



End Term Examinations (April/May 2019)

School: School of Engineering

Program: B Tech (MACT/DS/CTIS)

Course: Mechanics

Course Code: ENG107

Semester: II

Max Marks: 50

Duration (mins): 120 mins

Instructions:

- (1) Attempt Q. No.1 or 2, Q. No 3 or 4, Q. No.5 or 6, Q. No 7 or.8, Q No. 9 or 10
- (2) Figures to the right indicate full marks.
- (3) Use of non-programmable pocket size scientific calculator is Permitted.
- (4) Neat diagram must be drawn wherever necessary.
- (5) Assume suitable data, if necessary and mention it clearly in answer.

Q1) Solve the Following

- A) A string ABCD, attached to fixed points A and D has two equal weights of 1000 N attached to it at B and C. The weights rest with the portions AB and CD inclined at angles as shown in Fig 1. Find the tensions in the portions AB, BC and CD of the string, if the inclination of the portion BC with the vertical is 120° . [5]

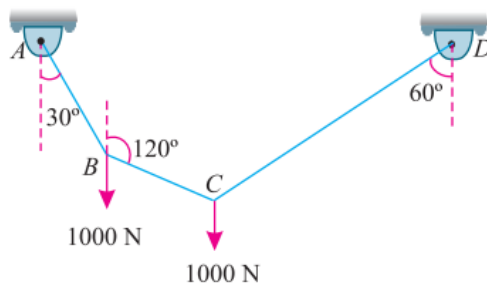


Fig. No 1

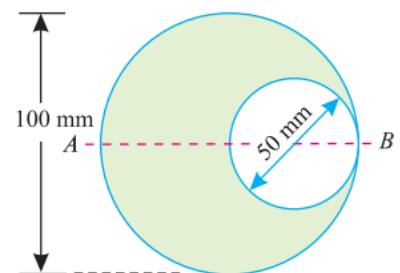


Fig No 2

- B) A circular hole of 50 mm diameter is cut out from a circular disc of 100 mm diameter as shown in Fig.2. Find the centroid of the section from A. [5]

OR

Q2) Solve the following:

- A) A machine component 1.5 m long and weight 2000 N is supported by two ropes AB and CD as shown in Fig.3 given below. Calculate the tensions T_1 and T_2 in the ropes AB and CD. [5]

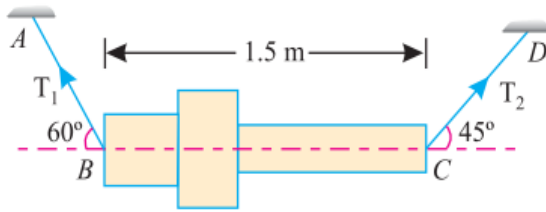


Fig No 3

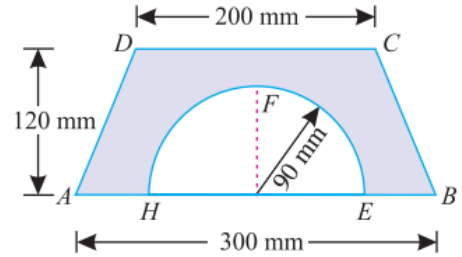


Fig No 4

- B) A semicircle of 90 mm radius is cut out from a trapezium as shown in Fig.4, Find the position of the centre of gravity of the figure. [5]

- Q3) Three cylinders weighting 100 N each and of 80 mm diameter are placed in a channel of 180 mm width as shown in Fig No 5. Determine the pressure exerted by (i) the cylinder A on B at the point of contact (ii) the cylinder B on the base and (iii) the cylinder B on the wall. [10]

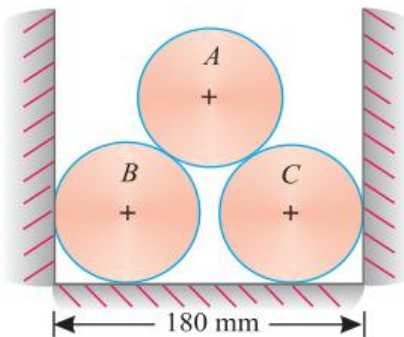


Fig No 5

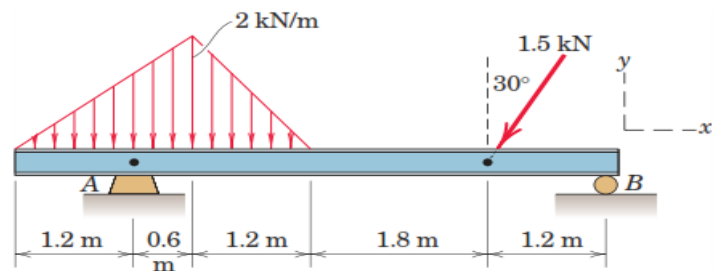


Fig No 6

OR

- Q4) Determine the reactions at A and B for the beam subjected to a combination of distributed and point loads as shown in fig No 6. [10]

- Q5) Knowing that the maximum tension in cable ABCD (as shown in fig no 7) is 15 kN, determine
 a) Sag Y_B b) Sag Y_C [10]

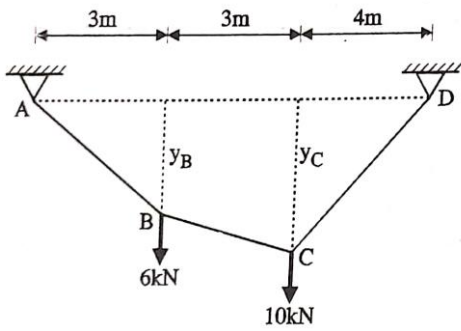


Fig No 7

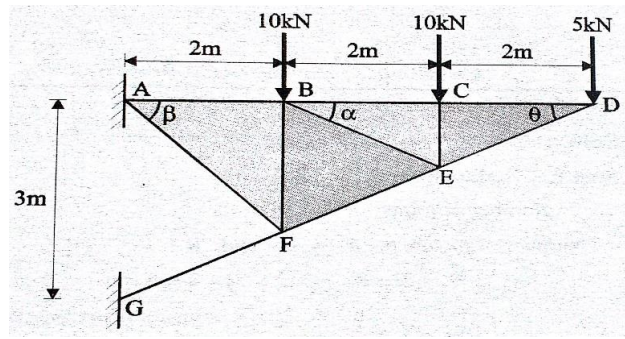


Fig No 8

OR

Q6) Find out the forces in all the members of truss shown in fin no 8. [10]

Q7) Two cars A and B are moving towards each other. At $t=0$, A and B are at 1.5 km apart with speeds 30 m/s and 15 m/s respectively and they are at points P and Q. Knowing that A passes point Q 50 sec after B was there and that B passes point P 55 sec after A was there, determine a) uniform acceleration of A and B, b) when two cars pass each other c) the speed of B at that time. [10]

OR

Q8) A projectile is fired with a velocity of 50 m/s on horizontal plane. Find its time of flight in the following three cases. [10]

- Its range is 4 times the maximum height.
- Its maximum height is 4 times the horizontal range.
- Its maximum height and horizontal range are equal.

Q9) Three ships sail in direction as shown in fig no 9. If a sailor ship C observes the ship A to sail with a velocity of 4 m/s at 60° in the direction of south of west. Find a) Velocity of ship A. b) Velocity of ship B as observed by A c) Velocity of C as observed by B. [10]

OR

Q10) Determine whether the block shown in fig no 10 is in equilibrium and find magnitude and direction of friction force. [10]

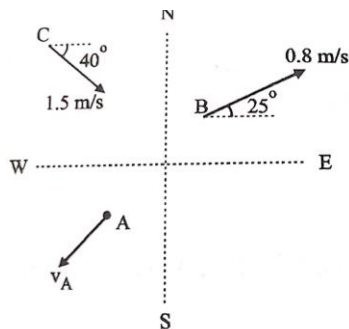


Fig No 9

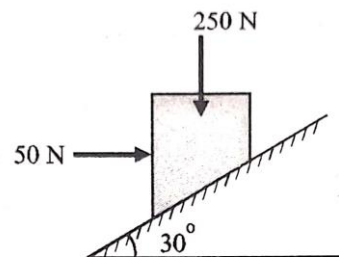


Fig No 10