

# CBCS SCHEME

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17ME45B/MEB405

## Fourth Semester B.E. Degree Examination, Jan./Feb. 2021 Machine Tools and Operations

Time: 3 hrs.

Max. Marks: 100

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

### Module-1

- 1 a. Define Machine tool. Give classification of drilling machines. (04 Marks)
- b. Briefly explain various parts of Radial drilling machine. (08 Marks)
- c. With a neat sketch, explain principal parts of horizontal boring machine. (08 Marks)

OR

- 2 a. Define Milling. With a neat sketch, explain Horizontal milling machine. (10 Marks)
- b. With a neat sketch, explain Vertical Broaching machine. (06 Marks)
- c. Differentiate between Shaper and Planer. (04 Marks)

### Module-2

- 3 a. What is Machining? With a neat sketch, explain relative motion of tool and work piece in milling. (08 Marks)
- b. Explain briefly, with neat sketches of any Four drilling operations. (06 Marks)
- c. List the operations performed on grinding machine. Explain any two operations with neat sketches. (06 Marks)

OR

- 4 a. List and explain different machining parameters and related quantities on a shaping machine. (06 Marks)
- b. Explain Centreless grinding operation, with a neat sketch. (07 Marks)
- c. Explain Slotting Operation on Slotting Machine. (07 Marks)

### Module-3

- 5 a. Explain the geometry of a Single Point Cutting tool, with a neat sketch. (08 Marks)
- b. Illustrate the desirable properties of cutting tool material. (05 Marks)
- c. A shaping machine is used to machine a rectangular piece of 18cm long and 35cm width, with a cutting speed of 26 mpm. Feed is 0.8mm per cycle. Cutting stroke is adjusted 20cm. Time for cutting to return stroke is 3:2. Find the time required for machining the whole surface. (07 Marks)

OR

- 6 a. Define Cutting fluid and explain essential properties of cutting fluid. (07 Marks)
- b. Explain different types of cutting fluids with their application. (06 Marks)
- c. Find the time required for drilling a 18mm hole in a work piece having – thickness of 50mm. Assume cutting speed of 12 meters per minute and feed 0.2mm/revolution. Neglect the length of approach. (07 Marks)

### Module-4

- 7 a. Explain the concept of oblique and Orthogonal cutting. (08 Marks)
- b. Explain different types of chips, with neat sketches. (05 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.

- c. In an experiment, a pipe is turned on end in Orthogonal cutting conditions with a tool of  $20^\circ$  rake angle. A chip – length of 85mm is obtained from an uncut chip length of 202mm while cutting with a depth of cut of 0.5mm. Determine the shear plane angle and chip thickness. (07 Marks)

OR

- 8 a. Draw Merchant circle diagram using usual notations and state the assumptions. (06 Marks)  
 b. Derive an expression for horizontal cutting force in terms of shear force, rake angle, friction angle and shear plane angle in an orthogonal cutting process. (05 Marks)  
 c. A seamless tubing 35mm outside diameter is turned orthogonally on a lathe. The following data is available. Rake angle =  $35^\circ$ , Cutting speed = 15m/min, Feed = 0.10mm/rev. Length of continuous chip in one revolution = 50.72mm, Cutting force = 200N, Feed force = 80N. Calculate the Coefficient friction, Shear plane angle, Velocity of chip along tool face and Chip thickness. (09 Marks)

Module-5

- 9 a. Define Tool Life. List out the wear mechanism. Explain any one. (08 Marks)  
 b. Define Machinability. List out the various parameters affecting the machinability. (06 Marks)  
 c. A cast iron bar stock was turned at 50m/min for which, the tool life was 3 hours. For the same material, at 40m/min, the tool life was 5 hours. Find the value of constant C and n in the Taylor's tool life equation. (06 Marks)

OR

- 10 a. Explain various criteria for determining machinability. (06 Marks)  
 b. Explain effect of variations in cutting speed on various cost factors. (08 Marks)  
 c. Determine the optimum cutting speed for an operation carried on a lathe using the following data : Tool change time 4 min, tool regrind time 3 min, machine running cost 20 paise per minute, depreciation tool grind one rupee. Assume values of C and n of Taylor's tool equation as 60 and 1/5 respectively. (06 Marks)

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