

Roll No.

Total Pages : 2

43155

BT-3/D-24

INTRODUCTION TO CIVIL ENGINEERING

Paper-HM-251A

Time : Three Hours]

[Maximum Marks : 75

Note : Attempt *five* questions in all, selecting at least *one* from each Unit. All questions carry equal marks.

UNIT-I

1. (a) What are various types of buildings? State the features and requisites of high-rise building. (8)
- (b) How are bridges classified? Explain. (7)
2. What is Civil engineering? Discuss various broad disciplines of Civil Engineering. State the career prospects in civil engineering. (15)

UNIT-II

3. What is the role of construction industry in the development plan of a country? Discuss the budget allocation in present regime for infrastructural growth in Indian context. (15)
4. (a) What are the traditional principles of surveying? Explain the use of GPS and LIDAR in the field of surveying. (9)

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- (b) What is the principle behind working of Total-station? (6)

UNIT-III

5. Write short notes on :
- (a) Robotics in construction.
 - (b) Contract Management. (15)
6. (a) What is major construction equipment? Discuss the significance of automation in construction industry. (7)
- (b) Why are chemicals used in construction? Discuss the use of chemicals in Construction industry with the help of examples. (8)

UNIT-IV

7. (a) How can you ensure sustainability in construction? Explain various actions taken for sustainability. (8)
- (b) What do you understand by solid waste management? Explain its techniques. (7)
8. What are the basics of water supply systems? State the design criteria and uses of Multipurpose reservoir projects. (15)

43156**BT-3/D-24****HIGHER ENGINEERING MATHEMATICS****Paper-BS-204A**

Time : 3 Hours]

[Maximum Marks : 75

Note : Attempt **five** questions in all, selecting at least **one** question from each unit. All questions carry equal marks.

UNIT-I

1. (a) Find the Laplace transform of the function

$$e^{2t} + 4t^3 + 2\sin 3t + 3\cos 3t. \quad (8)$$

- (b) Find the inverse Laplace transform of the function

$$\frac{2s^2 - 4}{(s+1)(s-2)(s-3)}. \quad (7)$$

2. (a) Find the Laplace transform of the function

$$\frac{1 - \cos 2t}{t}. \quad (8)$$

- (b) Solve the following differential equation using Laplace Transform :

$$\frac{d^3y}{dt^3} + 2\frac{d^2y}{dt^2} - \frac{dy}{dt} - 2y = 0,$$

$$\text{where } y = 1, \frac{dy}{dt} = 2 \frac{d^3y}{dt^3} = 2 \text{ at } t = 0. \quad (7)$$

UNIT-II

3. (a) Form the partial differential equation (by eliminating the arbitrary function) from

$$z = (x + y)\phi(x^2 - y^2). \quad (8)$$

- (b) Solve the Partial differential equation

$$x^2(y - z)p + y^2(z - x)q = z^2(x - y). \quad (7)$$

4. (a) Using Charit's method, solve :

$$z^2 = pqxy. \quad (8)$$

- (b) Solve the equation :

$$r - 4s + 4t = e^{2x+y}. \quad (7)$$

UNIT-III

5. (a) Using bisection method find the roots of the equation

$$x^2 - x - 11 = 0,$$

correct to four decimal places. (8)

- (b) Find the real root of the equation

$$x^4 - x - 9 = 0$$

by Newton-Raphson method, correct to three places of decimal. (7)

6. (a) Using Newton's forward interpretation formula, find y at x = 8 from the following table : (8)

x :	0	5	10	15	20	25
y :	7	11	14	18	24	32

- (b) Using Newton's divided difference formula, evaluate $f(8)$ and $f(15)$, given : (7)

x	4	5	7	10	11	13
f(x)	48	100	294	900	1210	2028

UNIT-IV

7. (a) Find the first, second and third derivatives of the function tabulated below at the point $x = 1.5$: (8)

x	1.5	2.0	2.5	3.0	3.5	4.0
f(x)	3.375	7.0	13.625	24.0	38.875	59.0

- (b) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ by using Trapezoidal and Simpson's 1/3 rule. (7)
8. Apply Runge-Kutta fourth order method, to find an approximate value of y when $x = 1.2$, in steps of 0.1, given that :

$$\frac{dy}{dx} = x^2 + y^2 \text{ and } y(1) = 1.5. \quad (15)$$

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BT-3/D-24

INTRODUCTION TO SOLID MECHANICS

Paper : CE-201A

Time : Three Hours]

[Maximum Marks : 75

Note : Attempt *five* questions in all, selecting at least *one* question from each unit. All questions carry equal marks.

1. (a) A steel plate of width 120 mm and thickness 20 mm is bent into a circular arc of radius 10 m. Determine the maximum stresses induced and the bending moment which will produce the maximum stress. Take $E = 2 \times 10^5 \text{ N/mm}^2$. (7)
 - (b) Define the following terms
 - (i) Poisson's ratio
 - (ii) Bulk modulus
 - (iii) Modulus of resilience
 - (iv) Rigidity modulus. (4)
 - (c) What are the assumptions in theory of simple bending? (4)
-
2. Calculate the crippling stress, using Euler's Formula, for a pin-ended 2 m long strut consisting of a tube of 7.5 cm outside diameter and 2.5 mm wall thickness. In a compression test, a short length of this tube failed at a load of 315 kN when tested as a strut with rounded ends,

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2 m long, it failed at a load of 174 kN. Find from these data the value of the constant in the Rankine's Formula. Take Young's modulus = 20 MN/cm². (15)

UNIT-II

3. (a) A cantilever beam of span L, fixed at the left end, carries a gradually varied load from zero at free end to w per m length at fixed end. Draw the SFD and BMD. (8)
- (b) Draw the shear force and bending moment diagram for a cantilever beam of span 5 m subjected to uniformly distributed load of 5 kN/m over a length of 2 m starting from the free end. (7)
4. A three hinge parabolic arch hinged at the support and crown has a span of 24 m and a central rise of 4 m. It carries a concentrated load 15 kN at 18 m from left end support and a uniformly distributed load of 30 kN/m over the left half portion. Determine the moment, thrust and radial shear at a section 6 m from left support. (15)

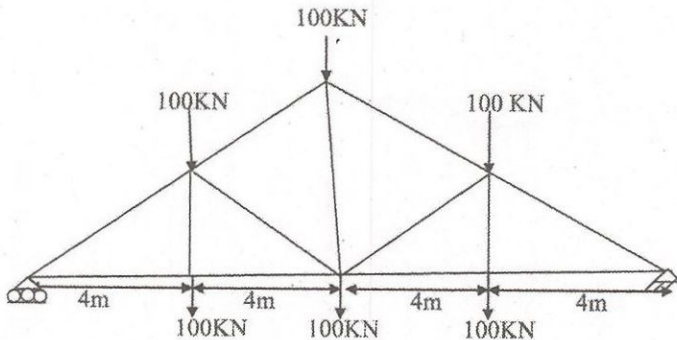
UNIT-III

5. (a) A 200 cm long cantilever beam carries a load of 3 kN at a distance of 100 cm from the fixed support end and a load of 2 kN at the free end. Determine the deflection at the free end. Take $E = 20 \times 10^6$ N/cm², $I = 1500$ cm². (10)
- (b) Explain moment area theorems. (5)

6. A cantilever of length 3 m is carrying a UDL of 10 kN/m over a length of 2 m from fixed end. Find the maximum slope and deflection. Assume $EI = 4 \times 10^{12} \text{ Nmm}^2$. (15)

UNIT-IV

7. Determine the forces in a member of truss as shown in fig. (a) By method of Joint. (15)



8. Explain Tension Coefficient Method for analysis of truss. (15)



BT-3/D-24**INTRODUCTION TO FLUID MECHANICS**

Paper : CE-203A

Time : Three Hours]

[Maximum Marks : 75

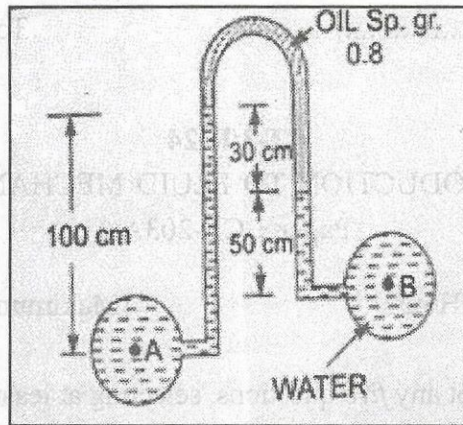
Note : Attempt any *five* questions, selecting at least *one* question from each unit.

UNIT-I

1. Define surface tension. Obtain an expression for capillary rise and capillary fall of a liquid. (15)
2. Water flows through a pipe AB 1.2 m diameter at 3 m/s and then passes through a pipe BC 1.5 m diameter. At C, the pipe branches. Branch CD is 0.8 m diameter and carries one-third of the flow in AB. The flow velocity in branch CE is 2.5 m/s. Find the volume rate of flow in AB, the velocity in BC and the diameter of CE. (15)

UNIT-II

3. (a) An inverted differential manometer connected to two pipes A and B containing water as shown in figure. The fluid in manometer is oil of specific gravity 0.8. For the manometer readings shown in figure, find the difference of pressure head between A and B. (7)



- (b) Give the expression for pressure in case of Vertical single column manometer. (8)

4. (a) Determine the total pressure on a circular plate of diameter 1.5 m which is placed vertically in water in such a way that the centre of plate is 3 m below the free surface of water. Find the position of centre of pressure also. (6)
- (b) With neat sketches, explain the conditions of equilibrium for floating and sub-merged bodies. (9)

UNIT-III

5. (a) State and derive Bernoulli's theorem from Euler's equation of motion. Give limitations of this theorem. (5)
- (b) The water is flowing through a pipe having diameters 20 cm and 10 cm at sections 1 and 2 respectively. The rate of flow through pipe is 35 litres/sec.

The section 1 is 6 m above datum and section 2 is 4 m above datum. If the pressure at section 1 is 39.24 N/cm^2 , find the intensity of pressure at section 2. (10)

6. Give classification of notches. Derive the formulae for discharge through a rectangular notch. (15)

UNIT-IV

7. Give the expression for displacement thickness and momentum thickness in boundary layer theory. (15)
8. The efficiency η of a fan depends on density ρ , dynamic viscosity μ of the fluid, angular velocity ω , diameter D of the rotor and the discharge Q . Express η in terms of dimensionless parameters. (15)
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BT-3/D-24

SURVEYING AND GEOMATICS

Paper-CE-205A

Time : Three Hours]

[Maximum Marks : 75

Note : Attempt any *five* questions, selecting at least *one* question from each unit.

UNIT-I

1. The distance between two points P and Q measured along a slope in 290 m. Find the horizontal distance between P and Q if (15)
 - (a) The slope angle is 12 degrees.
 - (b) The slope is 1 in 5.
 - (c) The difference in elevation is 3.0 m.

2. (a) What do you understand by Local attraction, explain in detail. (8)
(b) What is the different method of traversing explain each. (7)

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UNIT-II

3. Following Consecutive staffs reading were taken with a level along a sloping ground line XY at a regular interval of 20 m by using 4 m levelling staff 0.352, 0.787, 1.832, 2.956, 3.758, 0.953, 1.766, 2.738, 3.872, 0.812, 2.325 and 3.137. Rule out a page of level field book, enter the reading, RL of point X is 120.280. Calculate RL of all points by Rise and Fall Method, and workout the gradient of line XY. (15)
4. (a) Explain 3 Point problems in detail. Also write down the errors in Plane table surveying. (8)
- (b) Define the Characteristics of contours. (7)

UNIT-III

5. What is Compound curve? Write down the elements of Compound curve with a neat sketch. (15)
6. (a) Describe the different methods of measuring distance and state the various types of EDM instruments. (10)
- (b) Write down the working principle of Total station. (5)

UNIT-IV

7. What is the concept of G.I.S. and G.P.S. Explain the basic components and application of both. (15)

8. Determine the minimum number of photographs required to cover an area of $50 \text{ km} \times 50 \text{ km}$ from the following data :

(a) Size of photograph is $23 \text{ cm} \times 23 \text{ cm}$.

(b) Scale of photograph is 1:10000.

(c) Longitudinal overlap 60%.

(d) Side lap 30%.

(15)

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BUILDING CONSTRUCTION PRACTICE

Paper-CE-207A

Time : Three Hours]

[Maximum Marks : 75

Note : Attempt any *five* questions selecting at least *one* question from each unit.

UNIT-I

1. (a) Define Masonry and its types in detail. (7.5)
(b) Write the difference between English Bond and Flemish Bond with neat sketches. (7.5)
2. (a) Define Partition wall its advantage and classification with functions in detail. (7.5)
(b) Define Foundation, its purpose and types in brief. (7.5)

UNIT-II

3. What do you mean by Dampness and its ill effects in buildings and what are the various materials used for prevention of Dampness. (15)
4. Define King Post Truss with neat diagrams and explain all components of King Post Truss. (15)

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UNIT-III

5. (a) Define bricks and their constituents and what are the manufacturing process of bricks? (7.5)
- (b) What do you mean by mortar and its types. (7.5)
6. What is ordinary Portland cement, Explain the manufacturing of ordinary Portland cement. (15)

UNIT-IV

7. Explain the structure of Timber and the defects which affects it and what do you mean by seasoning of timber in detail. (15)
8. (a) Define Paints, its constituents, characteristic and types in detail. (7.5)
- (b) What are the classification and requirements of good building stone? (7.5)



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45188

PROFESSIONAL PRACTICE,
LAW AND ETHICS
HM-255A

Time : Three Hours]

[Maximum Marks : 75

Note : Attempt *Five* questions, at least *one* question from each Unit.

Unit I

1. Discuss the roles and responsibilities of :
 - (a) Government in ensuring the safety of citizens through regulatory norms and standardization. 8
 - (b) Standardization bodies like BIS and IRC in formulating standards for professional practice. 7
2. Explain the respective roles of consultants, contractors, and developers in civil engineering projects, highlighting how their roles are governed by regulations and standards ? 15

Unit II

3. Define professional ethics and explain its significance in engineering. Discuss how conflicts of interest and negligence can undermine ethical practices. 15
4. What is whistleblowing ? Discuss the role of vigil mechanisms in addressing issues like bribery and environmental breaches in professional practice. 15

Unit III

5. Explain the essential elements of a valid contract under the Indian Contract Act, 1972. Highlight the differences between valid, void, and voidable contracts. 15
6. Discuss the significance of force majeure, liquidated damages, and delay analysis in contract management. Provide examples of scenarios where these may apply. 15

Unit IV

7. Elaborate on the methods of engaging labor in civil engineering projects. Discuss the relevance of the Workmen's Compensation Act, 1923, in ensuring worker safety. 15

8. Discuss the objectives and significance of the Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996, in regulating labor conditions. 15

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45189

STRUCTURAL ANALYSIS-II

CE-301A

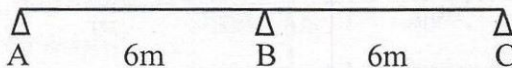
Time : Three Hours]

[Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. A 3-Hinged parabolic arch has a span of 40 m and a rise of 10 m. Draw ILD for the following :
 - (i) Horizontal thrust
 - (ii) B.M. at 8 m from left support
 - (iii) Normal thrust at above section
 - (iv) Radial shear at above section. 15
2. Compute the ordinates of I.L for reaction RA for the beam shown in figure, At 1m interval and draw ILD. The moment of inertia is constant throughout. 15

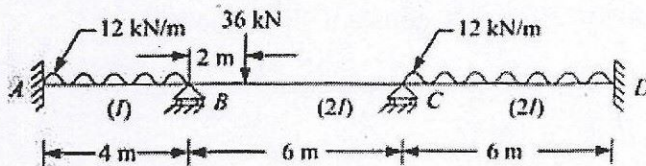


Unit II

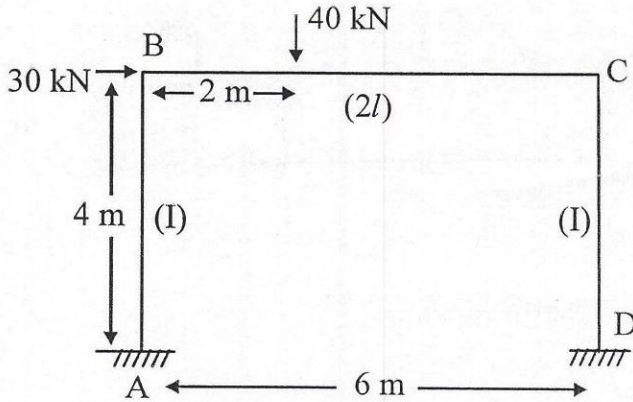
3. Find the maximum shear force and maximum bending moment in case of uniformly distributed load longer than the span of the girder. Draw SF diagram and also find absolute maximum bending moment. 15
4. A fixed parabolic symmetric arch of span 30 m and central rise 6 m has moment of inertia at any section $I = I_o \text{ Sec } \theta$, where I_o is the moment of inertia at the crown and θ is the inclination of tangent with the horizontal. Find the reactions at the support when the arch is subjected to a load of 240 kN acting at a distance of 6 m from the left support. Determine the moment under the load and at the crown. 15

Unit III

5. Analyse the continuous beam shown in figure given below by Kani's method. 15

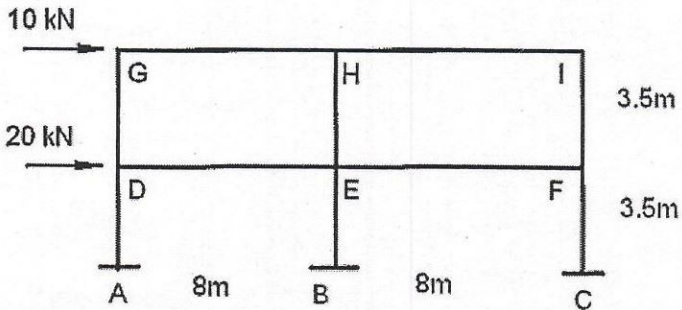


6. Analyse the frame shown in figure given below by Kani's method. 15



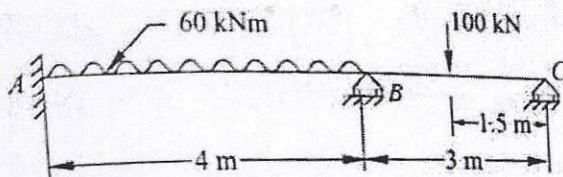
Unit IV

7. Analyse the frame by portal method. 15



8. Analyse the continuous beam as shown in figure by Stiffness matrix method. Take EI constant throughout.

15



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45190

DESIGN OF CONCRETE STRUCTURE-I
CE-303A

Time : Three Hours]

[Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks. Assume any data if necessary. Use of IS : 456 is allowed.

Unit I

1. Define Abram's law, also explain the factors affecting workability of concrete in detail. **15**
2. What are the major advantages with limit state design method ? Discuss three different types of limit states under each condition of limit state of collapse and serviceability. **15**

Unit II

3. A RCC beam 400×600 mm with 40 mm cover to the centre of reinforcements has been provided with

4-20 mm ϕ steel at bottom and 4-16 mm ϕ at top. If the permissible stresses in concrete and steel are 7 MPa and 230 MPa, find the moment of resistance of the beam using working stress method. **15**

4. Design a beam to resist bending moment 75 kNm, shear force 30 kN with M 20 grade of concrete and steel Fe 415 using Limit state method. **15**

Unit III

5. Design a column between floors with both ends fixed. The center-to-center distance between floors is 4 metres. Design the column for a axial load of 1400 kN. Take M25 and Fe 415. **15**
6. Which are different types of shear failures ? Explain various Codal Provision for bond and development length at support for compression and tension steel. **15**

Unit IV

7. Discuss different types of retaining walls with the help of figures and differentiate in their structural behavior. **15**

8. Design a slab over a room of $5\text{ m} \times 7\text{ m}$ as per IS code. The slab is supported on masonry wall all round with adequate restraint and corners are held down. The live load on slab is 3000 N/m^2 . The slab has a bearing of 300 mm on the support wall. Take M 20 and Fe 415.

15

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45191

HYDROLOGY

CE-305A

Time : Three Hours]

[Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. What do you understand by the hydrological cycle ?
Explain in brief various parts of this cycle with a neat and clean sketch. 15

2. (a) Define the term precipitation. Discuss different types of precipitation. 7
(b) The rainfall recorded for seven rain gauge stations are 131, 143, 118, 107, 166, 100 and 146 cm. For a 10% error, calculate the mean rainfall and additional rain gauge station required. 8

Unit II

3. (a) What do you mean by evaporation ? Describe the ISI evaporation pan for estimation of the evaporation. 7
- (b) List out the various empirical and theoretical equations used to estimate evapotranspiration. 8
4. The rainfall depth recorded during the successive 20-minute intervals of storms are 3, 10, 15, 10, 10, 8, and 4 mm. Calculate the phi index if the resulting runoff is 28 mm. 15

Unit III

5. (a) List various methods of determining the runoff from the catchment. 8
- (b) Explain the auto stage recorder used to measure the stage in the river. 7
6. The 3-hour Unit Hydrograph ordinates for a catchment are 0, 30, 180, 320, 370, 320, 230, 170, 100, 65, 40, 20, 10, and 0. Determine 9-hour Unit hydrograph for the catchment. 15

Unit IV

7. Define the following terms : 15
- (a) Aquifer
 - (b) Aquiclude
 - (c) Aquifuge
 - (d) Aquitard
 - (e) Compressibility of aquifers.
8. (a) Explain the various pollutants and list their possible source in groundwater. 8
- (b) Define pH and how do you determine the pH value of a sample of water in the laboratory. 7

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45192

GEOTECHNICAL ENGINEERING

CE-307A

Time : Three Hours]

[Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting *one* question from each Unit. Assume any data if necessary.

Unit I

1. What should be the depth of exploration, No. and disposition of pits and borings in different types of works in Civil Engineering ? Describe Static Cone Penetration test in detail. 15
2. What are different types of Samplers ? Discuss with neat sketches, the components of a Sampler. Describe the Terms Area Ratio, Inside Clearance and Outside Clearance and their relevance. Discuss, what should be the Number and Disposition of pits and borings ? Discuss the thumb rules in this regard, for various types of Civil Works. 15

Unit II

3. Using Rankine's analysis, Derive the expression for Passive earth pressure for Cohesive Soils. Draw Passive Earth Pressure Diagram along the height of a retaining wall having cohesive backfill. **15**

Describe the following terms :

- (i) Ultimate Bearing Capacity
 - (ii) Net Ultimate Bearing Capacity.
4. Discuss Terzaghi's analysis for the condition of complete bearing capacity failure and derive a General bearing Capacity Equation. What are the assumptions and Limitations in Terzaghi's analysis ? **15**

Unit III

5. Discuss classification of Pile Foundation, based on the function with neat sketches. Describe Hiley's formula for load carrying Capacity of Piles. **15**
6. Describe the various types of Hammers for Pile Driving. Discuss classification of piles, based on materials and composition. Describe engineering news formula, for various types of hammers, for load carrying capacity of piles. **15**

Unit IV

7. Discuss various shapes of a Well Foundation and advantages and disadvantages of each shape. Discuss various forces acting on a Well Foundation. 15
8. What are the problems encountered in well sinking ? What do you understand by tilt and sift of a well foundation ? How are they rectified ? 15

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45193

CONCRETE TECHNOLOGY

CE-309A

Time : Three Hours]

[Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. Write short notes on the following : 5×3=15
 - (a) Rapid Hardening Cement
 - (b) Low Heat Cement
 - (c) Sulphate Resistant Cement
 - (d) High Alumina Cement
 - (e) Waterproof Cement

2. (a) Explain in detail grades of concrete and concept of quality control. 7
(b) Describe applications and limitations of pozzolanic materials. 8

Unit II

3. Explain design of mix by IS and ACI method including batching of materials. 15
4. Write short notes on the following : 5×3=15
- (a) Ready mix concrete
 - (b) Workability of concrete
 - (c) Compaction of concrete
 - (d) Formwork removal
 - (e) Curing of concrete.

Unit III

5. Explain the cause of concrete deterioration by chemical reaction, frost action and sulphate attack. Also explain their preventive measures. 15
6. Describe the following techniques : 3×5=15
- (a) Rebound hammer test
 - (b) Ultrasonic pulse velocity
 - (c) Pullout test.

Unit IV

7. (a) Explain various defects occurring during construction and their preventive measures. 8

- (b) Describe conventional procedure and latest procedure to repair cracked or damaged concrete structures.

7

8. Write short notes on the following : $3 \times 5 = 15$

- (a) Waste material based concrete
- (b) Lightweight concrete
- (c) Prestressed concrete.

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BT-7/D-24

47262

DESIGN OF CONCRETE STRUCTURE-H

Paper-CE-401A

Time Allowed : 3 Hours]

[Maximum Marks : 75

Note : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks. Any missing data may be assumed suitably. Use of IS : 456 and IS : 3370 is allowed.

UNIT-I

1. A continuous beam with simple supports has three spans each of 5m. The characteristic dead load is 12 KN/m and Characteristic live load is 10 KN/m. Design the critical section of the beam and sketch reinforcement details. Use M20 concrete and Fe415 steel. 15
2. What are the basic principles of Pre-stressing? Explain various systems of Pre-stressing. What are various types of losses incurred in Pre-tensioning system? 15

UNIT-II

3. Design an interior panel 5 m × 5 m of flat slab for a live load of 4 KN/m². It is supported on columns of size 450 mm × 450 mm. Use M20 concrete and Fe 415 steel. Provide two way reinforcement. 15

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4. Design a Rectangular combined footing for two square columns of sizes 400 mm and 600 mm which are 4 m apart and carry axial loads of 750 KN and 900 KN. respectively. The safe bearing capacity of the soil is 180 KN/m^2 . Use M20 concrete and Fe 415 steel. 15

UNIT-III

5. Design a Bunker to store 300 KN of coal. Take unit weight of coal as 8500 N/m^3 . Angle of repose is 30° . The stored coal is to be surcharged at its angle of repose. Take permissible stress in steel as 140 N/mm^2 . 15
6. Design an underground Water tank $4 \text{ m} \times 6 \text{ m} \times 2 \text{ m}$ in size. The subsoil consists of sand having an angle of repose of 30° and saturated unit weight of Soil is 16 KN/m^3 . Use M20 concrete and Fe415 steel. 15

UNIT-IV

7. (a) What are the basic assumptions of Yield line theory? 6
- (b) A Rectangular slab of size $4\text{m} \times 5\text{m}$ is simply supported at edges and carries a live load of 5 KN/m^2 . Design the slab using yield line theory, if (i) Isotropically reinforced (ii) Orthotropically reinforced with $\mu = 0.70$. Use M20 concrete and Fe 415 steel. 9

8. Discuss analysis of Building frame subjected to vertical loads and lateral loads with a neat sketch. Also discuss the effect of ductility on design of beams. 15

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47263

ENERGY SCIENCE & ENGINEERING

Paper-ES212A

Time Allowed : 3 Hours]

[Maximum Marks : 75

Note : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks. Assume any data if necessary.

UNIT-I

1. What are the parameters involved in the setting up of Energy policy? Describe any two policies in detail and also explain the constraints which limit Policy choices. 15
2. Discuss the Social implications of Renewable energy sources. Differentiate between Renewable and Non-renewable energy sources. Briefly explain renewable energy availability in India. 15

UNIT-II

3. Discuss classifications and compositions of Fossil fuels. Write a short note on Physico-Chemical characteristics and energy content of Coal, Petroleum and Natural gas. 15

4. What are the advantages and disadvantages of Solar energy? Discuss briefly Geothermal energy. What are the major problems associated with Wind power systems? 15

UNIT-III

5. Enumerate any three factors of Global warming. Also, discuss mitigation factors for the same. 15
6. Discuss present status of Bioenergy in Indian context. 15

UNIT-IV

7. Discuss the operation of Tidal Power Plant. What types of Turbine is suited for such plants? Differentiate between single basin system and double basin system in tidal power with neat diagram. 15
8. When do you use Tower Intakes? What type of intake gates are used in them? 15

BT-7/D-24

47264

WATER RESOURCES ENGINEERING

Paper-CE-405A

Time Allowed : 3 Hours]

[Maximum Marks : 75

Note : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

UNIT-I

1. Explain the function and objectives of Multipurpose projects in Water resources. How are these projects different from single-purpose projects? 15
2. Prepare a list and explain the data required for proper planning of Water resources projects in India. 15

UNIT-II

3. (a) Explain the Microeconomics and Macroeconomics with a suitable example. 8
- (b) What do you mean by the concept of Equilibrium? Explain various types of equilibrium. 7
4. Explain discounting factors and techniques in detail. 15

UNIT-III

5. Define system approaches and give reasons for adopting this approach in the analysis of the water development project. 15

6. Solve graphically the following linear programming problems : 15

$$\text{Maximize : } V = 500x + 450y$$

$$\text{Subject to : } 6x + 5y \leq 60$$

$$10x + 20y \leq 150$$

$$x, y \geq 0$$

UNIT-IV

7. What is the application of System engineering in Hydrology and Water resources engineering? 15

8. What are the Mathematical models for forecasting Water resources-related problems? 15

Roll No.

Total Pages : 2

BT-7/D-24

47265

METRO SYSTEMS AND ENGINEERING

Paper-OE407A

Time Allowed : 3 Hours]

[Maximum Marks : 75

Note : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

UNIT-I

1. Explain the Routing studies to fulfill the requirement of Metros. How do you Judge the need for metros in existing cities in Indian context? 15
2. Explain the Planning and Financial process for Mass Rapid Transportation System. 15

UNIT-II

3. Explain the Construction methods for Elevated and underground Metro-stations. 15
4. Explain the initial Surveys and Investigations required to be carried out before the Construction of Tracks. 15

UNIT-III

5. What is Signaling? Why it is important to follow the signals for a Train? Explain various signaling methods used for Railways. 15

47265/K/996/250

P. T. O.

6. Discuss Elaborately various Control systems required for train movement. 15

UNIT-IV

7. (a) What is the requirement of Ventilation in a tunnel?
How is Ventilation ensured in tunnels? 7
- (b) Explain Air-conditioning for Metro stations and buildings. 8
8. (a) What is Rolling stock? Explain the criteria adopted for selection of Rolling stock power. 7
- (b) How Fire control systems are installed at Metro stations? 8

Roll No.

Total Pages : 2

BT-7/D-24

47268

ENVIRONMENTAL IMPACT ASSESSMENT

Paper-EL419A

Time Allowed : 3 Hours]

[Maximum Marks : 75

Note : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

UNIT-I

1. Explain various management strategies to Control Water Pollution and Manage Water Quality. 15
2. Write notes on the following : 3×5=15
 - (a) Impact of Anthropogenic activities on Water resources.
 - (b) Pollution.
 - (c) Reuse.

UNIT-II

3. Define atmosphere, its composition and importance. Mention how Human activities affect Air quality? 2,5,3,5

47268/K/997/250

P. T. O.

4. Write down different waste disposal alternatives available in India. Explain the basic strategies to be followed during Waste disposal. 10,5

UNIT-III

5. Describe the disadvantages of improper Waste disposal with suitable examples and Case studies. 15
6. Write descriptive notes on the following :
- (a) Types of Hazards in land use. 7½
- (b) Land use Management. 7½

UNIT-IV

7. Explain the need of Carrying Environment Assessment in Design process. Explain the general steps of Environment Assessment preparation. 6,9
8. What are Environmental standards? Describe the general requirements and techniques of setting standards. 3,6,6

BT-1/D-24

47272

RAILWAY ENGINEERING

Paper-EL427A

Time Allowed : 3 Hours]

[Maximum Marks : 75

Note : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

UNIT-I

1. Write a short note on Rail transportation. What is its importance in India. Also write a note on selection of Gauge. 15
2. Write short notes on the following :
 - (a) Length of Rails. 5
 - (b) Creep of Rails. 5
 - (c) Defects in Rails. 5

UNIT-II

3. Explain various types of Sleepers. Also write down their advantages and disadvantages. 15
4. Explain in details the functions and requirements of ballast. Also define the types of ballast. 15

47272/K/1009/250

P. T. O.

UNIT-III

5. Explain the working principle and design elements of a Turnout. 15
6. Write short notes on the following :
 - (a) Diamond crossing. 5
 - (b) Single double slips. 5
 - (c) Components of Switch. 5

UNIT-IV

7. Write down the requirements and principles of a good Interlocking System. 15
8. Differentiate the following :
 - (a) Absolute and Automatic system. 8
 - (b) Centralized and Automatic train control systems. 7

Roll No.

Total Pages : 03

BT-8/D-24

48321

ENGINEERING ECONOMICS ESTIMATION
AND COSTING
CE-402A

Time : Three Hours]

[Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. What are the principles of estimate ? List different items of work. Also discuss one method of estimate in detail with example.
2. Work out the estimated cost of the following items of works for the construction of a residential building :
 - (a) Earthwork in Excavation – 76.60 cu m
 - (b) Cement concrete in foundation – 26.40 cu m
 - (c) Brick work 1 : 6 in foundation and plinth – 50.88 cum

- (d) DPC 4 cm thick 1 : 2 : 4 – 30.14 sq m
- (e) RCC work in lintel and beams – 32.80 cu m

Unit II

- 3. Discuss in detail the specifications for different classes of buildings.
- 4. Define general specification. Write down detailed specification for the following works :
 - (a) Earthwork
 - (b) Concrete
 - (c) Brick work
 - (d) Distempering
 - (e) Flooring.

Unit III

- 5. What do you understand by rate analysis ? Explain in detail the importance, purpose and requirement of rate analysis.
- 6. Prepare Analysis of Rate for the following items of works :
 - (a) First class brick work in cement mortar 1 : 4
(1 cement : 4 coarse sand) in plinth and foundation.

- (b) Reinforced cement concrete (RCC) in slabs of mix 1 : 2 : 4 (1 cement : 2 sand : 4 coarse aggregates of 10 mm nominal size).

Assume suitable rates for labour and materials.

Unit IV

7. What do you understand by PW Department ? List out its functions. Explain the various types of contracts with their advantages and disadvantages.
8. Explain in detail the following terms :
- (a) Muster Roll and its maintenance
 - (b) Earnest Money
 - (c) Tender
 - (d) Performance guarantee
 - (e) Mobilization Advance

Roll No.

Total Pages : 03

BT-8/D-24

48322

BRIDGE ENGINEERING

CE-404A

Time : Three Hours]

[Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks. Use of IS 456-2000 and IRC codes are allowed.

Unit I

1. (a) List the various factors to be considered for the selection of Bridge site. 8
- (b) Define a bridge and various components of bridge with diagram. 7
2. Write the various IRC live loads and explain IRC Class AA wheeled and 70R loading with suitable diagram. 15

Unit II

3. Design a RCC culvert over a N.H. for the following data : 15
 - (i) Loading – IRC Class A loading

- (ii) Span – 5 m
- (iii) Carriage way width – 7.5 m
- (iv) Width of kerb – 600 mm on both sides.

Use M25 Concrete and Fe415 Steel.

4. (a) Name the various types of RCC Bridges. Explain any *two* in detail with the help of neat diagram. 10
- (b) Write down various advantages and disadvantages of using RCC Bridges. 5

Unit III

5. Explain the procedure for the Design of Plate Girder Bridge with suitable diagram. 15
6. Name the various types of Steel Bridges. Explain any *three* in detail with diagram. 15

Unit IV

7. (a) Explain the Design criteria of Well Foundation. 7.5
- (b) Explain the necessary investigation requires for Well Foundation. 7.5

8. Explain in detail the following :

15

- (a) Bearings
- (b) Approaches
- (c) Abutments
- (d) Wingwall
- (e) Piers.

Roll No.

Total Pages : 02

BT-8/D-24

48328

EARTHQUAKE ENGINEERING

EL-422A

Time : Three Hours]

[Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. Write a short note on plate tectonics in seismology. Explain mechanism and distribution of earthquake. 15
2. Write short notes on the following : 5×3=15
 - (a) Seismic zoning.
 - (b) Earthquake magnitude and intensity.
 - (c) Seismicity.

Unit II

3. Explain the general principles and assumptions of seismic coefficient method and response spectrum method. 15

4. Define design criterion for structures with design examples.
What is the significance of ductility ? **15**

Unit III

5. Write short notes on the following :
- (a) Method of assessing seismic performance. **7.5**
 - (b) Criterion for repair and strengthening techniques. **7.5**
6. Explain seismic resistance building architecture. Write down the recommendations mentioned in the masonry code like IS 4326 and IS 13828. **15**

Unit IV

7. Explain the following :
- (a) Explain about base isolation, active and passive control system. **7.5**
 - (b) Define general features of structural control. **7.5**
8. Explain the construction details as per IS : **15**
4326 and IS : 13920.

Roll No.

Total Pages : 03

BT-8/D-24

48331

WASTE WATER TECHNOLOGY

EL-428A

Time : Three Hours]

[Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. Explain the following : 5×3=15
 - (a) Flushing devices in sewage systems.
 - (b) Ventilation of sewers.
 - (c) Systems of sewage.

2. Write short notes on the following : 7.5×2=15
 - (a) Chemical and biological oxygen demand.
 - (b) Physical, chemical and biological parameters of sewage.

Unit II

3. Write short notes on the following : 7.5×2=15
- (a) Oxygen sag curve.
 - (b) Self-purification of streams.
4. Explain in detail the preliminary and primary treatment in design of screen with necessary diagram/sketch. 15

Unit III

5. (a) Explain the design of Septic tank and Imhoff tank. 7.5
- (b) Explain principle and working of oxidation ditch. 7.5
6. Explain in detail the design of up flow anaerobic sludge blanket reactors. Also explain any *one* method of sludge disposal. 15

Unit IV

7. (a) Write a short note on waste water treatment plants. 7.5
- (b) Define any *two* methods of re-use of waste water. 7.5

8. Write short notes any *three* on the following :

- (a) Sewage systems. 5
- (b) Neutralization. 5
- (c) Volume reduction and strength reduction. 5
- (d) Equalization of sewage. 5