

First /Second Semester B.E. Degree Examination, Dec. 07 / Jan. 08
Elements of Civil Engineering and Engineering Mechanics

Time: 3 hrs.

Max. Marks:100

Note : Answer any FIVE full questions, selecting at least two questions from each part.

PART - A

1.
 - a. Explain briefly the role of civil engineer in the infra-structural development of a nation.(05 Marks)
 - b. Explain briefly the scope of civil engineering in –
 - i) Water resources engineering, ii) Geotechnical engineering. (08 Marks)
 - c. Explain different types of roads. (07 Marks)
2.
 - a. Explain briefly the rigid body concept. (04 Marks)
 - b. Distinguish between – i) Resolution and composition, ii) Moment and couple, (06 Marks)
 - iii) Force and force system.
 - c. State and explain principle of transmissibility of a force. What are its limitations? (05 Marks)
 - d. Replace the force-couple system by a single force with respect to AB and CD shown in Fig.Q 2(d). (05 Marks)
3.
 - a. State and prove Varignon's theorem. (05 Marks)
 - b. Determine the force F and its inclination α required, so as to lift a block of weight 500 N as shown in Fig. Q 3(b). (05 Marks)

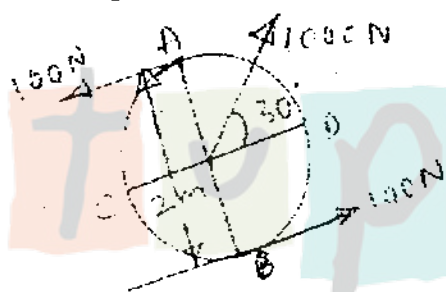


Fig. Q 2(d)

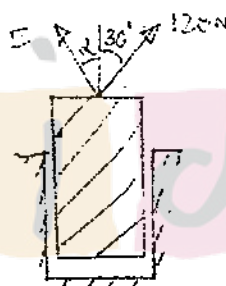


Fig. Q 3(b)

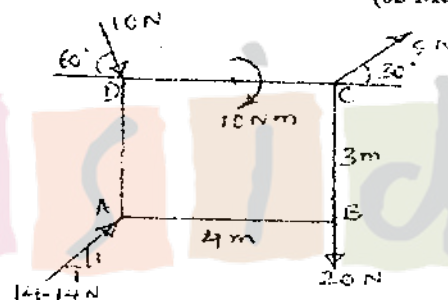


Fig. Q 3(c)

- c. Determine the resultant of the force system acting on the plate as shown in Fig. Q 3(c) with respect to AB and AD. (10 Marks)
4.
 - a. Distinguish between centroid and centre of gravity. (04 Marks)
 - b. Determine the centroid for the quarter circular area from first principles. (06 Marks)
 - c. Determine the position of the centroid for the shaded area with respect to the axes as shown in Fig.Q 4 (c). (10 Marks)

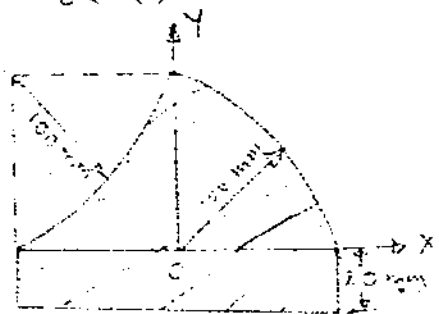


Fig. Q 4(c)

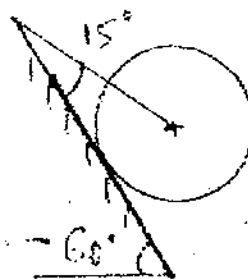


Fig. Q 5(b)

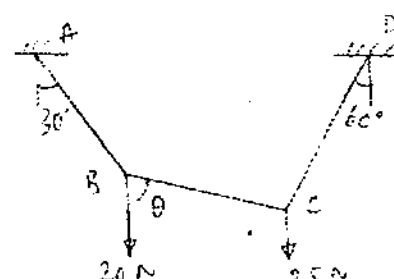


Fig. Q 5(c)

PART - B

5.
 - a. What is meant by equilibrium of a rigid body? State the conditions of static equilibrium for coplanar non – concurrent force system? (05 Marks)
 - b. Determine the tension in the string and the reaction at the contact surface for the cylinder of weight 1000N placed as shown in Fig.Q5 (b). (05 Marks)
 - c. Determine angle θ for the system of strings ABCD in equilibrium as shown in Fig. Q 5(c). (10 Marks)

- 6 a. Define statically determinate beams. (02 Marks)
 b. Distinguish between – i) hinged support and roller support. (04 Marks)
 c. Determine the position of 10 N load on the beam such that the reactions at the supports are equal for the beam loaded as shown in Fig. Q 6(c).

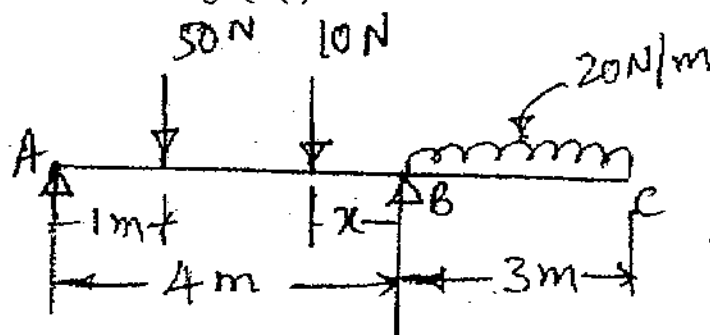


Fig. Q 6(c)

(05 Marks)

- d. Determine the reactions at the supports for the beam loaded as shown in Fig. Q 6(d).

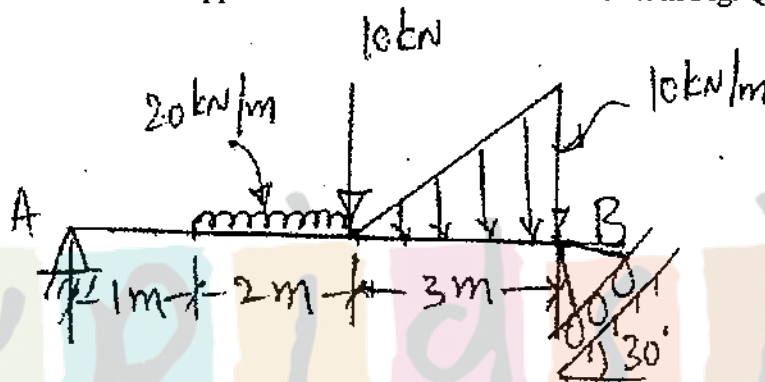


Fig. Q 6(d)

(09 Marks)

- 7 a. Define –
 i) Angle of friction
 ii) Cone of friction. (04 Marks)
 b. A ladder 5 m in length is resting against a smooth vertical wall and a rough horizontal floor. The ladder makes an angle of 60° with the horizontal. When a man of weight 800 N is at the top of the rung, what is the coefficient of friction required at the bottom of the ladder and the floor such that the ladder does not slip? Take the weight of ladder as 200 N. (08 Marks)
 c. Determine the force P required to cause motion of blocks to impend. Take the weight of A as 90 N and weight of B as 45 N. Take the coefficient of friction for all contact surfaces as 0.25 as shown Fig. Q 7(c), consider the pulley being frictionless. (08 Marks)

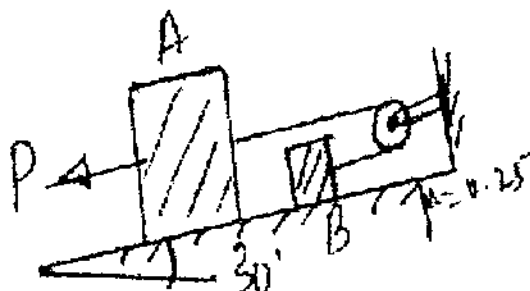


Fig. Q 7(c)

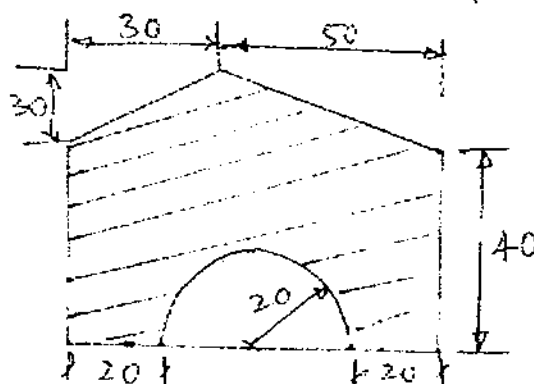


Fig. Q 8 (b)

- 8 a. State and explain parallel axis theorem. (06 Marks)
 b. Determine the second moment of the area about the horizontal centroidal axis as shown in Fig. Q 8(b). Also find radius of gyration. (14 Marks)
