Seat No.: _____ Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV(NEW) – EXAMINATION – SUMMER 2019

Subject Code:2144002 **Date:17/05/2019**

Subject Name: Fundamentals of Structural Analysis

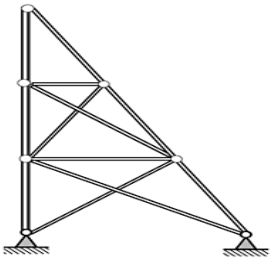
Time:02:30 PM TO 05:00 PM **Total Marks: 70**

Instructions:

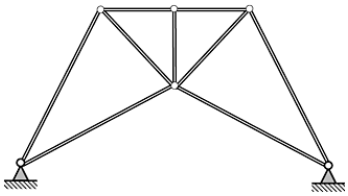
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

			MARKS
Q.1	**(a)**	Explain advantages and disadvantages of statically indeterminate structure.	**03**
	(b)	State and explain Principal of Superposition.	**04**
	(c)	Determine the degree of indeterminacy and the number of degrees-of-freedom.	**07**

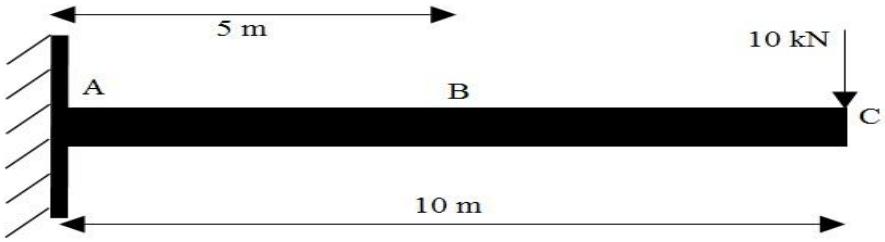
1.



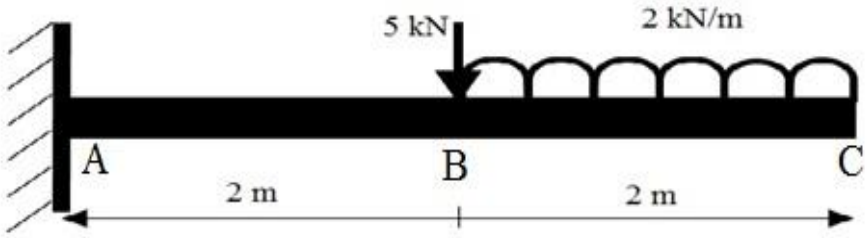
2.



Q.2	**(a)**	Enlist various methods of computing the joint deflection of Plane Truss.	**03**
	(b)	Write theorems of Moment Area Method.	**04**
	(c)	Calculate slope and Deflection at free end for cantilever beam subjected to point load at free end. Use Macaulay's method.	**07**
		OR	
	(c)	Calculate slope and deflection at free end for cantilever beam subjected to UDL w kN/m for entire span L. Use Macaulay's method.	**07**
Q.3	**(a)**	Define 1. Direct Stress 2. Bending Stress	**03**
	(b)	Determine the slope at point b and c of the Beam shown below. Take E = 200 GPa and I = 360 x 10^6 mm^4.	**04**



(c) Calculate slope and deflection for cantilever beam shown in fig. below at point B and C. Consider EI = 2000 kNm^2. Use conjugate beam method. **07**

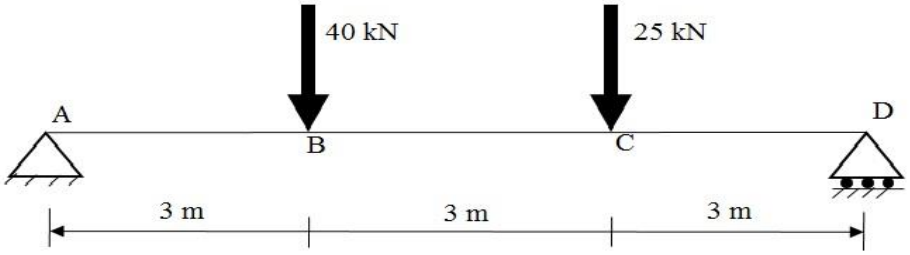


OR

Q.3 **(a)** Write limitations of the equation of Elastic line. **03**

(b) Differentiate Dam and Retaining wall. **04**

(c) Calculate slope at ends and deflection under point load for a simply supported beam shown in figure by Moment area method. Consider EI = 10000 kN.m^2. **07**



Q.4 **(a)** Differentiate thin and thick cylindrical shell. **03**

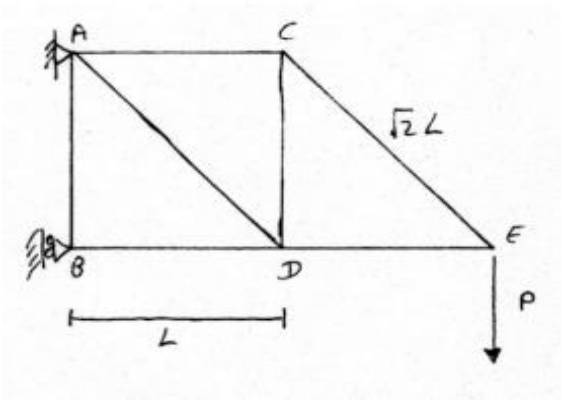
(b) What do you understand by limit eccentricity and core of the section explain briefly. **04**

(c) A symmetrical three hinged parabolic arch of span 30 m and rise of 10 m carries UDL of 20 kN/m over the left half of the span. The hinges are provided at supports and center of arch. Calculate the bending moment, radial shear and normal thrust at distance of 10m from left support. Also calculate maximum positive and negative bending moment. **07**

OR

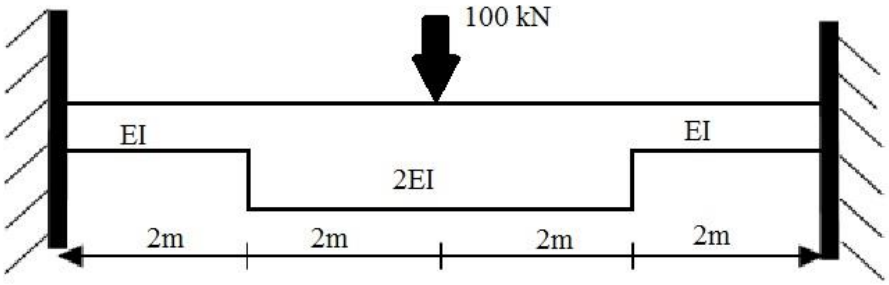
Q.4 **(a)** A cylindrical vessel 3 m long and 600 mm in diameter with 10 mm thick plates is subjected to an internal pressure of 3.5 MPa. Calculate the change in volume of the vessel. Take E = 200 GPa and Poisson's ratio = 0.32 for the vessel material. **03**

(b) Calculate deflection of loading point E in pin-jointed truss shown below. Bars are at 90 or 45 to each other. All bars have cross sectional area A, Young's modulus E. No temperature change occurs. **04**



(c) A three hinged parabolic arch has a span 20 m and central rise 3m.it carries a point load of 10 kN at 8 m from the left hinge. Calculate the bending moment, radial shear and normal thrust at a distance of 7.5 m from right end hinge. Also calculate maximum positive bending moment and its location. **07**

Q.5 **(a)** Analyze the Fixed beam given below. **03**

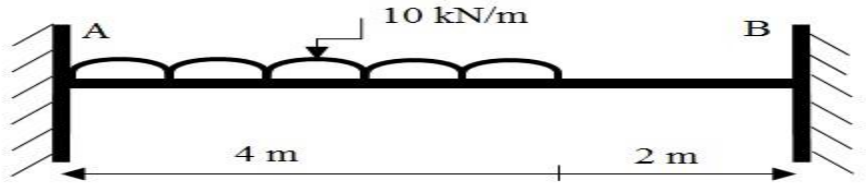


(b) Draw shear force & bending moment diagram for given beam in Q 5 (a) above. **04**

(c) A masonry retaining wall of trapezoidal section 6 m high, 3 m wide at top and 2 m wide at bottom. The earth face of wall is vertical. The soil level with the top of the wall. Find maximum and minimum pressure intensities at the base of the wall soil weighs 15 kN/m^3 with an angle of repose of 30^0. Masonry weighs 22.5 kN/m^3. **07**

OR

Q.5 **(a)** Analyze the Fixed beam given below. **03**



(b) Draw shear force & bending moment diagram for given beam in Q 5 (a) above. **04**

(c) A masonry chimney 15 m high is of circular section, the external and internal diameters of section being 5 m and 2 m respectively. The chimney is subjected to a horizontal wind pressure of 1600 N/m^2 of projected area. Find maximum and minimum stress intensities at the base. Take unit weight of Masonry as 21 kN/m^3. **07**

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