

# CBCS SCHEME

USN

--	--	--	--	--	--	--	--	--	--

CMRIT LIBRARY  
BANGALORE - 560 037

15CV42

## Fourth Semester B.E. Degree Examination, June/July 2018 Analysis of Determinate Structures

Time: 3 hrs.

Max. Marks: 80

- Note: 1. Answer any FIVE full questions, choosing one full question from each module.  
2. Assume any missing data suitably.*

### Module-1

- 1 a. Distinguish between Statically Determinate Beams and Indeterminate Beams with examples. (05 Marks)  
b. Define Degree of freedom. What is the degree of freedom for a (i) Fixed support (ii) Hinged support. (03 Marks)  
c. Determine static and kinematic indeterminacy for the following shown in Fig.Q1(c).

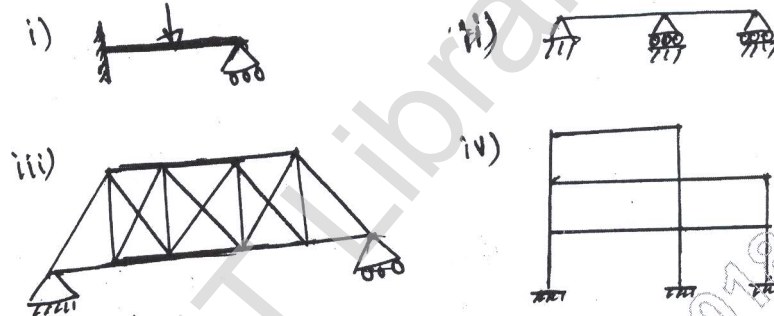


Fig.Q1(c)

(08 Marks)

OR

- 2 a. Find the forces in all members of the pin-jointed truss shown in Fig.Q2(a) by method of joints. (08 Marks)

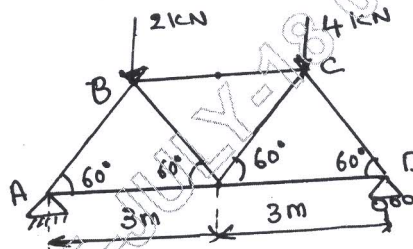


Fig.Q2(a)

- b. Determine the nature and magnitude of forces in members FE, FD, CD by method of sections for the truss shown in Fig.Q2(b). (08 Marks)

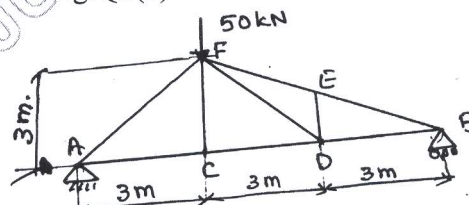


Fig.Q2(b)

1 of 3

CMRIT LIBRARY  
BANGALORE - 560 037

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-2

- 3 a. Derive Moment Curvature equation. (06 Marks)  
 b. A beam of length 6m is simply supported at its ends and carries a point load of 40 kN at a distance of 4m from the left support. Find the slopes at the supported ends and deflection under the load by Maculay's method. (10 Marks)

OR

- 4 a. Find the slope and deflection at the free end of the cantilever beam shown Fig.Q4(a) by moment area method. (08 Marks)

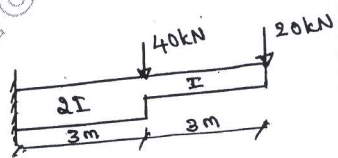


Fig.Q4(a)

- b. Find the deflection under the concentrated load for the beam shown in Fig.Q4(b) using conjugate beam method.  $EI = 40000 \text{ kN-m}^2$ . (08 Marks)

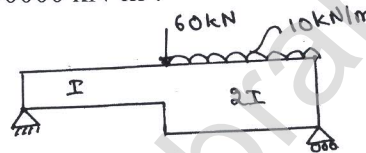


Fig.Q4(b)

Module-3

- 5 a. State (i) Castigliano's theorems (ii) Principal of virtual work. (08 Marks)  
 b. Determine the vertical deflection of joint C of the truss shown in Fig.Q5(b). Take  $E = 200 \times 10^6 \text{ kN/m}^2$  and cross sectional area of each bar as  $150 \times 10^{-6} \text{ m}^2$ . (08 Marks)

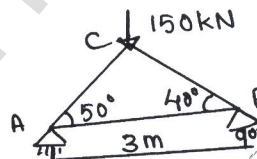


Fig.Q5(b)

OR

- 6 a. Determine the deflection of the cantilever beam shown in Fig.Q6(a) at its free end, by Castigliano's method. Take  $EI = 12000 \text{ Nm}^2$ . (06 Marks)

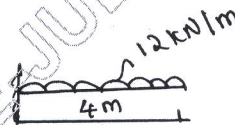


Fig.Q6(a)

- b. Determine the vertical and horizontal deflection at end C of the bent frame shown in Fig.Q6(b) by unit load method. Take  $E = 200 \text{ GPa}$  and  $I = 6(10)^7 \text{ mm}^4$ . (10 Marks)

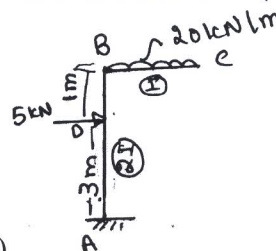


Fig.Q6(b)

CMRIT LIBRARY  
BANGALORE - 560 037

**Module-4**

- 7 A three hinged parabolic arch has a span of 24m and a central rise of 4m. It carries a concentrated load of 75 kN at 18m from the left support and uniformly distributed load of 45 kN/m over the left half of the portion. Find out the resultant reactions. Also determine the bending moment, normal thrust and radial shear at a section 6m from the left support. (16 Marks)

OR

- 8 A suspension cable of span 100m and dip 10m carries a uniformly distributed load of 10 kN/m over the full span. Find
- Maximum and minimum Tension in the cable and its inclination.
  - Minimum required cross sectional area of the cable if the allowable stress is 280 MPa.
  - Length of the cable
  - Vertical and horizontal forces transmitted to the supporting pylons (a) if the cable passed over a smooth pulley (b) if the cable is clamped to a saddle with roller on the top of the pier.

The anchor cable makes  $30^\circ$  to the horizontal at the pylons.

(16 Marks)

**Module-5**

- 9 A simple girder of 20m span is traversed by a moving uniformly distributed load of 6m length with an intensity of 20 kN/m from left to right. Find the maximum bending moment and maximum positive and negative shear forces at sections 4m from left support. Also find the absolute maximum bending moment that may occur anywhere in the girder. (16 Marks)

OR

- 10 Using relevant influence line diagram find (i) Maximum bending moment (ii) The maximum positive and negative shear forces at 4m from left support of a simply supported girder of span 10m, when a train of 4 wheel loads of 10 kN, 15 kN, 30 kN and 30 kN spaced at 2m, 3m and 3m respectively cross the span left to right with 10 kN load leading. [Refer Fig.Q10] (16 Marks)

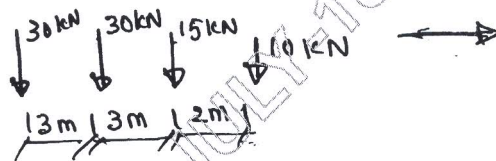


Fig.Q10

CMRIT LIBRARY  
\*\*\*\*\*  
BANGALORE - 560 037