Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY
Winter Examination-2018

Subject Name : Structural Analysis - I

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

Semester : 3 **Date :01/12/2018** **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 thermal Stain? (1)
b) Define Elastic Limit. (1)
c) Stress is directly Proportional to ……. (Strain/Elastic constant/Ductility) (1)
d) Enlist Different type of Support. (1)
e) What is Shear Force? (1)
f) Define Proof Resilience. (1)
g) Draw Stress Stain Curve For mild steel (1)
h) What is the difference between Impact load and Gradually Load? (1)
i) Write equation for relation between slope, deflection , and Radius of Curvature. (1)
j) What is Conjugate beam? (1)
k) Define Slenderness ratio. (1)
l) $L_{e=}$..... When both ends hinged in column (1)
m) Write equation for minimum stresses in beam (1)
n) What is axial load? (1)

Attempt any four questions from Q-2 to Q-8

Q-2 **Attempt all questions** **(14)**

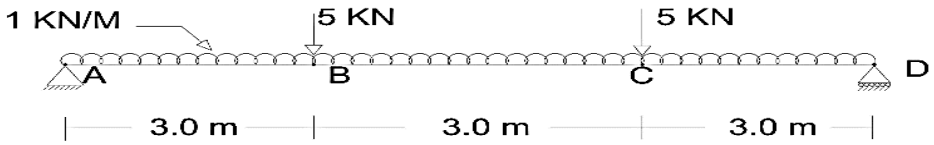
(A) A steel bar 1.5m long, 50mm wide and 20 mm thick is subjected to an axial tensile load of 120KN. If the elongation in the length of the bar is 0.9mm, make calculation for stress strain and Modulus of elasticity of the bar. **(7)**

(B) A solid circular steel rod 6mm in diameter and 500mm is rigidly fastened to the end of a square brass bar 25mm on a side and 400 mm long the geometric axis of the bars lying along the same line. An axial tensile force of 5kN is applied at each of extreme ends. Determine the elongation of assembly. For steel $E_{s=}200x10^3 N/mm^2$ and for brass $E_b= 90x10^3 N/mm^2$ **(7)**

Q-3 **Attempt all questions** **(14)**

(A) Enlist type of beam and load and explain any two beam and load in detail. **(6)**

(B) Draw Shear force and Bending Moment for following Beam **(8)**



Q-4 **Attempt all questions** **(14)**

(A) A steel bar of rectangular section 50mm x 30mm and length 1.5m is subjected to a gradually applied load of 150kN. Find the strain energy stored in the bar. If the elastic limit of the material is 150 N/mm^2 , proceed to determine the proof resilience and modulus of resilience. **(7)**

(B) Derive equation for Strain energy due to gradual loading. **(7)**

Q-5 **Attempt all questions** **(14)**

(A) The following data was recorded during tensile test made on a standard tensile test specimen **(7)**

Original diameter and gauge length = 15 mm and 60mm, minimum diameter at fracture = 10mm, distance between gauge points at fracture = 75mm load at yield point and fracture = 40 kN and 45kN, Maximum load that specimen could take = 70kN.

Make calculation for (a) yield strength , ultimate tensile strength and braking strength (b) percentage elongation and percentage reduction in area after fracture (c) Nominal and true stress at fracture.

(B) A simply supported beam of 5 m span carries a point load of 50kN at its center. Find the deflection at the center of beam and the slope at the supports **(7)**

The modulus of elasticity for the beam material is 200 Gpa and moment of inertia of the beam section is 80 x 10^{-6} m^4 .

Q-6 **Attempt all questions** **(14)**

(A) A beam simply supported over a span of 6m is carrying a point load of 50kN at 1.20m from right hand support. Find the position and amount of maximum deflection. Also calculate deflection at mid span Using Macaulay's Method. **(7)**

(B) A circular column 450mm in diameter carries a load of 600 kN at an eccentricity of 100 mm. calculate maximum and minimum stresses for the column. **(7)**

Q-7 **Attempt all questions** **(14)**

(A) Derive equation for maximum and minimum stress in rectangular section $\sigma_{max}=P/A(1+6e/b)$, $\sigma_{min}=P/A(1+6e/b)$ **(7)**

(B) A column of 2.5 m length is pin connected at both ends and has a rectangular cross – section 40mm x 80mm. if modulus of elasticity for the column material is 2 x10^5Mpa determine (a) Euler's buckling load and safe load if factor of safety is 1.5. (b) slenderness ratio and axial stress. **(7)**

Q-8

A masonry dam 6 m high 3 m wide at base and 1.5 m wide at top retains water on vertical face for full height. Considering density of masonry as 20 KN/m^3 and density of water as 10kN/m^3 find out maximum and minimum pressure intensity at the base.