<b>Enrollment No:</b> _	Exam Seat No:

## C. U. SHAH UNIVERSITY

### Winter Examination-2019

**Subject Name: Structural Analysis - I** 

Subject Code: 4TE03STA1 Branch: B.Tech (Civil)

Semester: 3 Date: 18/11/2019 Time: 02:30 To 05:30 Marks: 70

#### **Instructions:**

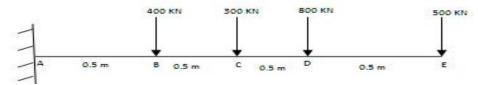
- (1) Use of Programmable calculator & any other electronic instrument is prohibited.
- (2) Instructions written on main answer book are strictly to be obeyed.
- (3) Draw neat diagrams and figures (if necessary) at right places.
- (4) Assume suitable data if needed.

Q-1		Attempt the following questions:	(14)	
	a)	What is strut?	(1)	
	<b>b</b> )	Define Long column.	(1)	
	c)	What do you mean by critical load?	(1)	
	<b>d</b> )	What is eccentricity?	(1)	
	<b>e</b> )	Define Kernel of section.	(1)	
	f)	What is deflection curve?	(1)	
	<b>g</b> )	Define Proof Resilience.	(1)	
	h)	Write Equation for strain Energy due to gradual loading.	(1)	
	i)	What is non Prismatic bar?	(1)	
	j)	Write Equation for strain Energy due to shear loading.	(1)	
	k)	What is thermal strain?	(1)	
	1)	Enlist various type of supports in beam.	(1)	
	-	Define Pure bending stress.	(1)	
	n)	What is yielding?	(1)	
Attempt any four questions from Q-2 to Q-8				
Q-2		Attempt all questions	(14)	
<b>C</b> –	<b>(A)</b>	A circular rod of diameter 25 mm and 550 mm long is subjected to a	(7)	
		tensile force 55kN. The modulus of elasticity for steel may be taken as		
		200kN/mm <sup>2</sup> . Find stress, strain and elongation of the bar due to applied		
	(T)	load.	<b></b> \	
	<b>(B)</b>	A load of 15 kN is to be raised with help of a steel wire. Find the	<b>(7</b> )	
		minimum diameter of the wire, if the stress is not to exceed 80N/mm <sup>2</sup>		
Q-3		Attempt all questions	<b>(14)</b>	
	(A)	A steel bar 1600 mm long is acted upon by forces as shown in below	<b>(7</b> )	
		figure. Take $E = 210 \text{ GN/m}^2$ .		





(B) Draw Shear force and Bending Moment Diagram for following beam. (7)



#### Q-4 Attempt all questions

**(14)** 

- (A) Derive the stress value based on the strain energy stored due to impact loading. (7)
- (B) A bar 50 mm in diameter is 3.0 m long. An axial load of 150 KN is suddenly applied to it. Find The maximum instantaneous stress The maximum instantaneous elongation The work stored in the bar at the instant of maximum elongation Take  $E = 200 \times 10^3 \text{ N/mm}^2$ .

#### Q-5 Attempt all questions

**(14)** 

- (A) Explain first castigliano's theorems. (7)
- (B) A short column rectangular section 250mm x 200 mm is subjected to a load of 400 KN at a point 50 mm from longer side and 100 mm from shorter side. Find maximum and minimum stresses in the column.

#### Q-6 Attempt all questions

**(14) (7)** 

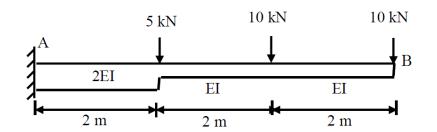
- (A) What is effective length for column when:
  - (1) Both ends hinged
  - (2) Both end fixed
  - (3) One end fixed and other hinged
  - (4) One end fixed and other free
- (B) A hollow cast iron column has outside diameter 200mm and thickness of 20mm. It is 4.5m long and fixed at both ends. Calculate the safe load and ratio of Euler's and Rankine's critical load. For cast iron Fc =  $550 \text{N/mm}^2$ ,  $\alpha = 1/1600$  and  $E = 0.8 \times 10^5 \text{ N/mm}^2$

#### Q-7 Attempt all questions

**(14)** 

- (A) Write assumption in Euler's formula (7)
- (B) Find the slope and deflection at the free end B of a cantilever beam AB as shown in fig. by moment area method. Take  $I = 2 \times 10^8 \text{ mm}^4$ ,  $E = 2 \times 10^5 \text{ N/mm}^2$





# Q-8 Attempt all questions Explain in detail Stress-Strain Curve for mild steel with diagram. (14)

