G.R. No.	

Paper Code :- U117 - 106 (T 1)

FEBRUARY 2018 / IN - SEM (T1)
F. Y. B.TECH. (COMMON) (SEMESTER - II)
COURSE NAME: Engineering Mechanics
(2017 PATTERN)

[Time: 1 Hour]   [Max. Marks: 30]

Instructions to candidates:
1) **Answer Q.1 OR Q.2, Q.3 OR Q.4**
2) **Figures to the right indicate full marks.**
3) **Use of scientific calculator is allowed.**
4) **Use suitable data wherever required and state it.**

Q.(1)(a) A sign-board is to be lowered vertically on a short pole with the help of two cables attached at point A at the bottom of the board as shown below. Cable on left hand side of pole has 80 N tension acting at an angle of 35° with the vertical. Determine smallest force 'P' for which resultant of the two forces will be exactly vertical. Also calculate the resultant.   [6]
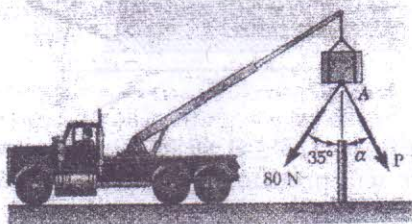


(b)Determine magnitude and direction of resultant of the force system comprising three forces and a couple. Also find intersection of the resultant on the reference axes.   [6]
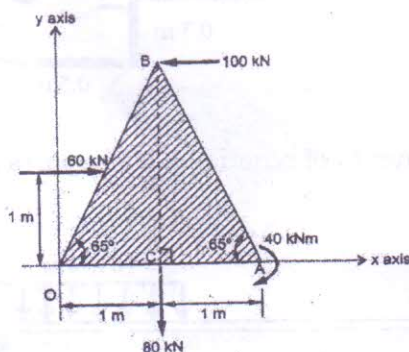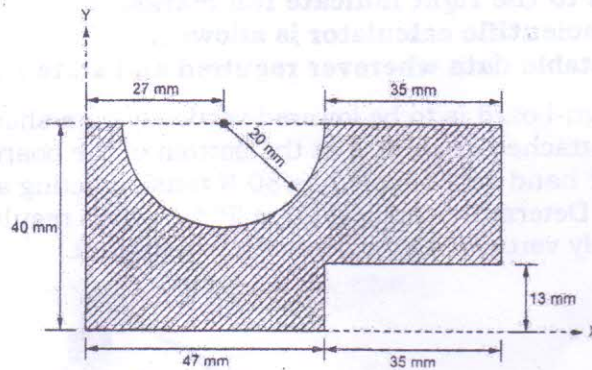

(c)Four vertical forces 10 kN↑, 8 kN↓, 4 kN↓, and 6 kN↑ act at points A, B, C, and D on a horizontal member AD of 4 m length. Find resultant and its point of application on the member. Given: AB = 1.5 m and AC = 2.5 m.   [4]
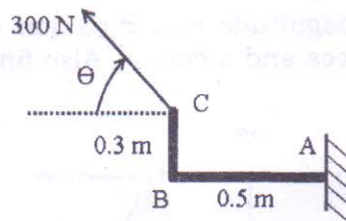
OR

Q.(2)(a) Knowing that resultant of the four forces (shown below) is 5.59 kN upward, determine P and Θ. [6]
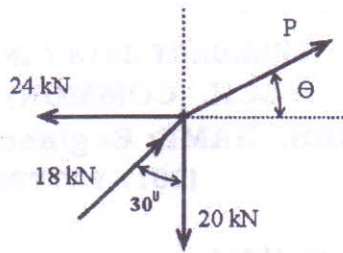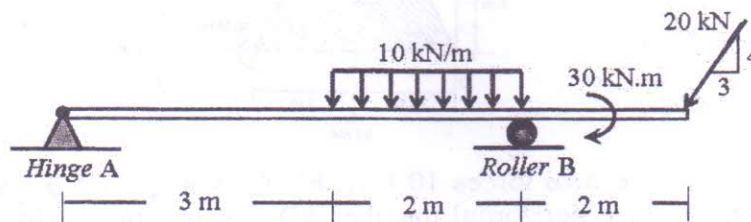

(b) Find coordinates of centroid of shaded portion with respect to origin. [6]

(c) Determine angle Θ ($0^0 \le \Theta \le 180^0$) for which the 300 N force acting at C as shown in the figure will produce maximum moment about point A. Also find magnitude and sense of the maximum moment. [4]

Q.(3)(a) Find components of reactions at supports for the beam. [6]

(b)A cylinder of 300 N weight is kept in a smooth groove as shown. Calculate reaction at each point of contact. [4]
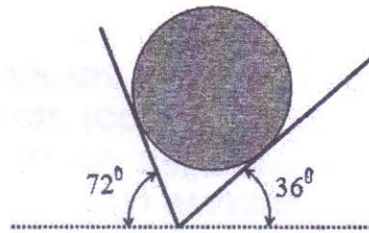

(c)Three forces of magnitudes 1 kN, 2 kN and 1.8 kN act from point A(0,0,10) to points B(-5,-2,0), C(4,-3,0) and D(-3,3,0) respectively. Compute their resultant completely. [4]

OR

Q.(4)(a)A vertical force of 1500 N acts on a space tripod as shown. Calculate axial tensile force induced in each leg of the tripod. [6]
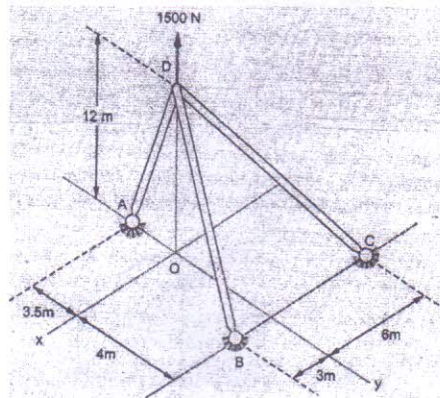
(b)Four forces act parallel to z-axis as shown. Determine their resultant and coordinates of its point of application on the board. [4]
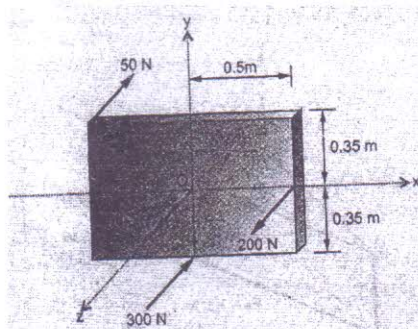
(c)Explain four types of beam supports and possible reactions at them with the help of neat sketches. [4]

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