

19203

11920

3 Hours / 100 Marks

Seat No.

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- Instructions* –
- (1) All Questions are *Compulsory*.
 - (2) Answer each next main Question on a new page.
 - (3) Illustrate your answers with neat sketches wherever necessary.
 - (4) Figures to the right indicate full marks.
 - (5) Assume suitable data, if necessary.
 - (6) Use of Non-programmable Electronic Pocket Calculator is permissible.
 - (7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any TEN of the following:

20

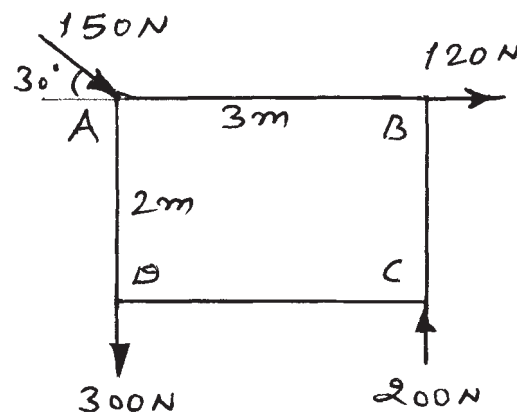
- a) Define fundamental unit and give two example of it.
- b) Define rigid body and weight.
- c) Define Engineering mechanics and dynamics.
- d) Define 1 N force.
- e) State law of moment.
- f) State the two uses of each of vector diagram and funicular polygon.
- g) State graphical condition of equilibrium for concurrent force system.
- h) State graphical condition of equilibrium for parallel forces system.
- i) With neat sketch define hinged beam and continuous beam.
- j) Define standard lamina and composite lamina.
- k) State \bar{x} and \bar{y} for a semicircle having 150mm on radius.
- l) For a solid cone $\bar{y} = 40\text{mm}$ What will be height of the cone.

P.T.O.

2. Attempt any FOUR of the following:

16

- Define giving diagram coplanar unlike parallel force system and general force system.
- Enlist four properties of couple.
- Resolve following forces in to orthogonal components.
 - 300 N force acting due West.
 - 200 N force acting 40° East of North.
 - 400 N force acting 50° West of South.
 - 500 N force acting 30° East of South.
- Two forces of magnitude 400 N and 150 N are acting at an angle of 60° with one another. Determine their resultant on magnitude and direction of :
 - Both are tensile and
 - 150 N is compressive
- Calculate the moment induced at the points A and B for loading on shown in Figure No.1

Fig. No. 1

- Calculate the R for two parallel forces of magnitude 250N and 400N acting at 2m apart when they are :
 - like parallel and
 - unlike parallel

3. Attempt any FOUR of the following:

16

- Calculate the resultant of the four system given in Question No - 2 (c) graphically.
- Calculate the R in magnitude and locate it's position w.r.t. point D for the system shown in Figure No. 1. of Question No-2 (e).
- Four parallel forces of magnitude 400N, 200N, 500N, and 100N are acting at 2m, 3m and 5m from 400N force respectively of 500N force is acting upword and other acting downward. Determine the R and it's position w.r.t. 400N force.
- Solve Question No. 3 (c) graphically.
- Five forces of magnitude 500N, 300N, 100N, 400N and 200N are acting at 40° , 120° , 210° , 270° , and 320° w.r.t. five x - axis taken on anticlockwise direction. Determine magnitude and direction of R.
- Solve Question No.3 (e) graphically.

4. Attempt any FOUR of the following:

16

- Define equilibriant and free body diagram.
- State analytical and graphical conditions of equilibrium for coplanar parallel force system.
- Calculate the tension in the rope if two labours are lifting a box of 150 N with it such that rope makes an angle of 40° and 70° with the horizontal.
- Determine the reactions given by the planks while supporting sphere of 2500N as shown in Figure No. 2.

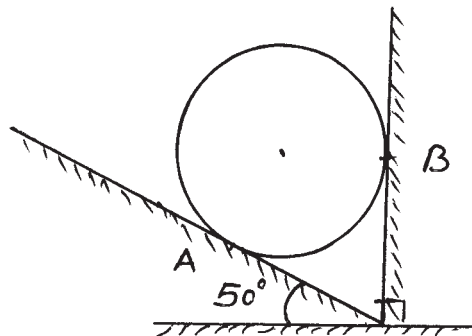


Fig. No. 2

- e) A box having wt of 100N is hung by means of a rope to the ceiling. Check whether a force of 200N applied horizontally will make the rope inclined at an angle of 30° to the ceiling.
- f) Giving diagram define any four types of beam.

5. Attempt any FOUR of the following:

16

- a) Define vector diagram and funicular diagram.
- b) Calculate reaction for a beam loaded as shown in Figure No. 3.

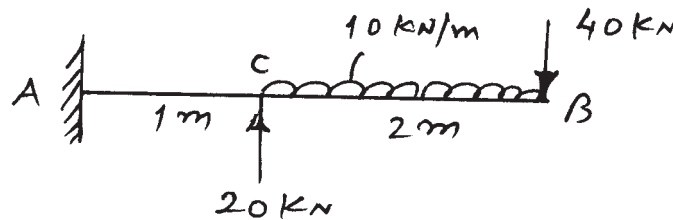


Fig. No. 3

- c) Calculate reaction for a beam loaded as shown in Figure No. 4.

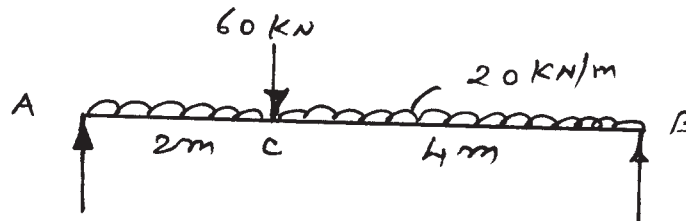


Fig. No. 4

- d) Calculate reaction for a beam loaded as shown in Figure No. 5.

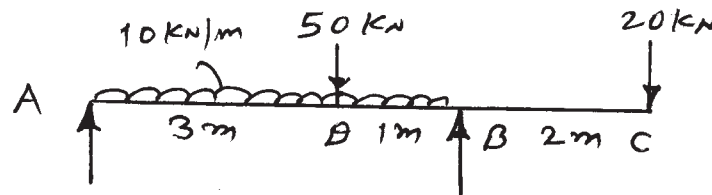


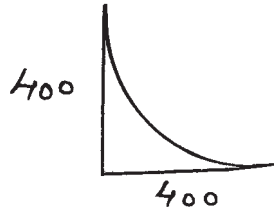
Fig. No. 5

- e) Solve Question No. 5 (c) graphically.
- f) Locate the centroid for an angle section of $100 \times 80 \times 20$.

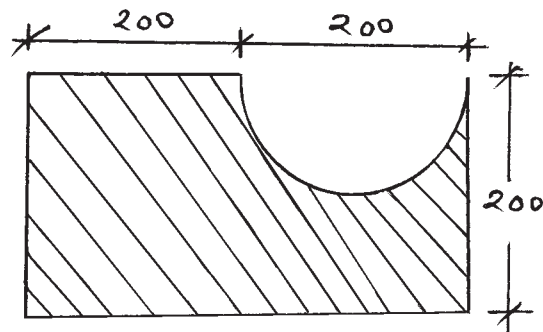
6. Attempt any FOUR of the following:

16

- a) Locate centroid for a T section having flange 800×200 mm and web of 800×200 mm total wt of section is 1000mm.
- b) Locate position of centroid for the lamina shown in Figure No. 6.

Fig. No. 6

- c) Calculate only \bar{x} for the lamina shown in Figure No. 7.

Fig. No. 7

- d) A trophy consist of a solid cylinder having 200mm diameter and 600mm height on which a sphere of 300mm diameter is placed coaxially at the top. Locate the position of C.G.
- e) From an inverted cone having 200mm diameter and 600mm height a hemisphere of 100mm diameter cutoff from the top coaxially locate the position of \bar{y} only.
- f) To a solid cylinder 300mm diameter and 600mm height a hole of diameter 100mm is drilled coaxially from bottom up to a height of 80% of it's height. Locate the position of CG for reminder.
