

44171

BT-4/M-26

ENGINEERING MECHANICS

Paper : ES-205A

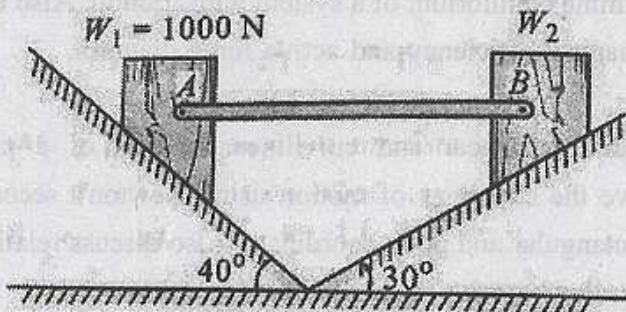
Time : Three Hours]

[Maximum Marks : 75

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

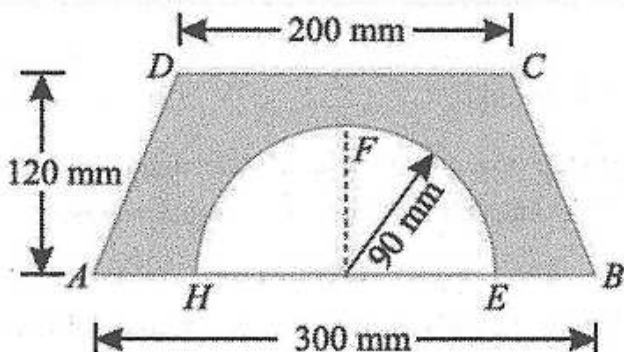
UNIT-I

1. Explain the concept of force systems. Classify different types of force systems and discuss coplanar concurrent forces. Determine the resultant of a given force system and explain the conditions of equilibrium with neat free body diagrams.
2. Two blocks W_1 and W_2 resting on two inclined planes are connected by a horizontal bar AB as shown in Fig8. If W_1 is equals 1000 N, determine the maximum value of W_2 for which the equilibrium can exists. The angle of limiting friction is 20° at all rubbing faces.



UNIT-II

3. A semicircle of 90 mm radius is cut out from a trapezium as shown in Fig. Find the position of the Centre of gravity of the figure.



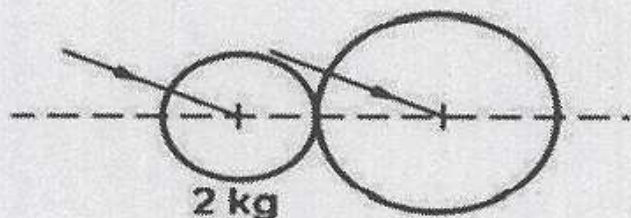
4. Define area moment of inertia and derive its expression for a rectangular section from first principles. Also explain parallel axis and perpendicular axis theorems with application.

UNIT-III

5. State and explain the principle of virtual work. Apply it to determine equilibrium of a system with friction. Also explain mechanical efficiency and active force diagram.
6. Explain rectilinear and curvilinear motion of a particle. Derive the equations of motion using Newton's second law in rectangular and polar coordinate. Also discuss relative and constrained motion with suitable examples.

UNIT-IV

7. A ball of mass 2 kg, moving with a velocity of 3 m/s, impinges on a ball of mass 4 kg moving with a velocity of 1 m/s. The velocities of the two balls are parallel and inclined at 30° to the line of joining their centers at the instant of impact. If the coefficient of restitution is 0.5. Explain
- Direction, in which the 4 kg ball will move after impact;
 - Velocity of the 4 kg ball after impact;
 - Direction, in which the 2 kg ball will move after impact;
 - Velocity of the 2 kg ball after impact.



8. Water drips from a tap fitted to a barrel at the rate of four drops per second. Find the vertical separation between two consecutive drops after the lower drop has attained a velocity of 3 m/s.
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44172**BT-4/M-26****STRUCTURAL ANALYSIS-I**

Paper : CE-202A

Time : Three Hours]

[Maximum Marks : 75

Note : Attempt *five* questions in all. Select at least *one* question from each Unit.

UNIT-I

1. (a) State and prove the 2nd Castigliano's theorem. Explain how it can be useful for analysis of structure? (8)
(b) Differentiate between static and kinematic indeterminacies. (7)
2. Analyse the frame given in Fig. 1. Using the strain energy method. (15)

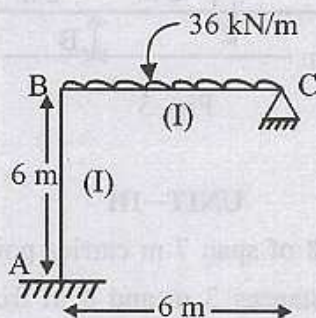


Fig. 1

UNIT-II

3. Analyse the portal frame loaded as shown in Fig. 2 by slope deflection method and sketch the bending moment and shear force diagram. (15)

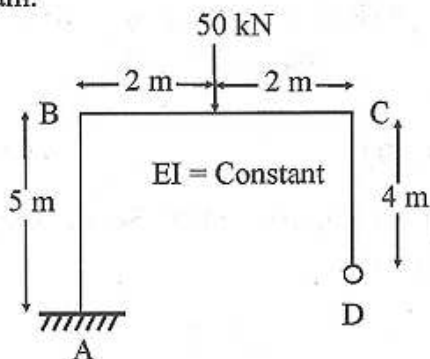


Fig. 2

4. Analyse the beam ABC shown in Fig. 3 by Moment Distribution Method. Draw B.M.D. and S.F.D. also. (15)

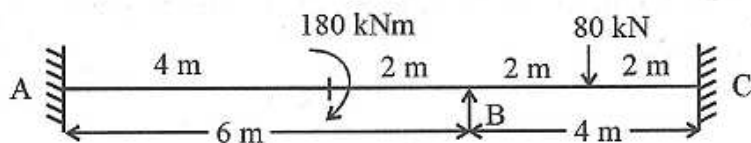


Fig. 3

UNIT-III

5. A fixed beam AB of span 7 m carries point load of 120 kN and 80 kN at distances 3 m and 6 m from the left end A. Determine fixing moment at the ends using column analogy method. (15)

6. A two hinged parabolic arch of span 'L' and rise 'h' carries uniformly distributed load of 'w' run over the whole span. Assuming $I = I_0 \sec Y$. Find the expression for the horizontal thrust developed. (15)

UNIT-IV

7. Define shear centre. Calculate the shear centre for :
(a) ISA $150 \times 125 \times 12$.
(b) ISMC 150. (15)
8. A suspension bridge of 90 m span has two three hinged stiffening girders supported by two cables having central dip of 8 m. The load way has 7.5 m width. The D.L. on the bridge is 6 kN/m^2 and L.L. of 10 kN/m^2 covers the left half of the span. Determine the shear force and bending moment in the girder at 20 m from left end. Also find the maximum tension in the cable for this position of load. (15)
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BT-4/M-26

44173

DESIGN OF STEEL STRUCTURE-I

Paper-CE-204A

Time : Three Hours]

[Maximum Marks : 75

Note : Attempt five questions selecting atleast one question from each unit. Use of IS-800 and Steel Tables is allowed. Assume any missing data appropriately and mention the same clearly.

UNIT-I

A member of a truss consist of two angles ISA $65 \times 65 \times 6$ placed back to back. It carries an ultimate tensile load of 125 KN and is connected to a gusset plate 8 mm thick placed in between the two connected legs. Determine the number of 16 mm diameter grade 4.6 ordinary bolts required for the joint. Assume f_u of plate as 410 MPa. 15

- (a) Write short notes on different types of weld joints. 5
- (b) An I section is built up by welding a $250 \text{ mm} \times 15 \text{ mm}$ web plate to two $150 \text{ mm} \times 15 \text{ mm}$ flange plates by 8 mm fillet welds. Find out maximum shearing force which may be permitted if the mean shearing stress in the web and the maximum shear stress in weld are not to exceed 100 N/mm^2 . 10

UNIT-II

3. (a) Explain the concept of effective length. 5
- (b) Design a built-up column composed of two channel sections placed back to back carrying an axial load of 1400 KN. Effective length of the column is 5.90 m. Also design single lacing system for the above column. Take $f = 250 \text{ N/mm}^2$. 10
4. (a) Differentiate between columns and built-up columns. 5
- (b) Design a slab base for a column ISHB 350 @ 72.4 kg/m, carrying an axial load of 1500 KN. Take allowable bearing pressure on concrete as 4 N/mm^2 . 10

UNIT-III

5. A simply supported beam has an effective span of 6.5 m and carries a uniformly distributed load of 50 KN/m. Taking $f_y = 250 \text{ N/mm}^2$ and $E = 2 \times 10^5 \text{ N/mm}^2$, design the beam, if it is laterally supported. Apply necessary checks. 15
6. Design a laterally unsupported I beam with simply supported ends of effective span 6 m subjected to a working load of 40 KN/m. Assume that full torsional and warping restraints are provided at the supports. 15

UNIT-IV

7. (a) What is the difference between a beam and a plate girder? Where are the plate girders used? 5

- (b) Design a gantry girder for a mill building to carry an electric overhead travelling crane, having the following data : 5

Crane capacity = 255 KN, Weight of crane excluding crab = 200 KN, Weight of crab = 65KN, Span of crane between rails = 20 m, Minimum hook approach = 1.1 m, Wheel base = 3.4 m, Span of gantry girder = 7 m, Mass of rail section = 30 kg/m, Height of rail section = 75mm, Taking $f_y = 250 \text{ N/mm}^2$ and $E = 2 \times 10^5 \text{ N/mm}^2$. 10

Design the maximum section of a plate girder for a bridge, for a live load of 50KN/m, and a dead load of 40KN/m. The girder is simply supported over an effective span of 12 m. Take $f_y = 250 \text{ N/mm}^2$ and $E = 2 \times 10^5 \text{ N/mm}^2$. 15

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44174

SOIL MECHANICS

Paper-CE-206A

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 missing data, if any suitably.

UNIT-I

1. (a) Define Soil Engineering and discuss the scope of Soil Engineering. 6
- (b) Differentiate between Engineering and Index properties of soil. 3
- (c) How are fine grained soils classified as per Indian standard? 6
2. (a) In situ dry unit weight of an embankment was found to be 1.75 g/cm^3 specific gravity was found to be 2.7 the loosest and the densest void ratio were 0.64 and 0.44 respectively. What is the relative density of embankment sand? 5
- (b) How is the permeability of soils determined in the field? Describe. 10

UNIT-II

3. (a) What is Critical Hydraulic Gradient? Derive an expression for it, in terms of G and e of the soil. Also discuss Quick sand Phenomena. 8

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- (b) Explain the construction of flow nets and their practical applications in geotechnical engineering. 7
4. Following results were obtained from a standard compaction test on a sample of soil:

Water content (%)	6	8	10	12	14
Bulk Density(g/cm^3)	1.78	1.88	1.95	1.98	1.94

- (a) Calculate the **dry density for each moisture content**.
- (b) Determine the **Optimum Moisture Content (OMC)** and **Maximum Dry Density (MDD)**. Also Plot the Zero Air voids line in the compaction curve. 15

UNIT-III

5. (a) Describe the consolidometer test. 8
- (b) Differentiate between Primary consolidation and Secondary Consolidation. 7
6. (a) A concentrated load of 2000 KN is applied at the ground surface. Determine the vertical stress at a point P which is 6 m directly below the load. Also calculate the vertical stress at point R which is at a depth of 6 m but at a horizontal distance of 5 m from the axis of the load. 6
- (b) Explain Westergaard's theory for the determination of vertical stress at a point. 6
- (c) What are limitations of elastic theories ? 3

UNIT-IV

7. (a) Bring out the relationship between principal stresses at failure and the shear strength parameters. 8

(b) Describe Vane Shear test for determining the shear strength of soil in the field. Under what circumstances, this test is preferred ? 7

8. (a) A wall with smooth vertical back 9 m high supports a purely cohesive soil with cohesion 0.4 kg/cm^2 and bulk density 1.7 g/cm^3 . Draw Rankine's Earth Pressure diagram and position of zero pressure. 8

(b) Discuss Culmann's graphical method to estimate active earth pressure on inclined wall with positive surcharge. 7

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44175

HYDRAULIC ENGINEERING

Paper-CE-208A

Time : Three Hours]

[Maximum Marks : 75

Note : Attempt *five* questions selecting at least *one* from each unit.**UNIT-I**

1. (a) Derive a relationship for the mean velocity of flow of a viscous fluid through a circular pipe. 7
(b) If a pipe 3 m in diameter is to carry a flow of $7.5 \text{ m}^3/\text{s}$ of water with a minimum expenditure of energy, determine the permissible height of the roughness projection of the pipe wall, when u for water is $0.015 \times 10^{-4} \text{ m}^2/\text{s}$. 8
2. (a) What do you mean by energy losses in a pipeline? How are they determined? 7
(b) The radial clear distance between a hydraulic plunger and the cylinder walls is 0.05 mm, the length and diameter of the plunger being 20 cm and 10 cm, respectively. Calculate the velocity of leakage when the difference in pressure between the two ends of the plunger is 10 m of water. Take viscosity as 0.0125 poise. 8

UNIT-II

3. (a) Explain the development of drag on a flat plate held perpendicular to the direction of flow with a neat sketch. 7

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- (b) Determine the most efficient section of a trapezoidal channel with side slopes 1 vertical to 2 horizontals, carrying a discharge of $11.25 \text{ m}^3/\text{s}$ with a velocity of 0.75 m/s . What should be the bed slope of the channel? Take Manning's $n = 0.025$. 8
4. (a) What do you mean by surge? Discuss the different types of surges that develop in an open channel. 7
- (b) A rectangular channel is reduced gradually from 2 m to 1.5 m, and the floor is raised by 0.25 m at a given section. When the approaching depth of flow is 1.5 m, what rate of flow will be indicated if the flow at the contracted section is at critical depth? 8

UNIT-III

5. (a) Differentiate between isothermal and adiabatic processes. Give examples. 7
- (b) Draw diagrams showing the propagation of pressure waves during the motion of a projectile with a steady velocity when the Mach number is less than one, equal to one, and greater than one. 8
6. (a) What do you mean by Mach number? Explain its significance in compressible fluid studies. 7
- (b) A volume of air at atmospheric pressure of 101.04 kN/m^2 absolute and 24°C is compressed adiabatically to a gage pressure of $3.09 \times 10^7 \text{ N/m}^2$. Calculate the final volume. 8

UNIT-IV

7. (a) Discuss various classifications of turbines with suitable examples. Draw a sketch of a single-jet Pelton wheel turbine. 8

(b) Explain the governing mechanism in hydraulic turbines with a neat sketch. 7

8. (a) Explain the terms 'slip' and 'cavitation' and reference to the reciprocating pump. 8

(b) Differentiate between the two types of centrifugal pumps, namely the volute and turbine pumps, with neat diagrams. 7

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44215

UNIVERSAL HUMAN VALUES-II :

UNDERSTANDING HARMONY

Paper-HTM-901A

Time : Three Hours]

[Maximum Marks : 75

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

UNIT-I

1. Discuss the concept of skill and value education. Discuss the process of self exploration with the one proposal you explored in your own life. (5+10=15)
2. Discuss the priority order of right understanding, relationship and physical facility for animals and human beings. Discuss the concept of happiness and prosperity. (8+7=15)

UNIT-II

3. Discuss the concept of co-existence for a human being. List and classify your desires based on self and body and further classify on the basis of source of imagination. (5+10=15)
4. Discuss the program of self regulation for harmony of self with the body. Discuss the effects of considering human being as body in today's lifestyle. (10+5=15)

UNIT-III

5. Discuss the feeling of trust and respect in human-human relationships. (15)

6. Discuss the human goal and various systems to achieve harmony in the society in detail. (15)

UNIT-IV

7. Discuss the various order of nature and harmony between them. Discuss the role of human being in maintaining/disturbing harmony. (9+6=15)
8. Discuss the concept of existence as coexistence in detail with various elements in it. Discuss the process to achieve universal human order at all level of existence. (10+5=15)
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Total Pages : 03

BT-6/M-26

46188

DESIGN OF STEEL STRUCTURE-II

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. If necessary, assume suitable data .Use of IS : 800 (2007) and Steel table are allowed.

Unit I

1. (a) Define Plastic Hinge. Explain formation of collapse mechanism in beams and portal frames.
(b) Derive the Expression for : (a) Plastic moment capacity (b) Shape factor for a Hollow-section.
2. (a) Explain mechanism method and statical method in plastic analysis.
(b) Determine the plastic moment capacity of a rectangular section 200 mm $\times$ 300 mm. Find the shape factor.

Unit II

3. Design a circular steel water tank of capacity 250 m^3 supported on staging 10 m high. Assume basic wind pressure = 1.5 kN/m^2 .
4. Design a self-supporting steel chimney of height 35 m located in Haryana.

Diameter of cylindrical portion = 2.5 m, Basic wind speed = 47 m/s.

Allowable stresses: Tensile = 140 MPa, Compressive = 100 MPa.

Design the base plate and foundation bolts. Apply usual stability checks.

Unit III

5. (a) Explain different types of Towers with neat sketches.
(b) Discuss the design procedure along with their specification of microwave tower and explain the method for the foundation design of microwave tower.
6. Design a cold-formed channel section used as a compression member of effective length 3 m carrying a factored load of 200 kN. Check for local buckling and overall buckling.

Unit IV

7. Design a Purlin supporting G.I. sheet of an industrial building having span 15 m and length 45 m. The D.L. = 0.25 kN/m^2 L.L. = 0.75 KN/m^2 . Use rise 5 m and spacing suitably.
8. Describe the design philosophy of roof trusses used in industrial buildings. Discuss the following :
- (i) Selection of truss configuration
 - (ii) Load transfer mechanism
 - (iii) Spacing of trusses
 - (iv) Secondary members
 - (v) Bracings.



BT-6/M-26**46189****TRANSPORTATION ENGINEERING**

Time : Three Hours]

[Maximum Marks : 75

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

Unit I

1. (a) Briefly outline the main features of various road patterns commonly in use with a neat and clean diagram. 9
(b) Explain O & D traffic study in detail. 6
2. With neat and clean sketch show types of warning and regulatory signs and mention the function of each. 15

Unit II

3. Explain the CBR method of pavement design. How is this method useful to determine the thickness of the component layers ? 15

4. (a) What are the steps for the thickness design of rigid pavement as per IRC guidelines ? 9
- (b) Differentiate between flexible and rigid pavement. 6

Unit III

5. (a) Explain the following in detail : 6
- (i) Land width
- (ii) Camber
- (iii) Overtaking sight distance
- (b) The speed of overtaking and overtaken vehicles are 90 and 70 kmph respectively on a two way traffic road. The average acceleration during overtaking may be assumed as 0.99 m/sec^2 . 9
- (i) Calculate safe overtaking sight distance.
- (ii) What is the minimum length of overtaking zones ?
6. Calculate (a) The length of transition curve and (b) the shift of transition curve using the following data : 15
- Design speed = 60 kmph , Radius of circular curve = 205 m,
Pavement width including extra widening = 7.5 m, Allowable rate of introduction of super-elevation = 1 in 150.

Unit IV

7. Explain the importance of conducting stripping test on road aggregates. Indicate the advantages and limitations of the test. 15
8. Bring out points of difference between : 15
- (i) Bitumen and Tar
 - (ii) Cutback and emulsion
 - (iii) Seal Coat and Tack Coat.



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Total Pages : 03

BT-6/M-26

46190

IRRIGATION ENGINEERING

Time : Three Hours]

[Maximum Marks : 75

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

Unit I

1. Write short notes on the following : 15

- (a) Saturation Capacity
- (b) Field Capacity
- (c) Wilting Point
- (d) Optimum Water

2. (a) What do you understand by crop rotation ? What are its advantages ? 5

- (b) A water course has a culturable command area of 1200 hectares. The intensity of irrigation for crop A is 40% and for B is 35%, both the crops being rabi crops. Crop A has kor period of 20 days and B has 15 days. Calculate discharge of water course if the kor depth for crop A is 10cm and B is 16cm. 10

Unit II

3. Describe border strip method of irrigation. Derive the expression for the time required to cover a given area by this method, for given rate of discharge and rate of infiltration of water in soil. **15**
4. Explain sprinkler irrigation method in detail. Also explain its types and advantages of this method. **15**

Unit III

5. Distinguish clearly between a low gravity dam and high gravity dam. Derive the expression used for such distinction. **15**

Determine the critical height of low gravity dam of concrete, taking the specific gravity of concrete as 2.40 and allowable compressive stress as 3340 KN/m^2 .

6. Design a channel section by Kennedy's theory given the following data : **15**

Discharge, $Q = 28$ cumec, Kutter's, $N = 0.0225$, Critical velocity ratio, $m = 1$

Find also bed slope of channel. $B/D = 7.6$

Unit IV

7. (a) Discuss the loss of water in canal by seepage. Also mention the factors which cause seepage. 8
- (b) Define water logging. Discuss the measure to control water logging. 7
8. How we can evaluate the performance of water management irrigation system ? Also explain the techniques used to minimize the water loss in irrigation. 15



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Total Pages : 02

BT-6/M-26

46191

**SOFT SKILL AND INTERPERSONAL
COMMUNICATION**

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. Define Communication. What are the different types of communication ? Explain with Examples.
2. Describe the different flows of communication within an Organization.

Unit II

3. What are the barriers to communication and how to overcome these barriers ?
4. What are the concepts kind of speaking skills are required in the current technical and professional world ? Explain the features and importance of speaking skills.

Unit III

5. What is personality ? What roles do heredity, environment and situation in its development ?
6. Write down the causes and effects of stress at workplace and how individuals manage their stress.

Unit IV

7. Describe the different forms of Group discussion ? What are the main strategies for Group discussion ?
8. Define the objectives of Resume ? Explain the design, structure and types of Resume.



Roll No.

Total Pages : 02

BT-6/M-26

46196

ENGINEERING GEOLOGY

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) Write a short note on the composition of the earth's interior.
(b) What is magma and what are its characteristics ?
2. What are the changes occurring on earth due to the internal and external geological forces ?

Unit II

3. What is fracture, as a property of minerals ? What are different types of fractures ?
4. What is a fold system ? Differentiate between a plunging fold system and a non-plunging fold system.

Unit III

5. How are geological maps and reports used in such geological investigations ? Describe briefly.
6. What is remote sensing ? Explain its applications in geological and hydrological investigations.

Unit IV

7. Explain the methods of improvement of foundation rocks. Discuss precautions against faults and joints.
8. Discuss the role of engineering geology in environmental protection. Explain the effects of global warming on earth environment.

Roll No.

Total Pages : 02

BT-6/M-26

46201

DISASTER PREPAREDNESS AND PLANNING

Time : Three Hours]

[Maximum Marks : 75

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

Unit I

1. (a) Explain the disaster management cycle with neat diagram. 7
(b) Define disaster, hazard, vulnerability and risk. 8
2. What are the causes and mitigation measures for earthquakes, floods and tsunami ? 15

Unit II

3. Explain hazard and risk assessment methodology. Discuss how risk analysis helps in disaster reduction planning ? 15
4. Describe emergency response systems during disasters. Explain medical response, search and rescue and rehabilitation operations. 15

Unit III

5. Explain the concept of capacity building in disaster management. Discuss the role of media and insurance sector. 15
6. Discuss the Disaster Management Act and NDMA guidelines. Explain the organizational structure for disaster management in India. 15

Unit IV

7. Explain the importance of community-based disaster management. Discuss methods for effective dissemination of disaster information. 15
8. Explain ecological and sustainable development models in disaster management. How do they help in reducing disaster risks ? 15



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Total Pages : 3

BT-7/M-26

47262

DESIGN OF CONCRETE STRUCTURE-II

Paper-CE-401A

Time : Three Hours]

[Maximum Marks : 75

Note : Attempt any *five* questions, selecting at least *one* question from each unit. If necessary, assume suitable data and specify the same. Use of IS: 456-2000 is allowed.

UNIT-I

1. Design a doubly reinforced concrete beam of rectangular section using the following data :
 - (a) Effective span = 5 m.
 - (b) Width of beam = 250 mm.
 - (c) Over all data = 500 mm.
 - (d) Service load (DL + LL) = 40KN/m.
 - (e) Effective cover = 50 mm.
 - (f) M20 grade of concrete and Fe 415 HYSD bars.
2.
 - (a) Explain various systems of prestressing with a diagram.
 - (b) Calculate the percentage loss of prestress due to the shrinkage of concrete in a beam prestressed by a cable carrying an initial prestress of 600N/mm^2 . The prestress is transferred at the age of 7 days. Assume the beam is both pretensioned as well as post-tensioned.

UNIT-II

3. A flat slab with 7.5×7.5 m panels on 500×500 mm columns has a slab thickness of 180 mm, designed for a total load of 9.0 KN/m^2 . Check the safety of the slab in shear and find the stirrups for reinforcing in the slab. Use M25 and Fe 415.
4. Design an isolated square sloped footing for a column 500×500 mm, transmitting an axial load of 1200 KN. The column is reinforced with 8 bars of 20 mm diameter. The safe bearing capacity of soil is 120 KN/m^2 . Use M20 and Fe 415

UNIT-III

5. Design a circular water tank wall having a capacity of 2,00,000 litres of water, assuming that the base of the wall is monolithic with the base slab. Assume concrete of grade M25 and steel of Fe 500.
6. Design a circular steel silo of 10 m height and 4 m internal diameter to store cement of unit weight 15.50 KN/m^3 and $Q = 25^\circ$.

UNIT-IV

7. The roof of an 8 m wide hall is supported on a portal frames spaced at 4 m intervals. The height of the portal frame is 4 m. The slab thickness is 100 mm. Live load on the roof is 2.25 kN/m , SBC of soil $2 = 200 \text{ kN/m}$. The column is hinged at the base. Design the column and hinge of the portal frame. Use M 20 grade concrete and Fe 415 grade steel.

8. (a) A square slab is simply supported on three sides and is free on the fourth side. If the moment capacities are equal in both directions, calculate the collapse load.
- (b) List the assumptions made in the yield line analysis of slabs.
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47272**BT-7/M-26****RAILWAY ENGINEERING****Paper : EL-427A****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 different types of railway gauges used in India? Explain the factors influencing the selection of a gauge. (15)

2. Write short notes on the following :

- (a) Creep of rails.
- (b) Defects in rails.
- (c) Conning of wheels. (3×5=15)

UNIT-II

3. What is sleeper density? Write down the advantages and disadvantages of each type of sleepers. (15)

4. Write short notes on the following :

- (a) Elastic fastenings.
- (b) Spikes.
- (c) Ballast. (3×5=15)

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UNIT-III

5. Explain the components of a Left Hand Turnout with the help of a neat sketch. (15)
6. Write short notes on :
- (a) Diamond Crossing.
 - (b) Automatic Train Control System.
 - (c) Turn Table. (3×5=15)

UNIT-IV

7. (a) Explain functions and types of stations. (8)
- (b) Explain the different types of gradients provided in railway track design, highlighting the purpose and design considerations for each. (7)
8. Discuss the necessity and objectives of regular track maintenance. Describe the different methods of track maintenance, including both manual and modern mechanised techniques, highlighting the advantages of the modern approach. (15)
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Total Pages : 4

BT-8/M-26

48321

**ENGINEERING ECONOMICS,
ESTIMATION & COSTING**

Paper-CE-402A

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

Prepare an approximate estimate of Materials required for constructing a single-room building with foundation, walls, roof, flooring and plastering.

Calculate the quantities of the following items for the building shown in Fig. 1 using the Centre line method :

- (a) Earthwork in excavation.
- (b) Brickwork in foundation and plinth.
- (c) PCC (1: 5: 10) below the foundation.
- (d) Damp Proof Course.

Write the detailed specifications for the following items of work :

- (a) Earthwork in excavation and filling.
- (b) Cement concrete.
- (c) Brickwork in Cement mortar.

UNIT-III

- 5. (a) Prepare a rate for ashlar masonry in the superstructure in 1 : 6 cement-sand mortar.
 - (b) Calculate the rate per sq.m for laying 2 cm thick damp proof course with 1:2 cement mortar.
 - (c) Describe the procedure for preparing a rate analysis of any construction item.
- 6. (a) Explain the purpose, importance and requirements of rate analysis in Civil engineering works.
 - (b) Prepare earthwork in banking or in excavation in road or canal work in a layer of 20 cm, including ramming, dressing etc., up to 30 m load and 1.5 m lift.
 - (c) Arrive rate per sq.m for laying 2.5 cm thick 1:1.5:3 cement concrete as a damp proof course.

UNIT-IV

7. (a) Describe the procedure of tendering and acceptance of tender.
- (b) What are the different types of contracts used in Public works?
8. Write short notes on the following :
 - (a) Measurement Book and its use.
 - (b) Cash Book.
 - (c) Preparation and payment of Bills (first and final bills).
 - (d) Administrative and Technical Sanction.

Roll No.

Total Pages : 2

BT-8/M-26

48322

BRIDGE ENGINEERING

Paper-CE-404A

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. Discuss the Indian Roads Congress (IRC) standard specifications for width of carriageway, clearance and live loads for road bridges. 15
2. What are the various types of loads considered in the design of road and railway bridges? Explain how they influence the bridge design? 15

UNIT-II

3. Explain the design steps and structural behavior of an R.C.C. box culvert with neat sketches. 15
4. Compare R.C.C. culverts and R.C.C. T-beam bridges in terms of design, construction and applications. 15

UNIT-III

5. What is a plate girder bridge? Explain its design considerations, components and load distribution. 15
6. Discuss the advantages and limitations of using steel bridges over R.C.C. bridges in modern transportation systems. 15

UNIT-IV

7. What are bearings in bridges? Discuss different types of bearings and their functions in load transfer and articulation. 15
8. Explain the structural design features of piers, abutments, wing walls, and approaches with neat sketches. 15

Roll No.

Total Pages : 2

BT-8/M-26

48325

HISTORY OF SCIENCE & ENGINEERING

Paper-OE-410A

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. (a) Explain in detail the beginnings of science, technology and engineering. 7½
(b) Explain how the history of science, technology and engineering travelling through the ages? 7½
2. Discuss the major functions of Science and Technology and the Emerging field in Science and Technology. 15

UNIT-II

3. Write short notes on the following : 15
 - (a) Statistical Profile of Science and Engineering profession.
 - (b) College enrolment trends of science and Engineering students.

4. Write a detailed note on the following :

(a) Diversity of profession distribution of Scientist and Engineer. 7½

(b) Job placement trends. 7½

UNIT-III

5. Write a note on the Biography of any **two** of the following : $2 \times 7\frac{1}{2} = 15$

(a) Albert Einstein.

(b) M. Visvesvaraya.

(c) Alfred Nobel.

6. Define learning style, accountability and overcoming challenging about the succeeding in classroom. 15

UNIT-IV

7. Elaborate Personal problem solving styles & also write a short note on Critical thinking in problem solving.

$7\frac{1}{2}, 7\frac{1}{2}$

8. Write a detailed difference between analytic problem solving and creative problem solving. 15

Roll No.

Total Pages : 2

BT-8/M-26

48328

EARTHQUAKE ENGINEERING

Paper-EL-422A

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 plate tectonics in Seismology. Explain mechanism and distribution of Earthquake. 15
2. Write short notes on following : 3×5=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. Explain Seismic resistance building architecture. Write down the recommendations mentioned in the Masonry code like IS 4326 and IS 13828. 15
6. Write short notes on the following :
- (a) Method of assessing seismic performance. 7½
 - (b) Criterion for repair and strengthening techniques. 7½

UNIT-IV

7. Explain the following :
- (a) Explain about base isolation, active and passive control system. 7½
 - (b) Define general features of structural control. 7½
8. Explain the construction details as per IS : 15
4326 and IS: 13920.

Roll No.

Total Pages : 2

BT-8/M-26

48331

WASTE WATER TREATMENT

Paper-EL-428A

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 short notes on the following : 15
 - (a) Inverted Siphon.
 - (b) Physical parameter of Sewage.
 - (c) First stage BOD.
2. (a) Explain the types of Water carriage system of Sewage? 7
(b) Describe the working of Manholes in Sewage system?
Draw a neat sketch also? 8

UNIT-II

3. Explain the Streeter Phelps equation and treatment of sewage? 15

4. Differentiate the following : 15
- (a) Flow equalization tank and sedimentation tank.
 - (b) Grit Chamber and Detritus Chamber.

UNIT-III

5. (a) Explain the Biological process of Trickling filter? 7
- (b) Explain the methods of thickening of Sludge ? 8
- 6 (a) Explain the principle and working of Oxidation Ditch? 7
- (b) Design up flow anaerobic sludge blanket reactor? 8

UNIT-IV

7. How can you minimize the effects of Industrial effluents on waste Water treatment plant? Explain the process of reuse of Waste water? 15
8. Write short note on following :
- (a) Equalization and Proportioning. 7
 - (b) Volume and Strength reduction. 8