

# CBCS SCHEME

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15ME45B/15MEB405

## Fourth Semester B.E. Degree Examination, July/August 2022 Machine Tools and Operations

Time: 3 hrs.

Max. Marks: 80

*Note: Answer any FIVE full questions, choosing ONE full question from each module.*

### Module-1

- 1 a. Define machine tool. Give classification of machine tool. (06 Marks)  
b. With neat sketch, explain various parts of lathe machine. (10 Marks)

OR

- 2 a. Explain with neat sketch working principle of drilling machine. (04 Marks)  
b. Sketch and label principle parts of shaper. (06 Marks)  
c. Explain briefly constructional features of milling machine with neat sketch. (Column and knee type) (06 Marks)

### Module-2

- 3 a. What are the types of motion in machining? Explain. (02 Marks)  
b. With neat sketch, explain the following operations:  
i) Turning ii) Boring iii) Slotting. (09 Marks)  
c. Define machining and classify metal removal process with example. (05 Marks)

OR

- 4 a. List the machining process on Drilling machine. Explain with suitable sketch the following operations: i) Drilling ii) Reaming iii) Counter sinking. (10 Marks)  
b. Discuss the related machining parameters. (06 Marks)

### Module-3

- 5 a. Briefly explain the desirable properties of cutting tool material. (06 Marks)  
b. With neat sketch, explain single point cutting tool Nomenclature. (08 Marks)  
c. List the types of cutting tool materials. (02 Marks)

OR

- 6 a. With neat sketch explain cutting tool geometry. (08 Marks)  
b. What are the functions of a cutting fluid? (04 Marks)  
c. A workpiece of diameter 38mm and length 400mm was turned on a lathe using a suitable cutting tool. Determine the machining time to reduce the workpiece to 36.5mm diameter in one pass with cutting speed of 300mpm and feed 0.7mm/rev. (04 Marks)

### Module-4

- 7 a. A workpiece of 80 mm diameter and 120 mm length is held between centres and turned in 2 passes. If the approach length is 10 mm and over travel is 6 mm find machining time. Assume cutting speed as 0.4 m/sec and feed 0.4 mm/rev. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

- b. Calculate the machining time required to reduce 60 mm diameter shaft to 50 mm diameter for a length of 1500 mm with depth of cut of 2 mm for rough cut and 1 mm for finish cut. The following details are given:
- Cutting speed = 30 m/min
  - Feed = 0.5 mm/rev
  - Approach length = 5 mm
  - Overrun length = 5 mm
  - Number of passes = 3 (2 rough cut + 1 finish cut)
- (08 Marks)

OR

- 8 a. A 63.5 mm diameter plain milling cutter having 6 teeth is used for face milling a block of aluminium 18 cm long and 3 cm wide. The spindle speed is 1500 rpm and the feed is 0.125 mm/tooth. Determine:
- Table feed in mm/min
  - Cutting time.
- (08 Marks)
- b. Evaluate cutting speed and machining time for the plain (slab) milling operation for the following data:
- Diameter of milling cutter = 100 mm  
 Cutting speed = 500 rpm  
 Depth of cut = 5 mm  
 Table feed = 100 mm/min  
 Length of workpiece = 50 cm  
 Number of teeth in the cutter = 8.
- (08 Marks)

Module-5

- 9 a. What are the reasons for tool failure? (06 Marks)
- b. Write short notes on Taylor's tool life equation. (04 Marks)
- c. A tool type of 80 minutes is obtained at a speed of 30 mpm and 8 minutes at 60 mpm. Determine the tool life equation and cutting speed for 4 min tool life. (06 Marks)

OR

- 10 a. What is Machinability? Explain various criteria for determining Machinability. (06 Marks)
- b. What are the various costs associated in manufacturing a component? (06 Marks)
- c. Calculate the optimum cutting speed and tool life for based on minimum cost criteria for the available data machine operating cost 40 paise/min cost of tool change Rs.10 cutting speed 35 mpm tool life 60 minutes index of Taylor's tool life equation = 0.22. (04 Marks)

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