

Gandhi Institute of Engineering and Technology University, Odisha, Gunupur (GIET University)



B. Tech (Sixth Semester - Regular) Examinations, April 2026

23BCVPC36002 - Structural Analysis II

(Civil Engineering)

Time: 3 hrs

Maximum: 60 Marks

Answer ALL questions
(The figures in the right hand margin indicate marks)

PART – A

(2 x 5 = 10 Marks)

Q.1. Answer **ALL** questions

- | | | |
|--|-----|--------------------|
| a. What is the distribution theorem? | CO1 | Blooms Level
K1 |
| b. What are the advantages of arch action over the beam? | CO2 | K2 |
| c. Sketch the cable-stayed bridge and mark the various components of it. | CO3 | K3 |
| d. List any three methods of force and displacement methods of analysis. | CO4 | K1 |
| e. What are the characteristics of the flexibility method? | CO5 | K1 |

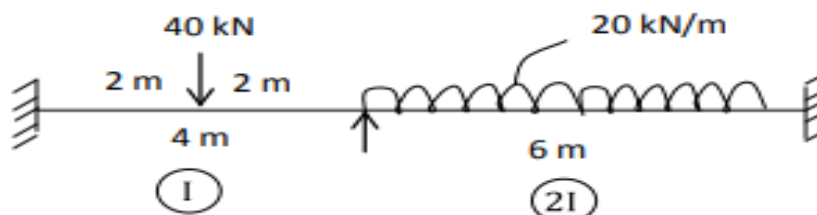
PART – B

(10 x 5 = 50 Marks)

Answer ALL the questions

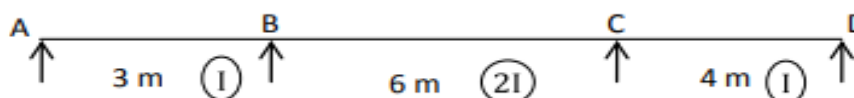
2. a. Analyze the beam by slope deflection method

Marks	CO #	Blooms Level
10	CO1	K3



(OR)

- | | | | |
|---|----|-----|----|
| b. Analyze the beam by moment distribution method. The beam at supports B and C sinks by 2 mm and 7 mm. Take $E = 200 \text{ kN/mm}^2$ and $I = 2.5 \times 10^7 \text{ mm}^4$. | 10 | CO1 | K3 |
|---|----|-----|----|



- | | | | |
|---|----|-----|----|
| 3.a. Using Slope and deflection method analyze the two span continuous beam. The moment of inertia of AB = 2I while that of BC = I. The ends A and C are Fixed. Sketch the B.M. and S.F. diagram. Span AB carries a concentric load of 40 kN with a span of 8m and span BC carries an udl of 25 kN/m over a span of 8m. | 10 | CO2 | K3 |
|---|----|-----|----|

(OR)

- | | | | |
|--|----|-----|----|
| b. A three-hinged parabolic arch has a span of 10m. The central rise of the arch is 2m. It is loaded with a uniformly distributed load of intensity 1 kN/m at the left 4m length. (a) Calculate the maximum positive and negative bending moments. (b) Calculate the bending moment, normal thrust and shear at 2m and 7.5m from the left end. | 10 | CO2 | K3 |
| 4.a. A symmetrically loaded arch with uniformly distributed load throughout the | 10 | CO3 | K3 |

span. Calculate the horizontal thrust

(OR)

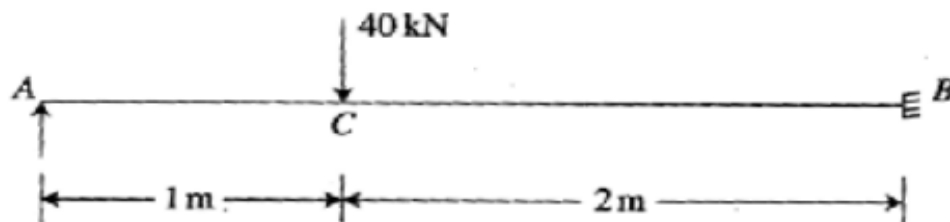
- | | | | | |
|------|---|----|-----|----|
| b. | A suspension bridge of 50 m span and 3.5 m wide platform is subjected to a load of 50 kN/m ² . The bridge is supported by a pair of cables having a central dip of 4.5 m. Find the necessary cross-sectional area of the cable, if the maximum permissible stress in the cable is not to exceed 150 N/mm ² | 10 | CO3 | K3 |
| 5.a. | A three-hinged segmental arch of horizontal span 40m and central rise 8m is hinged at the springing and crown. It carries a u.d.l of 20kN/m over the left half of the span, together with a point load of 100kN at 10m from the right support. Find the Support reactions and (R _A , R _B , H). Normal thrust and radial shear at 10m from the left support. | 10 | CO4 | K3 |

(OR)

- | | | | | |
|------|---|----|-----|----|
| b. | What is normal thrust and radial shear in a three-hinged arch. Explain it | 10 | CO4 | K2 |
| 6.a. | Write the steps involved in analyzing the stiffness method. | 10 | CO5 | K1 |

(OR)

- | | | | | |
|----|---|----|-----|----|
| b. | Using the stiffness matrix method, find the end moments at A and B for the given beam as shown in the figure. | 10 | CO5 | K3 |
|----|---|----|-----|----|



--- End of Paper ---