Total No. of Questions : 12]

SEAT No. :

P1191

[Total No. of Pages :3

[4659] - 40
B.E. (Mechanical)
b - MACHINE TOOL DESIGN
(2008 Pattern) (Elective - II) (Semester - I)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Attempt any three questions form each Section - I and Section - II.***
2) ***Answer to the questions should be written in separate books.***
3) ***Draw neat diagram wherever necessary.***
4) ***Assume Suitable data if required.***

SECTION - I

Q1) a) Design a six - speed gear box for a machine tool having a minimum speed 60 rpm. 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]**

OR

Q2) 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]**

Q3) 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]**

OR

P.T.O.

sppuonline.com

Q4) 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]**

Q5) a) Estimate the total error in pitch of a lead screw working on sliding friction and show that it could be expressed as **[10]**

$$\Delta_1\left(1+\frac{P^2}{2\eta D^2}\right)$$ Where Δ_1 = QP/ AE Q - Axial load, P - Pitch,

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

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

OR

Q6) 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]**

SECTION - II

Q7) 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]**

OR

Q8) 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]**

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

Q9) 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]**

OR

Q10)a) Explain how electrical breaking system is used for control in machine tool. **[8]**

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

Q11)Write a short note on following : **[15]**

a) Layout of machine tool by matrices

b) Feed back devices used in CNC

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

OR

Q12)a) Explain how and where a retrofitting is done in a old lathe machine tool. **[8]**

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

sppuonline.com