Exam. Code: 0905
Sub. Code: 6201

2074
B.E. (Mechanical) First Semester
MEC-101: Statics

Max. Marks: 50

Time allowed: 3 Hours

NOTE: Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Part.

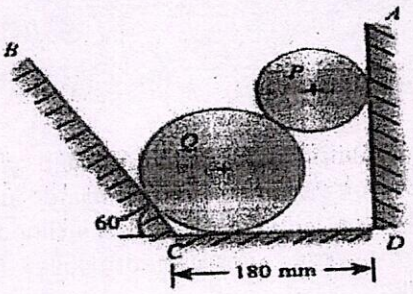
x-x-x

Q1a)Differentiate between scalar and vector
b)Explain principle of moments.
c)What is Catenary
d)Explain the concept of rolling resistance
e)State parallel axis theorem (10)

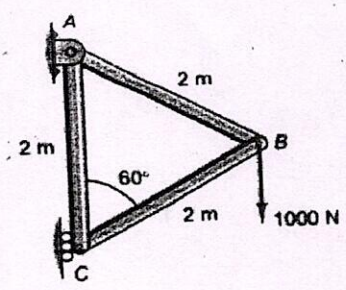
Part-A

Q2a)Explain the general procedure for analysis of a problem in engineering mechanics. (3)
b)State and prove Lami's theorem. (2)
c)A string of length L is fastened to two points A and B at the same level at a distant " A " apart.A ring of weight W can slide on the string and a horizontal force P is applied to it such that it is in equilibrium vertically below B . Show that P=WA/L and the tension in the string is $W(L^2+A^2)/2L$. (5)

Q3a)A string 2 m long is tied to the ends of a uniform rod that weighs 60 N and is 1.6 m long. The string passes over a nail, so that the rod hangs horizontally. Make calculations for tension in the string. (4)
b)Find reactions at all the contact points if weight of P is 200 N and diameter is 100 mm, where as weight of Q is 500 N and diameter is 180 mm. (6)



Q4a)State and prove Varignons theorem. (5)
b)Use the method of joints to calculate the force in each member of the loaded truss as shown in figure below and state whether each member is in tension or compression. Also calculate the reaction forces at A and C. (5)



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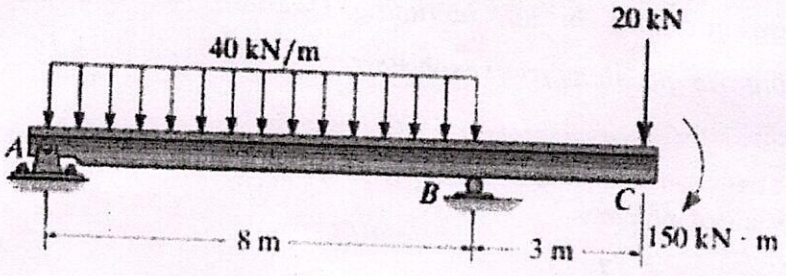
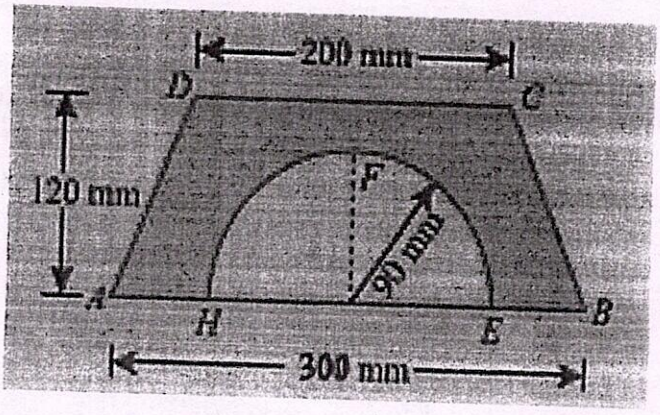
Part-B

Q5)Draw shear force and bending moment diagram for the beam loaded and supported as shown in figure below. (10)



Q6a)A block of stone resting on a horizontal plane requires 10 kN force just to move the block if applied horizontally.The same thing can be done by applying a pull force of 9 kN inclined at 30° to the horizontal.Determine the weight of the block and coefficient of friction. (4)

b)A semicircle of 90 mm radius is cut from a trapezium as shown in the figure below. Find the position of centre of gravity of the figure. (6)



Q7a)Derive the relation for mass moment of inertia of solid cylinder of radius R and height h. (5)

b)A weight of 5 kN is resting on a smooth surface inclined at 30° to the horizontal is supported by the load W resting on the another smooth surface inclined to horizontal by 45°.Both the weights are connected with a string carried over a smooth pulley .Determine the value of W .Use the principle of virtual work. (5)

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