

23124

3 Hours / 70 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 where 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 FIVE of the following:

10

- State S.I. unit of force and momentum.
- What is law of machine
- Define funicular polygon.
- Write the condition of equilibrium for non-concurrent co-planer force system.
- State two types of beam with diagram of each.
- What do you mean by friction.
- Define centre of gravity. How does it differ from centroid?

Marks

2. Attempt any THREE of the following :

12

- State any two properties and effect of force.
- Certain machine has a law of machine $P = 0.025 W + 20 \text{ N}$ with $VR. = 50$ Calculate its efficiency at load of 1 KN.
- Define effort lost in friction and load lost in friction.
Give expression of them.
- Define angle of repose with diagram.

Marks

3. Attempt any THREE of the following:

12

- Find magnitude and direction of resultant force, If 30 N, 40N, 50 N and 60 N, forces are acting the line joining the center of square to its vertices as shown in Fig. no. 1

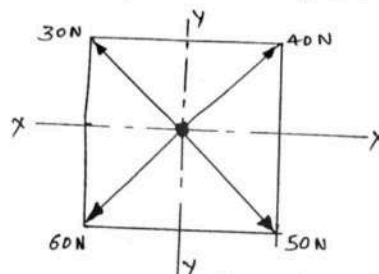


Fig. No. 1

- State any four properties of couple.
- For three sheave pulleys block an effort of 40 N can lift a load of 180 N. Calculate the effort lost in friction and load lost in friction along with efficiency.
- In a lifting machine an effort of 110 N raised a load of 1100 N and an effort 500 N raised a load of 5800. Find the law of machine.

Marks

12

4. Attempt any THREE of the following:

- a) Find analytically the resultant of coplanar concurrent force system as shown in Fig. no. 2. Also locate its position on figure.

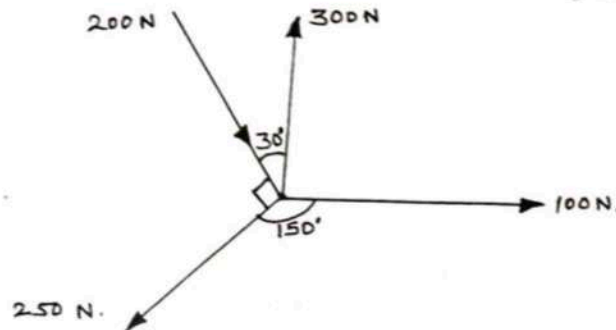


Fig. No. 2

- b) Find the reactions offered by two surfaces of a sphere weighing 1000 N. Refer Fig. no. 3.

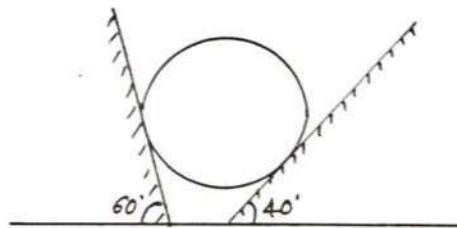


Fig. No. 3

- c) A simply supported beam of 4 m. span is loaded with an UDL of 5 KN/m for 2 m from left end and a point load of 30 KN at 1 m from right end. Find support reactions using graphical method.
- d) A parcel weighing 200 N is just on the point of moving horizontally by a horizontal force of 50 N. What is the coefficient of friction.
- e) Find analytically the reactions at roller and hinges support of a beam loaded as shown in Fig. no. 4

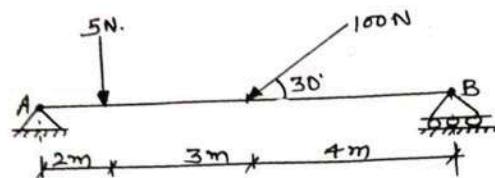


Fig. no. 4

Marks

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5. Attempt any TWO of the following:

- a) A simply supported beam is subjected to point load of 100 KN and couple of 50 KN m as shown in Fig. no. 5 Determine the reactions at support A and B.

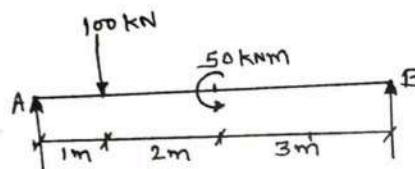


Fig. No. 5

- b) A block of weight 500 N is placed on a inclined plane at an angle of 20° with horizontal. If coefficient of friction is 0.15. Find the force P applied parallel to the plane, just move the body up the plane.
- c) Locate the resultant with magnitude and direction for the force system shown in Fig. no. 6 w.r.t. pt. A.

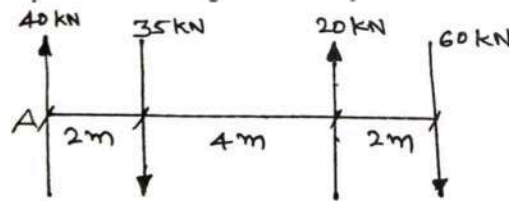


Fig. No. 6

Marks
12

6. Attempt any TWO of the following:

- a) Find centroid for ISA 90 x 60 x 8 mm (L – Section) as shown in fig. no. 7.

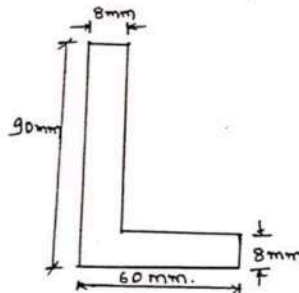


Fig. No. 7

- b) Locate the position of centroid for the lamina shown in Fig.No. 8.

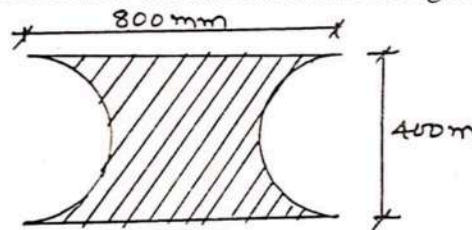


Fig. No. 8

- c) Find the y of the composite body given in Fig. no. 9.

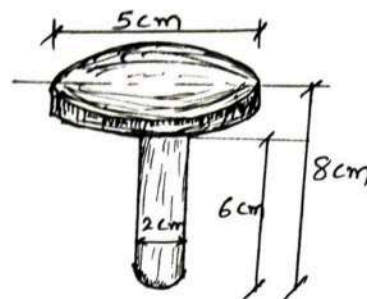


Fig. No. 9