SHAMBHUNATH INSTITUTE OF ENGINEERING & TECHNOLOGY, ALLAHABAD

B. TECH. (C.S. & M.E. Branches, 2nd Sem)

Session 2015-16

First Sessional Test

Engineering Mechanics

Total No. of Printed Pages: 03

Paper Code: NME-202 **Roll No.:**

Time: - $2\frac{1}{2}$ Hours **MAX MARKS: 60**

***Attempt all questions. Marks are indicated against each question/ part.:-**

Section A

1. Attempt all parts - (6x2=12)

a) State the principle of transmissibility of forces.
b) Find the tension in the string CD shown in fig:1(b)
c) Define angle of repose. How is it related to static friction.
d) Explain assumption in trusses.
e) A wooden log of weight 100 N and length 4 m is floating on water. Find intensity of upthrust force and draw its shear force and bending moment diagram.
f) Explain Parallel axis theorem.

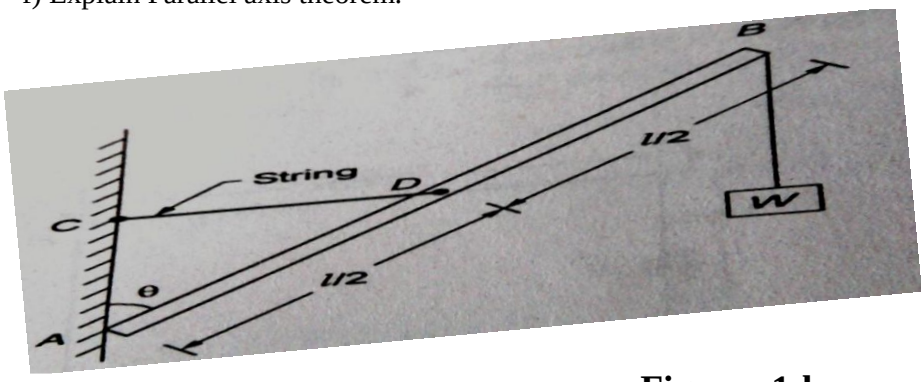

Figure:-1-b

Section B

***Attempt any five questions from this section** **5x6 = 30**

2) For the shown fig:2, find the angle of tilt Θ with horizontal so that the contact force at B will be one-half at A.

3) A fixed square board EFGH carries two pulleys A and B which carry load of 20 N and 40 N respectively with the help of cables fixed at point K and J as shown in fig:3. With reference to x-y axis the coordinates of centre of pulleys are A (1, 4)m and B (4, 1) m. Find magnitude of resultant force on the board and position and x intercept of the resultant force.

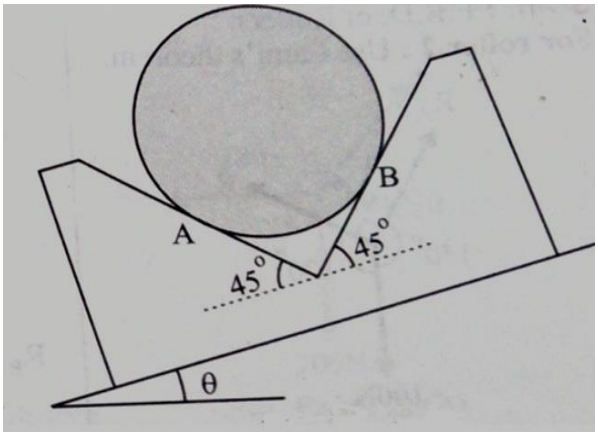

Figure:-2

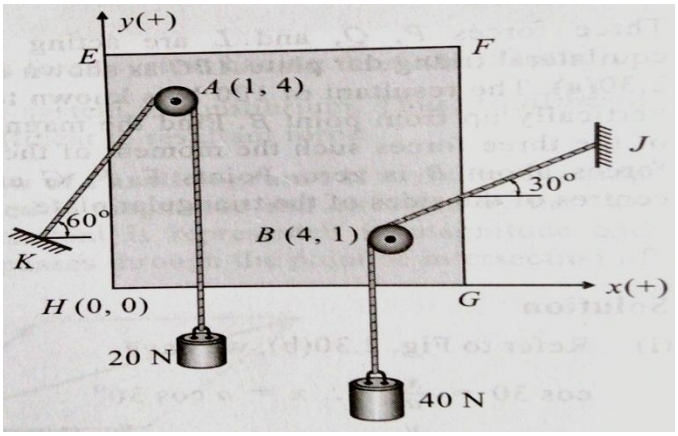

Figure:-3

4) Two bodies A and B are connected to each other by an inextensible string, shown in fig:4. The weight of the A and B are 200 N and 100 N respectively. The coefficient of friction under A is 0.20 and under B is 0.30. Calculate the minimum value of force P for impending rightward motion of the system of blocks.

5)Determine the forces in all the members of the truss as shown in fig:5

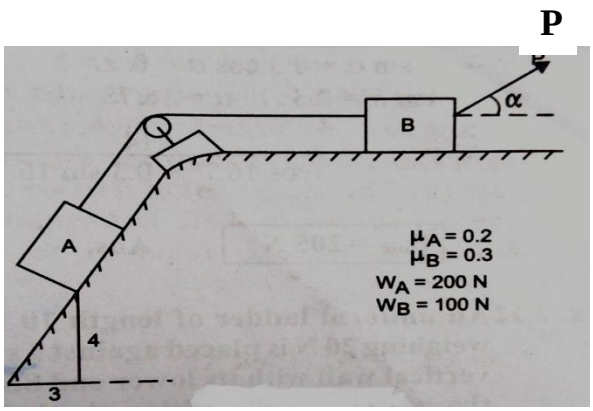

Figure:-4

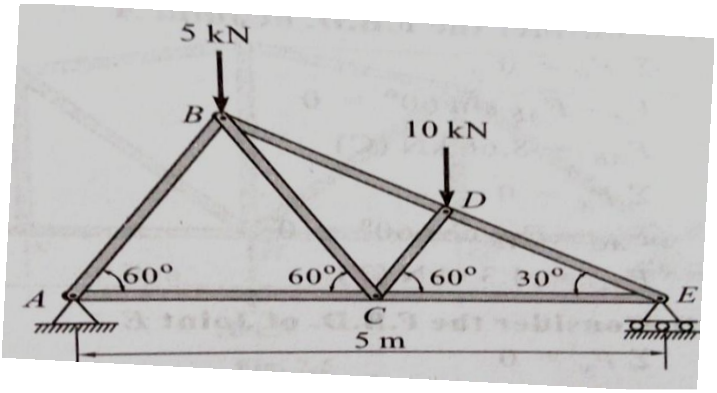

Figure:-5

6) Determine the reactions at support A and B of the beam shown in figure-6.

7) A uniform Ladder has a mass of 35 Kg shown in fig:7. What rightward force P is needed to start the ladder moving to the right. Take μ = 0.3 at all contact surfaces.

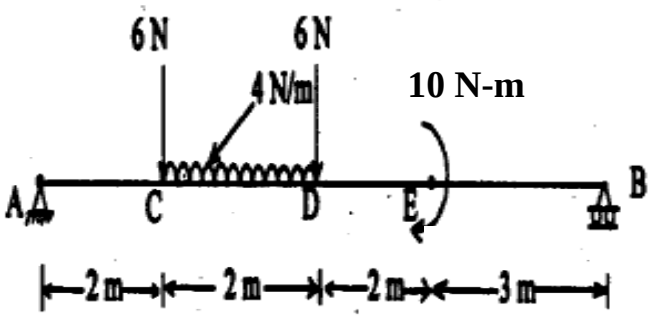

Figure:-6

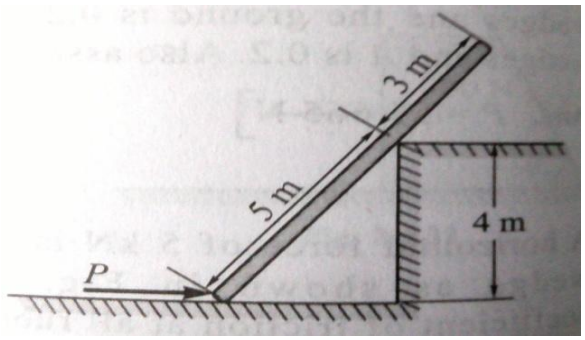

Figure:-7

8) Locate the position of centroid of the plane shaded area depicted in fig:8.

9) Determine length of wire such that c.g. is located at point O as shown if fig:9. Find length in terms of r.

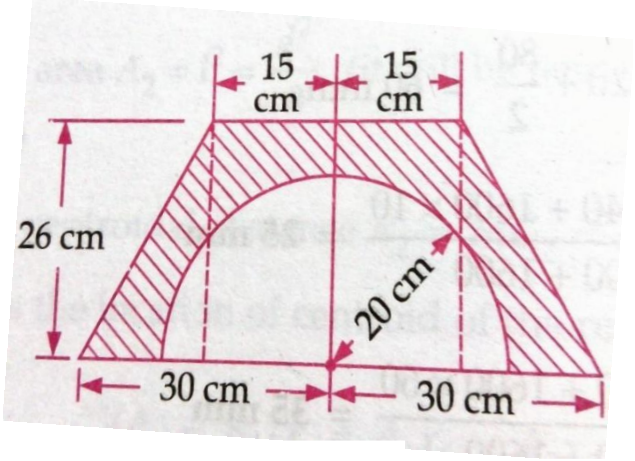

Figure:-8

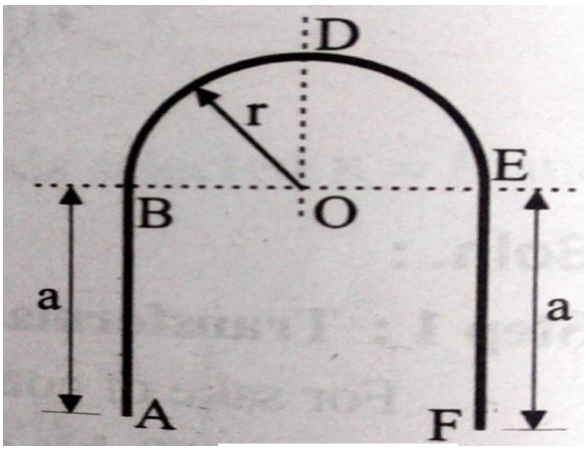

Figure:-9

Section C

***Attempt any two questions from this section** **2x9 = 18**

10) Draw the SFD and BMD of the beam shown in figure-10.

11) Draw the SFD and BMD of the beam shown in figure-11.

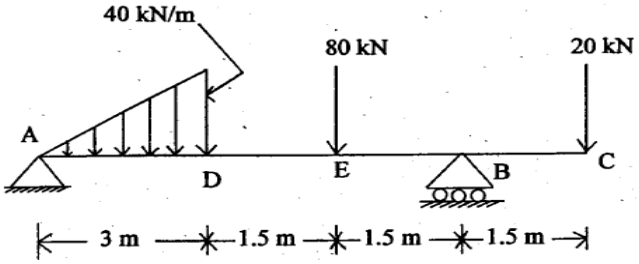

Figure:-10

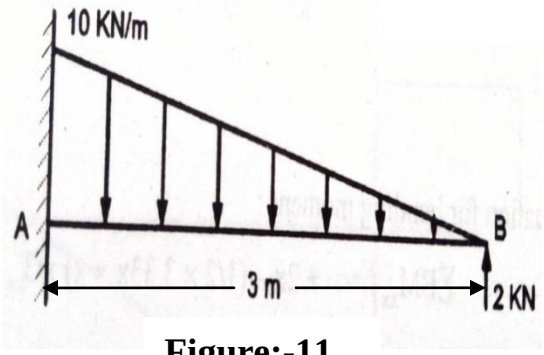

Figure:-11

12) Locate the position of centroid of the plane shaded area depicted in fig:12 , with respect to indicated x and y axis.

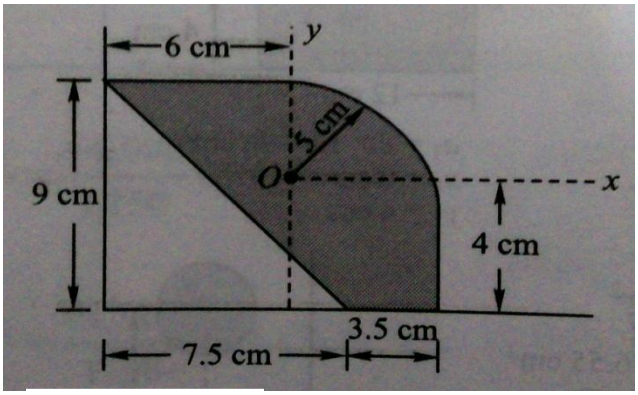

Figure:-12