

B.TECH. SEM -II (2007 COURSE) (ALL BRANCHES) :
SUMMER - 2018

SUBJECT : ENGINEERING MECHANICS

Day : **Wednesday**
Date : **06/06/2018**

S-2018-2554

Time : **10.00 AM TO 01.00 PM**
Max. Marks : 80

N.B.:

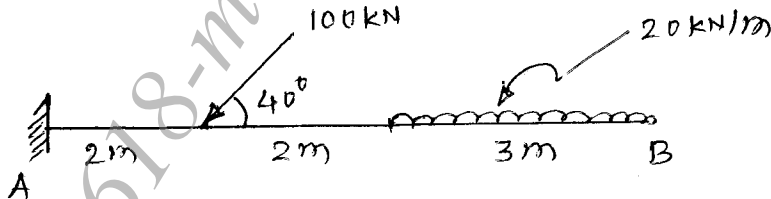
- 1) **Q.No.1 and Q.No.5 are COMPULSORY.** Out of the remaining questions attempt **ANY TWO** questions from each section.
- 2) Answers to both the sections should be written in the **SEPARATE** answer books.
- 3) Draw neat and labeled diagram **WHEREVER** necessary.
- 4) Figures to the right indicate **FULL** marks.
- 5) Assume suitable data if necessary.

SECTION - I

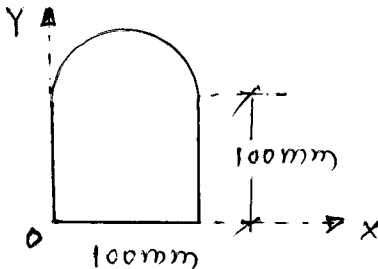
- Q.1** a) Explain moment and couple. Write properties of couple. [04]
- b) Write down formula for position of centroid for Rectangle, Triangle and semi-circle area. [04]
- c) Calculate minimum force 'P' to hold the weight shown in figure. Take $\mu = 0.4$ between belt and pulley. [04]



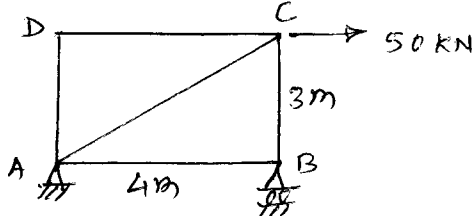
- Q.2** a) Write down conditions of equilibrium for concurrent and non-concurrent force system. [04]
- b) Calculate reactions at the supports for beam shown in figure. [10]



- Q.3** a) A force of magnitude 50kN acts from point A (1, 5, 2) to B (6, 10, 4). Write force in vector form. [04]
- b) Calculate moment of inertia about base AB for the area shown in figure. [10]

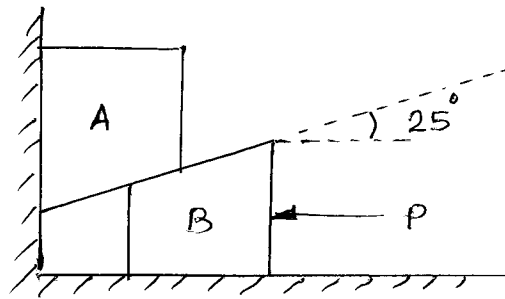


- Q.4** a) Identify members of truss with zero force. [04]



P.T.O.

- b) Calculate minimum force 'P' required to move block 'A' upward. Weight of block A and B is 1000N and 300N respectively. Take $\mu = 0.2$ for all contact surfaces. [10]



SECTION - II

- Q.5 a) Displacement of particle is given by $S = (6t^3 + 2t)$ calculate velocity and acceleration at $t = 10$ sec. [04]

- b) Explain Impulse momentum principle. [04]

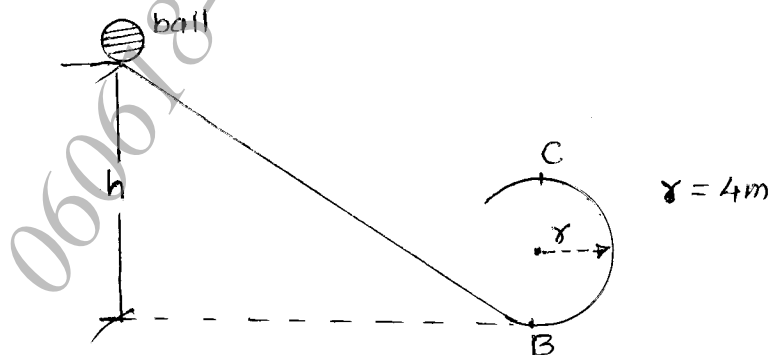
- c) Show only translation, only rotation and translation along with rotation for the vertical rod. [04]

- Q.6 a) Explain difference between kinematics and kinetics with suitable example. [04]

- b) Two cars A and B are traveling in same direction. At beginning car A is 30m ahead of car B. Initial velocity of car A and B is 10m/s and 20m/s. Acceleration of car A and B is 0.4m/s^2 and 0.2m/s^2 respectively. Check if overtaking of car will possible? if yes when and where? [10]

- Q.7 a) An object is projected from hill of height 80m with initial velocity 60m/s and inclination with horizontal 45° , calculate horizontal distance where an object will hit the ground. [04]

- b) A ball of mass 10 kg is released on smooth surface as shown in figure. Calculate minimum height 'h' so that it will reach point 'C' of loop of radius 4m. [10]



- Q.8 a) Explain direct central and oblique impact. [04]

- b) Bottom end 'A' of the ladder slips towards right side with velocity 4m/s. Calculate velocity of top end 'B'. The length of ladder is 7m. [10]

