

III B.Tech II Semester Supplementary Examinations, Aug/Sep 2007
MACHINE TOOLS
(Mechanical Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Prove that $\tan\phi = r \cos\alpha / 1 - r \sin\alpha$ where ϕ is shear angle, r chip thickness ratio and α is rake angle. [6]
(b) A mild steel bar of 50mm diameter was orthogonally machined on lathe. Its feed rate 0.5mm/rev, chip thickness 1.2mm, rotational speed 100rpm, rake angle 14° , Calculate chip thickness ratio, shear angle, Chip reduction ratio [10]
2. (a) What are the different types of taper turning attachments attached to lathed? Discuss them briefly. [8]
(b) Classify the Lathe machines and explain their important advantages. [8]
3. What are the main parts of capstan and turret lathes? Describe in brief with help of suitable illustrations? [16]
4. (a) How is shaping machine specified? [4]
(b) Describe with help of neat sketch, principal parts of shaper? [12]
5. (a) What is the general rule regarding the included angle of the drill point and the hardness of the material being drilled? [6]
(b) What is taper control drilling? Why the spiral point drilling is particularly adequate for this? [6]
(c) What is the advantage of using a drill Jig for mass production? [4]
6. (a) Explain the principle of gear hobbing [4]
(b) Write a note on the following [12]
 - i. Reciprocal milling
 - ii. Index milling
7. (a) Explain how the surface finish of carbide turning tools can be improved by grinding. [8]
(b) Explain the process of wear of a grinding wheel. [8]
8. (a) Explain the different teeth in a broaching tool. [8]
(b) Explain clearly the advantages and limitations of Broaching. [8]

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1. (a) Determine undeformed chip thickness during metal cutting operation With neat sketch [6]
(b) Differentiate orthogonal cutting of first kind and second kind? [4]
(c) Describe the role of various alloying elements in tool steels? [6]
2. (a) What are mandrels and why are they used? [8]
(b) Describe the construction and use of different types of mandrels. [8]
3. Describe single spindle automatic in detail with help of neat sketch. [16]
4. (a) With help of neat sketch describe main parts of slotter. [10]
(b) How is slotter machine is specified? Explain [6]
5. (a) Explain the various operations that can be performed on a drilling machine [8]
(b) Write a brief note a vertical boring mill. [8]
6. (a) Briefly explain some of the problems caused in milling. Give their causes and remedies. [8]
(b) What are the motions of the arbor mounted milling cutter has with respect to the work piece? Discuss [8]
7. Write a short note on the following [4x4=16]
 - (a) Brazed carbide tools
 - (b) Grade of grinding wheel
 - (c) Geometry of a single point turning tool
 - (d) Surface grinding machines
8. (a) What is the best method to locate a rough surface? [6]
(b) What are the causes of errors in the design and operation of jigs and fixtures? What measures should be taken to minimize the effects of the causes of errors? [10]

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1. (a) What is tool signature? [4]
(b) Explain ASA and ORS system of tool nomenclature. [6]
(c) Differentiate ORS and ASA system. [6]
2. (a) Describe different types of the tool posts used in lathe. [8]
(b) Sketch and describe different types of tool holders [8]
3. Write briefly about following holders used in capstan and turret lathes. [4x4=16]
(a) Multiple cutter holder
(b) Slide tool holder
(c) Knee tool holder
(d) Drill tool holder
4. (a) Differentiate between planer, slotter and shaper? [6]
(b) Describe constructional features of feed gearbox of shaper? [10]
5. (a) Explain clearly what is meant by boring? [6]
(b) Explain clearly with a neat sketch the construction and working principle of a horizontal boring machine. [10]
6. (a) Explain the characteristics that distinguish a milling process from other machining processes. [8]
(b) Describe the differences between a lathe and milling machine in terms of the types of surfaces generated, the types of tools used and applicability for general and production applications. [8]
7. Describe in detail the various arrangements of centreless grinding with neat sketches. Mention the applications in each case. [16]
8. (a) List the human factors involved in design of Jigs and Fixtures [8]
(b) What are the safety factors related to design of jigs and fixtures [8]

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1. (a) When the use of positive rake angles and negative rake angles is recommended ? [6]
- (b) Give significance of providing nose radius. [4]
- (c) Describe the tool represented by 10,10,6,6,8,8,1. [6]
2. (a) Give in detail classification of lathe. [12]
- (b) Why lathe beds are made of cast iron? Explain. [4]
3. (a) What are the differences between a capstan lathe and turret lathe? [6]
- (b) Explain with help of suitable sketches, different tool holders used in turret lathe. [10]
4. What are various work holding devices used in shaper? Discuss them with help of neat sketches. [16]
5. (a) What is the general rule regarding the included angle of the drill point and the hardness of the material being drilled? [6]
- (b) What is taper control drilling? Why the spiral point drilling is particularly adequate for this? [6]
- (c) What is the advantage of using a drill Jig for mass production? [4]
6. (a) Explain the characteristics that distinguish a milling process from other machining processes. [8]
- (b) Describe the differences between a lathe and milling machine in terms of the types of surfaces generated, the types of tools used and applicability for general and production applications. [8]
7. (a) What are the advantages and limitations of using centreless grinding? [8]
- (b) Describe the dressing and balancing requirements in grinding. [8]
8. Compare the broaching operation with that of any other metal machining operation for the purpose of generating constant inside contours. Show sketches of some example jobs made using broaching. [16]
