

22240

23242

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 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 FIVE of the following:** **10**
- a) Define energy and state its unit.
 - b) State Newton's First and Second law of Motion.
 - c) State the relation between M.A., V.R. and efficiency of simple machine.
 - d) Define stress and strain.
 - e) State any four desirable properties of lubricant.
 - f) Define Hook's Law and Elastic limit.
 - g) State various follower motions.

P.T.O.

2. Attempt any THREE of the following: 12

- a) Explain the concept of force and moment of force with suitable example.
- b) Find the magnitude and direction of resultant for the following force system. Refer Fig. No. 1.

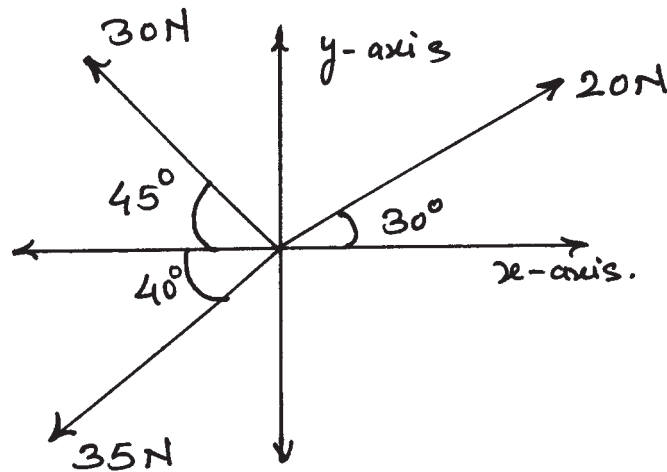


Fig. No. 1

- c) A simple axle and wheel has effort wheel diameter 300 mm and axle diameter 30 mm. What is the efficiency of the machine, if it can lift a load of 900N by an effort of 100N.
- d) Explain with neat sketch, knife edge follower.

3. Attempt any THREE of the following: 12

- a) The law of a certain machine is $P = \frac{W}{50} + 8N$ and V.R. = 100. Find efficiency and maximum possible M.A. at a load of 600N.
- b) Draw stress - Strain curve for ductile material showing following points.
 - i) Proportional limit
 - ii) Upper yield point
 - iii) Lower yield point
 - iv) Ultimate Stress Point

- c) A steel rod 800 mm long and 600 mm × 20 mm in cross-section is subjected to an axial push of 89 KN. If the modulus of elasticity is $2.1 \times 10^5 \frac{\text{N}}{\text{MM}^2}$, calculate stress, strain and reduction in length of the rod.
- d) Define modulus of elasticity and modulus of rigidity.

4. Attempt any THREE of the following: 12

- a) A block weighing 100 N can be just moved by applying a pull of 'P' N being applied horizontally. Find 'P' if coefficient of friction between block and surface is 0.50.
- b) A copper wire of length 500 mm is subjected to an axial pull of 5.5 KN. Find the minimum diameter if the stress is not to exceed $70 \frac{\text{N}}{\text{MM}^2}$. Also calculate the elongation if $E = 100 \text{ KN/MM}^2$.
- c) State the advantages of rolling contact bearing over sliding contact bearing.
- d) Explain epicyclic gear train with neat sketch.
- e) Explain any four factors affecting friction and state any two uses of bearing in textile industry.

5. Attempt any TWO of the following: 12

- a) Explain Single Purchase Crab and double purchase Crab with neat sketch.
- b) Explain the procedure for selection of bearing from manufacturers catalogue.
- c) State and explain centrifugal and centripetal force with any two uses of each in dryer machine.

6. Attempt any TWO of the following: 12

- a) State the factors to be considered while selecting the factor of safety.
- b) Differentiate between belt drive and chain drive (any six points).
- c) Explain Kinematics for linear and angular motion with suitable example.
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