

Total No. of Questions : 12]

SEAT No. :

P3884

[Total No. of Pages : 3

[4759] - 39

B.E. (Mechanical) (Semester - I)

MACHINE TOOL DESIGN

(2008 Pattern) (Elective - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Answer to the questions should be written on separate books.*
- 3) *Draw neat diagram wherever necessary.*
- 4) *Assume suitable data if required.*

- Q1)** a) Explain why cis used for calculating speed? Show value of geometric progression. Lies between 1 and 2. [8]
- b) Discuss the designs features of feed gear box with Norton drive. [8]
- c) Write a Short note on selection of best Ray diagram. [4]

OR

- Q2)** a) Design a six-speed gear box for a machine tool having a minimum speed 60rpm, G.P ratio = 1.55, speed of motor =1500 rpm. Draw the best possible Structural diagram, ray diagram, speed chart and gear layout. [14]
- b) Discuss the selection of motor for the drive, [6]

- Q3)** a) What are the functions of machine tool structures? Show the different types of cross sections used for machine tool beds and columns. [8]
- b) Discuss bed materials along with required properties. [7]

OR

- Q4)** a) What the design criteria for beds? How these are applied to for welded and cast beds. [8]
- b) Why stiffness is important consideration in machine tool structure? How Stiffness is improved explain with figures. [7]

P.T.O.

Q5) a) Discuss briefly the merits and demerits of Recirculating power screw in comparison to conventional lead screw .state its specific field of uses and application. [7]

b) Discuss the design consideration in guideways. [8]

OR

Q6) a) Estimate the total error in pitch of a lead screw working on sliding friction and show that it could be expressed as [10]

$$\Delta_1 \Delta_1 \left(1 + \frac{P^2}{2\eta D^2} \right) \text{ Where}$$

A - Cross section area, D - Effective diameter, η - Efficiency

b) Write a note on aerostatic slide ways. [5]

Q7) a) Describe the various elements of a spindle unit used in a drilling machine Draw the neat sketch of the arrangement. [7]

b) Explain optimum spacing of support in spindle for good rigidity. [8]
 $\Delta_1 = QP / AE$ Q- Axial load, P-Pitch,

c) State and explain the functions of machine tool spindle. What are the desirable Features of spindle units. [5]

OR

Q8) a) Explain the design consideration of machine tool spindle. [8]

b) Explain different methods for preloading of ball bearing. [6]

c) Describe the different types of bearing employed in machine tools. Give the Importance of each. [6]

Q9) a) Explain how electrical braking system is used for control in machine tool. [8]

b) Compare hydraulic control system with mechanical control system with Reference to performance, cost, and reliability considerations. [7]

OR

Q10)a) What do you understand by regenerative chatter in machine tool? State its causes and effects. [8]

b) How vibrations of boring bar are damped. [7]

Q11)a) Explain how and where a retrofitting is done in an old lathe machine tool. [8]

b) Differentiate stepped and stepless drive and explain Epicyclic stepless drive. [7]

OR

Q12)Write a short note on following : [15]

a) Layout of machine tool by matrices

b) Feedback devices used in CNC

c) For flat disc drive, derive the equation for frictional torque

