Reg. No: | | | | | | | | | | |

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech I Year II Semester Supplementary Examinations February-2022

ENGINEERING MECHANICS

(Common to CE, ME & AGE)

Time: 3 hours Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

UNIT-I

1 **a** Explain the classification of a force system with neat sketch. **6M**

b The following forces act at a point **6M**

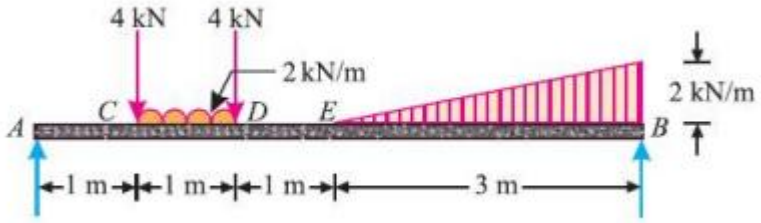
i) 20N inclined at 30o towards north of East
ii) 5N towards North
iii) 30N towards North West, and
iv) 35N inclined at 40 o towards South of West

Find the magnitude and direction of the resultant of force

OR

2 **a** Explain and define the term: 'free body diagram'. Draw the free body diagram of a ball of weight W, placed on a horizontal surface. **6M**

b A simply supported beam AB of 6 m span is subjected to loading as shown in Fig. Find the support reactions at A and B. **6M**

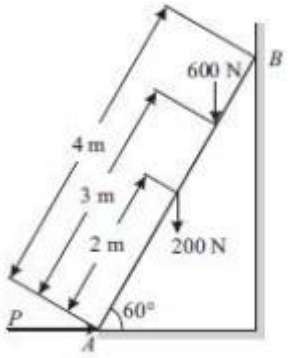


UNIT-II

3 **a** Define the following terms: **4M**

i) Angle of repose
ii) Cone of friction

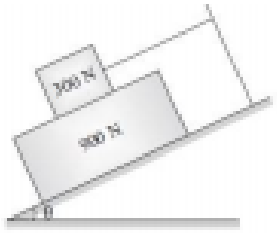
b A ladder of length 4 m, weighing 200 N is placed against a vertical wall as shown in Fig. The coefficient of friction between the wall and the ladder is 0.2 and that between floor and the ladder is 0.3. The ladder, in addition to its own weight, has to support a man weighing 600 N at a distance of 3 m from A. Calculate the minimum horizontal force to be applied at A to prevent slipping. **8M**



OR

4 **a** What is the differential screw jack? Explain the working principle of with neat sketch. **6M**

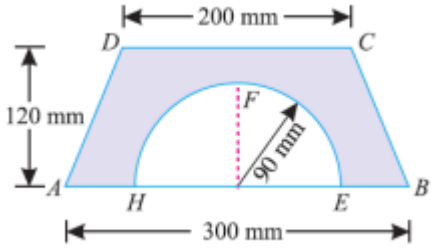
b What should be the value of θ in Fig. which will make the motion of 900 N block down the plane to impend? The coefficient of friction for all contact surfaces is 1/3. **6M**



UNIT-III

5 **a** Prove the parallel axis theorem in the determination of moment of inertia of areas with the help of a neat sketch. **6M**

b A semicircle of 90 mm radius is cut out from a trapezium as shown in Fig. Find the position of the centre of gravity of the figure. **6M**

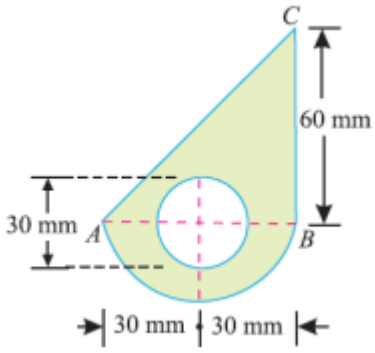


OR

6 **a** i) State the perpendicular axis theorem. **4M**

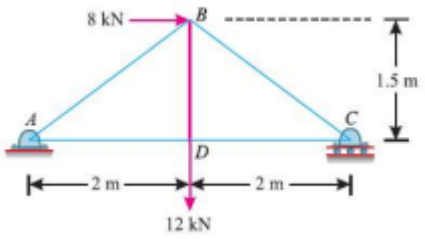
ii) How would you find out the centre of gravity of a section, with a cut out hole?

b Find the moment of inertia of the lamina with a circular hole of 30 mm diameter about the axis AB as shown in Fig. **8M**



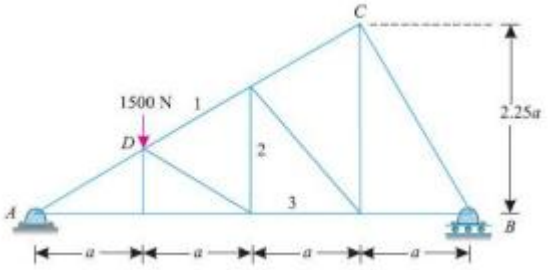
UNIT-IV

7 Determine the forces of figure shows a framed structure of 4 m span and 1.5 m height subjected to two point loads at B and D. **12M**



OR

8 A plane is loaded & supported as shown in fig. Determine the nature and magnitude of the forces in the members 1, 2 and 3. **12M**



UNIT-V

9 **a** Define the following terms **4M**
i) Uniform acceleration.
ii) Variable acceleration

b A small steel ball is shot vertically upwards from the top of building 50 m above the street with an initial velocity of 25 m/sec. **8M**
(i) In what time, it will reach the maximum height?
(ii) How high above the building will the ball rise?
(iii) Compute the velocity with which it will strike the street and the total time for which the ball is in motion.

OR

10 **a** The motion of a particle along a straight line is defined by relation $x = t3 – 4.5t^2 + 5$, where 'x' is in meters and't' in seconds. Plot motion curves from t = 0 to t = 5 s with $\Delta t = 0.5$ s. **6M**

b The acceleration of a particle in rectilinear motion is defined by the relation $a = 25 – 4S^2$. Where 'a' is expressed in m/sec^2 and 'S' is position coordinate in meters. The particle starts with no initial velocity at the position S = 0. Determine: **6M**
(i) The velocity when S = 3 m
(ii) The position where the velocity is again zero. The position where the velocity is maximum.

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