



Reg. No. :

Name :

**Combined First and Second Semester B.Tech. Degree
Examination, April 2016
(2008 Scheme)
08 – 105 : ENGINEERING MECHANICS**

Time : 3 Hours

Max. Marks : 100

PART – A

Answer **all** questions in Part – A. **Each** carries 5 marks :

1. Three concurrent forces are acting on a body which are in equilibrium, then the resultant of the two forces should be equal and opposite to the third force. Prove this statement.
2. Explain the different types of supports in details.
3. What is a wedge ? Explain how a wedge is used to raise heavy loads.
4. Define the terms moment of inertia and radius of gyration.
5. A link AB is moving in a vertical plane. At a certain instant when the link is inclined at 30° to the horizontal, the point A is moving horizontally at 5 m/s while B is moving vertically upwards. Find the velocity of B.
6. A train of weight 2000 KN starts from rest and attains a speed of 100 km/hr in 5 minutes. If the frictional resistance of the track is 10 N per KN of the trains weight. Find the average pull required.
7. Define the terms used with simple harmonic motion.
8. A ball is dropped on to a smooth horizontal floor from which it bounces to a height of 8 m on the second bounce it rises to a height of 5 m. From what height the ball was dropped and find the coefficient of restitution.

P.T.O.

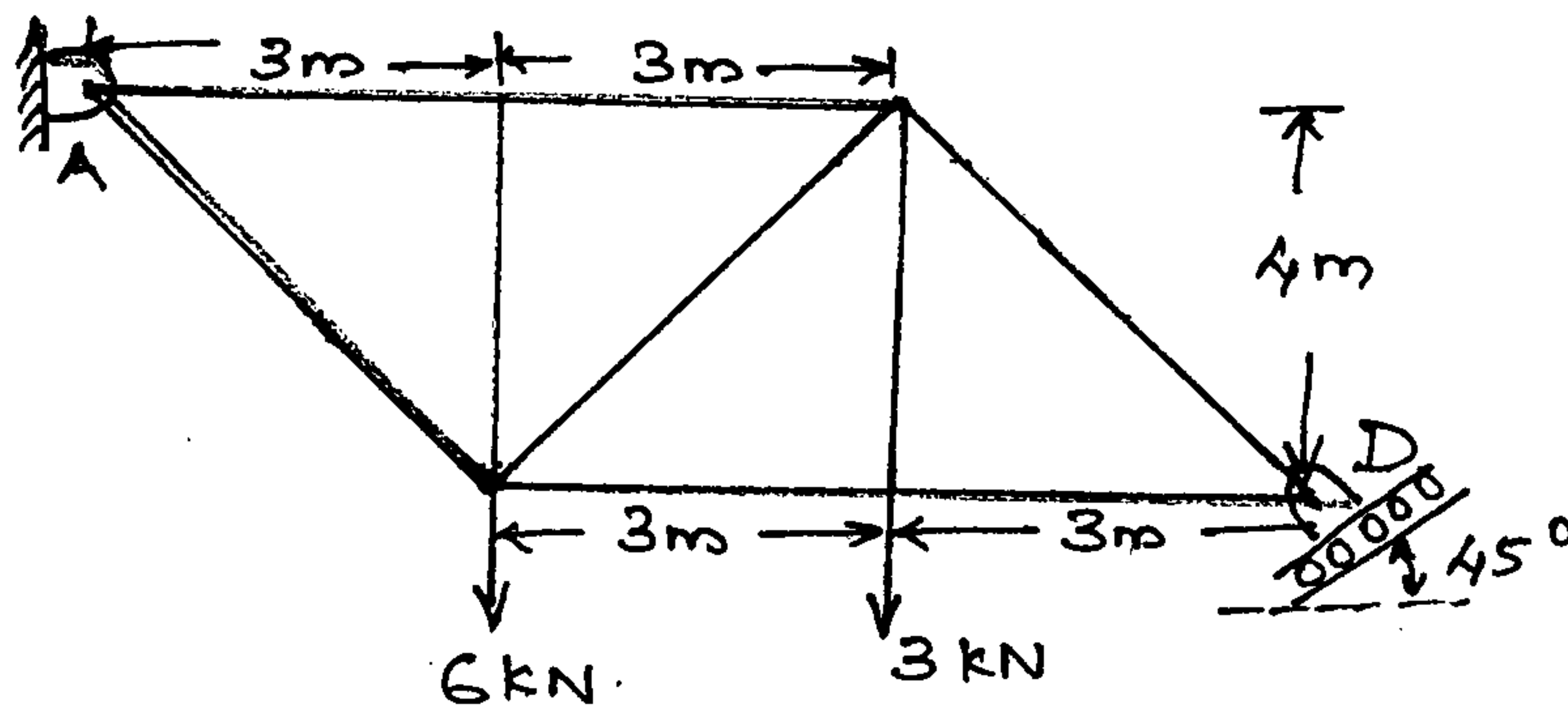


PART - B

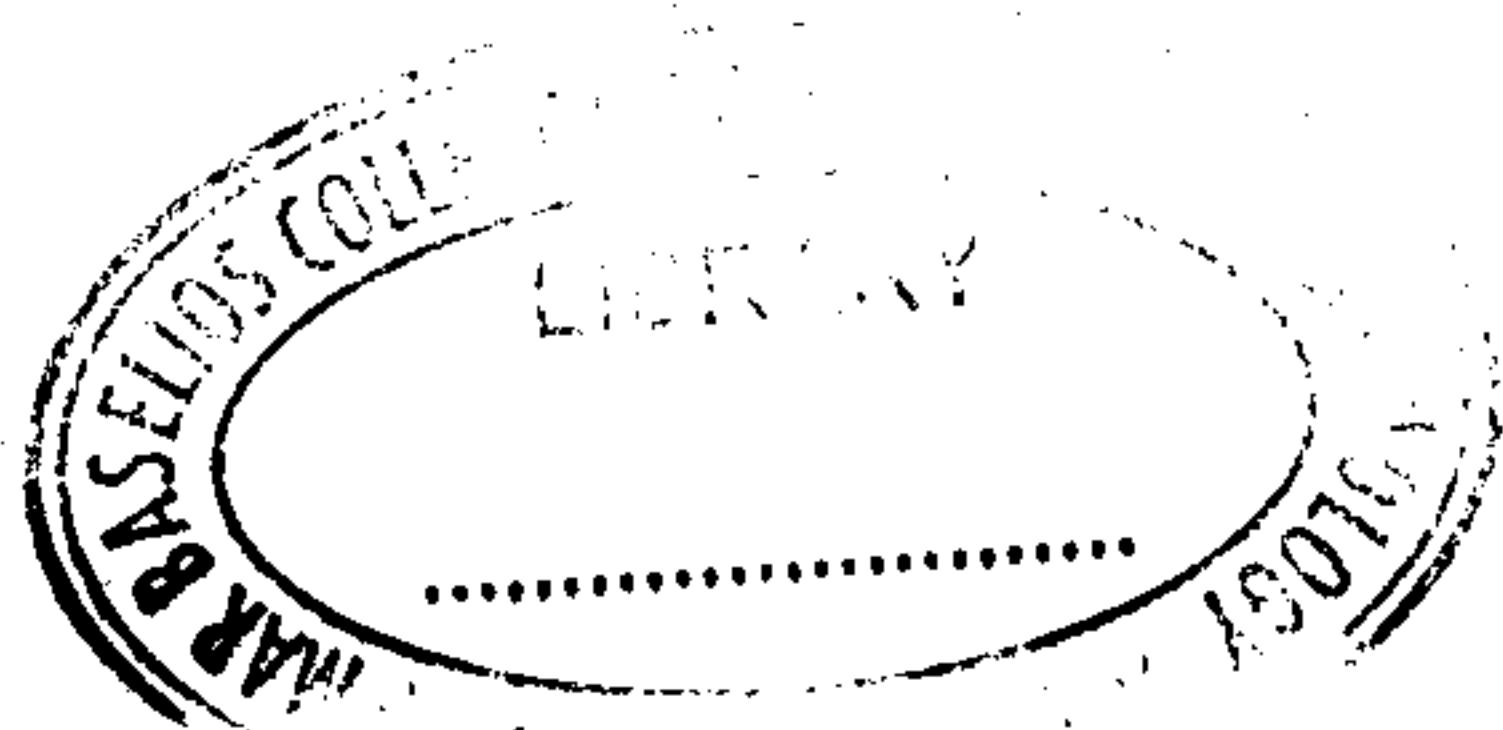
Module - I

Answer **any two** questions. **Each** question carries **10** marks :

9. Two smooth cylinders (circular) each of weight $W = 1000 \text{ N}$ and radius 15 cm are connected at their centres by a string of length 40 cm , and rest on a horizontal plane. A third cylinder of weight 2000 N of 15 cm radius is placed on top in between the other two cylinders. Find the tension in the string and the pressure exerted on the floor and the two point of contacts.
10. a) A truss hinged at A and supported on rollers at D is loaded as shown in figure. Find the reactions at A and D :



- b) What is the advantage of roller support in case of steel truss of the bridges ?
11. A uniform ladder of weight 250 N and of length 4.5 m rest on a horizontal ground, leans against a rough vertical wall. Coefficient of friction between the ladder and floor is 0.3 and between ladder and vertical wall is 0.2 . When a weight of 800 N is placed on the ladder at a distance of 1.2 m from top of the ladder, the ladder is at the point of sliding. Find the angle made by the ladder with horizontal, reaction at both the foot and top of the ladder.



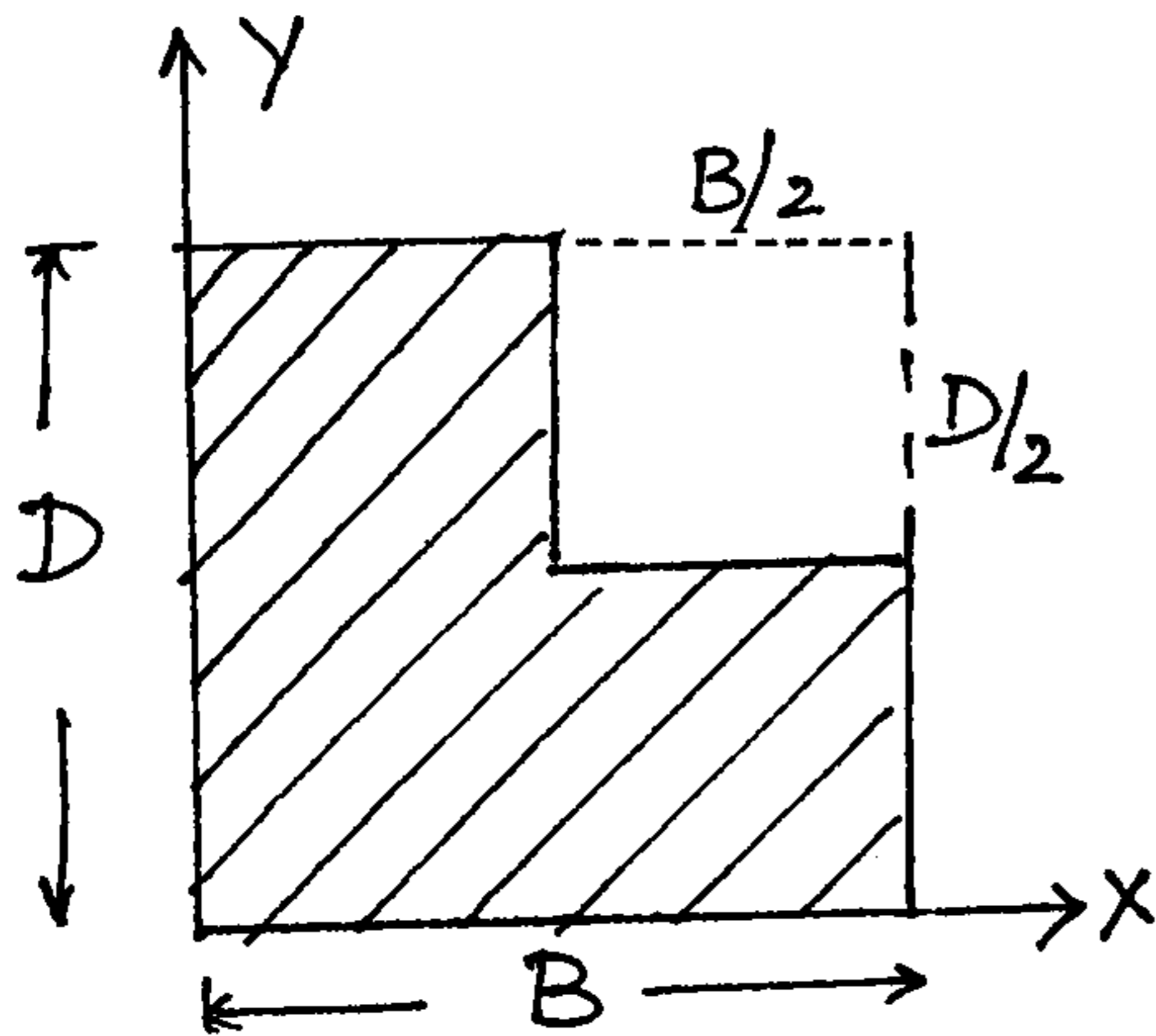


Module – II

Answer **any two** questions :

(10×2=20 Marks)

12. Find the moment of inertia about the centroidal XX and YY axes of the section shown in figure :



13. The crank of a reciprocating engine is rotating at 200 rpm. Length of crank and connecting rod are 75 cm and 10 cm respectively. Find the velocity and acceleration of the piston when crank has turned through an angle of 30° with horizontal.
14. An elevator weighs 2600 N and is moving downwards with constant acceleration. Write down the equation for the elevator cable tension. Starting from rest the lift towards a distance of 40 m during an interval of 10 sec. Find the cable tension during this time. Neglect all other resistance to motion. What are the limits of cable tension ?

Module – III

Answer **any two** questions :

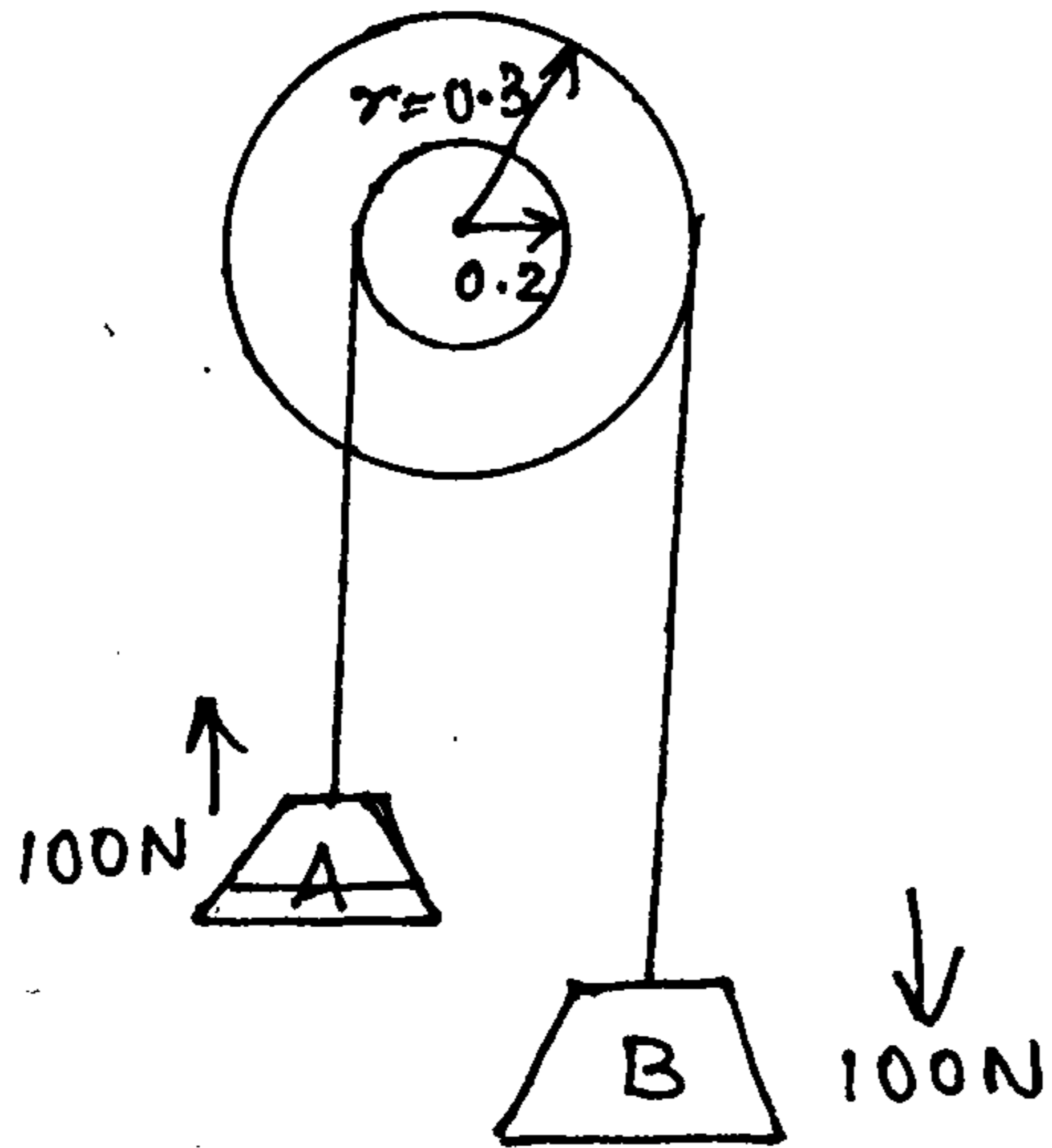
(10×2=20 Marks)

15. A train of weight 2500 KN moves down a slope of 1 in 180 at 20 km/hr and engine develops a power of 32 KW. If the train is pulled up at the same speed, what power will be required to pull the train ?
16. Two bodies of masses m_1 and m_2 and of initial velocities u_1 , and u_2 are having a direct impact. Find an expression for the loss of kinetic energy due to impact in terms of masses of two bodies and their velocities before impact.





17. Two weights each of 150 N are suspended from a compound pulley as shown in figure. Find :



- i) Angular acceleration of the pulley
- ii) Linear acceleration of the blocks A and B
- iii) Tension in the strings. Weight of the pulley is 400 N and its radius of gyration is 0.28 m.

