QP Code: RM22BTECH147 | Reg. No | | | | | | | | | | | AY 22

GIET UNIVERSITY, GUNUPUR – 765022

B. Tech (Fourth Semester Regular) Examinations, May – 2024

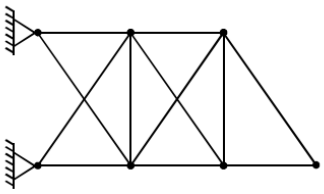
22BCVPC24001 – Structural Analysis I

(Civil)

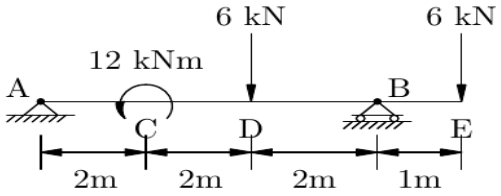
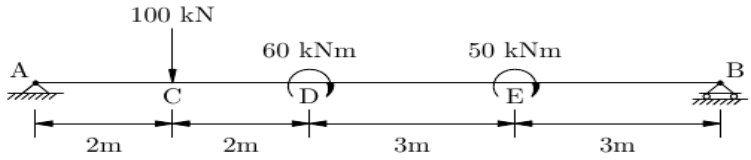
Time: 3 hrs | Maximum: 70 Marks

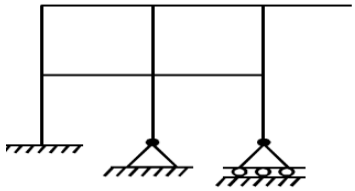
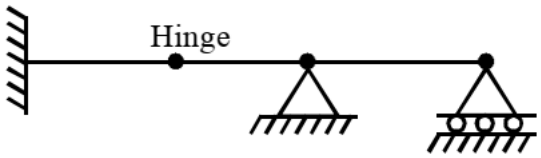
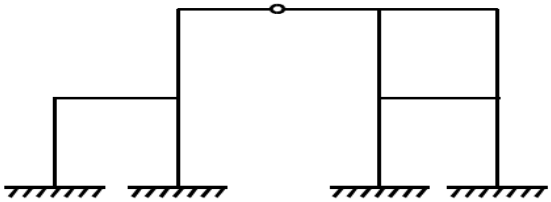
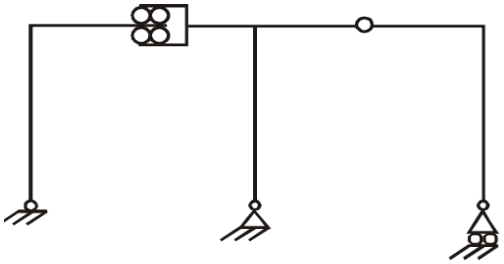
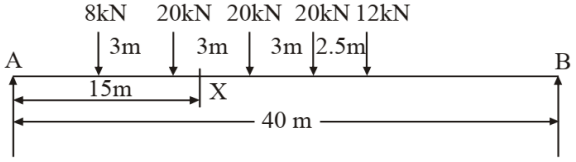
(The figures in the right hand margin indicate marks)

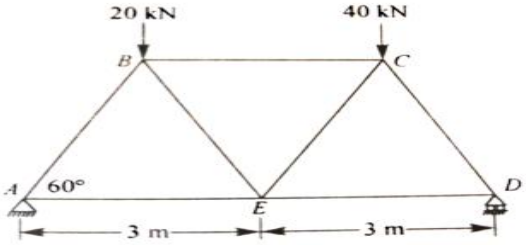
PART – A **(2 x 5 = 10 Marks)**

		CO #	Blooms Level
Q.1.	Answer ***ALL*** questions		
a.	Define Maxwell's reciprocal theorem and Betti's reciprocal theorem.	CO4	K1
b.	Find the degree of kinematic indeterminacy. 	CO1	K2
c.	What will be the deflection at the centre of a simply supported beam of length l carrying a point load (w) at the centre?	CO4	K2
d.	Draw the SFD and BMD of a simply supported beam of length 5m carrying a udl of 10kN/m over the whole length.	CO2	K2
e.	Draw an influence line diagram for a bending moment and shear force of a cantilever beam.	CO3	K2

PART – B **(15 x 4 = 60 Marks)**

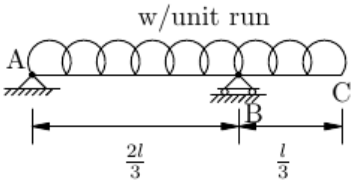
		Marks	CO #	Blooms Level
	Answer ***ALL*** questions			
2. a.	 Construct the bending moment and shear force diagram for the beam and mark the values of the important ordinates.	8	CO2	K3
b.	 Construct the bending moment and shear force diagram for the beam.	7	CO2	K3
	(OR)			
c.	A three hinged parabolic arch has a span of 20 m and central rise of 4m. It carries two concentrated loads of 25 kN and 40 kN at a distance of 3m and 7m respectively from the left support and an udl of 25 kN/m over the right half portion. Determine the followings: i. Reactions at the supports ii. Resultant reactions at the supports iii. Moment at a section 5m from left support. iv. Normal thrust at a section 5m from left support. v. Radial shear at a section 5m from left support. vi. Maximum positive bending moment.	15	CO2	K2

3.a.	Determine the static and kinematic indeterminacy (for flexible and rigid case). 	8	CO1	K2
b.	Determine the static and kinematic indeterminacy (for flexible and rigid case). 	7	CO1	K2
	(OR)			
c.	Determine the static and kinematic indeterminacy (for flexible and rigid case). 	8	CO1	K2
d.	Determine the static and kinematic indeterminacy (for flexible and rigid case). 	7	CO1	K2
4.a.	Draw the influence line diagram for reaction, shear force, bending moment of a simply supported beam of span "L".	8	CO3	K3
b.	Using influence line diagrams determine the shear force and bending moment at section X in the simply supported beam as shown in the figure. 	7	CO3	K2
	(OR)			
c.	Four wheel loads of 25, 30, 35, 20 and 32 kN spaced 2, 3, 2 and 2 meters apart respectively cross a girder of 25 m span from the left to right with 32 kN wheel leading. Calculate the i. Reactions when the 20 kN load is at 10 m. ii. Shear force when the 30 kN load is at 15 m. iii. Bending moment when the 35 kN load is at 12 m. iv. The maximum shear force & B.M. at 10m. v. The absolute bending moment.	15	CO3	K3
5.a.	Find the vertical and horizontal deflections of the joint E of the truss shown in the figure. The sectional area of each member is 1500 mm^2. Take E = 200kN/mm^2.	15	CO4	K2



(OR)

c.	A cantilever beam of length *l* carrying a uniformly distributed load of w per unit run over the whole span. Assume uniform flexural rigidity. Determine the deflection at the free end of the cantilever.	8	CO4	K2
d.	Find the deflection at the right end of beam using double integration method.	7	CO4	K2



--- End of Paper ---