

B.Tech I Year II Semester (R15) Supplementary Examinations December 2019

ENGINEERING MECHANICS

(Civil Engineering)

Time: 3 hours

Max. Marks: 70

PART – A
 (Compulsory Question)

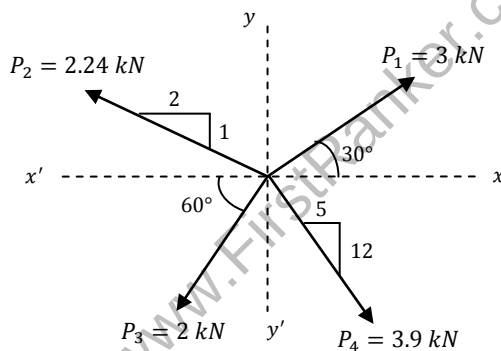
- 1 Answer the following: (10 X 02 = 20 Marks)
- What is the difference between collinear and concurrent forces?
 - State Varignon's theorem.
 - Define the terms cone of friction and angle of friction.
 - What do you mean by wedge friction?
 - What do understand by axes of reference?
 - State the perpendicular axis theorem.
 - What do you mean by planar motion?
 - What are the equations used in fixed axis rotation?
 - Write the steps in determining the forces in the method of sections.
 - Differentiate between a simple pendulum and compound pendulum.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

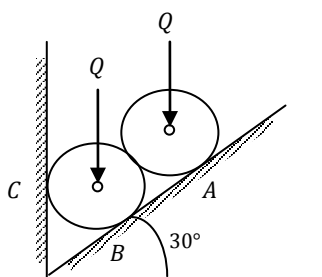
UNIT – I

- 2 Determine the resultant, both in magnitude and direction of the four forces acting on the body as shown in figure below.



OR

- 3 Two identical rollers, each of weight 100 N, are supported by an inclined plane and a vertical wall as shown in figure below. Assuming smooth surfaces, find the reactions induced at the points of supports A, B and C.

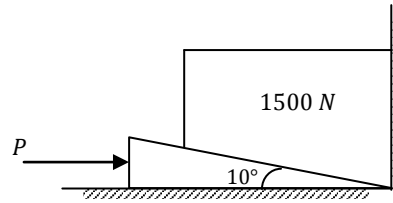


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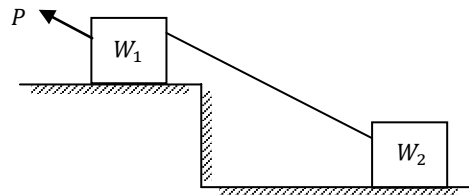
UNIT – II

- 4 A block overlying a 10° wedge on a horizontal floor and leaning against a vertical wall and weighing 1500 N is to be raised by applying a horizontal force to the wedge. Assuming the coefficient of friction to be 0.3 , determine the minimum horizontal force to be applied to raise the block as shown in figure below.



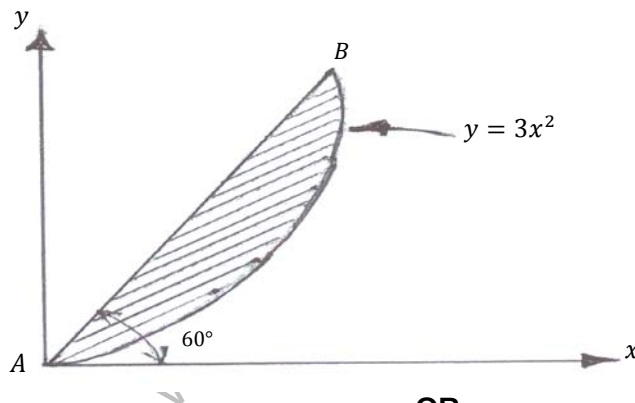
OR

- 5 Two blocks having weights W_1 and W_2 are connected by a string and rest on horizontal plane as shown in figure below. If the angle of friction for each block is ϕ , find the magnitude and direction of least force 'P' applied to the upper block that will induce sliding.



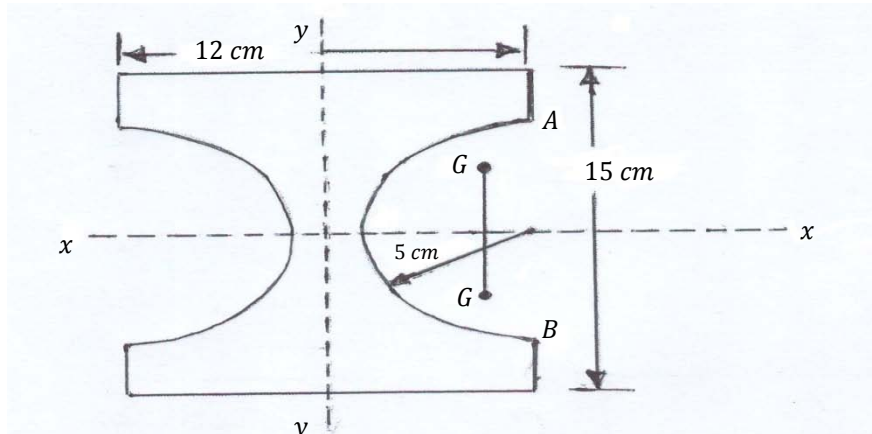
UNIT – III

- 6 Locate the centroid of the shaded area bounded by a straight line and a parabola as shown in figure below.



OR

- 7 Determine I_{xx} and I_{yy} of the cross-section of a cast iron beam as shown in figure below.



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UNIT – IV

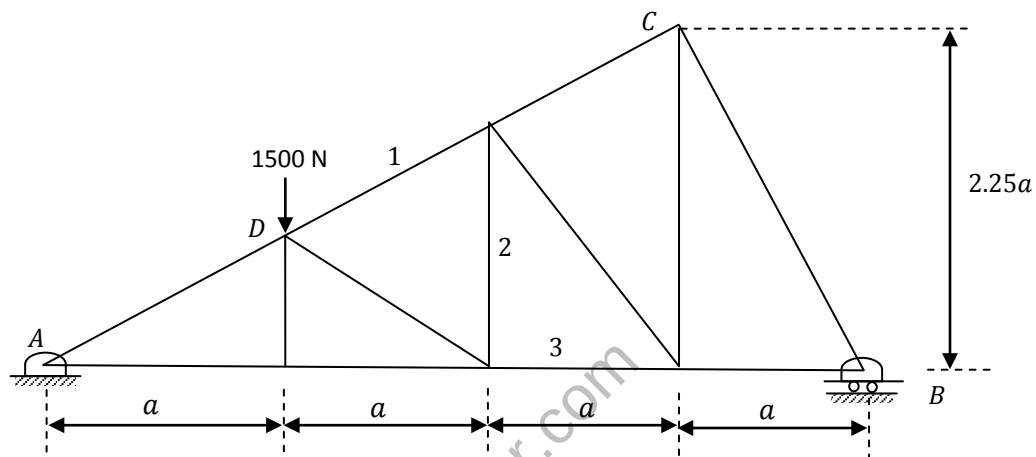
- 8 (a) A cage goes down a main shaft 750 m deep, in 45 s. For the first quarter of the distance only, the speed is being uniformly accelerated and during the last quarter uniformly retarded, the acceleration and retardation being equal. Find the uniform speed of the cage, while traversing the central portion of the shaft.
- (b) Explain the connected systems in kinetics.

OR

- 9 A pile of mass 1000 kg is driven 10 cms in to the ground by every blow of the pile driver of 200 kg mass which is dropped through 2 m before reaching to the pile. Find out: (i) K.E lost in each blow of the pile driver. (ii) Resistance offered by the ground to the pile.

UNIT – V

- 10 Determine the nature and magnitude of the forces in the members 1, 2 and 3 as shown in figure below.



OR

- 11 A body performing simple harmonic motion has a velocity = 12 m/s when the displacement is 50 mm and 3 m/s when the displacement is 100 mm, the displacement being measured from the mid-point. Calculate the frequency and amplitude of the motion. What is the acceleration when the displacement is 75 mm.
