(Following Paper ID and Roll No. to be filled in your Answer Book)

Paper ID : 140122 Roll No. | | | | | | | | | |

B.Tech

(SEM. I) THEORY EXAMINATION, 2015-16

ENGINEERING MECHANICS (EME-102)

[Time:3 hours] **[Total Marks:100]**

SECTION-A

1 Attempt **all** parts. All parts carry equal marks. Write answer of each part in short. (10×2=20)

(a) Two forces 60 KN and 20KN act at a point O. The included angle between them is 50°. Find the magnitude and direction of the resultant?

(b) Define force couple system.

(c) Define point of contra-flexure in beam.

(d) Write down the assumptions in truss analysis.

(e) Define product of inertia and area moment of inertia.

(10×5=50)

2. Three sphere A, B and C having their diameter 500 mm, 500mm and 800 mm respectively are placed in a trench with smooth side walls and floor as shown in figure.1 The center to center distance of spheres A and B is 600 mm. The weights of the cylinders A, B and C are 4 KN, 4KN and 8KN respectively. Determine the reactions at P,Q,R, and S.

Also find out the position of max BM and point of contra flexure.

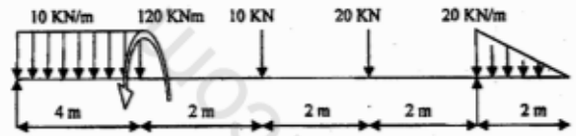

Fig. 2.0

4. Find out axial forces in all the members of truss Fig. 3.0.

cylinder about it's transverse centriodal axis.

6. Find out centroid of given section Fig.4.0. Also find out MOI about base. Take X=40mm

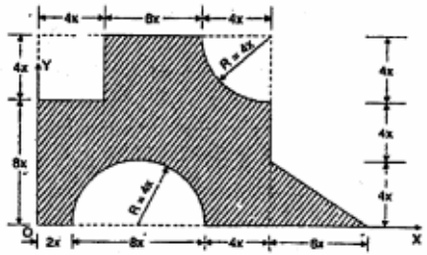

Fig. 4.0

down and carries weight 800N Fig. 5.0. If the coefficient of friction is 0.2 find tension in rope and acceleration with which body moves up.

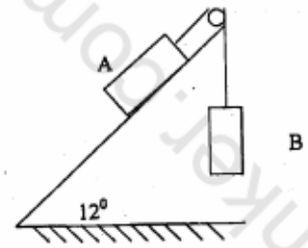

Fig. 5.0

10. (a) Determine the resultant of four forces tangent to the circle of radius 3 m shown in Fig.6.0. What will be its location with respect to the center of the circle.

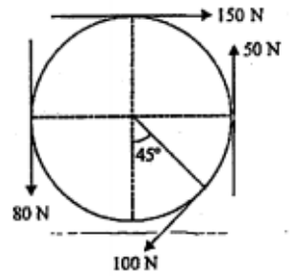

Fig. 6.0

m. Two blocks A and B are attached to inner and outer pulley respectively. Find out time required for block A to move 20 m. also find out velocities of both blocks.

(b) A sphere, cylinder and hoop is released from the top of a inclined and rolling. What will be the velocity at the end of inclined plane ?

12. (a) Draw the Stress-Strain diagram for ductile material mild steel under tension and discuss all the salient points.

(b) Determine the dimensions of a simply supported rectangular steel beam 6 m long to carry a brick wall 250 mm thick and 3 m high. If the brick weight is 20 KN/m³ and the maximum stress is 800N/cm². The depth of beam is 1.5 times of it's width.

(c) Define the term Poisson's ratio. Also establish the relation between modulus of elasticity and modulus of rigidity.

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