

22570

23124

3 Hours / 70 Marks

Seat No.

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- Instructions :**
- (1) All Questions are *compulsory*.
 - (2) Illustrate your answers with neat sketches wherever necessary.
 - (3) Figures to the right indicate full marks.
 - (4) Assume suitable data, if necessary.

Marks

1. Attempt any FIVE of the following :

10

- (a) Differentiate between machine tool and cutting tool.
- (b) List any four desired properties of machine tool structure.
- (c) State function of guideways.
- (d) List material used for guideways.
- (e) State the functions of spindle in machine tool.
- (f) State the features of geometric progression.
- (g) State importance of Aesthetics in machine tool.

2. Attempt any THREE of the following :

12

- (a) Describe with sketch general design procedure of any machine tool.
- (b) State different material used for machine tool structures. Write their properties.



- (c) State and explain in brief factors affecting stiffness of machine tool structure. State in brief remedies for it.
- (d) List types of profile used in machine tool structure and explain in detail most suitable profile used.

3. Attempt any THREE of the following : 12

- (a) Discuss any four methods to reduce stress concentration.
- (b) State function of machine tool structure and basic requirements.
- (c) Compare various profiles of slideways.
- (d) Compare Hydrostatic and Hydrodynamic Slideways.

4. Attempt any THREE of the following : 12

- (a) State functions of the spindle unit with their application in machine tool.
- (b) State types of vibration in machine tool and also state their effects.
- (c) State any four design recommendations for display.
- (d) If minimum speed = 30 rpm and geometric progression ratio = 2, then calculate next 6 speeds of speed box. State standard values of geometric progression ratio.
- (e) Describe Aesthetic characteristics in machine tools.

5. Attempt any TWO of the following : 12

- (a) State various sources of vibration in machine tools and explain methods of reducing vibrations.
- (b) State various types of machine tool structures and briefly discuss various profiles used.
- (c) Draw structural diagram for :
 - (i) 3(1) 3(3)
 - (ii) 2(1) 3(2) 2(6)

6. Attempt any TWO of the following :**12**

- (a) Sketch spindle support for Lathe machine and Drilling machine. Also state their function.
 - (b) Write structural formulae for 2 stage, 8 speed gear box. Draw structural diagrams and ray diagram. Take $\phi = 1.41$.
 - (c) Given $N_1 = 56$ rpm, $N_6 = 860$ rpm. Calculate the common ratio ϕ and remaining speed for six speed gear box. Also derive structural formula and draw structural diagram.
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