

FACULTY OF ENGINEERING AND INFORMATICS
B.E. I – Year (Main) Examination, June 2014

Subject : Engineering Mechanics

Time : 3 hours

Max. Marks : 75

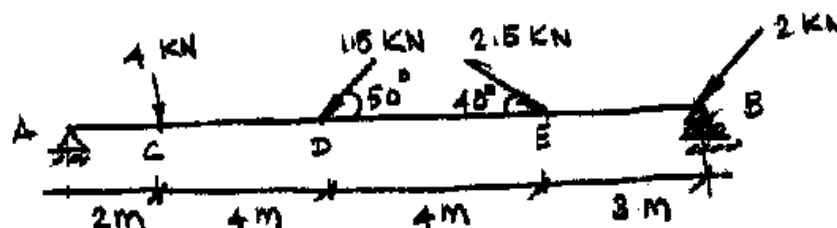
Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (25 Marks)

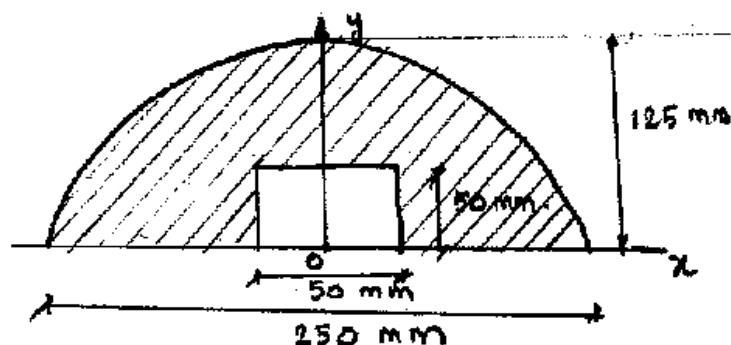
- 1 State the principle of Transmissibility? 2
- 2 Following forces act at a point P, $F_1 = 50i$ $F_2 = 30i - 15j$ $F_3 = -20i + 10j - 5k$. Determine the resultant. 3
- 3 Differentiate center of gravity and centroid. 2
- 4 Explain the difference between angle of friction and angle of repose. 3
- 5 State Parallel Axis theorem. 2
- 6 Find moment of inertia of a rectangular section about its base 'b'. 3
- 7 Differentiate kinematics and kinetics. 2
- 8 The rectilinear motion of a particle is defined by the displacement-time equation as $x = x_0 + v_0 t + \frac{1}{2} at^2$. Find the displacement and velocity at time $t = 2.58$ while $x_0 = 300$ mm, $v_0 = 110$ mm/sec and $a = 0.55$ m/s². 3
- 9 The kinetic energy of rotating body depends on _____ and _____. 2
- 10 Define the term natural frequency and angular frequency. 3

PART – B (50 Marks)

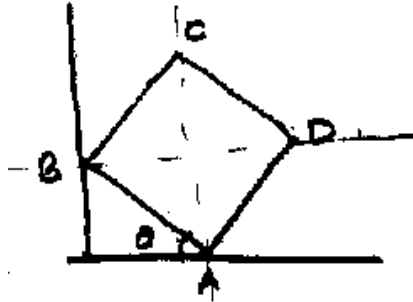
- 11 Neglecting thickness and mass of the beam, determine the support reactions on the beam loaded as shown below. 10



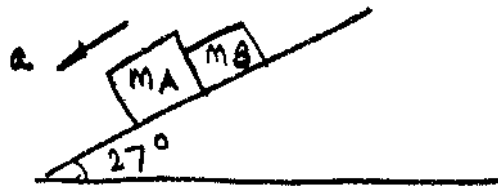
- 12 Find the centroid of the shaded portion of the section shown in the fig below after a square is cut out from it? 10



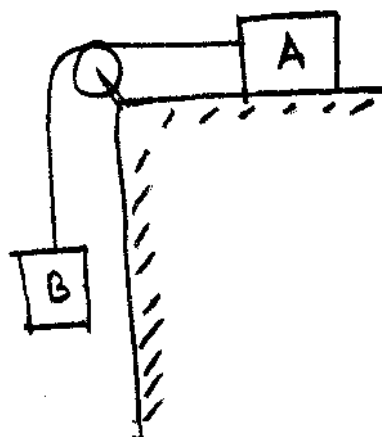
- 13 Find the expression for the moment of inertia of a circle about its diametral axes. 10
- 14 A uniform square plate ABCD rests on one of the corners A on a rough horizontal floor having co-efficient of friction 0.23 and another corner B on a rough vertical wall having co-efficient of friction 0.25. Find the inclination of the edge AB of the plate with horizontal.



- 15 a) Write a short note on fixed axis rotation of a rigid body. 3
- b) Two blocks as shown in the fig. below slide down a 27° incline. If co-efficient of friction at all contiguous surfaces are 0.22. Determine the pressure between the blocks. Take $M_A = 25$ kg and $M_B = 30$ kg. 7



- 16 Two blocks A and B are connected with an inextensible but flexible string as shown below. Let the system is released from rest. Determine the velocity of the block A after it has moved a distance of 0.5m. Assume the co-efficient of friction between block A and the plane is 0.3. Masses of the blocks are $M_A = 80$ kg; $M_B = 150$ kg.



- 17 In a particular SHM performed by a particle of mass m , the amplitude is 160cm and time period of oscillation is 4 sec. Determine the time required by the particle to pass two points at 1.4 m away and at 0.5m away from the central point of oscillation. Both the points lie on the same side of this central point.
