

VISWAJYOTHI COLLEGE OF ENGINEERING AND TECHNOLOGY (Autonomous)
FIRST SEMESTER B.TECH DEGREE EXAMINATION DECEMBER 2025 (2025 SCHEME)

Course Code: 25VJGCEST103

Course Name: ENGINEERING MECHANICS

Max. Marks: 60

Duration: 2 Hours 30 Minutes

PART A

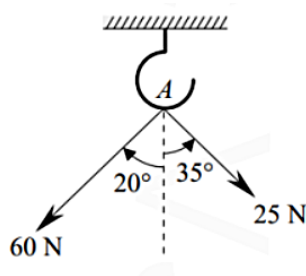
<i>Q.No.</i>	<i>Answer all questions. Each question carries 3 marks</i>	<i>CO</i>	<i>Marks</i>
1	State and explain Lami's theorem.	CO3	3
2	Explain the Principle of Transmissibility of forces.	CO1	3
3	What is Mass Moment of Inertia?	CO4	3
4	Distinguish between (i) Static and kinetic frictions, (ii) Sliding friction and rolling friction.	CO4	3
5	State and explain D'Alembert's principle and describe how it is applied to solve problems involving connected bodies.	CO5	3
6	Difference between Kinematics and Kinetics in Dynamics	CO5	3
7	What is projectile and projectile motion	CO5	3
8	Write down expression for kinematics of rotation	CO5	3

PART B

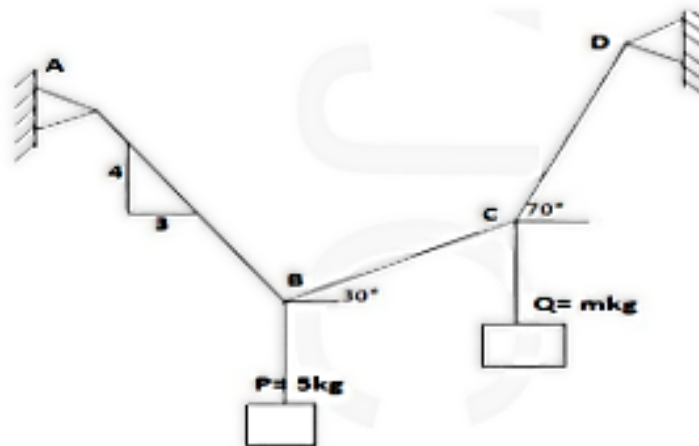
Answer any one full question from each module. Each question carries 9 marks

Module 1

- 9 a. Two forces are applied at the point A of a hook support as shown in Fig. Determine the magnitude and direction of the resultant force. CO2 4



- b. A force of magnitude 44 N acts through a point A (4,-1,7) in the direction of vector $9\mathbf{i}+6\mathbf{j}-2\mathbf{k}$. Find the moment of the force about the point B (1,-3, 2). CO1 5
- 10 A block P= 5kg and block Q of mass m kg are suspended through a chord which is in equilibrium as shown in Fig. Determine the mass of the block Q. CO3, CO4 9

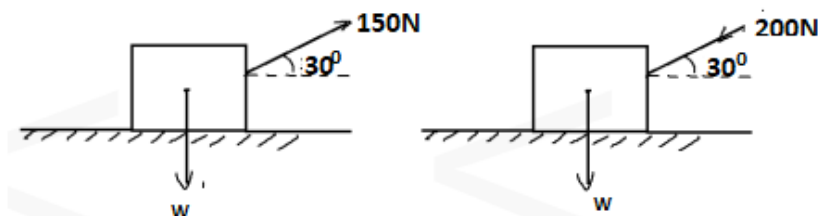


Module 2

- 11 A body, resting on a rough horizontal plane, required a pull of 150 N inclined at 30° to the plane just to move it. It was found that a push of 200 N inclined at 30° to the plane just moved the body. Determine the weight of the body and the coefficient of friction.

CO4

9



- 12 A uniform ladder of weight 850 N and length 6 m rests on a horizontal ground and leans against a smooth vertical wall. The angle made by the ladder with the horizontal is 65° . When a man of weight 750 N stands on the ladder at a distance of 4 m from the top of the ladder, the ladder is at the point of sliding. Determine the co-efficient of friction between the ladder and the floor.

CO3

9

Module 3

- 13 Two cars, A and B, travelling in the same direction get stopped at a traffic signal. When the signal turns green, car A accelerates at 0.75 m/s^2 and 1.75 s later, car B starts and accelerates at 1.1 m/s^2 . Determine (i) when and where B will overtake A, and (ii) the speed of each car at that time.
- 14 a. The equation of motion of a particle along a straight line is given by $s = 18t + 3t^2 - 2t^3$, where s is the distance travelled from starting point is in meters at the end of t seconds. Find (i) The velocity and acceleration at the starting (ii) The time when the particle reaches maximum velocity (iii) The maximum velocity of the particle.

CO4,
CO5

9

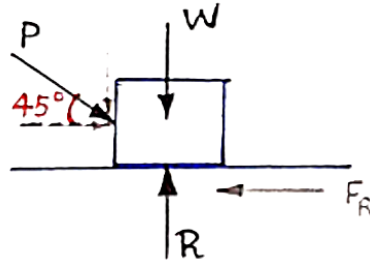
CO4,
CO5

6

- b. A body of mass 50 kg rest on a rough horizontal surface ($\mu = 0.4$). It is acted upon by a force applied at an angle of 45° with the horizontal as shown in fig. Determine the magnitude of force if it causes the body to move with an acceleration of 2 m/s^2 .

CO4

3



Module 4

- 15 A solid circular disc of mass 10kg and radius 0.3 m is rotated about its center with constant angular acceleration of 10 rad/s^2 . Determine the torque acting on the disc.

CO4,
CO5

9

- 16 The rotation of a flywheel is defined by the equation $\omega = 3t^2 - 2t + 2$, where ω is in rad/sec and t in sec. After one second from the start, the angular displacement was 4 radians. Determine the angular displacement, angular velocity and angular acceleration of the flywheel when $t = 3 \text{ s}$.

CO4,
CO5

9
