



# 17532

**21718**

**3 Hours / 100 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.*  
(5) *Use of Non-programmable Electronic Pocket Calculator is permissible.*

- |  | <b>Marks</b> |
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| <b>1. A) Attempt any three.</b>  | <b>12</b>    |
| a) Differentiate between Machine and Machine tool.   |              |
| b) State the functions of various machine tool structure parts.  |              |
| c) Write the classification of guideways.  |              |
| d) Define factor of safety for ductile material. Explain two factors on which it depends.  |              |
| <b>B) Attempt any one .</b>  | <b>6</b>     |
| a) Draw a block diagram of engineering design process as applied to machine tool and explain.  |              |
| b) State the factors affecting stiffness of machine tool structure and also write methods to improve it.   |              |
| <b>2. Attempt any four.</b>  | <b>16</b>    |
| a) Define stress concentration. Suggest any two methods to reduce its effect.  |              |
| b) Write the properties of material required for machine tool guideways.   |              |
| c) Why Geometric progression is preferred over arithmetic progression ? Explain with an example.   |              |
| d) State the different constraints for the requirement of stepped regulation of speeds.  |              |
| e) Explain aesthetic characteristics as used in Machine Tool Design.   |              |
| <b>3. Attempt any two.</b>   | <b>16</b>    |
| a) State the materials used for different machine tool structure parts (any four). Write their properties.   |              |
| b) Explain the different types of bearing as used for spindle support. Draw labeled sketch of bearing as used in Lathe and drilling machine tool spindle unit (two sketch each). |              |
| c) What are the effects of vibration on a) cutting tool b) work piece c) machine tool ? Explain with an example of each.   |              |

**P.T.O.**



4. A) Attempt **any three**. **12**
- a) Which type of profile is used in Lathe machine tool structure ? Explain.
  - b) Draw a structural diagram and Ray diagram for six speed gear box. Assume Geometric Ratio = 1.41 and minimum speed of gearbox = 270 R.P.M.
  - c) How feasibility of structural formula is checked ? Explain with suitable example.
  - d) What is the function of levers in a machine tool ? Draw any two sketches of levers as used in machine tools.
- B) Attempt **any one**. **6**
- a) What are the functions of spindle unit ? State two practical applications and requirements of spindle unit.
  - b) What information can be gathered from Ray diagram to draw the gearing diagram ? Explain with suitable example.
5. Attempt **any four**. **16**
- a) Explain the ergonomic considerations as applied to location of display.
  - b) What are different methods of reducing vibration ?
  - c) Compare speed chart with ray diagram and state the importance of speed chart.
  - d) Write two different structural formulas for twelve speed gear box. Check the feasibility of structural formula. Assume suitable Geometric Ratio.
  - e) Explain general design procedure for designing a machine element.
  - f) Explain Antifriction ways with neat sketch.
6. Attempt **any four**. **16**
- a) Represent the speeds on structural diagram for four speed. Assume minimum R.P.M. = 200 R.P.M. Geometric or Common Ratio = 2
  - b) What is stickslip phenomenon in slideways ?
  - c) Draw a neat sketch of star wheel. State its one application.
  - d) Explain hydrostatic slideways.
  - e) State the requirement of machine tool structure.
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