Code No. 6013 / S

FACULTY OF ENGINEERING

B.E. 2/4 (Civil) I – Semester (Suppl.) Examination, July 2014

Subject: Strength of Materials – I

Time: 3 Hours **Max.Marks: 75**

Note: Answer all questions from Part A. Answer any five questions from Part B.

PART – A (25 Marks)

1	Define Bulk Modulus and give the relation between E and K.	2
2	Write the formula for the elongation of a uniformly tapering circular bar of length 'ℓ' having diameters 'd_1' and 'd_2' at its ends and subjected to an axial load 'P'.	2
3	Sketch bending moment diagram for a cantilever beam of span 'ℓ' and subjected to a clockwise couple 'M' at its free end.	3
4	List out any two assumptions in the theory of simple bending.	2
5	What is core of a section? Sketch the core of a rectangular section.	3
6	Sketch the shear stress distribution across a circular section and give the relation between maximum shear stress and average shear stress.	3
7	What is the relation between the number of joints and members in a statically determinate truss?	2
8	Calculate the circumferential stress in a thin spherical shell of diameter 120 mm and 12 mm thick, subject to an internal pressure of 4 N/mm^2.	3
9	What is a compound cylinder? Explain its principle.	3
10	What is meant by a polar diagram?	2

PART – B (50 Marks)

11	a)	Explain briefly the stress-strain diagram for mild steel.	4
	b)	A copper rod of 18 mm diameter is enclosed by a steel tube of 24 mm external and 20 mm internal diameter and the ends are tightened by nuts and washers. The temperature of the assembly is raised by 50^{o}C. Find the stresses in rod and tube. Take α_c = 18x10^{-6}/^{o}C, α_s = 12x10^{-6}/^{o}C, E_c = 1x10^5 N/mm^2 and E_s = 2x10^5 N/mm^2.	6
12		Construct S.F and B.M diagrams for the simply supported beam shown in Fig. 1.	10

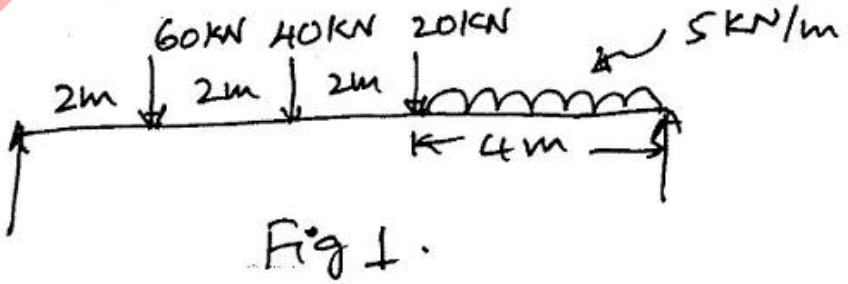

Fig 1.

13 A timber beam 150 mm wide and 300 m deep is flitched by 2 steel plates each 12 mm thick and 250 mm deep attached symmetrically on either side of timber beam. Calculate the moment of resistance of the flitched beam, if the permissible stress in timber is

8 N/mm^2, Take E_s/E_t = 20. Also sketch bending stress distribution diagram. 10

…2.

14 Sketch the shear stress distribution across the T-section shown in Fig. 2, which is subjected to a shear force of 200 kN. 10

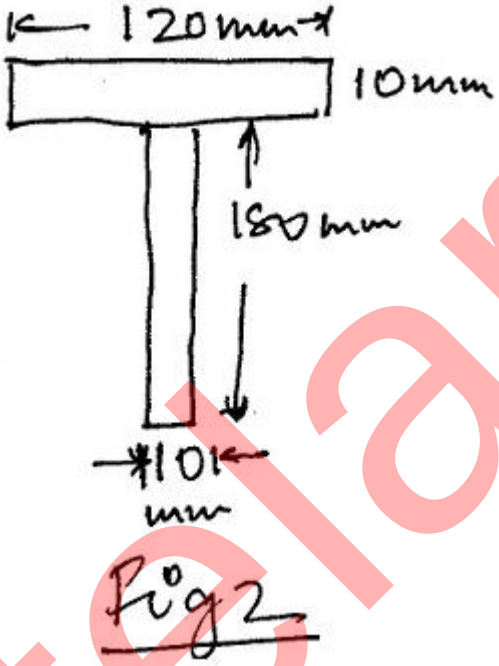

Fig 2

15 a) Obtain an expression for the circumferential stress of a thin cylindrical shell subjected to an internal pressure 'p'. 4

b) Calculate the increase in volume of a thin cylindrical shell 2 m long, internal diameter 1.2 m and 15 mm thick, if it is subjected to an internal pressure of 8 N/mm^2. Take $E = 2x10^5$ N/mm^2 and 1/m = 0.3. 6

16 A thick cylindrical shell of 300 mm internal diameter is subjected to an internal pressure of 20 N/mm^2. Determine the required thickness of shell, if the permissible tensile stress is 40 N/mm^2. 10

17 Find the forces in all the members of the truss shown in Fig. 3, analytically or graphically. 10

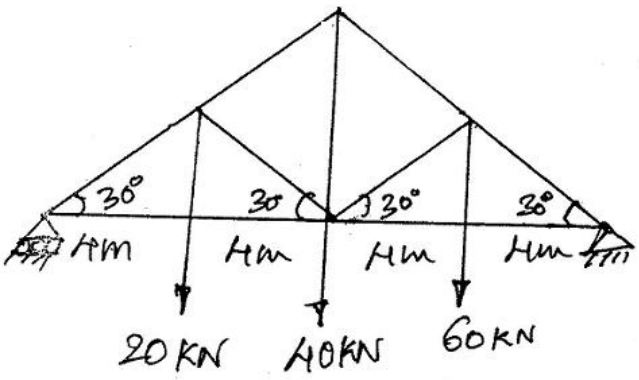

Fig 3

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