

**B 2342**

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2007.

Fourth Semester

Mechatronics Engineering

MF 131 — MACHINE TOOLS AND PROCESSES

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. List the factors that contribute to poor surface finish in cutting.
2. Define the terms machinability and tool life.
3. State whether you would set the height of the tool in turning operation at the centre of the work piece, a little above it, a little below it. Explain why?
4. Why is tapping a difficult operation?
5. What are the principal types of Broaching machines?
6. Name any two gear finishing methods.
7. List out any two abrasives used in grinding wheel.
8. What is meant by G-ratio?
9. Name any two cutting fluids used in machining operation.
10. Why is thermal expansion of the machine tool components important?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain the procedure of estimating the machining time for plain milling a flat surface when the width of the job to be milled is more than the width of the milling cutter. (8)
- (ii) Explain the trends in material used for machine tool structures. (8)

Or

- (b) (i) Why is damping and stiffness of machine tools important? How is it accomplished? (8)
- (ii) Write short notes on any four modern tool materials. (8)

12. (a) (i) Discuss various types of tool wear. (8)
- (ii) The following equation for tool life has been obtained for H.S.S tool.  
 $VT^{0.13}f^{0.6}d^{0.3} = C$ . A 60 min tool life was obtained using the following cutting conditions :  $V = 40\text{m/min}$ ;  $f = 0.25\text{mm}$ ;  $d = 2\text{mm}$ . Calculate the effect on tool life if speed, feed and depth of cut are together increased by 25% and also if they are increased individually by 25%. (8)

Or

- (b) (i) In an orthogonal cutting operation, the following data have been observed :

Cutting speed	=	0.223 m/s
Uncut chip thickness	=	0.06 mm
Width of cut	=	3.83 mm
Chip thickness ratio	=	0.51
Rake angle	=	20°
Cutting force	=	363 N
Thrust force	=	127 N

Determine: Shear angle, friction angle, shear stress along the shear plane and shear strain in the chip. (8)

- (ii) Explain different types of chips produced in cutting with neat sketches. (8)
13. (a) (i) Explain with suitable sketches the different operations performed on a lathe. (10)
- (ii) Sketch the reamer and show the various terms related to it. (6)

Or

- (b) (i) Explain the important features of a boring machine with neat diagrams. (8)
- (ii) Describe with neat sketches the nomenclature of the twist drill. (8)
14. (a) (i) Briefly describe the gear generating processes with suitable sketches. (8)
- (ii) Describe the structure of a horizontal knee type milling machine. (8)

Or

- (b) (i) Describe the method of producing curved surface on a planner. (8)
- (ii) What are the quick return mechanisms commonly used in shaper? Explain any one in detail. (8)

5. (a) (i) Describe the principle of working of a tool and cutter grinder. What are its uses? (8)
- (ii) What is meant by super finishing? Briefly explain the various methods of super finishing. (8)

Or

- (b) (i) Write short note on high speed grinding and ultra precision grinding. (8)
- (ii) What essential factors you will take into consideration while choosing a grinding wheel. (8)
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