Exam. Code: 0905
Sub. Code: 33255

2124

B.E. (Mechanical) First Semester

MEC-101: Statics

Time allowed: 3 Hours **Max. Marks: 50**

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

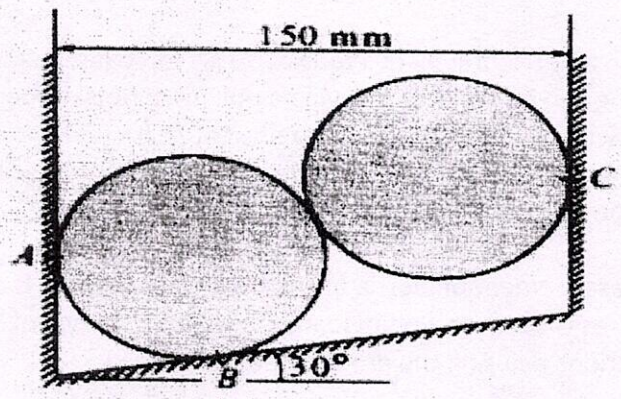
x-x-x

Q1a)What is the principle of transmissibility of force.
b)What is the significance of free body diagram.
c)State Varignon's theorem.
d)What are the characteristics of dry friction.
e)What are conservative forces. Give examples. (10)

Part-A

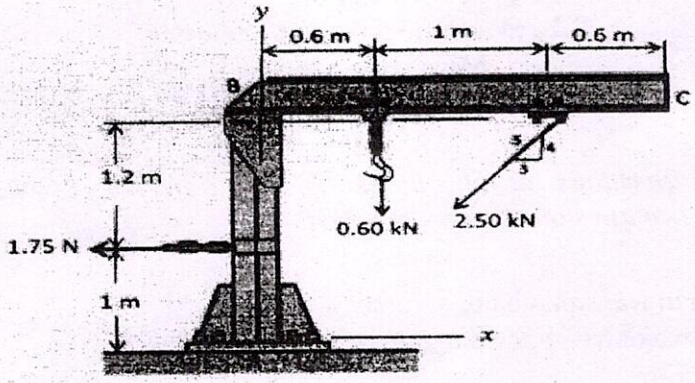
Q2a)Explain the general procedure for analysis of a problem in engineering mechanics. (4)
b)The following forces acts at a point: i)20N inclined at 30° towards North of East, ii) 25 N towards north, iii)30 N towards North West and 35 N inclined at 40° towards South of West .Find the magnitude and direction of resultant force. (6)

Q3a)A smooth sphere of radius 15 cm and weight 2 N is supported in contact with a smooth vertical wall by a string whose length equals the radius of sphere. The string joins a point on the wall and a point on the surface of sphere .Workout inclination and the tension in the string and reaction of the wall. (5)
b)Two cylinders each of diameter 100 mm and each weighing 200 N are placed as shown in figure below. Assuming that all the contact surfaces are smooth, find the reactions at the supports. (5)



Q4a)The jib crane is subjected to three coplanar forces.
i)Replace this loading by an equivalent resultant force alone, without using resultant couple moment.
ii)Specify where the resultant's line of action intersects the column AB. (5)

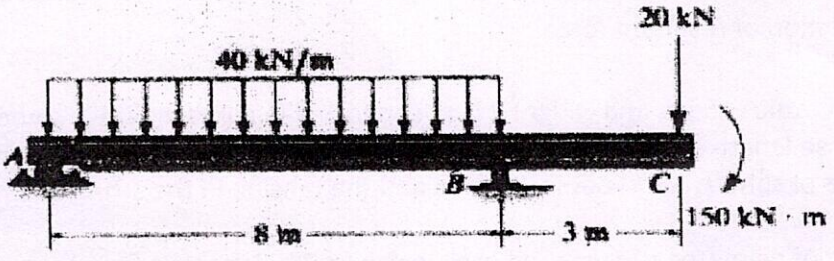
P.T.O.



b)Explain step by step procedure of method of joints to analyze the framed structures. (5)

Part-B

Q5)Draw shear force and bending moment diagram for the beam loaded and supported as shown in the 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. (5)

b)The frustum of a solid cone has base diameter 10 cm and the top diameter 5 cm and height 7.5 cm. Determine the centre of gravity of the solid. (5)

Q7a)Derive the relation for mass moment of inertia of solid cylinder of radius R and height h. (6)

b)A beam AB of span 5 metres is carrying a point load of 2kN at a distance of 2 metres from A . Determine the beam reactions by using the principle of virtual work. (4)

x-x-x