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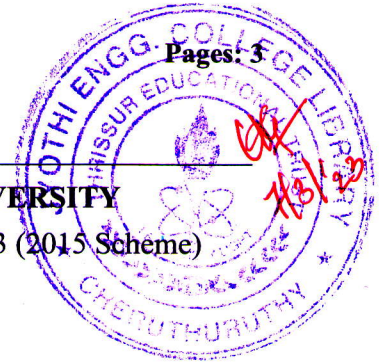
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Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S1 (S,FE) S2 (S) Examination February 2023 (2015 Scheme)



Course Code: BE 100

Course Name: ENGINEERING MECHANICS

Max. Marks: 100

Duration: 3 Hours

PART A

Answer all questions, each carries 5 marks

Marks

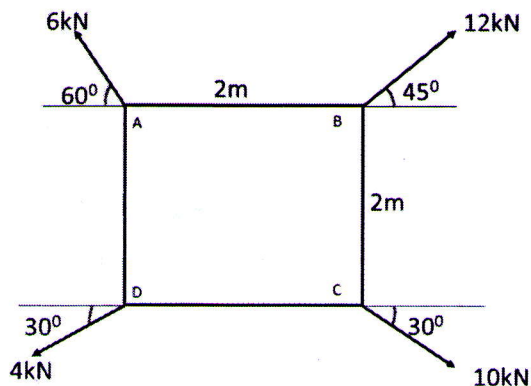
- 1 Two concurrent forces act at an angle of 60 degrees. The resultant is 20N and one of the forces is 8N. Find the other force. (5)
- 2 A force of 125 N makes an angle of 30, 60, 120 degrees with X, Y, Z axis respectively. Find the force vector. (5)
- 3 State and explain Parallel Axis Theorem. (5)
- 4 What is force of friction? State the Laws of friction. (5)
- 5 Explain the different types of plane motion? (5)
- 6 State and explain D'Alembert's Principle. (5)
- 7 Differentiate between forced and free Vibrations. (5)
- 8 What do you understand by Simple Harmonic Motion? Define the following terms (5)
– Time Period, amplitude, spring constant

PART B

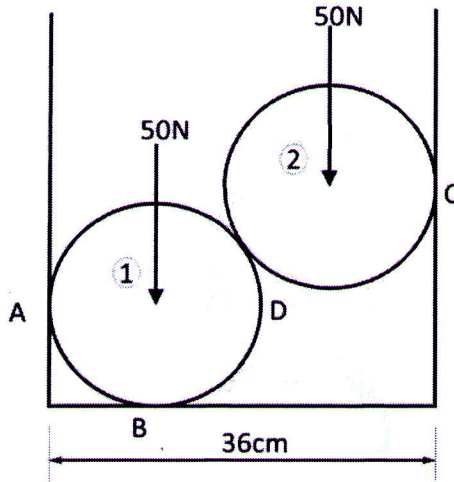
Answer any 2 questions from each SET, each question carries 10 marks.

SET I

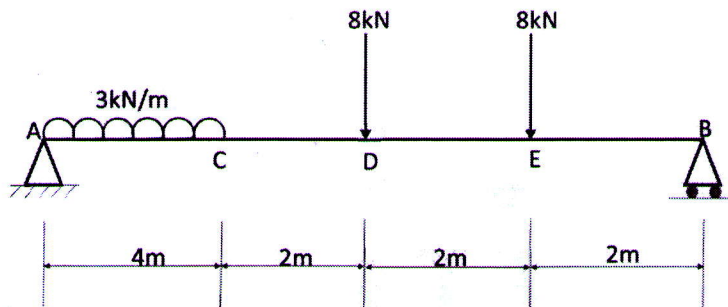
- 9 Four forces of magnitude and direction acting on a square ABCD of side 2m are shown below. Find the resultant in magnitude and direction and also locate its point of action with respect to point A. (10)



- 10 Two rollers each of weight 50N and of radius 10cm rest in a horizontal channel of width 36cm as shown (Qn.10) . Find the reaction at points A, B and C. (10)

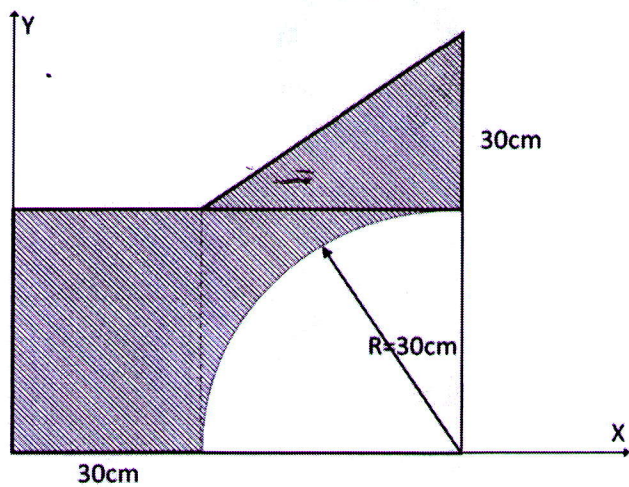


- 11 A beam AB of span 10m is loaded as shown below. Find the reactions at A and B. (10)

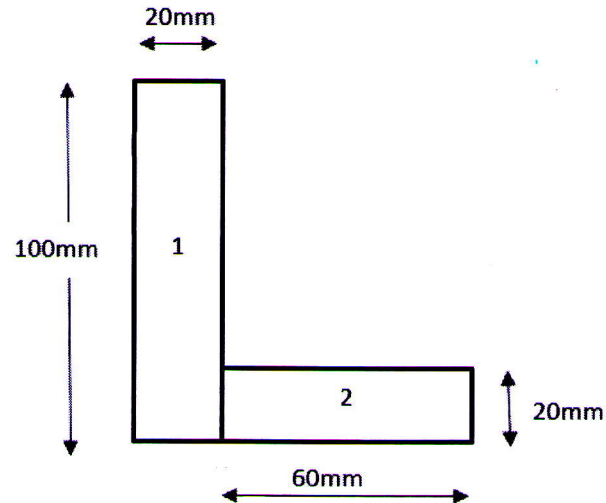


SET II

- 12 Locate Centroid for the shaded area. (10)



- 13 Find the moment of inertia of the section about the centroidal XX & YY axis. (10)



- 14 a) State and explain principle of virtual work. (3)
 b) A uniform ladder of weight 250N and length 5m is placed against a vertical wall in a position where its inclination to horizontal is 60 degrees. A man weighing 800N climbs the ladder. At what position will he induce slipping? Take $\mu=0.2$ at both the contact surfaces of the ladder. (7)

SET III

- 15 An elevator of mass 700kg is ascending with an acceleration of 1.8m/s^2 . During the upward motion, its operator who weighs 850N is standing on the weighing scale placed on the floor of the elevator. Calculate the scale reading and total tension in the cables of elevator during this motion. (10)
- 16 A particle executes SHM with a frequency of 15 oscillations per minute. When the particle lies at a distance of 12cm from the mean position, its velocity equals 75 percent of maximum velocity. Find the distance between two extreme positions of the particle and the maximum acceleration of the particle. (10)
- 17 A block of mass 75kg is supported by two springs of stiffness 3000 N/m and 4000 N/m arranged in series. The block is pulled 50mm down from the position of equilibrium and then released resulting in SHM. Find the period of vibration, maximum velocity and maximum acceleration. (10)
