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09ENG1.5

First Semester B.Arch. Degree Examination, June/July 2015
Structures – I

Time: 3 hrs. Max. Marks:100

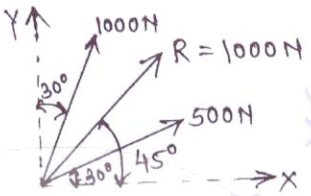
Note: ***1. Answer any FIVE full questions.***
2. Assume missing data suitably.

1 a. Define the force and state the characteristics of the force. **(06 Marks)**

b. What are scalars and vectors? Explain with suitable examples. **(05 Marks)**

c. Two forces acting on a body are 500N and 1000N as shown in Fig.Q.1(c). Determine the third force F such that the resultant of all the three forces is 1000N, directed at 40° to x-axis. **(09 Marks)**

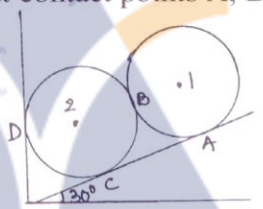
Fig.Q.1(c)



2 a. Distinguish between: i) Resolution and composition ; ii) Moment and couple. **(06 Marks)**

b. Two identical cylinders, each weighing 500N are placed in a trough as shown in Fig.Q.2(b). Determine the reactions developed at contact points A, B, C and D. **(14 Marks)**

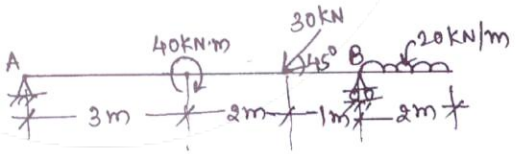
Fig.Q.2(b)



3 a. With neat sketches explain different types of loads and supports. **(08 Marks)**

b. Determine the reactions developed at supports A and B of beam shown in Fig.Q.3(b). **(12 Marks)**

Fig.Q.3(b)

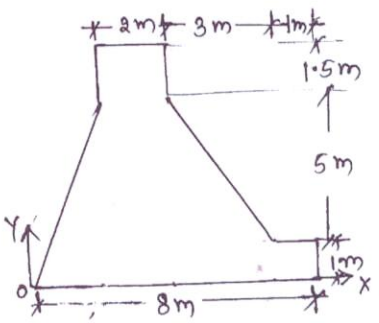


4 a. Distinguish between centre of gravity and centroid. **(04 Marks)**

b. Locate the centroid of a semicircle which is symmetrical about x-axis. **(06 Marks)**

c. Determine the centroid of the section shown in Fig.Q.4(c) with respect to the axes shown in Fig.Q.4(c). **(10 Marks)**

Fig.Q.4(c)



5 a. State laws of dry friction. **(06 Marks)**

b. The ladder is 6m long and is supported by a horizontal floor and a vertical wall. The coefficient of friction between the floor and the ladder is 0.25 and between the wall and the ladder is 0.4. The weight of the ladder is 200N may be considered as a concentrated load at centroid of ladder. Ladder supports a vertical load of 900N at C which is at a distance of 1m from B. Determine the least value of α at which the ladder may be placed without slipping. Determine the reaction at that stage. **(14 Marks)**

6 a. Define the terms:

i) Coefficient of friction

ii) Angle of friction

iii) Cone of friction. **(06 Marks)**

b. What should be the value of θ in Fig.Q.6(b) which will make the motion of 900N block down the plane to impend? The coefficient of friction for all contact surfaces is 1/3. **(14 Marks)**

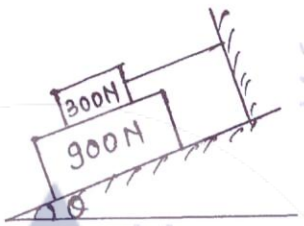


Fig.Q.6(b)

7 a. State and prove parallel axis theorem. **(05 Marks)**

b. Find the expression for moment of inertia of a triangle about its base. **(05 Marks)**

c. Determine the moment of inertia of the section shown in Fig.Q.7(c) about an axis passing through the centroid and parallel to the top most fibre of the section. Also determine moment of inertia about the axis of symmetry. Hence find radii of gyration. **(10 Marks)**

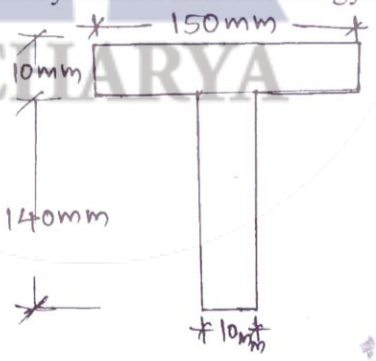


Fig.Q.7(c)

8 a. Explain perfect frames and imperfect frames with examples. **(05 Marks)**

b. State the assumptions made in analysis of frames. **(05 Marks)**

c. Explain the steps involved in the analysis of truss by method of section and by method of joints. **(10 Marks)**

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