial visits.

TEXT BOOKS:

- 1) Patterns of Entrepreneurship, Jack M. Kaplan Wiley Publications.
- 2) Planning and Industrial Unit, Jay Narayan Vyas, GranthVitran Shreyas, Opp. Jain Temple Near Navrangpura Bus Stop, Navrangpura

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- 3) Financing an Industrial Unit, Jay Narayan Vyas and Dilip Patel, Granthvitaran Ahmedabad .
- 4) Entrepreneurship Development Vol. I, II & III, Vasant Desai, Himalaya Publishing house.

REFERENCE BOOKS:

- 1) Entrepreneurship for the Nineties, Gordon B. Baty, Prentice Hall Inc. College Technical Reference by Granthvitaran.
- 2) Small Scale Industry Handbook, Jay Narayan Vyas, Granth Vitaran Ahmedabad
- 3) The Practice of Entrepreneurship, Geoffery G. Meredith R.E. Nelson and P. A. Neck, Published by International Labour Office, CH 1211, Geneva 22, Switzerland
- 4) Entrepreneurship Theory at Cross Road, Mathew J. Manimala, Biztantra publications.
- 5) Entrepreneurship and small business, WEBER, LEWIS, VOLERY, SCHAPER, Wiley publications.



PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR

B.E. (CIVIL) – I (CBCS)

5. ELECTIVE – II

5.9 REMOTE SENSING AND GEOGRAPHICAL INFORMATION SYSTEM APPLICATIONS

Teaching Scheme:

Lectures – 3 Hrs/Week, 3 Credits

Practical – 2 Hrs/Week, 1 Credits

Examination Scheme:

ISE – 30 Marks

ESE –70 Marks

ICA –25 Marks

ESE (OE) – 25 Marks

Course Objectives:

- 1) To gain understanding of the physics of remote sensing and an introduction to the major remote sensing systems that are in operation today.
- 2) To provide introductory understanding and working knowledge of Geographic Information Systems (GIS)
- 3) To gain applied experience in using GIS through a number of case study exercises.
- 4) An understanding of current research, technology and policy developments in the GIS/RS area and their potential applications to environmental and sustainability issues.

Course Outcomes:

By the end of the course students should be able to

- 1) Demonstrate the principles of remote sensing and digital image processing;
- 2) Exhibit knowledge of geographic information systems (GIS);
- 3) Apply remote sensing and GIS to solve problems in Civil Engineering
- 4) Use image processing and GIS application software.

SECTION-I

Unit No. 1

(6)

Introduction to Remote Sensing system: data acquisition and processing, Applications, Multi concept in remote sensing.

w. e. f. Academic Year 2019-20

Unit No. 2**(8)**

Physical Basis of Remote Sensing: EMR nature, definition, nomenclature and radiation laws; Interaction in atmosphere-nature, its effects in various Wave-length regions, atmospheric windows; Interaction at ground surface soils Geometric basis of interaction.

Unit No. 3**(8)**

Platform and Sensors: Terrestrial, aerial and space platforms, Orbital characteristics of space platforms, sun- and geo-synchronous; Sensor systems-radiometers, opto-mechanical and push broom sensor; resolution : spectral, spatial, radiometric and temporal; IFOV, FOV, GRE; geometric characteristics of scanners, V/H and S/N ratio; Data products from various air and space borne sensors-aerial photographs, LiDAR, Landsat, SPOT, IRS, ERS, IKONOS etc.,

SECTION-II**Unit No.4****(5)**

Image Interpretation: elements of interpretation; digital image processing and interpretation; Field verification Field verification;

Unit No.5**(10)**

Geographical Information systems: components of GIS-data acquisition, spatial and attribute data, pre-processing, storage and management; data structures raster and vector data; GIS analysis functions; Errors and corrections; data presentation and generation of thematic maps;

Unit No.6**(8)**

Civil engineering application of remote sensing techniques and GIS.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

The ICA shall consist the assignment based on above syllabus with minimum one case study with GIS Software.

REFERENCE BOOKS:

1. A. M. Chandra and S. K. Ghosh, Remote Sensing and GIS, Narosa Pub, 2007.

w. e. f. Academic Year 2019-20

2. Remote sensing and Geographical information System, M. Anjireddy, B.S. publications
3. Fundamentals of Geographic Information System, Michael N. Demers, Wiley publications
4. I. Heywood, S. Cornelius and S. Carver, An Introduction to GIS; Pearson Education-2nd Ed, 2002.
5. T .M. Lillisand, R.W. Kaifer and J. W. Chipman, Remote Sensing and Image Interpretation ; John Wiley and sons Inc,6th Edition Nov 2007.



PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR

**B.E. (Civil) Part-I
6. SEMINAR**

Teaching Scheme:

Practical – 2 Hrs/Week, 1 Credits

Examination Scheme:

ICA – 50 Marks

Course Objectives:-

- 1) To expose the students to a variety of subjects and research activities in Civil Engineering in order to enrich their academic experience.
- 2) To acquaints department members with all final year students within the department and learn about each students' seminar activities.
- 3) To give an opportunity for students to develop skills in presentation and discussion of various topics in a public forum.

Course Outcome:-

At the end of the course student will be able

- 1) Identify the recent developments and technology transfer taking place in the Civil Engineering domain
- 2) Prepare and deliver the presentation on the subject chosen using recent presentation tools
- 3) Enhance the soft skill and presentation skill

The topic for the Seminar may be related to Civil Engineering area and inter-disciplinary area related to Civil Engineering such as

- | | |
|--------------------------------|--|
| 1) Structural Engineering | 2) Environmental Engineering |
| 3) Geotechnical Engineering | 4) Transportation Engineering |
| 5) Infrastructural Engineering | 6) Water Resources Engineering |
| 7) Town & Country Planning | 8) Surveying & Remote Sensing Techniques |
| 9) Project Management | 10) Legal Aspects in Civil Engineering |
| 11) Earthquake Engineering | 12) Disaster Management |

w. e. f. Academic Year 2019-20



PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR

B.E. (Civil) Part-I

7. PROJECT WORK

Teaching Scheme:

Practical – 2 Hrs/Week, 1 Credits

Examination Scheme:

ICA –25 Marks

Course Objectives:

- 1) To carry out a thematic design project in one of the specializations of civil engineering
- 2) To carry out a project that will make the students aware of the different facets of civil engineering.
- 3) To explore the skill and abilities of student to work in team

Course Outcome:

At the end of the course student will be able

- 1) Develop an ability to apply the basic knowledge of mathematics, science and engineering to real-life problems.
- 2) Identify the real life problem and present the solution by conducting experimental/ analytical study and in and off the laboratory.
- 3) Apply modern tools such as different application software, modern instrumentation for the most precise study of the project undertaken
- 4) Demonstrate a commitment to teamwork while working with other students of diverse culture and different intellectual backgrounds.

The topic for the Project Work may be from any Civil Engineering and inter-disciplinary area related to Civil Engineering as mentioned in content at B.E. (Civil) Part-I. Practical work at B.E. (Civil) part-I will comprise of literature survey / problem formulation / preparation of experimental setup as the case may be of the identified problem.

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PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR

B.E. (Civil) Part-I

7. ASSESSMENT OF REPORT ON FIELD TRAINING- II

Credit - 1

ICA – 25 Marks

The students are required to undergo training in any of the areas of Civil Engineering for 30 working days beyond the academic schedule between the completion of T.E. (Civil) Part-I and B.E. (Civil) Part-I term end.

The training may be related to any of the Civil Engineering areas or inter-disciplinary areas such as:

- 1) Structural Engineering
- 2) Environmental Engineering
- 3) Geotechnical Engineering
- 4) Transportation Engineering
- 5) Infrastructural Engineering
- 6) Water Resources Engineering
- 7) Town & Country Planning
- 8) Construction Engineering
- 9) Surveying & Remote Sensing Techniques
- 10) Project Management
- 11) Legal Aspects in Civil Engineering
- 12) Earthquake Engineering
- 13) Disaster Management

Student shall submit a report of the field training undergone. The students should obtain a certificate of completion of training from the concerned organization and submit it to the department office. Assessment of the training report will be done by the 'Project Guide' to whom the concerned student is allotted.

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PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR

B.E. Civil – Part II (CBCS)

1. DESIGN OF CONCRETE STRUCTURES – II

Teaching Scheme:

Lectures – 4 Hrs/Week, 4 Credits

Practical – 2 Hrs/Week, 1 Credits

Examination Scheme:

ISE – 30 Marks

ESE –70 Marks

ICA –50 Marks

Course Objectives: At the end of course, students will be made familiar with

1. Analysis and Design of RCC Stairs and Column Footings.
2. Analysis and Design of RCC Retaining walls and Water tanks.
3. Pre stressing types and systems and analysis of Pre stress concrete sections.
4. Loss of Pre stress and Design of Pre stress Beams.
5. Analysis and Design of End Block of post tensioned PSC girder.

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

- 1) Analyze and Design RCC Stairs and Column Footings.
- 2) Analyze and Design of RCC Retaining walls and Water tanks.
- 3) Analyze Pre stress concrete sections.
- 4) Determine Loss of Pre stress and Design of Pre stress Beams.
- 5) Analyze and Design the End Block of post tensioned PSC girder.

SECTION I

Unit 1: Staircases (Limit state method) (7)

Design of Staircases, types of staircases, design of simply supported and Dog-legged staircases, Open well staircase with solid waist slab

Unit 2: Column Footings (7)

Design of isolated square and rectangular column footing, column footings subjected to eccentric load.

Unit 3: (8)

Analysis and design of cantilever and counter fort retaining walls

w. e. f. Academic Year 2019-20

Unit 4: (8)
Design of water tank: Design criteria, permissible stresses, Design of circular, rectangular GSR by IS code method

SECTION II: PRESTRESSED CONCRETE

Unit 5: (5)
Introduction to prestressed concrete, concepts, systems and methods of pre-stressing.

Unit 6: (7)
Analysis of Symmetrical and unsymmetrical sections, thrust line, cable profiles.

Unit 7: (5)
Losses in prestress. - Pre & Post tensioned members.

Unit 8: (7)
Design of rectangular and Symmetrical I sections.

Unit 9: (6)
Analysis and design of end blocks by various methods , Stress concentration.

NOTE:

Only IS: 456-2000 shall be allowed in University Exam.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

The ICA shall consist Ten Design Assignments on above syllabus.

REFERENCE BOOKS:

1. IS: 456-2000 and IS 1343
2. Reinforced Cement Concrete - B.C. Punmia
3. Reinforced Cement concrete - Jain Vol.I & II

w. e. f. Academic Year 2019-20

4. Prestressed Concrete – T.Y.Lin John Willey & sons, Newyork.
5. Prestressed Concrete – Sinha & Roy, S.Chand & Co., New Delhi
6. Prestressed Concrete – N.Krishnaraju.
7. Prestressed Concrete – P. Dayaratnam.
8. Prestressed Concrete – Leon Hardt.
9. Reynolds's Reinforced concrete Designer's Handbook.



PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR

B.E. Civil –Part II (CBCS)

2. CONSTRUCTION PRACTICES AND TOWN PLANNING

Teaching Scheme:

Lectures – 4 Hrs/Week, 4 Credits

Examination Scheme:

ISE – 30 Marks

ESE –70 Marks

ICA –25 Marks

Course objectives:

- 1) To study various construction methods and practices for Civil Engineering Projects
- 2) To learn prefabricated construction methods and safety at work
- 3) To impart basic knowledge of Town Planning to civil engineering students.
- 4) Learning town surveys, town aesthetics, M. R. Town Planning act

Course Outcomes:

By the end of the course students should be able to

- 1) Prepare layout of small towns
- 2) Identify and select various inputs for town planning
- 3) Calculate output of construction machines
- 4) Execute various items of construction work using construction machinery and adopt appropriate safety measures.

SECTION – I

TOWN PLANNING (2 CLOCK HOURS PER WEEK)

Unit 1: Necessity- Contribution- layouts

(12)

Necessity and scope of Town Planning, Brief history. Greek and Roman towns, planning in ancient India - Indus Valley civilization. Vedic period. Buddhist period. Medieval period. Contribution of town planners in modern era such as Sir Patrick Geddes. Sir Ebenezer Howard. Clarence stein sir Patrick Abercrombie, Le corbusier Present status of town planning in India. Layout of residential units, neighbourhood unit planning, Radburn plan, grid iron pattern. Cul de sacs shoe string development. Growth pattern of towns, concentric satellite, ribbon, scattered.

w. e. f. Academic Year 2019-20

Unit 2: Elements of Town-surveys-Town aesthetics (10)

Elements of town, various zones, Types of zoning. Urban roads- Objective and classification of roads, various road networks.

Surveys- physical, social, economic civic etc., Analysis of data, Town aesthetics, Treatment of traffic islands, open spaces, walks ways, public sit-outs. Sky walk, Continuous park system. Green ways.

Unit 3: M.R.T.P. –Land acquisition – rural development. (08)

Importance of MRTP in town planning.

Land acquisition act – necessity and procedure of acquisition. Village planning- Planning process, Multilevel planning, Decentralization concepts. Rural developments- planning methodology, Growth centre approach, Area Development approach, Integrated rural development approach

SECTION – II

CONSTRUCTION PRACTICES (2 CLOCK HOURS PER WEEK)

Unit 1: Earthwork Equipments (14)

Introduction -Conceptual planning of new project, site access and services, Mechanical v/s Manual construction.

Excavation in Earth: Earth moving equipments - Tractors, Bulldozers, Scrappers, Power shovel, Hoes, simple numerical problems based on cycle time and production rates, Drag line, Clamshell, Trenchers, Compactors- types and performance, operating efficiencies.

Unit 2: Prefabricated Units and Hoisting/ Erection Equipments (10)

Prefabricated construction – relative economy, elements and simple connections, cranes. Floating and dredging equipments. Asphalt mixing and batching plant (hot mix plant), sensor paver for rigid roads, Diaphragm Walls – Purpose and Construction Methods

Unit 3: Construction safety (6)

w. e. f. Academic Year 2019-20

Safety against accidents on various construction sites such as building, dam, road, tunnel, bridge, fabrication and erection works, etc. Safety at various stages of construction.
Safety measures in construction, prevention of accidents

INTERNAL CONTINUOUS ASSESSMENT (ICA)

The ICA shall consist Two Assignments per unit based on above syllabus.

REFERENCE BOOKS:

TOWN PLANNING

- i) Town and country Planning- N.K. Gandhi, Indian Town and Country Planning Association, 1973.
- ii) Fundamentals of Town Planning-G.K. Hiraskar, Dhanpat Rai Publication, 17th Edition.
- iii) Town Planning- S. C. Rangawala, Charotar Publications, Pune .
- iv) MRTP Act 1966.
- v) Land Acquisition Act – 1894.
- vi) Urban Pattern by Gallion, Eisner.
- vii) Rural development Planning – Design and method : Misra S.N., Satvahan Publications , New Delhi.
- viii) Economic development in Third world: Todaro Michael, Orient Longman Publication, New-Delhi
- ix) Construction Safety Manual, National safety Commission of India.

CONSTRUCTION PRACTICES

- i) Construction, Planning, Equipment and methods - R. L . Peurifoy McGraw hill book co New Delhi
- ii) Erection of Steel Structures – Thomas Baron
- iii) Reinforced Concrete Bridges – Taylors
- iv) Planning and Construction of Docks and Harbors – Quin
- v) Construction Equipment Guide, David A. Day, Neal B. H. Benjamin, John Wiley & Sons.
- vi) Construction Equipment – Mahesh Varma ,Metropolitan book co ,New York

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- vii) Hand Book of Heavy Construction – Stubbs
- viii) Concrete Construction Hand Book – Wadel
- ix) Heavy Construction – Planning, Equipment and methods – Jagman Singh, Oxford and IBH publishers, New Delhi.
- x) Construction of Diaphragm Walls, I Hajnal, I Marton, F. Regele Wiley Interscience Publication, John Wiley & Sons.
- xi) Structural & cut off Diaphragm walls, R.G.H. Boyes, Applied Science Publishers Ltd., London.
- xii) Construction Technology, Prof. S. S. Ataev, Mir Publishers, Moscow.



PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR

B.E. Civil –Part II (CBCS)

TRANSPORTATION ENGINEERING II

Teaching Scheme:

Lectures – 4 Hrs/Week, 4 Credits

Examination Scheme:

ISE – 30 Marks

ESE –70 Marks

ICA –25 Marks

Course objectives:

1. To Study various components of a railway track and geometric design of curves along railway tracks.
2. To impart knowledge of functioning of railway points, crossings, permanent way construction and junctions.
3. To learn about the aircraft characteristics, airport planning and air traffic control.
4. To introduce the students to docks and harbour engineering.

Course outcomes:

On completion of the course, the students will be able to:

1. Perform geometric design for the Railway tracks.
2. Evaluate engineering properties of the materials, to calculate the material quantities required for construction.
3. Design simple turnout at points and crossings and describe the working principles of railway interlocking system.
4. Design and plan airport layout, design facilities required for runway, taxiway and impart knowledge about visual aids.
5. Describe components of Docks and Harbour and their working principles

SECTION-I

RAILWAY ENGINEERING

UNIT 1: Introduction to Railway Engineering

(5)

History of Indian Railways- Component parts of railway track, Wheel and axle arrangements, Coning of wheels, Various resistance and their evaluation, Hauling capacity, Tractive effort, Stresses in railway tracks, Stresses in rail, Stresses in sleepers, Stresses in ballast, Formation.

w. e. f. Academic Year 2019-20

Unit 2: Permanent way component parts (5)

Types of rail section, Creep- wear and failure in rails, Rail Joint, Welding of rails, Sleeper Requirements and types, Tracks fixtures and fastenings, Bearing plates, Anti-creep device, Check and guard rails. Ballast requirements, Blanketing layer, Formations, Cross sections and Drainage.

Unit 3: Railway Construction and Maintenance: (6)

Earthwork – Stabilization of track on poor soil, Calculation of Materials required for track laying – Construction and maintenance of tracks – Modern methods of construction & maintenance – Railway stations and yards and passenger amenities- Urban rail – Infrastructure for Metro, Mono and underground railways. RDSO specifications

Unit 4: Geometric Design (5)

Alignment, Horizontal curves, Super elevation, Equilibrium cant and cant deficiency, Length of transition curves, Gradients and grade compensation, Vertical curves.

Unit 5: Points and Crossing: (5)

Functions of turn outs, Design of simple turn out, various types of track junction and their configurations.

Unit 6: Signalling and Interlocking: (4)

Control of Train movement and monitoring, Types of signals, Modern signalling Installations. Principle of interlocking, Modernization of railway and railway tracks, High speed tracks.

SECTION- II

AIRPORT ENGINEERING

Unit 7: Air transport development: (3)

Airport scenario in India-Stages of development, Aircraft characteristics, Airport planning, Site selection, Obstruction and zoning laws, Imaginary surfaces. Approach zone and turning zones.

Unit 8: Runway and Taxiway design: (8)

w. e. f. Academic Year 2019-20

Typical Airport layout, Element of runway, Orientation and configuration, Basic runway length and correction by ICAO and FAA specification, Geometric design elements, Taxiway design by ICAO and FAA specification, Exit taxiway, Separation clearance, Holding Aprons, Terminal building, Gate position.

Visual Aids and Air traffic Control:

Airport marking and lighting, Air way and airport traffic control, Instrumental landing Systems and other navigation aids.

Unit 9: DOCK AND HARBOURS ENGINEERING: (4)

Harbours: Classification of ports – Requirement of a good port – classification of Harbours – Docks – Dry & wet docks – Transition sheds and workhouses – Layouts; Quays – construction of Quay walls – Wharves – Jetties – Tides – Tidal data and Analysis – Break waters – Dredging – Maintenance of Ports and Harbours – Navigational aids.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

Assignment on each chapter and field visit report shall be submitted by the students.

TEXT BOOKS

- Railway Engineering by Satish Chandra and Agarwal M.M., Oxford University Press, New Delhi
- Airport Engineering by Khanna & Arora – Nemchand Bros, New Delhi.
- Docks and Harbour Engineering by Bindra S.P. – Dhanpathi Rai & Sons, New Delhi.
- RDSO Codes

REFERENCES

- ‘Railway Engineering’ by Saxena & Arora – Dhanpat Rai, New Delhi.
- ‘Transportation Engineering Planning Design’ by Wright P.H. & Ashfort N.J. – John Wiley & Sons.
- ‘Airport Engineering’ by Virendra Kumar, Dhanpat Rai Publishers, New Delhi.
- ‘Transportation Engineering’ by Srinivasa Kumar R, University Press, Hyderabad
- Railway and track Engineering- by Mundrey J.S.- Tata McGraw-Hill Education
- . Docks and Harbour Engineering Oza, Charotar Publication House

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PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR

B.E. (CIVIL) PART-II (CBCS)

4. ELECTIVE III

4.1. ADVANCED ENGINEERING GEOLOGY

Teaching Scheme:

Lectures – 4 Hrs/Week, 4 Credits

Practical – 2 Hrs/Week, 1 Credits

Examination Scheme:

ISE – 30 Marks

ESE –70 Marks

ICA –25 Marks

ESE (OE) – 25 Marks

Course Objectives:

- 1) To impart knowledge of geological formations of India
- 2) To learn about seismic zones of India and Seismic activity of Deccan trap region.
- 3) To know geological studies required for Civil Engineering project site
- 4) To study characterization of soils derived from different types of rocks
- 5) To impart knowledge of earth renewable and non renewable resources

Course outcomes:

By the end of the course students should be able to

- 1) Demonstrate knowledge of seismic zones of India and seismic activity in Deccan trap region.
- 2) Undertake geological studies required for various Civil Engineering project site
- 3) Characterize various soils derived from different types of rocks
- 4) Select appropriate technique of Geophysics for site exploration
- 5) Identify aquifer zones in project site.

SECTION – I

Unit 1: Stratigraphy and Indian Geology

(6)

Definition and scope, Geological Time scale, Physiographic division of India and their geologic, geomorphologic and tectonic characteristics, General study of important geological formations of India namely Dharwar , Vindhyan, Cuddapah, Gondwana and Deccan traps , Tertiary with respect to:

1. Introduction and general information.

w. e. f. Academic Year 2019-20

2. Distribution.
3. Lithology.
4. Tectonics.
5. Economic importance, Significance of these studies in Civil Engineering.

Unit 2: Seismic Activity of Deccan Trap Regions (6)

Continental Drift Theory and plate Tectonics in brief, Seismic zones of India, world, Seismic activity of Deccan trap region. Various theories on the origin of the seismic activity of Deccan Trap region, Reservoir induced seismicity, characteristics of seismic activity of Deccan Trap region. Tectonics of Deccan Trap region. Tectonic nature of seismic activity of Deccan Trap region. Prediction and precaution of earthquake. Earthquake proof constructions. Numerical problems based on seismic data.

Unit 3: Subsurface Exploration (4)

Various steps in the geological studies of project site, Engineering consideration of Structural features like dip, strike, joints, fractures, faults, folds, dykes etc. Exploratory drilling, observations during drilling, preservation of cores, core Logging, Graphical representation of core log, Limitations of exploratory drilling method, Numerical problems on core drilling.

Unit 4: Subsurface Water (7)

Runoff, Fly off and percolation of surface water, Ground water, Juvenile, connate and meteoric water, water table, zones of subsurface water, perched water table, types of aquifer. Requirements of good aquifer, Porosity and permeability of rocks, Darcy's law, hydraulic gradient, regional problems in ground water, water bearing capacity of common rocks, springs, hot springs and geysers, Artesian wells, cone of depression and its significance in civil Engineering, Natural and artificial recharge of aquifers, Saline water intrusions - control and prevention, Numerical problems related to Groundwater. Photogrammetry, Remote sensing and GIS /GPS, Water management.

SECTION II

Unit 5: Engineering Geology of Deccan Traps (6)

Types of Basalts and associated volcanic rocks, Engineering characteristics of these rock

w. e. f. Academic Year 2019-20

types, Engineering significance of variation in size, number and infillings of gas Cavities, Compact and amygdaloidal basalt as construction material, Effect of Jointing, hydrothermal alteration and weathering on engineering behavior of Various varieties of Deccan traps. Tail channel erosion problem in Deccan Trap region, suitability of Basalts from tunneling point of view. Problems due to columnar Basalt, dykes, red bole, Vesicular Basalt, volcanic breccias and fractures, Laterites -Origin, occurrence and engineering aspects. Ground water bearing capacity of the rocks of Deccan Trap region, Percolation tanks, Geological conditions suitable and unsuitable for construction of Percolation tanks

Unit 6: Geology of Soil Formations (3)

Soil genesis, Geological classification of soils, Residual and transported soils, soil Components, characteristics of soils derived from different types of rocks. Nature of alluvium and sand of the rivers of Deccan Trap region, Scarcity of sand in Deccan Trap area.

Unit 7: Geophysics (5)

Various geophysical methods, Basic principles of seismic, magnetic, gravitational and electrical resistivity methods, electrical resistivity. Use of electrical resistivity method using Wenner, Schlumberger, Inverse slope Configuration in Civil Engineering problems such as

- i) Finding out the thickness of over burden and depth of hard rock.
- ii) Locating the spot for ground water well.
- iii) Seepage of water finding.
- iv) Water harvesting techniques

Unit 8: Rock Mechanics (5)

General principles of rock mechanics, various engineering properties of rocks and their dependence upon geological characters, In-built stresses in rocks, measurements of these stresses by various methods.

Unit 9: Resource Engineering (4)

Types of resources, Earth renewable and non renewable resources, Coal and Petroleum as energy resources, Genesis, occurrence and reservoir of coal and Petroleum in India,

w. e. f. Academic Year 2019-20

geothermal energy. Mining methods, Mining laws, Mineral dressing techniques.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

The ICA shall consist of the laboratory work based upon following Syllabus.

- 1) Study of geological map of Maharashtra state and India.
- 2) Study of Civil Engineering aspects of important rock types.
- 3) Study and identification of important rocks and minerals in Megascopic and thin section under Microscope.
- 4) Three point problems.
- 5) Core logging of exploring drill hole.
- 6) Study and constructions of subsurface sections based upon data of the series of drill holes.
- 7) Completion of outcrop on contoured geological map and drawing a section of it.
- 8) Photogrammetry, Remote sensing and GIS
- 9) Use of electrical resistivity method for determining depth of bedrock, or ground water, Problems on confined and unconfined aquifers.
- 10) Education tour to the projects to study engineering geological aspects.

TEXT BOOKS:

1. Introduction to Rock Mechanics by Verma B. P., Khanna Publisher Delhi.
2. Engineering Geology –By B. S. Sathya, Narayanswami.
3. Introduction to Engineering and General Geology – by Dr. P. T. Sawant, New India Publishing Agency- NIPA, New Delhi.
5. Engineering Geology- A. Parthasarathy, Wiley India Pvt. Ltd. New Delhi
6. Fundamentals of Engineering Geology: F. G. Bell, B. S. Publications

REFERENCE BOOKS:

1. Geology of India and Burma – D.N Wadia, M. S. Krishnan, Higginbotham Pvt. Ltd;
2. Groundwater Hydrology by Tod D. K.-John Wiley & Son. New York
3. Groundwater- C.F. Tolman. McGraw Hill Co.
4. A Text Book of Engineering Geology-By R. B. Gupte- Pune Vidyarthi Griha

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Prakashan, Pune.

5. India's Mineral Resources - S. Krishnaswamy. Oxford & I.B.H. Co.
6. Koyana Earthquake Journal (1968) Indian Geophysics Uni.
7. Engineering Geology for Civil Engineers by Dr. D. V. Reddy.

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PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR

B.E. (CIVIL) PART-II (CBCS)

4. ELECTIVE III

4.2 GROUND IMPROVEMENT TECHNIQUES

Teaching Scheme:

Lectures – 3 Hrs/Week, 3 Credits

Practical – 2 Hrs/Week, 1 Credits

Examination Scheme:

ISE – 30 Marks

ESE –70 Marks

ICA –25 Marks

ESE (OE) – 25 Marks

Course objectives:

1. Students will know about various types of complex soil and learn appropriate ground improvement techniques to improve performance of soil.
2. Students will know various methods of drainage and dewatering, during construction stage and post construction stages
3. Students will learn about the use of geosynthetics in ground improvement methods.
4. Students will be familiar with various slope stabilization techniques and their limitations.
5. Students will be conversant with various soil stabilization techniques

Course outcomes:

By the end of the course students should be able to

1. Select and apply suitable ground modification technique while dealing with complex soils.
2. Design shallow compaction system as well as deep dynamic compaction system.
3. Design PVD system, sand drains, stone columns, dewatering systems.
4. Apply suitable stabilization techniques which suits the soil at the site.

SECTION I

Unit 1:

(4)

Introduction: Ground modification option in dealing with difficult soils, objectives of ground improvement. Role of ground improvement in foundation engineering – classification

w. e. f. Academic Year 2019-20

of ground modification techniques – Geotechnical problems in alluvial, lateritic and black cotton soils –Factors to be considered in the selection of the best soil improvement technique.

Unit 2: (10)

Mechanical modification: Introduction, aim of mechanical modification; surface compaction of soil, various equipment for compaction and their suitability for different soils.

In-situ Densification methods in cohesionless soils: Rapid impact compaction, Deep Dynamic compaction, Vibro flotation, Sand compaction piles and deep compaction and blasting.

In-situ Densification methods in cohesive soils: Introduction, Consolidation, Preloading with sand drains, and fabric drains, Stone columns and Lime piles, installation techniques, simple design , relative merits of above methods and their limitations.

Unit 3: (8)

Hydraulic modification: Dewatering, purpose of dewatering during construction stage and post construction stage, methods of dewatering such as ditch and sump method, Well point system , deep well system, Vacuum dewatering system, Electro-osmotic method ; advantages and limitations of each method Seepage analysis for two dimensional flow, fully penetrating slots in homogeneous deposits (simple cases only).

SECTION II

Unit 4: (6)

Thermal modification and slope stabilization: Heat treatment of soils, methods of heating soil in situ; ground freezing introduction, techniques of in situ artificial ground freezing, Slope stabilization Concept, various methods, Growing vegetation, drainage, anchoring, micro piling bolting Soil nailing etc.

Unit 5: (8)

Physico-Chemical modification:

Mechanical stabilization: Soil aggregate mixture, properties and proportioning techniques, soft aggregate stabilization, compaction, field compaction control. Cement stabilization,

w. e. f. Academic Year 2019-20

Mechanism, factors affecting and properties, use of additives, design of soil cement mixtures, construction techniques.

Lime and Bituminous Stabilization: Types of admixtures, mechanism, factors affecting, design of mixtures, construction methods.

Unit 6:

(9)

Modification by inclusions and confinement:

Grout injections, suspension and solution grouts, grouting equipment and methods, Applications. Reinforced Earth: Principles, components of reinforced earth, factors governing design of reinforced earth walls, Introduction to reinforced earth, load transfer mechanism and strength development, soil types and reinforced earth, anchored earth nailing reticulated micro piles, soil dowels, soil anchors, reinforced earth retaining walls

INTERNAL CONTINUOUS ASSESSMENT (ICA)

At least two assignments shall be given on each unit based on concept, theory and design of ground improvement technique. Minimum 12 assignments shall be given.

TEXT BOOKS:

1. Engineering principles of ground modification by M. R. Hausmann, McGraw hill publication
2. Ground Improvement Techniques- Purushothama Raj P. (1999), Laxmi Publications, New Delhi.
3. Construction and Geotechnical Method in Foundation Engineering- Koerner R.M. (1985) - McGraw Hill Pub. Co., New York.

REFERENCE BOOKS:

1. Foundation and earth retaining structures by Muni Budhu John Wiley and sons
2. Ground Improvement by M.P. Moseley and K. KirschSpon press
3. Das, B.M., Principles of Foundation Engineering, Fourth Edition, PWS Publishing, 1999.
4. Boveven R., Text Book on Grouting in Engineering Practice, Applied Science Publishers Ltd.

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5. Donald .H. Gray & Robbin B. Sotir, Text Book on Bio Technical & Soil Engineering Slope Stabilization, John Wiley
6. Rao G.V. & Rao G.V.S., Text Book On Engineering with Geotextiles, Tata McGraw Hill
7. Soil stabilization, Principles and Practice—Ingles C.G. and Metcalf J. B. (1972), Butter worth, London.
8. Shroff A. V. “Grouting Technology in Tunneling and Dam, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi-1999
9. Moseley M. D. Ground Treatment, Blackie Academic and Professional, 1998
10. Van Impe W. E., Text Book on Soil Improvement Techniques and Their Evolution, Balkena Publishers.



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B.E. (CIVIL) PART-II (CBCS)

4. ELECTIVE III

4.3 TRAFFIC ENGINEERING AND CONTROL

Teaching Scheme:

Lectures – 3 Hrs/Week, 3 Credits

Practical – 2 Hrs/Week, 1 Credits

Examination Scheme:

ISE – 30 Marks

ESE –70 Marks

ICA –25 Marks

ESE (OE) – 25 Marks

Course Objective: -

1. Students should learn basics of traffic engineering, road user characteristics and vehicular characteristics.
2. Familiarizing the students to various traffic studies their methodologies, application and analysis of traffic data.
3. To learn about nature of traffic flow, capacity studies for urban and rural roads and concept of Passenger Car Unit (PCU).
4. To know the various traffic control regulations, traffic control devices, design intersections and signals.
5. To learn the applications of various modern instruments used in traffic studies.

Course Outcomes:

On completing this course, the students will be able to

1. Undertake various traffic studies and analysis of traffic data including parking studies and calculation of parking demand.
2. Distinguish relation between flow, density, speed, concept of level of service for urban and rural area.
3. Describe the regulations on vehicle, driver and speed and Vehicle as per Motor Vehicle Rules.
4. Design intersections and signals and propose various traffic signs, road marking and lighting at various locations.
5. Apply principles of various modern instruments used in traffic studies.

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SECTION-I

Unit-1:

8

- a) Introduction: Components of road traffic, the vehicle, driver and road, Objectives-Scope of Traffic Engineering.
- b) Traffic characteristics: Road user characteristics, vehicular characteristics-static and dynamic characteristics, power performance of vehicles, Road Characteristics, Resistance to the motion of vehicles – Reaction time of driver.

Unit-2:

8

Traffic parameter studies and Analysis: Objectives and Method of study – Definition of study area- Sample size – Data Collection and Analysis- Interpretation of following Traffic Studies- Volume, Spot Speed, Speed and Delay , Origin and Destination, - parking on street and off street Parking- space consideration, parking demand, parking load and duration, space demand relation. Accidents- Causes, Analysis, Measures to reduce Accident. Statistical applications in traffic studies and traffic forecasting.

Unit-3:

6

Traffic Flow and Capacity: Nature of Traffic flow, Approaches to understand Traffic Flow, Parameters connected with Traffic Flow, Categories of traffic flow, uninterrupted traffic flow model, Analysis of speed, flow and density relationship, Empirical studies of traffic stream Characteristics. Highway Capacity and level of service, capacity of urban and rural roads, PCU concept.

SECTION-II

Unit-4:

8

Traffic Regulation: General regulations, regulations on vehicles- Vehicle registration requirements and accessories, vehicle inspection, inspection coverage, general control for motorist pedestrian, regulations on drivers- driver licensing, speed control- methods of control devices speed zoning, one way street – necessity, requirements, advantages and disadvantages. Central Motor Vehicle Rules

Unit-5:

7

Traffic Control Devices: Traffic signs, traffic Markings, islands, types of intersection and channelization, Rotary intersection design and traffic signal design by IRC and Webster's method- vehicle actuated and synchronized signals, signal coordination, Road Lighting and Intelligent Transport System- Definition, Necessities, Application in the present traffic scenario.

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Unit-6:**8**

- a) Automated Traffic Measurement – Traffic volume measurement – In-situ Technologies (Intrusive and non- Intrusive technologies), detectors and magneto-meter/ Passive magnetic systems, pneumatic tube detector, Inductive Detector Loop (IDL), Weigh in motion (WIM) detector system, Video image detection (VID), Infrared Sensors. Speed and delay survey- Floating Car Data (FCD), GPS-based FCD, application of Radio-frequency identification (RFID), Travel Time Data collection Technique, ITS probe vehicle data collection systems. Bump Integrator, Portable skid resistance tester, sideways force test vehicle and miscellaneous equipment.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

The ICA shall consist

- a) Field studies on traffic volume at midblock, intersection; O-D studies; speed studies, spot speed, speed and delay; parking demand studies and accident studies. Preparation and submission of report on all field surveys.
- b) Assignment on each chapter and field visit report shall be submitted by the students.
- c) Brief report on applications of software's used in traffic studies and analysis, such as VISSIM, SIDRA, PASSER III, TSIS, AIMSUN, Dynameq, Dynasmart, and SimTraffic and Transyt-7F.

TEXT BOOKS:

1. Traffic Engineering by Matson, Smith and Hurd *McGraw Hill & Co publication.*
2. Traffic Engineering and Transport Planning by Dr. L.R.Kadiyali., *Khanna Publishers.*
3. Highway Engineering by Khanna and Justo, *Nem Chand & Bros publication.*
4. Traffic Engineering – An Introduction by Wells, G.R., *Griffin, London publication.*

REFERENCE BOOKS:

1. Traffic Engineering by Pignataro, *Prentice Hall publications*
2. Highway Traffic Analysis and Design by Salter, R.J and Hounsell, N.B., *Mac Millan publishers, 1996.*
3. Highway capacity Manual-2000.

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4. An Introduction to Transportation Engineering by Jotin Khistey and Kent Lall, *Prentice Hall publication, 2002.*
5. Traffic Engineering by Roger P. Roess, Elena S. Prassas & William R. McShane, Fourth Edition, Pearson Education, South Asia



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4. ELECTIVE III

4.4 INFRASTRUCTURAL ENGINEERING

Teaching Scheme:

Lectures – 3 Hrs/Week, 3 Credits

Practical – 2 Hrs/Week, 1 Credits

Examination Scheme:

ISE – 30 Marks

ESE –70 Marks

ICA –25 Marks

ESE (OE) – 25 Marks

Course Objectives:-

- 1) To impart knowledge of Power, Transportation, Water Supply, Sanitation, and Telecommunications Sector in India.
- 2) To acquaint student to Philosophy of Public private partnership in Infrastructure
- 3) To study policies related to Special Economic Zones, Concerned organizations and role of players in the field of infrastructure.
- 4) Acquaint the Information Technology and Systems for successful infrastructure management.

Course Outcomes:-

Upon successful completion of course the students will be able to:

- 1) Apply Infrastructure Engineering concepts and a understand Public Private Partnership in Civil Engineering.
- 2) Apply the principles of Public private partnership in Infrastructure
- 3) Implement policies, economics, operation research, and technologies prevailing in infrastructural engineering.
- 4) Apply the Information Technology and Systems tools for successful infrastructure Management.

SECTION –I

Unit 1:

(08)

An Overview of Basic Concepts Related to Infrastructure

Introduction to Infrastructure, Overview of the Power Sector, Transportation Sectors, Water Supply and Sanitation Sector, Road, Rail, Air, and Port Telecommunications Sector Urban Infrastructure, Rural Infrastructure in India

w. e. f. Academic Year 2019-20

An introduction to Special Economic Zones, Organizations and players in the field of infrastructure, The Stages of an Infrastructure Project Lifecycle, Infrastructure Project Finance.

Unit 2: (08)

Public private partnership in Infrastructure

Historical Overview: - Infrastructure privatization the benefits of Infrastructure privatization
Problems with infrastructure privatization.

Challenges in privatization of Water Supply, Privatization of Power, Privatization of Infrastructure in India: Water Supply project- Privatization of road transportation infrastructure in India

Unit 3: (07)

Challenges to Successful Infrastructure Planning and Implementation

Economic and demand risks, Political risks, Socio-Environmental risks, Cultural risks in international infrastructure projects, Legal and contractual issues in Infrastructure. Challenges in construction and maintenance of infrastructure.

SECTION –II

Unit 4: (08)

Strategies for Successful Infrastructure Project Implementation

Risk management framework for Infrastructure Projects, Shaping the planning phase of infrastructure projects to mitigate risks, Designing Sustainable Contracts, Introduction to fair process and negotiation, Negotiating with multiple stakeholders on infrastructure projects, Sustainable development of infrastructure

Unit 5:

Advanced Infrastructure (08)

Information Technology and Systems for successful infrastructure Management, Innovative design and maintenance of infrastructure facilities, Performance Modelling and Life Cycle Analysis techniques, Capacity Building, Improving the Government's role in infrastructure implementation ,An integrated framework for successful Infrastructure

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Unit 6:

(06)

Planning, and Management – Infrastructure Management Systems and Future directions

INTERNAL CONTINUOUS ASSESSMENT (ICA)

The ICA shall consist Assignments based on above syllabus. Minimum five field visits with visit reports.

TEXT BOOKS:-

- 1) Infrastructure Engineering and Management, Grigg, Neil, Wiley Publication, (1988).
- 2) Infrastructure management: Integrating design, Construction, Maintenance, Rehabilitation, and Renovation, Hudson, Haas, and Uddin, Tata McGraw Hill Publication, (1997).

REFERENCES BOOKS:-

- 1) Indian Road Congress Journal.
- 2) Indian Railways Journal.
- 3) Indian Water Works Association Journal.
- 4) World Development Report 1994: Infrastructure for Development (1994).

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4. ELECTIVE III

4.5 PROJECT APPRAISAL

Teaching Scheme:

Lectures – 3 Hrs/Week, 3 Credits

Practical – 2 Hrs/Week, 1 Credits

Examination Scheme:

ISE – 30 Marks

ESE –70 Marks

ICA –25 Marks

ESE (OE) – 25 Marks

Course Objectives:

- 1) To understand the formulation and identification of project.
- 2) To understand the financial aspect and Investment Criteria.
- 3) To familiarize with proper methodology and various technical, financial and Investment Criteria, Appraisal and risk analysis for Civil Engineering project
- 4) To guide for documentation and report making.

Course Outcomes:

By the end of the course students should be able to

- 1) Formulate projects and identify projects for various locations and sites.
- 2) Apply the financial aspect for financial analysis and proper financial management for Civil Engineering projects.
- 3) Apply proper methodology and various Technical, Financial and Investment Criteria, Appraisal and risk analysis for Civil Engineering projects.
- 4) Prepare the reports for presentation and administration the project.

SECTION – I

Unit 1:

(08)

Project formulation and Identification:-

Project- Concepts, Capital investments, Generation and Screening of Project Ideas.

Project identification – Preliminary Analysis, Market, Technical, Financial, Economic and Ecological - Pre-Feasibility Report and its Clearance, Project Estimates and Techno Economic Feasibility Report, Detailed Project Report – Different Project Clearances required.

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Unit 2:**(08)**

Technical Analysis:- Plant Capacity, Materials and Utilities, Environmental considerations, Project charts and layouts, Location and site, Infrastructure costs, Environmental aspects, Project Implementation, Considering alternatives

Market and Demand analysis: - Collection of Information, Conduct of Market Survey, Characterisation of Market, Demand Forecasting, Marketing Plan.

Unit 3:**(07)****Financial analysis and Investment Criteria:-**

Financial Analysis:- Estimates of Sales and Production, Cost of production, Capital cost, Engineering economic and Comparison, investment and capital flow of the outlay cash project and its significance profit, Probability and break even analysis.

Investment Criteria:- Internal Rate of Return, Benefit Cost ratio, Net Present Value, Account Rate of Return, Pay Back Period, study influence of inflation on profitability influence of inflation and escalation on the projects.

SECTION – II**Unit 4:****(07)**

Social Aspects: Social cost benefit analysis (SCBA):- Rationale for SCBA – UNIDO approach objectives, direct – indirect costs and benefits – tangibles, intangibles and their conversion, levy subsidy concepts. Net benefit in terms of economic prices - Little and Mirlee's approach to SCBA.

Unit 5:**(08)**

Appraisal: Decision making criteria and selection from alternatives using the Discounting and Non-Discounting criteria, Assessment of Various Methods, Indian Practice of Investment Appraisal, International Practice of Appraisal.

Analysis of Risk:- Selection of a Project and Risk Analysis in Practice using Sensitivity analysis and Market analysis, application of decision tree analysis and game theory.

w. e. f. Academic Year 2019-20

Unit 6:**(07)****Project Review and Administration aspects:-**

Control of In-Program projects, post completion audits, Abandonment Analysis, project management after completion.

Administrative aspects of Capital Budgeting, Agency Problem, Evaluating Capital Budgeting systems of an organization. Preparation of project report and norms and its presentation. Definition of entrepreneurship and entrepreneur qualities.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

The ICA shall consist of Preparation and Submission of a detailed project report of any one of the civil engineering projects like lift irrigation, irrigation, bridge, water supply, housing complex, road etc.

TEXT BOOKS:-

- 1) Projects- Planning, Analysis, Selection, Implementation Review, Prasanna Chandra, McGraw Hill Publishing Company Ltd., New Delhi. 2006.
- 2) United Nations Industrial Development Organisation (UNIDO) Manual for the Preparation of Industrial Feasibility Studies, (IDBI Reproduction) Bombay, 1987.
- 3) Project Management, S.Choudhury, Tata McGraw Hill Publishing Co., Ltd.
- 4) Financial Management, Ravi.M.Kishore, Taxman Publications.

REFERENCE BOOKS:-

- 1) Water resources Project Economics, Edward Kuiper, Butterworths, 1971.
- 2) Cost Benefit Analysis, E. J. Mishan.
- 3) The Practice of Entrepreneurship, Geoffrey G. Meredith, R. E. Nelson.
- 5) Construction Project Management, Planning, Scheduling and Control, Krishan K. Chitkara, Tata McGraw Hill Publishing Co., Ltd.
- 6) Project Management, K. Nagarajan, New Age International, 2004.
- 7) Project Management, Meredith & Gopalan, Wiley India Ltd. 2011.

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4. ELECTIVE III

4.6 SOLID AND HAZARDOUS WASTE MANAGEMENT

Teaching Scheme:

Lectures – 3 Hrs/Week, 3 Credits

Practical – 2 Hrs/Week, 1 Credits

Examination Scheme:

ISE – 30 Marks

ESE –70 Marks

ICA –25 Marks

ESE (OE) – 25 Marks

Course Objectives:

- 1) To study the types, sources, generation of solid & hazardous waste.
- 2) To impart basic knowledge of collection, transportation, treatment and disposal of solid waste
- 3) To study handling and storage of solid and hazardous waste.

Course Outcomes:

Upon successful completion of course, the students will be able to:

- 1) Implement waste reduction and resource recovery methods
- 2) Select and adopt the appropriate waste disposal methods for the prevailing situation.
- 3) Identify the types of hazards and implement the precautionary methods.
- 4) Implement legal, political and administrative considerations in design and operation. of solid and hazardous waste management.

SECTION I

Solid Waste Management

Unit 1:

(06)

Solid Waste management: Functional outlines of refuse, storage, transportation of refuse, analysis, composition and quantity of refuse, Economic aspects of refuse collection and transport.

Solid waste in industries, common types of solid waste, classification, collection and transportation. Concept of biomedical & Hazardous waste management.

Unit 2:

(05)

Solid waste handling and Processing methods, Segregation and salvage recovery of

w. e. f. Academic Year 2019-20

bye-products, use of solid waste as raw material in industries. Recycling of solid waste.

Unit 3: (06)

Composting: Theory of composting, types of composting, factors governing composting, processing before composting, mechanical composting plant, and recovery of Bio –gas energy from organic solid waste.

Unit 4: (06)

Incineration: Theory and types of incinerators, location, planning aspects, effects of feed, composition, rate and temperature, air supply, design of incineration plant, pyrolysis and its by-products, energy recovery.

Solid waste management rules, status of solid waste management in India.

SECTION –II

Hazardous Waste Management

Unit 5: (06)

Definition of Hazardous waste, Characteristics and nature of hazards, natural and man- made hazards, classification of hazards.

Unit 6 : (04)

Qualitative estimation of damages, risk assessment and management.

Unit 7: (06)

Types of hazardous waste, characteristics, Site assessment waste minimization resource recovery. Strategy for minimization of damage due to natural and manmade hazards.

Unit 8: (06)

Storage and handling of hazardous waste, Site Selection, Transportation of hazardous wastes. Case Studies of hazards, episodes. Sanitary landfill site selection, types of land filling, maintenance and precaution, leachate and its control, control of contamination of ground water.

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INTERNAL CONTINUOUS ASSESSMENT (ICA)

The ICA shall consist:

1. Analysis of solid waste
2. Project on Design of Refuse collection & Disposal System for medium size town or a part of city.
3. Case study of Hazards and Episodes (Any Two).
4. Assignments (One Assignment on each unit)

TEXT BOOKS:

- i) Solid Waste Management – Dr. A.D. Bhide
- ii) Hazardous Waste Management – C. A. Wentz McGraw Hill International Edition
- iii) Management of Municipal Solid Waste- T. V. Ramchandra, Capital Publishing company, New Delhi
- iv) Solid and Hazardous Waste Management- M. N. Rao and Razia Sultana BS Publication

REFERENCE BOOKS:

- i) Solid Waste Management – George Tchobanoglous, Mc Graw Publication
- ii) Manual on Municipal Solid Waste management by ministry of Urban Development of Govt. of India.
- iii) Solid Waste Management- I. H. Khan, and Naved Ahsan, CBS Publishers and Distributors, New Delhi.

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4. ELECTIVE III

4.7 DYNAMICS OF STRUCTURES

Teaching Scheme:

Lectures – 3 Hrs/Week, 3 Credits

Practical – 2 Hrs/Week, 1 Credits

Examination Scheme:

ISE – 30 Marks

ESE –70 Marks

ICA –25 Marks

ESE (OE) – 25 Marks

Course objectives:

- 1) To introduce the basics of Earthquake Engineering.
- 2) To impart the knowledge of engineering seismology, building geometrics & characteristics, structural irregularities.
- 3) To discuss codal provisions and their application on different types of structures.
- 4) To study incorporation of features for making the structure earthquake resistant.

Course Outcomes:

On completion of the course, the students will be able to:

- 1) Apply the Principles of Earthquake Engineering in planning, design and construction of building.
- 2) Perform the dynamic analysis of structures under earthquake load.
- 4) Incorporate Earthquake resistant features for various types of construction.
- 5) Implement the provisions of IS 1893-2016 and IS 13920- 2016 Codes.
- 6) Incorporate Ductility features in the structures.

SECTION – I

Unit: 1 Elements of Seismology

(5)

General effects of an earthquake, terminology, structure of earth, causes of an earthquake, plate tectonic theory, seismic waves, magnitude and intensity, methods of measurement, energy released, seismograph, strong motion earthquakes, accelerogram, soil liquefaction, prominent earthquakes of India.

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Unit: 2 Free vibrations of single degree-of-freedom systems (8)

Dynamic loads and dynamic analysis, degrees of freedom, Undamped free vibrations, multiple elastic forces, viscously damped vibrations, equations of motion and solution, logarithmic decrement.

Unit: 3 Forced vibrations of single degree-of-freedom systems (8)

Forced vibrations (harmonic loading) of single degree of freedom systems. Undamped and viscously damped vibrations, equations of motion and solution, Force transmitted to foundation, transmissibility, response to harmonic support excitations.

Unit: 4 Response spectrum theory: (5)

Response to general dynamic loading, Duhamel's integral, rectangular and triangular loading, Earthquake response spectrum, tripartite spectrum, construction of design response spectrum, effect of foundation and structural damping on design spectrum.

SECTION – II

Unit: 5 Principles of earthquake resistant design (5)

Planning aspects, symmetry, simplicity, regularity. Resistance of structural elements and structures for dynamic load, design criteria, strength and deflection.

Unit: 6 Evaluations of Seismic Forces (5)

Philosophy of earthquake resistant design, Provisions of IS 1893 (All Parts), Soft storey, Design spectrum of IS 1893-2016, evaluation of lateral loads due to earthquake on multistory buildings.

Unit: 7 Ductile detailing of RCC members- (5)

Concept of ductility, different ways of measuring ductility, factors affecting ductility, energy absorption, provisions of IS 13920-2016.

Unit: 8 Earthquake resistant construction - (5)

Failure mechanism of different types of masonry construction, Construction aspects of

w. e. f. Academic Year 2019-20

Masonry and Timber structures, Retrofitting and strengthening techniques of low cost and low rise buildings. Provisions of I.S. 4326 and IS 13935.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

The ICA shall consist of at least one assignment on each unit.

TEXT BOOKS:

1. Elements of Earthquake Engineering – Jai Krishna, South Asian Pub. New Delhi
2. Earthquake Resistant, Design of Masonry and Timber Structures – A.S. Arya
3. Earthquake Resistant Design of R. C. C. Structures – S. K. Ghosh

REFERENCE BOOKS:

1. Dynamics of Structures –A.K. Chopra
2. Structural Dynamics - Mario Paz CBS Publication
3. Earthquake Resistant Structures –D.J. Dowrick John Wiley Publication
4. Dynamics of Structures – R. M. Clough and Penzian ,McGraw Hill co.New Delhi
5. Mechanical Vibrations – G. R. Grover Roorkee University, Roorkee
6. Analysis and Design of Foundations for Vibrations – P. J. Moove. Oxford and I. B. H. Publication, Delhi
7. Foundation Design Manual – N. V. Nayak, Dhanpatrai and sons, Delhi
8. Manual of Earthquake Resistant Non engineering Construction, University of Roorkee
9. Elements Seismology – Rochter
10. IS 1893-2016 –Part I, IS 13920-2016, IS: 4326 and IS 13935.
11. Earthquake Tips published by NICEE, IIT Roorkee.
12. Government of Maharashtra Earthquake resistant Design of house guiding lines and assessment of damages.



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4. ELECTIVE III

4.8 ENVIRONMENTAL MANAGEMENT

Teaching Scheme:

Lectures – 3 Hrs/Week, 3 Credits

Practical – 2 Hrs/Week, 1 Credits

Examination Scheme:

ISE – 30 Marks

ESE –70 Marks

ICA –25 Marks

ESE (OE) – 25 Marks

Course Objectives:

- 1) To study principles of Environmental Management System.
- 2) To acquaint students with different Environmental pollution control acts.
- 3) To study the electronic, biomedical and industrial waste properties and waste management systems
- 4) To inculcate idea of Environmental Impact Assessment.

Course outcomes:

Upon successful completion of course the students will be able to:

- 1) Demonstrate basic principles of Environmental Management System.
- 2) Exercise different Environmental pollution control acts.
- 3) Select and apply appropriate technology for management of electronic, biomedical and industrial waste
- 4) Perform Environmental Impact Assessment of small project

SECTION-I

Unit 1:

(6)

Fundamentals of environmental management system (EMS) and ISO 14000

series: History Background and development of ISO 14000, TC-207, ISO 14000 series. Environmental management Plans- Principles and elements. The ISO 14001-Environmental management systems standard, Definitions, Eco labeling, Auditing

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Unit 2: (6)

Environmental management acts related to environmental protection: Air, Water, Soil and Hazardous Waste. Detailed study of following acts - Water act 1974(Prevention and control of pollution), Air act 1981 (Air pollution prevention and control of pollution), Hazardous waste management handling rules -1989. Municipal solid waste rules- 2000, Noise pollution regulation and control rules 2000 (7)

Unit 3 : (5)

Electronic waste management: Objectives, Classification of E-waste, guidelines for environmentally sound management of E-waste, environmentally sound treatment technology for E-waste, guidelines for environmentally sound integrated E-waste recycling and treatment policy International scenario, hazardous substances that can occur in E-waste.

Unit 4: (5)

Biomedical waste management: Introduction, Classification, Types, segregation, packaging and transportation and storage, possible hazards, Effects, Detailed study of Biomedical waste management and handling rules 1998.

SECTION –II

Unit 5: (4)

Air pollution control:, Air quality standards, Air pollution control technologies for oxides of sulphur: Reducing SO_x levels through dilution by increasing stack height, use of alternative fuels. Extraction of sulphur from fuels. Reduction of sulphur in combustion process, fuel gas desulfurization.

Air pollution control technologies for oxides of Nitrogen: Emission of nitrogen oxides. Control technologies for oxides of nitrogen emissions. Air pollution control technologies for volatile organics, Hydrocarbons and hydrogen sulphide.

Unit 6: (5)

Advanced waste water treatment: Carbon adsorption, Ion exchange, sodium and hydrogen cycle. Membrane process. Electro dialysis process, pressure membrane process and

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membrane performance characterization. Nutrients removal such as nitrogen and phosphorus removal. Land treatment systems: Irrigation, rapid infiltration and overland flow systems. Wetland flow Systems.

Unit 7: (7)

Environmental Impact Management (EIA)

- I) Definition, Objectives of EIA .EIA procedure in detail, Role of different actors in EIA, components of EIA, Areas of human concern (Impact categories), Contents of EIA, Categories of projects under EIA, Introduction to Impact assessment methods such as Leopold matrix Legal provision for public participation in India, Role of general public in Environmental clearance. Limitations of EIA
- II) The environmental rules 1999, sitting for industrial process, methodology for preparing environmental impact assessment, role of regulatory agencies and control boards in obtaining Environmental clearance for project.
- III) **Case studies:-**Positive and negative environmental impacts of Dams, Express highways, Major industries, Power plants

Unit 8: (7)

Miscellaneous Topics

- I) **Removal of Chromium:** General, control methods, reduction precipitation, Ion Exchange, RO, Lime coagulation and adsorption
- II) **Removal of Mercury:** General, measurement of mercury, mercury losses in Chlor-Alkali industries, removal of mercury from gaseous streams, removal of Mercury through liquid streams.
- III) **Treatment of phenolic effluents:** Introduction, sources of phenols, Treatment and removal.

INTERNAL CONTINUOUS ASSESSMENT (ICA)

The ICA shall consist assignments on all above units and one industrial visit report.

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TEXT BOOKS:

1. Environmental engineering and management- Dhameja, Katson publications, Delhi
2. Air Pollution and control, K.V.S.G. Murli Krishna, Jain Brothers, Delhi
3. Water Management, K.V.S.G. Murli Krishna, Environmental Protection Soc.,
Kakinada

REFERENCE BOOKS:

1. Indian standards BIS
 - IS/ISO 14001
 - IS/ISO 14004
 - IS/ISO 14011
 - IS/ISO 14010
 - IS/ISO 14012
2. Wastewater treatment and reuse- Metcalf and Eddy, TMG, Delhi
3. Pollution control in process industries- S. P. Mahajan, TMG, Delhi
4. Environmental science and engineering- Henry and Henke, PHI, New Delhi
5. For all environmental acts and updates - <http://www.envfor.nic.in>



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4. ELECTIVE III

4.9 DESIGN OF BRIDGES

Teaching Scheme:

Lectures – 3 Hrs/Week, 3 Credits

Practical – 2 Hrs/Week, 1 Credits

Examination Scheme:

ISE – 30 Marks

ESE –70 Marks

ICA –25 Marks

ESE (OE) – 25 Marks

Course objectives:

- 1) To learn various elements of bridges and their significance in the load transfer mechanism.
- 2) To understand different loading on bridges and their evaluations as per the codal provisions.
- 3) To make students able to design various elements of superstructure and substructure of bridges using IRC Codes.
- 4) To acquaint student the different techniques available for repair and maintenance of bridges.

Course outcome:

By the end of the course students should be able to

- 1) Evaluate different action loads coming on the bridges as per the IRC bridge code
- 2) Design the different types of Deck slabs such as Solid slab and T beam type slab for two lane and four lane bridges.
- 3) Verify the adequacy of the Pier and Abutments for the given data
- 4) Arrive at most suitable techniques for the maintenance and repair of the bridge under the given conditions

SECTION – I

Unit 1: (4)

Components of bridges, Classification, importance of bridges, Investigation for Bridges.

Unit 2: (8)

Standard specification for Road Bridges. I.R.C. bridge code, width of carriageway, clearances, loads to be considered i.e. D.L., L.L., Impact load, wind load, Earthquake load,

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Longitudinal force, Centrifugal force, buoyancy, Earth pressure, water current force, thermal force etc. Introduction to prestressed concrete bridges - PSC Box girder bridges

Unit 3: (10)

General design considerations for R.C.C. & P.S.C. Bridges., Relative costs of bridge components. Design of reinforced concrete deck slab for two lane and four lane bridges,, Pigeaud's theory, beam and slab and T-beam, Courbon's theory.

SECTION – II

Unit 4: (8)

Construction Techniques – Construction of sub structure footing, piles, caissons, construction of reinforced earth retaining wall and reinforced earth abutments, super structure – erection method for bridge deck construction by cantilever method, Inspection maintenance and repair of bridges.

Unit 5: (8)

Design of sub structure, abutments, Piers, approach slab, well foundation

Unit 6: (7)

Bearing and expansion joints, forces on bearings, Types of bearings, design of elastomeric bearings, expansion joints.

Note:- The Design of Bridge elements shall be done in accordance with Limit state method

INTERNAL CONTINUOUS ASSESSMENT (ICA)

The ICA shall consist a set of tutorials based on above topics of syllabus.

TEXT BOOKS:

1. Essentials of Bridge Engg. by D. Johnsons Victor, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
2. Design of RCC Bridges- Jagdish Jayaram
3. Reinforced Concrete Structures – Vol. II by Dr. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, Laxmi Publications.

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REFERENCE BOOKS:

- 1) Concrete Bridge Practice by Dr. V. K. Raina, Tata McGraw Hill
- 2) Bridge Engg. by S. Ponnuswamy, Tata McGraw Hill
- 3) K. S. Rakshit, Design and Construction of Highway Bridges, New Central Book agency

IRC CODES:

- 1) IRC 6 (2000), Section II: Loads and stresses.
- 2) IRC 16 (1989), Section for priming of base course with bituminous primers
- 3) IRC 18 (2000), Design criteria for PC road bridges (post tensioned concrete)
- 4) IRC 21(2000), Section III : Cement concrete (Plain and reinforced)
- 5) IRC 78 (2000), Section VII: Foundations and substructures
- 6) IRC 83 (1982), Section IX: Bearings, Part I: Metallic bearings (1994)
- 7) IRC 83 (1987), Section IX: Bearings, Part II: Elastomeric bearings(1994)
- 8) IRC 83 (1987), Section IX: Bearings, Part III: POT and PTFE bearings (1994)

WEBSITES:

www.mahapwd.com
www.irc.org.in



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B.E. Civil – Part II (CBCS)

5. PROJECT ON R.C.C. STRUCTURES

Teaching Scheme:

Practical – 4 Hrs/Week, 2 Credits

Examination Scheme:

ICA – 50 Marks

ESE (OE) – 50 Marks

Course objectives:

- 1) To train the students to imagine and predict response of structures under loadings.
- 2) To carry out design of building as whole entity
- 3) To develop detailed drawings of the designed structure.

Course outcomes:

On completion of the course, the students will be able to:

- 1) Apply codal provisions in the analysis and design of structures in accordance with relevant IS codes.
- 2) Prepare detailed drawing of R.C.C section of designed building.
- 3) Perform the analysis using relevant application software .

INTERNAL CONTINUOUS ASSESSMENT (ICA)

The ICA shall consist of detailed design & drawing of the following R.C. structures by Limit State method unless specified.

- 1) Residential two storied building.
- 2) Any one from the following.
 - a) Combined trapezoidal footing/ raft foundation.
 - b) Pile foundation for structure with pile cap.
 - c) Water tank (GSR/USR/ESR) by working stress method using IS 3370.

Note:

1. Computer analysis of any one frame for project No.1 shall be performed for Dead Load, Live Load & Earthquake Loads using relevant application software.
2. CAD drawing shall be prepared for at least one sheet with provision of IS : 13920.

w. e. f. Academic Year 2019-20



PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR

B.E. (Civil) Part-II (CBCS)

6. PROJECT WORK

Teaching Scheme:

Practical – 6 Hrs/Week, 3 Credits

Examination Scheme:

ICA – 100 Marks

ESE (OE) – 100 Marks

Course Objectives:

- 1) To carry out a thematic design project in one of the specializations of civil engineering
- 2) To carry out a project that will make the students aware of the different facets of civil engineering.
- 3) To explore the skill and abilities of student to work in team

Course Outcome:

At the end of the course student will be able

- 5) Develop an ability to apply the basic knowledge of mathematics, science and engineering to real-life problems.
- 6) Identify the real life problem and present the solution by conducting experimental/ analytical study and in and off the laboratory.
- 7) Apply modern tools such as different application software, modern instrumentation for the most precise study of the project undertaken
- 8) Demonstrate a commitment to teamwork while working with other students of diverse culture and different intellectual backgrounds.

Project work at B.E. (Civil) Part-II is continuation of Project Work of B.E. (Civil) Part-I on any topic from Civil Engineering area or interdisciplinary area related to Civil Engineering.

The project work should be completed at B.E. (Civil) Part-II level.

Student shall submit the report and prepare presentation for defense.

w. e. f. Academic Year 2019-20