

II B.Tech II Semester Supplementary Examinations, April/May 2006
MACHINE TOOL ENGINEERING
(Production Engineering)

Time: 3 hours**Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

1. (a) What are the requirements of good cutting tool material? [4]
(b) What are the assumptions made by Merchant in his first theory relating to the mechanics of metal cutting? [4]
(c) In an orthogonal cutting experiment, the tangential force was 150kg and the feed force 100kg. The rake angle of tool was 10° and the chip thickness ratio was 0.35. Find the compressive and shear forces on the shear plane and also the coefficient of friction of the chip on the tool face. [8]
2. (a) Under what conditions discontinuous chips are formed? [3]
(b) Sketch a three view diagram of a 25mm square tool bit having tool signature (according to ASA) of : 15,15,10,10,15,10 (3mm). [5]
(c) How is a lathe specified? (Line diagram of lathe may be drawn for identifying major parameters). [5]
(d) Write a brief note on the use of ceramics as cutting tool material. [3]
3. (a) Make a simplified sketch (Line diagram) of a Swiss-Type automatic machine and indicate all the parts on it. In what way it differs from Turret-Type automatic screw machine? [8]
(b) Calculate the change gears for cutting R.H. single start threads of 0.25" pitch on a lathe having a lead screw of 8mm lead. Make neat sketch (two views) of the arrangement of gears. [8]
4. (a) Write four differences between a capstan lathe and a Turret Lathe. [4]
(b) A brass pin has a length of 500mm and of 40mm diameter. Find the turning time to reduce the pin to 38.8mm in one pass, when the cutting speed is 60 metres/minute and feed is 0.8mm/minute. [4]
(c) With a block diagram show the main features of a horizontal boring machine. Give its applications. [6]
(d) How do you specify the size of a Radial Drilling Machine. [2]
5. (a) Depict the following operations done on a drilling machine and indicate the main items on them:
 - i. Reaming
 - ii. Spot Facing
 - iii. Counter-Sinking

- iv. Tapping. [4x2=8]
- (b) A 10mm drilled hole in a casting of 10mm thickness is to be brought in alignment by boring. Calculate the time taken in boring operation assuming a cutting speed of 30 metres/minute and feed 0.13mm/rev. [4]
- (c) Briefly outline the salient features of a Deep Hole Drilling Machine. Give its applications. [4]
6. (a) Make a neat sketch of a Twist Drill and show all important features and angles on it. [5]
- (b) Show the block diagram of a Jig Boring Machine and label it. What are its applications? [5]
- (c) Describe the operation of cutting a dovetail bearing on a shaper. [6]
7. (a) Determine the time required to mill a slot in a work piece of 300mm length with a side milling cutter of 100mm diameter, 25mm wide and 18 teeth. The depth of cut is 5mm and the feed per tooth is 0.1mm. Cutting speed used is 30 metres/min. [8]
- (b) Discuss with the help of sketches the characteristics of Up milling and Down milling. [5]
- (c) Depict the operation of milling a closed profile key-way on the shaft and indicate the two main items on it. [3]
8. (a) What is meant by “Truing” of a grinding wheel. [2]
- (b) What is the name of the grinding machine mainly employed for sharpening (grinding) of cutting tools? [2]
- (c) Name the finishing process employed for smooth finishing of gage blocks. [2]
- (d) What is the phenomenon known as “Wheel Loading”? [2]
- (e) Explain the principle of centreless grinding. Explain with neat sketches “Through Feed”, “Infeed” and “End Feed” methods of centreless grinding. Give applications for each. [8]

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