

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2023

B.Tech- III Semester (Civil)

COURSE CODE (CREDITS): 18B11CE311 (3)

MAX. MARKS: 25

COURSE NAME: Chemistry

COURSE INSTRUCTOR: Dr. Poonam Sharma

MAX. TIME: 1 Hour 30 Minutes

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*Note: (a) All questions are compulsory.*

*(b) Marks are indicated against each question in square brackets.*

*(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems*

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- Q1(a). Small anodic area causes severe corrosion. Why? 2[COIII]
- (b). Give methods for purification of colloidal solutions 3[COII]
- Q2(a). Surface tension is the tendency of liquid surfaces at rest to shrink to the smallest possible surface area. Explain 2[COII]
- (b). Elaborate the factors affecting corrosion. 3[COIII]
- Q3(a). Discuss the applications of adsorption. 3[COII]
- (b). Elucidate different types of Dry corrosion with examples. 3[COII]
- Q4(a). Calculate the mass percentage of benzene ( $C_6H_6$ ) and carbon tetrachloride ( $CCl_4$ ) if 22 g of benzene is dissolved in 122 g of carbon tetrachloride. 3 [COII]
- (b). Calculate the molarity of 30 g of  $Co(NO_3)_2 \cdot 6H_2O$  in 4.3 L of solution. Molar mass of  $Co(NO_3)_2 \cdot 6H_2O$  is 291g/mol. 3[COII]
- Q5(a). Carboxylic acids exists as dimers. Why? 1[COI]
- (b). Why it is not possible to calculate the Limiting molar conductance for weak electrolytes graphically? 2[COII]

*Note: (a) All questions are compulsory.*

*(b) Marks are indicated against each question in square brackets.*

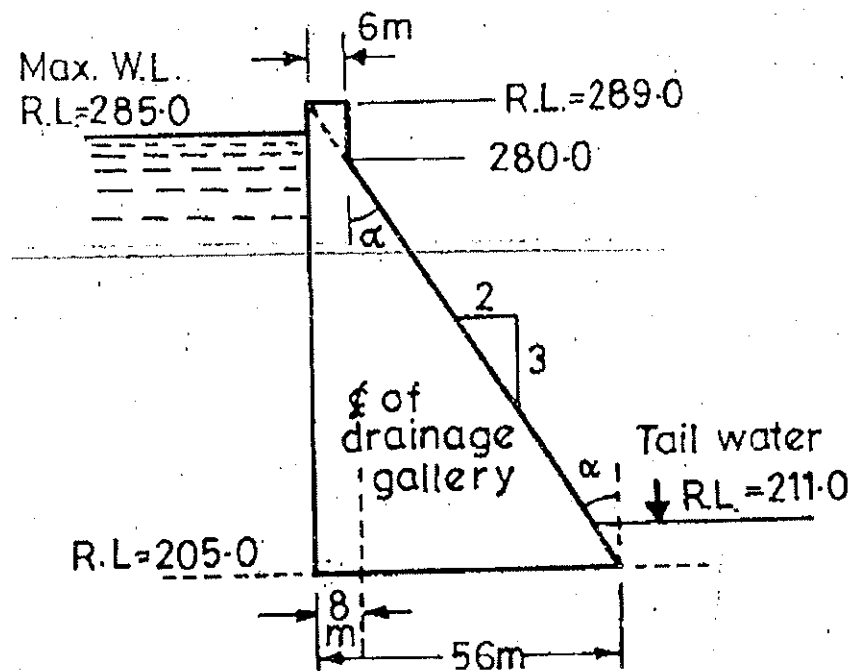
*(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems*

**Q1.** With reference to the combination of forces for design, explain the 'Normal Load Combination' and 'Extreme Load Combination' for the Reservoir full case. (CO2, CO3) [2+3 = 5]

**Q2.** Figure below shows the section of gravity dam (non – overflow portion) built of concrete. Calculate (neglecting earthquake effects):

- The maximum vertical stress at the heel and toe of the dam
- The major principal stress at the toe of the dam
- The intensity of shear stress on horizontal plane near the toe.

Assume weight of concrete =  $23.5 \text{ kN/m}^3$ ; unit length of dam and allowable stress in concrete may be taken as  $2500 \text{ kN/m}^2$ . (CO3) [3+3+2 = 8]



JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATIONS- 2023

B.Tech-VII Semester (CE)

COURSE CODE (CREDITS): 18B1WCE732 (3)

MAX. MARKS: 25

COURSE NAME: Environmental Management and Impact Assessment

COURSE INSTRUCTORS: Dr. Rishi Rana Kalia

MAX. TIME: 1 Hour 30 Minutes

*Note: (a) All questions are compulsory.*

*(b) Marks are indicated against each question in square brackets.*

*(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems*

Q.1 Define the terms: Biosphere, Ecology and Ecosystem?

[3 Marks] (CO-3)

Q.2 what are environmental indicators? How are they utilized in assessment of projects?

[4 Marks] (CO-3)

Q.3 Discuss the impacts of mining activities on physico-chemical and biological environment?

[4 Marks] (CO-4)

Q.4 (a) Define environmental scanning?

[2 Marks] (CO-2)

(b) The BOD of a sample from industry incubated for one day at 30°C has been found to be 110 mg/l. what will be the 5-day 20°C BOD? Assume  $K_1=0.1$  at 20°C.

[5 Marks] (CO-3)

Q.5 Discuss the salient features of simple interaction matrix? Identify the projects where this methodology is applied for identification of impacts?

[4 Marks] (CO-4)

Q.6 Tests for common ions are run on a sample and results show the concentration of various cations and anions. If 10% error in the balance is acceptable, calculate the percentage error.

Cations	Conc. (mg/L)	Anions	Conc. (mg/L)
Ca <sup>2+</sup>	175	HCO <sub>3</sub> <sup>-</sup>	320
Mg <sup>2+</sup>	121	SO <sub>4</sub> <sup>2-</sup>	99
Na <sup>+</sup>	198	Cl <sup>-</sup>	90

[3 Marks] (CO-3)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT  
TEST -2 EXAMINATIONS- 2023

PhD -I Semester

COURSE CODE (CREDITS): 14M31CE114 (3)

MAX. MARKS: 25

COURSE NAME: EIA and Risk Management

COURSE INSTRUCTORS: Dr. Rishi Rana Kalia

MAX. TIME: 1 Hour 30 Minutes

*Note: (a) All questions are compulsory.*

*(b) Marks are indicated against each question in square brackets.*

*(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems*

Q.1 What are fault tree and event tree analysis? [2 Marks] (CO-1)

Q.2 What is environmental impact assessment? Describe the merits and demerits? [2 Marks] (CO-1)

Q.3 Discuss the various human activities that generate emissions? [2 Marks] (CO-2)

Q.4 What do you understand by Environmental Accounting? Discuss with examples? [5 Marks] (CO-3)

Q.5 What is the status of Environmental Impact Assessment in India? [4 Marks] (CO-4)

Q.6 Explain the Environmental Effect of Mining and its assessment process? [4 Marks] (CO-2& 3)

Q.7 Determine the volume of 3 mol of stack gas at 1400 mmHg and 1000°C. [3 Marks] (CO-2 &1)

Q.8 Calculate the sound pressure level of the sources emanating the sound at every 10 minutes intervals as give in the following data- [3 Marks] (CO-3&4)

Time	dB
90	118
100	120
110	129
120	140
130	165
140	170
150	185
160	186
170	190
180	200

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2023

B.Tech-III Semester (CE)

COURSE CODE (CREDITS): 18B11CE313 (3)

MAX. MARKS: 25

COURSE NAME: BUILDING MATERIALS AND CONSTRUCTION

COURSE INSTRUCTORS: AKASH BHARDWAJ

MAX. TIME: 1 Hour 30 Minutes

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*Note: (a) All questions are compulsory.*

*(b) Marks are indicated against each question in square brackets.*

*(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems*

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Q1. (a) Draw the neat and clean figure of door frame mentioning its various components. (3 marks) [CO 3]

(b) How does the depth of the water table influence foundation design and construction on black cotton soil? Explain which type of foundation should be preferred in this case. (3 marks) [CO 2]

Q2. (a) Explain Quarrying. What are the primary methods of quarrying building stones, and how do they differ in terms of technique and equipment? (3 marks) [CO 1]

(b) What are the primary objectives of stone dressing, and how do they vary depending on the intended use of the stone? (2 marks) [CO 1]

Q3. (a) What are the primary purpose/objectives of soil exploration and site investigation in civil engineering and construction projects? (2 marks) [CO 1,2]

(b) What are the different geophysical methods used to assess subsurface conditions and soil properties? Explain any one. (3 marks) [CO 2]

Q4. (a) What are the standard dimensions of a brick (with and without mortar)? Draw rowlock and sailor orientation of brick. (3 marks) [CO 2,3]

(b) Explain efflorescence in bricks, and what causes it to occur? (2 marks) [CO 2]

Q5. (a) Define Perpend in brick masonry. (1 mark)

(b) Define Raking back in brick masonry with figure. (1 mark)

(c) Explain English bond in brick masonry with help of figure. (2 marks) [CO 1,2]

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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2023

PhD -I<sup>st</sup> Semester (CE/HSS)

COURSE CODE (CREDITS): 12M1WCE332

MAX. MARKS: 25

COURSE NAME: Repair and Retrofitting of Structures

COURSE INSTRUCTORS: Mr. Chandra Pal Gautam

MAX. TIME: 1 Hour 30 Minutes

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*Note: (a) All questions are compulsory.*

*(b) Marks are indicated against each question in square brackets.*

*(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems*

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**Q.1. (i)** Discuss various needs and benefits of repair and retrofitting of structures.

(ii) Differentiate between restoration, maintenance, retrofitting and rehabilitation. [3+3 = 6]

**Q.2. (i)** Mention different reasons for deterioration of a structure during its design life.

(ii) Mention the reason for deterioration of structures due to foundation and how that can be avoided in hilly region. [2+2 = 4]

**Q.3.** Discuss the types, mechanism and effect of corrosion in steel and how that can be avoided.

[4]

**Q.4.** Discuss the reason and mechanism behind acid and sulphur attack on concrete. Also mention the preventive measures. [4]

**Q.5.** "Freezing and thawing is a major challenge for concrete in cold weather". Justify this statement and mention the preventive measures for the same. [4]

**Q.6.** Discuss the effect of different kind of loading on the structures and how they enhance the deterioration of the structure. [3]

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATIONS-2023

B.Tech-V Semester (Civil)

COURSE CODE (CREDITS): 18B11CE512(3)

MAX. MARKS: 25

COURSE NAME: Sewage Treatment and Disposal

COURSE INSTRUCTOR: Niraj Singh Parihar

MAX. TIME: 1 Hour and 30 Minutes

*Note: All questions are compulsory. Marks are indicated against each question in square brackets. Assume suitable data if required.*

1. Discuss the methodology/technique adopted for
  - a. Detection of defects in the sewer pipes. [3]
  - b. Fixing the alignment of sewer line. [3] [CO2]
2. List the important factors taken into consideration while selecting the sewer material. Discuss the advantages and disadvantages of asbestos sewers. [2+3] [CO2]
3. The BOD of a sewage incubated for one day at 30°C has been found to be 100 mg/l. Derive the 5-day 20°C value of BOD. Take  $k=0.12$  at 20°C. [4] [CO3]
4. 100 cumec of a city sewage is discharged into a river fully saturated with oxygen flowing @ 1250 cumecs with a minimum velocity of 0.15 m/sec. If the 5-day BOD of the sewage is 260 mg/l, find the distance of the critical D.O. level in the river. Take the coefficient of purification of the river as 4 and coefficient of D.O. as 0.11 and assume that the ultimate BOD is 125% of the 5-day BOD of the sewage-river water mix. [5] [CO4]
5. Write short notes on the following:
  - a. Drop Manhole
  - b. Oil and Grease traps [2.5x2] [CO3]

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2023

B.Tech-VII Semester

COURSE CODE (CREDITS): 22B1WCE731 (3)

MAX. MARKS: 25

COURSE NAME: REMOTE SENSING AND GEOMATICS

COURSE INSTRUCTORS: AKASH BHARDWAJ

MAX. TIME: 1 Hour 30 Minutes

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*Note: (a) All questions are compulsory.*

*(b) Marks are indicated against each question in square brackets.*

*(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems*

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Q1. (a) What are the fundamental principles of image enhancement in digital image processing, and why is it important? (3 marks) [CO 3]

(b) Explain band interleave by line digital image data format. (2 marks) [CO 2]

Q2. (a) What are ground control points (GCPs) in the context of remote sensing and geospatial applications? Explain the two basic strategies for fitting images to maps by giving example of GCPs. (4 marks) [CO 2,3]

(b) Differentiate between Geometric and Radiometric errors in remote sensing with suitable examples. (3 marks) [CO 1]

Q3. (a) Explain roll, pitch and yaw with suitable figures. (3 marks) [CO 3]

(b) Enlist the factors governing image interpretation. (2 marks) [CO 2]

Q4. (a) What are the different elements of image interpretation? How these elements of image interpretation help in identifying and classifying objects or features in aerial or satellite imagery? (4 marks) [CO 1,3]

(b) What is a spectral reflectance curve? How can spectral reflectance curves be applied for assessing the health of vegetation or water quality in natural ecosystems? (4 marks) [CO 1,2]

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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATIONS- 2023

B.Tech-III Semester (CE)

COURSE CODE (CREDITS): 18B11CE314 (3)

MAX. MARKS: 25

COURSE NAME: Water Supply Engineering

COURSE INSTRUCTORS: Dr. Rishi Rana Kalia

MAX. TIME: 1 Hour 30 Minutes

*Note: (a) All questions are compulsory.*

*(b) Marks are indicated against each question in square brackets.*

*(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems*

Q.1 What are the different materials, which are commonly used for water supply pipes? Discuss their comparative merits and demerits? **[5 Marks] (CO-3)**

Q.2 (a) A sample of water from a surface stream is analyzed for the common ions with the following results:  $\text{Ca}^{2+} = 98 \text{ mg/L}$ ;  $\text{Cl}^- = 89 \text{ mg/L}$ ;  $\text{HCO}_3^- = 317 \text{ mg/L}$ ;  $\text{Mg}^{2+} = 22 \text{ mg/L}$ ;  $\text{Na}^+ = 71 \text{ mg/L}$ ;  $\text{SO}_4^{2-} = 125 \text{ mg/L}$ . what is the percent error in the cations-anion balance, also draw the bar diagram for the water? At. Wt of Ca-40; Mg- 24.3; Na-23;  $\text{HCO}_3^- = 61$ ;  $\text{SO}_4 = 96$ ; Cl-35.5.

**[4 Marks] (CO-2&3)**

(b) What are the sources and impacts of dissolved solids in water supplies? **[2 Marks] (CO-3)**

Q.3 (a) In a water treatment plant, the pH values of incoming and outgoing waters are 8.9 and 9.5 respectively. Assume a linear variation with time; determine the average pH value of water.

**[2 Marks] (CO-2)**

(b) Distinguish between expansion joint and flanged joint?

**[2 Marks] (CO-1&2)**

Q.4 (a) When is water required to be lifted up by means of pumping while arranging for water supply schemes serving towns and cities?

**[3 Marks] (CO-2)**

(b) What is an intake structure? Enumerate the various types of intakes, discuss any two. Draw neat and labeled diagram of dry intake tower?

**[5 Marks] (CO2)**

Q.5 The maximum daily demand at a water purification plant has been estimated as 12 million litres per day. Design the dimensions of a suitable sedimentation tank for raw supplies, assuming a detention period of 6 hours and the velocity of flow as 20 cm per minute? **[2 Marks] (CO-4)**

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATIONS-2023

B.Tech-VI Semester (Civil)

COURSE CODE (CREDITS): 18B11CE511

MAX. MARKS: 25

COURSE NAME: Highway Engineering

COURSE INSTRUCTORS: Dr. Amardeep

MAX. TIME: 1.5 Hours

*Note: All questions are compulsory. Marks are indicated against each question in square brackets.*

Q. 1. Calculate the Stopping Sight Distance for two-way traffic in a Single Lane Road. The design speed of the Road is 60 kmph. Assume Reaction time of the driver as 2.5 sec and Co-efficient of friction as 0.6. Brake efficiency is 50%. [CO2] (5)

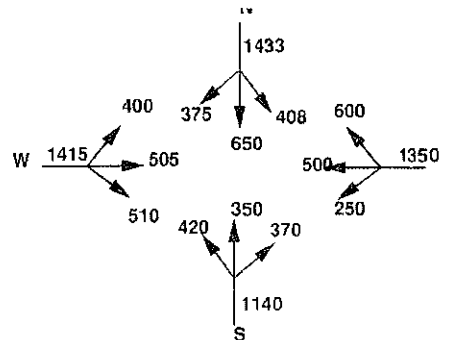
Q. 2. The speed of overtaking and the overtaken vehicle is 80 kmph and 65 kmph respectively on two-way traffic. The acceleration of the overtaking vehicle is 3.6 kmph. Calculate. (i) Safe overtaking sight distance. (ii) Minimum and desirable overtaking zone. [CO2] (5)

Q. 3. Design the rate of superelevation for a horizontal highway curve of radius 500m and speed 100 kmph. for mixed traffic conditions. [CO2] (4)

Q. 4. Solve the following:- [CO1]

- a) Minimum green time required for vehicular for any of the approach is \_\_\_ seconds
- b) Gradient on a highway is 1 in 20. Radius of the curve is 200 m. calculate grade compensation.
- c) Intermediate sight distance is equal to \_\_\_ times SSD
- d) As per IRC the maximum superelevation that can be provided on hill road not bound by snow is \_\_\_
- e) Define gradient and state any four types of gradients. (5X1 =5)

Q. 5. The width of a carriage way approaching an intersection is given as 15 m. The entry and exit width at the rotary is 10 m. The traffic approaching the intersection from the four sides is shown in the figure 4 below. Find the capacity of the rotary using the given data. [CO5] (6)



JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST - 2 EXAMINATION - 2023

B.Tech. - VII Semester (CSE/IT/ECE/BT/BI)

COURSE CODE (CREDITS): 22B1WCE733

MAX. MARKS: 25

COURSE NAME: Perennial Power Structures

COURSE INSTRUCTORS: Saurabh Rawat

MAX. TIME: 1 Hour 30 Minutes

*Note: (a) All questions are compulsory.*

*(b) Marks are indicated against each question in square brackets.*

*(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems*

**Q1.** A horizontal shaft, propeller type wind-turbine is in area having following wind characteristics:

Speed of wind 10 m/s at 1 atm and 15°C. Given R = gas constant 287 J/kg.K 1 atm and Pressure  
1 atm =  $1.01325 \times 10^5$  Pa. Calculate the following:

- Air density  $\rho$
- Total power density in wind stream,  $W/m^2$
- Maximum possible obtainable power density,  $W/m^2$
- Actual obtainable power density corresponding to an efficiency of 42%,  $W/m^2$
- Total power from a wind-turbine of 120 m dia. corresponding to the actual obtainable power density calculated in (4).
- Torque and axial thrust on the wind-turbine operating at 40 rpm and at maximum efficiency of 42%.  
(CO2, CO3) [1+1+2+2+1+3 = 10]

**Q2.** Derive and prove that the maximum efficiency of an ideal wind turbine is '16/27 times the wind power'.  
(CO3) [5]

**Q3.** Calculate the total thrust and aerodynamic power developed in a 3 – blade wind turbine at a wind velocity of 9 m/s. The machine specifications are as follows: Diameter of rotor = 9 m; Rotational speed = 100 rpm; Blade length = 4 m; TSR = 5.23; Chord Length = 0.45 m; Pitch angle = 5°; Distance from shaft to inner edge = 0.5 m; Airfoil section = NACA 23018  
(CO3) [6]

Attack angle (°)	CL	CD
$i_1$	0.95	0.0105
$i_2$	1.20	0.0143
$i_3$	0.75	0.0092
$i_4$	0.46	0.0078

**Q4.** Supporting with technical aspects, elaborate on the type of wind turbine you would install for harnessing wind energy in Rajasthan and in coastal area of Tamil Nadu.  
(CO2, CO3) [4]

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2023

B.Tech- VI Semester (CE)

COURSE CODE(CREDITS): 18B1WCE 639 (3)

MAX. MARKS: 25

COURSE NAME: Open channel flow and Hydraulic Machine

COURSE INSTRUCTORS: Ashish Kumar

MAX. TIME: 1 Hour 30 Minutes

*Note: (a) All questions are compulsory.*

*(b) Marks are indicated against each question in square brackets.*

*(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems*

- Q1.** Explain the different components of the Pelton turbine with neat diagram with their functioning. [5]
- Q2.** A trapezoidal channel has side slope of 1 horizontal to 2 vertical. The slope of the bed of the channel is given 1 in 1500. The area of section is  $40 \text{ m}^2$ . Find the dimensions of the section if it is most economical. Take value of Chezy's constant,  $C= 50$ . [5]
- Q3.** A Pelton wheel is to be designed for a head of 60 m when running at 200 rpm. The pelton wheel develops 96 kW shaft power. The velocity of the bucket = 0.45 times the velocity of the jet, overall efficiency =0.85 and Co-efficient of the velocity =0.98 [6]
- Q4.** Explain the phenomenon of hydraulic jump in open channel with neat sketch. [3]
- Q5.** The depth of flow of water, at a certain section of a rectangular channel of width 4 m is 0.5 m. The discharge is  $10 \text{ m}^3/\text{s}$  through the channel . If a hydraulic jump takes place on the downstream side, find the depth of flow after the jump. [3]
- Q6.** Explain the different types of efficiency of a turbine. [3]

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2023

B.Tech-V Semester (CE)

COURSE CODE (CREDITS): 18B11CE513

MAX. MARKS: 25

COURSE NAME: STRUCTURAL ANALYSIS

COURSE INSTRUCTORS: Mr. Chandra Pal Gautam

MAX. TIME: 1 Hour 30 Minutes

**Note:** (a) All questions are compulsory.

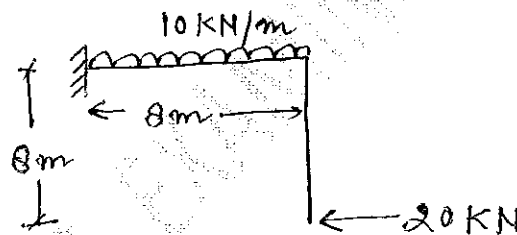
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(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

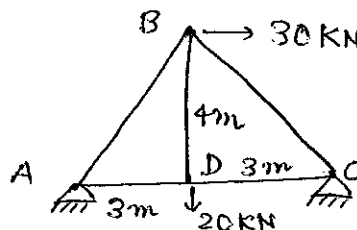
**Q.1. (i)** State the reason why indeterminate truss can't be solved by using Slope Deflection Equation Method.

(ii) Define fixed end moment. Compare the fixed beam with simply supported beam in term of slope, deflection and reinforcement pattern. [1+2 = 3] (CO -1, CO-2)

**Q.2.** Find the deflection at joint B along X axis for the frame shown below, by using Unit Load Method. [6] (CO - 2)



**Q.3.** Solve the indeterminate truss, shown below by using Force Method and also find the forces in all the members. [8] (CO -3)



**Q.4.** Solve the indeterminate beam shown below by using Slope Deflection Equation. Draw the bending moment diagram and reinforcement pattern in the beam assuming it a RCC beam. [8] (CO -3)

