Final

DIPLOMA CURRICULUM OF CIVIL ENGINEERING (THIRD YEAR) (5th Semester)

(To be implemented from 2026-27)

Prepared by;

National Institute of Technical Teachers' Training & Research Kolkata
Block – FC, Sector – III, Salt Lake City, Kolkata – 700106

Vetted by:
Domain experts from Polytechnics of Odisha

State Council for Technical Education & Vocational Training
Near Raj Bhawan, Unit-VIII, Bhubaneswar, Odisha

Table of Contents

Total 93 Credits and 3000 marks

PROGRAMME TITLE: CIVIL ENGINEERING

SEMESTER - V

SL. No	Category of Course	Code No	Course Title	Teaching Scheme				Evaluation Scheme				Total Marks	Credits
				Pre-requisite	Contact Hours/ week			Theory		Practical			
					L	T	P	End Exam	Progressive Assessment	End Exam	Progressive Assessment		
1	Programme Core	CEPC301 TH:1	Surveying		3	0	0	70	30			100	3
		CEPC303 TH:2	Design of RCC structures		3	0	0	70	30			100	3
2		CEPC305 PR:1	Surveying Lab		0	0	4			15	35	50	2
3		CEPC307 PR:2	Building planning & drawing Lab-II		0	0	4			15	35	50	2
		CEPC309 PR:3	Design of RCC structures Lab		0	0	4			15	35	50	2
5	Programme Elective	CEPE301 (Any one) Elective 3 TH:3	a) Pavement Design & maintenance b) Green Building and Energy Conservation c) Building Services and Maintenance		3	0	0	70	30	-	- -	100	3
7		CEPE303 (Any one) Elective 4 TH:4	a) Advanced Construction Technology b) Traffic Engg c) Tendering and Accounts		3	0	0	70	30	-	- -	100	3
7	Open Elective	Open Elective - I OE301 (Any one) TH:5	Open Elective – I Annexure - I a) Universal Human Values b) Leadership & Management Skills c) Professional Skills		3	0	0	70	30	-	- -	100	3
9	Summer Internship	SI301	SUMMER INTERNSHIP II*		0	0	0			15	35	50	2
	Major Project	PR301 PR:4	MAJOR PROJECT-I		0	0	4	--	-	15	35	50	2
TOTAL					**15**	**0**	**16**	**350**	**150**	**75**	**175**	**750**	**25**

*6-week internship after 4th Semester ## Assessment to be done, credit to be carried over

SEMESTER - V COURSES

TH:1- SURVEYING

L	T	P		
3	0	0		**Course Code: CEPC 301**
Total Contact Hours				**Theory Assessment**
Theory		: 45Hrs	**Total Marks: 100**	End Term Exam 70
				Progressive Assessment 30
Pre Requisite		**: Nil**		
Credit		**3**		Category of Course : PC

RATIONALE

Surveying is an essential component of the day to day work of a Civil Engineering Technician. The course content of Basic Surveying includes the basic concept of surveying, horizontal linear and angular measurements and conducting surveys involving horizontal linear and angular measurements with stress on familiarization with Various Equipment used.
Now a days application of advanced survey equipment in Civil Engineering analysis, has become a Routine. The diploma level students are directly associated with conduction of field survey. Hence this course will be immediately helpful in their service life.

LEARNING OUTCOME

After completion of this course, the students 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.
- Prepare plans using Theodolite surveys.
- Find distances and elevations using Tachometer.
- Prepare plans using Total Station instrument.
- Locate coordinates of stations using GPS

COURSE CONTENT DETAILS

UNIT NO.	CONTENT	TIME ALLOTTED (HRS.)
UNIT-I	**Overview and Classification of Survey** • Survey- Purpose and Use. • Types of surveying- Primary and Secondary, Classification: Plane, Geodetic, Cadastral, Hydrographic, Photogrammetry and Aerial. • Principles of Surveying.	**5**

	• 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. • Types of offsets: Perpendicular and Oblique. • Conventional Signs, Recording of measurements in a field book.	**5**
UNIT-III	**Compass Traverse Survey** • Compass Traversing- open, closed. • Technical Terms: Geographic/ True Magnetic Meridians and Bearings, Whole Circle Bearingsystem and Reduced Bearing system and examples on conversion of given bearing to anotherbearing (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. • Types of Compass-prismatic and surveyor compass • Components of Prismatic Compass and Surveyor 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. • Methods of plotting a traverse and closing error, Graphical adjustment of closing error.	**5**
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, Station, 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.	**5**

	• Contour, contour intervals, horizontal equivalent. • Uses of contour maps, Characteristics of contours, Methods of Contouring: Direct and indirect. **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.	
UNIT-V	**Theodolite Surveying** • Types and uses of Theodolite, Components of transit Theodolite and their functions, Reading the Vernier of transit Theodolite. • Technical terms- Swinging, Transiting, Face left, Face right. • Fundamental axes of transit Theodolite and their relationship • Temporary adjustment of transit Theodolite. • Measurement of horizontal angle- Direct and Repetition method, Errors eliminated by method of repetition. • Measurement of magnetic bearing of a line, Prolonging and ranging a line, deflection angle. • Measurement of vertical Angle. • Theodolite traversing by Included angle method and Deflection angle method. • Checks for open and closed traverse, Calculations of bearing from angles. • Traverse computation-Latitude, Departure, Consecutive coordinates, Independent coordinates, balancing the traverse by Bowditch's rule and Transit rule, Gale's Traverse table computation. (Simple numerical problems and concept only)	**8**
UNIT – VI	**Tacheometric surveying and Curve setting** • Principles of Tacheometry, Anallatic lens. • Tacheometric formula for horizontal distance with telescope horizontal and staff vertical. • Field method for determining constants of tacheometer, Determining horizontal and vertical distances with tacheometer by fixed hair method and staff held vertical, Limitations of tacheometry. • Types of curves used in roads and railway alignments. Designation of curves. • Setting simple circular curve by offsets from long chord and Rankine's method of deflection angles.	**7**
UNIT – VII	**Advanced surveying equipment** • Principle of Electronic Distance Meter (EDM), its	**5**

	component parts and their Functions, use of EDM. • Use of micro optic Theodolite and Electronic Digital Theodolite. • Use of Total Station, Use of function keys. • Measurements of Horizontal angles, vertical angles, distances and coordinates using Total Station, Traversing, Profile Survey and Contouring with Total Station.	
UNIT – VII	**Remote sensing, GPS and GIS** • Remote Sensing – Overview, Remote sensing system, Applications of remote sensing in Civil engineering, land use / Land cover, mapping, disaster management. • Use of Global Positioning System (G.P.S.) instruments, and DGPS • Geographic Information System (GIS): Over view, Components, Applications, Software for GIS. • Introduction to Drone Surveying.	**5**
	Total	**45**

SUGGESTED LEARNING RESOURCES

1. Kanetkar, T. P.; Kulkarni, S. V., Surveying and Levelling Part I and II, Pune Vidyarthi Gruh Prakashan, Pune.
2. Basak, N. N.,Surveying and Levelling, McGraw Hill Education (India) Pvt. Ltd.,Noida.
3. Duggal, S. K., Survey I and Survey II, Tata McGraw Hill Education Pvt. Ltd., Noida.
4. Saikia, M D.; Das. B.M.; Das. M.M., Surveying PHI Learning Pvt. Ltd., New Delhi.
5. Subramanian, R., Surveying and Levelling, Oxford University Press. New Delhi.
6. Punmia, B.C,; Jain, Ashok Kumar; Jain, Arun Kumar, Surveying Vol. I and Surveying Vol. II, Laxmi Publications Pvt. Ltd., New Delhi.
7. Rao, P. Venugopala Akella, Vijayalakshmi, Textbook of Surveying, PHI Learning Pvt. Ltd., New Delhi.
8. Venkatramaiah, C, Textbook of Surveying, Universities Press, Hyderabad.
9. Anderson, James M and Mikhail, Edward M, Surveying theory and practice, Mc Graw Hill Education, Noida.
10. De, Alak, Plane Surveying, S.Chand Publications, New Delhi.

TH:2- DESIGN RCC STRUCTURE

L	T	P		
3	0	0		**Course Code: CEPC 303**
Total Contact Hours				**Theory Assessment**
Theory		: 45Hrs		End Term Exam 70
			Total Marks: 100	Progressive Assessment 30
Pre Requisite		**: Nil**		
Credit		**3**		Category of Course : PC

RATIONALE

A structure's safety and durability are dependent on itsproper design, accurate detailing, and construction in accordance with specifications. Design of steel and RCC structures is therefore a crucial subject for a civil engineering diploma holder. The majority of the time to serve in a supervisory capacity on building projects. Diploma holders are also required to help designers, provide suggestions for design basic structural parts. The topic tries to address the aforementioned civil engineering aspects.

LEARNING OUTCOMES

After competing this course, student will be able to :

- Determine the development length in tension and compression members
- Apply the codal provision
- Design of singly and doubly reinforced RCC beam.
- Design of RCC beam for shear and development length.
- Design of short and long RCC columns.

COURSE CONTENT DETAILS

UNIT NO & TITLE	CONTENT	LECTURE HOURS
UNIT –I	**Design Philosophies, Shear, Bond and Development length in Design of RCC member** • Design Philosophies, Design of Singly Reinforced & Doubly Reinforced beam for Flexure using LSM. • Nominal shear stress in RCC section, Design shear strength of concrete, Design of shear reinforcement, • Minimum Shear Reinforcement, Provisions of IS 456 2000, forms of shear reinforcement • Types of bond, Bond stress, check for bond stress • Determination of Development length in tension and compression members and check as per codal provisions, Anchorage value of 90^{o} hook, Lapping of bars. • Simple numerical on: Shear reinforcement, Adequacy of section for shear. • Introduction to serviceability limit state check	**11**

UNIT – II	**Design of axially loaded RCC Column** • Definition and classification of column, Limit state of compression members, Effective length of column. • Provisions of IS 456 2000 for minimum steel, cover, maximum steel, spacing of ties etc. • Design of axially loaded short column - Square, Rectangular, and Circular only.	**8**
UNIT – III	**Design of RC flanged beam** • General features of T and L beams, Advantages, Effective width as per BIS 456 2000 • Design of singly reinforcement T beam, Stress and Strain diagram, Depth of neutral axis, Moment of resistance, T and L beams with neutral axis in flange only. • Simple numerical on location of neutral axis, Effective width of flange.	**6**
UNIT – IV	**Design of slab** • Design of simply supported one-wayslab for flexure, shear and deflection and checks, as per the provisions of BIS 456 • Design of one-way cantilever slab, Chajjas, Flexure including checks for Development length and Shear stress. • Design of two-way simply supported slab, • Introduction to design of dog-legged staircases	**11**
UNIT – V	**Design of Footing** • Design of footing for axially loaded column only. • Minimum Eccentricity, Design of Footing for uni-axial bending, column with uni- axial moment as per IS 456 provisions.	**9**
	Total	**45**

SUGGESTED LEARNING RESOURCES:

- Shah, V. L., and Gore, V., Limit State Design of Steel Structures, Structures Publications, Pune.
- Dayarathnam P., Design of Steel Structures, S. Chand and Company, Delhi.
- Subramanian N., Design of Steel Structures, Oxford University Press.
- Sairam, K.S., Design of Steel Structures, Pearson Publication, Chennai, Delhi.
- Shah, V. L., and Karve, S.R., Limit State Theory and Design of Reinforced Concrete Structures, Structures Publications, Pune,2014.
- Sinha N.C., and Roy S.K., Fundamentals of Reinforced Concrete, S. Chand & Co., New Delhi.
- Krishna Raju, and N. Pranesh, R.N., Reinforced Concrete Design Principles and Practice, New Age International, Mumbai.
- Pillai, S.U., and Menon, Devdas, Reinforced concrete Design, McGraw Hill Publications, New Delhi.
- Varghese, P. C., Limit State Design of Reinforced Concrete, Prentice Hall India Learning Private Limited, Delhi.

PR:1- SURVEYING LAB

L	T	P		
0	0	4		**Course Code: CEPC 305**
Total Contact Hours				**Theory Assessment**
Theory	:		**Total Marks: 50**	End Term Exam : 15
Practical	:60 Hrs			Progressive Assessment : 35
Pre Requisite	**: Nil**			
Credit	**: 2**			Category of Course : PC

RATIONALE

Surveying is the science and art of making all essential measurements to determine the relative position of points or physical and cultural details above, on, or beneath the surface of the Earth, and to depict them in a usable form, or to establish the position of points or details. Basic surveying lab enable the students to develop these skills through demonstration and practice.

LEARNING OUTCOME

After completion of this course, the students will be able to

- Explain types of surveying works required
- Explain the type of method and equipment to be used for different surveys
- Demonstrate the use and operational details of various surveying equipment.
- Use total station for surveying
- Prepare the project report of survey

COURSE CONTENT DETAILS

LIST OF PRACTICALS TO BE PERFORMED

	List of Practical
1	Measure distance between two survey stations using chain, tape and ranging rods when two stations are inter visible.
2	Determine area of open field using chain and cross staff survey.
3	Measure Fore Bearing and Back Bearing of survey lines of open traverse using PrismaticCompass.
4	Undertake differential leveling; determine reduced levels by height of instrument method and rise, and fall method using dumpy level/auto level and leveling staff.
5	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..
6	Use digital Thedolite as a Tacheometer to compute reduced levels and horizontal distances.

7	Set out a circular curve by Rankine's Method of Deflection Angles.
8	Measure area of irregular figure using Digital planimeter.
9	Use Total station instrument to measure horizontal distances and vertical angle
10	Use Total station instrument to carry out Survey Project for closed traverse for minimum five sides.
11	Use DGPS to locate the coordinates of a station
12	.Preparation of Map using GIS software

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

PR:2- BUILDING PLANNING AND DRAWING LAB-II

L	T	P		Course Code: CEPC 307	
0	0	4			
Total Contact Hours				**Theory Assessment**	
Theory		:	**Total Marks: 50**	End Term Exam	: 15
Practical		:60 Hrs		Progressive Assessment	: 35
Pre Requisite		**: Nil**			
Credit		**: 2**		Category of Course : PC	

RATIONALE

Building planning and drawing is a means of communication between owner, architect, engineer and contractor. Civil engineering diploma holder has to supervise various construction processes and execute civil engineering structures. A civil engineer is required to understand, prepare the drawings, interpret drawings for executing the works. He should be competent to convert his ideas into the drawing. Drawing helps in detailing the structures with quality parameters. The knowledge of this course is useful for building construction, estimating and costing, surveying, projects etc.

LEARNING OUTCOME

After completing this course, student will be able to:

- Prepare line plans of residential and public buildings using principles of planning.
- Prepare submission and working drawing for the given requirement of Load Bearing Structure.
- Prepare submission and working drawing using CAD for the given requirement of Framed Structure.

COURSE CONTENT DETAILS

	List of Practical to be performed
1	**COMPUTER AIDED DRAWING** • Introduction to AutoCAD • Editing /Modifying of existing drawing. • Dimensioning, Drawing section lines and Hashed section lines. • Writing texts on drawings. • Display of drawings on computer screens • Making use of different settings of drawings related to Scale unit, Co-ordinate system. • Creating and Editing layers • Creating and Editing blocks • Object dimensioning
2	• Details of an underground RCC water tank (such as Sheet No. 19 of SP 34 or any other) Combined detailed drawing of a two storied building with load-bearing wall spread footing and R.C. isolated column footing using Autocad.

3	**STRUCTURAL DETAILING** • Draw details of the following steel structures from the given line diagrams: a) A steel roof truss with details of bolted or riveted and welded joints and connections including that of the steel column at base level with foundation using Autocad. • A two storied steel building frame showing typical details of possible bolted and welded connections including that of column at base with the foundation using Autocad.
4	**PLOTTING OF DRAWING** a) Architectural views & Drafting views b) 3D Modeling with AutoCAD (Surfaces, Solids) and Rendering. c) Introduction to Revit / Fusion 360 Software for creating Solids.
5	• Project Planning & Scheduling using MS Project Software.

SUGGESTED LEARNING RESOURCES:

1. Shah. M.G. Kale, CM, Patki, S.Y., Building Drawing, Mcgraw Hill Publishing
2. Malik and Mayo, Civil Engineering Drawing, Computech Publication Ltd
3. M. G. Shah and C. M. Kale, Principles of Perspective Drawing, Mcgraw Hill
4. Swamy, Kumara; Rao, N, Kameshwara, A ., Building Planning and Drawing, Charotar Publica-tion, Anand.
5. Bhavikatti, S. S., Building Construction, Vikas Publication House Pvt. Ltd., Delhi.
6. Mantri, Sandip, A to Z Building Construction, Satya Prakashan, New Delhi.
7. Singh, Ajit, Working with Auto CAD 2000, Mcgraw Hill Publishing company Ltd.
8. Sane, Y.S., Planning and design of Building, Allied Publishers, New Delhi.

PR:3- DESIGN OF RCC STRCUTURES LAB

L	T	P		Course Code: CEPC 309	
0	0	4			
Total Contact Hours			**Total Marks: 50**	**Theory Assessment**	
Theory		:		End Term Exam	: 15
Practical		:60 Hrs		Progressive Assessment	: 35
Pre Requisite		**: Nil**			
Credit		**: 2**		Category of Course : PC	

RATIONALE

A structure's safety and durability are dependent on itsproper design, accurate detailing, and construction in accordance with specifications. Design of steel and RCC structures is therefore a crucial subject for a civil engineering diploma holder. The majority of the time to serve in a supervisory capacity on building projects. Diploma holders are also required to help designers, provide suggestions for design basic structural parts. The topic tries to address the aforementioned civil engineering aspects.

COURSE OUTCOME

After competing this course, student will be able to perform:

- Calculate the development length in tension and compression members
- Apply the codal provision
- Design of singly and doubly reinforced RCC beam.
- Design of RCC beam for shear and development length.
- Design of short and long RCC columns.

LIST OF PRACTICAL TO PERFORM

	List of Practical	LECTURE HOURS
	1. Draw the cross section , stress diagram strain diagram of single reinforced beam& Double Reinforced Beam using Autocad Software. 2. Draw sketches of different types of column footings. 3. Interpret the actual RCC Structural Drawings used on site with reference to reinforcement details of various structural elements. 4. Prepare a checklist for reinforcement provided from actual drawings used on site for various structural elements. 5. Prepare a detailed report of site visit for reinforcement detailing of structural elements like beams, columns, staircase & footing. 6. Modelling , Analysis & Design of Beam using STAAD-Pro. Software.	**6*10**
	Total	**60**

SUGGESTED LEARNING RESOURCES:

- Shah, V. L., and Gore, V., Limit State Design of Steel Structures, Structures Publications, Pune.
- Dayarathnam P., Design of Steel Structures, S. Chand and Company, Delhi.
- Subramanian N., Design of Steel Structures, Oxford University Press.
- Sairam, K.S., Design of Steel Structures, Pearson Publication, Chennai, Delhi.
- Shah, V. L., and Karve, S.R., Limit State Theory and Design of Reinforced Concrete Structures, Structures Publications, Pune,2014.
- Sinha N.C., and Roy S.K., Fundamentals of Reinforced Concrete, S. Chand & Co., New Delhi.
- Krishna Raju, and N. Pranesh, R.N., Reinforced Concrete Design Principles and Practice, New Age International, Mumbai.
- Pillai, S.U., and Menon, Devdas, Reinforced concrete Design, McGraw Hill Publications, New Delhi.
- Varghese, P. C., Limit State Design of Reinforced Concrete, Prentice Hall India Learning Private Limited, Delhi.

PROGRAMME ELECTIVE 3

TH:3(a)- PAVEMENT DESIGN & MAINTENANCE

L	T	P		Course Code: CEPE 301A	
3	0	0			
Total Contact Hours			**Total Marks: 100**	**Theory Assessment**	
Theory		: 45Hrs		End Term Exam	70
				Progressive Assessment	30
Pre Requisite		**: Nil**			
Credit		**3**		Category of Course : PE	

RATIONALE:

Students will learn how soil subgrade strength influences flexible pavement design. Students will understand how visual evaluations are conducted and the importance of serviceability in maintenance. Understanding different types of flexible pavement failures and the appropriate maintenance techniques. Understand the common failures of rigid pavements and the methods to restore functionality and durability. This course will give practical knowledge regarding the pavement design and its consideration.

COURSE OBJECTIVES:

After competing this course, student will be able to:

- Identify the components of the given type of pavement.
- Suggest the type of pavement for the given situation.
- Design the flexible pavement using the provisions of IRC
- Design the concrete pavement using the provisions of IRC
- Decide type of maintenance required under different damaged conditions

COURSE CONTENT DETAILS

UNIT NO & TITLE	CONTENT	LECTURE HOURS
UNIT –I	**Basics of pavement Design** • Types of pavement - Flexible, Rigid and Semi Rigid • Comparison of Rigid and flexible pavement according to Design precision, life maintenance, initial cost, stages of construction, availability of materials, surface characteristic, penetration of water in the pavement, utility location, glare and night visibility. • Functions and characteristics of pavement. • Factors affecting selection of type of pavement.	**8**
UNIT-II	**Fundamentals of pavement design** • Factors affecting pavement design-design wheel load ,Traffic factors, Environmental factors, • Road geometry and material, • Characteristics of soil and Drainage situation	**7**
UNIT-III	**Design of Flexible and Concrete pavement** • Overview, Methods of flexible pavement design-Theoretical method Empirical method with and without soil strength test	**10**

	• IRC37 guidelines for design of flexible pavement (overview only) • Factors affecting design of concrete pavement. • IRC58 guidelines for design of concrete pavement (overview only) • Joints-Need, Types, requirements, spacing of joints	
UNIT-IV	**Pavement evaluation** • Definition and purpose of pavement evaluation • Methods of Pavement evaluation –Visual rating, Pavement serviceability index, Roughness, measurements, Benkelman Beam deflection method	**10**
UNIT-V	**Pavement Maintenance** • Types of pavement maintenance - routine, periodic, and special. • Need for inspection and maintenance schedule. • Causes of pavement failure and remedial measures. Typical flexible and rigid pavement failures .Types and causes of damages in flexible pavement, surface defects, cracks. Deformations Rutting, fatigue, settlement and upheaval. Disintegration- loss of aggregate, stripping, pothole. Remedial measures - slurry seal, liquid seal, fog seal, and patching, ready mix patch. • Types of damages to rigid pavement - cracking, spalling, slab rocking, • settlement, joint sealant failure. Methods of repair - repair of spalled joints, full depth reconstruction, and replacement of dowel bars.	**10**
	Total	**45**

Suggested learning resources

1. Kadiyali, L.R., Highway Engineering, Khanna Book Publishing House, New Delhi (ISBN: 978-93-86173-133)

2. Chakroborty, Partha Das, Animesh., Principles of Transportation engineering, Prentice-Hall of India Pvt.Ltd

3. Vazirani, V N, Chaondola, S P., Transportation Engineering Vol. I & II, Khanna Publishers. Delhi

4. Yoder, E J, Principles of Pavement Design, Wiley India Pvt Ltd.

5. Bindra, S P., Highway Engineering, Dhanpat Rai Publications (P) Ltd

6. Kumar R S, Pavement Evaluation and Maintenance Management system, University Press (India), Pvt. Ltd.

7. Sharma S K, Principles, Practice and Design of Highway Engineering, S Chand, New Delhi

TH:3(b)- GREEN BUILDING AND ENERGY CONSERVATION

L	T	P		**Course Code: CEPE 301B**	
3	0	0			
Total Contact Hours				**Theory Assessment**	
Theory		: 45Hrs	**Total Marks: 100**	End Term Exam	70
				Progressive Assessment	30
Pre Requisite		**: Nil**			
Credit		**3**		Category of Course : PE	

RATIONALE:

Green building and energy conservation are essential for promoting environmental sustainability and reducing the ecological footprint of construction. Green buildings use eco-friendly materials, energy-efficient systems, and sustainable design practices to minimize energy consumption, reduce waste, and lower carbon emissions. Energy conservation measures, such as efficient heating, cooling, and lighting, contribute to long-term cost savings and a healthier living environment. This course will help the diploma students to design and manage buildings that are environmentally responsible, resource-efficient, and economically viable, supporting both global sustainability goals and improved quality of life for occupants

COURSE OBJECTIVES:

After completing this course, student will be able to:

- Identify various requirements for green building.
- Use different steps in environmental impact assessment.
- Relate the construction of green building with prevailing energy conservation policy and regulations.
- Supervise the construction of green building construction using green materials.
- Focus on criteria related to particular rating system for assessment of particular Green building.

COURSE CONTENT DETAILS

UNIT NO & TITLE	CONTENT	LECTURE HOURS
UNIT –I	**Introduction to Green Building and Design Features** • Definition of Green Building, Benefits of Green building, Components/features of Green Building, • Principles: Principles and planning of Green building • Features: Salient features of Green Building, Environmental design (ED) strategies for building construction. • Site selection, Energy Efficiency, Water efficiency, Material Efficiency, Indoor Air Quality. • Site selection strategies, Landscaping, building form, orientation, building envelope and fenestration, material and construction techniques, roofs, walls, fenestration and shaded finishes, advanced passive heating and cooling techniques, waste reduction during construction • Process: Improvement in environmental quality in civil structure • Materials: Green building materials and products- Bamboo, Rice husk ash	**15**

	concrete, plastic bricks, Bagasse particleboard, Insulated concrete forms. • Reuse of waste material-Plastic, rubber, Newspaper wood, Nontoxic paint, Green roofing. •	
UNIT-II	**Energy Audit and Environmental Impact Assessment (EIA)** • Energy Audit: Meaning, Necessity, Procedures, Types, Energy Management Programs, • Environmental Impact Assessment (EIA): Introduction, EIA regulations, Steps in environmental impact assessment process, Benefits of EIA, Limitations of EIA, Environmental clearance for the civil engineering projects.	**5**
UNIT-III	**Energy and Energy conservation** • Renewable Energy Resources: Solar Energy, Wind Energy, Ocean Energy, Hydro Energy, Biomass Energy, • Non-renewable Energy Resources: Coal, Petroleum, Natural Gas, Nuclear Energy, Chemical Sources of Energy, Fuel Cells, Hydrogen, Biofuels. • Energy conservation: Introduction, Specific objectives, present scenario, Need of energy Conservation, LEED India Rating System and Energy Efficiency.	**10**
UNIT-IV	**Rating System** • Introduction to (LEED) criteria, • Indian Green Building council (IGBC) Green rating, • Green Rating for Integrated Habitat Assessment. (GRIHA) criteria • Heating Ventilation Air Conditioning (HVAC) unit in green Building • Functions of Government organization working for Energy conservation and Audit(ECA)- National Productivity council(NPC) • Ministryof New and Renewable Energy (MNRE) • Bureau of Energy efficiency (BEE)	**10**
		45

Suggested learning resources

1. Kibert, C.J., Sustainable construction: Green Building design and Delivery, John Wiley Hobo-u ken, New Jersey.
2. Chauhan, D S Sreevasthava, S K., Non-conventional Energy Resources, New Age International Publishers, New Delhi.
3. O.P. Gupta, Energy Technology, Khanna Publishing House, New Delhi
4. Jagadeesh, K S, Reddy Venkatta Rama & Nanjunda Rao, K S., Alternative Building Materials and Technologies, New Age International Publishers, Delhi.
5. Sam Kubba., Handbook of Green Building Design and Construction, Butterworth-Heinemann.
6. Means R S, Green Building - Project Planning and Cost Estimating, John Wiley & Sons
7. Sharma K V, Venkataseshaiah P., Energy Management and Conservation, IK International.

TH:3(c)- BUILDING SERVICES AND MAINTENANCE

L	T	P		Course Code: CEPCE 301C	
3	0	0			
Total Contact Hours				**Theory Assessment**	
Theory		: 45Hrs	**Total Marks: 100**	End Term Exam	70
				Progressive Assessment	30
Pre Requisite		**: Nil**			
Credit		**3**		Category of Course : PE	

RATIONALE:

The primary objectives of this subject "building services and maintenance" are to equip with essential knowledge for managing and sustaining the building infrastructures. It covers the HVAC systems, plumbing, electric services, and maintenance strategies. It also empowers students to ensure optimal functionality, energy efficiency, occupant comfort, and cost-effective management of various structures.

COURSE OUTCOMES:

After completing this course, student will be able to:

- Classify various types of building services as per functional requirements.
- Propose the fire safety requirements for multi-storeyed building.
- Devise suitable water supply and sanitation system for given type of building.
- Evaluate the potential of rain water harvesting and solar water heater system for the giventype of building.
- Justify the necessity of designing the system of lighting, ventilation and acoustics for thegiven type of building.

COURSE CONTENT DETAILS

UNIT NO & TITLE	CONTENT	LECTURE HOURS
UNIT –I	**Overview of Building Services** • Introduction to building services, Classification of buildings as per National Building code, Necessity of building services, Functional requirements of building, Different types of build- ing services i.e. HVAC (Heat, Ventilation and Air Conditioning), Escalators and lifts, fire safety,protection and control, plumbing services, rain water harvesting, solar water heating system,lighting, acoustics, sound insulation and electric installation etc. • Role and responsibility of Building Service Engineer, Introduction to BMS (Building Management Services), Role of BMS, concept of smart building.	**12**
UNIT-II	**Modes of vertical communication** • Objectives and modes of vertical communication in building.	**12**

	• Lifts**:** Different types of lifts and its uses, Component parts of Lift- Lift Well, Travel, Pit, HoistWay, Machine, Buffer, Door Locks, Suspended Rope, Lift Car, Landing Door, Call Indicators, Call Push etc., Design provisions for basic size calculation of space enclosure to accommo- date lift services, Safety measures. • Escalators**:** Different Types of Escalators and its Uses, Components of escalators, Design provisions for basic size calculation of space enclosure to accommodate escalator services,Safety measures. • Ramp: Necessity, design consideration, gradient calculation, layout and Special features required for physically handicapped and elderly	
UNIT-III	**Fire Safety** • Fire protection requirements for multistoried building, causes of fire in building, Fire detecting and various extinguishing systems, Working principles of various fire protection systems. • Safety against fire in residential and public buildings (multistoried building), National Building Code provision for fire safety, Fire resisting materials and their properties, Fire resistant construction, procedures for carrying out fire safety inspections of existing buildings, Provisions for evacuation.	**10**
UNIT-IV	**Plumbing Services** • Importance of plumbing, AHJ (Authority Having Jurisdiction) approval, Plumbing Terminology and fixtures: Terms used in plumbing, Different types of plumbing fixtures, shapes/ sizes, capacities, situation and usage, Traps, Interceptors. • System of plumbing for building water supply: storage of water, hot and cold water supply system. • System of plumbing for building drainage: Types of drainage system such as two pipe sys- tem, one pipe system, types of Vents and purpose of venting, Concept of grey water and reclaimed water. • Different pipe materials, and jointing methods, fittings, hanger, supports and valves used in plumbing and their suitability.	**11**
		45

Suggested learning resources:

1. Patil, S. M., Building Services, Seema Publication, Mumbai.
2. Mantri and Sandeep., The A to Z of Practical Building Construction and its Management, Satya Prakashan, New Delhi**.**
3. Bag S P, Fire Services in India: History, Detection, Protection, Management, Mittal Publica- tions, New Delhi.

4. Deolalikar,S. G., Plumbing Design and Practice, McGraw-Hill,
5. Akhil Kumar Das., Principles of Fire Safety Engineering: UndeUnderstanding Fire and Fire Protec-tion, PHI Learning Pvt. Ltd, New Delhi.
6. Shraman N L, Solar panel installation guide & user manual, The Memory Guru of India.
7. Gupta M K, Practical handbook on building maintenance - Civil works, Nabhi Publications.
8. BIS., National Building Code Part1, 4, 8, 9., Bureau of Indian Standard, New Delhi
9. BIS., IS 12183(Part 1):1987 Code of practice for plumbing in multistoried buildings., Bureauof Indian Standard, New Delhi
10. BIS., 2008 Uniform plumbing code – India (UPC-I)., Bureau of Indian Standard

SUMMER INTERNSHIP - II

L	T	P		
0	0	4		**Course Code: SI 301**
Total Contact Hours				
Practical		: 60Hrs	**Total Marks: 50**	End Term Exam 15
				Progressive Assessment 35
Pre-Requisite		**: Nil**		
Credit		**2**		Category of Course: SI

RATIONALE:

The rationale for a summer internship is to offer a structured and practical learning experience that prepares individuals for their future careers, helps them make informed career choices, and equips them with the skills and knowledge necessary to succeed in their chosen field. This course provides opportunities to students for hand on industry experience.

LEARNING OUTCOMES:

After completion of the course, the students will be able to:

1. Apply theoretical knowledge gained in their academic coursework to real-world situations.
2. Develop and refine specific skills relevant to the field.
3. Gains hands-on experience in a professional network by interacting with mentors and industry professionals.
4. Learn to manage their time effectively.
5. Clarify career goals.

DETAILED COURSE CONTENTS:

Unit No.	Topic/Sub-Topic	Allotted Time (Hours)
I	**Orientation:** • Introduction to the organization's mission, values, and culture. • Familiarization with workplace policies, procedures, and safety guidelines. • Orientation to the team and organizational structure.	3
II	**Project-Based Learning:** • Description of the main project or tasks the intern will be working on during the internship. • Detailed project goals and objectives. • Training and guidance on project-specific tools, technologies, or • methodologies.	3
III	**Technical and Skill Development:**	3

	• Training sessions or workshops to enhance technical skills relevant to the internship role (e.g., programming languages, software tools, laboratory techniques). • Soft skills development, including communication, teamwork, problem solving, and time management	
IV	**Mentorship and Supervision:** • Regular meetings with a designated mentor or supervisor for guidance, feedback, and support. • Mentorship objectives and expectations.	3
V	**Professional Development:** • Sessions on professional etiquette, networking, and building a personal brand • Resume writing and interview preparation workshops.	3
VI	**Industry and Field-Specific Knowledge:** • Lectures, seminars, or presentations on industry trends, best practices, and emerging technologies. • Guest speakers from the field to share insights and experiences.	3
VII	**Reporting and Documentation:** • Training on how to document project progress, results, and findings. • Practice in creating reports, presentations, or other deliverables.	3
VIII	**Ethics and Professionalism:** • Discussions on ethical considerations within the field. • Scenarios and case studies related to ethical decision-making	3
IX	**Feedback and Evaluation:** • Regular performance evaluations and feedback sessions. • Self-assessment and goal-setting exercises.	3
X	**Networking and Industry Exposure:** • Opportunities to attend industry conferences, webinars, or networking events. • Encouragement to connect with professionals in the field.	3

PR:4- MAJOR ROJECT-I

L	T	P		
0	0	6		**Course Code: PR301**
Total Contact Hours				**Practical Assessment**
Practical		: 90Hrs	**Total Marks: 50**	End Term Exam 15
				Progressive Assessment 50
Pre Requisite		**: Nil**		
Credit		**3**		Category of Course : PR

RATIONALE:

A Major project is generally requires a larger amount of effort and more independent work than that involved in a normal assignment. It requires students to undertake their own fact-finding and analysis. The students will select the topic, perform and design work. Major project is as preparation for the students to take on more responsibilities and bigger project in the future. It is a learning experience, which aims to provide students with the opportunity to synthesize knowledge from different areas of learning, and critically and creatively apply it to real life situations. The leadership quality, co-ordination of job and maintaining good communal harmony is an important factor of this type of activity.

LEARNING OUTCOMES:

After completion of the course, the students will be able to

- Plan a Major Project
- Execute a Major Project with team.
- Implement hardware/software/analytical/numerical techniques, etc. based on project requirements.
- Optimize time related works through sharing of work responsibility
- Develop cost awareness and utilisation of fund.
- Prepare a technical report on the project.

GUIDELINES FOR MAJOR PROJECT-I

Unit No.	Topic/Sub-Topic
I	○ Minimum three and maximum five students can form a group for the major project.
II	○ Project type can include • Development of a simple prototype system/product. • Investigation of performance of some systems using experimental method • Analysis of components/systems/devices using suitable software • Investigation of optimum process/material for product development using market survey. • Solution for society/industry problems

III	○ Project domain may not be limited to the specific area / discipline.
IV	○ Project report to be prepared and submitted by the students with following components: 1. Title 2. Objectives 3. Relevance and significance 4. Methodology 5. Analysis-Simulation/experimentation/survey/testing etc. 6. Result and Discussion 7. Conclusion

ELECTIVE 4

TH:4(a)- ADVANCED CONSTRUCTION TECHNOLOGY

L	T	P		Course Code: CEPE 305A	
3	0	0			
Total Contact Hours				**Theory Assessment**	
Theory		: 45Hrs	**Total Marks: 100**	End Term Exam	70
				Progressive Assessment	30
Pre Requisite		**: Nil**			
Credit		**3**		Category of Course : PE	

RATIONALE

Some innovative aspects of construction technology will be explored in this course on "Advanced Construction Technology." Due to internal and external market demands for quality and expedited project completion employing modern techniques, use of new and waste materials, and through mechanized building, and the construction industry is currently undergoing significant changes and improvements. To make the construction process less stressful, we now need high capacity machines with better output and greater efficiency. The goal of this course is to prepare diploma engineers to employ cutting-edge construction technologies.

LEARNING OUTCOME

After competing this course, student will be able to:

- Use relevant materials in advanced construction of structures.
- Use relevant method of concreting and equipment according to type of construction.
- Apply advanced construction methods for given site condition.
- Select suitable hoisting and conveying equipment for a given situation.
- Identify advanced equipment required for a particular site condition

COURSE CONTENT DETAILS

UNIT NO.	CONTENT	TIME ALLOTTED (HRS.)
UNIT –I	**Advanced Construction Materials** • Fibres: Use and properties of steel, polypropylene, carbon and glass fibres. • Plastics: Use and properties of PVC, RPVC, HDPE, FRP, GRP. • Miscellaneous Materials: Properties and uses of acoustics materials, wall claddings, plaster boards, micro-silica, waterproofing materials, adhesives. • Use of waste products and industrial by products in bricks, blocks, concrete and mortar.	**7**
UNIT –II	**Advanced Concreting Methods and Equipments** • Ready Mix Concrete: Necessity and use of ready mix concrete. Products and equipments for ready mix concrete plant. Conveying of ready mix concrete, transit mixers. • Vibrators for concrete consolidation: Internal, needle, surface, platform and form vibrators. • Underwater Concreting: Procedure and equipments required for Tremie method, Drop bucket method. Properties, workability and water cement	**10**

	ratio of the concrete. • Special concrete: procedure and uses of special concretes: Roller compacted concrete, Self-compacting concrete (SCC), Steel fibre reinforced concrete, Foam concrete, shotcreting.	
UNIT –III	**Advanced Technology in Constructions** • Construction of bridges and flyovers: Equipments and machineries required for foundation and super structure. • Construction of multi-storeyed Building: Equipments and machinery required for construction of multi-storeyed building such as use of lifts, belt conveyers, pumping of concrete. • Prefabricated construction: Methods of prefabrication, Plant fabrication and site fabrication, All prefabricated building elements such as wall panels, slab panels, beams, columns, door and window frames etc. Equipments and machineries used for placing and Jointing of prefabricated elements. • Strengthening of embankments by soil reinforcing techniques using geo-synthetics	**10**
UNIT –IV	**Hoisting and Conveying Equipments** • Hoisting Equipments: Principles and working of Derrick-Pole, Gin Pole, Crane, Power driven scotch derrick crane, Hand operated crane, Locomotive crane, Tower crane, Lattice Girder, Winches, Elevators, ladders. Crawler cranes, Truck mounted cranes, Gantry cranes, Mast cranes. • Conveying Equipments: Working of belt conveyers, types of belts and conveying mechanism. Capacity and use of dumpers, tractors and trucks.	**8**
UNIT –V	**Miscellaneous Machineries and Equipments** • Excavation Equipments: Use, working and output of following machinery – bull dozers, scrapers, graders, Clam Shell, trenching equipment, Tunnel boring machine, Wheel mounted belt loaders, power shovels, JCB, and drag lines. • Compacting Equipments: Output of different types of rollers such as plain rollers, ship footed rollers, vibratory, pneumatic rollers rammers. • Miscellaneous Equipments: Working and selection of equipments: Pile driving equipments, Pile hammers, Hot mix bitumen plant, bitumen paver, grouting equipment, guniting equipments, floor polishing and cutting machine selection of drilling pattern for blasting, Bentonite/mud slurry in drilling, Explosives for blasting, Dynamite, process of using explosives.	**10**
	Total	**45**

SUGGESTED LEARNING RESOURCES:

1. Sharma S C and Deodhar S V, Construction Engineering and Management, Khanna Book
2. Publishing, New Delhi Chudly, R., Construction Technology Vol. I to II, ELBS-Longman Group.
3. Peurifoy, R. L., Construction Planning Equipment and Methods, McGraw Hill Co. Ltd. New York.
4. Seetharaman, S., Construction Engineering and Management, Umesh Publication, New Delhi.
5. Sengupta, B. and Guha., Construction Management and Planning, McGraw Hill Education, New Delhi.
6. Smith, R. C., Materials of Construction, McGraw Hill Co. Ltd.
7. Satyanarayana, R Saxena, S. C., Construction Planning and Equipment, Standard Publication, New Delhi.
8. Rangawala,S. C., Construction of Structures and Management of works, Charotar Publication, Anand.
9. Ghose,D. N., Materials of Construction, McGraw Hill Publishing Co, New Delhi.

TH:4(b)- TRAFFIC ENGINEERING

L	T	P		Course Code: CEPC 305B	
3	0	0			
Total Contact Hours				**Theory Assessment**	
Theory		: 45Hrs	**Total Marks: 100**	End Term Exam	70
				Progressive Assessment	30
Pre Requisite		**: Nil**			
Credit		**3**		Category of Course : PE	

RATIONALE

Traffic engineering is an important course for civil engineering students. Due to the rapid growth of population and infrastructure, traffic congestion has become a serious urban issue that requires attention in designing, installing, and modifying traffic control devices, including traffic signals, signs, pavement markings, etc., to ensure the safety of travelers. This course helps students develop knowledge in conducting traffic surveys, analyzing and interpreting data, providing solutions in the form of traffic control devices, and understanding the maintenance and construction of these structures.

COURSE OUTCOME

After competing this course, student will be able to:

- Analyze road traffic characteristics.
- Undertake various types of road traffic studies.
- Use relevant road traffic signs, signal and markings.
- Identify the intersection depending on the traffic flow.
- Suggest preventive measures to avoid accidents by analyzing the traffic conditions at site

COURSE CONTENT DETAILS

UNIT NO & TITLE	CONTENT	LECTURE HOURS
UNIT –I	**Fundamentals of Traffic Engineering.** • Traffic engineering- Definition, objects, scope • Relationship between speed, volume and density of traffic • Road user's characteristics- physical, mental, emotional factors. • Vehicular characteristics-width, length, height, weight, speed, efficiency of breaks. • Road characteristics - gradient, curve of a road, design speed, friction between road and tyre surface. • Reaction time - factors affecting reaction time. PIEV Theory	**7**
UNIT –II	**Traffic Studies** • Traffic volume count data- representation and analysis of data. • Necessity of Origin and Destination study and its methods. • Speed studies - Spot speed studies, and its presentation. • Need and method of parking study	**10**
UNIT –III	**Road Signs and Traffic Markings** • Traffic control devices –definition, necessity, types. • Road signs - definition, objects of road signs. Classification as per IRC: 67-Mandatory or Regulatory, Cautionary or warning, informatory signs, Location of cautionary or warning sign in urban and non-urban areas, Points to be considered while designing and erecting road signs. • Traffic markings-	**10**

	definition, classification, carriageway, kerb, object marking and reflector markers.	
UNIT –IV	**Traffic Signals and Traffic Islands** • Traffic signals- Definition, Types, Traffic control signals, pedestrian signals. • Types of traffic control signals - Fixed time, manually operated, traffic actuated signals and location of signals. • Compute signal time by fix time cycle, Webster's and IRC method and sketch timing diagram for each phase. • Traffic islands –Definition, advantages and disadvantages of providing islands. • Types of traffic islands - rotary or central, channelizing or Refuge Island. • Road intersections or junctions - Definition, Types of road intersection. • Intersection at grade- Types, basic requirements of good intersection at grade. • Grade separated intersection- advantages and disadvantages, types - flyovers-partial and full Cloverleaf pattern, Diamond intersection, Trumpet type, underpass	**8**
UNIT –V	**Road Accident Studies and Arboriculture** • Road Accidents-Definition, types and causes for collision and non-collision accidents. • Measures to prevent road accidents. • Collision and condition diagram. • Street lighting –definition, necessity, types-luminaire, foot candle, lumen, factors affecting their utilization and maintenance. • Arboriculture- definition, objectives, factors affecting selection of type of trees. • Maintenance of trees-protection and care of road side trees	**10**
	Total	**45**

Suggested learning resources:

1. Khanna S.K., Justo, C E G and Veeraragavan, A., Highway Engineering, Nem Chand and Brothers, Roorkee.
2. Kadiyali L.R., Transportation Engineering, Khanna Book Publishing Co., Delhi
3. Vazirani, V N , Chaondola, S P, Transportation Engineering Vol. I & II, Khanna Publishers. Delhi.
4. Saxena, S C, Traffic planning and design, Dhanpat Rai & Sons Delhi.
5. Kumar R S, Introduction to Traffic Engineering, University Press (India), Pvt. Ltd

TH:4(c)- TENDERING AND ACCOUNTS

L	T	P		Course Code: CEPE 305C	
3	0	0			
Total Contact Hours			**Total Marks: 100**	**Theory Assessment**	
Theory		: 45Hrs		End Term Exam	70
				Progressive Assessment	30
Pre Requisite		**: Nil**			
Credit		**3**		Category of Course : PE	

RATIONALE:

Tendering and accounts are essential course for civil enegineering diploma student in project management and construction. The tendering process ensures transparency and fairness in selecting contractors, promoting competitive pricing and high-quality work. It fosters accountability by requiring accurate and competitive bids. Accounts, on the other hand, are critical for managing financial resources, ensuring proper allocation, and preventing budget overruns. This Together, tendering and accounts help the student optimize project execution, maintain financial control, and reduce risks. A strong understanding of both practices is necessary to make informed decisions, maintain fiscal responsibility, and ensure project success.

COURSE OBJECTIVES:

Following are the objectives of this course:

- To understand terminologies in contract and tender document and their significance.
- To know different types of contracts and their uses.
- To learn preparation of typical Tender documents for civil engineering work.
- To get acquainted with rent fixation and valuation of civil structures.

COURSE CONTENT DETAILS

UNIT NO & TITLE	CONTENT	LECTURE HOURS
UNIT –I	**Procedure to execute the work** Administrative approval, Technical sanction, budget provision, expenditure sanction. Methods for carrying out works- contract method, departmental method -rate list method, piece work method, day's work method, employing labors on daily wages basis.	**8**

UNIT-II	**Contracts** Definition of contract, objects of contract, requirements of contract, overview of Indian Con- tract Act. Types of engineering contract with advantages, disadvantages and their suitability - Lump sum contract, item rate contract, percentage rate contract, cost plus percentage, cost plus fixed fee, cost plus variable percentage and cost plus variable fee contract, labour contract, demolition contract, target contract, negotiated contract, Engineering Procurement Construction Contract (EPC), Annuity Contract. Introduction of FIDIC Conditions of contract. Classification of contractor on basis of financial limits, Requirement of documents for registration of contractor. Build Operate Transfer (BOT) Project, BOT Toll contract, BOT (Annuity) contract, Design, Build, Finance, Operate and Transfer (DBFOT) contract, Hybrid Annuity contract, Operate Maintain and	**7**
	Transfer (OMT) contract, Operation & Maintenance contract (Introduction only).	
UNIT-III	**Tender and Tender Documents** Definition of tender, necessity of tender, types of tender- Local, Global, Limited. E -Tendering System – Online procedure of submission and opening of bids (Technical and Financial). Notice to invite tender (NIT)- Points to be included while drafting tender notice, Drafting of tender notice. Procedure of submitting filled tender Documents (Two-envelope system), procedure of opening tender, comparative statement, scrutiny of tenders, award of contract, letter of award. Meaning of terms - Earnest Money Deposit (EMD), Performance Security Deposit, Validity period, corrigendum to tender notice and its necessity, Unbalanced bid. Tender documents – Index, tender notice, general instructions, special instructions, Schedule A, Schedule B, Schedule C etc. Terms related to tender documents – contract conditions- time limit, time extension, penalty, defective material and workmanship, termination of contract, suspension of work, subletting of contract, extra items, price variation clause (escalation), defect liability Period, liquidated Damages. Arbitration- Meaning, Qualification of an arbitrator, Appointment, Dispute and Settlement of disputes, Arbitration and Conciliation Act, Arbitration award.	**10**
UNIT-IV	**Accounts** . Various account forms and their uses – Measurement Books, E-Measurement book (E-MB), Nominal Muster Roll(NMR), Imprest Cash, Indent, Invoice, Bill, Vouchers, Hand receipt Cash Book, Temporary Advance. Heads of Accounts. Mode of Payment to the contractor and its necessity -Interim Payment, Advance Payment Secured Advance, Petty advance, Mobilization advance, Running account bill, Final bill, Retention money, E - payment	**10**
UNIT-V	**Introduction to Valuation** Definition and purpose of Valuation, role of valuer. Definition - Cost, Price and Value, Characteristics of Value, Factors Affecting Value. Types of Value - Book Value, Scrap Value, Salvage Value, Speculative Value, Distress Value, Market Value, monopoly Value, Sentimental Value. Factors affecting value. Depreciation, Obsolescence, Sinking Fund, Methods of Calculation of Depreciation – Straight Line Method, Sinking Fund Method, Constant Percentage Method. Fixation of rent, Lease – types of lease, leasehold property and free hold property. Mortgage – Mortgage deed, precautions to be taken while making mortgage.	**10**
	Total	

Suggested learning resources

1. Datta, B. N., Estimating and Costing in Civil engineering, UBS Publishers Pvt. Ltd., New Delhi
2. Raina, V. K., Construction Management and Contract Practices, Shroff Publishers & Distributers Pvt. Ltd.
3. Rangawala, S. C., Estimating and Costing, Charotar Publishing House PVT. LTD., Gujrat
4. Birdie, G. S., Estimating and Costing, Dhanpat Rai Publishing Company (P) Ltd., New Delhi
5. Patil, B. S., Civil Engineering Contracts and Estimates, Orient Longman, Mumbai
6. Chakraborti, M., Estimating and Costing, Specification and Valuation in Civil Engineering, Monojit Chakraborti, Kolkata.

Annexure-I
Open Elective I

TH:5(a)- UNIVERSAL HUMAN VALUES

L	T	P		**Course Code: OE 301A**	
3	0	0			
Total Contact Hours					
Theory		: 45Hrs	**Total Marks: 100**	End Term Exam	70
				Progressive Assessment	30
Pre-Requisite		**: Nil**			
Credit		**3**		Category of Course: OE	

RATIONALE:

The Universal Human Values (UHV) course aims to help diploma students develop a strong ethical foundation, nurturing responsible individuals who contribute positively to society. In an era driven by rapid technological advancements, it is crucial for students not only to gain technical expertise but also to cultivate values that promote harmony, respect, and sustainability.

LEARNING OUTCOMES:

After completion of the course, the students will be able to:

- Identify fundamental human aspirations such as happiness and prosperity.
- Differentiate between the self and the body and understand their respective needs.
- Practice self-reflection to improve decision-making, emotional balance, and personal growth.
- Develop respectful and trustworthy relationships within family, friends, and society.
- Explain the role of values like trust, respect, and love in building strong social bonds.
- Promote cooperation and harmony within communities through ethical practices.

DETAILED COURSE CONTENT:

Unit No.	Topic/Sub-Topic	Allotted Time (Hours)
I	**Introduction to Value Education and Human Values -** Concept and Need for Value Education - Understanding the importance of value education in personal and professional life, Differentiating between values and skills. Basic Human Aspirations - Exploring fundamental human aspirations: happiness and prosperity, Methods to achieve these aspirations through right understanding and relationships.	8
II	**Harmony in the Human Being -** Understanding the Self - Differentiating between the 'Self' (I) and the Body, Understanding the needs of the Self and the Body, Harmony of the Self with the Body - Ensuring the harmony of 'I' with the Body, Practices for mental and physical well-being.	8
III	**Harmony in the Family and Society -** Family as the Basic Unit of Society - Understanding values in human relationships, Trust and respect as the foundational values in relationships, Harmony in Society - The concept of an undivided society, Universal human order and world family.	8

IV	**Harmony in Nature and Existence -** Interconnectedness in Nature -Understanding the four orders of nature: material, plant, animal, and human, Mutual fulfillment among these orders, Co-existence in Existence - Holistic perception of harmony in existence, Role of human beings in maintaining environmental balance.	8
V	**Professional Ethics -** Ethical Human Conduct - Integrating values into professional life, Concept of professional ethics and accountability, Case Studies in Professional Ethics - Analyzing real-life scenarios to understand ethical dilemmas, Developing solutions based on universal human values.	8
VI	**Personal Development and Social Responsibility** - Self-Reflection and Self-Exploration - Techniques for self-assessment and personal growth, Setting personal goals aligned with universal values, Social Responsibility - Understanding one's role in society, Participating in community service and social initiatives.	5

REFERENCES:

1.	R. R. Gaur, R. Asthana, G. P. Bagaria, A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019.
2.	R. R. Gaur, R. Asthana, G. P. Bagaria, Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019.
3.	A. Nagraj, JeevanVidya: EkParichaya, Amarkantak, 1999.
4.	A. N. Tripathi, Human Values, New Age Intl. Publishers, New Delhi, 2004.
5.	Moral Thinking: An Introduction To Values And Ethics, Vineet Sahu, IIT Kanpur: https://onlinecourses.nptel.ac.in/noc23_hs89/preview

TH:5(b)- LEADERSHIP AND MANAGEMENT SKILLS

L	T	P		Course Code: OE 301B	
3	0	0			
Total Contact Hours				**Theory Assessment**	
Theory		: 45Hrs	**Total Marks: 100**	End Term Exam	70
				Progressive Assessment	30
Pre Requisite		**: Nil**			
Credit		**3**		Category of Course : OE	

RATIONALE:

This course/subject on Leadership and Management Skills for students undergoing Diploma programmes is an exploration in leading and managing people, majorly in education based on sound and acceptable principles and theories for effective leadership. The leadership skills will enable them to take initiative, guide team efforts, motivate peers, and ensure effective collaboration. They'll learn how to delegate tasks, resolve conflicts, and foster a positive team environment. The management skills will help them in organizing tasks, setting timelines, and ensuring efficient workflow within a team.
It is expected that the students will be able to handle projects with better project outcomes and a earn a more productive learning experience. This will benefit their academic journey, future careers, and overall professional development:

LEARNING OUTCOMES:

After completion of the course, the students will be able to

- Explain the principles of management
- Collaborate across cultures for effective team work
- Communicate with people for a positive work culture
- Demonstrate personal dispositions, skills & abilities of a leader
- Undertake the process of change management
- Design training for staff development
- Adapt suitable leadership style for improved work efficiency.

DETAILED COURSE CONTENT:

Unit No.	Topic/Sub-Topic	Allotted Time (Hours)
I	**Leadership & Management, concept, principles.** • Definition of leadership, management • Leadership theories • Leadership characteristics • Principles of management • Managerial functions • Leader v/s Manager, Leader/Manager traits and character • Leadership Styles	10
II	**Human Resource Management in Organizations** • Human Resource Management: Meaning, Nature, Objectives, Scope • Job & Job analysis. • Staff Development: Need and Objectives of Staff Development, Approaches • Training & development • Organizational Development: Components of OD process. • Learning organization	10
III	**Personal disposition, skills & abilities of leaders** • Self-awareness • Leadership characteristics, traits • Leadership skills & abilities • Emotional intelligence & its components, importance in leadership • Communication skills for effective leadership, barriers to effective communication, Active Listening, Mindful listening. • Leading & Mentorship – Influencing & mentoring	09
IV	**Leader's role in Motivating, Inspiring and Transformative leadership, nurturing team-work** • Goal setting & leadership • Transformative Leadership, vision & envisioning • Motivational role of leader in people management • Group & team • Team dynamics • Conflict management, strategies in managing conflicts	08
V	**Change Management & Leadership** • Models of change • Forces driving change • Change Management – process, goal, importance • The process of change happening in an organization • Key aspects of leadership in change management – responsibilities of a change leader.	08

SUGGESTED ACTIVITIES:

- Group/individual presentation on the basic principles of leadership and management, Discussion on readings - Individual or group presentation of assigned topics in class on leadership and management principles and theories.
- Activities on Envisioning, Goal setting
- ACTION PLAN to be prepared

REFERENCES:

1.	Theories of Educational Leadership and Management (3rd ed.), by Bush, Tony (2003). SAGE Publications, Ltd.
2.	The inspiring leader: unlocking the secrets of how extraordinary leaders motivate. By Zenger, John, Joseph Folkman, and Scott Edinger (2009). New York: McGraw Hill Press.
3.	Knowing yourself. On becoming a leader: the leadership classic. By Bennis, Warren (2009). New York: Basic Books.
4.	Leading Change. By P. Kotter, Harvard Business, 2012.
5.	The Fifth Discipline. By Peter M. Senge, Crwon Currency, 2006.
6.	The Leadership Sutra: An Indian Approach to Power. By Devdutt Pattanaik, – Penguin Random House, 2017.
7.	Leadership and Management. By Dr. A. Chandra Mohan. Himalaya Publishing House, 2010.

TH:5(c)- PROFESSIONAL SKILLS

L	T	P		Course Code: OE 301C	
3	0	0			
Total Contact Hours			**Total Marks: 100**	**Theory Assessment**	
Theory		: 45Hrs		End Term Exam	70
				Progressive Assessment	30
Pre Requisite		**: Nil**			
Credit		**3**		Category of Course : OE	

RATIONALE:

The term, "Professional skills" carries significant weight in the job market and career development. This open elective course explores various types of professional skills, their significance, and how they can be cultivated and harnessed for career progression. By understanding the landscape of professional skills, student can better position himself or herself for success in the competitive job market. It is crucial to continuously update and adapt the professional skills to stay ahead in a rapidly changing work environment. By investing in professional development, one can enhance employability and open doors to new opportunities.

LEARNING OUTCOMES:

After completion of the course, the students will be able to

- Demonstrate Self-competency and Confidence
- Practice Emotional Competency
- Work in a team work or in collaboration
- Demonstrate problem solving and decision making skills
- Apply time management strategies and techniques effectively
- Apply professional ethics and integrity in professional and personal life

UNIT NO.	CONTENT	ALLOTTED TIME (HOURS)
I Communication Skills:	• Active listening • Verbal and non-verbal communication • Written communication • Presentation skills • Conflict resolution	08
II Teamwork and Collaboration:	• Building trust within a team • Effective collaboration strategies • Role delegation and responsibility sharing • Conflict resolution within a team	08
III Problem-Solving:	• Identifying root causes of issues • Generating solutions and evaluating options	08

	• Decision-making under pressure • Critical thinking skills • Triple constraint issues	
IV Time Management:	• Prioritization and task management • Setting realistic deadlines • Effective time planning and organization	06
V Emotional Intelligence:	• Self-awareness and emotional regulation • Empathy and understanding others' emotions • Managing interpersonal relationships • Motivation • Social skills • Emotional Intelligence (EQ) • Stress management	08
VI Professional Ethics and Integrity:	• Workplace ethics and code of conduct • Confidentiality and data privacy • Professional accountability- • Important Considerations:	05

REFERENCES:

1. Dr. Vitthal Gore: Professional Skills for 21st Century: A Key to Success: Blue Rose- ACADEMIC
2. The ACE of Soft Skills: Attitude, Communication and Etiquette for Success: PEARSON
3. The essence of Leadership: S. Manikutty: Bloomsbury