

III B.Tech. II Semester Regular Examinations, April/May -2005
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.
(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
2. (a) Explain, with the help of neat sketch, the working principle of Lathe machine
(b) How is size of lathe specified?
3. (a) Write briefly about cam design in automatic lathes.
(b) Differentiate between semi automatic and automatic lathes.
4. Briefly describe about the following?
 - (a) Planer miller
 - (b) plate or edge planer
 - (c) Divided table planer
 - (d) Pit planer
5. (a) How a drilling machine is specified?
(b) Define and write the formulae of the following for a drilling machine
 - i. Cutting speed
 - ii. Feed
 - iii. Machining time in drilling
6. (a) Briefly explain some of the problems caused in milling, their causes and probable remedies
(b) Derive the expression for the area of cross section of the chip in slab milling Ignore the direction of cut.
7. Describe in detail the various arrangements of centreless grinding with neat sketches. Mention the applications in each case.
8. (a) What is meant by 3-2-1 principle of location
(b) Explain the essential characteristics in the proper design of Jigs and Fixture

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1. Draw a merchant circle and derive expressions to show relationships among different forces acting on cutting tool.
2. (a) What are machining operations that can be performed on a center lathe?
(b) What are thread chasers? Sketch and describe the use of threading tool chaser?
3. (a) What is turret saddle? Describe its function in brief?
(b) How are sizes of capstan and turret lathes specified?
4. (a) Describe working and construction of crank quick return mechanism of a 8m shaper?
(b) How will you adjust the length of stroke and ram position in shaper?
5. (a) Define the process drilling. Give classification of various drilling machines
(b) Explain with a neat sketch the construction and working principle of a radial drilling machine
6. (a) What are the various types of milling cutters that are used in milling?
(b) Describe the application and relative merits of various types of milling cutters that are used in milling
7. Explain with a neat sketch the chip formation during surface grinding. Describe the expression for the various forces generated
8. (a) Explain briefly the cutting action of a broach
(b) Describe the continuous type broaching machine

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2. (a) What are mandrels and why are they used
(b) Describe the construction and use of different types of mandrels
3. (a) Describe constructional features of speed gearbox of machine tools?
(b) Compare the merits and demerits of turret and capstan lathe with engine lathe.
4. (a) What is planer? Illustrate and describe its working principle.
(b) Give detailed classification of planer machines.
5. (a) Describe the following
 - i. Gang milling
 - ii. Multiple spindle drilling
(b) Discuss the problems faced in a drilling operation with their causes and possible remedies
6. Explain clearly with neat sketch the various types of milling cutters and state their advantages and applications.
7. (a) How is grinding different from other machining operations? Explain its applications in view of its capabilities
(b) Why is it undesirable to continue running coolant on to a grinding wheel after the wheel has stopped?
8. Explain the following clearly
 - (a) Cylindrical super finishing
 - (b) Flat and Spherical super finishing

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1. (a) Explain briefly about chip breakers.
(b) Explain essential requirements of tool material.
2. (a) What are steady and follower rests? Why are they used?
(b) Explain about apron mechanism used in lathe.
3. (a) What are the differences between a capstan lathe and turret lathe?
(b) Explain with help of suitable sketches, different tool holders used in turret lathe.
4. (a) Write briefly about ram mechanisms used in slotter?
(b) Describe constructional features of feed gearbox of planer?
5. (a) Define the process drilling. Give classification of various drilling machines
(b) Explain with a neat sketch the construction and working principle of a radial drilling machine
6. Explain with the help of a line diagram the construction and working principle of a vertical milling machine. State the advantages and disadvantages along with application.
7. (a) How is the abrasive selected for a grinding operation? Indicate the reasons for selection
(b) What for is buff used? What is buff made of and what abrasives are used?
8. (a) How a broaching machine is specified?
(b) Why robust fixtures are required to support jobs to be broached?
(c) How much stock is removed by tooth on a broach?
(d) How the length of a broach is determined?
