

College of Engineering, Pune-411005.
(An Autonomous Institute of Government of Maharashtra)
Department of Production Engineering and Workshop

END-SEMESTER EXAMINATION

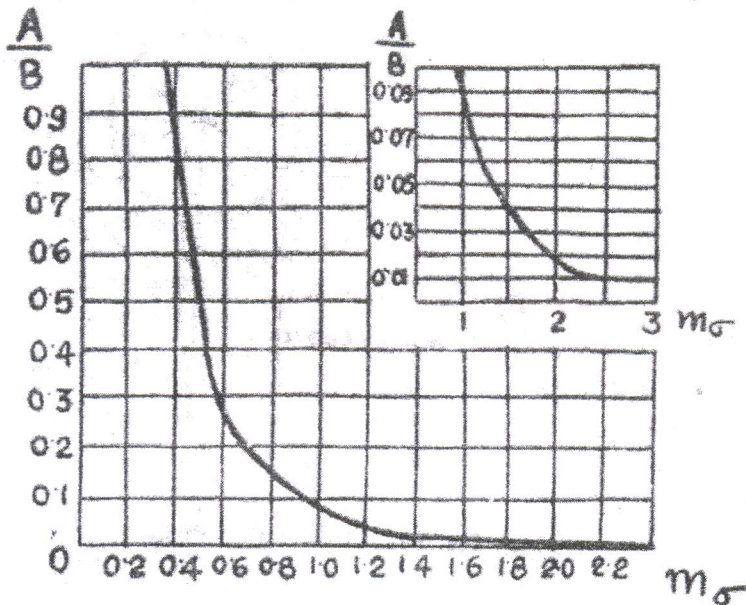
Class : B. Tech. (Production Engg. S/W)
Subject: Machine Tool Design (PE-402)

Year : 2012-2013
Time : 3 Hours

Instructions:

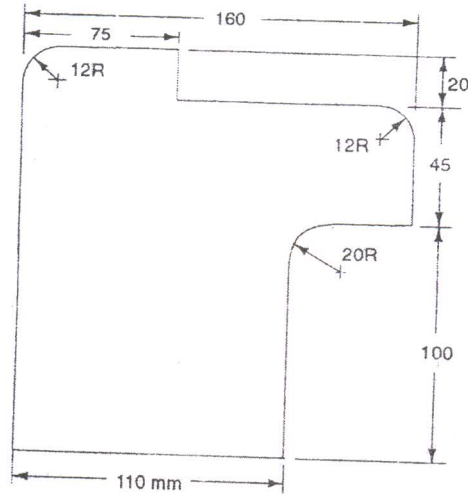
- 1. Answer any **Five** questions.
- 2. Draw neat self-explanatory sketches wherever required.
- 3. Use of scientific calculator is allowed.

- Q.1 a) Explain the 'Tobias Stability envelope curves'. 5
- b) While designing the machine tool bed, we prefer to use hollow rectangular box section out of other alternatives available. Explain what considerations are applied to select such cross section. 5
- Q.2 a) Explain 'Table design' for Vertical Boring machine having horizontal circular table with hydrodynamic lubrication provided between table and circular guides. 10
- Q.3 a) To find the total axial load (static) to which Ball recirculating power screw assembly can be subjected if diameter of ball (D_B) = 4 mm, and $R_0 = 19$ mm. Allowable contact stress (σ_c)=23000 kg/cm². Assume no. of threads=4, angle of contact=45°, ball and screw are made of same material having Young's modulus (E)= 2.1×10^6 kg/cm², and $R_2=2.1$ mm. Evaluate for semicircular and trapezoidal profile. 5



- b) Classify Rigidity of machine tools. Explain all static rigidity including overall rigidity. 5
- Q.4 a) Explain types of tool magazines used on CNC machines. 5
- b) What are design considerations of CNC machine Tools? How does tool chatter influence machine accuracy? 5

Q.5 a) Write complete APT part program to machine the outline of geometry shown in figure below: 10



(All dimensions are in mm)

Data : Part thickness : 5 mm

Cutter Dia : 10 mm

Speed : 1200 rpm

Feed Rate : 75 mm/min

Post processor Call statement is : MACHIN/NC

Q.6 Write short notes on **Any Two**:-

- i) Electromagnetic clutch and Electrical brakes.
- ii) Wear adjustment methods in lead screw.
- iii) Thermal relay and motor type time relay.