Total No. of Questions : 10]

SEAT No. :

P3191

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B.E. (Mechanical Engg.) (End Semester)

MACHINE TOOL DESIGN

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***All questions are compulsory i.e. Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***
4) ***Neat diagrams must be drawn wherever necessary.***

Q1) The most commonly large values of geometric progression ratio (φ) are used on small-sized machine tools whereas small values of φ are used on large-sized machine tools. Please comment on the statement. **[10]**

OR

Q2) Draw the structural diagrams (minimum three) of a machine tool speed box for minimum speed of 16 rpm and maximum speed of 760 rpm considering a geometric progression ratio as 1.26. The machine tool speed box is to be driven by an induction motor rotating at 1440 rpm. Obtain an optimum ray diagram and draw the layout of the gearbox. **[10]**

Q3) Give the comparative evaluation of machine tool structures on the basis of : a) Profiles of machine tool structures and b) Materials for machine tool structures. **[10]**

OR

Q4) Classify and sketch the various types of guides used in machine tools, based on material, lubrication system, drives control.

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Q5) a) Discuss in detail how optimization of spacing between spindle supports is achieved. **[8]**

b) Explain the methods of preloading of antifriction bearings. **[8]**

OR

Q6) a) Explain the method of compensating the errors resulting due to backlash (pitch error) with neat sketches. **[8]**

b) State the various technological performance indices for spindle units in small and medium-size machine tools. **[8]**

Q7) a) Explain various dynamic characteristics of the cutting process. **[8]**

b) Explain adaptive control of machine tools. **[8]**

OR

Q8) a) State the sources of perturbance acting on the cutting process? **[8]**

b) State the various mechanical and electrical automatic control systems. State the various factors that govern the selection of appropriate automatic control system. **[8]**

Q9) a) With the help of applications, explain recent trends in machine tools. **[10]**

b) Discuss the design considerations for step-less drive. **[8]**

OR

Q10)a) With the help of a block diagram explain a closed-loop N.C. system for taper turning. **[10]**

b) Discuss the advantages of retrofitting in building machine tools. **[8]**