

First Semester B.Arch. Degree Examination, Dec.2014/Jan.2015

Structures – I

Time: 3 hrs.

Max. Marks:100

Note:1. Answer any FIVE full questions.**2. Any missing data may be suitably assumed.**

1.
 - a. Define force and its characteristics with necessary sketch. (08 Marks)
 - b. The forces 10 N, 20 N, 30 N, 40 N and 50 N are acting on one of the angular points of regular hexagon towards the other five angular points taken in order. Find the direction and magnitude of the resultant force. (12 Marks)
2.
 - a. Define rigid body and elastic body. (03 Marks)
 - b. Discuss in brief with necessary examples the statically determinate structures and indeterminate structures. (05 Marks)
 - c. A uniform wheel of 60 cm diameter weighing 1000 N rests against a rectangular obstacle 15 cm high. Find the least force required which when acting through the centre of the wheel will just turn the wheel over the corner of the block. Also find the angle 'θ' which this least force shall make with AC. Refer Fig.Q 2(c). (12 Marks)

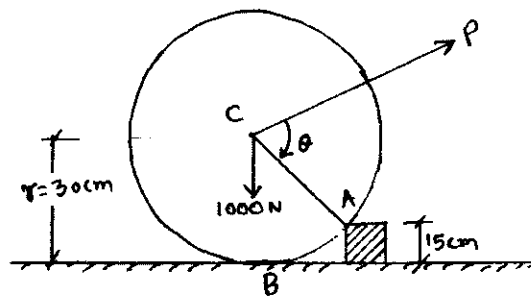


Fig. Q2 (c)

3.
 - a. Define couple and list the properties of couple. (08 Marks)
 - b. Determine the reactions at the supports of the overhanging beam shown in Fig. Q3 (b). (12 Marks)

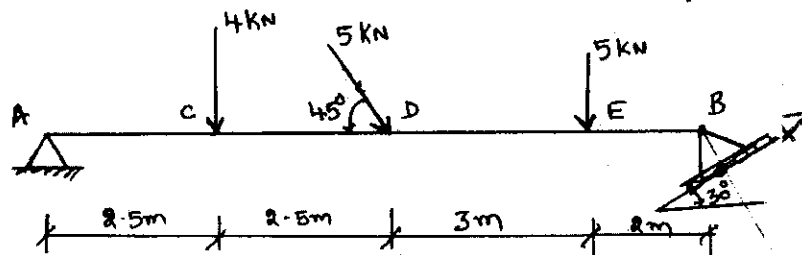


Fig. Q3 (b)

4.
 - a. Define the following:
 - i) Angle of friction.
 - ii) Angle of repose.
 - iii) Cone of friction. (06 Marks)
 - b. A uniform ladder of weight 200 N and length 5 meters is placed against a vertical wall in a position where its inclination to the vertical is 30° . A man weighing 650 N climbs the ladder. At what position will he induce slipping? The coefficient of friction for both the contact surfaces of the ladder is 0.3. (14 Marks)

- 5 a. Distinguish between centroid and centre of gravity. (04 Marks)
 b. From the first principles locate the centroid of quadrant of a circle. (06 Marks)
 c. For the lamina shown in Fig. Q5 (c) find the centroidal axis parallel to the base. (10 Marks)

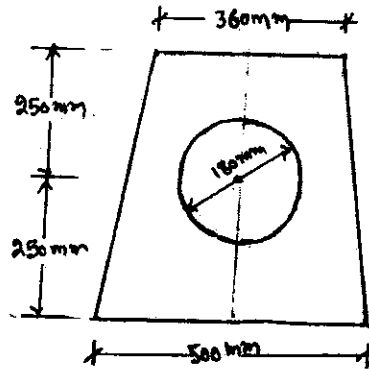


Fig. Q5 (c)

- 6 a. Derive an expression for moment of inertia of the triangular section about an axis passing through the C.G. and parallel to the base. (05 Marks)
 b. Find the moment of inertia of a channel section shown in Fig. Q6 (b) about the centroidal x-x and y-y axis. (15 Marks)

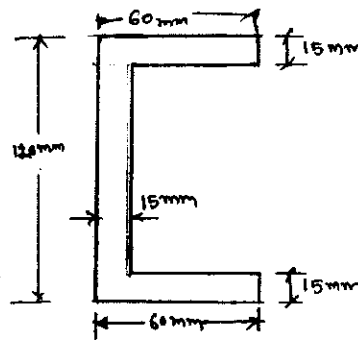


Fig. Q6 (b)

- 7 a. Define parallel axis theorem and radius of gyration. (04 Marks)
 b. Determine moment of inertia about the centroidal axis and radius of gyration for the T-section shown. (16 Marks)

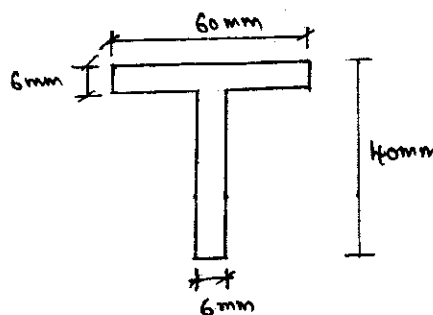


Fig. Q7 (b)

- 8 a. List the assumptions made in the analysis of trusses (frames). (03 Marks)
 b. Explain the difference between perfect and imperfect frames with necessary sketches. (07 Marks)
 c. Explain the stepwise procedure to analyse the trusses using method of section with necessary sketches. (10 Marks)
