



- b) A rod ABC rotating at 20rpm about a vertical axis through A, supports a 900N ball at its lower end as shown in Fig 3. It is fixed in the position by the rod BD. Neglecting the weights of rods AC and BD compute the force F in the rod BD. Is the force tensile or compressive? At what rpm will this force be zero? [6]

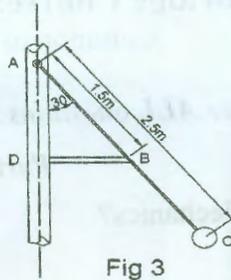


Fig 3

15. a) When equation of force is integrated directly with respect to time, the resultant equations are? [2]

- b) As shown in Fig 4, a 400N body moves along two inclines for which coefficient of friction is 0.20. If the body starts from the rest at A and slides 60m down the incline, how far will then move along other incline? What will be its velocity when it return to B? [5]

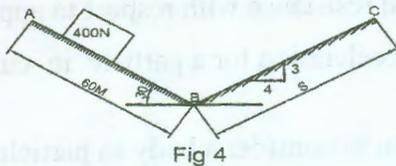


Fig 4

16. a) What is cone of friction explain with a neat sketch [2]  
 b) Determine the magnitude and direction of resultant for the coplanar concurrent system shown in Fig. 5 [5]

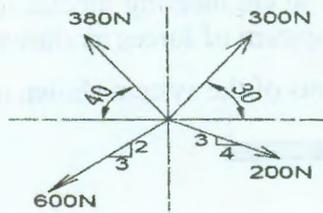


Fig 5

17. Answer any *two* of the following:

- a) For a particle in motion derive velocity and acceleration relations. [3.5]  
 b) In the system of connected blocks shown in Fig 6 coefficient of kinetic friction under blocks A and C is 0.2. Compute the acceleration of each block and the tension in the connecting cable. Pulleys are assumed to be frictionless and of negligible weight. [3.5]

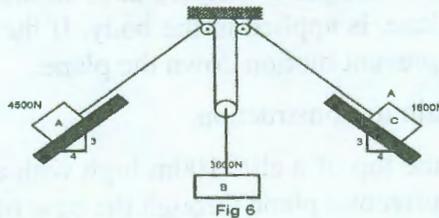


Fig 6

- c) Derive the following equation pertinent to work-energy [3.5]  

$$\int_0^s \sum X (ds) = \frac{W}{g} (v^2 - v_0^2)$$

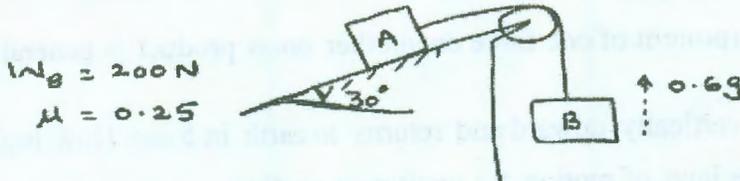
§§§§§

13. a) A ball is thrown vertically into the air at 15 m/s after 5 seconds another ball thrown vertically what should be its velocity if it reaches first ball 30m from the ground (Assume any data required suitably). [2]

b) A ball is thrown so that it strikes the incline ground 70m. If the ball reaches a maximum height of 17.5m above the point of release. Determine its initial velocity and inclination. [5]

14. a) Define the term 'Kinetics'. [2]

b) In the system of connected bodies shown, the pulleys are of negligible weight and frictionless. Determine the weight of A, the block B have an upward acceleration of  $0.6g$ . [5]



15. a) Write short note on work energy theorem. [2]

b) Show that work done by the rigid body is equal to change in kinetic energy of the system. [5]

16. a) Given the vectors  $a=2i-3j-4k$ ,  $b=4i+2j+k$  and  $c=3i-j-2k$ , evaluate  $(a \times b) \times (a \times c)$ . [3]

b) A 500 N block rests on inclined of  $45^\circ$  ground having coefficient of static friction as 0.25. Compute the value of horizontal force P necessary to just start the block upwards. [4]

17. Write short notes on any *two* of the following:

a) Projectile motion [3½]

b) Resultant force and inertial force with respect to dynamics. [3½]

c) Instantaneous centre in the plane motion. [3½]

§§§§§

