14\. a) A body moves along a straight-line so that its displacement from a fixed point on the line is given by $s = 4t^3 - 6t^2 + 20$. Find the displacement, velocity and acceleration at the end of 3 seconds.

(OR)

b) A particle starting from rest, moves in a straight line and its acceleration is given by $a = 50 - 36t^2$ m/s^2 where t is in sec. Determine the velocity of the particle when it has traveled 52 m.

15\. a) Two block of mass 20 kg and 40 kg are connected by a rope passing over a frictionless pulley as shown in figure (a). Assuming the coefficient of friction as 0.3 for all contact surfaces. Find the tension in the string and the acceleration of the system. Also compute the velocity of the system after 4 seconds starting from rest.

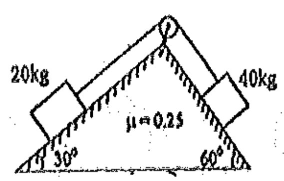


Fig. 15 (a)

(OR)

b) A body weighing 196.2 N slides up a 30° inclined plane under the action of an applied force 300 N parallel to be plane. The coefficient of friction is 0.2. the body move from rest. Determine at the end of 4 seconds, the acceleration, distance traveled, velocity, kinetic energy, work done, momentum and impulse applied on the body.

The free body diagram is drawn as shown in fig. 15 (b)

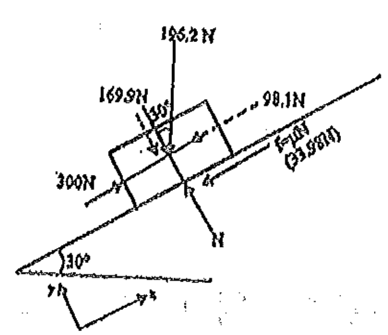


Fig. 15 (b)

Reg. No.:

23/11 AN

Question Paper Code : 50655

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017
Second Semester
Civil Engineering
GE 6253 – ENGINEERING MECHANICS
(Common to Mechanical Engineering (Sandwich), Aeronautical Engineering, Agriculture Engineering, Automobile Engineering, Environmental Engineering, Geoinformatics Engineering, Industrial Engineering, Industrial Engineering and Management, Manufacturing Engineering, Marine Engineering, Materials Science and Engineering, Mechanical Engineering, Mechanical and Automation Engineering, Mechatronics Engineering, Petrochemical Engineering, Production Engineering, Robotics and Automation Engineering, Chemical Engineering, Chemical and Electrochemical Engineering, Fashion Technology, Food Technology, Handloom and Textile Technology, Petrochemical Technology, Petroleum Engineering, Pharmaceutical Technology, Plastic Technology, Polymer Technology, Textile Chemistry, Textile Technology, Textile Technology (Fashion Technology)
(Regulations 2013)

Time : Three Hours Maximum : 100 Marks

Answer ALL questions.

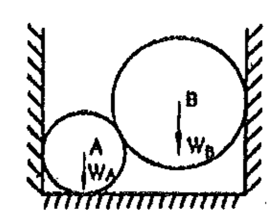
PART – A (10×2=20 Marks)

1\. State the polygon law of forces.

2\. State the principle of transmissibility.

3\. State and prove Varignon's theorem.

4\. Sketch the free body diagram for the cylinder B shown in figure.



5. By using Pappus theorem, determine the volume of sphere having radius r.

6. State the relationship between the second moment of area and mass moment of inertia for a uniform plate.

7. Equation of motion of a body is $s = 5t^3 + 4t^3 + 3t + 2$. Find velocity and acceleration.

8. Define Instantaneous velocity.

9. Define Rolling Resistance.

10. Define Coefficient of Friction.

PART – B (5×16=80 Marks)

11. a) Three links PQ, QR and RS connected as shown in Fig. 11 (a) support loads W and 50 N. Find the weight W and the force in each link if the system remains in equilibrium.

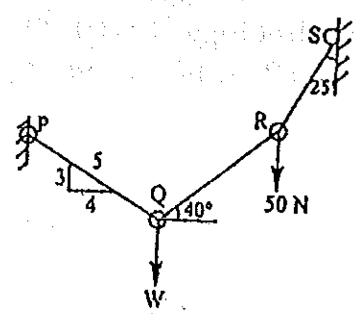


Fig. 11 (a)

(OR)

b) Two identical rollers each of weight 2.5 kN rest in between an inclined wall and a vertical wall as shown in Fig. 11 (b). Determine the reactions at the points of contact P, Q and R. Assume the wall surfaces to be smooth.

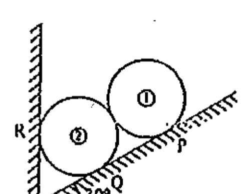


Fig. 11 (b)

12. a) Reduce the given system of forces acting on the beam AB in figure, 12 (a) to (i) an equivalent force couple system at A (ii) an equivalent force couple system at B.

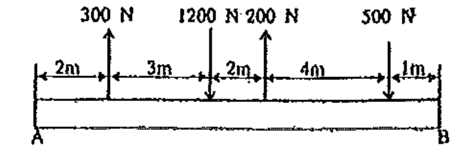


Fig. 12 (a)

(OR)

b) Find the pin reaction of A and the Roller reaction at B. For the beam shown in Fig. 12 (b).

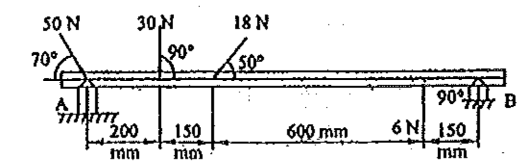


Fig. 12 (b)

13. a) Determine the second moment of area of a triangle about its base and along the axis passing through the centre of gravity.

(OR)

b) Find the mass moment of inertial of the rectangular block shown in figure 13 (b), about the vertical y axis. A cuboid of 20 mm × 20 mm × 20 mm has been removed from the rectangular block as shown in figure. The mass density of the material of the block is 7850 kg/m^3.

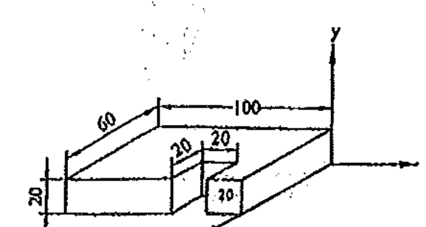


Fig. 13 (b)