Roll No. ………………..

24048

B. Tech. 3rd Semester (Mechanical Engg.)
Examination – December, 2012

ENGINEERING MECHANICS

Paper : ME-205-F

Time : Three hours]   [Maximum Marks : 100

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complain in this regard, will be entertained after examination.

Note : Question No. **1** is *compulsory*. Attempt *one* question from each Section. All questions carry equal marks.

1. (a) Define Lami's theorem.   3

   (b) What do you mean by moment of a force about a point and axis ?   3

   (c) Define truss, frame, centroid.   3

   (d) Describe Parallel axis and Perpendicular axis theorems.   3

   (e) How energy method of momentum methods are helpful for analysis ?   3

24048-8,800-(P-4)(Q-9)(12)   P. T. O.

(f) Write on classification of beams. **3**

(g) Write relationship between SF, BM and load. **2**

SECTION – A

2. Two rollers of same diameters are supported by an inclined plane and a vertical wall as shown in fig. The upper and the lower rollers are respectively 200 N and 250 N in weight. Assuming smooth surfaces, find the reactions induced at the points of support A, B, C and D. **20**
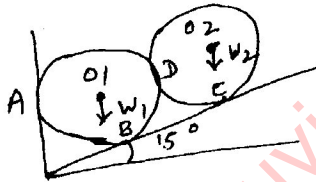

3. Forces of 20, 30, 40, 50, 60 and 70 N act along the side AB, CB, CD, ED, EF and FA respectively of a regular hexagon ABCDEF whose each side measures 10 cm. Make calculations for the algebraic sum of moments of the forces about the centre of hexagon and one of the vertices. **20**

SECTION – B

4. A truss has been loaded and supported as shown in fig. Make calculations for the reactions at the supports and forces in the members of truss. **20**
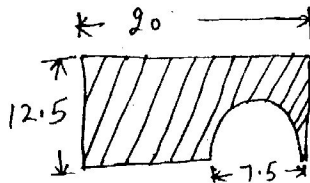
24048-8,800-(P-4)(Q-9)(12) (**2**)
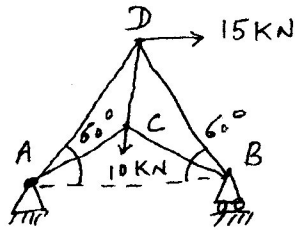
5. Locate the position of the centroid of the plane shaded area depicted in fig given below. **20**
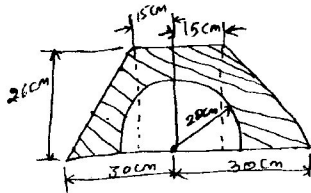
SECTION – C

6. For the shaded area shown in fig., determine : **20**

(a) co-ordinates of centroid,

(b) moment of inertia about the centroidal axis.

The removed area is semicircular and all the given dimensions are in cm.

7. At the instant shown in fig. 3, the rod AB is rotating clockwise at 2.5 rod 1 sec. If the end C of rod BC is free to move on a horizontal surface. Make calculations for the angular velocity of rod BC and velocity of its end point C. 20
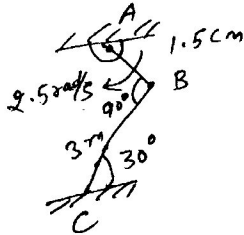

Fig. 3

SECTION – D

8. A flywheel of 1200 kg and 0.9 m radius of gyration is rotating at 190 rev/min. Determine its (a) kinetic energy (b) torque and average power required to give the wheel speed of 180 rev/min in 75 revolutions. 20

9. Draw the BM and SF diagrams for the beam as shown.

20