Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY

Summer Examination-2016

Subject Name: Structural Analysis - I

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

Semester: 3 **Date: 26/04 /2016** **Time: 02:30 To 05:30** **Marks: 70**

Instructions:

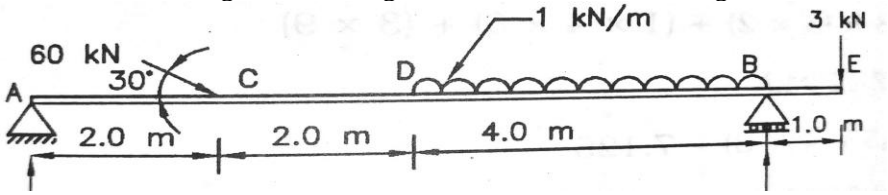
(1) Use of Programmable calculator & any other electronic instrument is prohibited.
(2) Instructions written on main answer book are strictly to be obeyed.
(3) Draw neat diagrams and figures (if necessary) at right places.
(4) Assume suitable data if needed.

Q-1 **Attempt the following questions:** **(14)**

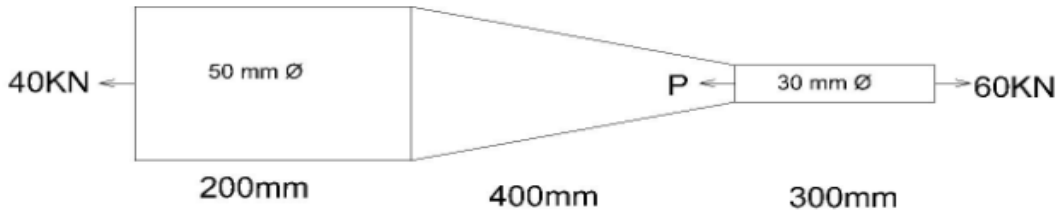
1	Point of contra flexure is where (a) bending moment is zero (b) shear force is zero (c) shear force diagram changes sign (d) bending moment diagram changes sign	1
2	A brittle material exhibits (a) Large plastic deformation (b) large elastic deformation (c) large yield plateau (d) no plastic deformation	1
3	A cantilever beam carrying UDL over entire span is to be replaced by a simply supported beam of same span. The maximum bending stress will be (a) reduced by two times (b) reduced by four times (c) increased by four times (d) decreased by four times	1
4	A prop cantilever will have _____ reactions. (a) 2 (b) 3 (c) 4 (d) 1	1
5	The strain energy stored in a body due to shear stress is, (a) $\tau^2V/2C$ (b) $2C/\tau V$ (c) $\tau^2V/4C$ (d) $2C/\tau^2V$	1
6	Fixed end moment for udl on entire span of fixed beam (A) wl/4 (B) $wl^2/8$ (C) wl/8 (D) $wl^2/12$	1
7	If both ends are fixed in column then what is its effective length ?	1
8	Fixed beam is loaded with 'W' KN/m over entire length 'l' m of the beam then what are the values of fixed end moment at each support ?	1
9	**Define the following:** Homogeneous material Statically determinate structure Kernel of section Proof resilience Point of contraflexure Radius of gyration	6

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

Q-2		**Attempt all questions**	**(14)**
	(a)	Draw share force and bending moment diagram for a beam shown in fig.below.	**8**



	(b)	Draw and explain the stress-strain curve for mildsteel	**6**
Q-3		**Attempt all questions**	**(14)**
	(a)	An assembly of steel bar as shown in figure below is in equilibrium. Find the force P in the net elongation of the assembly. Take E_s = 2 x 10^5N/mm^2	**7**



	(b)	Derive formula for strain energy due to torsion	**7**
Q-4		**Attempt all questions**	**(14)**
	(a)	A 200 mm long steel tube, 100 mm internal diameter and 10 mm thick is surrounded by a brass tube of the same thickness and length. The composite section carries an axial compression of 100 kN. Find the load carried by each tube and shortening of each tube . Es = 0.2 MN/mm^2 , E_b = 0.1 MN/mm^2	**8**
	(b)	Explain the mohr-circle method for locating principal axes.	**6**
Q-5		**Attempt all questions**	**(14)**
	(a)	A rectangular column section ABCD having side AB=CD=400 mm and BC=AD=300mm carries a compressive load of 300 KN at corner B. Find stress at each corner A,B,C,D and draw stress- distribution diagram for each side.	**7**
	(b)	A steel bar 50 mm in diameter and 2.5 m long has to transmit a shock energy of 100 Nm. Calculate the maximum instantaneous stress and elongation produced , Take E= 2 X 10^5 N/mm^2.	**7**
Q-6		**Attempt all questions**	**(14)**
	(a)	Drive kernel (Core) of section for hollow rectangular and circular section.	**7**
	(b)	Derive the fundamental equation for slope and deflection.	**7**
Q-7		**Attempt all questions**	**(14)**
	(a)	The external and internal diameter of a hollow cast iron column is 200 mm and 150 mm respectively. If the column is hinged at both ends having a length of 4 m, determine the crippling load using rankine formula. Take fs = 550N/mm^2 and α =1/1600	**7**
	(b)	Explain Castingliano's first theorem.	**7**
Q-8		**Attempt all questions**	**(14)**
	(a)	Determine the strain energy of a cantilever beam of span 2 m having size 20mm width x 60mm depth. Take E = 200 GPa	**7**

(1) When 1000 N concentrated load is placed at free end.
(2) When total 1000 N load is uniformly distributed over the entire span.

(b) Calculate θ_B and δ_B for a beam shown in figure below ,Take E = 2 x 10^5N/mm^2, I = 5 x 10^8 mm^4. Use Castigliano's first theorem. **7**