Code No: R21011 **R10** SET - 1

II B. Tech I Semester Supplementary Examinations, May/June - 2017
MECHANICS OF MATERIALS
(Civil Engineering)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. Two rollers of weights P and Q are connected by a flexible string DE and rest on two mutually perpendicular planes AB and BC, as shown in Figure 1. Find the tension ('T') in the string and the 'θ' that it makes with the horizontal when the system is in equilibrium. The following numerical data are given. P= 270 N, Q = 450 N, $\alpha = 30^0$. Assume that the string is inextensible and passes freely through slots in the smooth inclined planes AB and BC.

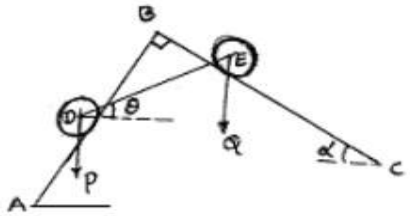

Figure-1

2. A body resting on a rough horizontal plane required to pull of 180 N inclined at 30^0 to the plane just moved the body. Determine the weight of the body and the coefficient of friction.

3. A flat belt, 8 mm thick and 100 mm wide transmit power two pulleys, running at 1600 m/min. The mass of the belt is 0.9 kg/m length. The angle of lap in the smaller pulley is 165^0 and the coefficient of friction between pulley and the belt is 0.3. If the maximum permissible stress in the belt is 2 MN/m^2, Find maximum power transmitted and Initial tension in the belt.

4. An unequal I section has the following dimensions. Top flange 3 × 6 cm width; bottom flange 2×12 cm width; web 2×7 cm deep. Locate the horizontal centroidal axis above the bottom line of the bottom flange.

5. Explain the following :
(i) Working stress
(ii) Factor of safety
(iii) Volumetric strain
(iv) Poisson's ratio.
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6. Establish the relation between S. F. & B.M. and rate of loading at a section of a beam. Obtain the maximum B. M. for the beam shown in Figure-6 by drawing the S. F. D. Find the value of slope of the S. F. D.

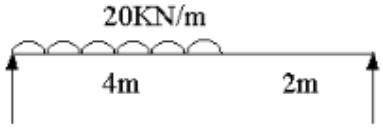

Figure-6

7. a) State the assumptions made in the theory of simple bending.
   b) Compare the weight of two beams of the same material and equal strength. One beam is of solid circular cross-section, while the other beam is of hollow circular section, the internal diameter being 0.75 times the external diameter.

8. An I-section shown in Figure-8 is subjected to the S.F. = 120KN . Sketch the shear stress distribution. Obtain maximum and mean shear stress.

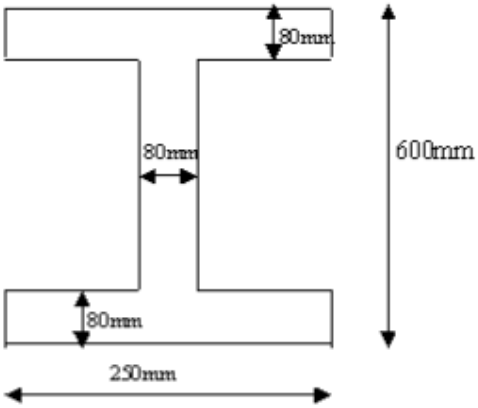

Figure-8