DIPLOMA WING

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA,BHOPAL

SCHEME OF STUDIES & EXAMINATIONS (IMPLEMENTED FROM SESSION : JULY 2023)

SCHEME	NAME OF BRANCH	BRANCH CODE	SEMESTER
OCBC JULY 2022/2023	CIVIL ENGINEERING	C03	THIRD (III)

S.N.	PAPER CODE	SUBJECT CODE	SUBJECT NAME	THEORY COMPONENT								PRACTICAL COMPONENT					TOTAL CREDITS	TOTAL MARKS
				HRS PER WEEK	CREDITS	TERM WORK				THEORY PAPER		HRS PER WEEK	CREDITS	LAB WORK	PRACTICAL EXAM/VIVA			
						QUIZ/ASSIGNMENT	MID TERM TEST*		TOTAL	MARKS	DURATION				MARKS	DURATION		
							I	II										
1	7366	301	CONSTRUCTION MATERIALS	3	3	10	10	10	30	70	03 Hrs.	2	1	20	30	03 Hrs.	4	150
2	7367	302	BASIC SURVEYING	3	3	10	10	10	30	70	03 Hrs.	2	1	20	30	03 Hrs.	4	150
3	7368	303	MECHANICS OF MATERIALS	3	3	10	10	10	30	70	03 Hrs.	2	1	20	30	03 Hrs.	4	150
4	7369	304	BUILDING CONSTRUCTION	3	3	10	10	10	30	70	03 Hrs.	0	0	0	0	0	3	100
5	7370	305	CONCRETE TECHNOLOGY	3	3	10	10	10	30	70	03 Hrs.	2	1	20	30	03 Hrs.	4	150
6	7371	306	GEOTECHNICAL ENGINEERING	3	3	10	10	10	30	70	03 Hrs.	2	1	20	30	03 Hrs.	4	150
7			**SUMMER INTERNSHIP- I	0	0	0	0	0	0	0	0	0	2	20	30	03 Hrs.	2	50
8			PROFESSIONAL DEVELOPMENT	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
9			***RECOVERY CLASSES/LIBERARY etc.	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0
TOTAL				18	18				180	420		18	7	120	180		25	900

NOTE - (1)* Two Best, out of Three Mid Term Tests (Progressive Tests) Marks should be entered here.

(2)** 3-4 Weeks Summer Internship after II Semester.

(3)***To recover courses if session delays due to summer internship.

GRAND TOTAL OF CREDITS	GRAND TOTAL OF MARKS
25	900

DIPLOMA WING
RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL
DIPLOMA IN CIVIL ENGINEERING (C03)

SEMESTER III

COURSE TITLE	:	CONSTRUCTION MATERIALS
PAPER CODE	:	7366
SUBJECT CODE	:	301
TREORY CREDITS	:	03
PRACTICAL CREDITS	:	01

Course Objectives:

Following are the objectives of this course:

- To learn about various construction materials, and understand their relevant characteristics.
- To be able to identify suitability of various materials for different construction purposes.
- To know about natural, artificial, and processed materials available for various purposes of construction activities.

Course Content:

Unit – I: Overview of Construction Materials

- Scope of construction materials in Building Construction, Transportation Engineering, Environmental Engineering, Irrigation Engineering (applications only).
- Selection of materials for different civil engineering structures on the basis of strength, durability, Eco friendly and economy.
- Broad classification of materials –, Natural, Artificial, special, finishing and recycled.

Unit – II: Natural Construction Materials

- Requirements of good building stone; general characteristics of stone; quarrying and dressing methods and tools for stone.
- Structure of timber, general properties and uses of good timber, different methods of seasoning for preservation of timber, defects in timber, use of bamboo in construction.
- Asphalt, bitumen and tar used in construction, properties and uses.
- Properties of lime, its types and uses.
- Types of soil and its suitability in construction.
- Properties of sand and uses
- Classification of coarse aggregate according to size

Unit- III: Artificial Construction Materials

- Constituents of brick earth, Conventional / Traditional bricks, Modular and Standard bricks, Special bricks –fly ash bricks, Characteristics of good brick, Field tests on Bricks, Classification of burnt clay bricks and their suitability, Manufacturing process of burnt clay brick, fly ash bricks, Aerated concrete blocks.
- Flooring tiles – Types, uses
- Manufacturing process of Cement - dry and wet (only flow chart), types of cement and its uses. field tests on cement.
- Pre-cast concrete blocks- hollow, solid, pavement blocks, and their uses.
- Plywood, particle board, Veneers, laminated board and their uses.
- Types of glass: soda lime glass, lead glass and borosilicate glass and their uses.
- Ferrous and non-ferrous metals and their uses.

Unit– IV: Special Construction Materials

- Types of material and suitability in construction works of following materials: Water proofing, Termite proofing; Thermal and sound insulating materials.
- Fibers – Types –Jute, Glass, Plastic Asbestos Fibers, (only uses).
- Geopolymer cement: Geo-cement: properties, uses.

Unit– V: Processed Construction Materials

- Constituents and uses of POP (Plaster of Paris), POP finishing boards, sizes and uses.
- Paints- whitewash, cement paint, Distempers, Oil Paints and Varnishes with their uses.(Situations where used).
- Industrial waste materials- Fly ash, Blast furnace slag, Granite and marble polishingwaste and their uses.
- Agro waste materials - Rice husk, Bagasse, coir fibres and their uses.
- Special processed construction materials; Geosynthetic, Ferro Crete, Artificial timber, Ar-tificial sand and their uses.

References:

1. Ghose, D. N., Construction Materials, Tata McGraw Hill, New Delhi.
2. S.K. Sharma, Civil Engineering Construction Materials, Khanna Publishing House, Delhi
3. Varghese, P.C. , Building Materials, PHI learning, New Delhi.
4. Rangwala, S.C., Engineering Materials, Charator publisher, Ahemdabad.
5. Somayaji, Shan, Civil Engineering Materials, Pearson education, New Delhi.
6. Rajput, R.K, Engineering Materials, S. Chand and Co., New Delhi.
7. Sood H., Laboratory Manual on Testing of Engineering Materials, New Age Publishers, NewDelhi.
8. Sharma C. P., Engineering Materials, PHI Learning, New Delhi.
9. Duggal, S. K, Building Materials, New International, New Delhi.

Course outcomes:

After competing this course, student will be able to:

- Identify relevant construction materials.
- Identify relevant natural construction materials.
- Select relevant artificial construction materials.
- Select relevant special type of construction materials.
- Identify and use of processed construction materials.

CONSTRUCTION MATERIALS LAB

Course Objectives:

Following are the objectives of this course:

- To learn about various construction materials, and understand their relevant characteristics.
- To be able to identify suitability of various materials for different construction purposes.
- To know about natural, artificial, and processed materials available for various purposes of construction activities.
- To understand flexural strength and abrasive properties of floor tiles.

List of practical to be performed:

- Identify various sizes of available coarse aggregates from sample of 10 kg in laboratory and prepare report (60,40, 20,10 mm)
- Prepare the lime putty by mixing lime (1 kg) with water in appropriate proportion and pre-pare report on slaking of lime.
- Identify various layers and types of soil in foundation pit by visiting construction sites and prepare report consisting photographs and samples.
- Select first class, second class and third-class bricks from the stake of bricks and prepare report on the basis of its properties.
- Measure dimensions of 10 bricks and find average dimension and weight. Perform field tests - dropping, striking and scratching by nail and correlate the results obtained.
- Identify different types of flooring tiles such as vitrified tiles, ceramic tiles, glazed tiles, mo- saic tiles, anti- skid tiles, chequered tiles, paving blocks and prepare report about the speci- fications.
- Apply two or more coats of selected paint on the prepared base of a given wall surface for the area of 1m x 1m using suitable brush/rollers adopting safe practices.
- Prepare the cement mortar of proportion 1:3 or 1:6 using artificial sand as a special pro-cessed construction material.
- Prepare mortar using cement and Fly ash or Granite/marble polishing waste in the propor-tion 1:6 or 1:3.
- Determine Water Absorption on bricks per IS:3495 (part II), IS:1077 or tile IS:1237.
- Determine Compressive strength of dry and wet bricks as per IS:3495(part I), IS:1077.
- Conduct Abrasion Test on flooring tiles (any one) e.g. Mosaic tiles, Ceramic Tiles as per IS: 13630 (part7), Cement Tile as per IS: 1237.
- Conduct Flexure test on floor tiles IS:1237,IS:13630 or roofing tiles as per IS:654,IS:2690.

Suggested learning resources:

1. Ghose, D. N., Construction Materials , Tata McGraw Hill, New Delhi.
2. S.K. Sharma, Civil Engineering Construction Materials, Khanna Publishing House, New Delhi
3. Varghese, P.C. , Building Materials, PHI learning, New Delhi.
4. Rangwala, S.C., Engineering Materials, Charator publisher, Ahemdabad.
5. Somayaji, Shan, Civil Engineering Materials, Pearson education, New Delhi.
6. Rajput, R.K, Engineering Materials, S. Chand and Co., New Delhi.
7. Sood H., Laboratory Manual on Testing of Engineering Materials, New Age Publishers, NewDelhi.
8. Sharma C. P., Engineering Materials, PHI Learning, New Delhi.
9. Duggal, S. K, Building Materials, New International, New Delhi.

Course outcomes:

After competing this course, student will be able to:

1) Identify relevant construction materials.
2) Identify relevant natural construction materials.
3) Select relevant artificial construction materials.
4) Select relevant special type of construction materials.
5) Identify and use of processed construction materials.
6) Calculate flexural strength of different types of floor tiles.

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DIPLOMA WING
RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL
DIPLOMA IN CIVIL ENGINEERING (C03)

SEMESTER III

COURSE TITLE	:	BASIC SURVEYING
PAPER CODE	:	7367
SUBJECT CODE	:	302
TREORY CREDITS	:	03
PRACTICAL CREDITS	:	01

Course Objectives:

Following are the objectives of this course:

- To understand types of surveying works required.
- To know the types of method and equipments to be used for different surveys.
- To know the use and operational details of various surveying equipments.

Course Content:

Unit – I Overview and Classification of Survey

- Survey- Purpose and Use.
- Types of surveying- Primary and Secondary, Classification: Plane, Geodetic, Cadastral, Hydro-graphic, Photogrammetry and Aerial.
- Principles of Surveying.
- Scales: Engineer's scale, Representative Fraction (RF) and diagonal scale.

Unit– II Chain Surveying

- Instruments used in chain survey: Metric Chain, Tapes, Arrow, Ranging rod, Line ranger, Off- set rod, Open cross staff, Optical square.
- Chain survey Station, Base line, Check line, Tie line, Offset, Tie station.
- Ranging: Direct and Indirect Ranging.
- Methods of Chaining, obstacles in chaining.
- Errors in length: Instrumental error, personal error, error due to natural cause, random error.
- Principles of triangulation.
- Types of offsets: Perpendicular and Oblique.
- Conventional Signs, Recording of measurements in a field book.

Unit– III Compass Traverse Survey

- Compass Traversing- open, closed.
- Technical Terms: Geographic/ True Magnetic Meridians and Bearings, Whole Circle Bearing system and Reduced Bearing system and examples on conversion of given bearing to another bearing (from one form to another), Fore Bearing and Back Bearing, Calculation of internal and external angles from bearings at a station, Dip of Magnetic needle, Magnetic Declination.
- Components of Prismatic Compass and their Functions, Methods of using Prismatic Com- pass- Temporary adjustments and observing bearings.
- Local attraction, Methods of correction of observed bearings - Correction at station and cor-rection to included angles.
- Methods of plotting a traverse and closing error, Graphical adjustment of closing error.

Unit– IV Levelling and Contouring

- Basic terminologies: Level surfaces, Horizontal and vertical surfaces, Datum, Bench Marks- GTS, Permanent, Arbitrary and Temporary, Reduced Level, Rise, Fall, Line of collimation, Sta-tion, Back sight, Fore sight, Intermediate sight, Change point, Height of instruments.
- Types of levels: Dumpy, Tilting, Auto level, Digital level, Components of Dumpy Level and its
  fundamental axes, Temporary adjustments of Level.
- Types of Leveling Staff: Self-reading staff and Target staff.
- Reduction of level by Line of collimation and Rise and Fall Method.
- Leveling Types: Simple, Differential, Fly, Profile and Reciprocal Leveling.
- Contour, contour intervals, horizontal equivalent.
- Uses of contour maps, Characteristics of contours, Methods of Contouring: Direct and indi-rect.

Unit– V Measurement of Area and Volume

- Components and use of Digital planimeter.
- Measurement of area using digital planimeter.
- Measurement of volume of reservoir from contour map.

Suggested learning resources

1. Punmia, B.C,; Jain, Ashok Kumar; Jain, Arun Kumar, Surveying I, Laxmi Publications, New Del-hi.
2. Basak, N. N., Surveying and Levelling, McGraw Hill Education, New Delhi.
3. Kanetkar, T. P.; Kulkarni, S. V., Surveying and Levelling volume I, Pune Vidyarthi Gruh Prakashan.
4. Duggal, S. K., Survey I, McGraw Hill Education, New Delhi.
5. Saikia, M D.; Das. B.M.; Das. M.M., Surveying, PHI Learning, New Delhi.
6. Subramanian, R., Fundamentals of Surveying and Levelling, Oxford University Press. New Del-hi.
7. Rao, P. Venugopala Akella, Vijayalakshmi, Textbook of Surveying, PHI Learning New Delhi.
8. Bhavikatti, S. S., Surveying and Levelling, Volume 1, I. K. International, New Delhi.
9. Arora K R , Surveying Vol. I, Standard Book House.

Course outcomes:

After competing this course, student will be able to:

- Select the type of survey required for given situation.
- Compute area of open field using chain, tape and cross staff.
- Conduct traversing in the field using chain and compass.
- Use levelling instruments to determine reduced level for preparation of contour maps
- Use digital planimeter to calculate the areas.

BASIC SURVEYING LAB

Course Objectives:

Following are the objectives of this course:

- To understand types of surveying works required
- To know the type of method and equipments to be used for different surveys
- To know the use and operational details of various surveying equipments.

List of Practicals to be performed

- Measure distance between two survey stations using chain, tape and ranging rods when twostations are inter visible.
- Determine area of open field using chain and cross staff survey.
- Measure Fore Bearing and Back Bearing of survey lines of open traverse using PrismaticCompass.
- Measure Fore Bearing and back bearing of a closed traverse of 5 or 6 sides and correct the bearings and included angles for the local attraction.
- Undertake Survey Project with chain and compass for closed traverse for minimum 5 sidesaround a building**.**
- Plot the traverse on A1 size imperial drawing sheet for data collected in Survey Project men-tioned at practical **No.6.**
- Undertake simple leveling using dumpy level/ Auto level and leveling staff.
- Undertake differential leveling and determine Reduced Levels by Height of instrument meth- od and Rise and fall method using dumpy level/Auto Level and leveling staff.
- Undertake fly leveling with double check using dumpy level/ Auto level and leveling staff.
- Undertake Survey Project with Leveling instrument for Profile leveling and cross-sectioning for a road length of 500 m with cross-section at 30 m interval.
- Plot the L-section with minimum 3 cross-sections on A1 size imperial sheet for data collected in Survey Project mentioned at practical **No.11.**

* Undertake Survey Project for plotting contour map using block contouring method for a block of 150m x 150m with grid of 10m x 10m.

* Plot the contours on A1 size imperial drawing sheet for data collected in Survey Project mentioned at practical **No.13.**

- Measure area of irregular figure using Digital planimeter.

Suggested learning resources:

1. Punmia, B.C,; Jain, Ashok Kumar; Jain, Arun Kumar, Surveying I, Laxmi Publications., New Delhi.
2. Basak, N. N., Surveying and Levelling, McGraw Hill Education, New Delhi.
3. Kanetkar, T. P.; Kulkarni, S. V., Surveying and Levelling volume I, Pune Vidyarthi Gruh Prakashan.
4. Duggal, S. K., Survey I, McGraw Hill Education, New Delhi.
5. Saikia, M D.; Das. B.M.; Das. M.M., Surveying, PHI Learning, New Delhi.
6. Subramanian, R., Fundamentals of Surveying and Levelling, Oxford University Press. New Del-hi.
7. Rao, P. Venugopala Akella, Vijayalakshmi, Textbook of Surveying, PHI Learning
8. Bhavikatti, S. S., Surveying and Levelling, Volume 1, I. K. International, New Delhi.
9. Arora K R , Surveying Vol. I, Standard Book House

Course outcomes:

After completing this course, student will be able to:

- Select the type of survey required for given situation.
- Compute area of open field using chain, tape and cross staff.
- Conduct traversing in the field using chain and compass.
- Use levelling instruments to determine reduced level to prepare contour maps
- Use digital planimeter to calculate the areas.

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DIPLOMA WING
RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL
DIPLOMA IN CIVIL ENGINEERING (C03)

SEMESTER III

COURSE TITLE	:	MECHANICS OF MATERIALS
PAPER CODE	:	7368
SUBJECT CODE	:	303
TREORY CREDITS	:	03
PRACTICAL CREDITS	:	01

Course Objectives:

Following are the objectives of this course:

- To learn properties of area and structural material properties.
- To understand the concept of stress and strain.
- To calculate shear force, bending moment for different shapes of structural elements andcorresponding stresses.
- To understand the concept of buckling loads for short and long columns.

Course Content

Unit – I Moment of Inertia

- Moment of inertia (M.I.): Definition, M.I. of plane lamina, Radius of gyration, section mod- ulus, Parallel and Perpendicular axes theorems (without derivations), M.I. of rectangle, square, circle, semi-circle, quarter circle and triangle section (without derivations).
- M.I. of symmetrical and unsymmetrical I-section, Channel section, T-section, Angle sec- tion, Hollow sections and built up sections about centroidal axes and any other referenceaxis.
- Polar Moment of Inertia of solid circular sections.

Unit– II Simple Stresses and Strains

- Definition of rigid, elastic and plastic bodies, deformation of elastic body under various forces, Definition of stress, strain, elasticity, Hook's law, Elastic limit, Modulus of elastic-ity.
- Type of Stresses-Normal, Direct, Bending and Shear and nature of stresses i.e. Tensile andCompressive stresses.
- Standard stress strain curve for tor steel bar under tension, Yield stress, Proof stress, Ul- timate stress, Strain at various critical points, Percentage elongation and Factor of safety.
- Deformation of body due to axial force, forces applied at intermediate sections, Maximum and minimum stress induced, Composite section under axial loading.
- Concept of temperature stresses and strain, Stress and strain developed due to tempera- ture variation in homogeneous simple bar (no composite section)

- Longitudinal and lateral strain, Modulus of Rigidity, Poisson's ratio, Biaxial and tri-axial stresses, volumetric strain, change in volume, Bulk modulus (Introduction only).
- Relation between modulus of elasticity, modulus of rigidity and bulk modulus (without derivation).

Unit– III Shear Force and Bending Moment

- Types of supports, beams and loads.
- Concept and definition of shear force and bending moment, Relation between load, shear force and bending moment (without derivation).
- Shear force and bending moment diagram for cantilever and simply supported beams subjected to point loads, uniformly distributed loads and couple (combination of any two types of loading), point of contra flexure.

Unit– IV Bending and Shear Stresses in beams

- Concept and theory of pure bending, assumptions, flexural equation (without deriva- tion), bending stresses and their nature, bending stress distribution diagram.
- Concept of moment of resistance and simple numerical problems using flexural equation.
- Shear stress equation (without derivation), relation between maximum and average shear stress for rectangular and circular section, shear stress distribution diagram.
- Shear stress distribution for square, rectangular, circle, hollow, square, rectangular, cir- cular, angle sections, channel section, I-section, T section. Simple numerical problems based on shear equation.

Unit– V Columns

- Concept of compression member, short and long column, Effective length, Radius of gy- ration, Slenderness ratio, Types of end condition for columns, Buckling of axially loaded columns.
- Euler's theory, assumptions made in Euler's theory and its limitations, Application of Eu- ler's equation to calculate buckling load.
- Rankine' s formula and its application to calculate crippling load.
- Concept of working load/safe load, design load and factor of safety.

Suggested learning resources:

1. Bedi D.S. , Strength of Materials, Khanna Publishing House, Delhi, Ed. 2018
2. Timoshenko, S., Strength of Materials, Vol. I, CBS, New Delhi.
3. Khurmi, R.S., Strength of Materials, S Chand and Co. Ltd. New Delhi.

4. Ramamurtham, S, Strength of Materials, Dhanpat Rai and sons, New Delhi.
5. Punmia B C, Strength of Materials, Laxmi Publications (p) Ltd. New Delhi.
6. Rattan S.S., Strength of Materials, McGraw Hill Education; New Delhi.
7. Bansal R K, Strength of Materials, Laxmi Publications.
8. Subramaniam R, Strength of Materials, Oxford University Press.

Course outcomes:

After competing this course, student will be able to:

- Articulate practical applications of moment of inertia of symmetrical and unsymmetricalstructural sections.
- Analyse structural behaviour of materials under various loading conditions.
- Interpret shear force and bending moment diagrams for various types of beams and loading conditions.
- Determine the bending and shear stresses in beams under different loading conditions.
- Analyse the column for various loading and end conditions.

MECHANICS OF MATERIALS LAB

Course Objectives:

Following are the objectives of this course:

- To know the procedure for the conduct of tensile and compressive strength.
- To understand the concept of stress and strain through testing of different materials.
- To calculate shear force, bending moment and their corresponding stresses.

List of Practicals to be performed:

- Study and understand the use and components of Universal Testing Machine (UTM).
- Perform Tension test on mild steel as per IS:432(1).
- Perform tension test on Tor steel as per IS:1608, IS:1139.
- Conduct compression test on sample test piece using Compression Testing Machine.
- Perform Single Shear and double shear test on any two metals e.g. Mild steel/ brass/alumi- num/copper / cast iron etc as per IS:5242.
- Plot Shear force and Bending Moment diagrams for cantilever, simply supported beams.
- Plot Shear force and Bending Moment diagrams for overhanging beams for different typesof loads including moment loading.
- Conduct Flexural test on timber beam on rectangular section in both orientation as per IS:1708, IS:2408.

Suggested learning resources:

1. Bedi D.S., Strength of Materials, Khanna Publishing House, New Delhi (Edition 2018)
2. Timoshenko, S., Strength of Materials, Vol. I, CBS, New Delhi.
3. Khurmi, R.S., Strength of Materials, S Chand and Co. Ltd. New Delhi.
4. Ramamurtham, S, Strength of Materials, Dhanpat Rai and sons, New Delhi.
5. Punmia B C, Strength of Materials, Laxmi Publications (p) Ltd. New Delhi.
6. Rattan S.S., Strength of Materials, McGraw Hill Education; New Delhi.
7. Bansal R K, Strength of Materials, Laxmi Publications.
8. Subramaniam R, Strength of Materials, Oxford University Press.

Course outcomes:

After competing this course, student will be able to:

- Test different Civil engineering materials on Universal Testing Machine.
- Analyse structural behaviour of materials under various loading conditions.
- Interpret shear force and bending moment diagrams for various types of beam sections anddifferent loading conditions.
- Determine bending and shear stresses in beams under different loading conditions.

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DIPLOMA WING
RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL
DIPLOMA IN CIVIL ENGINEERING (C03)

SEMESTER III

COURSE TITLE	:	BULIDING CONSTRUCTION
PAPER CODE	:	7369
SUBJECT CODE	:	304
TREORY CREDITS	:	03
PRACTICAL CREDITS	:	00

Course Objectives:

Following are the objectives of this course:

- To identify different components of building.
- To understand different types of foundation and their significance.
- To know different types of masonry and their construction.
- To highlight the importance of communications in building planning.

Course Content

Unit – I: Overview of Building Components Classification of Buildings as per National Building Code Group A to I, As per Types of Con- structions- Load Bearing Structure, Framed Structure, Composite Structure.

- Building Components - Functions of Building Components, Substructure – Foundation, Plinth.
- Superstructure – Walls, Partition wall, Cavity wall, Sill, Lintel, Doors and Windows,Floor, Mezzanine floor, Roof, Columns, Beams, Parapet.

Unit – II: Construction of Substructure

- Job Layout: Site Clearance, Layout for Load Bearing Structure and Framed Structure by Cen- ter Line and Face Line Method, Precautions.
- Earthwork: Excavation for Foundation, Timbering and Strutting, Earthwork for embank- ment, Material for plinth Filling, Tools and plants used for earthwork.
- Foundation: Functions of foundation, Types of foundation – Shallow Foundation, Stepped Footing, Wall Footing, Column Footing, Isolated and Combined Column Footing, Raft Foun- dation, Grillage Foundation. Deep Foundation - Pile Foundation, Well foundation and Cais- sons, Pumping Methods of Dewatering, Deep wells, Well points, Cofferdams (Introduction only).

Unit- III: Construction of Superstructure

- **Stone Masonry:** Terms used in stone masonry- facing, backing, hearting, Through stone, corner stone, cornice. Types of stone masonry: Rubble masonry, Ashlar Masonry and their types. Joints in stone masonry and their purpose. Selection of Stone Masonry, Precautions to be taken in Stone Masonry Construction.

- **Brick masonry:** Terms used in brick masonry- header, stretcher, closer, quoins, course, face, back, hearting, bat bond, joints, lap, frog line, level and plumb. Bonds in brick mason- ry- header bond, stretcher bond, English bond and Flemish bond. Requirements of good brick masonry. Junctions in brick masonry and their purpose and procedure. Precautions to be observed in Brick Masonry Construction. Comparison between stone and Brick Mason- ry. Tools and plants required for construction of stone and brick masonry. Hollow concrete block masonry and composite masonry.

- **Scaffolding and Shoring:** Purpose, Types of Scaffolding, Process of Erection and Disman- tling. Purpose and Types of Shoring, Underpinning. Formwork: Definition of Formwork, Requirements of Formwork, Materials used in Formwork, Types of Formwork, Removal offormwork.

Unit– IV: Building Communication and Ventilation

- **Horizontal Communication: Doors** –Components of Doors, Full Paneled Doors, Part- ly Paneled and Glazed Doors, Flush Doors, Collapsible Doors, Rolling Shutters, Revolving Doors, Glazed Doors. Sizes of Door recommended by BIS.
- **Windows:** Component of windows, Types of Windows - Full Paneled, Partly Paneled and Glazed, wooden, Steel, Aluminum windows, Sliding Windows, Louvered Window, Bay win- dow, Corner window, clear-storey window, Gable and Dormer window, Skylight. Sizes of Windows recommended by BIS. Ventilators.
- Fixtures and fastenings for doors and windows- Material used and functions of Window Sill and Lintels, Shed / Chajja.

* **Vertical Communication:** Means of Vertical Communication-

Stair Case, Ramps, Lift, Elevators and Escalators. Terms used in staircase- steps, tread, riser, nosing, soffit, waist slab,baluster, balustrade, scotia, hand rails, newel post, landing, headroom, winder. Types of stair- case (On the basis of shape): Straight, dog-legged, open well, Spiral, quarter turn, bifurcated, Three quarter turn and Half turn, (On the basis of Material): Stone, Brick, R.C.C.,wooden and Metal.

Unit– V: Building Finishes

- **Floors and Roofs**: Types of Floor Finishes and its suitability- Kota, Marble, Granite, Ceramic Tiles, Vitrified, Chequered Tiles, Paver Blocks, Concrete Floors, wooden Flooring, Skirting and Dado. Process of Laying and Construction, Finishing and Polishing of Floors, Roofing Ma- terials- RCC, Mangalore Tiles, AC Sheets, G.I. sheets, Corrugated G.I. Sheets, Plastic and Fibre Sheets. Types of Roof: Flat roof, Pitched Roof-King Post truss, Queen Post Truss, terms used in roofs.
- **Wall Finishes:** Plastering – Necessity of Plastering, Procedure of Plastering, Single Coat Plas- ter, Double Coat Plaster, Rough finish, Neeru Finishing and Plaster of Paris (POP). Special Plasters- Stucco plaster, sponge finish, pebble finish. Plaster Board and Wall Claddings. Pre- cautions to be taken in plastering, defects in plastering. Pointing – Necessity, Types of point- ing and procedure of Pointing. Painting –Necessity, Surface Preparation for painting, Methods of Application.

Suggested learning resources:

1. S. P. Arora and Bindra., Building Construction, Dhanpat Rai Publication, Delhi.
2. Sushil Kumar., Building Construction, Standard Publication.
3. Rangawala, S. C., Building Construction, Charotar Publication, Anand.
4. Punmia B. C., and Jain A. K., Building Construction ,Firewall Media.
5. Sharma S. K., Building Construction, S. Chand and Co. Pvt. Ltd., New Delhi.
6. Janardan Zha , Building Construction, Khanna Publication.
7. Bhavikatti S. S., Building Construction, Vikas Publication House Pvt. Ltd., Delhi.
8. Mantri S., A to Z Building Construction, Satya Prakashan, New Delhi.

Course outcomes:

After completing this course, student will be able to:

- Identify components of building structures.
- Propose suitable type of foundation for building structures.
- Select suitable type of masonry for building structures.
- Propose relevant means of communications for different types of buildings.
- Select relevant material for finishing works.

DIPLOMA WING
RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL
DIPLOMA IN CIVIL ENGINEERING (C03)

SEMESTER III

COURSE TITLE	:	CONCRETE TECHNOLOGY
PAPER CODE	:	7370
SUBJECT CODE	:	305
TREORY CREDITS	:	03
PRACTICAL CREDITS	:	01

Course Objectives:

Following are the objectives of this course:

- To know properties of cement, aggregate and water used in concrete.
- To understand different characteristics of concrete.
- To learn about role of admixtures in concrete.

Course Content:

Unit – I Cement, Aggregates and Water

- Physical properties of OPC and PPC: fineness, standard consistency, setting time, soundness,
  compressive strength. Different grades of OPC and relevant BIS codes
- Testing of cement: Laboratory tests-fineness, standard consistency, setting time, soundness,
  compressive strength. Storage of cement and effect of storage on properties of cement.
- BIS Specifications and field applications of different types of cements: Rapid hardening, Low heat, Portland pozzolana, Sulphate resisting, Blast furnace slag, High Alumina and White cement.
- Aggregates: Requirements of good aggregate, Classification according to size and shape.
- Fine aggregates: Properties, size, specific gravity, bulk density, water absorption and bulking,fineness modulus and grading zone of sand, silt content and their specification as per IS 383.Concept of crushed Sand.
- Coarse aggregates: Properties, size, shape, surface texture, water absorption, soundness, specific gravity and bulk density, fineness modulus of coarse aggregate, grading of coarse aggregates, crushing value, impact value and abrasion value of coarse aggregates with spec-ifications.
- Water: Quality of water, impurities in mixing water and permissible limits for solids as per
  IS: 456.

Unit– II Concrete

- Concrete: Different grades of concrete, provisions of IS 456.
- Duff Abraham water cement (w/c) ratio law, significance of w/c ratio, selection of w/c ratio for different grades, maximum w/c ratio for different grades of concrete for different expo- sure conditions as per IS 456.
- Properties of fresh concrete: Workability: Factors affecting workability of concrete. Determi-nation of workability of concrete by slump cone, compaction factor, Vee-Bee Consistometer. Value of workability requirement for different types of concrete works. Segregation, bleeding and preventive measures.
- Properties of Hardened concrete: Strength, Durability, Impermeability.

Unit– III Concrete Mix Design and Testing of Concrete

- Concrete mix design: Objectives, methods of mix design, study of mix design as per IS 10262
  (only procedural steps).
- Testing of concrete, determination of compressive strength of concrete cubes at different ages, interpretation and co-relation of test results.
- Non- destructive testing of concrete: Rebound hammer test, working principle of rebound hammer and factor affecting the rebound index, Ultrasonic pulse velocity test as per IS13311 (part 1 and 2), Importance of NDT tests.

Unit– IV Quality Control of Concrete

- Concreting Operations: Batching, Mixing, Transportation, Placing, Compaction, Curing and
  Finishing of concrete.
- Forms for concreting: Different types of form works for beams, slabs, columns, materials used for form work, requirement of good form work. Stripping time for removal of form works per IS 456.
- Waterproofing: Importance and need of waterproofing, methods of waterproofing and mate-rials used for waterproofing.
- Joints in concrete construction: Types of joints, methods for joining old and new concrete,
  materials used for filling joints.

Unit– V Chemical Admixture, Special Concrete and Extreme Weather concreting

- Admixtures in concrete: Purpose, properties and application for different types of admixture such as accelerating admixtures, retarding admixtures, water reducing admixtures, air en- training admixtures and super plasticizers.
- Special Concrete: Properties, advantages and limitation of following types of Special con- crete: Ready mix Concrete, Fiber Reinforced Concrete, High performance Concrete Self-com-pacting concrete and light weight concrete.
- Cold weather concreting: effect of cold weather on concrete, precautions to be taken while concreting in cold weather condition.

- Hot weather concreting: effect of hot weather on concrete, precautions to be taken while concreting in hot weather condition.

Suggested learning resources:

1. Gambhir, M.L., Concrete Technology, Tata McGraw Hill Publishing Co. Ltd., Delhi.
2. Shetty, M.S., Concrete Technology, S. Chand and Co. Pvt. Ltd., Ram Nagar, Delhi.
3. Santhakumar, A. R., Concrete Technology, Oxford University Press, New Delhi.
4. Neville, A. M. and Brooks, J.J., Concrete Technology, Pearson Education Pvt. Ltd.
5. Neville, A. M., Concrete Technology, Pearson Education Pvt. Ltd., New Delhi.
6. Sood, H., Kulkarni P. D., Mittal L. N., Laboratory Manual in Concrete Technology, CBS Publish-ers, New Delhi.

Course outcomes:

After completing this course, student will be able to:

- Use different types of cement and aggregates in concrete
- Prepare concrete of desired compressive strength.
- Prepare concrete of required specification.
- Maintain quality of concrete under different conditions.
- Apply relevant admixtures for concreting.

CONCRETE TECHNOLOGY LAB

Course Objectives:

Following are the objectives of this course:

- To know properties of cement, aggregate and water used in concrete.
- To understand different characteristics of concrete.
- To learn about role of admixtures in concrete.

List of Practical to be performed:

1	Determine fineness of cement by Blaine's air permeability apparatus Or by sieving.
2	Determine standard consistency, initial and final setting times of cement.
3	Determine compressive strength of cement.
4	Determine silt content in sand.
5	Determine bulking of sand.
6	Determine water absorption of fine and coarse aggregates.
7	Determine Fineness modulus of fine aggregate by sieve analysis.
8	Determine impact value of aggregate
9	Determine crushing value of aggregate.
10	Determine abrasion value of aggregate.
11	Determine elongation and flakiness index of coarse aggregates
12	Determine workability of concrete by slump cone test.
13	To prepare concrete mix of a particular grade and determine compressive strength of concrete for 7 and 28 days.
14	Demonstration of NDT equipments .

Suggested learning resources:

1. Gambhir, M.L., Concrete Technology, Tata McGraw Hill Publishing Co. Ltd., Delhi.
2. Shetty, M.S., Concrete Technology, S. Chand and Co. Pvt. Ltd., Ram Nagar, Delhi.
3. Santhakumar, A. R., Concrete Technology, Oxford University Press, New Delhi.
4. Neville, A. M. and Brooks, J.J., Concrete Technology, Pearson Education Pvt. Ltd.
5. Neville, A. M., Concrete Technology, Pearson Education Pvt. Ltd., New Delhi.
6. Sood, H., Kulkarni P. D., Mittal L. N., Laboratory Manual in Concrete Technology, CBS Publish-ers, New Delhi.Course outcomes:

Course outcomes:

After completing this course, student will be able to:

- Identify different types of cement by performing laboratory tests.
- Know the physical properties of fine and coarse aggregates.
- Prepare concrete of required specification.
- Maintain the quality of concrete applying scientific principles.
- Use relevant admixtures for improving the workability of concrete.

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DIPLOMA WING
RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL
DIPLOMA IN CIVIL ENGINEERING (C03)

SEMESTER III

COURSE TITLE	:	GEOTECHNICAL ENGINEERING
PAPER CODE	:	7371
SUBJECT CODE	:	306
TREORY CREDITS	:	03
PRACTICAL CREDITS	:	01

Course Objectives:

Following are the objectives of this course:

- To understand and determine physical and index properties and classification of soil
- To estimate permeability and shear strength of soil
- To know the load bearing capacity of soil
- To learn various soil stabilization and compaction methods

Course Content:

Unit – I Overview of Geology and Geotechnical Engineering

- Introduction of Geology, Branches of Geology, Importance of Geology for civil engineering structure and composition of earth, Definition of a rock: Classification based on their genesis(mode of origin), formation. Classification and engineering uses of igneous, sedimentary andmetamorphic rocks.
- Importance of soil as construction material in Civil engineering structures and as foundationbed for structures.
- Field application of geotechnical engineering for foundation design, pavement design, design of earth retaining structures, design of earthen dam.

Unit– II Physical and Index Properties of Soil

- Soil as a three phase system, water content, determination of water content by oven drying method as per BIS code, void ratio, porosity and degree of saturation, density index. Unit weight of soil mass – bulk unit weight, dry unit weight, unit weight of solids, saturated unit weight, submerged unit weight. Determination of bulk unit weight and dry unit weight by core cutter and sand replacement method, Determination of specific gravity by pycnometer.
- Consistency of soil, Atterberg limits of consistency: Liquid limit, plastic limit and shrinkage limit. Plasticity index.
- Particle size distribution test and plotting of curve, Determination of effective diameter of soil, well graded and uniformly graded soils, BIS classification of soil.

Unit– III Permeability and Shear Strength of Soil

- Definition of permeability, Darcy's law of permeability, coefficient of permeability, factors affecting permeability, determination of coefficient of permeability by constant head and fall- ing head tests, simple problems to determine coefficient of permeability. Seepage through earthen structures, seepage velocity, seepage pressure, phreatic line, flow lines, application of flow net, (No numerical problems).
- Shear failure of soil, concept of shear strength of soil. Components of shearing resistance of soil – cohesion, internal friction. Mohr-Coulomb failure theory, Strength envelope, strength equation for purely cohesive and cohesion less soils. Direct shear and vane shear test –labo-ratory methods.

Unit– IV Bearing Capacity of Soil

- Bearing capacity and theory of earth pressure. Concept of bearing capacity, ultimate bearing capacity, safe bearing capacity and allowable bearing pressure. Introduction to Terzaghi's analysis and assumptions, effect of water table on bearing capacity.
- Field methods for determination of bearing capacity – Plate load and Standard Penetration Test. Test procedures as per IS:1888 & IS:2131.
- Definition of earth pressure, Active and Passive earth pressure for no surcharge condition, coefficient of earth pressure, Rankine's theory and assumptions made for non-cohesive Soils.

Unit– V Compaction and stabilization of soil

- Concept of compaction, Standard and Modified proctor test as per IS code, Plotting of Compaction curve for determining: Optimum moisture content(OMC), maximum dry density(MDD), Zero air voids line. Factors affecting compaction, field methods of compaction – rolling, ram- ming and vibration. Suitability of various compaction equipments-smooth wheel roller, sheep foot roller, pneumatic tyred roller, Rammer and Vibrator, Difference between compaction andconsolidation.
    - Concept of soil stabilization, necessity of soil stabilization, different methods of soil stabiliza- tion. California bearing ratio (CBR) test - Meaning and Utilization in Pavement Construction
    - Necessity of site investigation and soil exploration: Types of exploration, criteria for deciding the location and number of test pits and bores. Field identification of soil – dry strength test, dilatancy test and toughness test.

Suggested learning resources:

1. Punmia, B.C., Soil Mechanics and Foundation Engineering, Laxmi Publication, Delhi.
2. Murthy, V.N.S., A text book of soil mechanics and foundation Engineering, CBS Publishers & Distributors Pvt. Ltd., New Delhi.
3. Ramamurthy, T.N. & Sitharam,T.G., Geotechnical Engineering(Soil Mechanics), S Chand andCompany LTD., New Delhi.
4. Raj, P. Purushothama, Soil Mechanics and Foundation Engineering, Pearson India, New Delhi.
5. Kasamalkar, B. J., Geotechnical Engineering, Pune Vidyarthi Griha Prakashan, Pune.
6. Arora K R, Soil Mechanics and Foundation Engineering, Standard Publisher.

Course outcomes:

After completing this course, student will be able to:

- Identify types of rocks and sub soil strata of earth.
- Interpret the physical properties of soil related to given construction activities.
- Interpret soil bearing capacity results.
- Compute optimum values for moisture content for maximum dry density of soil through various tests.

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GEOTECHNICAL ENGINEERING LAB

Course Objectives:

Following are the objectives of this course:

- To understand and determine physical and index properties of soil.
- To estimate the permeability and shear strength of soil.
- To know the procedure for performing C.B.R test.
- To learn various compaction methods for soil stabilization.

List of Practicals to be performed:

1. Identification of rocks from the given specimen.
2. Determine water content of given soil sample by oven drying method as per IS: 2720 (Part-II).
3. Determine specific gravity of soil by pycnometer method as per IS 2720 (Part- III).
4. Determine dry unit weight of soil in field by core cutter method as per IS 2720 (Part- XXIX).
5. Determine dry unit weight of soil in field by sand replacement method as per IS 2720 (Part-XXVIII).
6. Determine Plastic and Liquid Limit along with Plasticity Index of given soil sample as per IS
   2720 (Part- V).
7. Determine Shrinkage limit of given soil sample as per IS 2720 (Part- V).
8. Determine grain size distribution of given soil sample by mechanical sieve analysis as per IS2720 (Part- IV).
9. Determine coefficient of permeability by constant head test as per IS 2720 (Part- XVII).
10. Determine coefficient of permeability by falling head test as per IS 2720 (Part- XVII).
11. Determine shear strength of soil by direct shear test as per IS 2720 (Part-XIII).
12. Determine shear strength of soil by vane shear test as per IS 2720 (Part-XXX).
13. Determine MDD and OMC by standard proctor test of given soil sample as per IS 2720 (Part-VII).
14. Determination of CBR value on the field as per IS2720 (Part - XVI).

Suggested learning resources:

1. Punmia, B.C., Soil Mechanics and Foundation Engineering, Laxmi Publication
2. Murthy, V.N.S., A text book of soil mechanics and foundation Engineering, CBS Publishers &
   Distributors Pvt. Ltd., New Delhi.
3. Ramamurthy, T.N. & Sitharam,T.G., Geotechnical Engineering(Soil Mechanics), S Chand andCompany LTD., New Delhi.
4. Raj, P. Purushothama, Soil Mechanics and Foundation Engineering, Pearson India

5. Kasamalkar, B. J., Geotechnical Engineering, Pune Vidyarthi Griha Prakashan, Pune.

6. Arora K R, Soil Mechanics and Foundation Engineering, Standard Publisher.

Course outcomes:

After completing this course, student will be able to:

- Identify types of rocks and sub soil strata of earth.
- Interpret the physical properties of soil related to given construction activities.
- Interpret the soil bearing capacity results.
- Compute optimum moisture content values for maximum dry density of soil through various tests.

DIPLOMA WING

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN CIVIL ENGINEERING (C03)

SEMESTER - III

COURSE TITLE	:	SUMMER INTERNSHIP - I
PAPER CODE	:	--
SUBJECT CODE	:	--
TREORY CREDITS	:	00
PRACTICAL CREDITS	:	02

SUMMER INTERNSHIP –

3-4 weeks summer internship after IInd Semester.

It should be undertaken in an industry/Govt. or Pvt. Certified Agencies which are in social sector/Govt. Skill Centers/Schemes.

Evaluation is based on work done, quality of report, performance in viva-voce, presentation etc.

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DIPLOMA WING
RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL
DIPLOMA IN CIVIL ENGINEERING (C03)

SEMESTER - III

COURSE TITLE	:	PROFESSIONAL DEVELOPMENT
PAPER CODE	:	--
COURSE CODE	:	--
TREORY CREDITS	:	00
PRACTICAL CREDITS	:	00

Course Objectives:

Following are the objectives of this course:-

(1) To learn the principles of Professional and Social ethics.
(2) To know the concept of Lifelong learning and Self-directed learning.
(3) To present self for employment.
(4) To introduce the need of industrial visits.
(5) To understand CV, Resume, Bio-data and Interview and their significance.
(6) To develop the skills of Group Discussion.

Course Content:

Unit – I Professional and Social Ethics

Professional ethics, its need and importance, general code of ethics for engineers, ethical issues for engineers.

Need and importance of social skills, social skills for better group performance, important social skills such as social perceptiveness, coordination, negotiation, persuasion etc.

Unit – II Lifelong learning and Self-directed Learning

Lifelong learning, its examples, self-directed learning, its examples, important steps in lifelong learning.

Need for planning self-directed learning, planning self-directed learning plan, examples.

Unit – III Career Planning

Importance of career planning, major career opportunities in concerned branch of engineering , study of the important career opportunities regarding qualification, knowledge, skills, experience required for them, role of personal factors like personal life style, interest areas, desires, personal preferences in career planning.

Identification and detailing of important career opportunities in relation to branch of diploma, identification and detailing of important self-personal factors and self-personal preferences, development of self-career plan.

Unit – IV Industrial Visits

Necessity of exposure to environment and practices, lectures by industry experts.

Importance of Students' industrial visits, learning through observing real life industrial systems, planning and organizing the industrial visits.

Unit – V CV, Resume, Bio-data and Interview

Need of presenting self for employment, salient features and formats of bio-data, CV, resume, comparison of the three for their merits, limitations and specific uses, study of cases and examples of bio-data, CV, resume and covering letter by all students for self of for the given cases.

Importance of employment related interviews, purpose of interview, dress code, body language and posture of interviewee, do's and don'ts for interviews, interview checklist, practice of facing employment related interviews for all students.

Unit – VI Group Discussion

Need and importance of group discussion in professional work, ideal group discussion and skills needed to effectively participate in group discussion, practice of group discussion skills.

Course Outcomes:

After completing this course, the student will be able to:-

(1) Demonstrate his/her understanding of Professional and Social ethics.
(2) Plan self-learning and self-directed learning for completing the task.
(3) Suggest an action plan for his career planning.
(4) Demonstrate his/her learning from visits to industry.
(5) Prepare CV, Resume and Bio-data along with a covering letter for a job.
(6) Effectively face an interview.
(7) Participate in Group discussion.

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