Kashi Institute of Technology, Varanasi

(An Autonomous Institute Approved by AICTE)

Evaluation Scheme & Syllabus

For

Diploma 2nd Year

(Civil Engineering)

(Effective from Session: 2025-26)

Diploma Second Year, Semester-3rd
(Civil Engineering)

S.N	Course Category	Course Code	Course Title	Type	Periods			FA	SA	Total	Credit
					L	T	P				
1	PC	DCEPC205	HYDRAULICS AND HYDRAULIC MACHINES	T	3	0	0	70	30	100	3
2	PC	DCEPC207	CONCRETE TECHNOLOGY	T	3	0	0	70	30	100	3
3	PC	DCEPC209	STRENGTH OF MATERIAL	T	2	1	0	70	30	100	3
4	PC	DCEPC211	BUILDING CONSTRUCTION	T	3	0	0	70	30	100	3
5	PC	DCEPC213	BUILDING DRAWING	P	0	0	4	70	30	100	2
6	PC	DCEPC215	HYDRAULICS AND HYDRAULIC MACHINES LAB	p	0	0	2	70	30	100	1
7	PC	DCEPC217	CONCRETE TECHNOLOGY LAB	P	0	0	2	70	30	100	1
8	PC	DCEPC219	STRENGTH OF MATERIAL LAB	P	0	0	2	70	30	100	1
9	PR	DCEPR201	INDUSTRIAL TRAINING-I	P	-	-	-	--	--	100	2
10	CCA	DCCA203	CO-CURRICULAR ACTIVITIES	-	-	-	-	--	-	100	0.5
11	GP	DGP203	GENERAL PROFICIENCY	-	-	-	-	--	-	100	0.5
			Total	-	11	1	10	560	240	1100	20

Diploma Second Year, Semester-4th
(Civil Engineering)

S.N	Course Category	Course Code	Course Title	Type	Period			FA	SA	Total	Credit
					L	T	P				
1	HS	DHS202	COMMUNICATION SKILLS-II	T	2	0	0	70	30	100	2
2	PC	DCEPC204	TRANSPORTATIONENGINEERING- I	T	2	0	0	70	30	100	2
3	PC	DCEPC206	IRRIGATION ENGINEERING	T	3	0	0	70	30	100	3
4	PC	DCEPC208	SURVEYING - I	T	3	0	0	70	30	100	3
5	PC	DCEPC210	REINFORCED CEMENT CONCRETE STRUCTURES (RCC STRUCTURES)	T	3	0	0	70	30	100	3
6	PC	DCEPC212	GEOTECHNICAL ENGINEERING	T	3	0	0	70	30	100	3
7	PC	DCEPC214	TRANSPORTATION ENGINEERING - I LAB	P	0	0	2	70	30	100	1
8	PC	DCEPC216	SURVEYING − I LAB	P	0	0	2	70	30	100	1
9	PC	DCEPC218	GEOTECHNICAL ENGINEERING LAB	P	0	0	2	70	30	100	1
10	CCA	DCCA204	CO-CURRICULAR ACTIVITIES	-	-	-	-	--	-	100	0.5
11	GP	DGP204	GENERAL PROFICIENCY	-	-	-	-	--	-	100	0.5
			Total	-	16	0	6	630	270	1100	20

Note: 6 weeks industrial training will be organized after 4th Semester exam. The evaluation of industrial training will be done in 5th semester.

DETAILED SYLLABUS
DIPLOMA 2nd Year

- ## Civil Engineering 3rd Semester

(Effective from Session: 2025-26)

Diploma in Civil Engineering						
Semester : III				**Course Category: PC**		
Course Code	**Course**		**Period / Week**			**Credit**
		L	**T**	**P**		**C**
DCEPC205	**Hydraulics and Hydraulic machines**	**3**	**0**	**0**		**3**
Prerequisite	***At the end of this course, the students will be able to:***					**Bloom's Level**
Course Outcome	**CO1**	*Interpret the different terms related to fluids*				K1,K3
	CO2	*Calculate the pressure exerted by fluids on the walls of containers*				K3
	CO3	*Calculate discharge through pipes, irrigation channels, water supply pipe lines*				K3,K5
	CO4	*Use different flow measurement devices like venturimeter, mouthpiece, notches, weir, orifice meter*				K2,K3
	CO5	*Calculate the size of the pipe for carrying a particular discharge.*				K2,K3
UNIT – I	**Introduction**					**Contact Hours : 08**
Fluids: Real and ideal fluids Fluid Mechanics, Hydrostatics, Hydrodynamics, Hydraulics						**CO1**
UNIT – II	**Properties of Fluids (definition only)**					**Contact Hours : 08**
Mass density, specific weight, specific gravity, viscosity, surface tension - cohesion, adhesion and, capillarity, vapour pressure and compressibility. Newton's Law of viscosity, Newtonian and Non-Newtonian fluids, simple numerical problems.						**CO2**
UNIT – III	**Hydrostatic Pressure**					**Contact Hours : 08**
Pressure, intensity of pressure, pressure head, Pascal's law and its applications. Total pressure						**CO3**
UNIT – IV	**Measurement of Pressure**					**Contact Hours : 08**
Atmospheric pressure, gauge pressure, vacuum pressure and absolute pressure Piezometer Definition of pipe flow; Reynolds number, laminar and turbulent flow						**CO4**
UNIT – V	**Fundamentals of Fluid Flow**					**Contact Hours : 08**
Types of Flow: Steady and unsteady flow, laminar and turbulent flow, uniform and non-uniform flow, streamline, stream tubes, streak line and path line. Discharge and continuity equation Types of hydraulic energy: Potential energy, kinetic energy, pressure energy Bernoulli's theorem;						**CO5**
Lecture Hours : 40			**Tutorials Hours : 0**			**Total : 40**

Reference Books:

1. *Fluid Mechanics and Hydraulics by Jagdish Lal; Delhi Metropolitan Book Co. Pvt Ltd.*

2. *Hydraulics and Fluid Mechanics by Modi, PN, and Seth, SM; Delhi Standard Publishers Distributors*

3. *Hydraulics and Hydraulics Machines by Khurmi RS ; S Chand and Co., Delhi*

4. *Laboratory Manual for Fluid Mechanics by Poonia MP and Jakhar OP; Standard Publishers Distributors, Delhi*
5.   *Fluid Mechanics by Birinder Singh; Kaption Publishing, New Delhi*

Diploma in Civil Engineering					
Semester : III			**Course Category : PC**		
Course Code	**Course**	**Period / Week**			**Credit**
		L	**T**	**P**	**C**
DCEPC207	**CONCRETE TECHNOLOGY**	**3**	**0**	**0**	**3**
Prerequisite	*At the end of this course, the students will be able to:*				**Bloom's Level**
Course Outcome	**CO1**	*Understand the concept of concrete.*			K₂
	CO2	*Understand the concept of concrete properties.*			K3,
	CO3	*Understand the concept of water cement ratio and mix design.*			K2
	CO4	*Understand the use of Admixture.*			K3
	CO5	*Understand the concept of concrete making procedure.*			K3,K4
UNIT – I	**Introduction**				**Contact Hours : 08**
Definitions of concrete, properties of concrete, uses of concrete in comparison to other building materials. Advantages and disadvantages of concrete. Ingredients of Concrete. Cement: physical properties of cement; different types of cement as per IS CodesAggregates:Classification of aggregates. fineness modulusWater: Water Quality requirements as per IS:456-2000					**CO1**
UNIT – II	**Properties of Concrete**				**Contact Hours :08**
Properties in plastic state: Workability, Segregation, Bleeding and Harshness. Factors affecting workability, Measurement of workability: slump test, compacting factor and Vee Bee consist meter; Recommended slumps for placement in various conditions as per IS: 456-2000.Properties in hardened state: Strength, Durability, Impermeability, Dimensional changes;					**CO2**
UNIT – III	**Water Cement Ratio**				**Contact Hours : 08**
Hydration of cement principle of water-cement ratio, Duff Abram's Watercement ratio law: Limitations of water-cement ratio law and its effects on strength of concrete Mix Design:Objectives and parameters of mix design, introduction to various grades as per IS: 456-2000; proportioning for nominal mix design as prescribed by IS 456- 2000.Difference between nominal and controlled concrete					**CO3**
UNIT – IV	**Introduction to Admixtures and Special Concretes**				**Contact Hours : 08**
Admixture: types of Admixture,Concreting under special conditions, difficulties and precautions before, during and after concreting.Cold weather concreting, Under water concreting, Hot weather concreting , Ready mix concrete , Fiber reinforced concrete , Polymer Concrete , Fly ash concrete, Silica fume concrete , Self compacting concrete					**CO4**
UNIT – V	**Concreting Operations**				**Contact Hours : 08**
Storing of Cement ,Storing of Aggregate: Storing of aggregate at site, Mixing ,Transportation of concrete, Placement of concrete, Compaction, Finishing concrete slabs, Curing ,Defects in concrete					**CO5**
Lecture Hours : 40			**Tutorials Hours : 0**		**Total : 40**
Reference Books:					

1. *Concrete Technology by Krishnamurthy*
2. *Concrete Technology by Birinder Singh*
3. *Concrete Technology by Gupta BL and Gupta Amit*

Diploma in Civil Engineering					
Semester : III				**Course Category : PC**	
Course Code	**Course**	**Period / Week**			**Credit**
		L	**T**	**P**	**C**
DCEPC209	**Strength of material**	**2**	**1**	**0**	**3**
Prerequisite	*At the end of this course, the students will be able to:*				**Bloom's Level**
Course Outcome	**CO1**	*calculate shear force, bending moment for simply supported, cantilever and overhanging beams with concentrated and uniformly distributed load*			K1,K2
	CO2	*calculate moment of inertia, second moments of inertia, radius of gyration, section modulus for L, T, channel and I sections*			$K2,K3,K_5$
	CO3	*explain shear stress, stress distribution diagram for rectangular, circular, I,T and L sections*			K_2
	CO4	*calculate slope and deflection of determinate structures*			K2,K4
	CO5	*verify forces in a framed structure*			K1,K2,K6
UNIT – I	**Introduction**				**Contact Hours : 08**
Classification of materials, elastic materials, plastic materials, ductile materials, brittle materials., Introduction to tensile test, compressive test, impact test, fatigue test, torsion test on metals					**CO1**
UNIT- II	**Simple Stresses and Strains**				**Contact Hours : 08**
Concept of stress, normal and shear stresses, Concept of strain and deformation, longitudinal and transverse strain, poison's ratio, volumetric strain, and Hooke's law, modulus of elasticity and rigidity, Bulk modulus of elasticity, relationship between the elastic constants. Temperature stresses and strains					**CO2**
UNIT -III	**Shear Force and Bending Moment ,Moment of Inertia, Bending Stresses in Beams**				**Contact Hours : 08**
Moment of inertia for L, T and I sections, section modulus (simple numerical problems.), Concept of a beam and supports (Hinges, Roller and Fixed), types of beams: simply supported, cantilever, propped, overhang, fixed and continuous beams (only concept). Types of loads (dead load, live load, snow load, wind load seismic load as per IS Codes etc) and types of loading (point, uniformly distributed and uniformly varying loads) Concept of bending moment and shear force, sign conventions, Bending Moment and shear force diagrams for cantilever, simply supported and overhanging beams subjected to concentrated, uniformly distributed and varying loads, Fixed and continuous beams-simple numerical problems. Concept of pure/simple bending ,Assumptions made in the theory of simple bending					**CO3**
UNIT – IV	**Shear Stresses in Beams ,Slope and Deflection**				**Contact Hours : 08**
Determination of slope and deflection using Moment Area Theorem for simply supported beam for pointed load and U.D.L, Conjugate beam method and double integration method. (no derivation, numerical problems only) ,Concept of shear stresses in beams, shear stress distribution in rectangular, circular I, T, L sections for beams					**CO4**
UNIT – V	**Columns, Analysis of Trusses**				**Contact Hours : 08**

Theory of columns- long and short columns, slenderness ratio ,Problem solving using Euler's and Rankine formula. Concept of a perfect, redundant and deficient frames, Assumptions and analysis of trusses by: a) Method of joints b) Method of sections	**CO5**

Lecture Hours : 30	**Tutorials Hours : 10**	**Total : 40**

Reference Books:

1. Strength of Materials by Ramamrutham, S ; Dhanpat Rai and Sons., New Delhi

2. Strength of Materials by Punmia, BC ; Standard Publishers, Delhi
3. Structural Mechanics by Singh Birinder; Kaption Publishers, Ludhiana
4. Strength of Material by Karamveer Saini, Krishna Publishing House, Meerut.

Diploma in Civil Engineering						
Semester : III				**Course Category : PC**		
Course Code		**Course**	**Period / Week**			**Credit**
			L	**T**	**P**	**C**
DCEPC211		**BUILDING CONSTRUCTION**	**3**	**0**	**0**	**3**
Prerequisite		*At the end of this course, the students will be able to:*				**Bloom's Level**
Course Outcome	**CO1**	*Define the different components and classification of building*				K₂, K₄
	CO2	*Select a foundation for particular type of building*				
	CO3	*Select different types of doors, windows, floors and stairs cases in the building.*				K₄
	CO4	*Demonstrate the construction details of lintels and arches at appropriate level in building*				K₂, K₄
	CO5	*select a foundation for particular type of building*				K₂

UNIT – I	**Introduction**	**Contact Hours :08**
Definition of a building, classification of buildings based on occupancy. Different parts of a building. Concept of foundation and its purpose. Types of foundation-shallow and deep, Shallow foundation - constructional details of: Spread foundations for walls.Introduction to deep foundation and their types.		**CO1**
UNIT – II	**Walls ,Masonry, Stone Masonry**	**Contact Hours :08**
Purpose of walls ,Classification of walls - load bearing, non-load bearing, dwarf wall, retaining, breast walls and partition walls ,Classification of walls as per materials of construction: brick, stone, reinforced brick, reinforced concrete, precast, hollow and solid concrete block and composite masonry walls, Partition walls: Constructional details, suitability and uses of brick and wooden partition walls ,Scaffolding, construction details and suitability of mason's bricklayers and tubular scaffolding, shoring, underpinning Brick Masonry: Definition of terms like header, stretcher, queen closer, king closer, frog and quoin, course, bond, facing, backing, hearting, jambs, reveals, soffit, plinth, pillars and pilasters		**CO2**
UNIT – III	**Arches and Lintels, Doors, Windows and Ventilators, Damp Proofing and Water Proofing**	**Contact Hours :08**
Meaning and use of arches and lintels: Glossary of terms used in arches and lintels - abutment, pier, arch ring, intrados, soffit, extrados, voussoirs, springer, springing line, crown, key stone, skew back, span, rise, depth of an arch, haunch, spandril, jambs,bearing, thickness of lintel, effective span Arches: Types of Arches - Semi circular, segmental, elliptical and parabolic, flat, inverted and relieving, Stone arches and their construction, Brick arches and their construction, Glossary of terms with neat sketches,Classification based on materials i.e. wood, metal and plastic and their suitability for different situations. Different type of doors- panel door, flush door, glazed door, rolling shutter, steel door, sliding door, plastic and aluminum doors Window– Panel window, glazed windows (fixed and open able) ventilators, sky light window, Louvers shutters, plastic and aluminumwindows. Door and window frames –materials and sections, fixtures and fasteners, hold fasts		**CO3**
UNIT – IV	**Floors, Roofs**	**Contact Hours :08**
Glossary of terms-floor finish, topping, under layer, base course, rubble filling and their purposeTypes of floor finishes - concrete flooring, ceramic tile flooring, stone (marble and kota)		**CO4**

flooring. Wooden flooringSpecial emphasis on level/slope/reverse slope in bathrooms, toilets, kitchen, balcony and staircase		
UNIT – V	**Stairs**	**Contact Hours :08**
Glossary of terms: Staircase, winders, landing, stringer, newel, baluster, riser, tread, width of staircase, hand-rail, nosing ,Classification of staircase on the basis of material– RCC, timber, steel, Aluminum, Planning and layout of staircase: Relations between rise and tread, determination of width of stair, landing etc,Various types of layout - straight flight, dog legged, open well, quarter turn, half turn (newel and geometrical stairs), bifurcated stair, spiral stair		**CO5**
Lecture Hours : 40	**Tutorials Hours : 0**	**Total : 40**
Reference Books: 1. *A Text Book of Building Construction by Kulkarni, GJ; Ahmedabad Book Depo* 2. *Building Construction by Sushil Kumar; Standard Publishers Distributors, Delhi* 3. *A Text Book of Building Construction by Arora, SP and Bindra, SP; Dhanpat Rai and Sons, New Delhi*		

Diploma in Civil Engineering					
Semester: III			**Course Category: PC**		
Course Code	**Course**	**Period / Week**			**Credit**
		L	**T**	**P**	**C**
DCEPC213	**Building Drawing**	**0**	**0**	**4**	**2**
Prerequisite	*At the end of this course, the students will be able to:*				
Course Outcome	**CO1**	Layout foundation plan of different types of foundations.			
	CO2	Prepare details of brick courses in joints.			
	CO3	Prepare drawings of small buildings.			
	CO4	Developing different sections of building.			
	CO5	Draw the sketches of various joints of carpentry.			
List of experiment					
CO1	Details of spread footing foundations for a load bearing and non-load bearing wall for given thickness of walls with the help of given data or rule of the thumb, showing offsets, position of DPC. The details of the concrete and brick apron have to be shown in the drawing				
CO2	Plans of 'T' and Corner junction of walls of 1 Brick, 1-1/2 Brick and 2 brick thick in English bond				
CO3	Drawing plan, elevation of a small building by measurement and foundation detail and sectional elevation.				
CO4	Drawing detailed working plan, elevation and section of a residential building from a given line plan or given data showing details of foundations, roof and parapet				
CO5	Elevation, sectional plan and sectional side elevation of fully panelled door and fully glazed door.				

Diploma in Civil Engineering					
Semester: III				**Course Category: PC**	
Course Code	**Course**	**Period / Week**			**Credit**
		L	**T**	**P**	**C**
DCEPC215	**Hydraulics and Hydraulic machines Lab**	**0**	**0**	**2**	**1**
Prerequisite	*At the end of this course, the students will be able to:*				
Course Outcome	**CO1**	Calculate discharge through pipes, irrigation channels, and water supply pipe lines. .			
	CO2	use different flow measurement devices like venturimeter, mouthpiece, notches, weir, orifice meter			
	CO3	Calculate the size of the pipe for carrying a particular discharge.			
	CO4	use different flow measurement devices like venturimeter, mouthpiece, notches, weir, orifice meter			
	CO5	measure the loss of head in pipes and channels			
List of experiment					
CO1	1. To verify Bernoulli's Theorem				
	2. To determine coefficient of velocity (Cv), Coefficient of discharge (Cd) Coefficient of contraction (Cc) of an orifice and verify the relation between them				
CO2	3. To find out venturi meter coefficient				
	4. To verify loss of head in pipe flow				
CO3	5. To perform Reynolds's experiment				
	6. Demonstration of use of current meter and pitot tube				
CO4	7. To find orifice meter test				
	8. To determine coefficient of discharge of a rectangular notch and triangular notch.				
CO5	9. To determine head loss due to friction in pipe				

Diploma in Civil Engineering					
Semester: III				**Course Category: PC**	
Course Code	**Course**	**Period / Week**			**Credit**
		L	**T**	**P**	**C**
DCEPC217	**CONCRETE TECHNOLOGY LAB**	**0**	**0**	**2**	**1**
Prerequisite	*At the end of this course, the students will be able to:*				
Course Outcome	**CO1**	To understand the properties of cement.			
	CO2	To understand the elongation and flakiness of aggregate.			
	CO3	To understand the concept of specific gravity and elongation.			
	CO4	To understand the concept of workability.			
	CO5	To understand the strength of cube.			
List of experiment					
CO1	1. To determine the physical properties of cement such as fineness, consistency, setting time, soundness and compressive strength of cement as per IS Codes				
CO2	2. To determine flakiness index of coarse aggregate 3. To determine elongation index of coarse aggregate				
CO3	4. Determination of specific gravity of aggregates 5. Determination water absorption of aggregates				
CO4	6. To determine workability by slump test 7. To determine compressive strength of concrete cubes for different grades of concrete.				
CO5	8. To determine flexural strength of concrete beam. 9. Non destructive test on concrete.				

Diploma in Civil Engineering					
Semester: III			**Course Category: PC**		
Course Code	**Course**	**Period / Week**			**Credit**
		L	**T**	**P**	**C**
DCEPC219	**Strength of Material Lab**	**0**	**0**	**2**	**1**
Prerequisite	*At the end of this course, the students will be able to:*				
Course Outcome	**CO1**	conduct different tests on mild steel			
	CO2	Analyze and explain stress-strain diagram of mild and HYSD steel			
	CO3	calculate slope and deflection of determinate structures			
	CO4	calculate modulus of elasticity			
	CO5	Verification of forces in a framed structure			
List of experiment					
CO1	1. Determination of Tension test 2. Determination of Bending test on (Steel/Wood) Cantilever beam.				
CO2	3. Determination of Testing of HYSD Steel 4. Determination of Bending test on simple support beam				
CO3	5. Determination of Torsion test 6. Determination of Hardness test				
CO4	7. Determination of Spring test 8. Determination of Compression test on concrete 9. Determination of Impact test				
CO5	10. Determination of Shear test 11. Verification of Maxwell's Reciprocal theorem on beams. 12. Determination of Continuous beam – Deflection test.				

DETAILED SYLLABUS
DIPLOMA 2nd Year

- **Civil Engineering 4th Semester**

(Effective from Session: 2025-26)

Diploma in Civil Engineering					
Semester: IV			**Course Category : HS**		
Course Code	**Course**	**Period / Week**			**Credit**
		L	**T**	**P**	**C**
DHS202	**Communication Skills -II**	**2**	**0**	**0**	**2**
Prerequisite	*At the end of this course, the students will be able to:*				**Bloom's Level**
Course Outcome	**CO1**	*FrameCorrectsentenceswith language*			K1
	CO2	*Comprehendthe languagecorrectly*			K2
	CO3	*Mastering writingskills*			K3
	CO4	*Learningclassified knowledge onspeakingetiquettes*			K1,K3
	CO5	*Identifyingand evaluating theentireconceptsofBusiness writing and knowledge of literary elements*			K2,K3
UNIT – I	**DESCRIPTIVEGRAMMAR**				**Contact Hours :06**
Tense,Preposition,Conjunction,ComparisonofAdverbs,Simple,Compound&Complex,Sentences Adverb					**CO1**
UNIT – II	**READINGSKILLS**				**Contact Hours :06**
UnseenPassages forcomprehension, Vocabularyenhancement:-Prefix, Suffix, Synonyms, Antonyms					**CO2**
UNIT – III	**PROFESSIONALWRITINGSKILLS**				**Contact Hours :06**
ProfessionalEmail, Resume & CV writing, Etiquettes to be followed in E-mail Writing					**CO3**
UNIT – IV	**EFFECTIVELEARNINGPATTERNS FORINTERVIEWROUNDS**				**Contact Hours :06**
ProfessionalInterviewPractices, TypesofInterview(Placement,Govt.job,academics, research,internships& training),Do Interview session					**CO4**
UNIT – V	**BUSINESS WRITING AND LITERARY WORK**				**Contact Hours : 06**
BusinessLetters&itstypes,Memorandum,Circulars, Officeorders, Glossary of Literary term					**CO5**
Lecture Hours : 30		**Tutorials Hours :00**			**Total :30**

Reference Books:

1. AdvanceEnglish GrammarbyD.S. Paul, GoodwillPublishing House, 2016.
2. Howto WinFriends andInfluencePeople byDale CarnegieSimon andSchuster, 1936

Diploma in Civil Engineering					
Semester : IV			**Course Category : PC**		
Course Code	**Course**	Period / Week			**Credit**
		L	**T**	**P**	**C**
DCEPC204	**Transportation Engineering-I**	**2**	**0**	**0**	**2**
Prerequisite	***At the end of this course, the students will be able to:***				**Bloom's Level**
Course Outcome	**CO1**	*Classify the roads as per IRC types and geometrics*			K1
	CO2	*Explain various components of a flexible/rigid pavement*			K2
	CO3	*Select various highway materials and test them for different quality parameters , supervise construction of a highway in plain areas and hilly areas*			K3
	CO4	*Supervise repair and maintenance of roads ,supervise preparation of bituminous mix in the hot mix plants*			K1,K3
	CO5	*Describe the use various road construction equipment • describe basic terminology of various components of an airport.*			K2,K3
UNIT – I	**Introduction**				**Contact Hours :06**
Importance of Highway engineering, Functions of IRC, CRRI, MoRT& H, NHAI.,Classification of roads ,Mass Transportation system ,Concept of Smart highways ,Road Geometrics ,Glossary of terms used in road geo-metrics and their importance: Right- of way, formation width, road margin, road shoulder, carriage way, side slopes, kerbs, formation levels, camber and gradient ,Average running speed, stopping and overtaking sight distance					**CO1**
UNIT – II	**Highway Alignment**				**Contact Hours :06**
.Basic considerations governing alignment for a road in plain and hilly area ,Highway location, marking of alignment on ground, setting out alignment of road, setting out benchmarks, control pegs for embankment and cutting ,Road Materials ,Different types of road materials in use; soil, aggregate and binders ,Introduction to California Bearing Ratio, method of finding CBR value and its significance. Aggregate : Source and types, important properties, strength, durability ,Binders: Common binders; bitumen, properties as per BIS specifications, penetration, softening point, ductility and viscosity test of bitumen,					**CO2**
UNIT – III	**Road Pavements**				**Contact Hours :06**
Road pavement: Flexible and rigid pavement, their merits and demerits, typical cross-sections, functions of various components ,Sub-grade preparation Borrow pits, making profiles of embankment, construction of embankment, compaction, preparation of sub grade, methods of checking camber, gradient and alignment as per recommendations of IRC, equipment used for sub grade preparation, Stabilization of sub grade. Types of stabilization mechanical stabilization, lime stabilization, cement stabilization, fly ash stabilization etc.(introduction only) ,Base Course Granular base course: (a) Water Bound Macadam (WBM) (b) Wet Mix Macadam (WMM) Bitumen Courses: (a) Bituminous Macadam (b) Dense Bituminous Macadam (DBM)					**CO3**
UNIT – IV	**Surfacing**				**Contact Hours :06**
Types of surfacing, Prime coat and tack coat b) Surface dressing with seal coat c) Open graded premix carpet d) Mix seal surfacing e) Semi dense bituminous concrete f) Bituminous Concrete * Methods of constructions as per MORT&H specifications and quality control; equipment used for					**CO4**

above, Rigid Pavements Construction of concrete roads as per IRC specifications: Form work laying, mixing and placing the concrete, compacting and finishing, curing, joints in concrete pavement, equipment used. Roller compacted concrete. Hill Roads ,Introduction: Typical cross-sections showing all details of a typical hill road, partly in cutting and partly in filling, Special problems of hill areas ,Landslides: Causes, prevention and control measures, use of georgics, geoflexbiles, geo synthetics ,Drainage ,Soil erosion ,Snow: Snow clearance, snow avalanches, frost ,Land Subsidence	
UNIT – V	**Road Drainage**	**Contact Hours : 06**

| .Necessity of road drainage work, cross drainage Surface and subsurface drains and storm water drains. Location, spacing and typical details of side drains, side ditches for surface drainage. Intercepting drains, pipe drains in hill roads, details of drains in cutting embankment, typical cross sectionsRoad Maintenance
Common types of road failures of flexible pavements: Pot hole, cracks, rutting, alligator, cracking, upheaval - their causes and remedies (brief description) Maintenance of bituminous roads such as crack sealing, patch-work and resurfacing. Maintenance of concrete roads-filling cracks, repairing joints, maintenance of shoulders (beams) Road Construction Equipment. Output and use of the following plant and equipment Hot mix plant Tipper, tractors (wheel and crawler) scraper, bulldozer, dumpers, shovels, grader, roller, dragline Asphalt mixer and tar boilers Road pavers Paver finisher Airport Engineering Necessity of study of airport engineering, aviation transport scenario in India. Factors to be considered while selecting a site for an airport with respect to zoning laws. 8.3 Introduction to Runways, Taxiways, Apron and Hanger | **CO5** |

Lecture Hours : 30	**Tutorials Hours :00**	**Total :30**

Reference Books: *1.Highway Engineering by Khanna, SK and Justo, CEG; Nem Chand and Bros., Roorkee* *2. A Text Book on Highway Engineering and Airport by Sehgal, SB; and Bhanot, KL; S Chand and Co, Delhi* *3. A Course on Highway Engineering by Bindra, SP; Dhanpat Rai and Sons, New Delhi*

Diploma in Civil Engineering					
Semester : IV			Course Category : PC		
Course Code	Course	Period / Week			Credit
		L	T	P	C
DCEPC206	Irrigation Engineering	3	0	0	3
Prerequisite	At the end of this course, the students will be able to:				Bloom's Level
Course Outcome	CO1	Explain concept of necessity of irrigation in India			K1
	CO2	Recognize different crops and their water requirements			K2
	CO3	Define rainfall and runoff			K3
	CO4	Measure rainfall and read rain gauges and hydrographs			K1,K3
	CO5	Monitor construction and maintenance work of canal and canal linings			K2,K3
UNIT – I	Introduction				Contact Hours :08
Definition of irrigation Necessity of irrigation, Role of Irrigation in country's economy Major, medium and minor irrigation projects of India					CO1
UNIT – II	Water Requirement of Crops				Contact Hours :08
. Principal crops in India and their water requirements Crop seasons – Kharif and Rabi Soil water, soil crop and crop water relationships, Duty, Delta and Base Period, their relationship Gross commanded area (GCA), culturable commanded area (CCA), Intensity of Irrigation, Paleo, Kor, Crop Ratio, Crop period, Base period, Duty, Delta. Relation between Duty-Delta and Base period.					CO2
UNIT – III	Hydrological Cycle Catchment Area and Run-off				Contact Hours :08
Rainfall , definition rain-gauges – automatic and non-automatic, methods of estimating average rainfall, Advantages of keeping rainfall records, (Arithmetic system); catchment area, runoff, factors affecting runoff, hydrograph, basic concept of unit hydrograph.					CO3
UNIT – IV	Methods of Irrigation				Contact Hours :08
Flow irrigation - its advantages and limitations Lift Irrigation – Tube well, submersible and well irrigation advantages and disadvantages Sprinkler irrigation conditions favorable and essential requirements for sprinkler irrigation, sprinkler system – classification and component parts Drip irrigation, suitability of drip irrigation, layout,					CO4
UNIT – V	Canals				Contact Hours :08
Factors to be considered in Canal Alignment. Functions/Purpose of various components of Canal. Classification of Canals and their functions, Classification of dams; earthen dams					CO5
Lecture Hours :40			Tutorials Hours :00		Total :40
Reference Books: 1. Irrigation Engineering and Hydraulics Structures by Garg, Santosh Kumar; Khanna Publishers, Delhi, 2. Irrigation Engineering and Hydraulic Structures by Saharsabudhe SR 3. BIS Codes Central Ground Water Board and Central Water Commission Guidelines and Reference Books.					

Diploma in Civil Engineering					
Semester : IV			**Course Category : PC**		
Course Code	**Course**	**Period / Week**			**Credit**
		L	**T**	**P**	**C**
DCEPC208	**Surveying-I**	3	0	0	3
Prerequisite	*At the end of this course, the students will be able to:*				**Bloom's Level**
Course Outcome	**CO1**	Undertake the relevant type of survey for the given purpose in the given situation.			K_2, K_4
	CO2	Apply the necessary correction to the linear measurements recorded in the field book.			K_2, K_3, K_5
	CO3	Conduct chain and compass traverse survey in the given field.			K_4
	CO4	Find the difference of level between two points with dumpy level, auto level and digital level.			K_2, K_4
	CO5	Draw the contour map of the given terrain using the relevant leveling instrument.			K_2
UNIT – I	**Overview and Classification of Survey**				**Contact Hours :08**
Survey-Purpose and Use: Types of surveying- Primary and Secondary, Classification: Plane, Geodetic. Cadastral, Hydrographic, and Aerial. Principles of Surveying					**CO1**
UNIT – II	**Chain Survey**				**Contact Hours :08**
Instruments used in chain survey: Metric Chain, Tapes, Arrow, ranging rod, Line ranger, Offset rod, Open cross-staff, Optical square. Chain survey Station, Baseline, Check line, Tie line, Offset, Tie Station. Ranging Direct and Indirect Ranging, Method of chaining, obstacles in chaining. Errors in length: Instrumental error, personal error, error due to natural cause, random error.					**CO2**
UNIT – III	**Compass Survey**				**Contact Hours :08**
Compass Traversing-open, closed Traverse. Technical Terms: Geographic/True Meridians, Magnetic Meridians, and Bearings, Whole Circle Bearing system and Reduced Bearing system and examples on the 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 Compass- Temporary adjustments and observing bearings. Local attraction, Methods of correction of observed bearings - Correction at station and correction to included angles.					**CO3**
UNIT – IV	**Levelling**				**Contact Hours :08**
Basic Terms: Level surface, Horizontal and vertical surface, Datum, Benchmark - Permanent, Temporary, Arbitrary. Reduced Level, Rise, Fall, Back sight, Fore sight, Intermediate sight, Change point, Height of instrument, Line of collimation. Types of levels: Dumpy, Tilting, and Auto level, Temporary adjustments of Level. Types of Levelling Staff: Self-reading staff and Target staff, Reduction of level by Height of Instrument Method, and Rise and Fall Method.Levelling Types: Simple, Differential, Fly, Profile, and Reciprocal Levelling.					**CO4**
UNIT – V	**contouring**				**Contact Hours :08**

Contour, contour intervals, horizontal equivalent, Uses of contour maps, Characteristics of contours, Methods of Contouring-Direct and indirect.	**CO5**

Lecture Hours :40	**Tutorials Hours :00**	**Total :40**

Reference Books:

1. Surveying 1 Dr BC Punmia, Ashok Kumar Jain, Dr. Arun Kumar Jain Seventeenth Edition, Laxmi publication ISBN-10 9788170088530 ISBN-13 978-8170088530

2. Surveying and Leveling A K Arora 17th Edition, Standard book house ASIN: B08GY78N55 ISBN-13: 9788189401238

Diploma in Civil Engineering					
Semester : IV				**Course Category : PC**	
Course Code	**Course**	**Period / Week**			**Credit**
		L	**T**	**P**	**C**
DCEPC210	**Reinforced cement concrete structures(RCC Structures)**	**3**	**0**	**0**	**3**
Prerequisite	***At the end of this course, the students will be able to:***				**Bloom's Level**
Course Outcome	**CO1**	*Explain methods of RCC design*			K1
	CO2	*Design singly, doubly reinforced rectangular and T&L beams as per IS Code*			K2
	CO3	*.Design one way and two way slab*			K3
	CO4	*Design axially loaded column and their isolated footing*			K1,K3
	CO5	*Explain methods of RCC design - Working stress methods - Limit state methods*			K2,K3
UNIT – I	**Introduction**				**Contact Hours :08**
Concept of Reinforced Cement Concrete (RCC)Reinforcement Materials: - Suitability of steel as reinforcing material - Properties of mild steel, HYSD steel and TMT bars.Loading on structures as per IS: 875Introduction to following methods of RCC designWorking stress method: Definition and basic assumptions , Limit state method: Definition and basic assumptions , Problems of singly, doubly and T beam analysis by working stress method					**CO1**
UNIT – II	**Shear and Development Length**				**Contact Hours :08**
Shear strength of concrete without shear reinforcement,Maximum shear stress, ShearreinforcementConcept of Limit State Method ,Definitions and assumptions made in limit state of collapse.					**CO2**
UNIT – III	**Singly Reinforced beam**				**Contact Hours :08**
Partial factor of safety for materials ,Partial factor of safety for loads, Design loads ,Stress block, parameters ,Theory and design of singly reinforced beam by Limit State Method					**CO3**
UNIT – IV	**Doubly Reinforced Beams**				**Contact Hours :08**
Theory and design of simply supported doubly reinforced rectangular beam by Limit State Method Behavior of T beam, inverted T beam, isolated T beam and 'L' beams. Simple problems related to moment capacity. One Way Slab. Theory and design of simply supported one way slab including sketches showing reinforcement details (plan and section) by Limit State Method. Two Way Slab. Theory and design of two-way simply supported slab with corners free to lift, no provisions for torsion reinforcement by Limit State Method including sketches showing reinforcement details					**CO4**

UNIT – V	Axially Loaded Column	Contact Hours :08
Definition and classification of columns ,Effective length of column, Specifications for longitudinal and lateral reinforcement Design of axially loaded square, rectangular and circular short columns by Limit State Method including sketching of reinforcement Pre-stressed Concrete , Concept of prestressed concrete ,Methods of prestressing: pre-tensioning and post-tensioning ,Advantages and disadvantages of prestressing		CO5
Lecture Hours :40	**Tutorials Hours :00**	**Total :40**

Reference Books:

1. *Punmia, BC; RCC Design and Drawing by Singh, Birinder; Kaption Publishing House, New Delhi*
2. *Design of Reinforced Concrete Structures. Author Prof. V.N. Vazirani and Dr. M.M. Ratwani; ISBN: 978-81-7409-232-8*
3. *Design of Reinforced Concrete Structures Ed1st by S Ramamrutham.*

Diploma in Civil Engineering					
Semester : IV			**Course Category : PC**		
Course Code	**Course**	**Period / Week**			**Credit**
		L	**T**	**P**	**C**
DCEPC212	**Geotechnical Engineering**	**3**	**0**	**0**	**3**
Prerequisite	*At the end of this course, the students will be able to:*				**Bloom's Level**
Course Outcome	**CO1**	Classify different types of soil used in engineering applications.			K1
	CO2	Compute physical and index properties of given sample of soil for the given construction site.			K2
	CO3	Determine the permeability of the given sample of soil using relevant laboratory test method.			K3
	CO4	Calculate the shear strength parameters for field condition using relevant laboratory/ field test method.			K1,K3
	CO5	Determine the bearing capacity of the given soil sample using the relevant laboratory/field test method as per the provision of IS Code.			K2,K3
UNIT – I	**Overview of Soil Mechanics**				**Contact Hours :08**
Definition of soil, soil mechanics and rock mechanics. Types of soil and its classification, soil formation and deposition. Types of rocks, its classification, and their formation. Comparison between soil and rock. Importance of soil in Civil Engineering as construction material.					**CO1**
UNIT – II	**Physical and Index Properties of Soil**				**Contact Hours :08**
Soil as a three-phase system. Water content, Determination of water content by oven drying method as per IS code. Determination of Void ratio, porosity, degree of saturation and density index. Unit weight of soil mass –bulk unit weight, dry unit weight, unit weight of soil solids, saturated unit weight, submerged unit weight. Determination of bulk unit weight and dry unit weight by core cutter method and sand replacement method as per IS code. Specific gravity, determination of specific gravity by pycnometer. Consistency of soil, Atterberg's limits of consistency: Liquid limit, plastic limit, shrinkage limit and plasticity index. 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					**CO2**
UNIT – III	**Permeability of Soil**				**Contact Hours :08**
Definition of permeability and factors affecting permeability. Darcy's law of permeability, coefficient of permeability, typical values of coefficient of permeability for different soil. Determination of coefficient of permeability by constant head and falling head permeability tests, simple problems to determine coefficient of permeability. Seepage through earthen structures, seepage velocity, seepage pressure, phreatic line, flow lines and equipotential lines.					**CO3**
UNIT – IV	**Compaction, Consolidation and Shear Strength of Soil**				**Contact Hours :08**
Concept and purpose of compaction & consolidation with their field application. Standard and Modified proctor test – test procedure as per IS code, Compaction curve, optimum moisture content, maximum dry density, zero air voids line. Field methods of compaction – rolling, ramming & vibration. California bearing ratio, CBR test. Shear failure of soil, field situation of					**CO4**

shear failure 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. Laboratory determination of shear strength of soil – Direct shear test, Unconfined compression test & vane shear test, plotting strength envelope		
UNIT – V	**Stabilization and Bearing Capacity of Soil**	**Contact Hours :08**
Concept of soil stabilization, necessity of soil stabilization. Different methods of soil stabilization –Mechanical soil stabilization, lime stabilization, cement stabilization, bitumen stabilization and fly-ash stabilization Concept of bearing capacity, ultimate bearing capacity, safe bearing capacity and allowable bearing pressure. Terzaghi's analysis and assumptions. Effect of water table on bearing capacity. Field methods for determination of bearing capacity – Plate load test and standard penetration test. Test procedures as Per IS: 1888 & IS: 2131.		**CO5**
Lecture Hours :40	**Tutorials Hours :00**	**Total :40**

Reference Books:

1. Soil Mechanics and Foundation Engineering Punmia, B.C Laxmi Publication, Delhi. ISBN:978-8170087915
2. A text book of soil mechanics and foundation Engineering Murthy, V.N.S CBS Publishers ISBN:978-8123913629
3. Geotechnical Engineering (Soil Mechanics) Ramamurthy, T.N. &SitharamT.G S Chand and Company LTD., New Delhi. ISBN:978-8121924573

Diploma in Civil Engineering					
Semester: IV			**Course Category: PC**		
Course Code	**Course**	**Period / Week**			**Credit**
		L	**T**	**P**	**C**
DCEPC214	**Transportation Engineering- 1 Lab**	**0**	**0**	**2**	**1**
Prerequisite	*At the end of this course, the students will be able to:*				

Course Outcome	**CO1**	*Demonstration of working of hot mix plant through a field visit*
	CO2	*Determination of softening point of bitumen*
	CO3	*Determination of ductility of bitumen*
	CO4	*Visit to highway construction site for demonstration of operation of: Tipper, tractors (wheel and crawler), scraper, bulldozer, dumpers, shovels, grader, roller, dragline, road pavers, JCB*
	CO5	*Study of crushing strength of an aggregate.*

List of experiment	
CO1	1. Draw the sketches showing standard cross sections of Expressways, NH, SH, MDR, ODR.
	2. Flakiness and Elongation Index of aggregates.
CO2	3. Angularity Number of aggregates
	4. Aggregate impact test.
CO3	5. Determination of abrasion value (Los Angeles') of road aggregate
	6. Aggregate crushing test.
CO4	7. Penetration test of bitumen.
	8. Visit the road of any one type (flexible or rigid)to know the drainage condition
CO5	9. Visit to highway construction site for demonstration.

Diploma in Civil Engineering					
Semester: IV			**Course Category: PC**		
Course Code	**Course**	**Period / Week**			**Credit**
		L	**T**	**P**	**C**
DCEPC216	**Surveying 1 Lab**	**0**	**0**	**2**	**1**
Prerequisite	*At the end of this course, the students will be able to:*				
Course Outcome	**CO1**	Perform ranging and chaining operation in different field conditions			
	CO2	Determine the area of the given open field			
	CO3	Perform reciprocal ranging for the given situation			
	CO4	Undertake simple leveling operation for determining the reduced level of given points.			
	CO5	Undertake a survey project to plot a contour map for the given situation.			
List of experiment					
CO1	1. Measure the distance between two survey stations using chain, tape, and ranging rods when two stations are inter-visible.				
	2. Measure Fore Bearing and Back Bearing of survey lines of open traverse using Prismatic Compass.				
CO2	3. Determine the area of open field using chain and cross staff survey.				
	4. Longitudinal and cross sectioning of a road/railway/canal				
CO3	5. Perform reciprocal ranging and measure the distance between two stations.				
	6. Study of the plane table survey equipments.				
CO4	7. Undertake simple leveling using dumpy level/ Auto level and leveling staff.				
	8. Traversing an area with a plane table (at least five lines)				
CO5	9. Undertake Survey Project for plotting contour map using block contouring method for a block of 150m x 150m with a grid of 10m x10m.				

Diploma in Civil Engineering						
Semester: IV				**Course Category: PC**		
Course Code	**Course**		**Period / Week**			**Credit**
		L	**T**	**P**		**C**
DCEPC218	**Geotechnical Engineering Lab**	**0**	**0**	**2**		**1**
Prerequisite	*At the end of this course, the students will be able to:*					
Course Outcome	**CO1**	Calculate water content of the given soil sample.				
	CO2	Calculate unit weight of the given soil sample in given soil condition.				
	CO3	Calculate specific gravity of given soil sample.				
	CO4	Calculate liquid limit & plastic limit for given soil sample.				
	CO5	Draw grain size distribution curve for given soil samples.				
List of experiment						
CO1	1. Determination of water content of given soil sample by oven drying method as per IS Code. IS 2720-2 1973					
	2. Determination of bulk unit weight, dry unit weight of soil in field by core cutter method as per IS Code.					
CO2	3. Determination of bulk unit weight, dry unit weight of soil in field by sand replacement method as per IS Code.					
	4. Determination of specific gravity of soil by Pycnometer method. IS 2720-3-1 1980					
CO3	5. Determination of Liquid limit & Plastic limit of given soil sample as per IS Code. IS 2720-5 1985					
	6. Determination of shear strength of soil using direct shear test. IS 2720-13 1986.					
CO4	7. Determination of MDD & OMC by standard & modified proctor test on given soil sample as per IS Code					
	8. Determination of grain size distribution of given soil sample by mechanical sieve analysis as per IS Code. IS 2720-4 1985					
CO5	9. Determination of coefficient of permeability by constant head method. IS 2720-17 1986					
	10. Determination of coefficient of permeability by falling head test IS 2720-17 1986					