USN

06CIV13/23

First/Second Semester B.E. Degree Examination, June / July 08
Elements of Civil Engineering and Engineering Machanics

Time: 3 hrs. Max. Marks:100

Note : *Answer any FIVE full questions, choosing atleast two questions from each part.*

PART - A

1 a. Explain in brief the scope of civil engineering. **(08 Marks)**

b. Write a note on impact of infrastructural development on the economy of the country. **(06 Marks)**

c. Explain any two types of dams with neat figures. **(06 Marks)**

2 a. Define the following :
i) Particle ii) Rigid body iii) Continuum iv) Force. **(10 Marks)**

b. Explain transmissibility of force.

c. Two cables which have known tensions $T_1 = 2$ kN and $T_2 = 4$ kN are attached at the point B of a mast AB. A third cable BC is used as a guy wire and is attached at B. Determine the required tension in cable BC, so that the resultant of the forces exerted by the three cables will be vertical. Also find the magnitude of the resultant. Refer Fig. Q 2(c). **(10 Marks)**

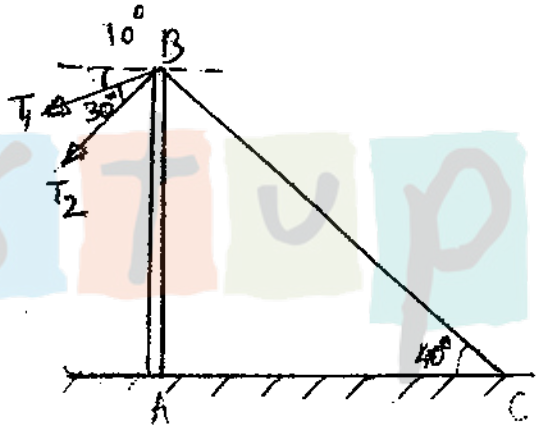

Fig. Q 2(c)

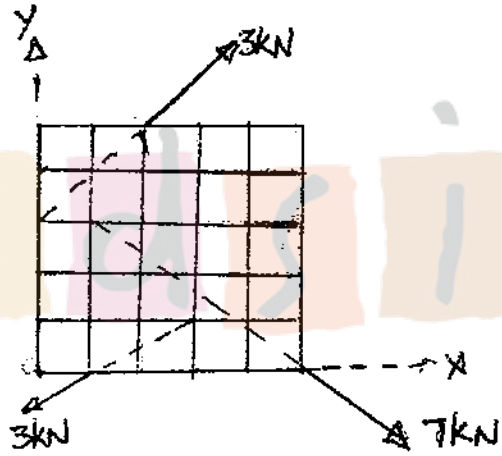

Fig. Q 3(b)

3 a. State and prove :
i) Parallelogram law of forces ii) Varignon's theorem. **(10 Marks)**

b. The coplanar forces are acting on a lamina as shown in Fig. Q 3(b), where the side of each square is 1m. Find the magnitude and position of the resultant. **(10 Marks)**

4 a. Define : i) Centre of gravity ii) Centroid iii) Axis of symmetry. **(03 Marks)**

b. Determine the centre of gravity of a semicircle by method of integration. **(05 Marks)**

c. Find the coordinates of centroid of the lamina, shown in Fig.Q4(c) with respect to point A. **(12 Marks)**

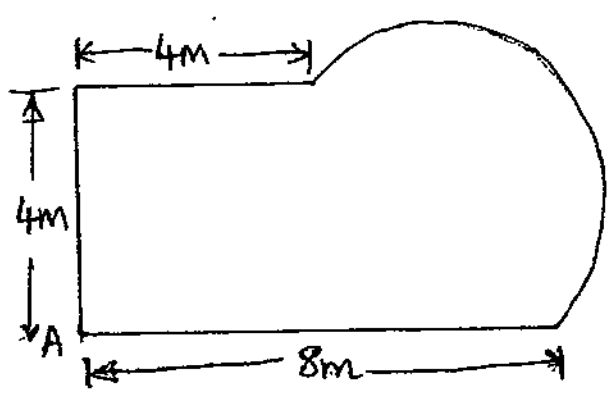

Fig. Q 4(c)

PART – B

5 a. Define the conditions of equilibrium for coplanar non concurrent force system. **(10 Marks)**

b. Find the magnitude and position of the equilibriant for the set of forces shown in Fig.Q5(b).

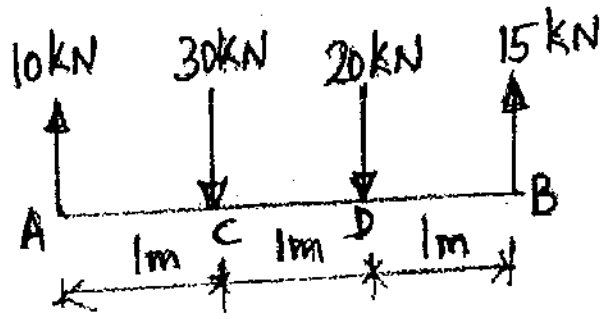

Fig. Q 5(b)

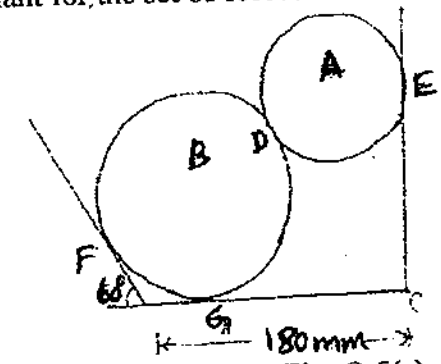

Fig. Q 5(c)

c. Two cylinders A and B rest in a channel as shown in Fig. Q 5(c). A has a diameter of 100 mm and weighs 20 kN, B has a diameter of 180 mm and weights 50 kN. The channel is 180 mm wide at bottom with one side vertical and the other side at 60^0 inclinations. Find the reactions at contact points. **(10 Marks)**

6 a. Explain different types of supports and reactions. **(08 Marks)**

b. Determine the reactions at the ends of the beams AB and CD as shown in Fig. Q 6(b). Neglect the self weight of the beams. **(12 Marks)**

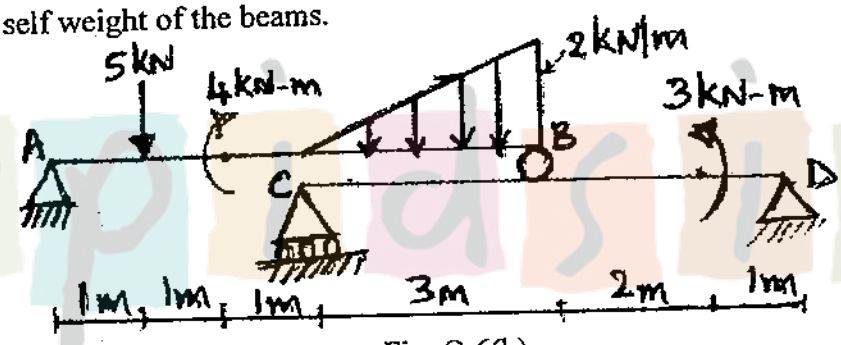

Fig. Q 6(b)

7 a. Mention the laws of static friction. **(05 Marks)**

b. Define angle of friction and angle of repose. **(05 Marks)**

c. A uniform ladder of length 20 m, rests against a vertical wall with which it makes an angle of 45^0, the coefficient of friction between the ladder and the wall and ground respectively being $\frac{1}{3}$ and $\frac{1}{2}$. If a man, whose weight is one half that of the ladder, ascends the ladder, how high will he be, when the ladder slips? **(10 Marks)**

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

b. Derive an expression for moment of inertia of a triangle about the base using method of integration.

c. Find the moment of inertia of the section shown in Fig. Q 8(c) about horizontal centroidal axis and also find the radius of gyration about the same axis. **(10 Marks)**

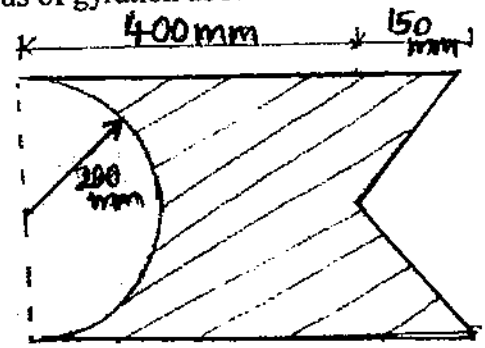

Fig. Q 8(c)

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