

BACHELOR OF TECHNOLOGY (C.B.C.S.) (2021-COURSE)

B. Tech. Sem - II R&AE :SUMMER- 2022

SUBJECT : ENGINEERING MECHANICS

Day : Friday

Time : 10:00 AM-01:00 PM

Date : 5/8/2022

S-24127-2022

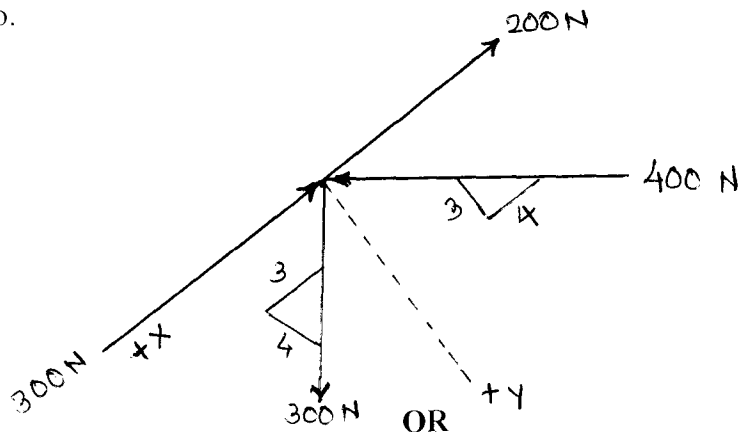
Max. Marks : 60

N.B.:

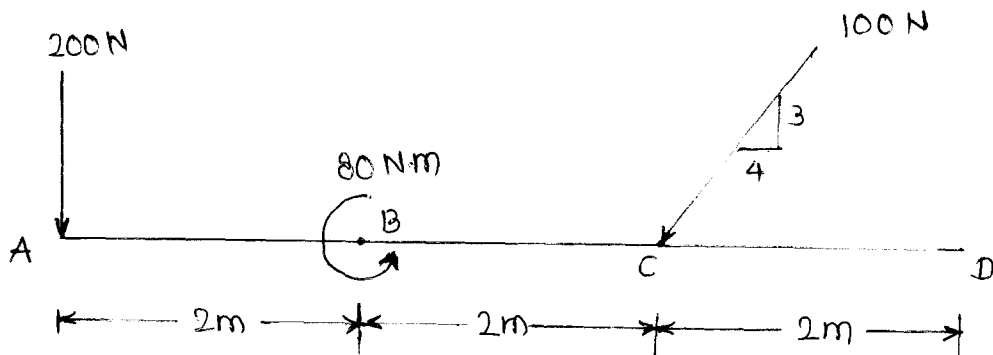
- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Assume suitable data if necessary.
- 4) Use of Non-programmable of **CALCULATOR** is allowed.

Q.1 A) i) State - Varignon's Theorem 04
 ii) Define - Resultant and Equilibrant

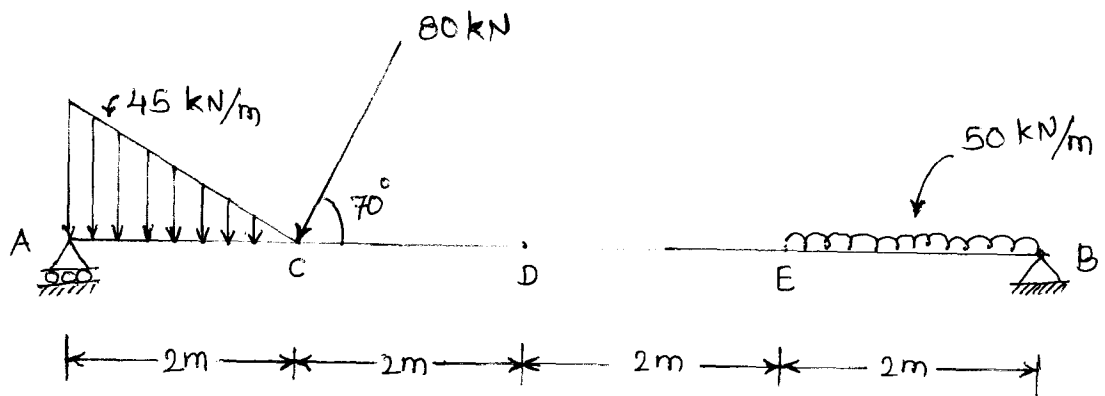
B) Show that the resultant of given forces system shown in figure below is Zero. 06



Q.1 A) Find the magnitude of Resultant and locate its position with respect to point A, for the figure shown below. 04



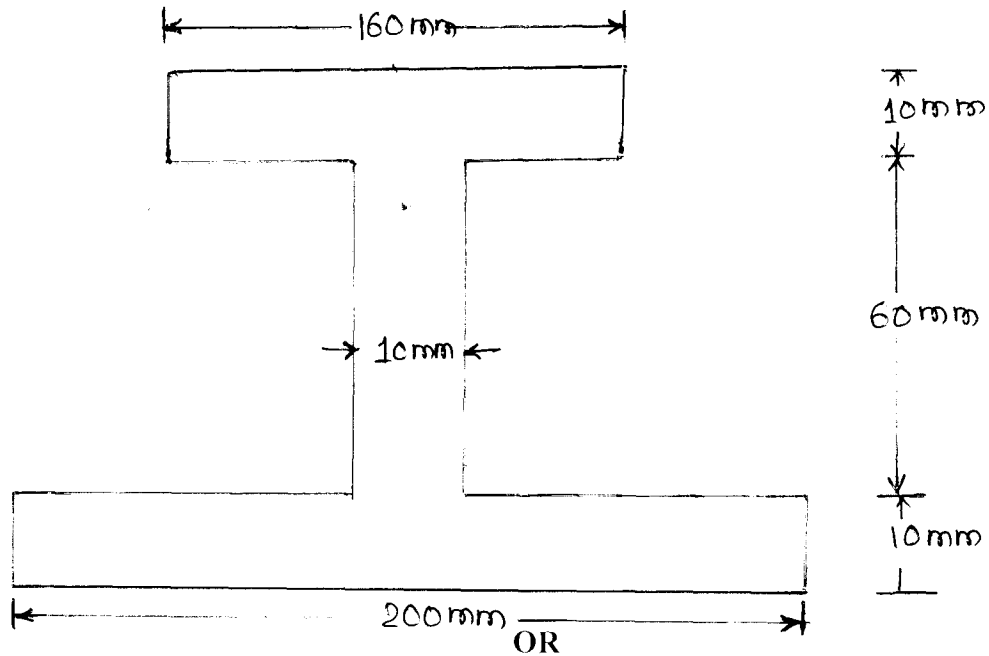
B) Find the support reactions at A & B of the loaded beam shown in figure below. 06



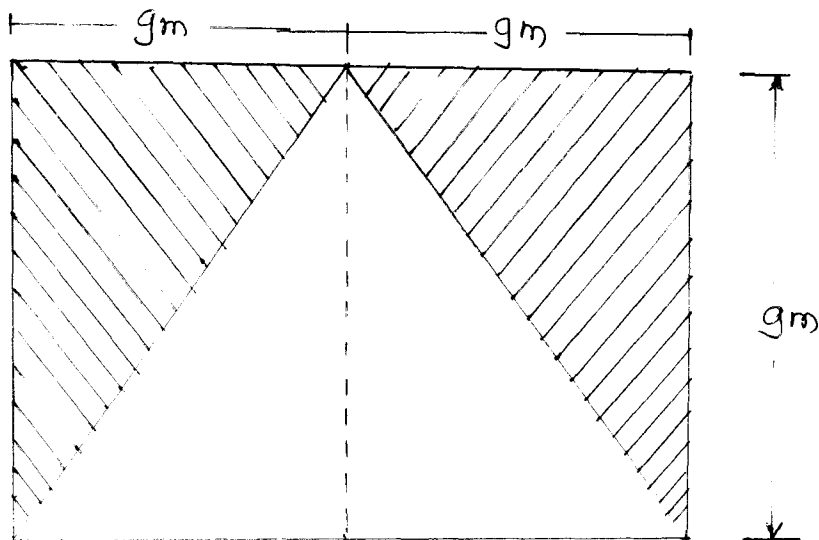
P.T.O.

- Q.2 A Give with neat sketch the formula of Centroid for the following figures; 04
- i) Right Angle Triangle
 - ii) Semi-Circle

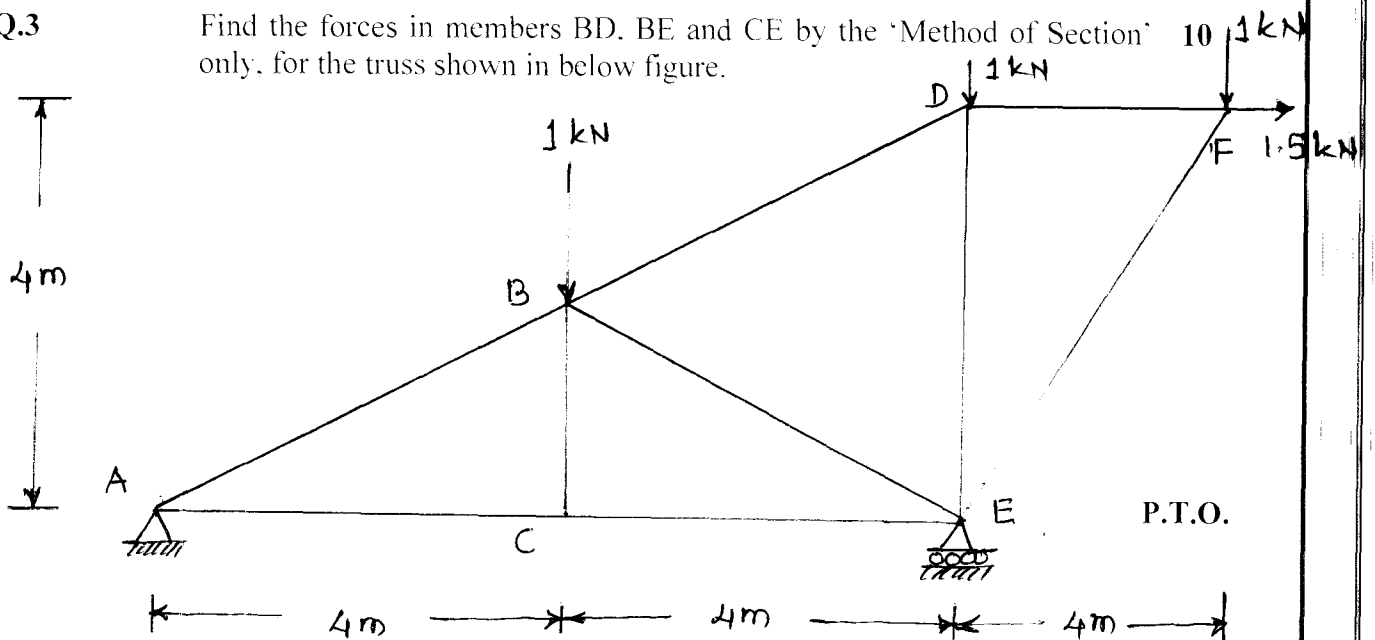
- B. Locate the centroid of 'I' - Section shown in figure below. 06



- Q.2 Find the Moment of Inertia of shaded area about its centroidal axis X-X and Y-Y for the given figure below. 10



- Q.3 Find the forces in members BD, BE and CE by the 'Method of Section' only, for the truss shown in below figure. 10

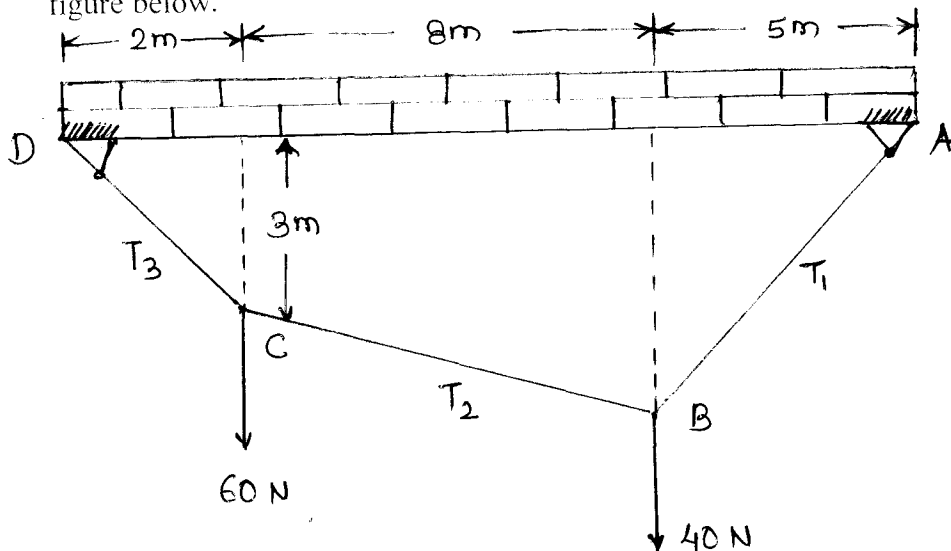


P.T.O.

OR

Q.3

Find the tension in each member of cable (i.e. T_1 , T_2 & T_3) as shown in figure below. 10



Q.4 A

The distance travelled by the object along a straight line in time t is given by $3 - 4t + 5t^2$. Find the initial velocity of the object. 04

B

A particle is projected at an angle of 30° with horizontal. The horizontal range of the particle is 4km. Find ; 06

- i) The velocity of projection &
- ii) The maximum height attained by the particle.

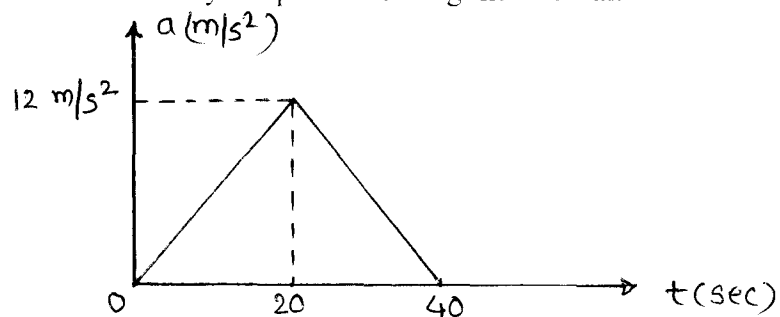
OR

Q.4 A

A particle is traversing a curved path of radius 300m with a speed of 108 kmph and tangential acceleration is 4 m/s^2 . Determine total acceleration of the particle. 04

B

Figure below shows a diagram of acceleration versus time for a particle moving along X - axis for a time interval of 0 to 40 sec. For the same time interval plot; i) the velocity time diagram and ii) the displacement time diagram ; and hence find the maximum speed attained and maximum distance covered by the particle during the interval. 06

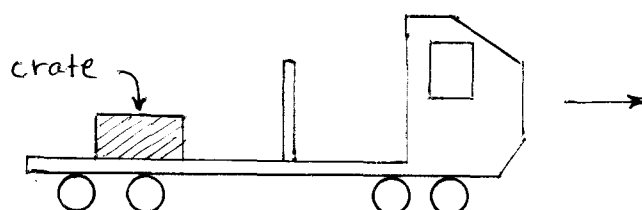


Q.5 A

A force of 500N is acting on a block of mass 50kg resting on a horizontal surface. Determine the velocity after the block has travelled a distance of 10m. Take $\mu_k = 0.5$ 04

B

The coefficient of friction are $\mu_s=0.3$ & $\mu_k=0.25$ between the flat bed of the truck and the crate. Determine the minimum stopping distance & corresponding time which the truck can have from a speed of 70kmph with constant deceleration if the crate is not to slip forward. 06



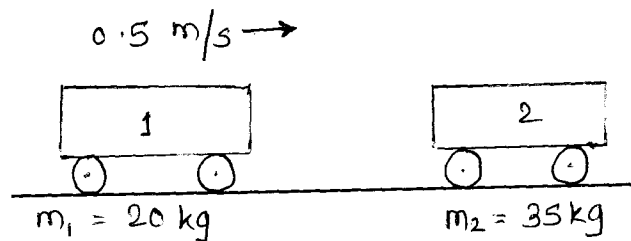
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OR

Q.5

A 20kg wagon moving at a speed of 0.5 m/s towards right collides with a 35 kg wagon which is at rest. If after collision the 35 kg car is observed to move to the right at a speed of 0.3 m/s. Determine the coefficient of restitution between the two wagons. Also find the loss in kinetic energy.

10



Q.6 A

Give the functions of the Foundation.

04

B

Differentiate between Load Bearing Structures and RCC Structures.

06

OR

Q.6 A

Explain the properties of the following construction materials;

04

i) Brick

ii) Concrete

B

Give any four types of the foundation and explain in brief the concept of bearing capacity.

06
