

Seat
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माला - 007

ELECTIVE- II
Machine Tool Design
(1100) (1102)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

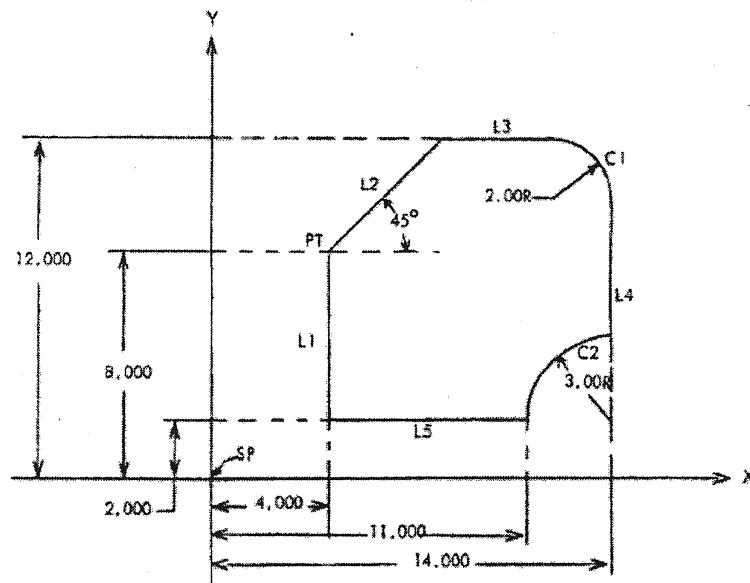
1. Do not write anything on question paper except Seat No.
2. Answersheet should be written with blue ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Answer **any five** questions.
5. Neat diagrams must be drawn wherever necessary.
6. Figures to the right indicate full marks.
7. Assume suitable data, if necessary.

1. a) Explain briefly techno-economical prerequisites for undertaking the design of a new machine tool. 10
b) Calculate breadth & length of guideway for a total load of 450kg. The viscosity of lubricant is 0.015 kg.s/m^2 and slide is moving with a transverse rate of 3.5 m/min. The minimum film thickness is 0.01 mm. The permissible pressure is 1.8 kg/cm^2 . 10
2. a) Design a nine speed gear box for the headstock of a lathe, the spindle speed ranging from 28 rpm to 1000 rpm. Draw the structural diagram, & show the layout of the gears & connection to motor. 14
b) What are the general requirements of machine tool design. 6
3. a) Explain stick slip motion in guides. 10
b) In orthogonal cutting of a material the feed force is 80 kg & cutting force is 150kg. Calculate the following. 10
 - i) Compression & shear forces on shear plane.
 - ii) Coefficient of friction of the chip on tool face.
Take chip thickness ratio as 0.3 & rake angle as 8° .

4. a) Write the APT program for machining the part as shown in fig. 4a.

12

fig. 4 a.



- b) Explain design calculations of spindle in brief. 8
5. a) Explain design procedure of radial drill column with neat sketch. 8
- b) Explain design of sliding friction power screws on the basis of following points. 12
- Design for wear resistance.
 - Design for strength.
 - Design for stiffness.
 - Design for buckling stability.
6. A 4 speed (2 x 2) gear box is required to be designed for transmitting 8H.P with speed ranging from 300 rpm. with $\phi = 1.2$. select an optimum ray diagram & hence calculate gear sizes module and width of gears. Calculate the shaft sizes & sketch the gear box. The gears are made up of mild steel. 20
7. Write short notes on:
- Adaptive control systems. 10
 - Absolute and incremental system of dimensioning in numerical control machine. 10
8. a) Explain with neat sketches: 12
- Vibration isolated tool holders.
 - Preselective control system.
- b) Explain throttle valve, pressure relief valve and non return valve used in hydraulic circuits. 8
