TEACHING AND EXAMINATION SCHEME
FOR DIPLOMA **II Year CIVIL ENGINEERING**
SESSION – 2009-2010 & ONWARDS
Third Semester

Code No.	Subjects	Distribution of Time				Distribution of Max. Marks/ Duration							Total Marks
		Hours per week				University's Exam.				Sessionals			
		L	T	P	Tot	TH	Hrs.	PR	Hrs.	CT	TU	PR(S)	
*CE 31	Strength of Materials-I	2	2/2	2	5	70	3	50	3	30	25	25	200
*CE 32	Fluid Mechanics-I	2	2/2	2	5	70	3	50	3	30	25	25	200
CE 33	Building Technology – I	2	--	2	4	70	3	--	--	30	--	50	150
CE 34	Surveying –I	2	--	6	8	70	3	50	3	30	--	50	200
CE 35	Transportation Engineering-I	2	2/2	2	5	70	3	--	--	30	50	--	150
CE 36	Soil Engineering	2	2/2	2	5	70	3	50	3	30	25	25	200
CE 37	Construction Materials	2	--	2	4	70	3	--	--	30	--	50	150
	Total	14	4	18	36	490		200		210	125	225	1250
												Grand Total:	**1250**

1. L: Lecture
2. T:Tutorial
3. P:Practical
4. TH:Marks for University Examination for Theory

5. PR: Marks for University's Examination for Practicals
6. CT:Marks for Class Tests
7. TU: Marks for Tutorials
8. PR(S):Marks for Practical and Viva

*CE 31 same as AR 31/ MA 31/ ME 31/ MP 31   *CE 32 same as MA 32/ ME 32

TEACHING AND EXAMINATION SCHEME
FOR DIPLOMA **II Year CIVIL ENGINEERING**
SESSION – 2009-2010 & ONWARDS
Fourth Semester

Code No.	Subjects	Distribution of Time				Distribution of Max. Marks/ Duration							Total Marks
		Hours per week				University's Exam.				Sessionals			
		L	T	P	Tot	TH	Hrs.	PR	Hrs.	CT	TU	PR(S)	
*CE 41	Strength of Materials-II	2	2/2	2	5	70	3	50	3	30	25	25	200
CE 42	Fluid Mechanics-II	2	2/2	2	5	70	3	50	3	30	25	25	200
CE 43	Building Technology – II	2	--	2	4	70	3	--	--	30	--	50	150
CE 44	Surveying –II	2	--	6	8	70	3	50	3	30	--	50	200
CE 45	Transportation Engineering-II	2	2	--	4	70	3	--	--	30	50	--	150
CE 46	Concrete Technology	2	--	2	4	70	3	50	3	30	--	50	200
CE 47	Building Drawing	--	--	6	6	--	3	50	3	--	--	100	150
	Total	12	4	20	36	420		250	--	210	125	300	1250
												Grand Total:	**1250**

1. L:Lecture
2. T:Tutorial
3. P:Practical
4. TH:Marks for University Examination for Theory

5. PR: Marks for University's Examination for Practicals
6. CT:Marks for Class Tests
7 TU:Marks for Tutorials
8. PR(S):Marks for Practical and Viva

*CE 41 same as MA 41/ ME 41

TEACHING AND EXAMINATION SCHEME
FOR DIPLOMA **III Year CIVIL ENGINEERING**
SESSION – 2009-2010 & ONWARDS
Fifth Semester

Code No.	Subjects	Distribution of Time				Distribution of Max. Marks/ Duration							Total Marks
		Hours per week				University's Exam.				Sessionals			
		L	T	P	Tot	TH	Hrs.	PR	Hrs.	CT	TU	PR(S)	
CE 51	Public Health Engineering – I	2	--	2	4	70	3	50	3	30	--	50	200
CE 52	Irrigation Engineering –I	2	2/2	2/2	4	70	3	--	--	30	25	25	150
CE 53	Theory of Structures	2	2	--	4	70	3	--	--	30	50	--	150
CE 54	Surveying - III	2	--	6	8	70	3	50	3	30	--	50	200
CE 55	Estimating & Costing- I	2	--	6	8	70	3	50	3	30	--	50	200
CE 56	**Elective – I** CE 561 Construction Management and Equipments	2	2	--	4	70	3	--	--	30	50	--	150
	CE 562 Building Services	2	2	--	4	70	3	--	--	30	50	--	
CE 57	Elective – II * CE 571 'C' Programming	2	--	2	4	70	3	--	--	30	--	50	150
	* CE 572 Computer in Business Systems	2	--	2	4	70	3	--	--	30	--	50	
	Practical Training (24 Working days)							100					100
												Grand Total:	**1300**

1. L:Lecture   5. PR: Marks for University's Examination for Practicals

2. T:Tutorial   6. CT: Marks for Class Tests

3. P:Practical   7. TU: Marks for Tutorials

4. TH:Marks for University Examination for Theory   8. PR(S): Marks for Practical and Viva

*CE 571 Common for All Branches of Engineering except CS &IT

*CE 572 Common for all branches of Engineering

TEACHING AND EXAMINATION SCHEME
FOR DIPLOMA **III Year CIVIL ENGINEERING**
SESSION – 2009-2010 & ONWARDS
Sixth Semester

Code No.	Subjects	Distribution of Time				Distribution of Max. Marks/ Duration							Total Marks
		Hours per week				University's Exam.				Sessionals			
		L	T	P	Tot	TH	Hrs.	PR	Hrs.	CT	TU	PR(S)	
CE 61	Public Health Engineering – II	2	--	2	4	70	3	50	3	30	--	50	200
CE 62	Irrigation Engineering –II	2	2/2	2/2	4	70	3	--	--	30	25	25	150
CE 63	Steel Structure Design & Drawing	2	2	2	6	70	3	--	--	30	25	25	150
CE 64	R.C.C. Design & Drawing	2	2	2	6	70	3	--	--	30	25	25	150
CE 65	Estimating & Costing- II	2	--	6	8	70	3	50	3	30	--	50	200
CE 66	Elective – III CE 661 Repair and Maintenance of Civil Works	2	2	--	4	70	3	--	--	30	50	--	150
	CE 662 Appropriate Technology	2	2	--	4	70	3	--	--	30	50	--	
	CE 663 Environmental Engineering	2	2	--	4	70	3	--	--	30	50	--	
CE 67	Elective – IV * CE 671 Management	2	2	--	4	70	3	--	--	30	50	--	150
	* CE 672 Entrepreneurship Development	2	2	--	4	70	3	--	--	30	50	--	
	* CE 673 Production System Management	2	2	--	4	70	3	--	--	30	50	--	
	Practical (24 Working days)							100					100
											Grand Total:		**1250**

1. L:Lecture

2.T:Tutorial

3.P:Practical

4.TH:Marks for University Examination for Theory

5. PR: Marks for University's Examination for Practicals

6. CT: Marks for Class Tests

7. TU: Marks for Tutorials

8. PR(S): Marks for Practical and Viva

*CE 671/ CE 672/ CE 673 Common for All Branches of Engineering

STRENGTH OF MATERIALS - I

CODE CE 31   L   T   P
        AR 31/MA 31/ME 31/MP 31   2   2/2 2

RATIONALE

In Engineering every structure or machine element is designed for a particular application. Then it is tested. A Diploma holder should be capable of designing the various elements for particular requirements. For this he must be able to calculate the stresses in an elements and their nature.

CONTENTS

1.   Simple Stress and Strain :

1.7   Shear stresses

    1.7.1   Modulus of rigidity
    1.7.2   Complementary shear stress
    1.7.3   Concept of single shear and double shear
    1.7.4   Shear strain

1.8   Poisson's ratio and volumetric strain

    1.8.1   Lateral strain
    1.8.2   Longitudinal strain
    1.8.3   Volumetric strain
    1.8.4   Bulk modulus

1.9   Relationship between elastic constants (Derivation)

    1.9.1 $E=3K(1-2/m)$
    1.9.2 $E=2N(1+1/m)$
    1.9.3 $E=9KN/(3K+N)$

2.   Compound Stress :

2.1   Introduction
2.2   Stress components on an inclined plane

    2.2.1   Induced by direct stresses
    2.2.2   Induced by simple shear
    2.2.3   Induced by direct and simple shear stresses

2.3   Mohr's circle :

    2.3.1   For like direct stresses
    2.3.2   For unlike direct stresses
    2.3.3   For two perpendiculars direct stresses with state of simple shear

2.4   Principal stresses and planes

    2.4.1   Major principal stress
    2.4.2   Minor principal stress
    2.4.3   Mohr's circle method for principal stresses

3.   Strain Energy :

3.1   Introduction
3.2   Strain energy from stress - strain diagram
3.3   Proof resilience
3.4   Types of loading - gradual, sudden, impact

    3.4.1   Stress in gradual loading
    3.4.2   Stress in sudden loading
    3.4.3   Stress in impact loading

4.   Bending Moments and Shear Force :

4.1   Basic concept

    4.1.1   Types of support

        4.1.1.1   Movable hinge support (roller)
        4.1.1.2   Immovable hinge support
        4.1.1.3   Fixed support

    4.1.2   Types of beam

4.1.2.1 Cantilever beam
4.1.2.2 Simply supported beam
4.1.2.3 Fixed beam
4.1.2.4 Continuous beam
4.1.2.5 Overhanging beam

4.1.3   Types of load

4.1.3.1 Point load
4.1.3.2 Distributed load - uniformly and non uniformly

4.2   Shear force and bending moment

4.2.1   Concept and calculation of shear force and bending moment
4.2.2   Sign convention for shear force and bending moment

4.3   Bending moment and shear force diagrams (for point loads, U.D.L. and their combinations)

4.3.1   Cantilever beam
4.3.2   Simply supported beam
4.3.3   Simply supported beam with over hang

5.   Moment of Inertia :

5.1   Concept of moment of Inertia
5.2   Radius of gyration

5.2.1   Parallel axis theorem
5.2.2   Perpendicular axis theorem

5.3   Moment of Inertia of various section

5.3.1   Rectangle
5.3.2   Triangle
5.3.3   Circle

5.4   Moment of inertia of unsymmetrical section like : T-section, channel section, L-section etc.

6.   Bending Stresses in Beams :

6.1   Concept of bending stress
6.2   Theory of simple bending

6.2.1   Assumptions in theory of simple bending

6.2.2   Use of equation $\dfrac{M}{I} = \dfrac{f}{y} = \dfrac{E}{R}$ (without proof)

6.3   Design criterion and section modulus

6.3.1   Section modulus
6.3.2   Calculation of max bending stress in beams of rectangular, circular, I and T section

7.   Shear Stress in Beams :

7.1   Concept

7.2   Use of equation $q = \dfrac{F}{Ib}(A\bar{y})$ (without proof)

7.3   Shear stress distribution diagram of various sections

7.3.1   Rectangle

7.3.2   I section
7.3.3   T section
7.3.4   Channel section
7.3.5   H section
7.3.6   + section
7.3.7   Circular section

PRACTICALS

1.   Study of extensometers
2.   Study and operation of UTM
3.   Tensile test on mild steel specimen and plotting stress strain curve.
4.   Bending test on timber beams.
5.   Compression test on common structural materials viz. timber, cast iron etc.
6.   Determination of toughness of cast iron and mild steel specimen by Charpy and Izod test.
7.   Hardness test by Brinell and Rockwell test.

REFERENCE BOOKS :

1.   Strength of Materials &   B.C.Punmia
       Theory of Structures (vol. I)
2.   Strength of Materials   Ramamurtham
3.   Strength of Materials   Junarkar
4.   Strength of Materials   R.S. Khurmi
5.   Strength of Materials (Hindi)   Gurcharan singh

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FLUID MECHANICS - I

CODE CE 32   L   T   P
      MA 32/ME 32   2   2/2   2

RATIONALE

Technicians have to deal with pressure measurement, transportation of fluids and the machines converting hydraulic power into mechanical power and vice versa, in the field/industries for that one has to have a basic knowledge of fluid mechanics. Topics such as pressure measurement, laws governing the flow of liquids, measurement of discharge, production of power are included in this subject.

Although the major emphasis in this subject is on the study of liquids like water an incompressible fluid yet all the principles are applicable to all the fluids such as air, gas, steam etc.

CONTENTS

1.   **Introduction :**

    1.1   Introduction concepts

        1.1.1   Fluids and solids
        1.1.2   Liquid, gas and vapour

    1.2   Fluid mechanics

        1.2.1   Kinematics
        1.2.2   Dynamics

    1.3   Fluid properties

        1.3.1   Density
        1.3.2   Specific volume
        1.3.3   Specific gravity
        1.3.4   Viscosity

            1.3.4.1   Newton's law of viscosity
            1.3.4.2   Dynamic and Kinematic viscosity

        1.3.5   Compressibility
        1.3.6   Surface tension - soap bubble, drop
        1.3.7   Capillarity
        1.3.8   Vapour pressure and its importance

2.   **Fluid Pressure and its Measurement :**

    2.1   Definition and its units
    2.2   Pascal's law

        2.2.1   Intensity of pressure at a point in fluid at rest
        2.2.2   Pressure head

    2.3   Pressure

        2.3.1   Atmospheric pressure
        2.3.2   Gauge pressure
        2.3.3   Vacuum pressure
        2.3.4   Absolute pressure
        2.3.5   Differentials pressure
    2.4   Law of hydrostatic pressure
    2.5   Brahma's press
    2.6   Pressure measurement

2.6.1   Manometers

2.6.1.1 Piezometer - its limitation
2.6.1.2 U-tube - simple, differential, inverted
2.6.1.3 Micro-manometers
2.6.1.4 Inclined tube micro-manometers

2.6.2   Mechanical gauge

2.6.2.1 Bourdon gauge
2.6.2.2 Bellow gauge
2.6.2.3 Diaphragm gauge
2.6.2.4 Dead weight gauge

3.   Hydrostatics :

3.1   Total pressure
3.2   Centre of pressure
3.3   Total pressure and center of pressure in following cases

3.3.1   Plane surface immersed horizontally
3.3.2   Plane surface immersed vertically
3.3.3   Plane surface immersed at an angle
3.3.4   Curved surface (no proof)

3.4   Working of lock gates, sluice gate
3.5   Pressure on masonry dams of rectangular and trapezoidal sections and their condition of stability

4.   Hydrokinematics :

4.1   Description of fluid flow

4.1.1   Eular approach
4.1.2   Lagrangian approach

4.2   Definition of path line, stream line
4.3   Types of flow

4.3.1   Steady - Non steady
4.3.2   Uniform - Non uniform
4.3.3   Laminar - Turbulent
4.3.4   One, Two, Three dimensional flow

4.4   Continuity equation (no proof) :

4.4.1   Assumption
4.4.2   Rate of discharge
4.4.3   For one dimensional flow

5.   Hydrodynamics and Measurement of Flow :

5.1   Energy of fluid - pressure, kinetic and potential
5.2   Bernoulli's theorem (no proof)

5.2.1   Assumptions and its limitation
5.2.2   Conversion of pressure into pressure head, velocity into kinetic head

5.3   Applications of Bernoulli's theorem

5.3.1   Pitot-tube
5.3.2   Venturimeter
5.3.3   Orificemeter

6.   Orifices and Notches :

6.1   Definition and classification
6.2   Discharge through small orifices

        6.2.1   Coefficient of contraction
        6.2.2   Coefficient of velocity
        6.2.3   Coefficient of discharge
        6.2.4   Coefficient of resistance

6.3   Time of emptying a vessel of uniform cross section through an orifice at bottom.
6.4   Notches - Classification

        6.4.1   Crest, Nappe
        6.4.2   Difference between notch and weir

6.5   Flow over -

        6.5.1   Triangular notch
        6.5.2   Rectangular notch

        [Simple numerical problems without velocity of approach]

PRACTICALS.

1.   Study of different types of manometers and pressure gauges
2.   Verification of Bernoulli's theorem
3.   Determination of C_d for Venturimeter
4.   Determination of C_d for Orificemeter
5.   Determination of C_c, C_v and C_d of small orifice
6.   Visit of a near by dam

REFERENCE BOOKS :

1.   Fluid Mechanics & Machines   Dr. Jagdish Lal
2.   Fluid Mechanics & Machines   Dr. R.K.Bansal
3.   Fluid Mechanics & Machines   R.S.Khurmi.
4.   Hydraulics & Pneumatics   H.L. Stewart.

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BUILDING TECHNOLOGY - I

CODE CE 33   L   T   P
      CC33   2   --   2

RATIONALE

Building construction is an important job of Civil Engineering diploma holder. So he must acquire the knowledge of various parts of the building, their functions, importance and procedure of construction and maintenance. Building technology includes all the aspects of construction and importance of building work.

CONTENTS

1.   Introduction :

    1.1   Definition of a building
    1.2   Classification of building based on occupancy
    1.3   Explanation of different parts of a building

2.   Foundation :

    2.1   Concept of foundation
    2.2   Factors affecting selection of foundations
    2.3   Definition and importance of bearing capacity, Average bearing capacity of common soils.
    2.4   Types of foundations- shallow and deep foundations
    2.5   Shallow foundation- spread footings, raft and inverted arch foundation. Rankine's formula for depth of foundations
    2.6   Deep Foundation - Pile foundation, their suitability, Classification of piles according to function, material and installation
    2.7   Causes of failure of foundation and remedial measures.

3.   Walls :

    3.1   Purpose of walls
    3.2   Types of walls- Load bearing, non-load bearing
    3.3   Partition walls - construction details, suitability and use of brick and wooden partition walls.
    3.4   Cavity walls - Brief description and constructional detail of cavity walls

4.   Brick Masonry :

    4.1   Definition related to brick masonry
    4.2   Bond, necessity of bond
    4.3   Types of bonds- English, Flemish, header and stretcher, T-junction, corner junction.
    4.4   Sketches for 1, 1½ and 2-brick thick wall and square pillars
    4.5   Construction of brick walls-method of laying brick in walls and precautions to be taken for it.

5.   Stone Masonry :

    5.1   Definition related to stone masonry
    5.2   Dressing of stones - Hammer dressing, chisel dressing
    5.3   General principles for construction of stone masonry
    5.4   Brief description and sketches of different types of stone masonry- Ashlar, random rubble and coursed rubble. Ashlar facing to coursed, rubble and brick masonry.
    5.5   Brief description, sketches and uses of joggles, dowells and cramps in stone masonry.

6.   Scaffolding, Shoring and Underpinning :

    6.1   Brief description and application of different types of scaffolding and shores.
    6.2   Meaning and need for underpinning.

7.   Dampness and its Prevention :

7.1   Causes of dampness in buildings and principles of its prevention.
7.2   Materials commonly used for damp proofing.
7.3   Damp proof course
7.4   Anti termite treatment of buildings before and after construction

8.   Building Bye Laws :

8.1   Study of building bye laws as per is 1256-1967
8.2   Terminology related to residential building, building permit occupancy certificate, unsafe buildings, enforcement code, offences and penalties.
8.3   Health sanitation and other requirements, means of access, open space requirements, plinth area, projections, covered area in residential plots.
8.4   Distance from electric lines, plinth regulation, height regulation, size of rooms, lighting and ventilation, construction of water closets, kitchen, mezzanine floor, stair cases, drainage and sanitation.

9.   Site Selection :

9.1   Selection of site for a building and building complex
9.2   Comparative study of sites with respect to local topography, flooding, soil access, location
9.3   Communication links, with surroundings availability of water and electricity, prevailing wind, made up ground, water table, trees etc.

PRACTICALS

1.   Sketching of common hand tool used in building construction.
2.   Sketching of Foundation

2.1   Spread foundation for external and internal wall
2.2   Raft foundation
2.3   Inverted arch foundation
2.4   Different types of piles

3.   Sketches of Walls

3.1   Cavity wall
3.2   English bond and Flemish bond for 1½ and 2 brick thick wall corner
3.3   Different types of stone masonry

4.   Sketches of Different Types of Scaffolding.

REFERENCE BOOKS :

1. Building Construction   Bindra & Arora.
2. Building Construction   Sushil Kumar.
3. Building Construction   B.C. Punamia.

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SURVEYING - I

CODE CE 34   L   T   P
                                                                                      2   --   6

RATIONALE

A diploma holder is expected to be well aware of the surveying. He must know measuring instruments and application of them in practical work. He should be able to measure a irregular field and calculate its area.

CONTENTS

1.   Introduction :

1.1   Plane surveying and geodetic surveying
1.2   Uses of surveying in engineering.
1.3   Principles of surveying

2.   Chain Surveying :

2.1   Different types of chains

      2.1.1   Metric chain
      2.1.2   Engineer's chain
      2.1.3   Gunter's chain
      2.1.4   Revenue chain

2.2   Types of Tapes

      2.2.1   Linen tapes
      2.2.2   Metallic tapes
      2.2.3   Invar tapes
      2.2.4   Steel band

2.3   Ranging rods
2.4   Offset rods
2.5   Line ranger
2.6   Cross staff
2.7   Optical square
2.8   Arrows
2.9   Folding, unfolding, of chains
2.10   Testing and adjusting of chains
2.11   Ranging

      2.11.1   Direct ranging
      2.11.2   Indirect ranging

2.12   Chaining on plane ground,
2.13   Conventional signs in surveying
2.14   Recording in field book
2.15   Chaining on sloping ground

      2.15.1   Direct method
      2.15.2   Indirect method

2.16   Common errors and precautions
2.17   Traversing
2.18   Fixing and marking stations
2.19   Base line, Check lines and Tie lines
2.20   Common obstacles in chaining
2.21   Plotting of traverse

3.   Compass Surveying :

3.1   Prismatic compass
3.2   Surveyor's compass
3.3   Difference in the above two compasses
3.4   Definitions

        3.4.1   Meridian - magnetic, true, arbitrary
        3.4.2   Magnetic dip
        3.4.3   Magnetic declination
        3.4.4   Fore bearing
        3.4.5   Back bearing

3.5   Whole circle bearing system
3.6   Quadrilateral bearing system
3.7   Conversion from whole circle bearing to quadrilateral bearing and vice versa.
3.8   Reading the bearing of lines
3.9   Computation of internal angles
3.10   Distribution of instrumental error
3.11   Local attraction
3.12   Correction of bearings due to local attractions
3.13   Traversing with chain and compass

        3.13.1   Open traverse
        3.13.2   Closed traverse

3.14   Booking in field book
3.15   Adjustment of error in a closed traverse

4.   Minor Instrument :

4.1   Study and uses of

        4.1.1   Hand level
        4.1.2   Abney level
        4.1.3   Clinometer
        4.1.4   Planimeter
        4.1.5   Pantagraph
        4.1.6   Sextent
        4.1.7   Cylon ghat tracer

PRACTICALS

1.   Study of

1.1   Different types of chains and tapes
1.2   Cross staff
1.3   Optical square
1.4   Line ranger

2.   Use of Chains :

2.1   Folding and unfolding
2.2   Ranging and chaining on plane and sloping surface
2.3   Setting right angles.
2.4   Setting parallel lines.
2.5   Taking offsets.

3.   Chain surveying of small areas
4.   Study of prismatic compass
5.   Study of surveyor compass
6.   Measurements of bearing of lines
7.   Transverse by compass and adjustment of error

8.   **Study of**

      8.1   Hand and abney level
      8.2   Clinometer
      8.3   Planimeter
      8.4   Pantagraph
      8.5   Sextant
      8.6   Cylon ghat tracer

REFERENCE BOOKS :

1.   सर्वेक्षण भाग.५   डा0 बालचन्द्र पुनमिया
2.   Surveying Vol. I   B.C. Punmia.
3.   Surveying Vol. I   S.B. Kanetkar

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TRANSPORTATION ENGINEERING - I

CODE CE 35
                                                                     L   T   P
                                                                     2   2/2   2

RATIONALE

For economic social and cultural development of a country, Highway plays a very important role. With the invention of heavy and high-speed automobiles, it has become necessary to construct path for them for their speedy, safe and undelay movement from one place to another place. Due to lack of awareness in this field, road accident rate may increase, there may be delay in reaching raw materials to industries and finished products to consumer's etc. The basic purpose of this subject is to make the students of diploma to acquaint with construction and maintenance of highway for safe, undelayed movement of traffic with minimum accidental hazards.

CONTENTS

1.   Introduction :

    1.1   Importance of highway transportation
    1.2   Different modes of transportation
    1.3   Scope of highway engineering

2.   Highway Development and Planning :

    2.1   Historical development of road construction
    2.2   Necessity of highway planning
    2.3   Classification of roads
    2.4   Road pattern
    2.5   Highway planning in India

3.   Highway Geometric Design :

    3.1   Highway alignment and basic consideration governing alignment for a road
    3.2   Glossaries of terms used in road geometric and their importance
    3.3   Highway cross section elements
    3.4   Sight distances
    3.5   Design of horizontal alignments
    3.6   Design of vertical alignments

4.   Traffic Engineering :

    4.1   Scope of traffic engineering
    4.2   Passenger car unit (PCU)
    4.3   Traffic control devices - signs, signals, marking, traffic islands
    4.4   Causes and precaution of road accidents
    4.5   On street and off street parking
    4.6   Highway lighting

5.   Highway Materials :

    5.1   Subgrade soil

        5.1.1   Desirable properties
        5.1.2   Highway research board classification of soils
        5.1.3   CBR test

    5.2   Stone aggregates

        5.2.1   Desirable properties
        5.2.2   Attrition and abrasion tests
        5.2.3   Crushing test
        5.2.4   Impact test

5.2.5   Shape test

5.3   Bituminous materials

5.3.1   Penetration test
5.3.2   Softening point test
5.3.3   Ductility, flash and fire point
5.3.4   Specific gravity test

6.   Construction of Roads :

6.1   Introduction
6.2   Water Bound Macadam roads
6.3   Bituminous roads

7.   Highway Maintenance :

7.1   Common types of road failures
7.2   Routine maintenance

8.   Road Drainage and Road Arboriculture :

8.1   Necessity of road drainage
8.2   Surface and sub surface drainage
8.3   Object of road arboriculture
8.4   Common roadside trees
8.5   Plantation and protection of trees

9.   Bridges :

9.1   Introduction : Classification of bridges

9.1.1   Temporary bridges
9.1.2   Permanent bridges

9.2   Selection of site of the bridges
9.3   Economical span of the bridges, calculation of discharge, velocity, afflux by various methods
9.4   I.R.C. loading
9.5   Cause ways, culverts - brief description with sketches
9.6   Brief introduction to piers, abutments, wing walls and bearing.

PRACTICALS

1.   Determination of abrasion value of aggregates by Los Angel's test
2.   Determination of impact value of aggregate
3.   Determination of crushing value of given aggregates
4.   Determination of C.B.R. value of sub grade soil.
5.   Determination of penetration value of bitumen
6.   Determination of softening point of bitumen.
7.   Determination of ductility of bitumen
8.   Determination of flash and fire point of bitumen

REFERENCE BOOKS :

1.   Highway Engg.   Khanna & Justo.
2.   Highway Engg.   Priyani
3.   Bridge Engg.   S.P. Bindra

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SOIL ENGINEERING

CODE CE 36   L   T   P
      CC36   2   2/2   2

RATIONALE

Supervision of earth work in construction at dams, roads, embankments and other structures is an important function of a Civil Engg. diploma holder. For this the basic knowledge of Soil Engg. is essential. This subject covers such topics as will enable the diploma holder to identify and classify the different types of soils, their selection and proper use in the field of engineering construction. To develop related skills suitable laboratory work is also recommended.

CONTENTS

1.   Introduction :

    1.1   Introduction and scope of soil engineering
    1.2   Origin and formation of soils
    1.3   Major soil deposits of India

2.   Fundamental Definitions and Relationships :

    2.1   Representation of soil as a three phase system
    2.2   Definition of moisture content, unit weights, density, and specific gravity, void ratio, porosity, degree of saturation and the relationship among them.

3.   Classification of Soils :

    3.1   Classification of soils as per particle size and plasticity chart according to IS specifications
    3.2   Particle size distribution - Sieve analysis and hydrometer analysis
    3.3   Consistency of soils
    3.4   Field identification of soil

4.   Permeability of Soils:

    4.1   Definition of permeability and related terms
    4.2   Darcy's law of flow through soils
    4.3   Factors affecting permeability
    4.4   Measurement of permeability in laboratory
    4.5   Measurement of permeability in field

5.   Compaction :

    5.1   Process of compaction
    5.2   Proctor's compaction test
    5.3   Moisture content and density relationships
    5.4   Factors affecting compaction
    5.5   Different methods of compaction
    5.6   Brief description of field compaction methods, equipments and suitability for different type of soils.

6.   Consolidation :

    6.1   Meaning and explanation of phenomena
    6.2   Total stress, natural stress and effective stress
    6.3   Measurement of compressibility characteristics
    6.4   Consolidation test
    6.5   Pressure void ratio relationship in consolidation
    6.6   Practical methods of accelerating consolidation
    6.7   Normally consolidated and over consolidated soil

7.   Shear strength :

   7.1   Concept of shear strength
   7.2   Factors contributing to shear strength of soils.
   7.3   Drainage conditions of testing.
   7.4   Determination of shearing strength by direct shear test,   unconfined
compression test, vane shear test.

8.   Bearing Capacity :

   8.1   Concept of bearing capacity
   8.2   Terzaghi's beating capacity factors and bearing capacity as per IS code
   8.3   Factors affecting bearing capacity.
   8.4   Determining bearing capacity of soil by plate load test and SPT.
   8.5   Methods of improving bearing capacity

9.   Earth Pressures :

   9.1   Active and passive earth pressure
   9.2   Earth pressure at rest
   9.3   Determination of earth pressure by Rankine's theory for cohesionless soil (No derivation)

10.   Soil Exploration :

   10.1   Functions and scope of soil exploration
   10.2   Excavation and boring methods of sub-surface exploration
   10.3   Types of samplers
   10.4   Disturbed and undisturbed samples
   10.5   Labelling, sealing and preservation of samples

PRACTICALS

1.   Determination of moisture content
2.   Determination of specific gravity of soils
3.   Grain size analysis (by sieve analysis)
4.   Determination of liquid and plastic limits of soils
5.   Determination of field density by core cutter method
6.   Determination of field density by sand replacement method
7.   Proctor's compaction test
8.   Constant head and falling head permeability test.
9.   Determination of shear strength from direct shear test
10.   Determination of unconfined compression strength test.
11.   Conduct of SPT
12.   Soil sampling by auger and tube sampler.

REFERENCE BOOKS :

1.   Soil Engg   B.C. Punmmia
2.   Basic Soil Engg.   Dr. Alam Singh
3.   Modern Geo- Technical Engg.   Alam Singh
4.   Soil and Foundation Engineering (Hindi)   B.C. Punmia
5.   Soil and Foundation Engineering (Hindi)   B.L.Gupta.
6.   Soil Mechanics(Hindi)   Janardan Jha

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CONSTRUCTION MATERIALS

CODE CE 37   L   T   P
     CC37   2   -   2

RATIONALE

Construction materials are an important part of Civil Engineering. A Civil Engg. diploma holder should have the thorough knowledge about different materials, useful for constructions, diploma holder should know the properties of different materials used in Civil Engineering works.

CONTENTS

1.   Stones :

1.1   Classification of rocks
1.2   Geological classification - igneous rocks, sedimentary rocks and metamorphic rocks
1.3   Chemical classification - argillaceous, siliceous and calcareous rocks
1.4   Physical classification - unstratified, stratified, foliated rocks.
1.5   Common rock forming minerals and their properties - silica, felspar, mica, hornblende and dolomite.
1.6   Qualities of good building stone
1.7   General characteristics, identification and uses of common building stones - granite, basalt, trap, sand stone, lime stone, dolomite, marble, slate, quartzite.
1.8   Natural bed of stones
1.9   Seasoning of stones.

2.   Bricks :

2.1   Meaning and composition of brick
2.2   Preparation of brick clay - weathering, kneading and tempering of clay
2.3   Brief description and use of pug mill
2.4   Standard size and shape of wooden and steel moulds
2.5   Moulding - ground moulding, table moulding, sand moulding and slop moulding, machine moulding, utility of frog.
2.6   Brief description and working of different types of kilns
2.7   Classification and testing of bricks as per B.I.S.

3.   Tiles :

3.1   Use of tiles
3.2   Classification of tiles

    3.2.1   According to use
    3.2.2   According to shape
    3.2.3   Special tiles - Allahabad tiles, Mangalore tiles

3.3   Preparation of clay
3.4   Moulding, shaping, drying and burning
3.5   Properties and uses of fire clay tiles.

4.   Lime :

4.1   Introduction - lime, calcination, quick lime, slaking, setting, hardening, hydraulicity
4.2   Classification of lime as per B.I.S.
4.3   Manufacture of lime - process of charging, burning, collection and slaking.
4.4   Properties and uses of lime
4.5   Storage of lime
4.6   Testing of lime as per B.I.S.
4.7   Field test of lime as per B.I.S.
4.8   Pozzolanic materials as surkhi, cinder and fly ash.

5.   Lime Mortar :

5.1   Constituents of lime mortar
5.2   Functions of sand and surkhi in lime mortar.
5.3   Preparation of lime mortar - mixing and grinding
5.4   Properties and common uses of lime mortar.
5.5   Constituents, function and properties of lime concrete

6.   Cement and Cement Mortar :

6.1   Introduction
6.2   Raw material
6.3   Manufacturing process of ordinary Portland cement
6.4   Flow diagram for wet and dry process
6.5   Properties and use of ordinary Portland cement
6.6   Constituents, function and use of cement mortar

7.   Timber :

7.1   Standing timber, rough timber, converted timber, exogenous trees, endogenous trees, softwood and hard wood.
7.2   Growth and general structure of exogenous trees
7.3   Seasoning of timber - natural and artificial
7.4   Conversion of timber by sawing
7.5   Common defects of timber and decay of timber
7.6   Preservation of timber
7.7   Qualities and uses of good timber
7.8   Manufacturing and uses of ply woods and different ply boards and laminated boards.

8.   Paints and Varnishes :

8.1   Classification of paints - oil paints, plastic paints, enamel paints, water paints and cement paints.
8.2   Constituent materials of paints
8.3   Preparation and uses of different paints
8.4   Constituents, properties and uses of varnish and polish - spirit polish and wax polish.
8.5   Different types and use of exterior paints

PRACTICALS

1.   Identification of common rocks and minerals
2.   Dimension, water absorption and efflorescence tests of bricks
3.   Dimension, water absorption test of tiles
4.   Field test of lime
5.   Laboratory test of lime as per B.I.S.
6.   Identification of common Indian timbers, plywood and laminated boards

REFERENCE BOOKS :

1.   Construction Materials   Sushil Kumar
2.   Construction Materials   Rangwala
                                                    *****

STRENGTH OF MATERIALS - II

CODE CE 41   L   T   P
       MA 41/ME 41   2   2/2 2

RATIONALE

In Engineering every structure or machine element is designed for a particular application. Then it is tested. A Diploma holder should be capable of designing the various elements for particular requirements. For this he must be able to calculate the stresses in an elements and their nature.

CONTENTS

1.   Deflection :

1.1   Concept of deflection of a beam
1.2   Use of standard formula for calculating deflection (for point loads, U.D.L. and their combination)

      1.2.1   Cantilever beam
      1.2.2   Simply supported beam

2.   Columns and Struts :

2.1   Concept of column and struts
2.2   Modes of failure
2.3   Types of column; long and short
2.4   Buckling loads
2.5   Slenderness ratio
2.6   Euler's formula (without proof)

      2.6.1   Both ends hinged
      2.6.2   One end fixed and other end free
      2.6.3   Both ends fixed
      2.6.4   One end fixed and other end hinged
      2.6.5   Limitations of Euler's Formula
      2.6.6   Equivalent length

2.7   Rankine's formula

3.   Torsion of Shaft :

3.1   Concept of torsion

      3.1.1   Angle of twist
      3.1.2   Polar moment of Inertia
      3.1.3   Assumptions in the theory of pure torsion

3.2   Derivation and use of

$$\frac{q}{r} = \frac{T}{J} = \frac{N\theta}{l}$$

3.3   Relation between power and torque
3.4   Combined stress due to bending and torsion in solid and hollow shaft

4.   Springs :

4.1   Introduction and classification of springs
4.2   Flat carriage springs

      4.2.1   Application of flat carriage springs
      4.2.2   Determination of number of leaves and their sections, deflection and radius of curvature
      4.2.3   Quarter elliptical spring

4.3   Closely coiled helical springs :

4.3.1   Application of closely coiled helical springs
4.3.2   Determination of deflection, angle of twist, number of coils and stiffness under axial loading in closely coiled helical springs.

5.   Thin Cylindrical Shells :

5.1   Use of cylinders
5.2   Stresses due to internal pressure

5.2.1   Circumferential stress or hoop stress
5.2.2   Longitudinal stress

5.3   Design of thin cylinders - calculation of the various dimensions of a thin cylinder

6.   Combined Direct and Bending Stress :

6.1   Effect of eccentricity
6.2   Stress due to eccentric load
6.3   Middle third rule

7.   Frames :

7.1   Different types of frames
7.2   Calculation of forces in the members of determinate frames

7.2.1   Method of Joints
7.2.2   Method of section
7.2.3   Graphical method

PRACTICALS

1.   Determination of deflection for various types of loading
2.   Torsion test on brass and mild steel
3.   Compression test on columns
4.   Determination of stiffness of close coiled spring
5.   Deflection test on leaf spring.

REFERENCE BOOKS :

1.   Strength of Materials &   B.C.Punmia
     Theory of Structures (Vol. I)
2.   Strength of Materials   Ramamurtham
3.   Strength of Materials   Junarkar
4.   Strength of Materials   R.S. Khurmi
5.   Strength of Materials (Hindi)   Gurcharan Singh

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FLUID MECHANICS - II

CODE CE 42   L   T   P
                                                                          2   2/2   2

RATIONALE

Constructional engineer are often required to deal with flow of water through pipe lines and canals, therefore they must know various hydraulic phenomena with which they have to come across during their professional carrier.

Many times they may require to design pipe line for a colony, measure the discharge in canals and to select proper type of pump for a given situation. In order to be able to do so they must be trained properly to perform the above jobs satisfactorily.

CONTENTS

4.   Pumps :

      4.1   Classification of pumps
      4.2   Constructional detail of reciprocating pump
      4.3   Constructional detail of centrifugal pump
      4.4   Comparison of reciprocating and centrifugal pump
      4.5   Brief description of submersible pump and deep well turbine pump
      4.6   Installation and maintenance of pumps

PRACTICALS

1.   Determination of coefficient of friction in pipe
2.   Determination of losses of head in flow through pipes
3.   Determination of roughness coefficient for different types of channel surfaces.
4.   Determination of surface velocity and mean velocity in an open channel
5.   Study of constructional features of working of Pelton wheel turbine and Francis turbine.
6.   Study of constructional features and working of centrifugal and reciprocating pump

REFERENCE BOOKS :

1.   Hydraulics   Modi & Seth
2.   Hydraulics   K. R. Arora
3.   Hydraulics   Anand & Kulsrestha
4.   Hydraulics   B. L. Gupta

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BUILDING TECHNOLOGY - II

CODE CE 43   L   T   P
     CC43   2   --   2

RATIONALE

      Building construction is an important job of Civil Engineering diploma holder. So he must acquire the knowledge of various parts of the building, their functions, importance and procedure of construction and maintenance. Building technology includes all the aspects of construction and importance of building work.

CONTENTS

1.   Arches and Lintels :

      1.1   Meaning and uses of arches and lintels
      1.2   Glossary of terms related to arch and lintels
      1.3   Thickness of lintels, Effective span
      1.4   Type of arches e.g. semi circular, segmental arches, elliptical, pointed, relieving arch, flat arch.
      1.5   Thickness of semi-circular and segmental arches by empirical   rules

2.   Doors :

      2.1   Types of door frames - stone, timber, steel, concrete
      2.2   Description and sketches of different types of doors ledged, battened and braced door, framed and panelled door, glazed and panelled doors, louvered doors, flush doors.
      2.3   Use of collapsible door, rolling steel doors, side sliding doors, wire mesh doors.

3.   Windows :

      3.1   Names, uses and sketches of - fully panelled window, fully glazed windows
      3.2   Casement and pivoted window, dormer window, clearstory window, skylight, fanlight and ventilators
      3.3   Window frames of different materials- wood, steel, aluminium.

4.   Stairs and Stair Cases :

     4.1   Glossary of terms related to stairs

     4.2   Brief description and sketches of common types of staircase : Straight flight, Quarter turn, Half turn dog legged and open newel, Bifurcated, Circular, Spiral

     4.3   Classification of staircases according to materials used.

5.   **Roofs :**

     5.1   Functions of roofs and ceilings. Brief description, constructional details and suitability of common types of roofs.

     5.2   Definition of terms for pitched roofs, principal rafter, common rafter, jack rafter, hip rafter, valley rafter, ridge piece, caves, purlins, cleats, wall plates, valley gutter, side gutter, gable, facia board.

     5.3   Roof coverings for pitched roofs - Asbestos cement and C.G.I. method of arranging and fixing to battens, rafters, purlins both steel and wooden.

     5.4   Drainage arrangement for pitched and flat roofs.

6.   **Floors :**

     6.1   Ground floors

     6.2   Brief description, uses and construction of ground floors - Brick on edge; tiles, stone slab, marble and glazed tiles, lime concrete, cement concrete, terrazzo and mosaic.

7.   **Finishing of buildings :**

     7.1   Different types of plastering, rendering and painting

     7.2   Methods of plastering, and curing

     7.3   Defects in plasters and repairs of the defects.

     7.4   Different types of painting uses and methods of painting

     7.5   White washing, colour washing and distempering- water and oil bound distempers. Application of cement plastic paints

     7.6   Provision of expansion joints in building floors, walls and roofs.

8.   **Basic Principles of Building Planning :**

     8.1   Aspect, prospect its internal circulation, privacy grouping   (i) living areas (ii) sleeping areas and (iii) working areas

     8.2   Roominess, flexibility, furniture setting, sanitation elegance and economy

     8.3   Arrangement of doors, windows, cupboards etc for a residential building

9.   **Orientation :**

     9.1   Orientation of buildings as per I.S. 7662 in relation to sun and wind directions, rain, internal circulation and placement of room, commensurate with available areas and requirements.

     9.2   Preparation and study of sun chart on polar graphs. Sun shading devices-types sketches suitability, for different orientations.

10.   **Design of Buildings :**

     10.1   Common standards for floor space and cubical contents for residential building and public building (Schools, Hostels, Dispensaries, Panchayatghars).

     10.2   Economical design of single room tenements, double room   tenement   and residential flats

     10.3   Design of a residential building and public buildings (School, Hostel, Dispensary, Panchayatghar) including location of water supply line, drainage line and placing of electrical fittings.

     10.4   Details of a toilet, kitchen and staircase for modern residential buildings.

PRACTICALS

1.   **Sketch of**

     1.1   Panelled door

     1.2   Panelled and glazed door

     1.3   Laced battened and braced door

    1.4   Other types of doors

2.   Windows :

    2.1   Panelled windows
    2.2   Section windows
    2.3   Panelled and glazed windows
    2.4   Glazed windows

3.   Drawing of stair case

    3.1   Dog legged
    3.2   Open newel

4.   Sketch of a roof truss showing the details.

REFERENCE BOOKS :

1. Building Construction   Bindra & Arora.
2. Building Construction   Sushil Kumar.
3. Building Construction   B.C. Punamia.

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SURVEYING - II

CODE CE 44   L   T   P
                                                   2   --   6

RATIONALE

       The important functions of Civil Engineering diploma include the jobs of (i) Surveying (ii) Plotting of survey data (iii) Preparation of survey maps and (iv) Setting out works.

       Stress has, therefore, been given to the development of the skills in types of surveys including levelling, contouring, Plane table alongwith Minor Instruments that the Civil Engg. diploma holder will normally be called upon to perform. Ability of plotting and preparing survey maps and sections is equally important like fieldwork and so the students are required to be given practice in both.

CONTENTS

1.   Levelling :

    1.1   Definitions

           1.1   Level surface
           1.2   Level line
           1.3   Horizontal line
           1.4   Vertical line
           1.5   Mean sea level
           1.6   Reduced level

    1.2   Names and function of different parts of -

           1.2.1   Dumpy level
           1.2.2   Tilting level

    1.3   Difference in dumpy and tilting level.
    1.4   Internal and external focusing telescope
    1.5   Temporary adjustments of dumpy and tilting level
    1.6   Levelling staff

1.6.1   Self reading
1.6.2   Telescope staff
1.6.3   Target staff

1.7   Reading a levelling staff
1.8   Levelling with dumpy and tilting levels

1.8.1   Taking observations
1.8.2   Recording in a level book.

1.9   Calculation of R.L.

1.9.1   Height of instrument method
1.9.2   Rise and fall method
1.9.3   Arithmetical checks

1.10   Types of levelling

1.10.1 Fly levelling
1.10.2 Differential levelling
1.10.3 Profile levelling
1.10.4 Reciprocal levelling
1.10.5 Precise levelling

1.11   Effect of curvature and refraction in levelling and their corrections.
1.12   Permanent adjustment

1.12.1 Dumpy level
1.12.2 Tilting level

2.   Contouring :

2.1   Concept
2.2   Purpose of contouring
2.3   Contour interval
2.4   Horizontal equivalent
2.5   Factors affecting contour interval
2.6   Characteristics of contours
2.7   Methods of contouring - direct and indirect
2.8   Interpolation of contours
2.9   Uses of contour maps
2.10   Drawing cross sections from contour maps.

3.   Plane Table Surveying :

3.1   Description and uses of plane table and its accessories
3.2   Advantages of plane table surveying
3.3   Centering, levelling and orientation of plane table
3.4   Radiation
3.5   Intersections
3.6   Traversing
3.7   Resection
3.8   Two point problems
3.9   Three point problems
3.10   Errors in plane tabling

4.   Modern instruments

4.1   Automatic level

PRACTICALS

1.   Study of the component parts and handling of

       1.1   Dumpy level
       1.2   Tilting level
       1.3   Staves

2.   Temporary adjustments of a dumpy level and a tilting level
3.   Use of dumpy level and tilting level in differential levelling and levelling for cross section and longitudinal section. Recording in level book and plotting.
4.   Permanent adjustment of a dumpy level and tilting level
5.   Dismantling and refitting a dumpy level and tilting level.
6.   Study and use of plane table and its accessories e.g. stand, table, clamping arrangement, sight vane, through compass, plumbing fork, plumb bob, sprit level etc.
7.   Methods of plane tabling

       7.1   Radiation
       7.2   Intersection
       7.3   Traversing
       7.4   Resection

8.   Two and three point problems
9.   Preparation of a plan on area by plane table survey.
10.   Plotting spot levels of a given area by the grid method and   interpolation of contours.
11.   Preparations of a contoured plan of an uneven area with the help a level and a plane table.

REFERENCE BOOKS :

1.   Surveying   B. C. Punmia
2.   Surveying   G. C. Singh
3.   Surveying   K. R. Arora

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TRANSPORTATION ENGINEERING - II

CODE CE 45   L   T   P
                                                                        2   2   --

RATIONALE

This subject is to cater to the needs of the diploma holder engaged in the investigation, planning and construction of railways. The study of technology behind the layout, construction and maintenance of reasonably good all weather railway systems, is extremely important. Moreover, the maintenance part is very difficult and highly sophisticated affairs requiring the service of large team of technicians having sound knowledge of appropriate technology. Under railways, topics related to jobs, which fall under the purview of Civil Engineering technicians, have been included.

CONTENTS

1. **Introduction :**

    1.1   Railways, its importance
    1.2   Railway systems in India
    1.3   Gauge, different gauges in India
    1.4   Advantages and disadvantages of more than one gauge

2. **Permanent Way and Track Materials :**

    2.1   Definition of a permanent way
    2.2   Component parts of a permanent way
            subgrade, ballast, sleepers, rails, fastening and fixture.

3. **Rails :**

    3.1   Function of rails
    3.2   Requirement of rails
    3.3   Types of rail sections - Double headed rails, bull headed, flat footed rail
    3.4   Standard length and weight of flat-footed rails for different gauges
    3.5   Wear of rails- its causes and effects
    3.6   Failures of rails
    3.7   Creep-its definition, causes, effect and prevention
    3.8   Corrugated or roaring rails.
    3.9   Conning of wheels

4. **Sleepers :**

    4.1   Functions of sleepers
    4.2   Characteristics of good sleeper
    4.3   Different types of rail sleepers- wooden, steel, cast iron, concrete and prestressed concrete
    4.4   Size and shapes of all type of sleepers
    4.5   Sleeper density

5. **Ballast :**

    5.1   Functions of ballast
    5.2   Characteristics of good ballast
    5.3   Materials used as ballast - broken stone, gravel, cinder, kanker, moorum, brickbats etc.
    5.4   Size and section of ballast
    5.5   Quantity of ballast
    5.6   Renewal of ballast

6. **Fixture and Fastenings :**

    6.1   Connection of rail to fish plate and welded rails
    6.2   Connection of rail to sleepers
    6.3   Details of fixtures used

7.   Railway Geometries :

7.1   Alignment of railway line
7.2   Gradients, curve, transition length as per railway code
7.3   Superelevation, cant deficiency
7.4   Widening of gauge on curves

8.   Permanent and Temporary Land widths :

8.1   Typical cross sectioning singles and doubles tracks in cutting and embankment

9.   Points and Crossing :

9.1   Necessity and details of arrangement
9.2   Sketch of a turnout
9.3   Functions of different parts and components
9.4   Different types of point and crossing
9.5   Turnout, crossover, scissors, diamond crossing with slips, double junctions, gathering lines
9.6   Turn tables and triangles.

10.   Tracks Laying :

10.1   Plate lying
10.2   Methods of plate lying
10.3   Duties of a permanent way inspector

11.   Maintenance :

11.1   Routine maintenance of formation and side slope
11.2   Routine maintenance of ballast, fixtures and drainage
11.3   Special maintenance - replacement of defective sleeper and rails
11.4   Tools used for the maintenance of track.

12.   Stations and Yards :
12.1   Classification
12.2   Requirement and layout of station and yards
12.3   Flag station, wayside station, junction, terminal station
12.4   Passenger yards, goods yards
12.5   Marshalling yards, locomotive yards
12.6   Station equipments

13.   Signallings :

13.1   Classification and functions of signal
13.2   Types of signal - Semaphore, warner, shunt disc, colour light signal, outer, home, routing signal, starter, advanced starter, calling on and co-acting signals
13.3   3-aspect signals

14.   System of Signallings :

14.1   Absolute block system
14.2   Automatic block system
14.3   Pilot guard system

15.   Tunnelling :

15.1   Introduction
15.2   Advantages and disadvantages
15.3   Methods of construction of tunnels full-face method and needle beam method
15.4   Factors effecting the alignment of tunnels
15.5   Description and sketches of different types of tunnels
15.6   Necessity of ventilation

15.7   Method of ventilation
15.8   Drainage of tunnels
15.9   Safety precautions to be taken at the time of construction of tunnels.

REFERENCE BOOKS :

1.   Railway Bridges and Tunnels   Vazirani and Chandola
2.   Railway Bridges and Tunnels   B.L. Gupta
3.   Railway Bridges and Tunnels   G.C. Singh
4.   Railway Engineering   Saxena and Arora
5.   Railway and Tunnels   S.C. Rangwala

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CONCRETE TECHNOLOGY

CODE CE 46   L   T   P
                                                                 2   --   2

RATIONALE

A diploma holder in Civil Engineering will be required to handle various Civil Engineering constructions made of Cement Concrete in his professional life. He should know the properties and uses of various types of cement and other ingredients used in Cement Concrete. He should know to prepare concrete mix and various operations required. He should also know to test the cement and other ingredients used in cement concrete as per Indian Standard Codes.

CONTENTS

1.   Cement :

1.1   Manufacture of Portland cement
1.2   Chemical composition
1.3   Hydration of cement
1.4   Types of cement

      1.4.1   Ordinary Portland cement
      1.4.2   Rapid hardening cement
      1.4.3   Extra rapid hardening cement
      1.4.4   Sulphate resisting cement
      1.4.5   Blast furnace cement
      1.4.6   Quick setting cement
      1.4.7   Super sulphate cement
      1.4.8   Low heat cement
      1.4.9   Portland pozzolana cement
      1.4.10   White cement
      1.4.11   Hydrophobic cement
      1.4.12   Oil-well cement
      1.4.13   High alumina cement

1.5   Testing of cement

      1.5.1   Field testing
      1.5.2   Fineness test
      1.5.3   Standard consistency test
      1.5.4   Setting time test
      1.5.5   Strength test
      1.6.3   Soundness test

2.   Aggregates :

2.1   Classification of aggregates according to sources
2.2   Shape, size and texture
2.3   Bulk density
2.4   Specific gravity
2.5   Water absorption and moisture content
2.6   Bulking of aggregate
2.7   Alkali - aggregate reaction
2.8   Grading of aggregates
2.9   Sieve analysis
2.10   Standard grading curve
2.11   Specified grading
2.12   Gap grading
2.13   Flakiness index
2.14   Elongation index
2.15   Fineness modulus
2.16   Crushing value

2.17   Fines value

3.   Water :

3.1   Indian Standards for quality of water for use in cement concrete.
3.2   Effect of impurities in water on concrete.

4.   Admixtures :

4.1   Types
4.2   Uses of admixtures
4.3   Air entraining agents and their effect
4.4   Accelerators, Retarders
4.5   Workability agents

5.   Fresh Concrete :

5.1   Workability
5.2   Factors affecting workability
5.3   Measurement of workability

      5.3.1   Slump test
      5.3.2   Compacting factor test
      5.3.3   Vee-Bee consistometer test

5.4   Segregation
5.5   Bleeding
5.6   Process of manufacture of concrete

6.   Concrete Operation :

6.1   Batching

      6.1.1   Volume batching
      61.2   Weight batching

6.2   Mixing

      6.2.1   Hand mixing
      6.2.2   Machine mixing

6.3   Transporting of concrete

      6.3.1   Mortar pan
      6.3.2   Wheel barrow
      6.3.3   Bucket and rope way
      6.3.4   Truck mixer and dumpers
      6.3.5   Belt conveyors
      6.3.6   Chute
      6.3.7   Skip and hoist
      6.3.8   Pumps and pipeline

6.4   Placing concrete
6.5   Compaction of concrete

      6.5.1   Hand compaction
      6.5.2   Compaction by vibrators

6.6   Types of vibrators and its uses
6.7   Curing of concrete

      6.7.1   Water curing

6.7.2   Membrane curing
6.7.3   Steam curing
6.8   Finishing
6.8.1   Formwork finishes
6.8.2   Requirements of good finish

7.   Strength of Concrete :
7.1   Water cement ratio
7.2   Effect of maximum size of aggregate on strength
7.3   Relation between compressive and tensile strength
7.4   Bond strength
7.6   High strength concrete
7.7   Seeding
7.8   Polymer concrete

8.   Special Concrete :

8.1   Light weight concrete
8.2   No fines concrete
8.3   Aerated concrete
8.4   High density concrete
8.5   Fiber reinforced concrete
8.6   RMC (ready mixed concrete)
8.7   Ferro cement

9.   Formwork :

9.1   Requirements of formwork
9.2   Types of formwork
9.3   Time for stripping formwork

10.   Quality Control at Site :

10.1   Characteristic strength control
10.2   Test on cement, aggregate, water and concrete
10.3   Frequency of test

PRACTICALS
1.   Determination of specific gravity of cement
2.   Determination of fineness of cement
3.   Determination of soundness of cement
4.   Determination of compressive strength of cement
5.   Determination of specific gravity and water absorption of aggregates (size 40mm to 10 mm)
6.   Determination of flakiness index and elongation index of aggregates
7.   Determination of fineness modules and grain size distribution
8.   Determination of bulking of fine aggregate
9.   Test for workability
9.1   Slump test
9.2   Compaction factor test
9.3   Vee-Bee test
10.   Determination of strength of cement concrete.

REFERENCE BOOKS :
1.   Concrete Technology   P.D. Kulkarni
2.   Concrete Technology   M.S Shetty
2.   Concrete Technology   Varshney.
4.   Concrete Technology (Hindi)   G. Das & B.L.Gupta
5.   Concrete Manual   M.L. Gambhir
6.   Code IS-456-1978

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BUILDING DRAWING

CODE CE 47   L   T   P
                                                                             --   --   6

RATIONALE

A Civil Engineering diploma student should be able to communicate through drawings and sketches. He should also read drawing given to him. Through this subject, the student should develop skills of preparing drawing, drawing sketches to explain construction details and reading building sketches to explain construction details and reading building drawings. Considerations, which go with planning of building, should also be covered in the subject.

CONTENTS

1.   Detailed working plan, elevation and section of the following.

    1.1   Two bed room residential building (single story)
    1.2   Three bed room duplex bungalow with the given plot size
    1.3   Detailed plan of above showing house drainage, water supply and electrical fittings as per BIS.
    1.4   Hostel building
    1.5   Dispensary
    1.6   Primary school

2.   Drawing of a small residential building from measurements.
3.   Detailed working drawing of a two storied building.

REFERENCE BOOKS :

1. Civil Engg. Drawing   Gurcharn Singh.
2. Building Drawing   Shah, Kala & Pataki.

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THIRD YEAR

PUBLIC HEALTH ENGINEERING - I

CODE CE 51   L   T   P
                                                                                          2   --   2

RATIONALE

One of the basic necessities of life on this earth is water. Life would be impossible without it and yet it is unfortunately not available to many people in the required quantity and quality. The greater tragedy is the lack of awareness of people about water and sanitary requirements. One of the basic responsibilities of a diploma holder is to educate people in about public health standards followed by planning, design and construction of public health works. First, providing potable water and second, appropriate collection   and disposal of waste solids and liquids. The purpose of this essential subject is to make the diploma holder to acquire the knowledge of all public health works and to enable him to construct them efficiently.

CONTENTS

1.   Introduction :

1.1   Necessity of water supply system
1.2   Development of water supply system

2.   Quantity of Water :

2.1   Water demand per capita for domestic and other uses
2.2   Population forecast
2.3   Fire demand
2.4   Design period
2.5   Demand as per B.I.S

3.   Sources of Water :

3.1   Surface sources
3.2   Sub-surface sources
3.3   Quality of water obtained from different sources

4.   Quality of Water :

4.1   Examination of water

      4.1.1   Physical
      4.1.2   Chemical
      4.1.3   Bacteriological
4.2   Potability of water
4.3   Impurities of water

      4.3.1   Suspended
      4.3.2   Colloidal
      4.3.3   Dissolved impurities

4.4   Permissible standard for potable water
4.5   Effects of impurities if they are more than permissible limits

5.   Treatment of Water :

5.1   Flow diagrams of treatment plants
5.2   Function, constructional details, working of

      5.2.1   Aeration unit
      5.2.2   Feeding and mixing devices of chemicals
      5.2.3   Sedimentation

5.2.4   Coagulation and flocculation unit
5.2.5   Filtration unit

5.2.5.1   Slow sand filter
5.2.5.2   Rapid sand filter
5.2.5.3   Pressure filter

5.3   Chlorination
5.4   Chemicals used in treatment
5.5   Desalination and defluoridation

6.   Conveyance of Water :

6.1   Use, joints, merits and demerits of

6.1.1   Steel pipes
6.1.2   Cast iron pipes
6.1.3   P.V.C.
6.1.4   Asbestos cement pipes
6.1.5   G.I. pipes

7.   Regulatory Valves :

7.1   Sluice valve (gate valve)
7.2   Reflux valve
7.3   Air release valve
7.4   Scour valve
7.5   Safety valves
7.6   Pressure relief valves
7.7   Fire hydrants

8.   Distribution of Water :

8.1   Systems of supply

8.1.1   Intermittent
8.1.2   Continuous

8.2   Service reservoirs
8.3   Advantages and disadvantages of metered water supply
8.4   Types of layouts

8.4.1   Dead end system and its design as per PHED practice
8.4.2   Grid system
8.4.3   Radial system

9.   Building Water Supply :

9.1   Water supply arrangement for a building (single and double story) as per B.I.S. 2065
9.2   Water supply fixtures and their installation
9.3   Tapping of a water main.
9.4   Leakage detection and prevention
9.5   Maintenance of fixtures

10.   Rural Water Supply :

10.1   Important aspects
10.2   Sources
10.3   Treatment

PRACTICALS

1.   To determine residual chlorine by Orthotolidine-Sodium test.
2.   To determine optimum dose of coagulant by jar test.

3.   To determine hardness of water by E.D.T.A. test.
4.   To determine pH value of water by universal indicator method.
5.   To determine total, dissolved and suspended solids in a water.
6.   To determine turbidity of water by Jackson Turbidimeter or nephelometer.
7.   To determine the alkalinity by titration method.
8.   Layout of water treatment plant and detailed drawing of rapid sand filter.
9.   Use of water testing kit
10.   Sketch of sluice, reflux, air release, scour, safety valve.

REFERENCE BOOKS :

1.   Water Supply Engg.   S. K. Garg
2.   Water Supply & Sanitary Engg.   Rangwala
3.   Water Supply Engineering – I   B.C. Punmia
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IRRIGATION ENGINEERING-I

CODE CE 52   L   T   P
                                                         2 2/2 2/2
RATIONALE

        In the field of irrigation engineering a diploma engineer is responsible for maintenance and smooth running of IRRIGATION channels. So he should have sufficient knowledge of water management for the growth of crops in the country.

CONTENTS

1.   **Introduction :**

        1.1   History of irrigation development in India.
        1.2   Classification and different methods of irrigation.

2.   **Water Requirements of Crops :**

        2.1   Classes and availability of soil water
        2.2   Depth and frequency of irrigation
        2.3   Relationship between duty, delta and base period.
        2.4   Gross command area (G.C.A.) culturable commanded area (C.C.A.), culturable cultivated and uncultivated area. Intensity of irrigation
        2.5   Factors affecting duty of water, methods of improving duty
        2.6   Principal crops of rajasthan and India. Sowing and harvesting
                time
        2.7   Water requirements and rotation of different crops
        2.8   Calculation of water requirement for a given irrigated area.

3.   **Hydrology :**

        3.1   Hydrologic cycle
        3.2   Rainfall its characteristics and methods of measurement.
        3.3   Run off, factors affecting run off, determination of average annual run off.
        3.4   Importance and different methods of gauging stream flow. Hydrograph, unit hydrograph and flood hydrograph

4.   **Reservoir Planning :**

        4.1   Introduction
        4.2   Selection of site for a reservoir
        4.3   Zones of storage in a reservoir
        4.4   Mass inflow curve
        4.5   Computing storage capacity of a reservoir and capacity curve from contoured plans of storage basins
        4.6   Sitting of reservoirs, prevention and removal of silt.

5.   **Dams :**

5.1   Types of Dams
5.2   Selection of site for a dam
5.3   Forces acting on a gravity dam
5.4   Failure of gravity dams

6.   Earthen and Rock fill Dams :

6.1   Homogeneous dams and composite dams
6.2   Causes of failure of earthen dams
6.3   Drainage of earthen dam
6.4   Rock-fill dams : basic features and its need

7.   Spillways :

9.1   Brief description and functions of different types of spillways

8.   River Training Works :

8.1   River behaviour in plane and mountainous regions
8.2   Different methods of river training works sketches and brief
        description

PRACTICALS

1.   Drawing of gravity dam
2.   Drawing of earthen dam
3.   Drawing of rock fill dam
4.   Drawing of spillways

REFERENCE BOOKS :

1.   Irrigation & Water Power Engg.   Dr. B.C. Punmia & Pandey Laxmi
2.   Irrigation & Water Power Engg.   Dr. P.N. Modi
3.   Irrigation & Water Power Engg.   S.K. Garg
4.   Elem. Irrigation Engg. (Hindi)   Gurcharan Singh
5.   Elem. Irrigation Engg. (Hindi)   B.L. Gupta
6.   Fundamental Principles of
      Irrigation Engg.   V.B.   Priyani

*****

THEORY OF STRUCTURES

CODE CE 53   L   T   P
                                                                  2   2   --

RATIONALE

This subject follows the subject of strength of materials taught. The acquired knowledge is applied here to analyse the simple structures. A diploma holder in civil engineering will be required to design and construct simple structures in his professional life.

CONTENTS

1.   Slope and Deflection :

1.1   Calculation of slope and deflection in simply supported and cantilever beams, loaded with point and
        uniformly distributed load by

        1.1.1   Double integration method
        1.1.2   Macaulay's method
        1.1.3   Area moment method

2.   Influence Line Diagram for the following in Simply Supported   Beams :

2.1   Reaction
2.2   Shear force
2.3   Bending moment

3.   Rolling Loads :

3.1   Drawing of maximum B.M.D. and S.F.D. for simply supported beam for rolling loads of

3.1.1   Single concentrated load
3.1.2   Two point loads
3.1.3   Series of point loads
3.1.4   U.D.L. longer than span
3.1.5   U.D.L. shorter than span

4.   Indeterminate Structures :

4.1   Types of indeterminacy
4.2   External and internal
4.3   Degree of indeterminacy in beams and pin jointed frames

5.   Propped Cantilever Beam :

5.1   Concept
5.2   Drawing of B.M.D. and S.F.D. for propped cantilever beams loaded with point loads and U.D.L.
5.3   Slope and deflection for point loads and U.D.L.

6.   Fixed Beams :

6.1   Concept
6.2   Drawing of BMD and SFD

7.   Continuous Beams :

7.1   Drawing of BMD and SFD for continuous beams loaded with point load and UDL using Claypeyron's theorem of three moments

REFERENCE BOOKS :

1.   Strength of Material & Theory
     of Structures. Vol – I & II   B.C. Punmia
2.   Mechanics of Structure   S.B. Junarkar.
3.   Strength of Material   S. Ramamurtham
                                              *****

SURVEYING -III

CODE CE 54   L   T   P
                                                     2   --   6

RATIONALE

The important functions of Civil Engineering diploma holder include the jobs of (i) Surveying (ii) Plotting of survey data (iii) Preparation of topographic maps and (iv) Setting out works. Stress has, therefore, been given to the development of the skills in types of surveys including, Theodolite Survey, Tacheometry survey that the Civil Engineering diploma holder will normally be called upon to perform. Ability of plotting and preparing survey maps and sections is equally important like fieldwork and so the students are required to be given practice in both.

CONTENTS

1.   Theodolite :

1.1 Types
1.2 Different parts of a Vernier Transit Theodolite
1.3 Fundamental axes
1.4 Temporary adjustment
1.5 Transiting
1.6 Swinging
1.7 Measurement of horizontal angle (Repetition and Reiteration method)
1.8 Measurement of vertical angle
1.9 Measurement of the bearing
1.10 Prolonging a line
1.11 Use as level
1.12 Permanent adjustment

2. Traverse :

2.1 Types - open and closed traverse
2.2 Methods of traversing

    2.2.1 Traversing by included angles
    2.2.2 Traversing by deflection angles

2.3 Latitudes and departures
2.4 Balancing of a traverse by

    2.4.1 Bowditch's rule
    2.4.2 Transit rule

2.5 Omitted measurements

3. Tacheometry :

3.1 Concept
3.2 Methods

    3.2.1 Stadia methods
    3.2.2 Tangential methods

3.3 Anallatic lens
3.4 Determination of horizontal and vertical distances by

    3.4.1 Staff vertical
    3.4.2 Staff normal to the line of sight

3.5 Substance bar

4. Trigonometrical Levelling :

4.1 Determination of heights and distance of a point
    4.1.1 Base accessible
    4.1.2 Base inaccessible

5. Curves :

5.1 Elements of simple circular curves
5.2 Designation of curve
5.3 Radius and degree of curve
5.4 Relation between radius and degree of curve
5.5 Setting out of simple circular curve by linear and tangential methods
5.6 Vertical curves

    5.6.1 Types
    5.6.2 Setting out of vertical curves

5.7 Transition Curves

5.7.1   Ideal transition curve
5.7.2   Types of transition curve

6.   **Modern Instruments - Brief Description :**

6.1   Electronic distance measuring instruments
6.2   T-2-Theodolite
6.3   Total station

PRACTICALS

1.   Study of parts of theodolite.
2.   Measurement of horizontal angles by repetition and reiteration method.
3.   Measurement of vertical angles.
4.   Measurement of bearing of line
5.   Prolonging of a line with theodolite.
6.   Running a closed traverse using theodolite, computations, balancing   and plotting by Gale's traverse table
7.   Determination of stadia constants.
8.   Contouring by Tacheometry of a small area
9.   Setting out of simple circular curves.
10.   Determination of height of a distant point by trignometrical levelling

REFERENCE BOOKS :

1.   Surveying Vol. I & II   B. C. Punmia
2.   Surveying Vol. I & II   T.P. Kanetkar
3.   Surveying   Devid Clark

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ESTIMATING AND COSTING - I

CODE CE 55   L   T   P
                                                                 2   --   6

RATIONALE

A diploma holder should have the knowledge about to forecast the quantity of materials required for each item of work from the available drawings.

The student should also know about specifications of each work, knowledge of earthwork calculation and preparing of abstract of cost.

CONTENTS

1.   **Introduction :**

1.1   Purpose
1.2   Importance of estimating
1.3   Common items of works in civil engineering construction works
1.4   Units of measurement for common items of works
1.5   Methods of measurement
1.6   Explanation of common terms used for estimating
1.7   Different types of estimates and their significance
1.8   Merits and demerits.
1.9   Methods of taking out quantities
1.10   Study of Basic Schedule of Rates (B.S.R.)

2.   **Rate-Analysis :**

2.1   Factors affecting cost of work
2.2   Explanation of terms
2.3   Prime cost

2.4   Original cost
2.5   Provisional items
2.6   Provisional sum
2.7   Day work, item wise
2.8   Analysis of cost of material
2.9   Labour
2.10   Transport
2.11   Establishment charges and incidentals
2.12   Preparation of analysis of rates for items of work involved in building construction mentioned in practical syllabus.

3.   Specifications :

3.1   Importance of specifications. Principles for writing out specifications, types of specification
3.2   Writing general and detailed specifications for items of work in building construction mentioned in practical syllabus.

4.   Detailed Estimates for Buildings :

4.1   Calculation of quantities
4.2   Preparing abstract of cost for a residential building.

5.   Earth Work Calculations for Road & Rail Formation :

5.1   Earthwork calculations and estimates for roads and rail formation
        For earth work following methods may be used :

        5.1.1   Mean depth method.
        5.1.2   Mean area method.
        5.1.3   Prismoidal formula method
        5.1.4   Graphical method
                Using longitudinal and typical cross sections

5.2   Cross section for different stations.
5.3   Finding earth work by these sections
5.4   Calculation of permanent and temporary lands for roads
5.5   Economical depth of digging for canals
5.6   Mass haul diagram

PRACTICALS

1.   Writing units for various items of work involved in construction
2.   Recording measurement in M.B.
3.   Finding out the quantities of work for a residential building.
4.   Calculation of arch masonry.
5.   Preparation of detailed estimate for a residential building.

        5.1   Single storey
        5.2   Double storey

6.   Writing detailed specifications and rate analysis schedules for

        6.1   Earth work in excavation.
        6.2   Concrete in foundation.
        6.3   Brick work in sub and super structure.
        6.4   Random rubble and Ashler masonry.
        6.5   RCC in beams and slabs.
        6.6   Plastering
        6.7   Pointing
        6.8   White washing, colour washing and distempering

7.   Calculation of earthwork by average depth, average area, prismoidal formula and graphical method.
8.   Find out earthwork for roads using longitudinal section and typical cross section.
9.   Calculation of permanent and temporary land for roads.

REFERENCE BOOKS :

1.   Estimating & Costing   B.N.Dutta.
2.   Estimating & Costing   R.Chakarborthy.
3.   P.W.D. Basic Schedule of
     Rates of Rajasthan State

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CONSTRUCTION MANAGEMENT AND EQUIPMENTS

CODE CE 561   L   T   P
                                                            2   2   --

RATIONALE

A junior engineer is responsible for the management of a construction job at site. He is required to instruct the workmen, arrange the materials, tools and plants before carrying   out any construction activity. He is also supposed to make payments to workmen and handle some govt. money. So this subject provides all the necessary know how for the systematic work and guidance to the diploma holders. Safety relating to civil works is also included in the contents.

CONTENTS

1.   **Introduction :**

        1.1   Different types of construction
        1.2   Stages   in construction from conception to realization
        1.3   Construction team - owners, engineer and contractor
        1.4   Construction management

                 1.4.1   Necessity
                 1.4.2   Resources - men power, machines, materials, money and management
                 1.4.3   Function of construction management-planning, organising, staffing, directing, controlling and
                            co-ordinating
                 1.4.4   Joint venturing and BOT (Build Operate and Transfer) projects

2.   **Construction Planning :**

        2.1   Construction project planning
        2.2   Stages in planning
        2.3   Bar charts
        2.4   Introduction to Network
        2.5   Planning and scheduling by bar charts
        2.6   Limitations of bar chart
        2.7   PERT and CPM
        2.8   Network construction
        2.9   Determination of project schedule and critical path of a network for different cases
        2.10   Resource allocation and cost time balancing.

3.   **Organisation :**

        3.1   Types of organisation

                 3.1.1   Line, functional and line & staff and their description chart
                 3.1.2   Advantages, disadvantages and applications of various organisation
                 3.1.3   Principles of organisation
                 3.1.4   Site organisation
                 3.1.5   Principles of storing and stacking materials at site
                 3.1.6   Location of equipments
                 3.1.7   Introduction of job layout and factors influencing it

4.   **Construction Contracts :**

4.1   Introduction
4.2   Proposal and agreements
4.3   Types of construction contracts : lumpsum contract, rate contract, cost plus contracts, turnkey contracts
4.4   General conditions of contracts
4.5   Contract labour act.

5.   Construction Labour :

5.1   Condition of construction workers in India
5.2   Wages paid to workers
5.3   Trade unions
5.4   Trade union act
5.5   Important provisions of Minimum Wages Act
5.6   Productivity in construction
5.7   Workman's Compensations Act

6.   Inspection and Quality Control :

6.1   Technical services required for inspection
6.2   Quality construction
6.3   Quality control operation
6.4   Quality control in concreting, earthwork and other constructions.
6.5   Methods of recording progress of a project

7.   Construction Safety :

7.1   Meaning and scope
7.2   Legal requirements
7.3   Causes and effects of accidents
7.4   First Aid
7.5   First prevention
7.6   Safety programme
7.7   Safety training

8.   Construction Equipments :

8.1   Brief description and uses of

8.1.1   Bulldozer
8.1.2   Power shovel
8.1.3   Dragline
8.1.4   Hot mix plant
8.1.5   Rollers
8.1.6   Hauling equipments
8.1.7   Paver concrete mixer
8.1.8   Concrete vibrators
8.1.9   Jaw and roller crusher
8.1.10   Tower cranes

REFERENCE BOOKS :

1.   Construction Management & Accounts   Vazrani & Chandola
2.   Construction Management & Accounts   H. Singh- (TMH).
3.   Estimating Costing & Specification in
     Civil Engg.   M.Chakraborti
4.   Estimating Costing & Specification in
     Civil Engg. :   S.Dutta.
5.   Construction Management & Equipment   B.L. Gupta.
6.   Construction Equipment   Dr. Mahesh Verma.
7.   Construction Planning & Equipment   Peuirtoy Mc. Graw Hill
8.   Construction Planning & Equipment   Satya Narayannn &
                                                 Sushma   Saxena

9. Construction Management & Equipment   Subhash Sharma & Khanna.
10. PERT & CPM   Dr. P.N. Modi.
11. Construction Management, Equipments
    & Accounts   (Hindi)   M.R.Choudhary

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BUILDING SERVICES

CODE CE 562   L   T   P
                                                    2   2   --

RATIONALE

This subject has been kept as an elective subject to provide specialised knowledge regarding domestic water supply, building drainage, refuse storage and disposal, acoustics, principles of air conditioning and ventilation, fire fighting, electrical services and lifts.

CONTENTS

1.   Surface Finishes and External Rendering :

1.1   Types of finishes that are used for external surfaces of concrete
1.2   Shutter finish
1.3   Exposed aggregate finish
1.4   Tooled finish
1.5   Coloured finish
1.6   Painting

        1.6.1   Cement paint
        1.6.2   Plastic emulsion paint
        1.6.3   Oil paints

2.   Water Supply and Drainage in Buildings :

2.1   Water distribution system
2.2   Hot water distribution system
2.3   Drainage system in buildings
2.4   Layout of plumbing
2.5   Layout of venting

3.   Hot Water Supply :

3.1   Electric water heaters
3.2   Boiler system

        3.2.1   Direct system
        3.2.2   Indirect system

3.3   Solar water heater

4.   Ventilation :

4.1   Recommended rates of ventilation

4.2   Sources of heat

        4.2.1   Heat from people
        4.2.2   Heat from electrical appliances
        4.2.3   Solar radiation
        4.2.4   Air motion
        4.2.5   Air distribution

4.3   Ventilation systems

        4.3.1   Exhaust systems

4.3.2   Air supply systems
4.3.3   Combined supply and exhaust system

5.   Air-Conditioning System for Buildings :

5.1   Psychometrics
5.2   Cleaning of contaminants

    5.2.1   Dust to be removed
    5.2.2   Air cleaning devices

5.3   Estimating cooling load
5.4   Applications of

    5.4.1   Central system
    5.4.2   Self contained air -conditioners
    5.4.3   Window air conditioners

6.   Basic Concepts of Electrical Wiring :

6.1   Selection of wiring
6.2   Layout of wiring
6.3   Calculation of power, current and circuits
6.4   Types of wiring
6.5   Earthing

7.   Lifts :

7.1   Design considerations

    7.1.1   Number of lifts and capacity
    7.1.2   Quality of service

7.2   Arrangement of lifts
7.3   Operation of electrical lifts

    7.3.1   Single speed resistance
    7.3.2   Two speed resistance
    7.3.3   Variable voltage control
7.4   Lift wells
7.5   Lift pits
7.6   Types of entrances
7.7   Maintenance of lifts

8.   Lighting :

8.1   Lighting requirements
8.2   Good visibility
8.3   Day lighting

    8.3.1   Calculation of day light factor
    8.3.2   Measurement of daylight

8.4   Sunlight
8.5   Guidelines for provision on openings to afford good lighting
8.6   Artificial lighting

9.   Fire Protection :

9.1   Classification of buildings
9.2   Degree of fire resistance
9.3   Occupancy
9.4   Site planning and access to fire brigade
9.5   Fire zones
9.6   Fire resistance and building material

    9.6.1   Brick
    9.6.2   Stone
    9.6.3   Timber

9.6.4   Cement concrete
9.6.5   Reinforced concrete
9.6.6   Prestressed concrete
9.6.7   Steel
9.6.8   Plastic
9.6.9   Glass
9.6.10 Plaster
9.6.11 Asbestos

9.7   Fire detection

9.7.1   Fire fighting

10.   Sound and Acoustics :

10.1   Velocity of sound
10.2   Frequency of sound
10.3   Sound in enclosures
10.4   Reflection of sound
10.5   Defects due to reflected sound
10.6   Absorption of sound
10.7   Absorbent material
10.8   Types of absorbent materials
10.9   Sound insulation
10.10   Method of sound insulation
10.11   Noise and its effects.

REFERCENCE BOOKS :

1.   Building Construction   Bindra & Arora
2.   Building Construction   B.C. Punmia
3.   Building Construction   Rangwala

*****

'C' PROGRAMMING

CODE CE 571   L   T   P
Common for All Branches of Engineering   2   --   2
except CS & IT

RATIONALE

'C' is computer programming language and also structured programming language. In 'C' programming language we consider various syntax used in programming. By having good knowledge of 'C', students can write modular application and system programs. 'C' can be used in the engineering applications. By acquiring a sound knowledge of 'C' students will be able to understand the concept of all the application areas. This course is specially designed for engineering students of all diploma streams.

CONTENTS

1.   Introduction :

1.1   Scope of 'C' Language
1.2   Distinction and similarities with other HLLs
1.3   Special features and Application areas

2.   Elements of 'C' :

2.1   Character set
2.2   Key words
2.3   Data types
2.4   Constants and Variables
2.5   Operators: unary, binary, ternary
2.6   Operator precedence

3.   Console Input-Output :

3.1   Types of I-O
3.2   Console I-O
3.3   Unformatted console I-O: getchar(),putchar(), gets(), puts(), getch(),getche()
3.4   Formatted I-O: scanf(), printf()

4.   Control Flow :

4.1   Statements and blocks
4.2   if
4.3   switch
4.4   Loops: for, while, do-while
4.5   goto and labels
4.6   break, continue, exit
4.7   Nesting control statements

5.   Arrays :

5.1   Basic concepts
5.2   Memory representation
5.3   One dimensional array
5.4   Two dimensional array

6.   Functions :

6.1   Basic concepts
6.2   Declaration and prototypes
6.3   Calling
6.4   Arguments
6.5   Scope rules
6.6   Recursion
6.7   Storage classes types
6.8   Library of functions: math, string, system

7.   Pointers :

7.1   Basic concepts
7.2   &, * operator
7.3   Pointer expression: assignment, arithmetic, comparison
7.4   Dynamic memory allocation
7.5   Pointer v/s Arrays

8.   Structure and Enumerated Data Types :

8.1   Basic concepts
8.2   Declaration and memory map
8.3   Elements of structures
8.4   Enumerated data types : typedef, enum
8.5   Union

PRACTICALS

1.   Problems based on arithmetic expression, fixed mode arithmetic.
2.   Problems based on conditional statements and control structures.
3.   Problems based on arrays (1-D, 2-D), functions and pointers.
4.   Problems based on Engineering applications.

REFERENCE BOOKS :

1.   'C' Programming   Stephen Kochan
2.   Programming with 'C'   Schaum's Series
3.   'C' Programming   V.Balguru Swami
4.   'C' Programming   Kernighan & Ritchie
5.   Let us 'C'   Yashwant Kanetkar

*****

COMPUTER IN BUSINESS SYSTEMS

CODE CE 572	L	T	P
Common for All Branches of Engineering	2	--	2

RATIONALE

Computer is a tool, which can be applied to any field. It is not necessary to apply it in only engineering application but can be applied to various commercial applications equally. The student from engineering streams must have some knowledge about commercial application, as these are basic need for every one. This course is aimed to fulfil all the requirements of some one in commercial applications using FoxPro.

CONTENTS

1   Business Data Processing :

1.1   Business System
1.2   Management Functions
1.3   Levels of Management
1.4   Information Requirement
1.5   Basic tasks in business data processing
1.6   Examples of business data processing Payroll, Financial,
            Accounting, Inventory

2   Business Files :

2.1   Files, Records, Fields, Elements
2.2   Fixed and Variable Length Records
2.3   Master File, Transaction File
2.4   Record Updating in Sequential File and Direct File

3   Design, Analysis and Development of :

3.1   Computerized Invoicing

      3.1.1   Data Entry Screens
      3.1.2   Validations
      3.1.3   Receipt Data Entry
      3.1.4   Reports

3.2   Computerized Payroll

      3.2.1   Factors Involved in Payroll
      3.2.2   Exposure to structure, processing and reports
      3.2.3   File maintenance

3.3   Computerized Inventory Control

      3.3.1   Introduction and Aim of Inventory
      3.3.2   Inventory Costs
      3.3.3   Inventory Control Process
      3.3.4   Inventory transactions
      3.3.5   Inventory reports

4   FoxPro (A tool for Business System) :

4.1   Starting FoxPro
4.2   FoxPro Menus and Menu Options, Elementary Level
4.3   Creating Data Base File (DBF)
4.4   Adding and Editing Records : Browse, Append
4.5   Viewing Records
4.6   SET commands : Talk, Date, Century, Default, Printer, Deleted,
            Safety
4.7   Querying DBF : Simple and RQBE
4.8   Updating, Deleting and recalling records
4.9   Sorting, Indexing and Searching
4.10   Screen, Label, Menu, Report Generator

PRACTICALS

1.   Hands on Experience with FoxPro
2.   Creating Simple DBF, adding record, viewing data
3.   Creating a simple DBF for Invoice
4.   Querying Invoice DBF
5.   Creating a simple DBF for Payroll
6.   Report Generation for Payroll
7.   Creating Inventory DBF
8.   Inventory Report Generation

REFERENCE BOOKS :

1.   FoxPro Made Simple   R.K.Taxali
2.   Business Systems   Satish Jain
3.   Computer Fundamentals   V.K.Kapoor
4.   FoxPro Programming   Michael P.Antonovich, Galgotia Pub.

******

PUBLIC HEALTH ENGINEERING - II

CODE CE 61   L   T   P
                                                              2   --   2

RATIONALE

One of the basic necessities of life on this earth is water. Life would be impossible without it and yet it is unfortunately not available to many people in the required quantity and quality. The greater tragedy is the lack of awareness of people about water and sanitary requirements. One of the basic responsibilities of a diploma holder is to educate people in about public health standards followed by planning, designing and construction of public health works. First, providing potable water and second, appropriate collection and disposal of waste solids and liquids. The purpose of this essential subject is to make the diploma holder to acquire the knowledge of all public health works and to enable him to construct them efficiently.

CONTENTS

1.   Introduction :

   1.1   Necessity of systematic collection and disposal of waste
   1.2   Present status in the state
   1.3   Dry waste
   1.4   Semi-liquid waste
   1.5   Liquid waste
   1.6   Terminology related to sanitary engineering

2.   Quantity of Sewage :

   2.1   Domestic sewage
   2.2   Industrial waste
   2.3   Storm water
   2.4   Volume of domestic sewage dry weather flow (D.W.F.) and   equivalent DWF
   2.5   Variation of flow
   2.6   Limiting velocities

         2.6.1   Non-silting velocity
         2.6.2   Non-scouring velocity
         2.6.3   Self cleansing velocity
         2.6.4   Transporting velocity

   2.7   Depth of flow

3.   Characteristics and Composition of Sewage :

   3.1   Decomposition of sewage
   3.2   Sewage sampling
   3.3   Physical and chemical analysis
   3.4   Testing of sewage

         3.4.1   Physical test
         3.4.2   Biological test
         3.4.3   Chemical test

4.   Building Drainage :

   4.1   Aims and requirements
   4.2   Fittings and arrangements in single and multi storied buildings
   4.3   Different sanitary fitting and their installation
   4.4   Traps, seal in traps
   4.5   Gulley trap
   4.6   Intercepting trap

4.7   Grease trap
4.8   Causes of breaking seal in the traps and precautions
4.9   Testing of house drainage system

5.   Sewerage Systems :

5.1   Types

5.1.1   Separate system
5.1.2   Combined system
5.1.3   Partially separate system

5.2   Stone ware sewers
5.3   Cast iron sewers
5.4   Concrete sewers
5.5   Sewer Joints
5.6   Different shapes of sewers

6.   Appurtenances :

6.1   Manholes

6.1.1   Location
6.1.2   Location
6.1.3   Construction

6.2   Drop manhole
6.3   Inlets
6.4   Catch basin
6.5   Inverted syphon
6.6   Flushing tanks
6.7   Ventilating shaft
6.8   Lamp holes

7.   Laying of Sewers :

7.1   Setting out alignment
7.2   Excavation
7.3   Checking the gradient using boning rod
7.4   Preparation of bed
7.5   Lowering, laying and jointing
7.6   Testing
7.7   Back filling
7.8   Construction of masonry sewers
7.9   Construction of surface drains

8.   Maintenance :

8.1   Inspection of mains
8.2   Cleaning of sewers
8.3   Precautions during cleaning operations
8.4   Maintenance of traps
8.5   Cleaning of house drainage line
8.6   Ventilation of sewers
8.7   Tools and equipment needed for maintenance

9.   Sewage Disposal :

9.1   General composition of sewage
9.2   Strength of sewage
9.3   Land disposal
9.4   Dilution method of disposal
9.5   Nuisance due to disposal
9.6   Self purification of streams

10.   Treatment and Disposal :

10.1   Primary treatment
10.2   Secondary treatment
10.3   Function and construction of

10.3.1   Screening chambers
10.3.2   Grit chambers
10.3.3   Clarifier chambers
10.3.4   Trickling filters
10.3.5   Aeration tank
10.3.6   Activated sludge process

10.4   Sludge treatment
10.5   Sludge digestion
10.6   Sludge disposal

11.   Septic Tanks :

11.1   Design consideration
11.2   Disposal of effluent
11.3   Soak pit

12.   Rural Sanitation :

12.1   Introduction
12.2   Dry and wet latrines : selection, location, design life
12.3   Latrine for waterlogged high flood areas.
12.4   Aqua privies
12.5   Storm water and sludge problem

PRACTICALS

1.   Sampling procedure for water and sewage.
2.   Determination of chlorides of sewage sample.
3.   Determination of sulphates of sewage sample.
4.   Determination of BOD of sewage sample.
5.   Determination of COD of sewage sample.
6.   Flow diagram of sewage treatment plant (with sketch)
5.   Study of various types of traps (with sketches)
6.   Study of flushing cistern (with sketches)
7.   Study of urinals and WC's. (with sketches)
8.   Sketches of manhole, septic tank, clarifier and trickling filter.

REFERENCE BOOKS :

1.   Sanitary Engineering   S.K. Garg
2.   Sanitary Engineering   Rangwala
3.   Water Supply – I   B.C. Punmia

*****

IRRIGATION ENGINEERING-II

CODE CE 62   L   T   P
                                                             2   2/2 2/2

RATIONALE

In the field of irrigation engineering, a diploma engineer is responsible for maintenance and smooth running of irrigation channels. So he should have sufficient knowledge of water management for the growth of crops in the country.

Irrigation engineering is taught in the diploma course to impart the knowledge of :

I. System of channels providing irrigation at agricultural areas.

II. Crops and irrigation structures.

CONTENTS

1.   Canals :

1.1   Explanation of terms-canal
1.2   Classification of canals, channel, major distributory, minor distributory, water course, navigation canal, hydro-canal, irrigation canal, perennial canal, inundation canal
1.3   Water shed
1.4   Drainage
1.5   Alignment of irrigation canal
1.6   Explanation of terms-critical velocity, rugosity coefficient, velocity ratio, silt factor
1.7   Regime, regime slope, regime dimensions
1.8   Relation between Kennedy's critical velocity ratio and Lacey's silt factor.
1.9   Problems of sediment transport in channels.
1.10   Salient features of Kennedy's and Lacey's silt theories
1.11   Reading dimensions of irrigation channels from

      1.11.1   Garret's diagrams
      1.11.2   Lacey's diagrams

1.12   Computing the losses in irrigation channels

2.   Water Logging :

2.1   Definition
2.2   Causes, effects and preventive measures
2.3   Types of canal lining brief description and advantages

3.   Diversion Head Works :

3.1   Typical layout of head works
3.2   Brief description, sketches and function of component parts of weir or barrage
3.3   Scouring sluices, silt excluder
3.4   Divide-wall
3.5   Fish ladder
3.6   Guide bank
3.7   Marginal bunds
3.8   Head regulator
3.9   Classes of weirs

      3.9.1   Rockfill weir
      3.9.2   Bligh type weir
      3.9.3   Khosla type weir
      3.9.4   Pickup weir

3.10   Causes of failure of weirs.

4.   Cross Drainage Works :

4.1   Brief description of different methods of disposal of drainage intercepted by canals
4.2   Inlet and outlet
4.3   Aqueduct and syphon aqueduct
4.4   Super passage and syphon
4.5   Level crossing

5.   Distributory Works :

5.1   Brief description and sketches of

      5.1.1   Distributory head
      5.1.2   Silt selective device
      5.1.3   Discharge regulator
      5.1.4   Tail escape
      5.1.5   Bed bar tail escape

6.   Well Irrigation :

6.1   Explanation of terms - well, open well tube well, shallow and deep well, ground water reservoir, mota layer, depression head, cone of depression, radius of influence critical velocity.
6.2   Method of sinking of an open well through average soil

6.3   Method of construction of an open well in rock
6.4   Method of lifting of water from well
6.5   Classification of tube well

      6.5.1   Slotted wells
      6.5.2   Strainer wells
      6.5.3   Cavity wells

6.6   Brief description and sketches of common types of strainer
6.7   Construction of strainer well - selection of site boring and lowering of casing tube, preparation of strata chart, lowering strainers, shrouding, development
6.8   Construction of slotted and cavity wells
6.9   Duty of open wells and tube wells
6.10   Relative advantages and disadvantages of open wells and tube wells.

PRACTICALS

1.   Detail drawing of canal regulator
2.   Detail drawing of head regulator
3.   Detail drawing of aqueduct
4.   Detail drawing of syphon aqueduct
5.   Detail drawing of diversion head works.

REFERENCE BOOKS :

1.   Irrigation & Water Power Engg.   Dr. B.C. Punmia & Pandey
2.   Irrigation & Water Power Engg.   S.K. Garg
3.   Elementary Irrigation Engg. (Hindi)   B.L. Gupta
4.   Elementary Irrigation Engg. (Hindi)   Gurcharan Singh
*****

STEEL STRUCTURE DESIGN AND DRAWING

CODE CE 63   L   T   P
                                                       2   2   2

RATIONALE

        A diploma holder in Civil Engineering will be required to design and construct simple structures in his professional life. This subject covers design of simple steel structure. The student will also learn to use the latest relevant Indian Standard codes in the design practice of steel structures.

CONTENTS

1.   Introduction :

1.1   Types of section as per SP 24
1.2   Properties of steel as per IS 226-1969

2.   Structural Steel Connection :

2.1   Riveted connections

      2.1.1   Types of rivets
      2.1.2   Permissible stresses in rivets
      2.1.3   Failure of riveted joint
      2.1.4   Types of riveted joints
      2.1.5   Design of riveted joints for axially loaded members only.

2.2   Welded connections

      2.2.1   Types of welds
      2.2.2   Permissible stresses in welds
      2.2.3   Types of welded connections
      2.2.4   Design of butt and fillet welded connections subjected to axial loads

3.   Tension Members :

     3.1   Permissible stresses in tension for steel sections
     3.2   Load carrying capacity of a given section
     3.3   Design of tension members (flats, angles and tee sections only.)

4.   Compression Members :

     4.1   End conditions : Effective length, slenderness ratio, radius of gyration
     4.2   Permissible stresses in compression as per IS : 800.
     4.3   Strength of columns-single and built up sections.
     4.4   Design of axially loaded

          4.4.1   Simple column
          4.4.2   Built up column laced

     4.5   Design of lacing
     4.6   Design of battens
     4.7   Design of angle struts.

5.   Column Bases :

     5.1   Design of slab base
     5.2   Design of gussetted base

6.   Beams and Lintels :

     6.1   Design of simply supported laterally restrained steel beams
     6.2   Design of base plates
     6.3   Design of steel lintels
     6.4   Web buckling and crippling

7.   Roof Trusses :

     7.1   Types of loads - Dead load, live load, wind load.
     7.2   Design of purlins for a given wind load (angle, I, Channel)
     7.3   Design of members of a roof truss for given loading
     7.4   Design of joints

8.   Plate Girder :

     8.1   Design of web
     8.2   Design of flange
     8.3   Curtailment of flange plates
     8.4   Stiffeners and their requirements (no design)

PRACTICALS

1.   Sketches of the following -

     1.1   Riveted joint
     1.2   Welded joint
     1.3   Tension member
     1.4   Compression member
     1.5   Column bases
     1.6   Beams and lintels

2.   Detailed drawing of -

     2.1   Laced column
     2.2   Battened column
     2.3   Roof truss
     2.4   Plate girder
     2.5   Beam column connections

NOTE :
1.   IS : 800, and steel table must be provided in examination.
2.   No Detailed drawing questions will be asked in theory question paper.

REFERENCE BOOKS :

1. Steel Structure (Hindi)   M.M. Malhotra.
2. Steel Structure   L.S. Negi.
3. Steel Structure   S. Ramamurtham
4. Steel Structure   Arya & Azamani
5. Steel Structure (Vol -I)   Ramchandra

*****

R.C.C. DESIGN AND DRAWING

CODE CE 64   L   T   P
                                                       2   2   2

RATIONALE

A diploma holder in Civil Engineering will be required to handle simple R.C.C. structures in his professional life, therefore he should be able to design simple structural elements of R.C.C. The student should also learn to use the latest relevant Indian Standard codes in his design practice.

NOTE : All designs are to conform to the provisions of IS : 456- 2000.

CONTENTS

1.   Introduction :

  1.1   Reinforced Cement Concrete- its meaning, constituents,
          functions and specifications as per I.S..
  1.2   Working stress method of design
  1.3   Limit state method of design
  1.4   Ultimate method of design
  1.5   Past practice and present practice for the design of structures.
  1.6   Grades of concrete and steel
  1.7   Stress - strain curve for concrete and steel
  1.8   Load factors
  1.9   Steel concrete bond, development length, anchorage value
  1.10   Effective span, specification of reinforcement as per BIS

2.   Flexural Members :

  2.1   Limit state of collapse
  2.2   Limit state of flexure
  2.3   Neutral axis, moment of resistance, balanced and unbalanced sections
  2.4   Limit state of shear, nominal shear stress, shear strength of beam.
  2.5   Design of shear reinforcement
  2.6   Limit state of serviceability deflection and cracking criteria.
  2.7   Curtailment of bars

3.   Analysis and Design of Beams :

  3.1   Single reinforced beam
  3.2   Doubly reinforced beam
  3.3   T-beam
  3.4   Lintel
  3.5   Cantilever beam

4.   Slabs :

  4.1   Design criteria as per BIS
  4.2   Design of one-way slab
  4.3   Design of two-way slab with corners free to lift

5.   Compression Members (axially loaded columns) :

  5.1   Limit state of compression
  5.2   Load carrying capacity
  5.3   Design of short and long column (with lateral ties only)

6.   Design of Footing :

    6.1   Critical section for shear and bending moment
    6.2   Design of an isolated footing of uniform depth for a square column
    6.3   Layout of reinforcement

7.   Retaining Wall :

    7.1   Types of retaining walls
    7.2   Design of cantilever type retaining wall
    7.3   Reinforcement details

8.   Prestressed Concrete :

    8.1   Definition, advantages and methods of prestressing
    8.2   Losses in prestressing
    8.3   Stress calculations for point loads and uniformly distributed load for different tendon positions

PRACTICALS

1.   Sketches of the following

    1.1   Singly reinforced beam
    1.2   Doubly reinforced beam
    1.3   T-beam
    1.4   Cantilever beam
    1.5   Lintel
    1.6   Column
    1.7   Isolated square footing.

2.   Detailed working drawing of R.C.C. cantilever retaining wall with bar bending schedule.
3.   Detailed working drawing of flat bottom circular tank at ground.

NOTE :
1.   IS 456-2000 must be provided / allowed in exam.
2.   No Detailed drawing questions will be asked in theory question paper.

REFERENCE BOOKS :

1.   Reinforced Cement Concrit   B.C. Punmia
2.   Reinforced Cement Concrit   H.J. Shah
3.   Reinforced Cement Concrit   A.K. Jain

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ESTIMATING AND COSTING - II

CODE CE 65   L   T   P
                                                                                   2   --   6

RATIONALE

    A diploma holder in civil engineering has a major job of valuation and rent fixation. Once he is working as junior engineer or contractor he must be familiar with the departmental procedures. The student will get the knowledge of making tender notices, inviting tenders, executing contracts and recording M.B.

CONTENTS

1.   Preparing Detailed Estimates for the Various Items of Work from the   given Drawing for

    1.1   Detailed estimates for earthwork of irrigation canals
    1.2   Septic tank and soak pit
    1.3   Workshop shed
    1.4   Arch and slab culvert
    1.5   Bitumen road

2.   Valuation of Property and Rent Fixation :

    2.1   Objects of valuation

4.14   Supplementary estimate
4.15   Daily labour on muster roll system
4.16   Completion report

5.   Public Works Accounts :

5.1   Payment to labourers
5.2   Payment to contractors and suppliers
5.3   Standard measurement book
5.4   First and final bill
5.5   Running account bill
5.6   Advance payments
5.7   Hand receipt form no. 28
5.8   General instructions for preparation of bills
5.9   Payment to work-charged establishment
5.10   Imprest account
5.11   Temporary advance account
5.12   Treasury challan
5.13   Cash book

6.   Stores, Tools and Plants :

6.1   Purchase of stores
6.2   Reserve of stock
6.3   Dead stock
6.4   Surplus and unserviceable stores
6.5   Verification of stores
6.6   Issue of materials from stock
6.7   Tools and plants
6.8   M.A.S. account

PRACTICALS

1.   Finding earth work for irrigation canals using L-section and cross section.
2.   Calculation of permanent and temporary land for canals
3.   Detailed estimate for septic tank and soak pit
4.   Detailed estimate for workshop shed
5.   Detailed estimate for arch and slab culvert
6.   Preparation of tender notice
7.   Valuation by different methods.
8.   Typical valuation reports
9.   Calculation of rent of residential building
10.   Calculation of rent of commercial building
11.   Typical rent statement

REFERENCE BOOKS :

1.   Estimating & Costing   Chakerborty
2.   Estimating & Costing   B.N. Dutta
3.   Estimating & Costing   Rangwala
4.   Estimating & Costing   Bhasin
5.   Estimating & Costing   Vazirani & Chandola
6.   Civil Engg. Estimating & Costing   Mahajan
7.   Civil Engg. Estimating & Costing   G.S. Birdie
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REPAIR AND MAINTENANCE OF CIVIL WORKS

CODE CE 661   L   T   P
                                                     2   2   --

RATIONALE

One of the major concerns of civil engineering technicians is to take care of the civil works, already constructed, in order to keep these works/ structures in utmost workable conditions. Usually it is being felt that the civil work

deteriorate faster for want of care and proper maintenance. The buildings usually have a shabby appearance due to leakage from the roofs and sanitary / water supply fittings. Thus the need for teaching the subject in proper perspective has arisen.

CONTENTS

1.   Principles of Maintenance :

      1.1   Introduction
      1.2   Definition
      1.3   Causes of deterioration and decay of civil works
      1.4   Maintenance generators : mechanical agents, electromagnetic agents, thermal agents, biological agents, chemical agents, water, user misuse, vandalism
      1.5   Durability of materials : bricks and tiles, bituminous materials, concrete, metals, plastics, stone, timber

2.   Maintenance Standards :

      2.1   Determinants of maintenance standards, statutory standards, repairs, stability, freedom from dampness, natural lighting, ventilation, water supply, drainage, sanitary conveniences

3.   Defects :

      3.1   Broad list of common defects
      3.2   Methods of investigation : list of basic equipment for investigating defects, maintaining building and size records
      3.3   Diagnosis of defects: prescribing remedies : executing remedial prescriptions.

4.   Maintenance Organisation :

      4.1   Inventory of buildings and other civil works required to be maintained; Inspections : annual, Performa for classification of maintenance operation; preparation of estimates for maintenance work
      4.2   Tendering and award of work
      4.3   Maintaining departmental labour teams for petty repairs
      4.4   Maintaining records : Measurement books : check measurement books and standard measurement books

5.   Maintenance Problems and Their Solution :

      5.1   Foundation problems, water proofing, leaking basements and roofs, treating dampness in walls, omission of DPC and by-passing of DPC, window sills, down-pipes and other areas of damp penetration.
      5.2   Cracks in walls : horizontal, vertical, diagonal : care and floors, removing stains from floors : ink, rust, oil, paint and varnish, asphalt / bitumen, blood, urine, coffee, tea.
      5.3   Timber defects, termites, scraping doors, plaster work, door jamb repairs, internal finishes, glazing, rendering, external finishing.
      5.4   Maintenance problems of plumbing, heating, hot water supply, clogged drains, sewers; leaking pipe joints, electrical installations. Other building services, septic tanks, soak pits.
      5.5   Maintenance of roads, road berms, side drains
      5.6   Maintenance of bridges, culverts, causeways
      5.7   Strengthening of canal embankments, silt clearance, weed removal, Repairs to canal lining, repairs of outlets.

Note :   Instructional Strategy :

      This is very important course and efforts should be made to find damaged/ defective work spots and students should be asked to think about rectifying/ finding solution to the problem. Visits to work site, where repair and maintenance activities are in progress can be very useful to students.

REFERENCES BOOKS :

1.   Maintenance Engineering for   Naysk, BS
     Civil Engineers   Khanna Publishers, Delhi.
2.   Building Failures - Diagnosis & Avoidance   Ranaom
3.   Maintenance & Repair of Buildings   Hutchin Son

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APPROPRIATE TECHNOLOGY

CODE CE 662   L   T   P
                                                                          2   2   --

RATIONALE

Considerable employment opportunities are available in rural sector if diploma holders in civil engineering are trained to undertake small entrepreneurial activity in the rural areas. This subject aims at imparting knowledge and skill in the use of local materials for low cost housing, rural water supply and sanitation, rural roads and other appropriate technologies, which can be promoted for upgrading standards of life in rural areas.

CONTENTS

1. **Introduction :**

    1.1   Scope and concept of appropriate technology as applicable to civil engineering, importance of low cost construction in rural areas.

2. **Materials :**

    2.1   Importance of locally available materials, bamboo, tree, bushes, grass, mud, sand etc., treatment of materials for protection against termite, decay and for increasing their strength.

3. **Mud walls :**

    3.1   Construction of plane and block mud walls, bamboo / bush reinforced mud walls, water proofing of mud walls, thickness of mud walls, mud plaster, bitumen combine mud plaster.

4. **Thatched Roofs :**

    4.1   Method of construction for thatched roofs, fire proofing of thatched roof, low cost treatment of thatched roof

5. **Low Cost Housing :**

    5.1   Planning and construction of low cost houses, cluster of houses, ventilation, low cost doors, construction of mud floors, construction of smokeless chullahs, construction of cement treated gunny bags, sheds, construction of sheds for animals.

6. **Rural Water Supply :**

    6.1   Construction of open well, chlorination of water from open well, construction of hand pumps, construction of bathing cubical, construction of low cost drains.

7. **Rural Sanitation :**

    7.1   Construction of low cost latrines, construction of prefabricated septic tanks, construction of soak pits.

8. **Rural Roads :**

    8.1   Soil stabilization and construction of fair weather roads, construction of bunds.

9. **Miscellaneous :**

    9.1   Low lift pumps, ferro cement storage tanks, ferro- cement grain bins, red clay tiles for roof and floors, construction of rapid burning low cost brick kilns, solar seasoning plants. Solar cookers, fiber corrugated sheets
            Concrete blocks for wall construction, brick panels, pre cast lintels, slabs and beams etc.

REFERENCE BOOKS :

1.   Grameen Nirman   Er. D. K. Bhargav
2.   Rural Water Supply & Sanitation   Rajiv Gandhi National
       Programme in India   Drinking Water Mission, New Delhi
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ENVIRONMENTAL ENGINEERING

CODE CE 663   L   T   P
                                                                          2   2   --

RATIONALE

A civil engineering diploma holders must have the knowledge of different types of pollution caused due to industrialisation and construction activities so as he may help in balancing the ecosystem and control pollution by providing controlling measures. He should also be aware of the environment laws for effectively controlling the pollution of environment.

CONTENTS

1.   Environment and Ecology :

    1.1   Definition and understanding of their concept
    1.2   Ecosystem
    1.3   Energy flow in an ecosystem
    1.4   Important bio chemical cycles (water, carbon, oxygen)
    1.5   Communities relationship in an eco system

2.   Factors Affecting Environmental Pollution :

    2.1   Population
    2.2   Urbanisation
    2.3   Industrialisation
    2.4   Transportation
    2.5   Insecticide
    2.6   Animals
    2.7   Wars
    2.8   Deforestation

3.   Water Pollution :

    3.1   Fresh water

        3.1.1   Causes of water pollution in surface and ground water
        3.1.2   Water quality standards
        3.1.3   Remedial measures to control fresh water pollution

    3.2   Waste water

        3.2.1   Adverse effects of domestic and industrial effluents
        3.2.2   Standards for industrial effluents
        3.2.3   Remedial measures to control industrial pollution

4.   Air Pollution :

    4.1   Definition
    4.2   Sources
    4.3   Harmful effects on living and non living beings
    4.4   Permissible limits as per Indian standard
    4.5   Remedial measures

5.   Noise Pollution :

    5.1   Introduction
    5.2   Sources of noise
    5.3   Decibel scale
    5.4   Adverse effect on human beings and environment
    5.5   Control measures

6.   Land Pollution :

    6.1   Introduction
    6.2   Sources of land pollution
    6.3   Effects of land pollution
    6.4   Control measures
    6.5   Soil conservation

7.   Environmental Impact Assessment (EIA) :

7.1   Introduction
7.2   E.I.A. of thermal power plants, mining and nuclear radiation

8.   Global Environmental Issues :

8.1   Deforestation
8.2   Land sliding
8.3   Recharging and drying of water resources
8.4   Green house effects
8.5   Ozone depletion
8.6   Acid rain
8.7   Global warming

9.   Non Conventional Sources of Energy in Environmental Protection.
10.   Pollution Control Acts :

10.1   Water Pollution Control Act 1974 and 1981
10.2   Air Pollution Control Act 1981
10.3   Forest (Animal) Conservation Act 1972
10.4   Environmental Protection Act 1986
10.5   Pollution Control provisions in Motor Vehicle Act

11.   Environment Laws :

11.1   Water Pollution Prevention and Control Act
11.2   Air Pollution Prevention and Control Act

REFERENCE BOOKS :

1.   An Overview of Environment Engg.   Kapoor
2.   Water Supply & Sanitary Engg.   Birdie & Birdie
3.   i;kZoj.k bUthfu;jh   lh-ch- 'kekZ
4.   i;kZoj.k vocks/k   MkW- vks>k
5.   i;kZoj.k vfHk;kaf=dh   vt; dqekj mik/;k;

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MANAGEMENT

CODE CE 671   L   T   P
    Common for All Branches of Engineering   2   2   --

RATIONALE

To achieve the target and goals in an organisation it is essential to co-ordinate the entire system. For this purpose the knowledge of principles of management, human resources development, material management and financial management is required.

CONTENTS

1.   Principles of Management :
1.1   Management, administration and organisation, difference between them.
1.2   Scientific management : Meaning, characteristics, object and advantage : Taylor's scientific management – Fayol's principles of management, functions of management
1.3   Types of ownership, sole trading, partnership, joint stock, co-operative and public enterprise
1.4   Types of organisation, different types and their charts.
1.5   Importance of human relation professional ethics
1.6   Need for leadership, leadership qualities
1.7   Motivation

2.   Human Resources Development :

2.1   Introduction, object and functions of human resource development department
2.2   Recruitment, sources and methods of selection, need for effective training, method of training, duties of supervisor / Formen, role of HRD in industries.

3.   Wages and Incentives :

3.1   Definition and requirements of a good wage system methods of wage payment
3.2   Wage incentives - type of incentive, difference in wage incentive and bonus, incentive to supervisor.

4.   Material Management :

4.1   Purchasing Functions and duties of purchase department organisation of purchase department, methods of purchasing, purchase order contracts, legality of contracts types of contracts i.e. piece work contract, lumpsum contract, item rate contract, percentage contract, merits and limitation of each contract system, departmental execution of works, rate contract - D.G.S & D and C.S.P.O. tender, necessity, types of tenders, tendering procedure, earnest money and security money
4.2   Store and store keeping : Functions and duties of store department, location and layout of store, bin cards, store ledger, receipt and issue procedure of materials, physical verification of stores, disposal method of unserviceable articles and protection of stores.
4.3   Sales : function and duties of sales department sales promotion advertisement service after sales.

5.   Financial Management :

5.1   Function and duties of finance department
5.2   Brief idea of journal, ledger, trial balance, trading account, profit and loss account, balance sheet.
5.3   Cheques (crossed and bearer), draft, promissory note, letter of credit, brief idea of cost accounting.
5.4   Numerical problems.

6.   Marketing Management :

6.1   Concept of Marketing
6.2   Problems of Marketing
6.3   Pricing policy
6.4   Distribution channels and methods of marketing

7.   Tax System and Insurance :

7.1   Idea of income tax, sales tax, excise duty and custom duty
7.2   Industrial and fire insurance, procedure for industrial insurance.

8.   Labour Legislation and Pollution Control Acts :

8.1   Industrial acts : factory act 1948
8.2   Workmen's compensation act 1923
8.3   Apprentices act 1961
8.4   Water pollution contract act 1974 and 1981
8.5   Air pollution contract act 1981
8.6   Environmental protection act 1986
8.7   Forest (animal conservation act 1972)
8.8   Pollution control provisions in motor vehicle act.

9.   Entrepreneurship Development :

9.1   Role of entrepreneurship and its advantages
9.2   Distinction between an entrepreneur and a manager
9.3   Project identification and selection
9.4   Project formulation
9.5   Project appraisal

REFERENCE BOOKS :
1.   Industrial Management   V.K. Sharma & O.P. Harkut
2.   Industrial Engg. & Management   O.P. Khanana
3.   Industrial Engg. & Management   T.R. Banga
                                       *****

ENTREPRENEURSHIP DEVELOPMENT

CODE CE 672   L   T   P
            Common for All Branches of Engineering   2   2   --

RATIONALE

This subject will introduce the students about how to set up a small-scale industry. The subject includes the procedure for how to select, proceed and start the SSI, which also involves a concrete market survey report and project formulation.

CONTENTS

1.   Entrepreneurship :

    1.1   Role of entrepreneurship and its advantage
    1.2   Classification of industries (based on scale)
    1.3   Classification of industries (based on type)

2.   Industrial Policy :

    2.1   New industrial policy
    2.2   M.R.T.P. act.

3.   Entrepreneurial Development :

    3.1   Product identification/ selection
    3.2   Site selection
    3.3   Plant layout
    3.4   Institutional support needed
    3.5   Pre-market survey

4.   Entrepreneurship Support System:

    4.1   Role of District Industries Centre in setting up industry
    4.2   Function of NSIC, SISI, NISIET, NRDC, SSIC, SIDO, NMTC, KVIC, RSMDC
    4.3   Role of state finance corporation, state electricity board, pollution control board, RAJCON, BIS, I.S.O. etc.

5.   Setting up SSI :

    5.1   Registration of SSI
    5.2   Allotment of land by RIICO
    5.3   Preparation of project report
    5.4   Structure of organisation
    5.5   Building construction
    5.6   Establishment of machines

6.   Raw Material Management :

    6.1   Allotment of iron and steel, coke/ coal
    6.2   Allotment of other indigenous raw material from NSIC
    6.3   Allotment of imported raw material and parts

7.   Marketing Facilities :

    7.1   Supply of product to state govt, to defence, to railways, to CSPO, to CSD
    7.2   Participation in international exhibition and fairs, trade centres, state emporium and departmental stores
    7.3   Quality consciousness and its effect on product sales

8.   Financial Sources for SSI :

    8.1   Various institutions providing loans for industries
    8.2   Various types of loans
    8.3   Subsidies

9.   Contracts and Tenders :

    9.1   Type of contracts
    9.2   Necessity of contract and tenders
    9.3   Type of tenders
    9.4   Tendering procedure

10.   Project Report :

    10.1   Procedure of preparing a project report
    10.2   Format of project report

10.3   Preparation of project report for some SSI items

11.   ISO : 9000 Series of Quality System :

11.1   Definition of few important terms related to ISO quality system
11.2   Various models for quality assurance in ISO : 9000 series
11.3   Various elements of ISO : 9001 model (20 points)
11.4   Benefits by becoming an ISO : 9000 company
11.5   Introduction to total quality management (TQM)

REFERENCE BOOKS :

1.   Hand Book of Small Scale Industry   P.M. Bhandari
2.   Hand Book on Entrepreneurship Development   O.P. Harkut
3.   Entrepreneurial Development   S.S. Khanka
4.   Statistical Quality Control   Mahohar Mahajan
5.   ISO : 9000 Quality System   S. Dalela

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PRODUCTION SYSTEM MANAGEMENT

CODE CE 673   L   T   P
    Common for All Branches of Engineering   2   2   --

RATIONALE

Diploma holders are responsible for controlling various production activities, which are not directly related to shop floor. These activities are new product design, Demand forecasting, capacity planning, material requirement planning etc. A diploma engineer should also be aware about new techniques used for manufacturing like group technology and JIT manufacturing.

CONTENTS

1.   Introduction :

1.1   Production and production management
1.2   Objectives of production management
1.3   Functions and scope of production management

2.   New Product Design :

2.1   Product life cycle
2.2   Product policy of an organisation
2.3   Selection of a profitable product
2.4   Product design process and product analysis

3.   Demand Forecasting :

3.1   Need for demand forecasting
3.2   Long term and short term forecasts
3..3   Classification of forecasting methods
3.4   Various forecasting methods

4.   Production Planning and Control :

4.1   Objective and function of PPC
4.2   Comparison between production planning and production control
4.3   Information requirement of PPC
4.4   Organisation for PPC
4.5   Manufacturing method and PPC
4.6   Problems of PPC

5.   Capacity Planning :

5.1   Measurement of capacity
5.2   Capacity planning

     5.3   Estimating future capacity needs
     5.4   Aggregate planning
     5.5   Master production schedule

6.   Material Requirement Planning :

     6.1   Objectives and functions of MRP
     6.2   MRP system
     6.3   Management information from MRP
     6.4   Lot sizing consideration
     6.5   Manufacturing resource planning (MRP – II)

7.   Process Planning :

     7.1   Process and equipment selection
     7.2   Machine requirement
     7.3   Machine output
     7.4   Manpower planning
     7.5   Line balancing
     7.6   Process planning

8.   Production Control :

     8.1   Loading
     8.2   Sequencing
     8.3   Assignment model
     8.4   Scheduling
     8.5   Despatching

9.   Make or Buy Decision :

     9.1   Make or buy decision making
     9.2   Factors influencing make or buy decision
     9.3   Functional aspects of make or buy decision

10.   Application of LPP in Production Management :

     10.1   Product mix decision
     10.2   Standard form of linear programming problem
     10.3   Formulation of L.P. problem
     10.4   Graphical method (only) for solving problems

11.   Group Technology :

     11.1   Concept of group technology
     11.2   Group layout
     11.3   Stages in group technology manufacturing
     11.4   Benefits of G.T.

12.   Just in Time Manufacturing :

     12.1   Concept of JIT
     12.2   Seven wastes
     12.3   Basic element of JIT
     12.4   Benefits of JIT

REFERENCE BOOKS :

1.   Industrial Engg. & Production Managemsent   Martand Telsang,
2.   Production Management   Jain & Agarwal
3.   Production Management System   S.C. Sharma

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