

Total No. of Questions : 12]

SEAT No. :

P2137

[Total No. of Pages : 3

[4659] - 154

B.E. (Production S/W) (Semester - I)

A : MACHINE TOOL DESIGN

(2008 Pattern) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Figures to the right indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables are allowed.*
- 5) *Assume suitable data, if necessary.*
- 6) *Answer any three questions from Section - I and any three questions from Section - II.*

SECTION - I

Unit - I

- Q1)** a) A nine speed gear box is to be designed for the minimum speed of 100 rpm and maximum speed of 1600 rpm. It is to be driven by an induction motor rotating at 1440 rpm. Draw best structural diagram, optimum ray diagram & gear box layout. **[12]**
- b) Explain the design considerations for stepless drives. **[4]**

OR

- Q2)** a) Explain the design considerations in the design of feed gear box. **[8]**
- b) Explain PIV drive with block diagram. **[8]**

Unit - II

- Q3)** a) Importance of rigidity & how it can be improved in existing machine tool structure. **[8]**
- b) What are the design considerations for design of beds, columns & housings with respect to machine tool structures. **[8]**

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OR

- Q4)** a) List the materials used for machine tool structure & what should be the material properties for making the machine tool structures. [8]
- b) Sketch the commonly used bed sections & function of bed in machine tools. [8]

Unit - III

- Q5)** a) Explain the important design consideration for power screw. [8]
- b) With neat sketch explain the function & different types of guide ways.[10]

OR

- Q6)** a) Explain different methods used for adjustments of clearance for slide.[8]
- b) What are the major requirements of guideways suitable for machine tools? Give the classification of guides and slideways used in machine tools.[10]

SECTION - II

Unit - IV

- Q7)** a) State the functions of spindle units if machine tools. What are the desirable features of spindle supports? [8]
- b) Draw & explain typical spindle end & explain the main features of spindle unit used in machine tool structure. [8]

OR

- Q8)** a) What are the recommendations for selection of material for spindle of machine tool. [8]
- b) Discuss the importance of the following in spindle design. [8]
- i) Spindle material
 - ii) Additional spindle support
 - iii) Location of bearings and drive elements
 - iv) Balancing

Unit - V

Q9) Explain (Any two) : **[16]**

- a) Control systems : Mechanical & Electrical
- b) Adaptive Control System
- c) Relays and push button control
- d) Electrical brakes

OR

Q10) a) What do you understand by self-excited vibration in machine tool and state the methods of preventing it. **[8]**

b) What is the effect of vibration on machine tool, cutting condition, work piece, tool life. **[8]**

Unit - VI

Q11) a) Explain design considerations in SPM. **[10]**

b) Explain how and where a retrofitting is done in a old milling machine tool. **[8]**

OR

Q12) a) Explain tooling requirements in CNC machine tool. **[8]**

b) Explain design layout of machine tool using matrices. **[10]**

