

No. of Pages:02

Roll No.....

C-131

B.Tech. Civil Engineering III Semester Examinations (Jun 2026)
Structural Mechanics (BT-CE-201A)

Time- 3hrs
Max.Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory and each Question carries 12 marks.

Q.1	Marks
(a) Define slenderness ratio.	2*6=12
(b) What do you mean by Determinate structure?	
(c) State the principles of theory of simple bending.	
(d) What are assumptions and limitations of Euler's formula?	
(e) What is Moment area method? Where is Moment area method used conveniently?	
(f) Differentiate between concentric load and eccentric load on a column.	

UNIT-I

Q.2(a)	Explain different types of stresses that act on a body.	6
Q.2(b)	Discuss in brief various prominent theories of failure.	6
Q.3	Direct stresses of 120 N/mm^2 (tensile) and 90 N/mm^2 (compressive) exist on two perpendicular planes at a certain point in a body. They are accompanied by shear stress on the planes. The greatest principal stress at the point due to these is 150 N/mm^2 . What must be the magnitude of the shearing stresses on the two planes? Also, calculate the maximum shearing stress at the point.	12

UNIT-II

Q.4(a)	What do you mean by composite beams? How do you calculate equivalent moment of inertia of the composite section?	6
Q.4(b)	A simply supported beam of span 6 m is subjected to a UDL of 12 kN/m over its entire length. The cross-section of beam is $200 \text{ mm} \times 300 \text{ mm}$. Calculate the variations of bending stress and shear stress in beam cross-section and show it by diagram.	6
Q.5	A simply supported beam of 5 m span is subjected to two point loads of each 50 kN at one third span. The permissible bending stress for the beam material is 110 N/mm^2 . Design the beam as a rectangular section keeping breadth as half of the depth. Neglect self weight of the beam.	12

UNIT-III

Q.6	A cantilever beam of 6 m long carries 2 point loads 15 kN at the free end and 25 kN at the distance of 2.0 m from the free end. Determine the slope at free end & also deflection at free end. Take $I = 1.3 \times 10^8 \text{ mm}^4$. $E = 2 \times 10^5 \text{ N/mm}^2$	12
Q.7(a)	Write short notes on various methods used to find the slope and deflection of beams.	6
Q.7(b)	A beam 5 m long, simply supported at its ends, is carrying a point load W at the centre. If the slope at the ends of the beam should not exceed 1° , find the deflection at the centre of the beam.	6

UNIT-IV

Q.8	What are various types of trusses? Explain the method of joints and method of sections for analysis of plane trusses.	12
Q.9(a)	A column of length 2.4 m area of cross-section 2000 mm^2 and moment of inertia of $I_{xx} = 720 \times 10^4 \text{ mm}^4$ and $I_{yy} = 80 \times 10^4 \text{ mm}^4$ is subjected to buckling load. Both the ends of the column are fixed. Calculate the slenderness ratio of column?	6

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- Q.9(b)** Write short notes on
- a) Effective length of column
 - b) Difference between column and strut
 - c) Bulking load

6

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C-132

B.Tech. Civil Engineering III Semester Examinations (June 2026)
Building Construction & Materials (BT-CE-203A)

Time- 3hrs
Max.Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory and each Question carries 12 marks.

Q.1

	Marks
(a) What is purpose of dressing of stone?	2
(b) Explain the basic requirements of good quality cement.	2
(c) Explain the basic structure of a tree.	2
(d) What are the factors considered in the selection of type of foundation?	2
(e) Enumerate the various classes of rubble masonry.	2
(f) What are the materials used for making doors and windows?	2

UNIT-I

- Q.2 (a)** What are the qualities of a good building stone? Discuss them. 6
- Q.2 (b)** Distinguish between the quick lime and slaked lime. 6
- Q.3** With the help of a neat sketch, explain the working of Hoffman's kiln for the burning of bricks. 12

UNIT-II

- Q.4** Explain with neat sketches different forms of plywood. 12
- Q.5 (a)** What is gypsum? How gypsum plaster is used? 6
- Q.5 (b)** How is steel classified based on the carbon content? 6

UNIT-III

- Q.6** Explain the difference between brick and stone masonry with reference to their stability, cost and method of construction. 12
- Q.7 (a)** Discuss the factors affecting the bearing capacity of soil. 6
- Q.7 (b)** What are the requirements of formwork? Explain with specification. 6

UNIT-IV

- Q.8** Describe four commonly adopted types of floorings that are recommended in modern building giving their merits and demerits. 12
- Q.9 (a)** What are the factors to be kept in mind while selecting a suitable external finish? 6
- Q.9 (b)** Explain the requirements of an ideal damp proofing material. 6

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C-133

B.Tech. Civil Engineering - III Semester Examinations (Jun 2026)
Fluid Mechanics I (BT-CE-205A)

Time- 3hrs
Max. Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory and each Question carries 12 marks.

Q.1		Marks
(a)	What is dynamic viscosity and kinematic viscosity?	2
(b)	What is the difference between steady and unsteady flow?	2
(c)	Why is the centre of pressure always below the centroid for a vertical submerged surface?	2
(d)	Why does cavitation occur in venturi meter?	2
(e)	Why is the boundary layer thickness zero at the leading edge?	2
(f)	Why is Froude law used in open channel flow models?	2

UNIT-I

Q.2(a)	A plate having an area of 0.6 m^2 is sliding down the inclined plane at angle at 30° to the horizontal with a velocity of 0.36 m/sec . There is cushion of fluid 1.8 mm thick between the plane and the plate. Find the viscosity of the fluid if the weight of plate is 280 N .	6
Q.2(b)	The velocity component in a two-dimensional flow field for an incompressible fluid are expressed as	6

$$U = y^3/3 + 2x - x^2y, v = xy^2 - 2y - x^3/3$$

Show that these functions represent a possible case of an irrotational flow.

Obtain an expression for stream function Ψ .

Q.3	Create a comparative analytical model for streamlines, pathlines, and streaklines in steady and unsteady flow conditions. Explain how these concepts differ and how are they used in flow visualization experiments.	12
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UNIT-II

Q.4	Evaluate the influence of (i) shape of submerged surface, (ii) depth of submergence, and (iii) inclination of surface on the magnitude and point of application of hydrostatic force. Discuss their importance in the design of hydraulic structures.	12
Q.5(a)	Derive the expression for metacentric height of a floating body.	6
Q.5(b)	A circular plate of diameter 1 m is submerged vertically in water with its top edge 2 m below the free surface. Determine the total hydrostatic force acting on the plate and the depth of centre of pressure.	6

UNIT-III

Q.6	A channel system is used in the field for measuring discharge through notch/weir in an irrigation network. Which type of notch is most suitable for this condition by eliminating the effect of end contraction? Derive the discharge equation for the	12
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selected notch. Also explain the procedure for calibration and the development of a calibration chart.

- Q.7(a)** A suppressed rectangular weir in a rectangular channel of width 2.5m carries a discharge with a head of 0.35m over the crest. If the crest is 0.70 m above the channel bed, calculate the discharge over the weir. The flow can be assumed to be free. **6**
- Q.7(b)** A cylindrical external mouthpiece of diameter 8 cm is fitted to the side of a tank. The head of water above the mouthpiece is 5 m. The coefficient of discharge is 0.82. Calculate: **6**

1. The theoretical discharge
2. The actual discharge
3. Percentage increase in discharge compared to a sharp-edged orifice of same diameter having $C_d = 0.62$.

UNIT-IV

- Q.8** Show that the resistance F to the motion of a sphere of dia 'D' moving with a uniform velocity V through a real fluid of density ρ and viscosity μ is given by **12**

$$F = \rho D^2 V^2 f\left(\frac{\mu}{VD\ell}\right)$$

Where, H = head causing the flow, D = diameter of orifice, μ = Coefficient of viscosity, P = density, σ = Surface tension and g = acceleration due to gravity

- Q.9(a)** What is boundary layer separation? Explain the effect of adverse pressure gradient on separation. **6**
- Q.9(b)** Define model and prototype. Differentiate between distorted and undistorted models. **6**

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C-135

B.Tech. Civil Engineering III Semester Examinations (June 2026)
Soil Mechanics (BT-CE-209A)

Time- 3hrs
Max. Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory and each Question carries 12 marks.

Q.1		Marks
(a)	What do you mean by the Phase diagram of soil explain it with neat sketch.	2
(b)	A soil sample has volume of voids (V_v) 40 cm^3 and volume of solids (V_s) 80 cm^3 . Find the void ratio.	2
(c)	What do you mean by capillary rise in soil?	2
(d)	Define zero air voids line.	2
(e)	What is degree of consolidation?	2
(f)	Define stress-strain relationship in soils.	2

UNIT-I

Q.2(a)	Define void ratio, porosity, water content and degree of saturation. Derive the relationship among them.	6
Q.2(b)	A dry soil sample has a mass of 200 g and occupies a total volume of 100 cm^3 . Calculate the dry density of the soil.	6
Q.3(a)	Describe the determination of water content in laboratory by oven drying method.	6
Q.3(b)	The weight of a moist soil sample is 180 g. After oven drying, the weight of dry soil becomes 150 g. Determine the water content of the soil sample.	6

UNIT-II

Q.4	Explain the concept of stress distribution in soils. A point load of 500 kN acts on the ground surface. Determine the vertical stress at a depth of 2 m directly below the load using Boussinesq's equation coefficient $I = 0.48$.	12
Q.5(a)	Define coefficient of permeability and explain the factors affecting permeability of soils.	6
Q.5(b)	Explain quicksand condition and discuss its causes and prevention methods.	6

UNIT-III

Q.6(a)	Discuss the effect of compaction on engineering properties of soil.	6
Q.6(b)	Differentiate between normally consolidated clay and over consolidated clay.	6
Q.7	Define coefficient of consolidation and explain its engineering significance. During consolidation test, a clay specimen of drainage path 2 cm reaches 50% consolidation in 4 minutes. Determine the coefficient of consolidation. Take $T_v = 0.197$.	12

UNIT-IV

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|--------|---|----|
| Q.8 | State Mohr–Coulomb failure theory and explain its engineering significance. A soil has cohesion $c = 25 \text{ kN/m}^2$, angle of friction $\Phi = 30^\circ$ and normal stress $\sigma = 200 \text{ kN/m}^2$. Determine the shear strength of soil. | 12 |
| Q.9(a) | Explain the advantages and limitations of direct shear test. | 6 |
| Q.9(b) | Define sensitivity of clay and explain its engineering significance. | 6 |

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D-131

B. Tech. Civil Engineering IV Semester Examinations (Jun 2026)

Structural Analysis-I (BT-CE-202A)

Time- 3hrs

Max.Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory. Each Question carries 12 marks.

Q.1

- (a) State the properties of analogous column.
- (b) Discuss the effect of yielding of support in the case of an arch?
- (c) Why is Unit load method named so?
- (d) Explain the condition of equilibrium.
- (e) Define Influence Line diagram. State its uses.
- (f) What do you understand by statically indeterminate structure?

Marks

2*6=12

UNIT-I

Q.2 (a) What is the basic concept of the Principle of Virtual Work? What are the advantages of using the Principle of Virtual Work? 4

Q.2 (b) A two hinged parabolic arch of 40 m span and 6 m rise with $I_c = I \sec \theta$ (usual notations), is subjected to u.d.l. of 10 kN/m over entire span and in addition a point load of 20 kN acts at the crown of arch. Calculate horizontal thrust and draw B.M.D. Also, calculate radial shear and normal thrust at left quarter span. 8

Q.3 A three hinged parabolic arch a span of 60 meters and rise of 15 meters. The arch carries two concentrated loads of 200 kN and 150 kN at distances of 10 m and 18 m from the left end. It also carries a UDL of 60 kN/m on the right half of the span. Calculate the vertical and horizontal reactions at supports. Also, calculate the normal thrusts and radial shear at a section 18 m from left support. 12

UNIT-II

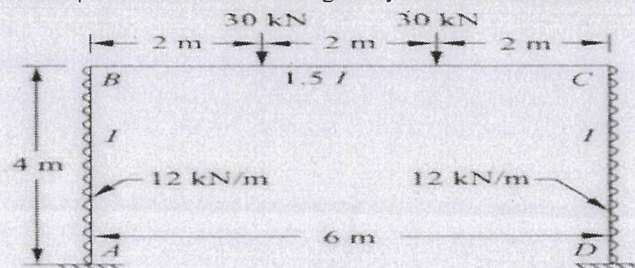
Q.4 (a) Draw influence line diagrams for simply supported beams. 9

Q.4 (b) Explain the concept of equivalent UDL. 3

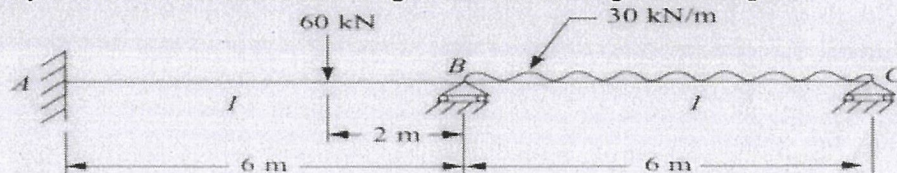
Q.5 A simply supported beam has a span of 15 m. UDL of 40 kN/m and 5 m long crosses the girder from left to right. Draw the influence line diagram for shear force and bending moment at a section 6 m from left end. Use these diagrams to calculate the maximum shear force and bending moment at this section. 12

UNIT-III

Q.6 Analyse the symmetric portal frame shown in Figure by moment distribution method. 12

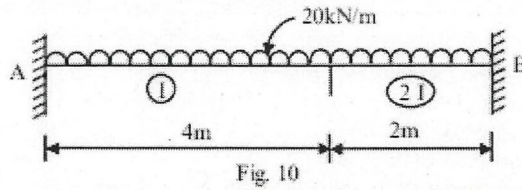


Q.7 Analyse the continuous beam shown in figure and draw bending moment diagram. 12



UNIT-IV

- Q.8 (a) Explain temperature stresses in cable and suspension bridges. 6
- Q.8 (b) What is the difference between cable stayed and suspension bridges. Discuss with the help of examples. 6
- Q.9 Analyse the fixed beam shown in figure by column analogy method. 12



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D 132
B.Tech. Civil Engineering IV Semester Examinations (Jun 2026)
Transportation Engineering I (BT-CE-204A)

Time- 3hrs
Max. Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory and each Question carries 12 marks.

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|------------|--|---------------|
| Q.1 | | Marks |
| (a) | Define space and time mean speed. | 2x6=12 |
| (b) | List 3 desirable properties of road aggregates, their tests and recommended values. | |
| (c) | What do you understand by radius of relative stiffness? List factors affecting this. | |
| (d) | Show in neat sketches bottom up and top-down cracking of pavement slab with position of wheel loads. | |
| (e) | List various components of a railway track. | |
| (f) | What are the functions of a pilot tunnel? | |

UNIT-I

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|---------------|--|-----------|
| Q.2(a) | List various types of traffic volume studies and minimum time duration for them. Define peak hour factor. | 6 |
| Q.2(b) | Describe impact test for road aggregates and its importance. What are the permissible impact values for different pavement layers. | 6 |
| Q.3 | Briefly explain the requirements of a good Highway alignment. What are the factors affecting alignment? Describe saturation system of highway planning and prioritization. | 12 |

UNIT-II

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|---------------|---|-----------|
| Q.4 | Draw plan and section of a rigid pavement showing its various types of joints. Explain why these joints are needed. What are the functions of dowel and tie bars in these joints. | 12 |
| Q.5(a) | Explain the procedure of determining ESWL and VDF. | 6 |
| Q.5(b) | Calculate CSA for design of a 4 lane undivided road with traffic of 100 cvpd in both direction for design life of 20 years. Assume other data as per IRC guidelines. | 6 |

UNIT-III

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|---------------|--|-----------|
| Q.6 | List various cross section elements covered in geometric design. Design camber for a 4 lane divided road with surface course of 25 MM Premix carpet passing through heavy rainfall area. What will be the transition length required to eliminate this camber on a circular curve of radius 100 m. | 12 |
| Q.7(a) | Draw neat sketch showing various operations involved in overtaking and various components of OSD on an undivided road. | 6 |
| Q.7(b) | Differentiate between WBM, WMM, BBM and DBM. Mention the name of the pavement layer in which they are used. | 6 |

UNIT-IV

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|---------------|---|-----------|
| Q.8 | What are the requirements of a good rail? Describe various types of rails used in India with neat sketches of cross section. What are the reasons of wear of rails, describe preventive measures. | 12 |
| Q.9(a) | Describe various types of tunnel sections used in transportation engineering and where are they preferably used. | 6 |
| Q.9(b) | Describe any one method of tunneling through hard rocks. | 6 |

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D 133

B.Tech. Civil Engineering IV Semester Examinations (Jun 2026)
Irrigation Engineering I (BT-CE-206A)

Time- 3hrs

Max. Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory and each Question carries 12 marks.

Q.1	Marks
(a) Name two methods for measuring discharge in channels.	2
(b) Define Silt Factor as per Lacey.	2
(c) What is the Wilting Point?	2
(d) What is an Attracting Spur?	2
(e) What is Land Reclamation?	2
(f) Mention two types of losses in canals.	2

UNIT-I

Q.2(a)	Explain various crops and crop season in India. Discuss the relation between delta, duty and base period.	6
Q.2(b)	What do you understand by Sprinkler irrigation? Explain component parts, advantages and disadvantages of sprinkler irrigation.	6
Q.3	Classify different types of irrigation methods. Explain the terms infiltration, field capacity, intensity of irrigation, well irrigation.	12

UNIT-II

Q.4	What do you understand by silt theories and design of alluvial channels using different theories? Compare the design of channel using Lacey's theory and Kennedy's theory.	12
Q.5(a)	Design an alluvial channel using Lacey's Theory for a given discharge and silt factor.	6
Q.5(b)	Describe different types of canal lining and the selection criteria for each.	6

UNIT-III

Q.6	What do you understand by river training works? Discuss the objectives of river training. Discuss the terms with neat sketches: a) Embankments b) Cutoffs c) Bank pitching.	12
Q.7(a)	Discuss various anti-water logging measures used in canal-irrigated areas.	6
Q.7(b)	What do you understand by surface and sub surface drainage of land? Explain the design consideration for surface drains used in irrigation purpose.	6

UNIT-IV

Q.8	Explain the water management techniques used in irrigation system. How the optimization of water use done in India?	12
Q.9(a)	Discuss the performance evaluation and economic aspects of irrigation.	6
Q.9(b)	Explain the role of Water Resource Associations in water management.	6

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D-134

B.Tech. Civil Engineering IV Semester Examinations (Jun 2026)
Environmental Engineering (BT-CE-208A)

Time- 3hrs

Max. Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory and each Question carries 12 marks.

- | Q.1 | Marks |
|--|-------|
| (a) Define Environmental Engineering and explain its scope in Civil Engineering. | 2 |
| (b) Differentiate between surface water and groundwater sources. | 2 |
| (c) State any four physical parameters used to determine water quality. | 2 |
| (d) What is coagulation in water treatment? Name two commonly used coagulants. | 2 |
| (e) Define BOD and explain its significance in sewage analysis. | 2 |
| (f) List any four factors affecting the design of sewers. | 2 |

UNIT-I

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|---------------|---|---|
| Q.2(a) | Explain the factors affecting municipal water demand. Discuss various types of water demands in a city. | 6 |
| Q.2(b) | The population data for a town over five decades, from 1930 to 1970, is given below. Using the Incremental Increase Method and the Decreasing Rate of Growth Method, estimate the population of the town after one, two, and three decades beyond the last known decade (1970). | 6 |

Year	1930	1940	1950	1960	1970
Population	25,000	28,000	34,000	42,000	47,000

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|---------------|--|---|
| Q.3(a) | Draw a neat and labeled sketch of a reservoir intake tower and explain its components. | 6 |
| Q.3(b) | Discuss different sources of water supply and their suitability for municipal use. | 6 |

UNIT-II

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|---------------|--|---|
| Q.4(a) | Describe the physical, chemical, and biological parameters used to assess water quality. | 6 |
| Q.4(b) | Explain the working and mechanism of sedimentation in water treatment. | 6 |
| Q.5(a) | Design a filtration unit for a town with a population of 50,000 and water demand of 135 LPCD. Assume the rate of filtration as 200 L/m ² /hr. Determine the required surface area and dimension of filter beds if 4 filter beds is installed. | 6 |
| Q.5(b) | Explain various methods of disinfection of water. Why is chlorination preferred? | 6 |

UNIT-III

- Q.6(a)** Explain temporary and permanent hardness of water. Explain the various processes used for water softening. 6
- Q.6(b)** Describe the principles of desalination and demineralization of water. 6
- Q.7(a)** Explain the construction and working of centrifugal pumps with neat sketches. 6
- Q.7(b)** Describe pump operating curves and discuss the criteria for selection of pumps for pumping stations. 6

UNIT-IV

- Q.8(a)** Explain different systems of sewage collection and conveyance. Discuss their advantages and disadvantages. 6
- Q.8(b)** Design a circular sewer for a residential colony having the following data: 6
- Area of colony = 36 hectares
 - Population = 8,000
 - Per capita water consumption = 170 lpcd
 - Critical design rainfall intensity = 4 cm/hr
 - General available ground slope = 1 in 900
- Assume suitable data wherever necessary.
- Q.9(a)** Explain various parameters used for the characterization of sewage. 6
- Q.9(b)** The BOD of a sewage incubated for one day at 30°C was found to be 110 mg/L. Determine the 5-day BOD at 20°C. Assume $K_D = 0.1$ at 20°C. 6

- Q.3** Explain the method of estimation for road passing through hill. Briefly explain different methods used in determining road estimate. **12**

UNIT-II

- Q.4** What is the purpose of General specification. Give general specification of all components of a second-class building. **12**
- Q.5** Write detailed specification of any three of following items: **12**
- a) Earthwork in excavation and foundation
 - b) Lime concrete in roof terracing
 - c) Brickwork IIInd Class
 - d) Cement Concrete 1:2:4
 - e) Reinforced Brick work.

UNIT-III

- Q.6** Explain the importance of Rate analysis in project. Estimate the quantities of materials required for a R.C.C. roof slab 15cm thick with 1% reinforcement for a room having internal dimensions of 5x4m. Estimate the cost of construction of the roof slab with suitable rates of materials and taking labour rate of laying including centering and shuttering etc., as Rs. 80 per cum of RCC work. **12**
- Q.7** Explain the different components of contract. Briefly describe the tendering process for awarding contract. **12**

UNIT-IV

- Q.8(a)** Explain the organization and functions of Public Works Department. **6**
- Q.8(b)** Describe different types of valuation and their purposes. **6**
- Q.9** Explain the importance of detailed feasibility report for a project. Discuss different components of detailed feasibility report. **12**
