Syllabus of

UNDERGRADUATE DEGREE COURSE

B.Tech. V Semester

Civil Engineering

Rajasthan Technical University, Kota

Effective from session: 2019-20

RAJASTHAN TECHNICAL UNIVERSITY, KOTA
Syllabus
3rd Year - V Semester: B.Tech. (Civil Engineering)

5CE3-01: CONSTRUCTION TECHNOLOGY AND EQUIPMENT

Credit: 2 **Max. Marks: 100(IA:20, ETE:80)**
2L+0T+0P **End Term Exam: 2 Hours**

SN	Contents	Hours
1	**Introduction:** Objective, scope and outcome of the course.	1
2	**Engineering Economy** Principle of Engineering Economy, Minimum cost point analysis, Breakeven point analysis, Depreciation and depletion	6
3	**Safety in construction** Causes, classification, cost and measurement of an accident, safety programme for construction, protective equipment, accident report, safety measure: (a) For storage and handling of building materials. (b) Construction of elements of a building (c) In demolition of buildings; Safety lacuna in Indian scenario. Fire safety provisions as per NBC.	8
4	**Construction Planning** Need of construction planning, Constructional Resources, construction team, stages in construction, preparation of construction schedule, Job layout, inspection and quality control; **Materials Management:** Objective and functions of material management	7
5	**Construction Equipment and Management** Earth Moving Equipment-Bull dozers tractor pulled scrapers Power shovels Draglines clamshells; cranes; Hoes, Trenching machine types Hauling Equipment; Drilling, Blasting and Tunnelling Equipment; Pile Driving Equipment	6
	TOTAL	28

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Syllabus

3rd Year - V Semester: B.Tech. (Civil Engineering)

5CE4-02: STRUCTURE ANALYSIS-I

Credit: 2 **Max. Marks: 100(IA:20, ETE:80)**

2L+0T+0P **End Term Exam: 2 Hours**

SN	Contents	Hours
1	Introduction: Objective, scope and outcome of the course.	1
2	Introduction to Indeterminate structures, Degrees of freedom per node, Static and Kinematic indeterminacy (i.e. for beams, frames & portal with & without sway etc.), Releases in structures, Maxwell's reciprocal theorem and Betti's theorem. Analysis of prop cantilever structures, Analysis of Indeterminate Structure (fixed and continues beams) using Area moment method, Conjugate beam method, Three moments Theorem.	11
3	Analysis of Statically Indeterminate Structures using Slope-deflection method and Moment-distribution method applied to continuous beams and portal frames with and without inclined members	11
4	**Vibrations:** Elementary concepts of structural vibration, Mathematical models, basic elements of vibratory system. Degree of freedom. Equivalent Spring stiffness of springs in parallel and in series. **Simple Harmonic Motion**: vector representation, characteristic, addition of harmonic motions, Angular oscillation. **Undamped free vibration of SDOF system**: Newton's law of motion, D Almbert's principle, deriving equation of motions, solution of differential equation of motion, frequency & period of vibration, amplitude of motion; Introduction to damped and forced vibration.	5
	TOTAL	28

RAJASTHAN TECHNICAL UNIVERSITY, KOTA

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3rd Year - V Semester: B.Tech. (Civil Engineering)

5CE4-03: DESIGN OF CONCRETE STRUCTURES

Credit: 3 **Max. Marks: 150(IA:30, ETE:120)**

3L+0T+0P **End Term Exam: 3 Hours**

SN	Contents	Hours
1	Introduction: Objective, scope and outcome of the course.	1
2	Fundamental concepts of design of RC members, assumptions. Types and function of reinforcement. Introduction to various related IS codes, Characteristic load and characteristic strength. **Working Stress Method:** Working stress design philosophy. Analysis and Design of singly reinforced rectangular beam section for flexure.	5
3	**Limit State Design:** Limit state design philosophy. Assumptions, Analysis and design of singly reinforced, doubly reinforced rectangular beams and flanged beams for flexure using codal provisions for simply supported, cantilever, fixed and continuous beams.	10
4	**Limit state of serviceability for deflection**: control of deflection as per codal provisions of empirical coefficients. **Limit state of collapse in shear**: Types of shear reinforcement and its detailing, analysis and design of shear reinforcement for prismatic sections. **Limit state of collapse in bond**: concept of bond stress, anchorage length and development length. Detailing and curtailment of reinforcement as per codal provisions.	6
5	**Slabs:** Analysis and design of one way and two way slabs using LSM, Detailing of reinforcement. Check for shear and deflection.	6
6	**Columns:** Short and long columns, their structural behaviour. Analysis and design of axially loaded short columns, using LSM. Analysis of eccentrically loaded short columns. Introduction to Pu-Mu interaction curves and their use for eccentrically loaded columns. **Footings:** Analysis and design of Isolated column footing for axial load. Introduction to combined footing for two columns (without central beam) for axial loads using LSM.	5 4
7	**Torsion:** Analysis and Design of beams for torsion as per codal method.	3
	TOTAL	40

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3rd Year - V Semester: B.Tech. (Civil Engineering)

5CE4-04: GEOTECHNICAL ENGINEERING

Credit: 3 **Max. Marks: 150(IA:30, ETE:120)**
3L+0T+0P **End Term Exam: 3 Hours**

SN	Contents	Hours
1	Introduction: Objective, scope and outcome of the course.	1
2	Soil and soil-mass constituents, water content, specific gravity, void ratio, porosity, degree of saturation, air void and air content, unit weights, density index etc. Inter-relationships of the above. Determination of index properties of soil: water content, specific gravity, particle size distribution, sieve and sedimentation analysis, consistency limits, void ratio and density index. Mineral structures, structures of Illite Montmorillonites and kaolinite and their characteristics. Darcy's law of permeability of soil and its determination in laboratory. Stresses in soil mass: total, effective and neutral pressure, calculation of stresses, influence of water table on effective stress, quicksand phenomenon. Classification of soil for general engineering purposes : particle size and I.S. Classification systems.	8
3	Mohr's circle of stress, shearing strength of soil, parameters of shear strength, Coulomb's failure envelope, determination of shear parameters by Direct Shear Box. Tri-axial and unconfined compression test apparatuses. Principles of soil compaction, laboratory compaction tests; Proctor's test, Stresses in Soil under surface loading: Bossinesq's and Westergaard's analysis for vertical pressure and its distribution in a soil mass. Vertical stresses due to concentrated loads, Isobar diagram, Vertical stress distribution on a horizontal plane. Influence diagram, Vertical stresses at a point under circular and rectangular loaded area. Approximate methods of obtaining vertical pressure due to surface loading. Newmark's chart,	8

4	Compressibility and Consolidation: Introduction to consolidation, comparison of compaction and consolidation, Spring Analogy Terzaghis one dimensional consolidation theory, Degree of consolidation, consolidation test, Compressibility parameters, co-efficient of consolidation. Pre-consolidation pressure and its determination. Normally, over and under consolidated soils. Methods of predicting Settlement and its rate. Total and differential Settlement.	**8**
5	Stability of Slopes: Classifications of slopes, Stability analysis of infinite slopes. Stability of finite slopes by Swedish and Friction circle method. Stability analysis by Taylor's stability number , Taylor's stability number curves. . Bishop's method of stability analysis. Earth Pressure: Active, passive and earth pressure at rest. Rankine's and Coulomb's theories. Rebhann's and Culman's graphical methods for active earth pressure for vertical and inclined back retaining walls, horizontal and inclined cohesion less back fill.	**8**
6	Bearing Capacity of Soils: Terminology related to bearing capacity, Common types of foundations. Terzaghi and Meyehoff's theory for bearing capacity. Rankine's method for minimum depth of foundation. Skempton's method. Effect of eccentricity and water table on bearing capacity. IS code method, Plate load and penetration tests for determining bearing capacity. Introduction to pile, Site Investigations: Methods of explorations. Planning of Investigations, Depth of exploration, Number of boreholes, Undisturbed and Disturbed samples. Types of samplers. Brief description of procedures of sampling, Transportation and Storage of samples.	**9**
	TOTAL	**42**

RAJASTHAN TECHNICAL UNIVERSITY, KOTA

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3rd Year - V Semester: B.Tech. (Civil Engineering)

5CE4-05: WATER RESOURCE ENGINEERING

Credit: 2 **Max. Marks: 100(IA:20, ETE:80)**

2L+0T+0P **End Term Exam: 2 Hours**

SN	Contents	Hours
1	Introduction: Objective, scope and outcome of the course.	1
2	**Introduction**: Definitions, functions and advantages of irrigation, present status of irrigation in India, classification for agriculture, soil moisture and crop water relations, Irrigation water quality. Consumptive use of water, principal Indian crop seasons and water requirements.	5
3	**Canal Irrigation:** Types of canals, design of channels, regime and semi theoretical approaches (Kennedy's Theory, Lacey's Theory) **Diversion Head works:** Design for surface and subsurface flows, Bligh's and Khosla's methods.	6
4	**Embankment Dams:** Suitable sites, causes of failures, stability and seepage analysis, flow net, principles of design of earth dams. **Gravity Dams:** Force acting on a gravity dam, stability requirements.	5
5	**Well Irrigation:** Open wells and tube wells, types of tube wells, duty of tube well water. **Cross-Drainage Structure**: Necessity of Cross-drainage structures, their types and selection, comparative merits and demerits.	5
6	**Hydrology:** Definition, Hydrologic cycle, measurement of rainfall, Flood hydrograph, Rainfall analysis, Infiltration, Run off, Unit hydrograph and its determination.	6
		28

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5CE5-11: AIR & NOISE POLLUTION AND CONTROL

Credit: 2 **Max. Marks: 100(IA:20, ETE:80)**

2L+0T+0P **End Term Exam: 2 Hours**

SN	Contents	Hours
1	Introduction: Objective, scope and outcome of the course.	1
2	*Air Pollution:* Air pollutants, Sources, classification, Combustion Processes and pollutant emission, Effects on Health, vegetation, materials and atmosphere, Reactions of pollutants in the atmosphere and their effects-Smoke, smog and ozone layer disturbance, Greenhouse effect.	7
	Air sampling and pollution measurement methods, principles and instruments, Ambient air quality and emission standards, Air pollution indices, Air Act, legislation and regulations, control principles,	6
	Removal of gaseous pollutants by adsorption, absorption, reaction and other methods. Particulate emission control, settling chambers, cyclone separation, Wet collectors, fabric filters, electrostatic precipitators and other removal methods like absorption, adsorption, precipitation etc. Biological air pollution control technologies, Indoor air quality.	7
3	*Noise pollution:* Basics of acoustics and specification of sound; sound power, sound intensity and sound pressure levels; plane, point and line sources, multiple sources; outdoor and indoor noise propagation; psychoacoustics and noise criteria,	4
	Effects of noise on health, annoyance rating schemes; special noise environments: Infrasound, ultrasound, impulsive sound and sonic boom; noise standards and limit values; noise instrumentation and monitoring procedure. Noise indices. Noise control methods	3
	TOTAL	28

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5CE5-12: DISASTER MANAGEMENT

Credit: 2 **Max. Marks: 100(IA:20, ETE:80)**

2L+0T+0P **End Term Exam: 2 Hours**

SN	Contents	Hours
1	Introduction: Objective, scope and outcome of the course.	1
2	**Introduction:** Understanding the Concepts and definitions of Disaster, Hazard, Vulnerability, Risk, Natural and Manmade Disasters, Disaster and Development, and Climate Change.	2
3	**Types of Disasters, their occurrence/ causes, impact and preventive measures:** **Geological Disasters**: earthquakes, landslides, tsunami, mining;	4
	Hydro-Meteorological Disasters: floods, cyclones, lightning, thunder-storms, hail storms, avalanches, droughts, cold and heat waves.	3
	Biological Disasters: epidemics, pest attacks, forest fire.;	3
	Technological Disasters: chemical, industrial, radiological, nuclear.	3
	Manmade Disasters: building collapse, rural and urban fire, road and rail accidents.	2
	Disaster profile of Indian continent, Mega Disasters of India and Lessons Learnt. Risk mapping.	3
4	**Disaster Management Cycle**: Disaster Management Cycle and its components: Pre disaster and post disaster, Paradigm Shift in Disaster Management. Safety tips for various types of disasters.	3
5	**Disaster management system in India:** Disaster Management Act 2005, National Guidelines and Plans on Disaster Management; Role of Government (local, state and national),Non-Government and Inter-Governmental Agencies.	4
	TOTAL	28

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5CE5-13: TOWN PLANNING

Credit: 2 **Max. Marks: 100(IA:20, ETE:80)**

2L+0T+0P **End Term Exam: 2 Hours**

SN	Contents	Hours
1	Introduction: Objective, scope and outcome of the course.	1
2	Introduction: Definition of town planning, Evolution of towns, Objects of town planning, Economic Justification for town planning, Principles of town planning, Necessity of town planning, Origin, Growth and patterns of town development, distribution of land use, site for ideal town, powers required to enforce T.P. scheme	6
3	Civic Surveys: Definition, Necessity, collection of data, Types of surveys, methods adopted to collect data, Drawings, reports.	3
4	Zoning: Definition, Use of land, Objects of zoning, Principles of zoning, Aspects, Advantages & Importance zoning, Transition zone, Zoning powers, Maps for zoning	3
5	Importance and Demand of housing, Classification, requirements and design of residential building, Housing agencies, Housing problems in India.	3
6	Slums: Causes, characteristics and effects of slums, Slum clearance.	2
7	Industries: Classification of industry, Concentration of industry, requirements of the industry, Industrial townships.	3
8	Public Buildings: Location, classification principle of design, town center, grouping of public buildings. Town Planning, CL-SPP/CL-DDU/Nadiad, Gujarat, INDIA 4	3
9	Re-planning of existing towns: Objects of re-planning, defects of existing town, data required for re- planning, Urban Renewal projects, De-centralization and Re-centralized, Garden city concept overview.	5
	TOTAL	28

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5CE5-14: REPAIR AND REHABILITATION OF STRUCTURES

Credit: 2 **Max. Marks: 100(IA:20, ETE:80)**

2L+0T+0P **End Term Exam: 2 Hours**

SN	Contents	Hours
1	Introduction: Objective, scope and outcome of the course.	1
2	**Deterioration of Concrete Structures:** Penetrability of concrete- permeability, sorptivity, diffusion. Physical processes- abrasion, erosion. Chemical- carbonation, chloride and sulfate attack. Alkali – Aggregate Reaction. Corrosion- mechanism. **Factors affecting and Preventive measures** :for all the above, including water – proofing techniques for various conditions, sacrificial anode, corrosion resistant steel, corrosion inhibitors, protective coatings etc.	8
3	**Cracks in Concrete and Masonry Structures-** Types, patterns, measurement and preventive measures	3
4	**Assessment of Risk/Damagein Structures:** *Preliminary investigation-* visual, history collection etc. *Detailed Investigation:* core cutting, rebar locator, corrosion meter, penetration resistance, pull out tests, half–cell potential, concrete resistivity etc. Interpretation of non destructive test data from all the above tests as well as rebound hammer number and ultra sonic pulse velocity. Destructive and chemical tests- on material samples from site.	5
5	**Materials for Repair:** polymers and resins, self curing compounds, FRP, ferro-cement- properties, selection criterion, cement based and polymer modified mortars etc	4
6	**Repair Techniques:** Grouting, Jacketing, External bonded plates- processes, limitations, design computations etc. including numerical problems. **Under Water Repair:** Processes	6
7	**Case Studies:** related to rehabilitation of bridge piers, heritage structures, masonry structures etc.	2
	TOTAL	28

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3rd Year - V Semester: B.Tech. (Civil Engineering)

5CE5-15: GROUND IMPROVEMENT TECHNIQUES

Credit: 2 **Max. Marks: 100(IA:20, ETE:80)**

2L+0T+0P **End Term Exam: 2 Hours**

SN	Contents	Hours
1	**Introduction:** Objective, scope and outcome of the course.	1
2	**Introduction**: Formation of soil- Mechanical Weathering, Chemical weathering, types of soil-Residual soil, Transported soil, Regional soil Deposit in India, Difficult soils- Expansive soil, Collapsible soil, organic soil etc. Purpose and Principles of Ground Improvements.	03
3	**Densification by Compaction Near Surface**: Theory of compaction, Laboratory compaction tests; compaction in field, Effect of compaction on different soil properties, Factor affecting compaction in field, Measurement of density in field.	03
4	**Densification by Deep Compaction:** (a) Vibration methods- Vibro compaction, Vibro floatation, Vibratory probes method, Blasting. (b) Displacement methods- Sand compaction piles; Dynamic compaction.	04
5	**Modification Using Stone Columns:** **Introduction**- Failure mechanism, load carrying capacity, settlement analysis, installation technique, Geo-synthetic -encased stone columns, Mechanism of encasement, field control of stone columns **Pre-Compression and Vertical Drain**: Applicability and types of pre compression. Purpose and mechanism of pre-compression by pre loading. Design procedure of pre-compression by preloading. **Pre-compression by preloading with vertical drains**- Principles, Advantages, and disadvantages of Vertical drains, Type of Vertical drains, Installation, Monitoring and Instrumentation of Vertical drains.	04 03

6	**Modification by Grouting**: Purpose, principles and classification of grouts and their properties. Desirable characteristics of grout, Grouting methods, Planning and operation of grouting, control of grouting operations and monitoring.	**4**
	Modification by Soil Reinforcement: Purpose of reinforced earth, Mechanism of reinforced soil, Failure mechanism of reinforced earth, Advantages of reinforced earth. Application of Reinforced Earth, Design methods of reinforced earth wall- (a) Check for External stability. Check for Internal stability.	**4**
7	**Miscellaneous Methods of Soil stabilization:** Lime stabilization, cement stabilization, bituminous stabilization, chemical stabilization.	**02**
	TOTAL	**28**

RAJASTHAN TECHNICAL UNIVERSITY, KOTA
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3rd Year - V Semester: B.Tech. (Civil Engineering)

5CE5-16: ENERGY SCIENCE AND ENGINEERING

Credit: 2 **Max. Marks: 100(IA:20, ETE:80)**

2L+0T+0P **End Term Exam: 2 Hours**

SN	Contents	Hours
1	Introduction: Objective, scope and outcome of the course.	1
2	Introduction to Energy Science: Scientific principles and historical interpretation to place energy use in the context of pressing societal, environmental and climate issues; Introduction to energy systems and resources; Introduction to Energy, sustainability & the environment	5
3	Energy Sources: Overview of energy systems, sources, transformations, efficiency, and storage. Fossil fuels (coal, oil, oil-bearing shale and sands, coal gasification) - past, present & future, Remedies & alternatives for fossil fuels - biomass, wind, solar, nuclear, wave, tidal and hydrogen; Sustainability and environmental trade-offs of different energy systems	6
4	Energy & Environment: Energy efficiency and conservation; introduction to clean energy technologies and its importance in sustainable development; Carbon footprint, energy consumption and sustainability	5
5	Civil Engineering Projects connected with the Energy Sources: Coal mining technologies, Oil exploration offshore platforms, Underground and under-sea oil pipelines, solar chimney project, wave energy caissons, coastal installations for tidal power, wind mill towers; hydro power stations above-ground and underground along with associated dams, tunnels, penstocks, etc.	7
6	Engineering for Energy conservation: Concept of Green Building and Green Architecture; Green building concepts; LEED ratings; Identification of energy related enterprises	4
	TOTAL	**28**

5CE5-17: Understanding the Human Being Comprehensively – Human Aspirations and its Fulfillment (Professional Elective Course)

Prerequisites: Universal Human Values and Professional Ethics

Course Objectives:

1. To help the students having the clarity about human aspirations, goal, activities and purpose of life.
2. To facilitate the competence to understand the harmony in nature/existence and participation of human being in the nature/existence.
3. To help the students to develop the understanding of human tradition and its various components.

Course Methodology:

1. The methodology of this course is explorational and thus universally adaptable. It involves a systematic and rational study of the human being vis-a-vis the rest of existence.
2. It is free from any dogma or set of dos and don'ts related to values.
3. It is a process of self-investigation and self-exploration, and not of giving sermons. Whatever is found as truth or reality is stated as a proposal and the students are facilitated and encouraged to verify it in their own right, based on their Natural Acceptance and subsequent Experiential Validation.
4. This process of self-exploration takes the form of a dialogue between the teacher and the students to begin with, and then to continue within the student leading to continuous self-evolution.
5. This self-exploration also enables them to critically evaluate their pre-conditionings and present beliefs.

Course Content

Unit 1:Introduction - The basic human aspirations and their fulfillment through Right understanding and Resolution; All-encompassing Resolution for a Human Being, its details and solution of problems in the light of Resolution

Unit 2: Understanding Human Being and its Expansion -The domain of right understanding starts from understanding the human being (the knower, the experiencer and the doer).; and extends up to understanding nature/existence – its interconnectedness and co-existence; and finally understanding the role of human being in existence (human conduct).

Unit 3: Activities of the Self -Understanding the human being comprehensively is the first step and the core theme of this course; human being as co-existence of the self and the body; the activities and potentialities of the self; Reasons for harmony/contradiction in the self

Unit 4:Understanding Co-existence with other orders -The need and the process of inner evolution (through self-exploration, self-awareness and self-evaluation)- particularly awakening to activities of the Self: Realization, Understanding and Contemplation in the Self (Realization of Co-Existence, Understanding of Harmony in Nature and Contemplation of Participation of Human in this harmony/ order leading to comprehensive knowledge about the existence).

Unit 5: Expansion of harmony from self to entire existence -Understanding different aspects of All-encompassing Resolution (understanding, wisdom, science etc.), Holistic way of living for Human Being with All-encompassing Resolution covering all four dimensions of human endeavour viz., realization, thought, behavior and work (participation in the larger order) leading to harmony at all levels from self to Nature and entire Existence

Reference Books:

1. A Foundation Course in Human Values and Profession Ethics (Text Book and Teachers Manual), R. R. Gaur, R. Sangal, G. P. Bagaria (2010), Excel Books, New Delhi [ISBN 978-8-174-46781-2]
2. Avartansheel Arthshastra, A. Nagraj, Divya Path Sansthan, Amarkantak, India
3. Economy of Permanence – (a quest for social order based on non-violence), J. C. Kumarappa (2010), Sarva-Seva-Sangh-Prakashan, Varansi, India
4. Energy and Equity, Ivan Illich (1974), The Trinity Press, Worcester & Harper Collins, USA
5. IshandiNauUpnishad, Shankaracharya, Geeta press, Gorakhpur,
6. Manav Vyavahar Darshan, A. Nagraj, Divya Path Sansthan, Amarkantak, India
7. Manaviya Sanvidhan, A. Nagraj, Divya Path Sansthan, Amarkantak, India
8. MahasatipatthanSutta , S N Goenka, Vipassana Research Institute, First Edition, 1996
9. Small Is Beautiful: A Study of Economics as if People Mattered, E. F. Schumacher, 1973, Blond & Briggs, UK
10. Slow is Beautiful, Cecile Andrews http://www.newsociety.com/Books/S/Slow-is-Beautiful)
11. Science & Humanism – towards a unified worldview, P. L. Dhar & R. R. Gaur (1990), Commonwealth Publishers, New Delhi
12. Sanchian Sri Guru Granth Sahib Ji ,Shiromani GurdwaraParbhandhak Committee, 2001
13. SamanSuttam, JinendraVami ,1974.
14. Vyavaharvadi Samajshastra, A. Nagraj, Divya Path Sansthan, Amarkantak, India
15. Vyavahatmak Janvad, A. Nagraj, Divya Path Sansthan, Amarkantak, India.

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3rd Year - V Semester: B.Tech. (Civil Engineering)

5CE4-21 : CONCRETE STRUCTURES DESIGN

Credit: 1.5 **Max. Marks: 75(IA:45, ETE:30)**

0L+0T+3P **End Term Exam: 3 Hours**

SN	Contents	Hours
1	Revision of Typical problems of BMD and SFD	3
2	Analysis and Design of singly reinforced rectangular beam section for flexure, based on Working stress design philosophy.	3
3	Analysis and Design of singly reinforced rectangular beam section for flexure, based on Limit State design philosophy	3
4	Analysis and Design of doubly reinforced rectangular beam section for flexure, based on Limit State design philosophy	3
5	Analysis and Design of flanged beam section for flexure, based on Limit State design philosophy	3
6	Problems on Limit state of serviceability for deflection as per codal provisions of empirical coefficients.	3
7	Analysis and design of prismatic sections for shear using LSD	3
8	Problems on limit state of collapse in bond	3
9	Analysis and design of one way slabs using LSM,	3
10	Analysis and design of two way slabs using LSM,	3
11	Analysis and design of short axially loaded columns	3
12	Analysis and design of footing	3
13	Analysis and Design of beams for torsion as per codal method..	3
	TOTAL	**39**

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5CE4-22 : GEOTECHNICAL ENGINEERDING LAB

Credit: 1.5 **Max. Marks: 75(IA:45, ETE:30)**
0L+0T+3P **End Term Exam: 3 Hours**

1	Grain size distribution by sieve Analysis and Hydrometer
2	Determination of specific Gravity by Pycnometer.
3	Determination of liquid limit by Casagrande's apparatus and cone penetrometer.
4	Determination of plastic limit and shrinkage limit
5	Determination of field density by core-cutter and sand replacement method
6	Determination of compaction properties by standard Proctor Test Apparatus
7	Determination of C-Ø values by unconfined compression Test Apparatus, Direct Shear Test Apparatus and Triaxial Test.
8	To determine the differential free swell index of soil and swelling pressure of soil.
9	To determine the CBR of soil.
10	To determine the compressibility parameters of soil by consolidation test.
11	To determine the permeability of soil by constant and falling head methods. Design as per syllabus of theory.

5CE4-23: WATER RESOURCES ENGINEERING DESIGN LAB

Credit: 1 **Max. Marks: 50(IA:30, ETE:20)**
0L+0T+2P **End Term Exam: 2 Hours**

Design as per syllabus of theory.

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3rd Year - VI Semester: B.Tech. (Civil Engineering)

6CE3-01: WIND AND SEISMIC ANALYSIS

Credit: 2 **Max. Marks: 100(IA:20, ETE:80)**

2L+0T+0P **End Term Exam: 2 Hours**

SN	CONTENTS	Hours
1	**Introduction:** Objective, scope and outcome of the course.	1
2	**Structural Systems:** Types of structures and Structure's forms, Symmetry and Asymmetry in building forms, Vertical and lateral loadresting elements, shear walls, framed tubes and various multi-storey configurations.	4
3	**Design Loads:** various types of loads and relevant codes. Design loads for different types of buildings. (IS-875 part 1 & 2) & Load Flow Concept	3
4	**Wind Loads Analysis:** Wind loads & calculation of wind load on flat roof, pitched roof and single sloped roof buildings (IS: 875-Part 3).	8
5	**Earthquake Load Analysis:** Earthquake loads & calculations of earthquake loads on framed structures. (IS: 1893 – Part 1).	6
6	**Earthquake Resistant Construction:** Typical seismic failure of masonry and RCC structures.Earthquake resistant construction of buildings, and various provisions as per IS codes; IS-4326,IS-13827, IS-13828, IS-13920, IS-13935.	6
	TOTAL	28

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6CE4-02: STRUCTURAL ANALYSIS-II

Credit: 3 **Max. Marks: 150(IA:30, ETE:120)**

3L+0T+0P **End Term Exam: 3 Hours**

SN	CONTENTS	Hours
1	**Introduction:** Objective, scope and outcome of the course.	1
2	Unit load method & their applications: deflection of determinate beams and frames, analysis of determinate and redundant frames up to two degree of redundancy, lack of fit in redundant frames. Introduction to Energy Methods: Strain energy for gradually applied, suddenly applied and impact loads, Strain energy due to axial loads, bending, shear and torsion;. Castiglione's theorems & their applications in analysis of determinate and redundant frames up to two degree of redundancy and trussed beams; Stresses due to temperature & lack of fit in redundant frames; deflection of determinate beams, frames using energy methods	12
3	**Influence line diagram & Rolling load:** ILD for beams & frames, Muller-Breslau principle and its application for drawing ILD, Rolling load, maximum stress resultants in a member/section, absolute maximum stress resultant in a structure.	10
4	**Arches:** analysis of three hinged two hinged and fixed type parabolic arches with supports at the same level and at different levels.	7
5	**Unsymmetrical bending:** Definition, location of NA, computation of stresses and deflection, shear centre and its location,	6
6	**Approximate methods for lateral loads:** Analysis of multistory frames by portal method, cantilever method & factor method. Analysis of determinate space trusses by tension coefficient method.	6
	TOTAL	42

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3rd Year - VI Semester: B.Tech. (Civil Engineering)

6CE4-03: ENVIRONMENTAL ENGINEERING

Credit: 3 **Max. Marks: 150(IA:30, ETE:120)**

3L+0T+0P **End Term Exam: 3 Hours**

SN	CONTENTS	Hours
1	**Introduction:** Objective, scope and outcome of the course.	1
2	*Water:* -Sources of Water and quality issues, water quality requirement for different beneficial uses, Water quality standards, water quality indices. Water Supply systems, Need for planned water supply schemes, Water demand industrial and agricultural water requirements, Components of water supply system; Transmission of water, Distribution system, Various valves used in W/S systems, service reservoirs and design. Water Treatment: aeration, sedimentation, coagulation flocculation, filtration, disinfection, advanced treatments like adsorption, ion exchange, membrane processes.	4 5 6
3	*Sewage*- Domestic and Storm water, Quantity of Sewage, Sewage flow variations. Conveyance of sewage- Sewers, shapes design parameters, operation and maintenance of sewers, Sewage pumping; Sewerage, Sewer appurtenances, Design of sewerage systems. Small bore systems, Storm Water- Quantification and design of Storm water. Sewage characteristics: Quality parameters: BOD, COD, TOC, Solids, DO, Nitrogen, Phosphorus, Standards of disposal into natural watercourses and on land, Indian standards. Sewage and Sullage, Pollution due to improper disposal of sewage, Wastewater treatment, aerobic and anaerobic treatment systems, suspended and attached growth systems, recycling of sewage – quality requirements for various purposes. Wastewater Disposal and Refuse: Disposal of sewage by dilution, Self-purification of streams, sewage disposal by irrigation sewage farming, waste water reuse.	5 4 7 5
4	*Air* - Composition and properties of air, Quantification of air pollutants, Monitoring of air pollutants, Air quality standards, Control measures for Air pollution	3
5	*Noise*- Basic concept, measurement and various control methods.	2
	Total	42

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3rd Year - VI Semester: B.Tech. (Civil Engineering)

6CE-04: DESIGN OF STEEL STRUCTURES

Credit: 3 **Max. Marks: 150(IA:30, ETE:120)**

3L+0T+0P **End Term Exam: 3 Hours**

SN	CONTENTS	Hours
1	**Introduction:** Objective, scope and outcome of the course.	1
2	Types of Steels and their broad specifications. Structural steel forms- hot rolled, tubular, light gauge etc and their applicability. Classification of cross sections as per IS 800-2007- Plastic, compact, semi compact and slender- characteristics	2
3	Plastic analysis of steel structures, fundamentals, shape factor, static and mechanism method of analysis, bending of beams of uniform cross sections (any shape)	3
4	Connections: Types of bolts, load transfer mechanism, prying action. Design of bolted and welded connections under axial and eccentric loadings with IS provisions	3
5	Tension Members: Design strength in gross section yielding, net section rupture and block shear. Design of axially loaded members.	3
6	Compression Members: Types of buckling, Imperfection factor, Buckling curves for different cross sections as per IS. Design of compression members: Axially loaded members including made up of angle section: single and in pair; built up columns including design of lacings and battens as per IS.	6
7	Beams: Design of beams: simple and compound sections. Design of laterally supported and unsupported beams including for web buckling, web crippling, lateral torsional buckling.	6
8	Member design under combined forces: Compressive load and uniaxial moment. tension and uniaxial moment	3
9	Column Bases: Design of column bases for axial and eccentric compressive loads: Slab and gusseted base.	2

10	Design of plate girder: Design of welded and bolted sections including web and flange splicing, horizontal, intermediate and bearing stiffeners. Shear strength determination by post critical and tension field action methods. End panel design options and procedure as per IS 800. Curtailment of flange plates. Connections for flange plate to flange angles and flange angles to web, etc. Design of welded connections	**7**
11	Design of gantry girder	**2**
12	Design of roof trusses members for combined forces, wind loading etc. Purlin design	**2**
13	Introduction to Pre Engineered Buildings , characteristics and their applications.	**1**
14	Introduction of truss girder bridges-its members including portal and sway bracings etc. Design aspects of foot over bridges.	**1**
	TOTAL	**42**

RAJASTHAN TECHNICAL UNIVERSITY, KOTA

Syllabus

3rd Year - VI Semester: B.Tech. (Civil Engineering)

6CE5-11: PRE-STRESSED CONCRETE

Credit: 2 **Max. Marks: 100(IA:20, ETE:80)**

2L+0T+0P **End Term Exam: 2 Hours**

SN	CONTENTS	Hours
1	**Introduction:** Objective, scope and outcome of the course.	1
2	**Introduction:** Basic concepts of Pre-stressing and its advantages. Materials for pre-stressed concrete. Tensioning devices. Pre-tensioning and post tensioning systems.	4
3	**Analysis of Pre-stress and Bending Stresses:** Assumptions, Flexural analysis of pre-stressed rectangular and unsymmetrical T section. Concept of load balancing.	6
4	**Losses of Pre-stress:** Losses due to - elastic deformation of concrete, successive tensioning of curved cable, shrinkage of concrete, creep of concrete, relaxation of stress in steel, friction and anchorage slip.	4
5	**Deflection of Pre-stressed Concrete Members:** Effect of tendon profileand associated factors incontinuous members.Computation of deflection in pre-stressed concrete members.	6
6	**Design of Pre-stressed Concrete Sections:** Flexural Shear and Torsional strengthusing simplified code procedure (IS-1343-2012). Design of simply supported Pre-stressed Concrete Sections forflexure.	7
	TOTAL	28

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Syllabus
3rd Year - VI Semester: B.Tech. (Civil Engineering)

6CE5-12: SOLID AND HAZARDOUS WASTE MANAGEMENT

Credit: 2 **Max. Marks: 100(IA:20, ETE:80)**
2L+0T+0P **End Term Exam: 2 Hours**

SN	CONTENTS	Hours
1	**Introduction:** Objective, scope and outcome of the course.	**1**
2	**Introduction to SWM:** Definition of waste and solid waste, classification solid waste, sources of solid waste, its composition, factors affecting waste generation, traditional methods of waste collection and disposal	**4**
3	**Waste Collection:** Components of waste collection, waste collection containers, their characteristics, types, waste collection vehicles, collection frequency, collection route, transfer stations	**4**
4	**Solid Waste Characterization:** Physical characteristics, chemical characteristics and biological characteristics of solid wastes **Waste Processing**: Size reduction, factors affecting size reduction, size reducing equipment, volume reduction, equipment for volume reduction, waste minimization, waste hierarchy, 3 R principle	**5**
5	**Hazardous Waste:** Definition, sources, classification, collection, segregation, treatment and disposal methods **Radioactive Waste, E-Waste, Biomedical Waste:** Definition, sources, classification, segregation, management and disposal methods	**6**
6	**Treatment and Disposal of Solid Waste:** Composting, vermicomposting, biogas production, thermal treatment, incineration, pyrolysis, gasification, biological treatment, Sanitary land filling, land fill leachate and gas management **Latest Advances and Rules** related to SWM, Hazardous Waste, Plastic Waste and E-Waste Management	**5** **3**
	TOTAL	**28**

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3rd Year - VI Semester: B.Tech. (Civil Engineering)

6CE5-13: TRAFFIC ENGINEERING AND MANAGEMENT

Credit: 2 **Max. Marks: 100(IA:20, ETE:80)**

2L+0T+0P **End Term Exam: 2 Hours**

SN	CONTENTS	Hours
1	**Introduction:** Objective, scope and outcome of the course.	**1**
2	**Traffic Planning and Characteristics:** Road Characteristics – Road user characteristics – PIEV theory – Vehicle – Performance characteristics – Fundamentals of Traffic Flow .	**4**
3	**Traffic Surveys**: Traffic Surveys – Speed, journey time and delay surveys – Vehicles Volume Survey including nonmotorized transports – Methods and interpretation – Origin Destination Survey – Methods and presentation – Parking Survey – Accident analyses -Methods, interpretation and presentation –Level of service – Concept, applications and significance.	**6**
4	**Traffic Design and Visual Aids:** Intersection Design – channelization, Rotary intersection design – Signal design – Coordination of signals — Grade separation – Traffic signs including VMS and road markings – Significant roles of traffic control personnel – Networking pedestrian facilities & cycle tracks.	**6**
5	**Traffic Safety and Environment**: Road accidents – Causes, effect, prevention, and cost – Street lighting – Traffic and environment hazards –	**4**
6	**Traffic Management:** Area Traffic Management System – Traffic System Management (TSM) with IRC standards –- Traffic Regulatory Measures-Travel Demand Management (TDM) – Direct and indirect methods – Congestion and parking pricing – All segregation methods- Coordination among different agencies – Intelligent Transport System for traffic management, enforcement and education.	**7**
	TOTAL	**28**

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Syllabus

3rd Year - VI Semester: B.Tech. (Civil Engineering)

6CE5-14: BRIDGE ENGINEERING

Credit: 2 **Max. Marks: 100(IA:20, ETE:80)**

2L+0T+0P **End Term Exam: 2 Hours**

SN	CONTENTS	Hours
1	**Introduction:** Objective, scope and outcome of the course.	**1**
2	**Introduction:** Type of bridges & classification of road & railways bridges. IRC & Railwayloadings for bridges, wind load & Earthquake forces. : Expansion joints.	**3**
3	**Steel bridges**: Introduction to Design of through type &deck type steel bridges for IRC loading. Design of through type truss bridges forrailway loadings.	**9**
4	**Reinforced concrete culverts & bridges:** Reinforced concrete slab culvert, T-beam bridges-courbons & Hendry-Jaegar methods.	**10**
5	**Bearings**: Bearings for slab bridges and girder bridges. Elastomeric bearings, design concepts as per IRC 83 (Part II).	**5**
	TOTAL	**28**

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Syllabus

3rd Year - VI Semester: B.Tech. (Civil Engineering)

6CE5-15: ROCK ENGINEERING

Credit: 2 **Max. Marks: 100(IA:20, ETE:80)**

2L+0T+0P **End Term Exam: 2 Hours**

SN	CONTENTS	Hours
1	**Introduction:** Objective, scope and outcome of the course.	**1**
2	**Engineering Classification of Rocks**: Objectives, Intact rock classification, Rock mass Classification. Terzaghi's, Rock load classification, Austrian classification, Deere's rock quality classification, rock structure rating concept, RMR classification, Q classification. Inter relation between Q and RMR.	**6**
3	**Engineering Properties and Laboratory Tests on Rocks:** Porosity, Density, Moisture content, Degree of saturation, Co-efficient of permeability, Durability, Compressive strength, Tensile strength, Shear strength, elasticity, Plasticity Deformability. Sampling and Samples Preparations, Uniaxial Compressive strength, Tensile Strength – Brazilian test, Shear strength test – Direct Shear test and Punch shear test, Triaxial Test, Flexural strength.	**7**
4	**In-situ Tests on Rocks**: Necessity of Insitu test, Plate load test for deformability, Field Shear test **Jointed Rocks:** Rocks Joint properties, Joint properties, Joint Roughness Co-efficient, Scale effects, Dilation, Orientation of Joints, Gouge, Joint Intensity, Uniaxial Compressive strength of Jointed Rocks.	**7**
5	**Strength of Rocks in Unconfined Condition**: Ramamurthy Strength Criteria, Singh and Rao Strength Criteria, Kulatilake Methodology, Barton Methodology. **Strength of Rocks in Confined Condition:** History of Hoek and Brown Failure Criterions, Parabolic Strength Criteria. **Bearing Capacity of Rocks:** Bearing capacity of intact rocks, jointed rocks,IS Code methodology, Singh and Rao Method and latest methodologies.	**7**
	TOTAL	**40**

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RAJASTHAN TECHNICAL UNIVERSITY, KOTA

Syllabus

3rd Year - VI Semester: B.Tech. (Civil Engineering)

6CE5-16: GEOGRAPHIC INFORMATION SYSTEM & REMOTE SENSING

Credit: 2 **Max. Marks: 100(IA:20, ETE:80)**

2L+0T+0P **End Term Exam: 2 Hours**

SN	CONTENTS	Hours
1	**Introduction:** Objective, scope and outcome of the course.	**1**
2	**Photogrammetry:** Definition of Photogrammetric Terms, Geometry of aerial and terrestrial photographs,Aerial camera and photo-theodolite, Scale of a Photograph, Tilt and Height displacements, Stereoscopicvision and stereoscopes, Height determination from parallax measurements, Flight planning, Maps andMap substitutes and their uses.	**7**
3	**Remote Sensing:** Introduction and definition of remote sensing terms, Remote Sensing System, Electromagnetic radiation and spectrum, Spectral signature, Atmospheric windows.	**4/6**
4	Different types of platforms, sensors and their characteristics, Orbital parameters of a satellite, Multiconcept in Remote Sensing.	**4/4**
5	**Image Interpretation:** Principles of interpretation of aerial and satellite images, equipments and aidsrequired for interpretation, ground truth – collection and verification, advantages of multidate andmultiband images. Digital Image Processing concept.	**6/5**
6	**Geographic Information System (GIS) :** Introduction & applications of GIS in map revision, Land use,Agriculture, Forestry, Archaeology, Municipal, Geology, water resources, Soil Erosion, Land suitabilityanalysis, change detection.	**6/5**
	TOTAL	**28**

BIKANER TECHNICAL UNIVERSITY, BIKANER
बीकानेर तकनीकी विश्वविद्यालय, बीकानेर

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Pugal Road, Bikaner Pin Code: 334004 Ph. 0151-2250948

6CE5-17: Values, Relationship & Ethical Human Conduct-For a Happy & Harmonious Society
(Professional Elective Course)

Prerequisites: For this subject only those faculty will teach these courses who had done the FDP for these courses.

Course Objectives:

1. To help the students to understand the importance and types of relationship with expressions.
2. To develop the competence to think about the conceptual framework of undivided society as well as universal Human order.
3. To help the students to develop the exposure for transition from current state to the undivided society and universal human order.

Course Methodology:

1. The methodology of this course is explorational and thus universally adaptable. It involves a systematic and rational study of the human being vis-a-vis the rest of existence.
2. It is free from any dogma or set of do's and don'ts related to values.
3. It is a process of self-investigation and self-exploration, and not of giving sermons. Whatever is found as truth or reality is stated as a proposal and the students are facilitated and encouraged to verify it in their own right, based on their Natural Acceptance and subsequent Experiential Validation.
4. This process of self-exploration takes the form of a dialogue between the teacher and the students to begin with, and then to continue within the student leading to continuous self-evolution.
5. This self-exploration also enables them to critically evaluate their pre-conditionings and present beliefs.

Course content

Unit I: Introduction to the course - Basic aspiration of a Human Being and program for its fulfillment, Need for family and relationship for a Human Being, Human-human relationship and role of behavior in its fulfillment, Human-rest of Nature relationship and role of work in its fulfillment, Comprehensive Human Goal, Need for Undivided Society, Need for Universal Human Order, an appraisal of the Current State, Appraisal of Efforts in this Direction in Human History.

Unit II: Understanding Human-Human Relationship & its fulfillment – Recognition of Human-Human Relationship, Recognition of feelings in relationship, established values and Expressed Values in Relationship, interrelatedness of feelings and their purpose, mutual evaluation in relationship, meaning of justice in relationship, justice leading to culture, civilization and human conduct.

Unit III: Justice from family to world family order -Undivided Society as continuity and expanse of Justice in behavior – family to world family order, continuity of culture and civilization, Universal Order on the basis of Undivided Society, Conceptual Framework for Universal human order, Universal Human Order as continuity and expanse of order in living: from family order to world family order, a conceptual framework for universal human order.

Unit IV: Program for Ensuring Undivided Society and Universal Human Order -Education – Sanskar, Health – Sanyam, Production-work, Exchange – storage, Justice-preservation.

Unit V: Human Tradition -Scope and Steps of Universal Human Order, Human Tradition (Ex. Family order to world family order), Steps for transition from the current state, Possibilities of participation of students in this direction, Present efforts in this direction, Sum up.

Text Books:

1. A Foundation Course in Human Values and Profession Ethics (Text Book and Teachers' Manual), R. R. Gaur, R. Asthana, G. P. Bagaria (2010), Excel Books, New Delhi.
2. Avartansheel Arthshastra, A. Nagraj, Divya Path Sansthan, Amarkantak, India.
3. An Appeal by the Dalai Lama to the World: Ethics Are More Important Than Religion , Dalai Lama XIV, 2015.
4. Economy of Permanence – (a quest for social order based on non-violence), J. C. Kumarappa (2010), Sarva-Seva-Sangh-Prakashan, Varansi, India.
5. Energy and Equity, Ivan Illich (1974), The Trinity Press, Worcester & Harper Collins, USA.
6. Human Society, Kingsley Davis, 1949.
7. Hind Swaraj or, Indian home rule Mohandas K. Gandhi, 1909.
8. Integral Humanism, Deendayal Upadhyaya, 1965.
9. Lohiya Ke Vichar, Lok Bharti , Rammanohar Lohiya, 2008.
10. Manav Vyavahar Darshan, A. Nagraj, Divya Path Sansthan, Amarkantak, India.
11. Manaviya Sanvidhan, A. Nagraj, Divya Path Sansthan, Amarkantak, India
12. Samadhanatmak Bhautikvad, A. Nagraj, Divya Path Sansthan, Amarkantak, India
13. Small Is Beautiful: A Study of Economics as if People Mattered, E. F. Schumacher, 1973, Blond & Briggs, UK.
14. Slow is Beautiful, Cecile Andrews (http://www.newsociety.com/Books/S/Slow-is-Beautiful)
15. Sociology Themes and Perspectives, Harper Collins; EIGHT edition (2014), Martin Holborn and Peter Langley, 1980.

16. Samagra kranti: Jaya Prakash Narayan's philosophy of social change, Siddharth Publications Renu Sinha, 1996.
17. Science & Humanism – towards a unified worldview, P. L. Dhar & R. R. Gaur (1990), Commonwealth Publishers, New Delhi
18. Vyavaharvadi Samajshastra, A. Nagraj, Divya Path Sansthan, Amarkantak, India.
19. Vyavahatmak Janvad, A. Nagraj, Divya Path Sansthan, Amarkantak, India.
20. The Communist Manifesto, Karl Marx, 1848.
21. Toward a True Kinship of Faiths: How the World's Religions Can Come Together Dalai Lama XIV, 2011.

Reference Videos.

1. kin school (30 minutes)
2. Technology (Solar City etc.).
3. Natural Farming.
4. Economics of Happiness (1h 8m)

RAJASTHAN TECHNICAL UNIVERSITY, KOTA

Syllabus

3rd Year - VI Semester: B.Tech. (Civil Engineering)

6CE4-21: Environmental Engineering Design and Lab

Credit: 1.5 **Max. Marks: 75(IA:45, ETE:30)**

0L+0T+3P **End Term Exam: 3 Hours**

Design

1. Population forecasting and water demand
2. Water Quality parameters
3. Design of Sedimentation tanks, coagulation and flocculation tanks
4. Design of rapid and slow sand filters
5. Design of disinfection units and transmission systems
6. Design of Sewer lines and storm water systems
7. Design of aerobic and anaerobic treatment units
8. Design of suspended and attached growth systems

Lab.

1. Physical Characterization of water: Turbidity, Electrical Conductivity, pH
2. Analysis of solids content of water: Dissolved, Settleable, suspended, total, volatile, inorganic etc.
3. Alkalinity and acidity, Hardness: total hardness, calcium and magnesium hardness
4. Optimum coagulant dose
5. Chemical Oxygen Demand (COD)
6. Dissolved Oxygen (D.O) and Biochemical Oxygen Demand (BOD)
7. Break point Chlorination
8. Bacteriological quality measurement: MPN,

6CE4-22: Steel Structures Design

Credit: 1.5 **Max. Marks: 75(IA:45, ETE:30)**
0L+0T+3P **End Term Exam: 3 Hours**

Analysis and design Problems as per different topics of syllabus of theory 6CE4-05, with latest version of IS 800 and other relevant IS codes. In addition to numerical problems, following exercises:

1. Case study of foot over bridges/truss- girder bridge in vicinity /home town of the students, preferably in groups of 8-10 students. A report including photographs marked with names and section details of different members in it (maximum limit of words :1000).
2. Case study of a structure using tubular sections or light gauge sections in vicinity /home town of the students, preferably in groups of 8-10 students. A report including photographs marked with names, size and section details of different members in it (maximum limit of words: 1000).

6CE4-23: QUANTITY SURVEYING AND VALUATION

Credit: 1 **Max. Marks: 50(IA:30, ETE:20)**
0L+0T+2P **End Term Exam: 2 Hours**

Contents

1. Preliminary Estimate (Plinth Area and Cubic Content)
2. Detailed Estimate of buildings (Long wall-Short wall and Centre line method)
3. Rate Analysis of different Items of Works (Earthwork, Concrete Work, DPC, Stone masonry, Brickwork, RCC, Roofing, Flooring, and Finishing etc.)
4. Earthwork Calculation for Roads, Irrigation Canals and Channels (cutting and filling)
5. Valuation of Buildings and Properties

6CE4-24: WATER AND EARTH RETAINING STRUCTURES DESIGN

Credit: 1 **Max. Marks: 50(IA:30, ETE:20)**
0L+0T+2P **End Term Exam: 2 Hours**

Assignments/ Exercises on the following topics:		
SN	**CONTENTS**	**Hours**
1	**Continuous Beams:** Analysis andDesign of continuous beams using coefficients (IS Code), concept of moment redistribution	**4**
2	**Curved Beams:** Analysis and design of beams curved in plan.	**4**
3	**Circular Domes:** Analysisand design of Circular domes with u.d.l. & concentrated load at crown.	**4**
4	**Water Tanks and Towers:** Water Tanks and Water Towers-design of rectangular, circular and Intze type tanks, column brace type staging.	**10**
5	**Retaining walls:** Analysis and design of Cantilever Retaining Walls: Introduction to counterfort and buttress type retaining walls, their structural behaviour and stability analysis.	**6**
	TOTAL	**28**

6CE4-25: FOUNDATION ENGINEERING

Credit: 1 **Max. Marks: 50(IA:30, ETE:20)**
0L+0T+2P **End Term Exam: 2 Hours**

1. Design of isolated shallow footings, combined footings, raft foundations.
2. Design of pile foundations.
3. Design of wells and cassions.
4. Design of machine foundation.
5. Design of retaining structures etc

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