

# 22473

**12425**

**03 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 answer 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) State any four applications of Cotter joint.
  - b) State different types of Keys.
  - c) Define stress and state its formula and unit.
  - d) State types of rolling contact bearing.
  - e) State any four applications of lever.
  - f) State different materials used for shaft.
  - g) Define direct load and shear load.
  
- 2. Attempt any THREE of the following:** **12**
  - a) Define factor of safety and state its significance.
  - b) Compare welded joints with screwed joints. (Any four points)
  - c) State any four desirable properties for a good spring material.
  - d) Compare between Ball and Roller Bearings. (Any four points)

P.T.O.

- 3. Attempt any THREE of the following:** **12**
- a) Write flexural formula and state meaning of each term used in it.
  - b) Classify shaft coupling.
  - c) State any four advantage and disadvantage of welded joint.
  - d) A circular rod of diameter 20 mm is subjected to an axial pull of 50 kN, calculate stress induced in the shaft.
  - e) Define following terms of spring
    - i) Spring Rate
    - ii) Spring Index.
- 4. Attempt any THREE of the following:** **12**
- a) A column 40 \* 40 mm is subjected to an axial compressive load of 100 kN, calculate stress induced in the shaft.
  - b) Design a knuckle joint to transmit 150 kN. The design stresses may be taken as 75 MPa in tension, 60 MPa in shear and 150 MPa in compression.
  - c) Explain various stresses induced in helical compression spring.
  - d) Explain working of sleeve of muff coupling with neat sketch.
  - e) State different forms of threads with their relative advantages and applications.
- 5. Attempt any TWO of the following:** **12**
- a) A solid circular shaft of 100 mm diameter is transmitting power 100 kW at 150 rpm. Find the intensity of the induced shear stress in the shaft.
  - b) Explain design procedure of hand lever with neat sketch.
  - c) Explain selection procedure of helical compression spring from manufacturer's catalogue.

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**Marks**

**6. Attempt any TWO of the following:**

**12**

- a) Design single cotter joint to transmit 200 kN. Allowable stresses for the material are 75 MPa in tension and 50 MPa in shear.
  - b) Explain selection procedure of ball bearings from manufacturer's catalogue.
  - c) Explain steps involved in a general design procedure of machine element.
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