Total No. of Questions: 22 Total No. of Pages: 04

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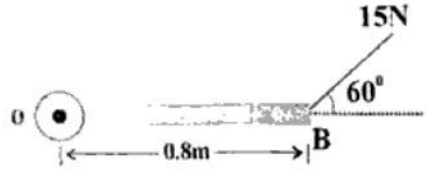
B.Tech. III-Sem (Main & Back) January-2026
Civil Engineering
3CE3-04 Engineering Mechanics
3E1213

Time : 3 Hours Maximum Marks : 70

Attempt all ten questions from Part A, five questions out of seven questrion from Part B and three questions out of five questions from Part C.
(Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.
Use of following supporting materia! is permitted during examination.
(Mentioned in form No. 205)
1. _____ 2. _____

Part-A
(Answer should be given up to 25 words only)
All questions are compulsory. **10x2=20**

Q.1 Define Lami's theorem with diagram.
Q.2 Two forces of 400N and 600N act at an angle 60^0 to each other determine the resultant in magnitude and direction.
Q.3 State parallel axis theorem. T-433
Q.4 Differentiate centroid and center of gravity.
Q.5 Write the principle of virtual work.
Q.6 What is the difference between springs in series and parallel?
Q.7 Define bulk modulus.
Q.8 What is angle of repose? T-433
Q.9 A force of 15N is applied at an angle of 60^0 to the edge of a door 0.8m wide as shown in Fig. Find the moment of the force about the hinge(O).



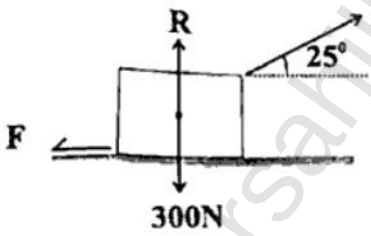
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Q.10 A bar of length 2m is subjected to a tensile force, causing an extension of 0.1mm. Find the strain. T-433

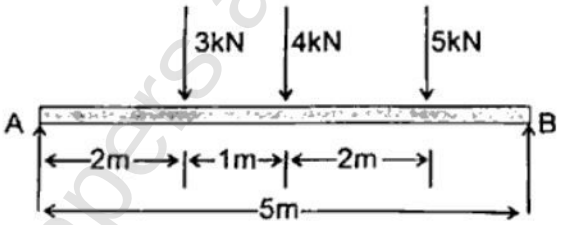
Part-B
(Analytic/Problem solving questions)

Attempt any Five questions **5x4=20**

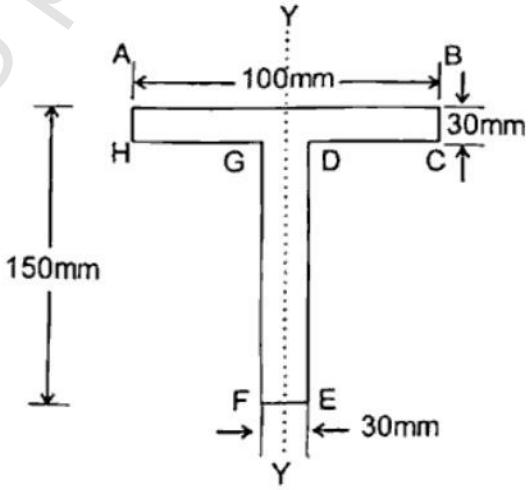
Q.1 A body of weight 300N is lying on a rough horizontal plane having a coefficient of friction as 0.3. Find the magnitude of the force (P), which can move the body, while acting at an angle of 25° with the horizontal.



Q.2 A simply supported beam AB of span 5m is loaded as shown in Fig. Find the reactions at A and B.



Q.3 Find the centre of gravity of a 100mm x 150mm x 30mm T-section.

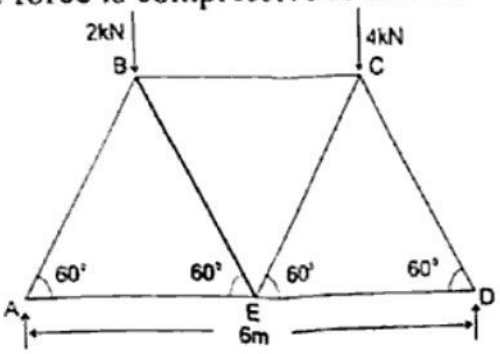


T-433

Q.4 Figure shows a Warren girder consisting of seven members each of 3m length freely supported at its end points. The girder is loaded at B and C

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as shown. Find the forces in all the members of the girder, indicating whether the force is compressive or tensile.



Q.5 A steel ball of weight 60 N is dropped onto a spring of stiffness 500N/m from a height of 100 mm. Find the maximum deflection of the spring (Use the work energy principle) T-433

Q.6 A steel rod of diameter 20mm and length 1m is subjected to a tensile force of 50kN. Find the volumetric strain in the rod. (E=200 GPa, v=0.3)

Q.7 A circular wheel of mass 50 Kg and radius 200 mm is roatating at 300 r.p.m. Find its kinetic energy.

Part-C

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any three questions **3x10=30**

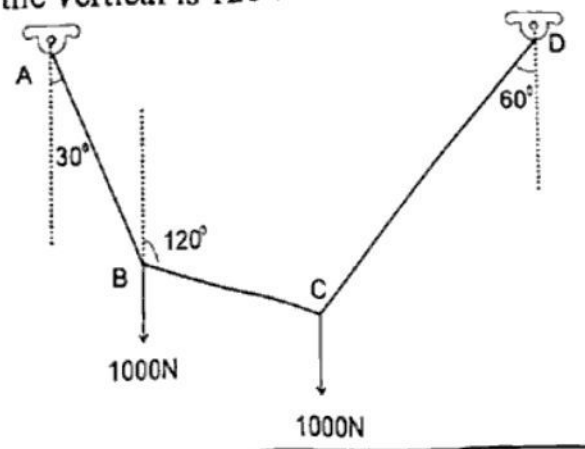
Q.1 Explain:-

(a) Concept of virtual work. T-433

(b) Bulk Modulus, Young Modulus, Modulus of rigidity.

(c) Define and Comapre Co-efficient of friction and angle of friction.

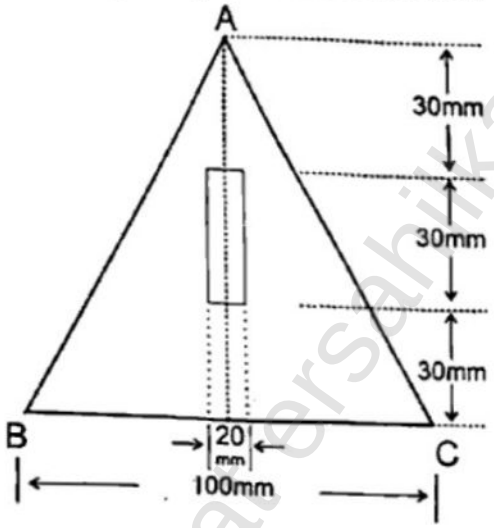
Q.2 A string ABCD, attached to fixed points A and D has two equal weights of 1000N attached to it at B and C. The weights rest with the portions AB and CD inclined at angles as shown in Fig. Find the tensions in the portions AB, BC, and CD of the string, if the inclination of the portion BC with the vertical is 120^0.



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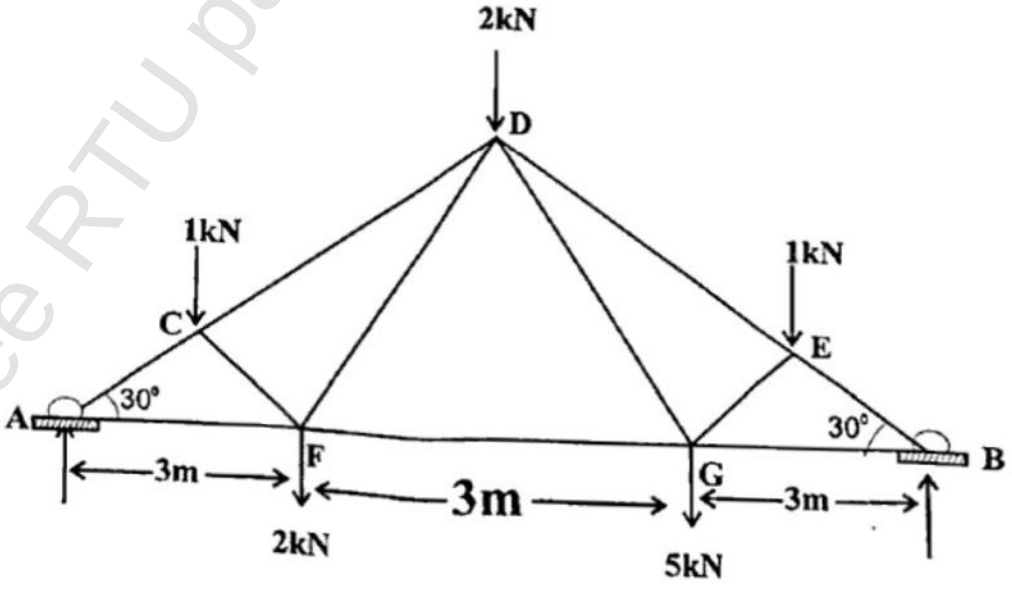
Q.3 A rectangular hole is made in a triangular section as shown in Figure. Determine the moment of inertia of the section about X-X axis passing through its center of gravity and the base BC.



Q.4 A thin cylinder of diameter 500mm and wall thickness 10mm is subjected to an internal pressure of 2MPa, find the hoop stress, longitudinal stress, and change in diameter of the cylinder. (E=200 GPa, v=0.3)

Q.5 A truss of 9m span is loaded as shown in Fig. Find the reactions at the two supports.

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