

B.E./B.TECH. DEGREE EXAMINATION, DECEMBER 2020

Second Semester

CE18201-ENGINEERING MECHANICS FOR CIVIL ENGINEERING

(Regulation 2018)

Time: Three hours

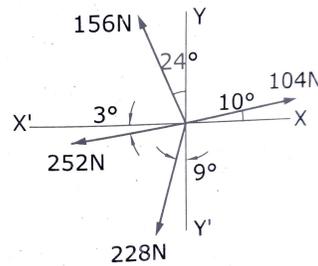
Maximum : 80 Marks

Answer ALL questions**PART A - (8 X 2 = 16 marks)**

1. A heavy string attached at two ends at same horizontal level and when the central dip is very small approaches the following curve
 - a) Circular
 - b) Parabola
 - c) Hyperbola
 - d) Elliptical
2. Two like parallel forces are acting at a distance of 24 mm apart and their resultant is 20N. If the line of action of the resultant is 6mm from any given force, the two forces are
 - a) 15N and 5N
 - b) 20N and 5N
 - c) 15N and 15N
 - d) 10N and 10N
3. Forces are called coplanar when all of them acting on body lie in
 - a) One point
 - b) One plane
 - c) Different planes
 - d) Perpendicular planes
4. A body moves, from rest with a constant acceleration of 5 m per sec. The distance covered in 5 sec is most nearly
 - a) 38 m
 - b) 62.5 m
 - c) 96 m
 - d) 124 m
5. Write down the Equilibrium equations of Rigid bodies in two dimensions.
6. The distance of centroid of a surface from x-axis is 15 mm. First moment of the surface area about x-axis is 225 mm³. Determine total area of the surface.
7. Give the expression for maximum height attained by the projectile?
8. A wheel rotates at constant angular speed of 30 rad/s. What is the speed of the wheel?

PART B - (4 X16 = 64 marks)

9. (a) The four coplanar forces are acting at a point as shown in figure 1. Determine the resultant in magnitude and direction.

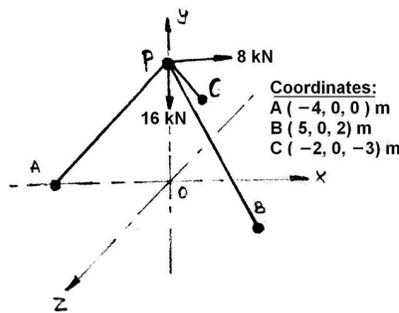


(16)

Figure 1

(OR)

- (b) Two forces act upon a tripod at 'P' as shown in figure 2. The force 8 kN is parallel to x-axis and the force 16 kN is parallel to y-axis. Determine the forces acting at the legs of tripod if the legs rest on ground at A, B and C whose coordinates with respect to O are given. The height of the P above the origin is 10 m.



(16)

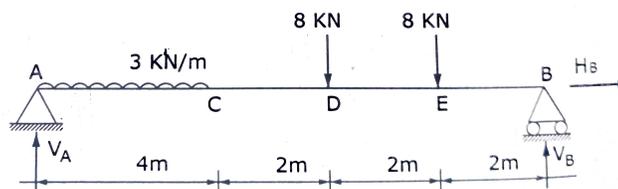
Figure 2

10. (a) Forces 32 kN, 24 kN, 24 kN and 120 kN are concurrent at origin and are respectively directed through the points whose coordinates are A(2,1,6), B (4,-2,5), C (-3,-2,1) and D (5,1,-2). Determine the resultant of the system.

(16)

(OR)

- (b) A beam AB of span 10 m is loaded as shown in figure 3. Determine the reactions at A and B



(16)

Figure 3

11. (a) Locate the horizontal and vertical centroidal axes for the section shown in figure 4

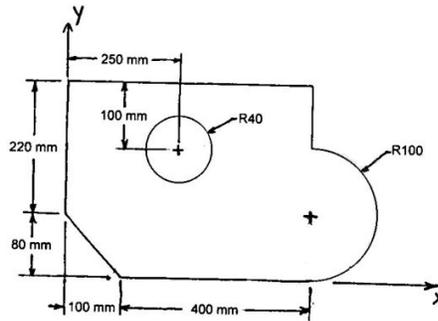


Figure 4

(16)

(OR)

- (b) Find the moment of inertia of a T-section shown in figure 5 about its centroidal axes

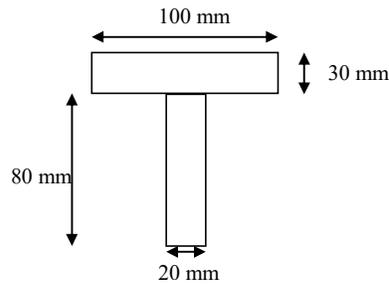


Figure 5

(16)

12. (a) (i) Boy A throws a ball vertically up with a speed of 9 m/s from the top of a shed 2.5m high. Boy B on the ground at the same instant throws a ball vertically up with a speed of 12m/s. Determine the time at which the two balls will be at the same height above the ground. What is the height?

(10)

- (ii) The angle of rotation of a body is given by the equation,

$$\theta = 3t^3 + 4t^2 - 6t + 9 \text{ where } \theta \text{ is expressed in radians and } t \text{ in seconds, find:}$$

(6)

- i. angular velocity and
- ii. angular acceleration of the body when $t = 0$ and $t = 4$

(OR)

- (b) Two weights 800N and 200N are connected by a rope and they move along a rough horizontal plane under the action of force 'P' of 400N applied to 800N block as shown in the figure 6. Find the acceleration of the weights and tension in the rope using Work energy principle.

(16)

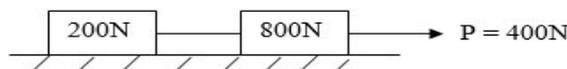


Figure 6

