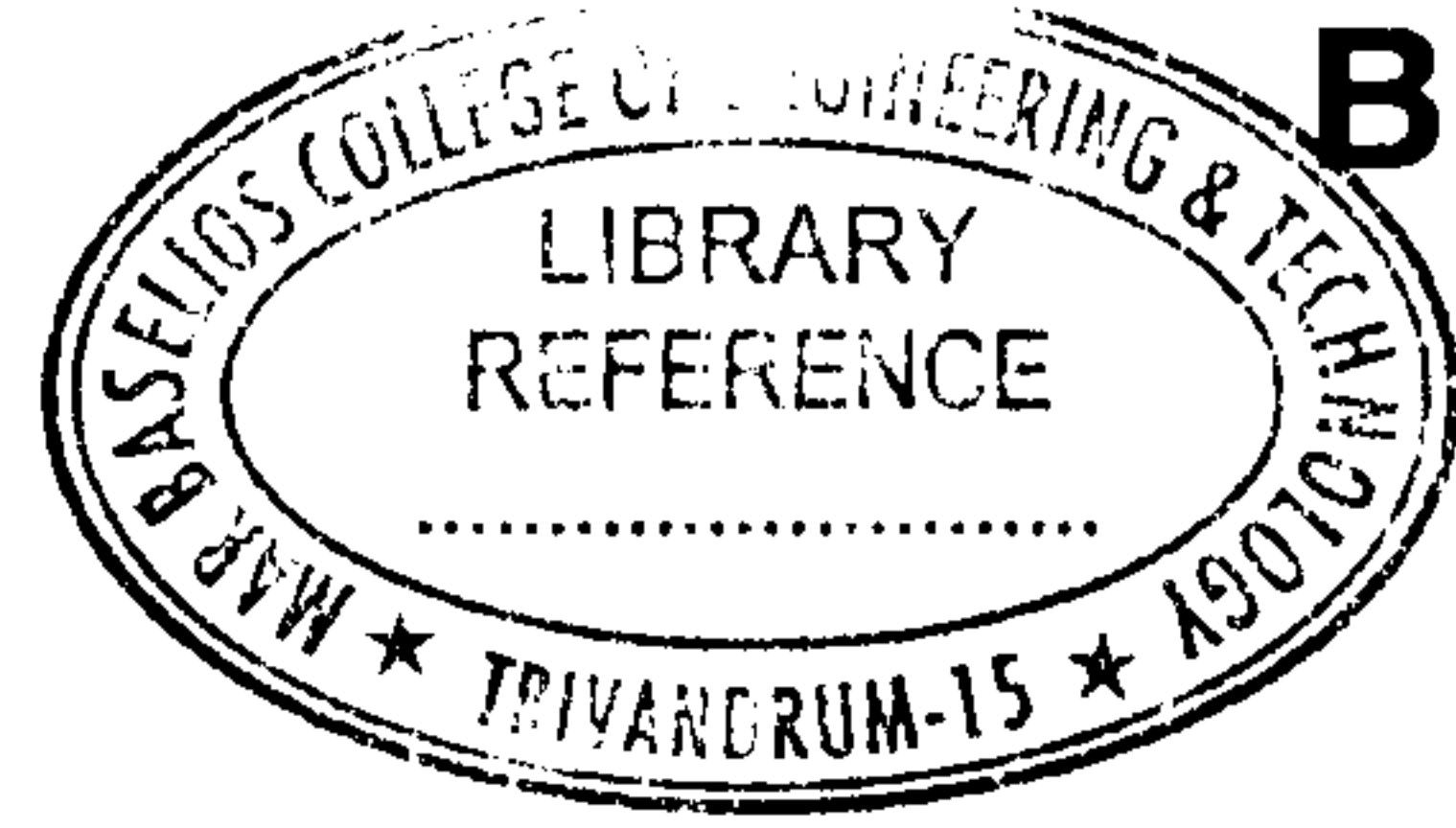




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B – 6052

Reg. No. :

Name :

**Combined First and Second Semester B.Tech. Degree
Examination, April 2017
ENGINEERING MECHANICS (CMNPHERARUF)
(2008 Scheme)**

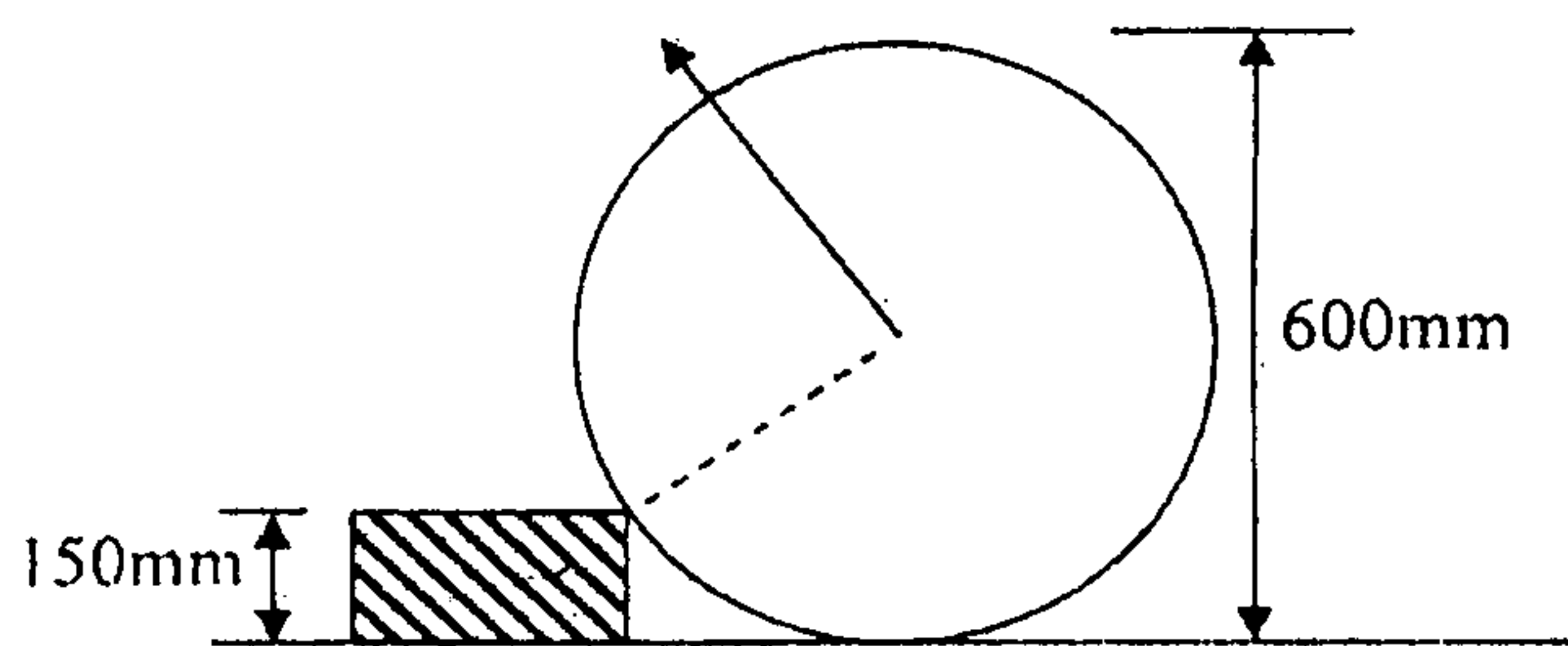
Time : 3 Hours

Max. Marks : 100

- Instructions :** 1) Answer **all** questions from Part **A** and **any two** questions from **each** Module in Part – **B**.
2) Part – **A** carries **40** marks and **all other** questions carry **10** marks **each**.

PART – A

- I. 1) a) Differentiate between stable, unstable and neutral equilibrium with diagrams.
b) Define couple of a force and explain its properties. What is couple moment ?
c) State and explain the principle of transmissibility.
- 2) What is free body diagram ? Explain with example. What is its significance in mechanics ?
- 3) A uniform wheel 600 mm diameter and weighing 10 kN rests against a rigid rectangular block 15 cm thick. Find the least pull required to turn the wheel over the corner of the block.



- 4) State and explain Pappus – Guldinus theorem. Applying the theorem, find the surface area and volume of a sphere of radius r .

P.T.O.



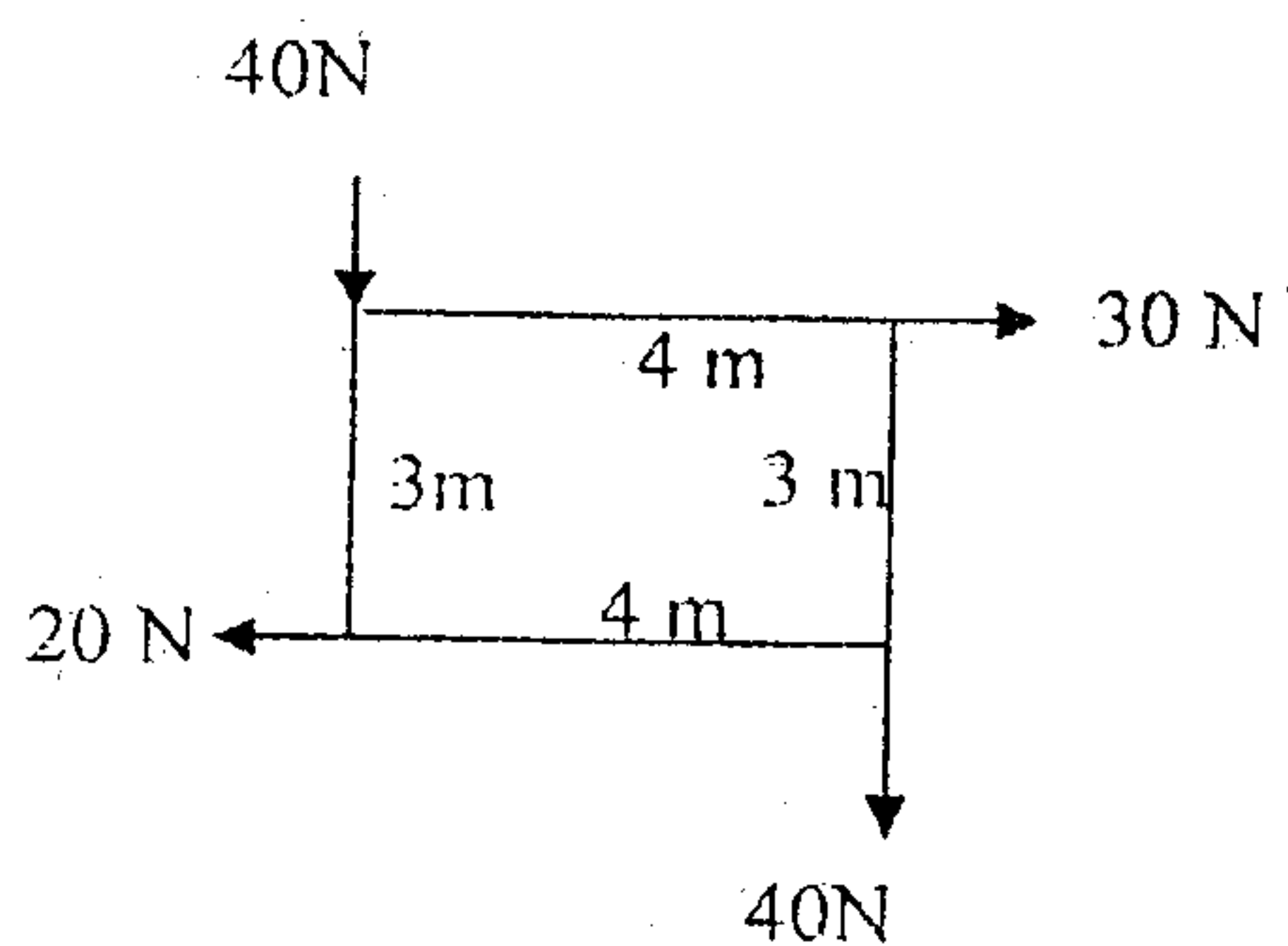
- 5) Explain the terms relative velocity with a simple example.
- 6) Define the terms amplitude, frequency and time period with respect to simple harmonic motion.
- 7) A force of 120 N acts on a body having a mass of 4 kg for 12 seconds. If the initial velocity of the body is 6m/sec, find the acceleration produced in the direction of force and the distance moved by the body in 10 seconds.
- 8) A wheel rotating at 5000 RPM is brought to rest in 10 seconds by applying a retarding couple of 250 Nm. Determine the mass moment of inertia of the wheel and the number of revolutions made by it before coming to rest.

(8×5=40 Marks)

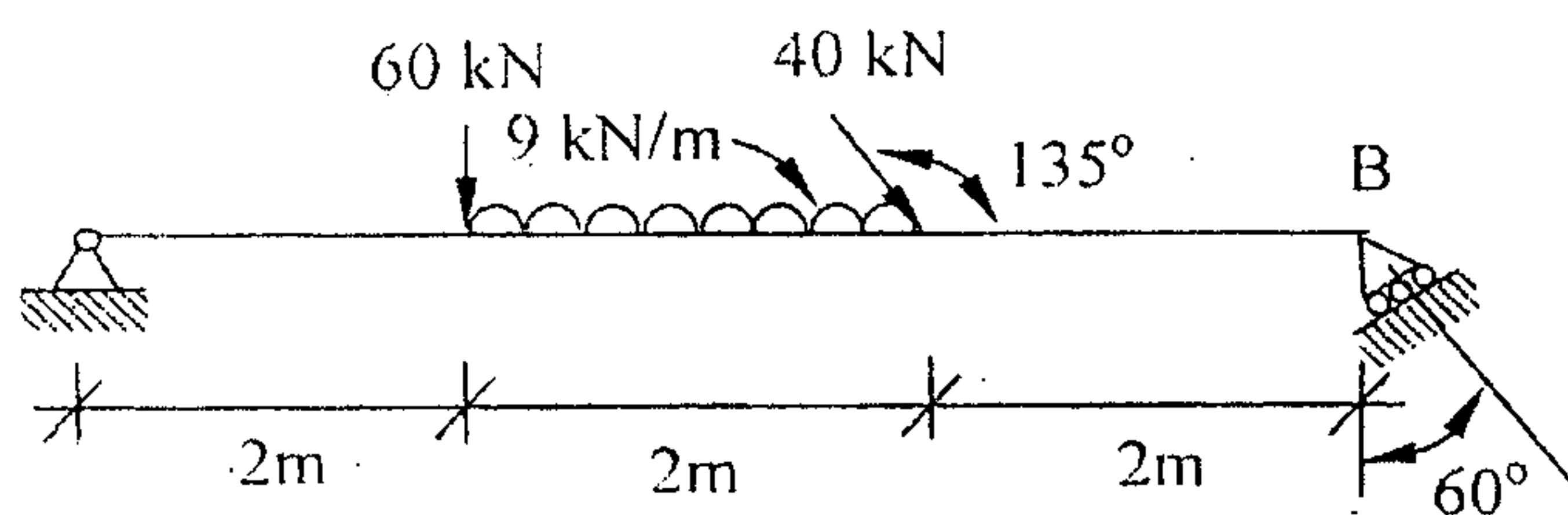
PART – B

Module – I

- II. Find the magnitude, direction and point of action of the resultant of the system of forces shown.



- III. Find the reactions at A and B.

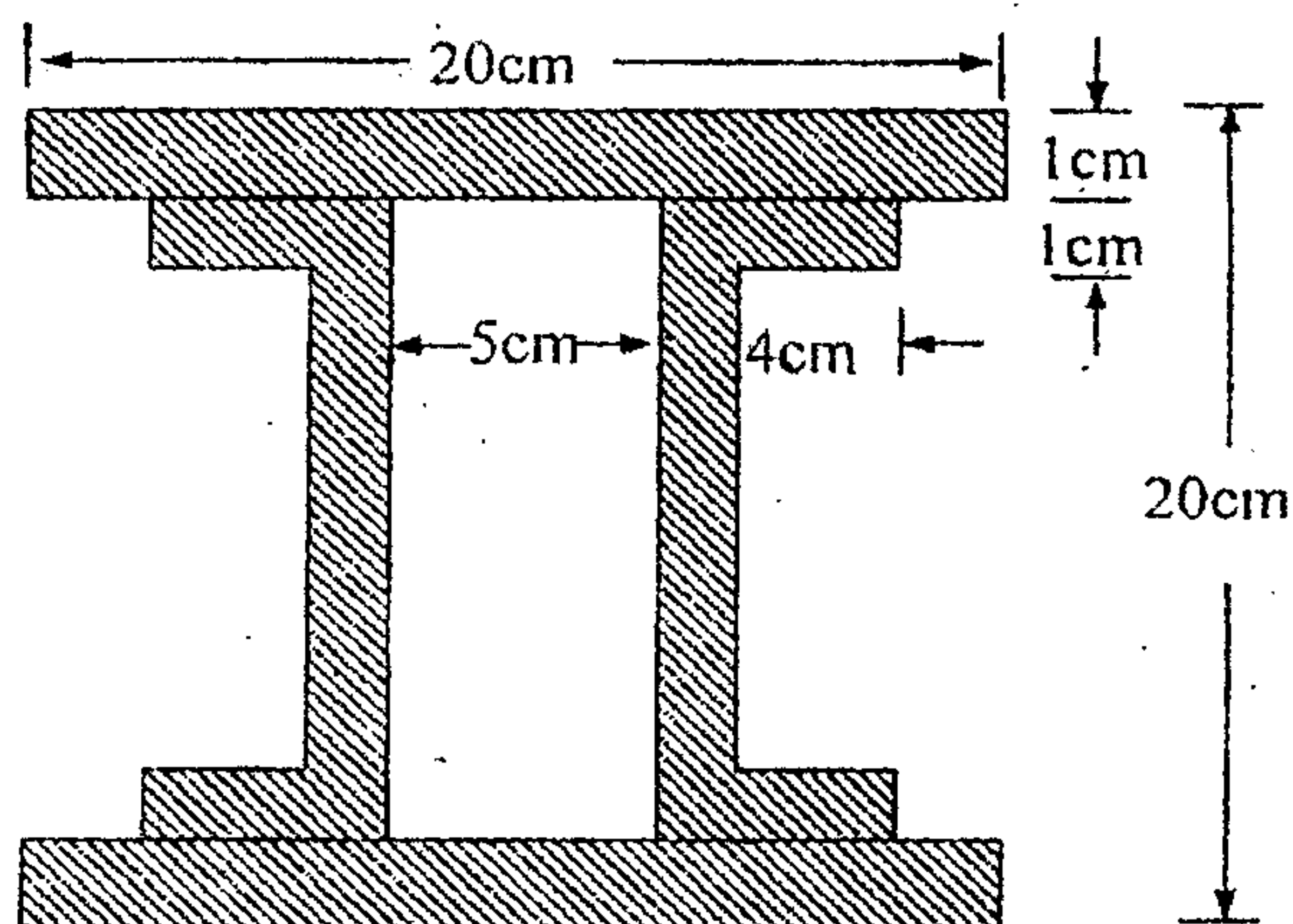


- IV. A ladder 5 m long and 250 N weight is placed against a vertical wall in position at an angle of 30° to the vertical. A man weighing 900 N climbs the ladder. At what position will the ladder start slipping? Take $\mu = 0.2$ for all surfaces of contact.



Module – II

V. Find the moment of inertia of the built up section show.



VI. A reciprocating engine is driving a crank of 20 cm length at 300 RPM. Length of the connecting rod is 100 cm. Find the velocity of the piston, when the crank makes an angle 45° with the horizontal.

VII. A ship sailing east with a velocity of 15 kmph passes a certain point at noon. A second ship is sailing North with a velocity of 20 kmph passes the same point at 1:30 pm. Find at what time, they are closest together and what is distance between them ?

Module – III

VIII. A particle with a mass of 2 kg is oscillating about an axis, which is a distance of 0.5 m from the centre of gravity of the body. If the radius of gyration of the body about the central axis is 9.9 m, find the mass moment of inertia of the body and the length of the equivalent simple pendulum and the time period.

IX. A roller of mass 600 kg and 25 cm radius is pushed with a force of 1000 N on a smooth plane. If it starts from rest and rolls without slipping, find the distance required to be rolled if it is to acquire a velocity of 3 m/sec.

X. Flywheel A rotating at 400 RPM has a mass of 1000 kg and a radius of gyration 1.5 m. Another flywheel B at rest has a mass of 4000 kg and a radius of gyration of 1m. If the shafts are suddenly engaged and allowed to move together, find the common angular speed and the loss of the Kinetic energy to the system.

(6×10=60 Marks)

