

22570

21222

3 Hours / 70 Marks

Seat No.

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15 minutes extra for each hour

- 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.

Marks

1. Attempt any FIVE of the following :

10

- (a) Define service factor.
- (b) List the types of machine tool structure.
- (c) List the different types of slide ways.
- (d) Name different material used for spindle.
- (e) State the functions of machine tool structure.
- (f) List advantages of G P Series.
- (g) State the necessity of ergonomics in machine tool design.

2. Attempt any THREE of the following :

12

- (a) Define factor of safety and stress concentration factor.
- (b) Explain the factors affecting the stiffness of machine tool structure.
- (c) Describe the working of hydrostatic slide way.
- (d) List the different types of spindle support. List the different requirements for selection of spindle support.

- 3. Attempt any THREE of the following :** **12**
- (a) Explain engineering design process applied to machine tools with suitable example.
 - (b) List factors for selection of range of spindle speed.
 - (c) Explain ray diagram and speed chart.
 - (d) List effects of machine tool vibrations on machine tool.
- 4. Attempt any THREE of the following :** **12**
- (a) Define :
 - (i) Factor of safety
 - (ii) Machine tool
 - (b) Draw a structural diagram and ray diagram for six speed gear box. Assume geometric ratio = 1.41 and minimum speed of gear box = 270 rpm.
 - (c) List different methods of reduction of tool vibration. Explain any one of them with neat sketch.
 - (d) List the different types of materials used for machine tool structure with their applications.
 - (e) State the functions of any two knobs with neat sketch.
- 5. Attempt any TWO of the following :** **12**
- (a) Sketch the different profiles of machine tool structure used in machine tools available in your institute's workshop.
 - (b) Classify the guide ways. Draw the shapes of guide ways and material used for it.
 - (c) List different bearing used for spindle supports. Explain construction of any one bearing with neat sketch.
- 6. Attempt any TWO of the following :** **12**
- (a) Compare speed chart with ray diagram and state the importance of ray diagram.
 - (b) Calculate the rpm values and diameter range served by each rpm for the following $n_1 = 30$ rpm, $n_2 = 375$ rpm, $v = 20$ m/min., $Z = 12$ for geometric progression. Write comment.
 - (c) Explain aesthetics characteristics in detail.
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