C. U. SHAH UNIVERSITY Summer Examination-2020

Subject Name: Structural Analysis - I

Subject Code: 4TE03STA1		Branch: B.Tech (Civil)		
Semester : 3	Date : 29/02/2020	Time : 02:30 To 05:30	Marks : 70	

Instructions:

- (1) Use of Programmable calculator & any other electronic instrument is prohibited.
- (2) Instructions written on main answer book are strictly to be obeyed.
- (3) Draw neat diagrams and figures (if necessary) at right places.
- (4) Assume suitable data if needed.

Q-1	Attempt the following questions:	(14)
-	a) Define Hook's Law.	(1)
	b) What is Axial loading?	(1)
	c) Define lateral strain.	(1)
	d) Define brittle material.	(1)
	e) Write the relation between shear force and bending moment.	(1)
	f) Enlist various type of beam.	(1)
	g) Define pure bending stress	(1)
	h) What is shear stress?	(1)
	i) Write equation for strain energy due to gradual loading.	(1)
	j) What is principal plane.	(1)
	k) What is elastic curve?	(1)
	I) Enlist various method for finding slope and deflection at a point.	(1)
	m) Write any two difference between strut and column	(1)
	n) What is slenderness ratio.	(1)
Attemp	t any four questions from Q-2 to Q-8	

Q-2 Attempt all questions (14) (A) Draw shear force and bending moment for following beam (8)



(B) Explain various types supports and loads in detail

(6)

- Q-3 Attempt all questions (14)
 - (A) Derive equation for stresses in bars of uniformly tapering circular section (7)



	(B)	A load of 10kN is to be raised with help of a steel wire. Find the minimum diameter of the wire , if the stress is not to exceed 80 N/mm^2	(7)
Q-4	(A)	Attempt all questions A steel rod 15mm in diameter and 200mm long is heated through 100^{0} C and at the same time subjected to an axial pull "p". if total extension of the rod is 0.30 mm. calculate the magnitude of the pull "p". The coefficient of liner expansion of steel is 12×10^{-6} / C and E = 200 kN/mm ²	(14) (7)
	(B)	A beam simply supported and carries an U.D.L of 40 kN/m Over whole span. The size of beam is 150mm x 400mm. if maximum stress in the material of beam is 100 N/mm ² find span of beam.	(7)
Q-5		Attempt all questions	(14)
	(A)	Derive equation of bending stress.	(7)
	(B)	A simply supported beam 300mm deep is simply supported over a span of 4m. what u.d.l. per meter the beam can carry, if the bending stress is not exceed 150 N/mm ² take $I = 8 \times 10^6 \text{ mm}^4$.	(7)
Q-6		Attempt all questions	(14)
	(A)	Derive Equation for Maximum and Minimum stress in rectangular section	(7)
	(B)	A circular column 450mm in diameter carries a load of 600KN at an eccentricity of 100 mm. calculate maximum and minimum stresses for the column	(7)
0-7		Attempt all questions	(14)
Υ,	(A)	Write the assumption and limitation of Euler's formula	(11)
	(B)	A steel tube of 25mm external diameter and 20mm internal diameter is used as a column 3m long with both ends hinged. Determine the Euler's cripplied load if $E = 2 \times 10^5 \text{ N/mm}^2$.	(7)
Q-8		Attempt all questions	(14)
-	(A)	Derive strain energy due to impact loading.	(7)
	(B)	A steel bar 50mm in diameter and 2.5m long has to tansmit a shock energy of 100 N.m. calculate the maximum instantaneous stress and elongation produced. Take $E = 2 \times 10^5 \text{ N/mm}^2$	(7)

