Basavarajeswari Group of Institutions

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

(Autonomous Institute under Visvesvaraya Technological University, Belagavi)

USN											Course Code	2	1	C	V	4	4

Fourth Semester B.E. Degree Examinations, Sep/Oct 2023

STRUCTURAL ANALYSIS-I

Duration: 3 hrs **Max. Marks: 100**

Note: ***1. Answer any* FIVE *full questions, choosing* ONE *full question from each module.***
2. Missing data, if any, may be suitably assumed

Q. No		***Question***	***Marks***	*(RBTL:CO: PI)*
		MODULE – 1		
1.	**a.**	Define statically determinate and indeterminate structures.	**4**	(1 :1: 1.3.1)
	b.	Determine the static and kinematic indeterminacy for the following structuresshown in fig 1(b). Neglect axial deformations.	**8**	(2 :1: 1.3.1)

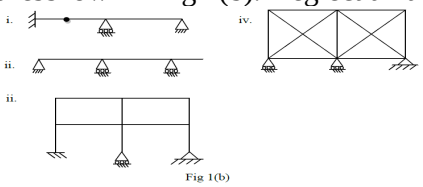
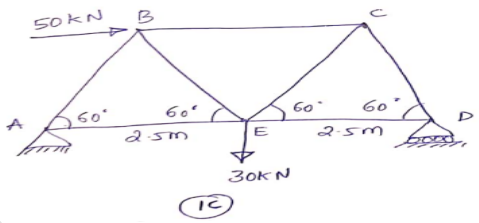


Fig 1(b)

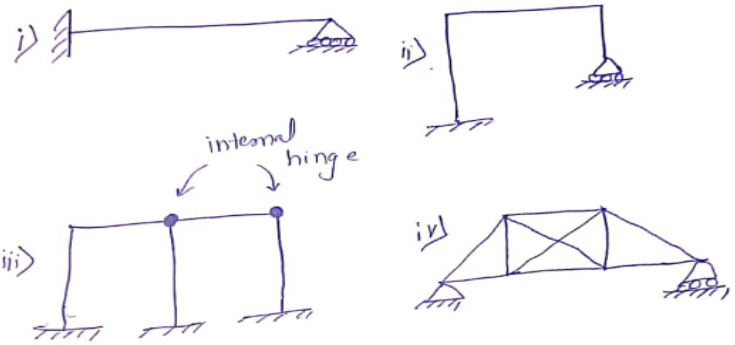
	c	Analyze the forces in all the members of the truss using method of joints as shown in fig 1(c).	**12**	(2 :1: 1.3.1)



(1c)

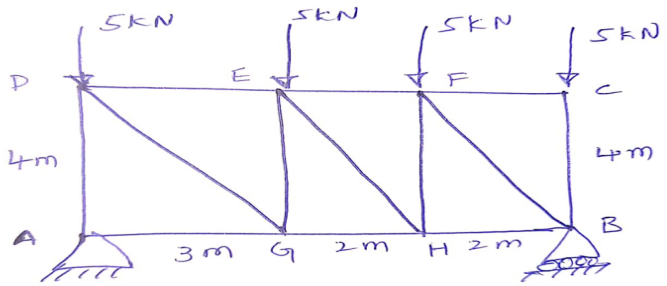
OR

2.	**a.**	Define static indeterminacy and kinematic indeterminacy	**4**	(1 :1: 1.3.1)
	b.	Determine the static and kinematic indeterminacy for the following structuresshown in fig 1(b). Neglect axial deformations.	**8**	(2 :1: 1.3.1)



Note: (**RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI - Performance Indicator)**

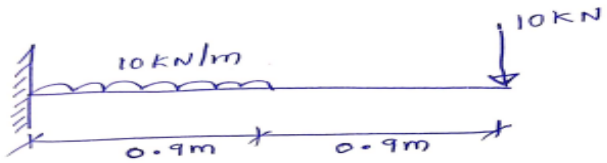
c Analyze the forces in all the members of the truss using method of joints as shown in fig 2(c). (2 :1: 1.3.1)



MODULE – 2

3. a. Derive the Mohr's first theorem of moment area method. **8** (1 :2: 1.3.1)

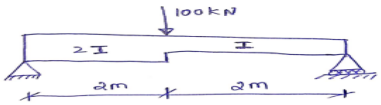
b. Find the slope and deflection at the free end of cantilever beam shown in fig by moment area method. **12** (2 :2: 1.3.1)



OR

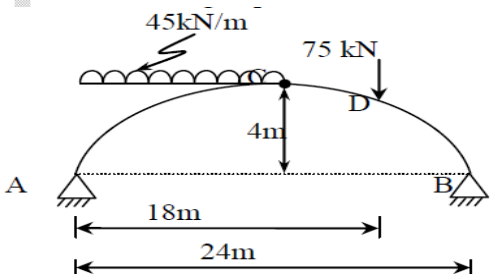
4. a. Derive the Mohr's second theorem of moment area method. **8** (1 :2: 1.3.1)

b. Determine slope at the supports and deflection under the load for simple supported beam shown in the fig by conjugate beam method. **12** (2 :2: 1.3.1)



MODULE – 3

a. Determine the bending moment, normal thrust and radial shear at a section 6m from the left support for a three hinged parabolic arch shown in fig . **10** (2 :3: 1.3.1)



b A bridge cable is suspended from the towers 80m apart and carries a UDL of 45kN/m on the entire span, the maximum sag is 8m, calculate the maximum tension in the cable and forces transferred to the tower if the cable is supported by saddles which are stayed by wires inclined at 250 to the horizontal. **10** (2 :3: 1.3.1)

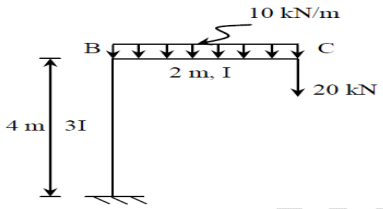
OR

Note: (**RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI - Performance Indicator)**

6.	**a.**	Asymmetrical parabolic arch hinged at springing and crown has a span of 30m. The central rise of the arch is 4m. It is loaded with UDL of 2.5 KN/m on the left 8m length. Calculate: a) The direction and the magnitude of reaction at the hinges. b) The bending moment, normal thrust and shears at 4m from left end	**10**	(2 :3: 1.3.1)
	b.	A cable is suspended from two points A and B which are 80m apart. A is 5m below B. The lowest point on the cable is 10m below A. The cable supports a udl of intensity 20kN/m over the entire span. Compute the required diameter of the cable if the maximum stress in the cable is not to exceed 150MPa.	**10**	(2 :3: 1.3.1)

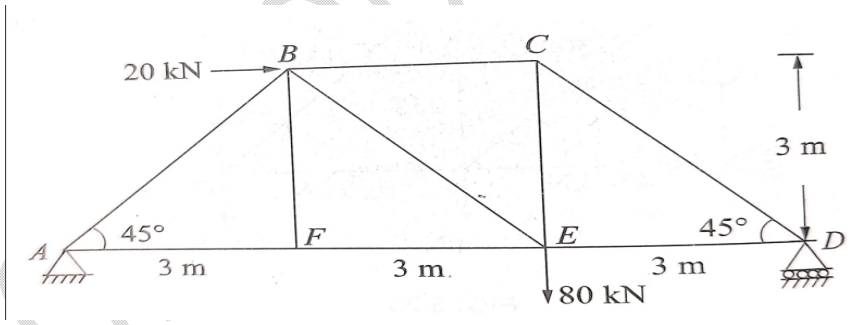
MODULE – 4

7.	**a.**	Derive the expression for strain energy stored in a member due to bending.	**5**	(1 :4: 1.3.1)
	b.	Find the vertical deflection at point C for the frame shown in fig using Castiglione's method. Assume E = $2x10^5$ N/mm^2 and I = $2x10^8$ mm^4.	**15**	(2 :4: 1.3.1)



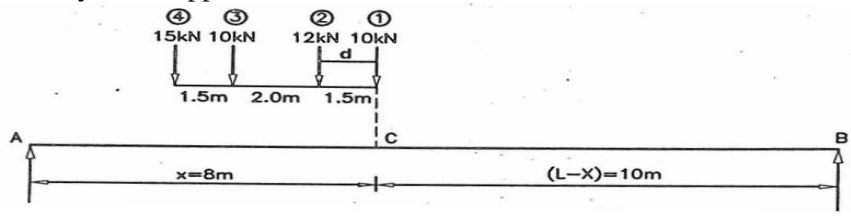
OR

8.	**a.**	Derive the expression for strain energy stored in a member due to axial force.	**5**	(1 :4: 1.3.1)
	b.	Determine the vertical deflection of joint E for the Warren truss shown in fig by unit load method. Take A = 645 mm2 and E = 200 kN/mm^2 for all the members.	**15**	(2 :4: 1.3.1)



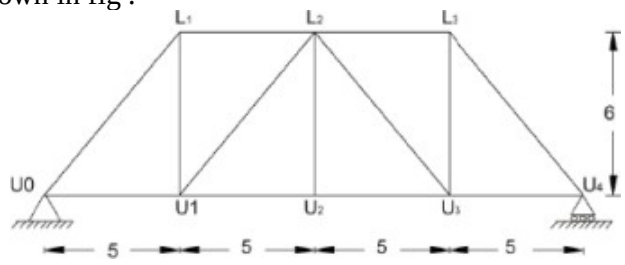
MODULE – 5

9.	**a.**	A train of loads showed in fig crosses a simply supported girder of span 18m from left to right. Calculate the maximum S.F. and B.M. at section 8m away fromsupport A.	**10**	(2 :5: 1.3.1)



Note: (**RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI - Performance Indicator)**

b. Draw the influence line diagram for members L_1L_2, U_1L_2 and U_1U_2 of the trussshown in fig . **10** (2 :5: 1.3.1)



OR

10. **a.** A moving UDL of 20 kN/m and 8m long cross over a simply supported beam ofspan 20m. Determine **12** (2 :5: 1.3.1)

I. Maximum +ve SF, -ve SF and BM at 6m from left support.
II. Absolute maximum SF and BM anywhere on the beam.

b. Two-point loads of 100 kN and 200 kN spaced 3m apart cross a girder of span 15m from left to right with the 100 kN load leading. Draw the influenceline for shear force and bending moment and find the value of maximum shear force and bending moment at a section, 6m from the left-hand support. Also, findthe absolute maximum moment due to the given load system. **08** (2 :5: 1.3.1)

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MODEL QUESTION PAPER

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