

Code No: R22012

R10**SET - 1****II B. Tech II Semester Supplementary Examinations, November-2017****STRENGTH OF MATERIALS**

(Civil Engineering)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. A cantilever of length 2 m carries a uniformly distributed load of 2.5 kN/m run for a length of 1.25 m from the fixed end and a point load of 1 kN at the free end. Find the deflection at the free end if the section is rectangular 12 cm wide and 24 cm deep and  $E = 1 \times 10^4 \text{ N/mm}^2$
2. a) Write the Lami's equations for thick cylindrical shell and explain the terms.  
b) A thick spherical shell of 20 m internal diameter is subjected to an internal fluid pressure of  $7 \text{ N/mm}^2$ . If the permissible tensile stress in the shell materials is  $8 \text{ N/mm}^2$ , find the thickness of the shell.
3. A rectangular block of material is subjected to a tensile stress of  $110 \text{ N/mm}^2$  on one plane and a tensile stress of  $47 \text{ N/mm}^2$  on the plane at right angle to the former plane. Each of the above stress is accompanied by a shear stress of  $63 \text{ N/mm}^2$ . Find (i) The direction and magnitude of each of the principal stress (ii) Magnitude of greatest shear stress
4. Determine the diameter of a solid shaft which will transmit 300 kN at 250 rpm. The maximum shear stress should not exceed  $30 \text{ N/mm}^2$  and twist should not be more than 10 in shaft length 2m. Take modulus of rigidity =  $1 \times 10^5 \text{ N/mm}^2$ .
5. a) Derive an equation for Euler's crippling load.  
b) A hollow cast iron cylindrical column, 4m long with both ends firmly fixed carries an axial load of 200 kN. The internal diameter of the column is equal to 0.8 times the external diameter. Determine the section of the column, taking  $f_c = 600 \text{ N/mm}^2$ , Rankine constant  $\alpha = 1/1600$  and f. o. s = 6.

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6. A square chimney 25m high, having an opening of  $l_n$  by  $l_n$  is subjected to a horizontal wind pressure of  $1.5 \text{ KN/m}^2$ . Find the necessary thickness of brick work at base if the density of the masonry is  $21 \text{ KN/m}^3$  and the max permissible stress on brick masonry is limited to  $0.8 \text{ N/mm}^2$
7. a) What are the forces developed at a section in a curved beam.  
b) Determine the rotation at the free end of a cantilever curved beam of quarter circle of radius 'R' subject to a concentrated load 'P' at its free end.
8. Find the forces in all the members of the simply supported truss loaded as shown in below figure

