

DEPARTMENT OF CIVIL ENGINEERING

LIST OF MINORS

S.No	CODE	Subject	Cat Code	Internal Marks	External Marks	Total Marks	L	T	P	Credits
1	R20CCMN01	Introduction to Civil Engineering-Concepts And Materials	PC	30	70	100	4	0	0	4
2	R20CCMN02	Geomatics	PC	30	70	100	4	0	0	4
3	R20CCMN05	Fundamentals of Structural Engineering	PC	30	70	100	4	0	0	4
4	R20CCMN06	Environmental Engineering	PC	30	70	100	4	0	0	4

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MINORS	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	30	70	100	4
CODE: R20CCMN01	INTRODUCTION TO CIVIL ENGINEERING CONCEPTS AND MATERIALS						

COURSE OBJECTIVES:

The course is designed to know the basic civil engineering concepts and materials.

COURSE OUTCOMES:

CO 1: Classify rocks and identify particular type of stones

CO 2: Classify different types of bricks

CO 3: Perform laboratory tests of cement to determine properties of cement

CO 4: Identify types of defects of timber

CO 5: Identify and use different types of metals/alloys

UNIT-I

INTRODUCTION TO CIVIL ENGINEERING: Overview of Civil Engineering-Civil Engineering Landmarks-Impact (social, economic, environmental) of Civil Engineering on Society-Future directions-Job opportunities in Civil Engineering-Case studies-Hands-on projects- demonstrations and Field visit.

UNIT-II

CONSTRUCTION MATERIALS

BUILDING STONES:

Classification of Rocks: (General Review) - Geological classification: Igneous, sedimentary and metamorphic rocks - Chemical classification; Calcareous, argillaceous and siliceous rocks-Physical classification: Unstratified, stratified and foliated rocks -General characteristics of stones –Requirements of good building stones -Identification of common building stones- Various uses of stones in construction

UNIT-III

BRICKS

INTRODUCTION TO BRICKS - Raw materials for brick manufacturing and properties of good brick making earth - Manufacturing of bricks-Preparation of clay (manual/mechanically) - Moulding: hand moulding and machine moulding brick table; drying of bricks, burning of bricks, types of kilns (Bull's Trench Kiln and Hoffman's Kiln), process of burning, size and weight of standard brick; Classification and specifications of bricks as per BIS:

UNIT-IV CONSTITUENTS OF CONCRETE (Cement, Aggregates): Proportioning of concrete, Fresh concrete, Hardened concrete, Quality control (Sampling, Acceptance, etc.), Transportation and placing, Testing of concrete (including NDT)

UNIT-V

TIMBER AND WOOD

Identification and uses of different types of timber: Teak, Deodar, Shisham, Sal, Mango, Kail, Chir, Fir, Hollock, Champ-Market forms of converted timber as per BIS Code-Seasoning of timber: Purpose, methods of seasoning as per BIS Code - Properties of timber and specifications of structural timber- Defects in timber, decay in timber -Preservation of timber and methods of treatment as per BIS

UNIT-V

TILES

Building tiles-Types of tiles-wall, ceiling, roofing and flooring tiles, Ceramic, terrazo and PVC tiles, their properties and uses, Vitrified tiles, Paver blocks, interlocking tiles -Stacking of bricks and tiles at site

METALS - Ferrous metals: Composition, properties and uses of cast iron, mild steel, HYSD steel, high tension steel as per BIS. Commercial forms of ferrous, metals. Aluminium & Stainless Steel.

TEXT BOOKS:

1. Dr.P.Naga Sowjanya, Er.K.V.Prataap,"Elements of Building Sciences", Sunraise Publications, ISBN:978-81-952678-2-8,2001.
2. S.C.Rangwala, K.S. Rangwala and P.S. Rangwala [2012], *Engineering materials*, Charotar Publishers, Anand.
3. Dr. B.C. Punmia [2008], *Building construction*, Laxmi Publications (P) Ltd., New Delhi.
4. Dr. N. Kumara Swamy and A. Kameswara Rao [2012], *Building Planning and Drawing*, Charotar Publishers, Anand.
5. Gurucharan Singh and Jagdish Singh [2009], *Building Planning Designing and scheduling*, Standard publishers Distributors.

REFERENCE BOOKS:

1. S.K. Duggal [2012], *Building materials*, New Age international (P) Ltd., New Delhi.
2. N.L. Arora and B.L. Gupta [2014], *Building construction*, Satyaprakshan publications.
3. S.V. Deodhar [2005], *Building science and planning*, Khanna Publishers, New Delhi.

4. Bureau of Indian Standards, *National Building Code of India – 2016*, New Delhi.
5. V.K. Jain [2009], *Automation Systems in smart and Green Buildings*, Khanna Publications.
6. S.C. Rangwala [2009], *Civil Engineering Drawing*, Charotar Publishing Hous

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	4	0	0	30	70	100	4
CODE: R20CCMN02	GEOMATICS						

COURSE OBJECTIVES:

The course is designed to know the Geomatics concepts.

COURSE OUTCOMES: after the completion of the course student should be able to

CO1: Gain a broad understanding of Land Survey

CO2: Get accustomed with the angular and linear measurements.

CO3: Trained with recording the field information and necessary plot.

CO4: Contemporary issues and developments.

Unit-I:

Introduction and Basic Concepts

Introduction, Objectives, classification and principles of surveying, Scales, Shrinkage of Map, Conventional symbols and Code of Signals, Surveying accessories, phases of surveying.

Measurement of Distances and Directions

Linear distances- Approximate methods, Direct Methods- Chains- Tapes, ranging, Tape corrections, indirect methods- optical methods.

Prismatic Compass- Bearings, included angles, Local Attraction, Magnetic Declination and dip.

Unit-II

Leveling and Contouring

Leveling- Basics definitions, types of levels and leveling staves, temporary adjustments, methods of leveling, booking and Determination of levels- HI Method-Rise and Fall method, Effect of Curvature of Earth and Refraction.

Contouring- Characteristics and uses of Contours, Direct & Indirect methods of contour surveying, interpolation and sketching of Contours.

Plan Table Surveying: Introduction of Plane table surveying- Area by the method of radiation and intersection – Two point problem

Computation of Areas and Volumes

Areas- Determination of areas consisting of irregular boundary and regular boundary (coordinates, MDM, DMD methods), Planimeter.

Volumes- Computation of areas for level section and two level sections with and without transverse slopes, determination of volume of earth work in cutting and embankments, volume of borrow pits, capacity of reservoirs.

Unit-III

Theodolite Surveying

Types of Theodolites, Fundamental Lines, temporary adjustments, measurement of horizontal angle by repetition method and reiteration method, measurement of vertical Angle, Trigonometrical leveling when base is accessible and inaccessible.

Traversing

Methods of traversing, traverse computations and adjustments, Gale's traverse table, Omitted measurements.

Unit-IV

Tacheometric Surveying

Principles of Tacheometry, stadia and tangential methods of Tacheometry.

Curves Types of curves and their necessity, elements of simple curve, setting out of simple Curves, Introduction to compound curves.

Unit-V

Modern Surveying Methods

Total Station and Global Positioning System. : Basic principles, classifications, applications, comparison with conventional surveying. Electromagnetic wave theory - electromagnetic distance measuring system - principle of working, E.D.M. method and EDM instruments, Components of GPS – space segment, control segment and user segment, reference systems, satellite orbits, GPS observations. Applications of GPS.

TEXT BOOKS:

1. Chandra A M, "Plane Surveying", New age International Pvt. Ltd., Publishers, New Delhi, 2002.
2. Chandra A M, "Higher Surveying", New age International Pvt. Ltd., Publishers, New Delhi, 2002.
3. Duggal S K, "Surveying (Vol – 1 & 2), Tata Mc.Graw Hill Publishing Co. Ltd. New Delhi, 2004.

4. Hoffman.B, H.Lichtenegga and J.Collins, Global Positioning System - Theory and Practice, Springer - Verlag Publishers, 2001.

REFERENCES:

1. Arthur R Benton and Philip J Taety, Elements of Plane Surveying, McGraw Hill – 2000
2. Arora K R “Surveying Vol 1, 2 & 3), Standard Book House, Delhi, 2004

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MINORS	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	30	70	100	4
CODE: R20CCMN05	FUNDAMENTALS OF STRUCTURAL ENGINEERING						

COURSE OBJECTIVES:

Upon completion of the course, the student shall be able to

- Understand the concept Equilibrium of Co-Planar forces
- Understand the term Centroid
- Compute the Moment of Inertia and radius of gyration
- Calculate the simple Stresses and Strains in structural materials
- Determine Shear Force and Bending Moment of simple beams analytically

COURSE OUTCOMES:

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

CO 1: Compute the resultant and moment of a force system and apply the equations of equilibrium for a generalized force system (**Apply**)

CO 2: Interpret the centroids, centers of gravity of inertia of simple geometric shapes and understand the physical applications of these properties. (**Apply**)

CO 3: Interpret the moments of inertia of simple geometric shapes and understand the physical applications of these properties. (**Apply**)

CO 4: Analyse the stresses and strains in a member subjected to different loadings and understand the strain energy under different load conditions. (**Understanding, Analysing**)

CO 5: Apply different methods and analyse the various beams subjected to different loads using shear force and bending moment diagrams (**Applying, Analysing**)

UNIT-I FORCES & MOMENTS:

Definition of force - vectors and scalars - vector representation of a force - systems of forces - co-planar forces. Resultant of forces at a point – Parallelogram Law and Triangle Law of forces – Lami’s theorem – Polygon law of forces –Resolution of forces. Parallel forces – like and unlike – moment of force -its

units and sense-couple-moment of a couple – properties of a couple. Conditions of equilibrium of a rigid body subjected to a number of co-planar forces. Structural members supporting co - planar forces.

UNIT-II CENTROID:

Definitions – Centroid, Centre of gravity Position of Centroid of standard figures like rectangle, triangle, parallelogram, circle, semi-circle and trapezium. Determination of location of Centroid of standard sections- T, L, I, Channel section, Z section, built up sections consisting of RSJs & flange plates.

UNIT-III MOMENT OF INERTIA:

Definition of Moment of Inertia Perpendicular and parallel axes theorems Moment of Inertia of standard sections like rectangle, triangle, circle and hallow circular sections Moment of Inertia of built up sections- T, L, I, Channel section, and Z sections using parallel axis theorem Moment of Inertia and radius of gyration of built-up sections consisting of the combinations of RSJ's & flange plates. Polar Moment of Inertia of solid and hollow circular sections using Perpendicular axis theorem.

UNIT-IV SIMPLE STRESSES AND STRAINS:

Stress and strain – type of stresses and strains Stress strain curves for ductile materials- mild steel, elastic limit, Limit of proportionality, Yield point, Ultimate stress, breaking stress, Working stress and Factor of safety. Hooke's law – Young's modulus – deformation under axial load. Shear stress and Shear Strain – Modulus of rigidity. Longitudinal and lateral strain - Poisson's ratio, Bulk Modulus –relationship between elastic constants (proof not required, only problems).Composite sections – effect of axial loads Temperature stresses and strains – hoop stress. Resilience – strain energy-proof resilience and modulus of resilience – maximum instantaneous stress due to gradual, sudden and shock loading. Mechanical properties of materials - elasticity, plasticity, ductility, brittleness, malleability, stiffness, hardness, toughness, creep, fatigue- examples of materials which exhibit the above properties.

UNIT-V SHEAR FORCE AND BENDING MOMENT:

Beams – Types of beams – Cantilevers – Simply supported –Overhanging – Fixed and Continuous. Types of supports – Roller – Hinged – Fixed, Explanation of S.F and B.M. at a section, Relation between rate of loading SF and BM Calculation of S.F. and B.M values at different sections for cantilevers Simply supported beams, overhanging beams under point loads and uniformly distributed loads, position and significance of points of contra flexure. Drawing S.F and B.M diagrams by analytical methods – location of points of contra flexure.

TEXT BOOKS:

1. Engineering Mechanics – N. H.Dubey (Tata McGraw Hill)
2. Engineering Mechanics - R.S.Kurmi
3. Engineering Mechanics - P.K. Abdul Latheef

REFERENCE BOOKS

1. Engineering Mechanics & Statics – Dayaratnam
2. Engineering Mechanics - N. Srinivasulu,

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CODE: R20CCMN06	4	0	0	30	70	100	4
ENVIRONMENTAL ENGINEERING							

COURSE OBJECTIVES:

- Outline planning and the design of water supply systems for a community/ town/ city.
- To impart the knowledge of selecting sources of water with reference to quality and quantity in a locality, for domestic usage.
- Provide knowledge of characterization of water and wastewater.
- To introduce various treatment options available and their design principles for water treatment and wastewater treatment at the household and municipal level.
- To elucidate the various collection and disposal options available for water and wastewater, including the distribution networks, layout, construction and maintenance.

COURSE OUTCOMES:

The students will be able to

CO 1: Assess the quality and quantity of water requirements for a city

CO 2: Design of different treatment units and distribution systems for water supply

CO 3: Analyze the characteristics, collection, conveyance and disposal of wastewater

CO 4: Design of sewers and various units in a wastewater treatment plant

CO 5: Design of secondary and biological treatment units

SYLLABUS

UNIT-I: WATER DEMANDS- STANDARDS -SOURCES

Aspects of Environmental Engineering – Protected water supply – Need – Water borne diseases –Water demands – Fluctuations – Design period-Population forecast – Water quality – Drinking water standards- Testing and significance – Quality and Quantity and other considerations of surface and sub- surface sources – Yield calculations – Intake works –Types of Intakes – Storage reservoir capacity – Systems of water supply – Requirements – Detection of leakages – Selection of pump – Economical diameter of pumping main.

UNIT- II: TREATMENT OF WATER AND DISTRIBUTION

Water treatment, conventional treatment flow diagram – Sedimentation types – Principles – Design factors – Coagulation – Design of Clariflocculator – Filtration – Slow, Rapid gravity filters and Pressure filters – Design principles-Disinfection – Theory of Chlorination– Distribution systems– Layouts – Design- and analysis, Hardy Cross method and Equivalent Pipe method. Valves – Other appurtenances.

UNIT-III: WASTEWATER MANAGEMENT

Introduction: Waste water treatment system – Definitions of terms – Collection and conveyance of sewage – Sewage flow rates – Storm water – Characteristics of sewage– Cycles of decay – BOD – COD – Ultimate disposal of sewage–self-purification of rivers– sewage farming.

UNIT-IV: DESIGN OF SEWERS AND PRIMARY TREATMENT

Layouts – Design of sewers – Sewers appurtenances – Sewage pumping -Conventional sewage treatment – Primary treatment: - Screens – Grit chamber – Sedimentation tanks – Design principles. Septic tanks and Imhoff tanks - rural latrines – House plumbing – Appurtenances.

UNIT-V: SECONDARY BIOLOGICAL TREATMENT 14 HOURS

Secondary treatment – Biological treatment – Trickling filters – Activated Sludge Process – Low cost waste treatment methods – Design of Oxidation ponds – Aerobic and Anaerobic lagoons. Sludge Digestion– Disposal.

TEXT BOOKS:

1. B.C. Punmia B C, A.K. Jain and A.K. Jain, —Water Supply Engineering, Laxmi Publications. 2nd Edition 1995, Reprint 2005.
2. B.C. Punmia, A.K. Jain and A.K. Jain, —Wastewater Engineering, Laxmi Publications, 2nd Edition 1998, Reprint 2014.

REFERENCE BOOKS:

1. S.K. Garg, —Water Supply Engineering, Khanna Publishers, 26th revised Edition, New Delhi. 2010.
2. S.K. Garg, —Sewage disposal and Air Pollution Engineering, Khanna Publishers New Delhi. 36th Edition, 2017.
3. H.S. Peavy, D. Rowe, and G. Tchobanoglous, —Environmental Engineering, McGraw Hill Publishers, New Delhi. 1985.
4. G.S. Birdie and J.S. Birdie, —Water Supply and Sanitary Engineering, Dhanpat Rai Publishing Company New Delhi, 6th Edition, 2002

