STATE BOARD OF TECHNICAL EDUCATION, BIHAR

Scheme of Teaching and Examinations for

III[rd] SEMESTER DIPLOMA IN CIVIL ENGINEERING / CIVIL (RURAL) ENGINEERING

(Effective from Session 2020-21 Batch)

THEORY

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME							
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks A	Class Test (CT) Marks B	End Semester Exam. (ESE) Marks C	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	Credits
1.	Building Construction and Construction Materials	2015301	05	03	10	20	70	100	28	40	05
2.	Basic Surveying	2015302	04	03	10	20	70	100	28	40	03
3.	Mechanics of Materials	2015303	04	03	10	20	70	100	28	40	03
4.	Concrete Technology	2015304	03	03	10	20	70	100	28	40	03
5.	Geo Technical Engineering	2015305	03	03	10	20	70	100	28	40	03
		Total :-	**19**				**350**	**500**			**17**

PRACTICAL

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME					
			Periods per Week	Hours of Exam.	Practical		Total Marks	Pass Marks in the Subject	Credits
					Internal (PA)	External (ESE)			
6.	Basic Surveying Lab	2015306	02 50% Physical 50% Virtual	04	15	35	50	20	01
7.	Building Construction and Construction materials Lab	2015307	02 50% Physical 50% Virtual	04	15	35	50	20	01
8.	Web Technology Lab	2018308	02 50% Physical 50% Virtual	03	07	18	25	10	01
Total :-			**06**				**125**		**03**

TERM WORK

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME				
			Periods per Week	Marks of Internal (PA)	Marks of External (ESE)	Total Marks	Pass Marks in the Subject	Credits
9.	Mechanics of Materials Lab (TW)	2015309	02	07	18	25	10	01
10.	Concrete Technology Lab (TW)	2015310	02	07	18	25	10	01
11.	Python	2018311	02	07	18	25	10	01
12.	Geo Technical Eng. Lab (TW)	2015312	02	15	35	50	20	01
Total :-			**08**			**125**		**04**
Total Periods per week Each of duration One Hour 33				Total Marks = **750**				**24**

Building Construction and Construction Materials

Subject Code	Theory						Credits
	No. of Periods Per Week			Full Marks	:	100	05
2015301	L	T	P/S	ESE	:	70	
	05	—		TA	:	10	
	—	—	—	CT	:	20	

Course Objective:

1. To identify different components of building.
2. To understand different types of foundation and their significance.
3. To know different types of masonry and their construction.
4. To highlight the importance of communications in building planning.
5. To learn about various construction materials.
6. To be able to identify suitability of various materials for different construction purposes.

COURSE OUTCOMES (COs):

1. Identify relevant construction materials.
2. Identify relevant natural construction materials.
3. Select relevant special type of construction materials.
4. Identify components of building structures.
5. Propose suitable type of foundation for building structures.
6. Select suitable type of masonry for building structures.
7. Propose relevant means of communications for different types of buildings.

Contents: Theory		Hrs
Unit -1	**Overview of Building Components** 1.1 Classification of Buildings as per National Building Code Group A to I, as per Types of Constructions- Load Bearing Structure, Framed Structure, Composite Structure. 1.2 Building Components - Functions of Building Components, Foundation, Plinth and Super structure.	08
Unit -2	**Natural And Artificial Construction Materials** 2.1 Requirements of good building stone; general characteristics of stone; quarrying and dressing methods and tools for stone. 2.2 Structure of timber, general properties and uses of good timber, different methods of seasoning for preservation of timber, defects in timber. 2.3 Asphalt, bitumen and tar used in construction, properties and uses. 2.4 Properties of sand and uses. 2.5 Classification of coarse aggregate according to size. 2.6 Constituents of brick earth, Conventional / Traditional bricks, Modular and Standard bricks, Special bricks –fly ash bricks, 2.7 Characteristics of good brick	12

Unit – 3	**Special and Processed Construction Materials** 3.1 Types of material and suitability in construction works of following materials: Water proofing, Termite proofing; Thermal and sound insulating materials. 3.2 Paints- whitewash, cement paint, Distempers, Oil Paints and Varnishes.	04
Unit – 4	**Construction of Substructure and Superstructure** **4.1** Job Layout: Site Clearance, Layout for Load Bearing Structure and Framed Structure by Center Line and Face Line Method, Precautions. **4.2.** Foundation: Functions of foundation, Types of foundation – Shallow Foundation, Stepped Footing, Wall Footing, Column Footing, Isolated and Combined Column Footing, Raft Foundation. **4.3. 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. **4.4. Brick masonry:** Terms used in brick masonry, header, stretcher, closer, quoins, course, face, back, hearting, bat bond, joints, lap, frog. Bonds in brick masonry- header bond, stretcher bond, English bond and Flemish bond. **4.5. Scaffolding and Shoring:** Purpose, Types of Scaffolding, Process of Erection and Dismantling. Purpose and Types of Shoring, Underpinning.	10
Unit-5	**5.1 Building Communication and Ventilation** Doors –Components of Doors, Full Paneled Doors, Partly Paneled and Glazed Doors, Flush Doors, Collapsible Doors, Rolling Shutters, Revolving Doors, Glazed Doors. Sizes of Door recommended by BIS. **5.2 Windows:** Component of windows, Types of Windows - Full Paneled, Partly Paneled and Glazed, wooden, Steel, Aluminum windows, Sliding Windows, Louvered Window, Bay window, Sizes of Windows recommended by BIS. Ventilators. **5.3Vertical Communication:** Means of Vertical Communication- Stair Case, Ramps, Lift, Elevators and Escalators. Terms used in staircase-steps, tread, riser, nosing, soffit, waist slab, balustrade, scotia, hand rails, newel post, landing, headroom, winder. Types of staircases (On the basis of shape): Straight, dog-legged, open well, Spiral, quarter turn, bifurcated, three quarter turn and Half turn, **5.4 Wall Finishes:** Plastering – Necessity of Plastering, Procedure of Plastering, Single Coat Plaster, Double Coat Plaster, Rough finish. Precautions to be taken in plastering, defects in plastering. Pointing – Necessity, Types of pointing and procedure of Pointing, Painting. .	**14**
	Total	48

Suggested Text Book:

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) Rang Wala, S.C., Engineering Materials, Charoter publishing, House, Anand.

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, New Delhi.

8) Sharma C. P., Engineering Materials, PHI Learning, New Delhi.

9) Duggal, S. K, Building Materials, New International, New Delhi

10) S. P. Arora and Bindra., Building Construction, Dhanpat Rai Publication, Delhi.

11) Sushil Kumar., Building Construction, Standard Publication.

12) Ranga Wala, S. C., Building Construction, publishing, House, Anand.

13) Punmia B. C., and Jain A. K., Building Construction.

14) Sharma S. K., Building Construction, S. Chand and Co. Pvt. Ltd., New Delhi.

15) Janardan Jha, Building Construction, Khanna Publication.

16	Building Construction	SNP Srivastava	FPH
17	Adhunik Bhawan Nirman	SNP Srivastava	FPH
18	Building Construction and Construction Materials	SNP Srivastava	FPH

BASIC SURVEYING

Subject Code 2015302	Theory						Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	04	—	—	TA	:	10	
	—	—	—	CT	:	20	

Course Objective:

1. To understand types of surveying works required.
2. To know the types of method and equipment's to be used for different surveys.
3. To know the use and operational details of various surveying equipment's**.**

COURSE OUTCOMES (COs):

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

Contents: Theory		Hrs
Unit -1	**Overview and classification of survey** **1.1** Survey- Purpose and Use. **1.2** Types of surveying- Primary and Secondary, Classification: Plane, Geodetic, Cadastral, Hydrographic and Aerial. **1.3** Principles of Surveying **1.4** Scales: Engineer's scale, Representative Fraction (RF) and diagonal scale.	04
Unit -2	**Chain survey** 2.1 Instruments used in chain survey: Metric Chain, Tapes, Arrow, ranging rod, Line ranger, Offset rod, Open cross staff, Optical square. 2.2 Chain survey Station, Baseline, Check line, Tie line, Offset, Tie station. 2.3 Ranging- Direct and Indirect Ranging, Methods of Chaining, obstacles inchaining. 2.4 Errors in length: Instrumental error, personal error, error due to natural cause, random error, Principles of triangulation. 2.5 Types of offsets: Perpendicular and Oblique, Conventional Signs, Recording of measurements ina field book.	12

Unit – 3	**Compass traverse survey** 3.1 Compass Traversing-open, closed. 3.2 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, MagneticDeclination. 3.3 Components of Prismatic Compass and their Functions, Methods of using Prismatic Compass- Temporary adjustments and observing bearings. 3.4 Local attraction, Methods of correction of observed bearings - Correction at station and correction to included angles 3.5 Methods of plotting a traverse and closing error, Graphical adjustment of closing error.	12
Unit – 4	**Levelling and contouring** 4.1 Basic terminologies: Level surfaces, Horizontal and vertical surfaces, Datum, Bench Marks, Permanent, Arbitrary and Temporary, Reduced Level, Rise, Fall, Line of collimation, Station, Back sight, Fore sight, Intermediate sight, Change point, Height of instruments. 4.2 Types of levels: Dumpy, Tilting and Auto level, Temporary adjustments of Level. 4.3 Types of Levelling Staff: Self-reading staff and Target staff, Reduction of level by Height of Instrument Method and Rise and Fall Method. 4.4 Levelling Types: Simple, Differential, Fly, Profileand Reciprocal Levelling. 4.5 Contour, contour intervals, horizontal equivalent, Uses of contour maps, Characteristics of contours, Methods of Contouring- Direct and indirect.	16
Unit – 5	**Measurement of Area and Volume** 5.1 Components and use of Digital planimeter. 5.2 Measurement of area using digital planimeter. 5.3 Measurement of volume of reservoir from contourmap.	04
	TOTAL-	**48**

Suggested Text Book/ **Reference Book:**

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 Delhi.
7. Text Book of Surveying and Measurement — Vinod Kumar — FPH
8. Surveying — Sweta Kumari — FPH
9. Basic Surveying — Gopal krishnan — FPH

Mechanics of Materials

Subject Code 2015303	Theory						Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	04	—	—	TA	:	10	
	—	—	—	CT	:	20	

Course Objective:

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

COURSE OUTCOMES (COs):

1. Articulate practical applications of moment of inertia of symmetrical and unsymmetrical structural sections.
2. Analyze structural behavior of materials under various loading conditions.
3. Interpret shear force and bending moment diagrams for various types of beams and loading conditions.
4. Determine the bending and shear stresses in beams under different loading conditions.
5. Analyze the column for various loading and end conditions.

CONTENTS: THEORY		Hrs
Unit -1	**Moment of Inertia** **1.1** Moment of inertia (M.I.): Definition, M.I. of plane lamina, Radius of gyration, section modulus, Parallel and Perpendicular axes theorems (without derivations), M.I. of rectangle, square, circle, semi-circle, quarter circle and triangle section (without derivations). **1.2** M.I. of symmetrical and unsymmetrical I-section, Channel section, T-section, Angle section, Hollow sections and built-up sections about centroidal axes and any other reference axis. **1.3** Polar Moment of Inertia of solid circular sections.	10
Unit -2	**Simple stresses and strains** 2.1 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 elasticity. 2.2 Type of Stresses-Normal, Direct, Bending and Shear and nature of stresses i.e., Tensile and Compressive stresses. 2.3 Standard stress strain curve for tor steel bar under tension, Yield stress, Proof stress, Ultimate stress, Strain at various critical points, Percentage elongation and Factor of safety. 2.4 Deformation of body due to axial force, forces applied at intermediate sections, Maximum and minimum stress induced, Composite section under axial loading. 2.5 Concept of temperature stresses and strain, Stress and strain developed due to tempera- true variation in homogeneous simple bar (no composite section) 2.6 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).	10

Unit -3	**Shear force and Bending moment** 3.1 Types of supports, beams and loads 3.2 Concept and definition of shear force and bending moment, Relation between load, shear force and bending moment (without derivation). 3.3 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 contraflexure.	10
Unit -4	**Bending and Shear stresses in beams** 4.1 Concept and theory of pure bending, assumptions, flexural equation (without derivation), bending stresses and their nature, bending stress distribution diagram. 4.2 Concept of moment of resistance and simple numerical problems using flexural equation. 4.3 Shear stress equation (without derivation), relation between maximum and average shear stress for rectangular and circular section, shear stress distribution diagram. 4.4 Shear stress distribution for square, rectangular, circular, angle sections, channel section, I-section, T section. Simple numerical problems based on shear equation.	10
Unit -5	**Columns** 5.1 Concept of compression member, short and long column, Effective length, Radius of gyration, Slenderness ratio, Types of end condition for columns, Buckling of axially loaded columns. 5.2 Euler's theory, assumptions made in Euler's theory and its limitations, Application of Euler's equation to calculate buckling load. 5.3 Rankine's formula and its application to calculate crippling load. 5.4 Concept of working load/safe load, design load and factor of safety.	08
	TOTAL	48

Suggested Text Book/ Reference Book:

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. Ramamrutham, 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.
9. Mechanics of Structure — Roshan Sinha — FPH
10. Mechanics of Materials — A.K.Ghosh — FPH

CONCRETE TECHNOLOGY

Subject Code 2015304	Theory						Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

Course Objective:

1. To know properties of cement and aggregate used in concrete.
2. To understand different characteristics of concrete.
3. To learn about role of admixtures in concrete.

COURSE OUTCOMES (COs):

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

CONTENTS: THEORY		Hrs
Unit -1	**Cement** 1.1 Physical Properties of OPC- fineness, standard consistency, setting time, compressive strength & soundness. 1.2 Testing of cement - fineness test, consistency test, setting time test, compressive strength test & soundness test, Storage of Cement and its effects on the properties of cement. 1.3 Types of Cements and their properties as per IS Specifications and their field applications- Ordinary Portland Cement (33, 43 and 53 grades), Portland Pozzolana Cement, Rapid Hardening Cement, Low Heat Cement, High Alumina Cement, Sulphate Resisting Cement, White Cement.	o6
Unit -2	**Aggregates** 2.1 Aggregates: Source, Requirements of good aggregate, Classification according to size and shape. 2.2 Fine aggregates: Properties, size, specific gravity, bulk density, water absorption and bulking, fineness modulus and grading zone of sand, 2.3 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 specifications.	o8

Unit – 3	**Concrete** 3.1 Definition of concrete, different grades of concrete (ordinary concrete, standard concrete & high strength concrete as per provisions of IS 456- 2000), minimum grade of concrete for different exposure conditions, minimum grade of concrete for R.C.C., water retaining structure & in sea water construction, durability of concrete. 3.2 Water Cement ratio, 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 exposure conditions as per IS 456. 3.3 Properties of fresh concrete: - Workability,Factors affecting workability of concrete, Determination 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. 3.4 Properties of hardened concrete: - Compressive strength, durability, impermeability.	10
Unit – 4	**Concrete mix design and testing of Concrete** 4.1 Concrete mix design, objectives, methods of mix design, study of mix design procedure by IS method as per IS 10262, (only procedural steps). 4.2 Testing of hardened concrete: Significance of testing, determination of compressive strength of concrete cubes at different ages, interpretation & co relation of test results. 4.3 Non- Destructive Tests of concrete: Importance of NDT, Methods of NDT - Rebound hammer test, Ultrasonic pulse velocity test, working principle of rebound hammer and factor affecting the rebound index.	10
Unit-5	**Quality control of concrete** **5.1** Concreting Operations: Batching, Mixing, Transportation, Placing, Compaction, Curing and finishing of concrete**.** 5.2 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 5.3 Waterproofing: Importance and need of waterproofing, methods of waterproofing and materials used for waterproofing. 5.4 Joints in concrete construction: Types of joints, methods for joining old and new concrete, materials used for filling joints.	06

Unit-6	**Chemical Admixture, Special concrete and Extreme weather concreting** 6.1 Admixtures in concrete: Purpose, properties and application of different types of admixtures such as accelerating admixtures, retarding admixtures, water reducing admixtures, air entraining admixtures and super plasticizers. 6.2 Special Concrete: Properties, advantages and limitation of following types of Special concrete: Ready mix Concrete, Fiber Reinforced Concrete, High performance Concrete and light weight concrete. 6.3 Cold weather concreting: effect of cold weather on concrete, precautions to be taken while concreting in cold weather condition. 6.4 Hot weather concreting: effect of hot weather on concrete, precautions to be taken while concreting in hot weather condition.	08
	Total	48

Suggested Text Book/ **Reference Book:**

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. Sood, H., Kulkarni P. D., Mittal L. N., Laboratory Manual in Concrete Technology, CBS Publishers, New Delhi.
6. Concrete Technology — Gopal krishnan — FPH
7. Concrete Technology — S.S.Ahuja — FPH

GEO TECHNICAL ENGINEERING

Subject Code 2015305	Theory						Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

Course Objective:

1. To Understand and determine physical and index properties of soil.
2. To estimate permeability and shear strain of soil.

COURSE OUTCOMES (COs):

1. Analyze and classify soils.
2. Identify shear strength parameters for field conditions.
3. Understand the principles of compaction and its control.
4. Understand various stresses and their distribution in soil and other engineering properties of soil.

	CONTENTS: THEORY	Hrs.
Unit -1	**Overview of Geotechnical Engineering** 1.1 Definition of soil. 1.2 Importance of soil in Civil Engineering as construction material. 1.3 Field application of geotechnical engineering for foundation design, pavement design, design of earth retaining structures, design of earthen dams (brief ideas only).	04
Unit -2	**Physical and Index Properties of Soil** 2.1 Soil as a three phase system. 2.2 Water content, Determination of water content by oven drying method as per IS code. 2.3 Void ratio, porosity ,degree of saturation and density index. 2.4 Unit weight of soil mass – bulk unit weight, dry unit weight, unit weight of soil solids, saturated unit weight, submerged unit weight. 2.5 Determination of bulk unit weight and dry unit weight by core cutter method and sand replacement method as per IS code. 2.6 Specific gravity, determination of specific gravity by pycnometer. 2.7 Consistency of soil, Atterberg's limits of consistency: Liquid limit, plastic limit and shrinkage limit, plasticity index. 2.8 Determination of liquid limit, plastic limit and shrinkage limit as per IS code. 2.9 Particle size distribution, mechanical sieve analysis as per IS code, particle size distribution curve, effective diameter of soil, Uniformity coefficient and coefficient of curvature, well graded and uniformly graded soils.	10

Unit – 3	**Permeability of Soil** 3.1 Definition of permeability 3.2 Darcy's law of permeability, coefficient of permeability, typical values of coefficient of permeability for different soil. 3.3 Factors affecting permeability 3.4 Determination of coefficient of permeability by constant head and falling head permeability tests, simple problems to determine coefficient of permeability. 3.5 Seepage through earthen structures, seepage velocity, seepage pressure, phreatic line, flow lines and equipotential lines. 3.6 Flow net, characteristics of flow net, application of flow net (no numerical problems).	10
Unit – 4	**Shear strength of Soil** 4.1 Shear failure of soil, field situation of shear failure 4.2 Concept of shear strength of soil. 4.3 Components of shearing resistance of soil– cohesion, internal friction. 4.4 Mohr-coulomb failure theory, Strength envelope, strength equation for purely. cohesive and cohesion less soils. 4.5 Laboratory determination of shear strength of soil – Direct shear test, Unconfined compression test & vane shear test, plotting strength envelope, determining shear strength parameters of soil.	10
Unit – 5	**Bearing capacity of Soil** 5.1 Concept of bearing capacity, ultimate bearing capacity, safe bearing capacity and allowable bearing pressure. 5.2 Terzaghi's analysis and assumptions . 5.3 Effect of water table on bearing capacity. 5.4 Field methods for determination of bearing capacity – Plate load test and standard penetration test. Test procedures as Per IS:1888 & IS:2131. 5.5 Definition of active earth pressure and passive earth pressure, structures subjected to earth pressure in the field.	06
Unit – 6	**Compaction and stabilization of soil** 6.1 Concept of compaction, purpose of compaction, field situations where compaction is required. 6.2 Standard proctor test – test procedure as per IS code, Compaction curve, optimum moisture content, maximum dry density, Zero air voids line. 6.3 Modified proctor test. 6.4 Factors affecting compaction. 6.5 Field methods of compaction – rolling, ramming & vibration. 6.6 California bearing ratio, CBR test, significance of CBR value. 6.7 Concept of soil stabilization, necessity of soil stabilization.	08

	6.8 Different methods of soil stabilization – Mechanical soil stabilization, lime stabilization, cement stabilization, bitumen stabilization, fly-ash stabilization.	
	Total	48

Suggested Text book / Reference book:

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.
3. Ramamurthy, T.N. & SitharamT.G, Geotechnical Engineering (Soil Mechanics), S Chand and Company 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.

7. Geo-Technical Engineering	Kuldep Singh	FPH
8. Geo-Technical Engineering	K.N. Prasad	FPH
9. Geo-Technical Engineering	Ashok Jain	FPH

BASIC SURVEYING LAB

Subject Code 2015306	Practical						Credits
	No. of Periods Per Week			Full Marks	:	50	01
	L	T	P/S	Internal(PA)	:	15	
	—	—	02	External(ESE)	:	35	

Course Objective:

1. To understand types of surveying works required.
2. To know the type of method and equipment to be used for different surveys.
3. To know the use and operational details of various surveying equipment.

Practical Outcomes:

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

CONTENTS: PRACTICAL

Preform any eight Experiments

1. Measure distance between two survey stations using chain, tape and ranging rods when two stations are inter visible.
2. Perform reciprocal ranging and measure the distance between two stations.
3. Determine area of open field using chain and cross staff survey.
4. Measure Fore Bearing and Back Bearing of survey lines of open traverse using Prismatic Compass.
5. 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.
6. Undertake Survey Project with chain and compass for closed traverse for minimum 5 sides around a building.
7. Plot the traverse on A1 size imperial drawing sheet for data collected in Survey Project mentioned at practical **No.6.**
8. Undertake simple levelling using dumpy level/ Auto level and levelling staff.
9. Undertake differential levelling and determine Reduced Levels by Height of instrument method and Rise and fall method using dumpy level/Auto Level and levelling staff.
10. Undertake fly levelling with double check using dumpy level/ Auto level and levelling staff.

11. Undertake Survey Project for plotting contour map using block contouring method for a block of 150m x 150m with grid of 10m x10m.
12. Measure area of irregular figure using Digital planimeter

Reference Book:

1. Punmia, B.C, Jain, Ashok Kumar; Jain, Arun, Surveying Volume 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 Delhi.

BUILDING CONSTRUCTION AND CONSTRUCTION MATERIALS LAB

Subject Code 2015307	Practical						Credits
	No. of Periods Per Week			Full Marks	:	50	01
	L	T	P/S	Internal(PA)	:	15	
	—	—	02	External(ESE)	:	35	

Course Objective:

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

Practical Outcomes:

1. Identify relevant construction materials.
2. Identify relevant natural construction materials.
3. Select relevant artificial construction materials.

CONTENTS: PRACTICAL

Perform any eight experiments:

1. Identify various sizes of available coarse aggregates from sample of 10 kg in laboratory and prepare report.
2. Prepare the lime putty by mixing lime (1 kg) with water in appropriate proportion and prepare report on slaking of lime.
3. Select first class, second class and third-class bricks from the stake of bricks and prepare report on the basis of its properties
4. 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.
5. Identify different types of flooring tiles such as vitrified tiles, ceramic tiles, glazed tiles, mosaic tiles, anti- skid tiles and prepare report about the specifications.
6. Identify the type of glasses from the given samples.
7. Prepare the cement mortar of proportion 1:3 or 1:6 using cement and sand.
8. Preparing foundation plan and marking on ground layout of load bearing structure by face line method from the given plan of the building
9. Preparing foundation plan and marking on ground layout of framed structure by face line method from the given Plan of the building
10. Observing and writing report of the process of plastering.

Reference Book:

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. Rang Wala, S.C., Engineering Materials, Cha rotor publisher, Ahmedabad.
5. Rajput, R.K, Engineering Materials, S. Chand and Co., New Delhi.
6. Sood H., Laboratory Manual on Testing of Engineering Materials, New Age Publishers, New Delhi.
7. Sharma C. P., Engineering Materials, PHI Learning, New Delhi.
8. Duggal, S. K, Building Materials, New International, New Delhi

WEB TECHNOLOGY LAB

Subject Code	Practical						Credits
2018308	No. of Periods Per Week			Full Marks	:	25	01
	L	T	P/S	Internal(PA)	:	07	
	—	—	02	External(ESE)	:	18	

Course Learning Objectives:

This Lab course is intended to practice whatever is taught in theory class of 'Web Technologies'. Some of the things that should necessary be covered in lab.

Course outcomes:

Student will be able to program web applications using and will be able to do the following:

- Use LAMP Stack for web applications
- Write simple applications with Technologies like HTML, Java script, AJAX, PHP
- Connect to Database and get results
- Parse XML files Student will be able to develop/build a functional website with full features.

Content: Practical		Hrs.	Marks
Unit – 1	Home page Development static pages (using Only HTML) of an online Book store.	04	
Unit – 2	Write a JavaScript to design a simple calculator to perform the following operations: sum, product, difference and quotient.	06	
Unit – 3	Write a PHP program to display a digital clock which displays the current time of the server.	06	
Unit – 4	Write an HTML code to display your CV on a web page.	04	
Unit – 5	Write an XML program to display products.	05	
Unit – 6	Create a web page with all types of Cascading style sheets.	06	
Unit – 7	Write a PHP program to display a digital clock which displays the current time of the server.	05	
Unit – 8	Write a JavaScript that calculates the squares and cubes of the numbers from 0 to 10 and outputs HTML text that displays the resulting values in an HTML table format.	04	

This is a skill course. More student practice and try to find solution on their own, better it will be.

Reference Books:

1. "Web Technologies--A Computer Science Perspective", Jeffrey C.Jackson
2. "Internet & World Wide Web How to Program", Deitel, Goldberg, Pearson Education
3. "Web programming- Building Internet Application", Chris Bales
4. Web Applications: Concepts and Real-World Design, Knuckles

Mechanics of Materials Lab (TW)

Subject Code 2015309	Term Work						Credits
	No. of Periods Per Week			Full Marks	:	25	01
	L	T	P/S	Internal(PA)	:	07	
	—	—	02	External(ESE)	:	18	

Course Objective:

1. To know the procedure for the conduct of tensile and compressive strength.
2. To understand the concept of stress and strain through testing of different materials.
3. To calculate shear force, bending moment and their corresponding stresses.
4. To understand flexural strength of floor tiles.

Term Work Outcomes:

1. Test different Civil engineering materials on Universal Testing Machine.
2. Analyze structural behavior of materials under various loading conditions.
3. Interpret shear force and bending moment diagrams for various types of beam sections and different loading conditions.
4. Determine bending and shear stresses in beams under different loading conditions.
5. Calculate flexural strength of different types of floor tiles

CONTENTS: -TERM WORK

Preform any eight Experiments

1. Study different components of Universal Testing Machine (UTM).
2. Perform Tension test on mild steel as per IS:432(1).
3. Perform tension test on Tor steel as per IS:1608, IS:1139.
4. Conduct compression test on sample test piece using Compression Testing Machine.
5. Conduct Izod Impact test on three metals. e.g., mild steel/ brass/aluminum/ copper /cast iron as per IS:1598.
6. Conduct Charpy Impact test on three metals. e.g., mild steel/ brass/aluminum/ copper /cast iron as per IS:1757.
7. Determine Water Absorption on bricks as per IS:1077
8. Determine Compressive strength of dry and wet bricks as per IS:3495(part I), IS:1077
9. Conduct Abrasion Test on flooring tiles (any one) e.g., Mosaic tiles, Ceramic Tiles Cement Tile.
10. Perform Single Shear and double shear test on any two metals e.g., Mild steel/ brass/aluminum/copper / cast iron as per IS:5242.
11. Plot Shear force and Bending Moment diagrams for cantilever, simply supported beams for different types of loads.
12. Plot Shear force and Bending Moment diagrams for overhanging beams for different types of loads including moment loading.
13. Conduct Flexural test on timber beam on rectangular section in both orientations as per IS:1708, IS:2408.
14. Conduct Flexure test on floor tiles IS:1237 or roofing tiles as per IS:654.

Reference Book:

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. Ramamrutham, 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.

Concrete Technology Lab (TW)

Subject Code	Term Work						Credits
2015310	No. of Periods Per Week			Full Marks	:	25	01
	L	T	P/S	Internal(PA)	:	07	
	—	—	02	External(ESE)	:	18	

Course Objective:

1. To know properties of cement and aggregate used in concrete.
2. To understand different characteristics of concrete.
3. To learn about preparation of Concrete.

Term Work Outcomes:

1. Identify different types of cement by performing laboratory tests.
2. Know the physical properties of fine and coarse aggregates.
3. Prepare concrete of required grade.

Contents: - Term Work

Preform any eight Experiments

1. Determine fineness of cement by Blaine's air permeability apparatus or by sieving.
2. Determine specific gravity, 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 bulk density of fine and coarse aggregates.
7. Determine water absorption of fine and coarse aggregates.
8. Determine Fineness modulus of fine aggregate by sieve analysis.
9. Determine impact value of aggregate.
10. Determine crushing value of aggregate.
11. Determine abrasion value of aggregate.
12. Determine elongation and flakiness index of coarse aggregates.
13. Determine workability of concrete by slump cone test.
14. Determine workability of concrete by compaction factor test.
15. To prepare concrete mix of a particular grade and determine compressive strength of concrete for 7 and 28 days.
16. Demonstration of NDT equipment.

Reference Book:

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.

TERM WORK

PYTHON (TW)

Subject Code 2018311	Term Work						Credits
	No. of Periods Per Week			Full Marks	:	25	01
	L	T	P/S	Internal(PA)	:	07	
	—	—	02	External(ESE)	:	18	

CONTENTS: Practical		Hrs.	Marks
UNIT – 01	Write a program to demonstrate basic data type in python.		
UNIT – 02	Write a program to computedistance between two pointstaking input from the user (Pythagorean Theorem)		
UNIT – 03	Write a python program Using for loop, write a program thatprints out the decimal equivalent of 1+½+1/3….1/n		
UNIT – 04	Write a Python program to find first n prime numbers. Write a program to demonstrate list and tuple in python.		
UNIT – 05	Write a program using a for loop that loops over a sequence. Write a program using a while loop that asks the user for a number and prints a countdown from that number to zero.		
UNIT – 06	Write a Python Program to add matrices. Write a Python program to multiply matrices.		
UNIT – 07	Write a Python program tocheck if a string is palindrome or not.		
UNIT – 08	Write a Python program toExtract Unique values dictionary values		
UNIT – 09	Write a Python program to read file word by word Write a Python program to Get number of characters, words.		
UNIT – 10	Write a Python program for Linear Search		

References Books:

1. Taming Python by Programming, Jeeva Jose, Khanna Publishing House
2. Starting Out with Python, Tony Gaddis, Pearson
3. Core Python Programming, Wesley J. Chun, Prentice Hall
4. Python Programming: Using Problem Solving Approach, Reema Thareja, Oxford University
5. Introduction to Computation and Programming Using Python. John V. Gut tag, MIT Press.

Geo Technical Eng. Lab (TW)

Subject Code 2015312	Term Work						Credits
	No. of Periods Per Week			Full Marks	:	50	01
	L	T	P/S	Internal(PA)	:	15	
	—	—	02	External(ESE)	:	35	

Course Objectives:

- To understand and determine physical properties of soil.
- To estimate the permeability and shear strength of soil.
- To know the procedure for performing C.B.R test.

Term Work outcomes:

- Interpret the physical properties of soil.
- Use the results of permeability and shear strength test for foundation analysis.
- Compute optimum moisture content values for maximum dry density of soil through various tests.

Contents: - Term Work

Preform any eight Experiments

1. Determination of water content of given soil sample by oven drying method as per IS Code.
2. Determination of bulk unit weight, dry unit weight of soil in field by core cutter method as per IS Code.
3. Determination of specific gravity of soil by Pycnometer method.
4. Determination of bulk unit weight, dry unit weight of soil in field by sand replacement method as per IS Code.
5. Determination of Liquid limit & Plastic limit of given soil sample as per IS Code.
6. Determination of grain size distribution of given soil sample by mechanical sieve analysis as per IS Code.
7. Determination of coefficient of permeability by constant head test.
8. Determination of coefficient of permeability by falling head test.
9. Determination of shear strength of soil using direct shear test.
10. Determination of shear strength of soil using Laboratory Vane shear test.
11. Determination of MDD & OMC by standard proctor test on given soil sample as per IS Code.
12. Determination of CBR value of given soil sample.

Suggested Text Books: -

1. Soil Mechanics and Foundation Engineering – B.C. Punmia, Laxmi Publications (P) Ltd.
2. Textbook of Soil Mechanics and Foundation Engineering – V.N.S. Murthy, CBS Publishers & Distributors Pvt. Ltd

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