GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER– IV EXAMINATION – SUMMER 2020

Subject Code: 3140603   **Date:27/10/2020**

Subject Name: Structural Analysis-I

Time: 10:30 AM TO 01:00 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)**	Define statically determinate and indeterminate structures.	**03**
	(b)	Determine the radius (eccentricity e) of core for a hollow circular cross section.	**04**
	(c)	A steel rod 500mm^2 in cross section and 2m long is vertically suspended from a rigid support. Determine the height from which a weight of 100N should be allowed to fall on the collar so as to produce a maximum stress of 40 N/mm^2 in the rod. E=2x10^5 N/mm^2	**07**
Q.2	**(a)**	Explain gradual load, sudden load and load applied with impact.	**03**
	(b)	State and prove Maxwell's reciprocal theorem.	**04**
	(c)	A beam simply supported over a span of 6m is carrying a point load of 50 kN at 1.20 m from right hand support. Calculate using Macaulay's Method the position and amount of maximum deflection. Take EI=20,000 kNm^2.	**07**
		OR	
	(c)	A cantilever beam of span 'l' is subjected to udl 'w' on the entire span. Find the slope and deflection at the free end by Conjugate beam method.	**07**
Q.3	**(a)**	Distinguish between Truss and Frame.	**03**
	(b)	Write the assumptions and limitations of Euler's formula.	**04**
	(c)	A pier supports a vertical load of 50 kN as shown in figure 1. Find the stresses at each corner of the pier.	**07**
		OR	
Q.3	**(a)**	Derive the expressions for Hoop and longitudinal stresses in a thin cylinder.	**03**
	(b)	Explain Eddy' theorem	**04**
	(c)	A mild steel tube 4m long, 30 mm internal diameter and 4mm thick is used as strut with both the ends hinged. Find the collapse load. What will be the collapse load if both the ends are fixed?	**07**
Q.4	**(a)**	Define: 1)Resilience, 2) Proof Resilience and 3) Modulus of Resilience	**03**
	(b)	Define a conjugate beam and how we can determine slope and deflection?	**04**
	(c)	Analyze the beam shown in figure 2 by moment distribution method.	**07**
		OR	

Q.4	(a)	Discuss middle third rule.	03
	(b)	Explain static and kinematic indeterminacy	04
	(c)	Discuss the stability conditions for a dam subjected to hydrostatic pressure.	07
Q.5	(a)	Discuss various types of Arches.	03
	(b)	Derive the expression for strain energy stored in a beam.	04
	(c)	A propped cantilever beam of span 'L' is subjected to a point load 'P' at mid span. Determine the reactions at the supports.	07

OR

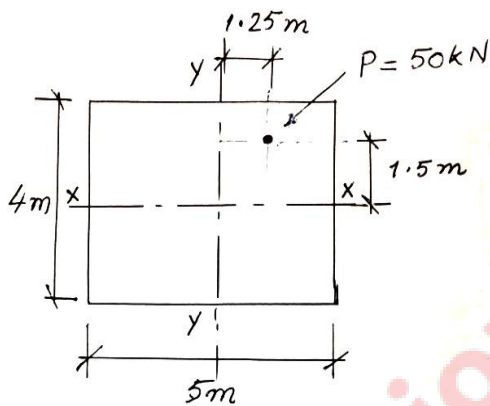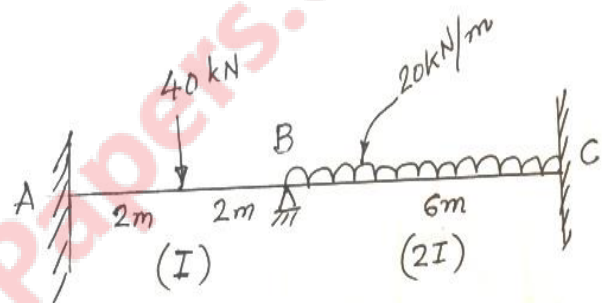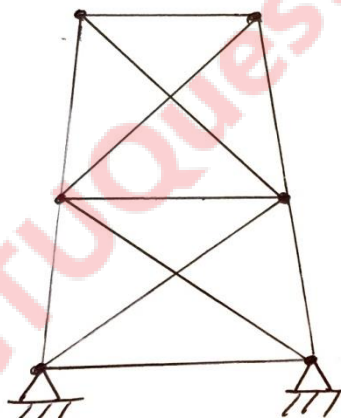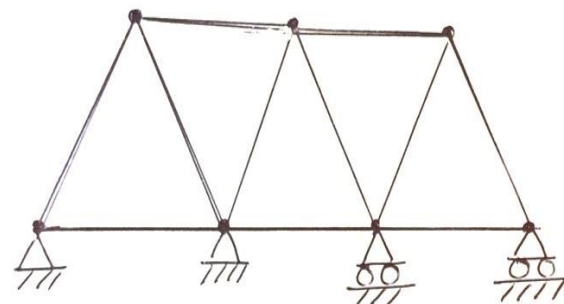| Q.5	(a)	Define slenderness ratio, radius of gyration and effective length for a long column.	03
	(b)	Derive the expression for horizontal reaction, tension at the ends for a uniformly loaded cable.	04
	(c)	Check the stability and calculate the degree of redundancy for the trusses shown in figure 3 and 4	07

Figure-1

Figure-2

Figure-3

Figure-4

2