

Code: 9A01101

SS

B.Tech II Year I Semester (R09) Supplementary Examinations December 2015

ENGINEERING MECHANICS

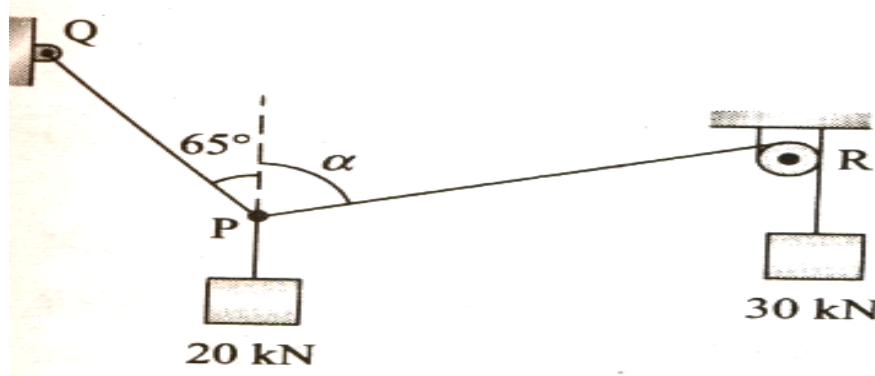
(Civil Engineering)

Time: 3 hours

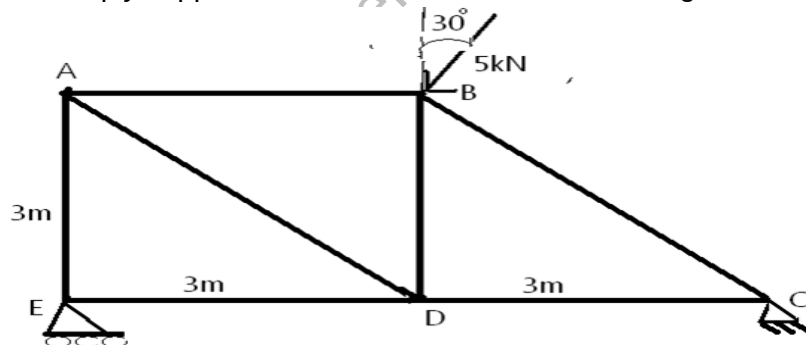
Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

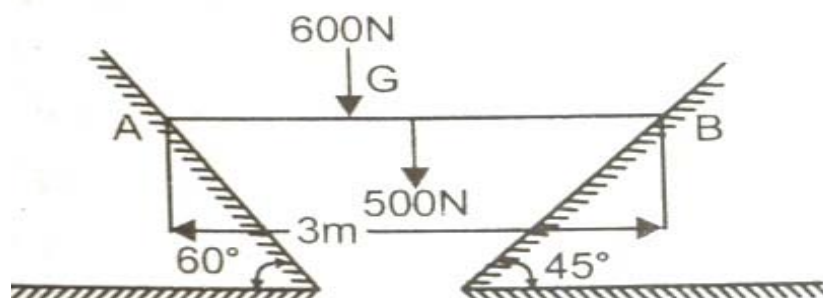
- 1 Two weights are suspended as shown in figure below. Determine the tension in string PQ. Pulley is assumed smooth.



- 2 Find the axial forces of simply supported frame as shown in the below figure.



- 3 A horizontal bar AB of length 3 m and weighing 500 N is lying in a trough as shown in the below figure. Find how close to end A and B a load of 600 N can be placed safely, if coefficient of friction between bar and supports is 0.2.

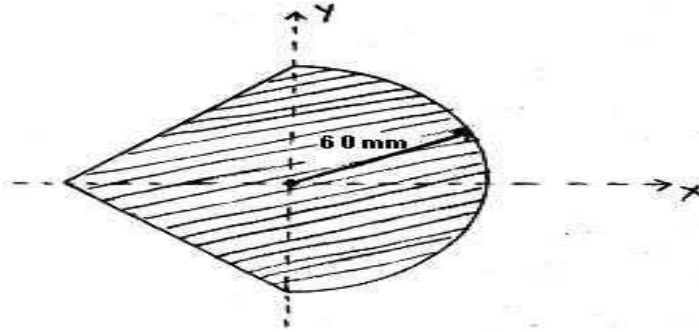


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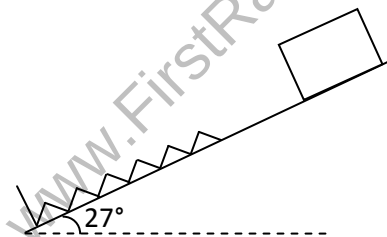
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- 4 Locate the centroid of a shaded area as shown in below figure.



- 5 Calculate the mass moment of the inertia of a circular cone of base radius 300 mm and height 600 mm about a line which passes through the mass center of the cone and which is parallel to the base of the cone. The mass density of the cone is 2500 kg/m^3 .
- 6 (a) Explain the terms displacement, velocity and acceleration connected to rectilinear translation.
(b) An auto is accelerated from rest to top speed of 100 kmph. And then immediately decelerated to a stop if the total elapsed time is 20 seconds, Determine the distance covered. The acceleration and deceleration are both constant, but not necessarily of the same magnitude.
- 7 A block of mass 13 kg is released from rest to slide a 27° incline. After moving a distance of 0.57 m, the block hits a spring of spring constant 1.7 N/mm . If the coefficient of friction at all contact surfaces is 0.23, determine the maximum compression of the spring.



- 8 A spindle of diameter 30 mm and of length 3.5 m carries a weight of 280 N at one end. The other end of the spindle is fixed. The weight is pulled downwards and released so that the spindle is having free longitudinal vibrations. Neglecting the weight of the rod, determine the frequency of vibration. Take the modulus of the velocity of the material of the spindle as $2 \times 10^{11} \text{ N/m}^2$.
