Code No. : 3317/N

FACULTY OF ENGINEERING & INFORMATICS

B.E. I Year (New) (Common to all branches) (Main) Examination, June 2011

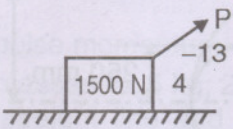
ENGINEERING MECHANIC

Time : 3 Hours] **[Max. Marks : 75**

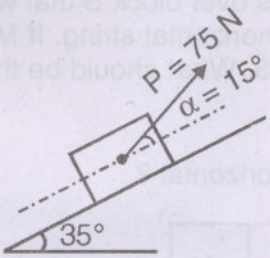
Note : Answer **all** questions from Part – **A**. Answer any **five** Questions from Part – **B**.

PART – A (Marks : 25)

1. State Lami's theorem. 2
2. What are the different conditions of equilibrium ? 2
3. State Pappu's Theorem I and II. 3
4. Differentiate static friction and dynamic friction. 2
5. State perpendicular axis theorem. 3
6. The notion of a particle is defined by the relation $x = t^4 - 12t^2 - 40$. Where x is expressed in metres and t in sec. Determine the position velocity and acceleration when t = 25 sec. 3
7. Determine the force P that will give the body shown below an acceleration of 0.25 g. m/sec^2. The coefficient of kinetic friction is 0.22. 3



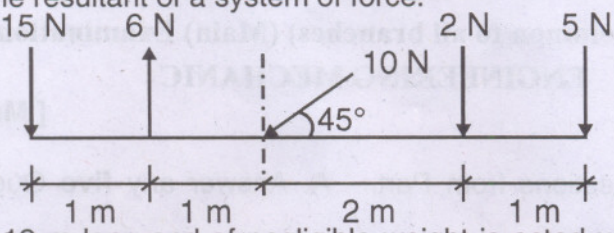
8. Derive work-energy principle. 2
9. A body weighing 80 N is pulled up on a smooth plane by a force 'P' as shown. Determine the velocity of the block after 5 sec. 3



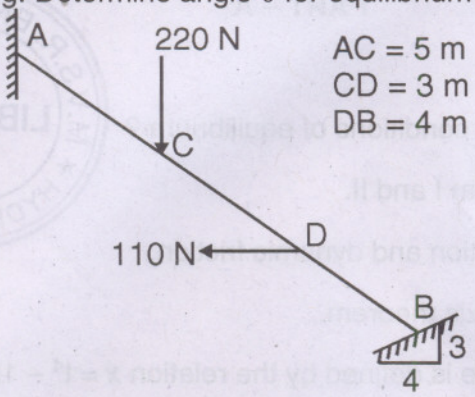
10. Differentiate direct central impact and oblique central impact. 2

PART – B **(Marks : 50)**

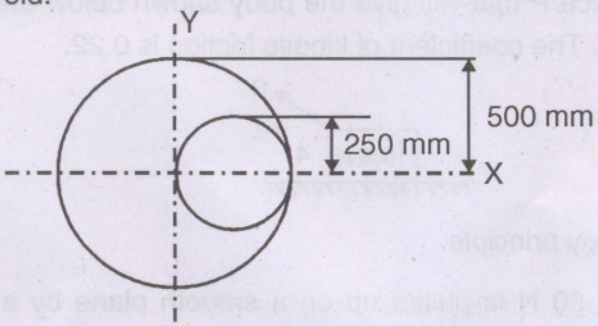
11. (a) Find the resultant of a system of force. **5**



(b) A bar 12 m long and of negligible weight is acted upon by forces as shown in Fig. Determine angle θ for equilibrium of bar **5**



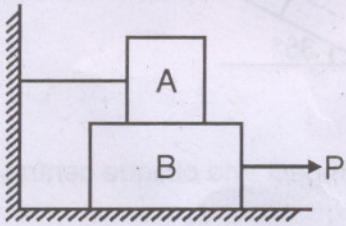
12. A circular disc of 250 mm radius is removed from a circular disc of 500 mm radius as shown below. Centre of both lines are on same horizontal line. Locate centroid. **10**



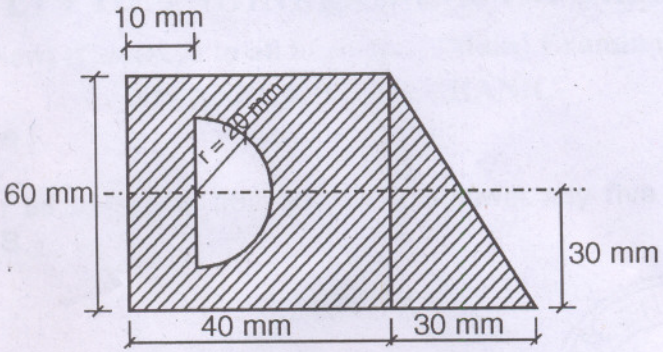
13. Block A weighing 1100 N rests over block B that weights 2200 N as shown. Block A is tied to wall with a horizontal string. If M between A and B is 1/4 and between B and floor is 1/3. What should be the value of P to move the block B if **10**

(a) P is horizontal

(b) P acts 40° upwards to horizontal ?



14. Find the product of inertia for hatched area about the axes XY and y. **10**



15. An elevator of gross weight of 5 kN starts to more upwards with a constant acceleration and acquires a velocity of 2 m/sec after travelling a distance of 3 m. Find the pull in cable during accelerated motion. If the elevator while stopping moves with a constant deceleration from a constant velocity of 2 m/sec and comes to rest in 2 sec. Calculate the pressure exerted by a man weighted up. 800 N to the floor during stopping. **10**

16. Two bodies of weight W_A = 850 N and W_B = 500 N are connected to the two ends of light inextensible string, passing over smooth pulley. The weight W_A is placed on rough horizontal surface whose co-efficient of friction is 0.25 and W_B is hanging vertically in air. If the system is released from rest and block 'B' falls through a vertical distance of 2.5 m; determine the velocity attained by 'B'. **10**

17. (a) State the principle of impulse momentum. **2**

    (b) Three balls A, B and C masses 12.5 kg, 26 kg and 55 kg respectively move along the same straight line and in the same direction with velocities of 16 m/sec, 4 m/sec and 3 m/sec. If 'A' collides with 'B' and subsequently 'B' collides with C. Find the final velocities. Assume perfectly elastic impacts. **8**