22570

12425

3 Hours / 70 Marks Seat No. | | | | | | | | |

Instructions : (1) All Questions are *compulsory.*

(2) Illustrate your answers with neat sketches wherever necessary.

(3) Figures to the right indicate full marks.

Marks

1. Attempt any FIVE of the following : **10**

(a) List any four examples of machine tools.

(b) Define Group-3 machine structure.

(c) State the basic functions of Guide ways.

(d) List the most common material used for slide ways.

(e) Name any four bearing used as spindle support.

(f) State the standard values of geometric progression (ϕ).

(g) Define the term Aesthetics.

2. Attempt any THREE of the following : **12**

(a) State the general requirements of machine tool design.

(b) Discuss the sources of vibration in machine tool and also state their effects on machine tool performance.

(c) Discuss the methods of improving stiffness of machine structure.

(d) Differentiate between static and dynamic stiffness of machine structure.

3. Attempt any THREE of the following : **12**

(a) State the importance of Factor of safety in machine tool design.

(b) List the materials used for machine tool structure, also state its property.

(c) Differentiate between Hydrostatic and Hydrostatic Slide ways.

(d) Discuss the drawbacks of Cylindrical slide ways profile.

4. Attempt any THREE of the following : **12**

(a) State the general requirements of spindle support.

(b) Explain with neat sketch the methods of reducing vibrations.

(c) Differentiate between qualitative and quantitative display.

(d) List various laws of stepped Regulation and explain any one of them.

(e) List the ergonomics consideration in designing of Push buttons and hand wheel.

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

(a) Explain with neat sketch methods of reducing stress concentration.

(b) Draw a various profiles of machine tool structures and also state the advantages of using box type profile.

(c) Draw the structural diagram of machine tool speed box for N_{min} = 16 rpm, N_{max} = 770 rpm, and ϕ = 1.26. Select the best possible layout with proper reasoning.

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

(a) List various spindle support, also sketch spindle supports for lathe and drilling machine spindle.

(b) Draw structural diagrams for given structural formulas :

(i) 2(3)3(1)2(6)

(ii) 2(1)3(4)2(2)

(c) Draw the speed chart if Motor rpm = 1440, No. of speed steps = 12, ϕ = 1.41, N_{min} = 30 rpm, N_{max} = 1500 rpm and Structural formula is 2(1) 3(2) 2(6). (Assume suitable data if necessary)
