

Seat No.

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मक्षिका - 009

Elements of Civil Engineering & Engineering Mechanics (101104)

P. Pages : 4

Time : Three Hours

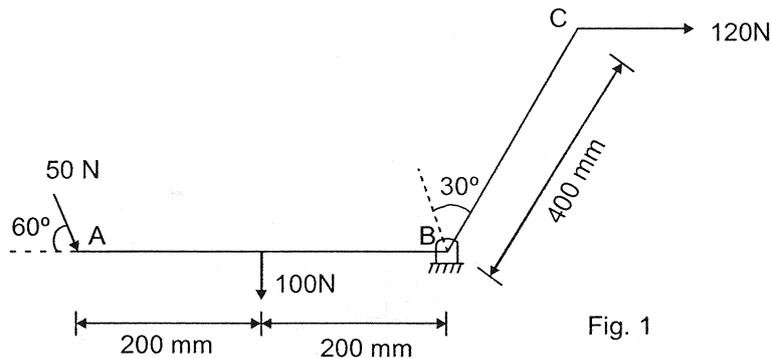
Max. Marks : 80

Instructions to Candidates :

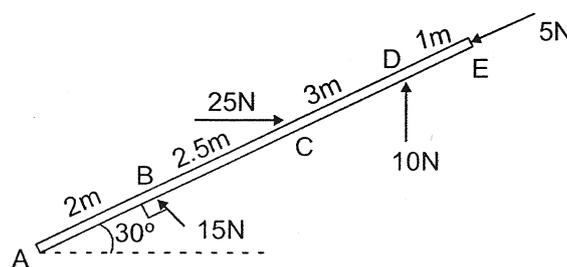
1. Do not write anything on question paper except Seat No.
2. Answersheet should be written with blue ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt **any two** subquestion from each question.
5. Figures to the right indicate full marks.
6. Use of non programmable calculator is allowed.

UNIT - I

1. a) Explain graphical representation of moment and find the resultant of forces acting on the bell crank lever shown in fig. 1 with completely. 8



- b) A rod ABCDE is acted upon by four forces as shown in fig. 2 find the resultant in magnitude and direction. Also locate the point on the rod AE where resultant is acting. 8



- c) Find the support reactions at A and C for the bent up beam loaded as shown in fig. 3.

8

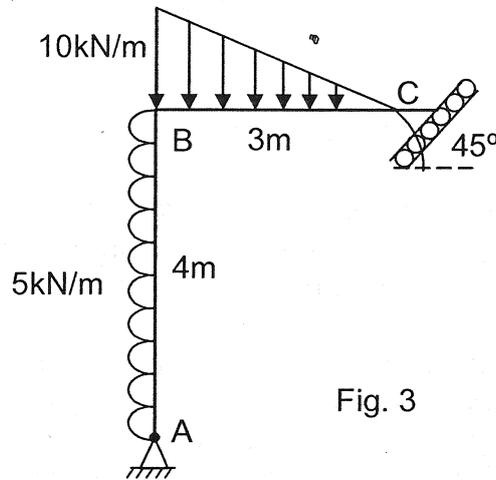


Fig. 3

UNIT - II

2. a) Differentiate between centroid and centre of Gravity and locate the centroid of shaded area as shown in fig. 4.

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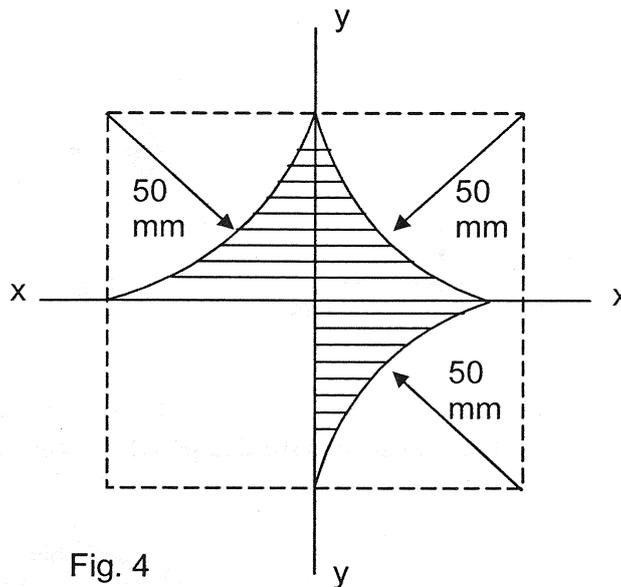


Fig. 4

- b) A truss is loaded and supported as shown in fig. 5. Determine the forces in the CD, CF and FG. 8

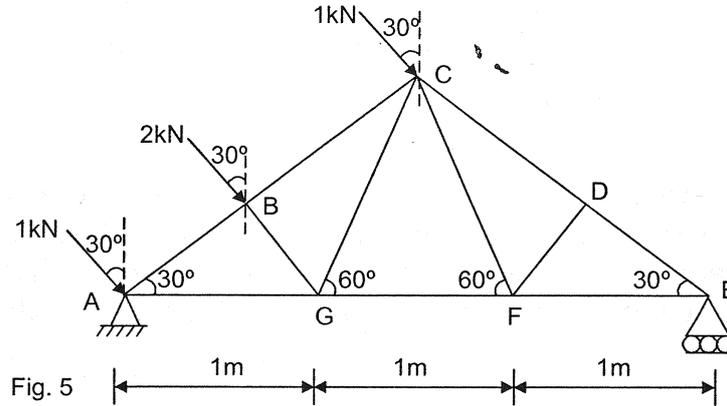


Fig. 5

- c) A horizontal rod of negligible weight rests on a rough inclined plane as shown in fig. 6 if the angle of friction is 15° determine the length of the rod such that it is on verge of motion i.e. point B is on verge of going down. 8

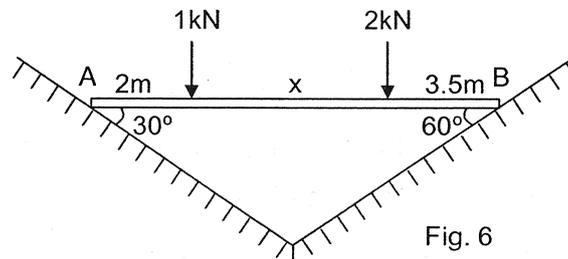


Fig. 6

UNIT - III

3. a) A body travels 40m during its 4th second and 42m during its 6th second. Find
 i) its initial velocity and uniform acceleration.
 ii) find also the total distance travelled by the body in six seconds from start. 8
- b) A car starts from rest on a circular highway when $t=0$ increases his speed at a constant rate and enters at point B with the same constant rate speed increases to 120 kmph at C. Ref fig. 7.
 Determine
 i) Speed at point B. ii) Total acceleration when $t=12$ sec. 8

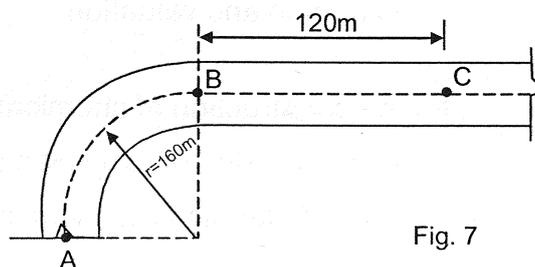


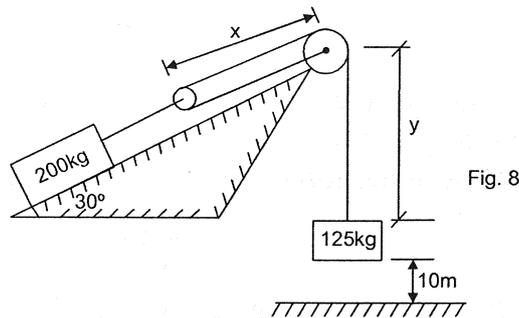
Fig. 7

- c) An experimental rocket is fired from rest at an angle of 75° with horizontal and moves with constant acceleration of 40 m/s^2 . All the fuel in the rocket is burnt out in 10 sec. and the rocket continues to move as a free particle under gravity. Assume that the path of rocket is a straight line till the fuel is burnt out. Determine -
- Maximum altitude reached by rocket.
 - Maximum horizontal distance travelled to reach the ground.
 - Total time of journey.

8

UNIT - IV

4. a) A log of wood weighing 200 kg is to be pulled up by a concrete block weighing 125 kg. If the inclined plane on which the log rests makes an angle of 30° w.r.t. horizontal and if coefficient of dynamic friction between log and plane is 0.5 determine the velocity of the log wood as the block hits the floor. Ref fig 8. 8



- b) i) Write a short note on Dip and declination of magnetic needle. 4
 ii) Write working rules for application of work-energy principle. 4
- c) The following are the observed bearings of the lines of a traverse ABCDEA. With a compass in a plane where local attraction was suspected.

Line	F.B.	B.B.
AB	$191^\circ 45'$	$13^\circ 0'$
BC	$39^\circ 30'$	$222^\circ 30'$
CD	$22^\circ 15'$	$200^\circ 30'$
DE	$242^\circ 45'$	$62^\circ 45'$
EA	$330^\circ 15'$	$147^\circ 45'$

Calculate interior angles and find correct bearings of the lines. 8

UNIT - V

5. a) i) Explain significance of Civil Engineering. 4
 ii) Difference between estimation and valuation. 4
- b) i) Write short notes on:
 Special materials for the construction of chemical plant and its necessity. 4
 ii) Difference between flexible pavements and rigid pavements. 4
- c) Explain the following principles of planning with neat sketches.
 i) Sanitation. 4
 ii) Roominess. 4
