

CBCS SCHEME



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15ME45B/15MEB405

Fourth Semester B.E. Degree Examination, Aug./Sept.2020

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 with example. (08 Marks)
b. Mention the specification of lathe with a neat sketch. (08 Marks)

OR

- 2 a. Explain with neat sketch working principle of column and knee type milling machine. (08 Marks)
b. Explain the constructional feature of horizontal surface grinding machine with a neat sketch. (08 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. Explain the difference between orthogonal cutting and oblique cutting. (04 Marks)
b. Briefly explain the mechanism and types of chip formation. (06 Marks)
c. A seamless tubing 35mm outside diameter is turned orthogonally on a lathe. The following data is available rake angle = 35°, Current 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 of friction shear plane angle and chip thickness. (06 Marks)

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OR

- 8 a. Derive an expression for shear plane angle with respect to orthogonal cutting. (08 Marks)
b. A twist drill of 32mm diameter is used to drill a hole in a mild steel plate. The vertical cutting force is 60kg cutting force at the lips 36kg. Feed rate 0.6mm/rev and speed of drill 50rpm. Taking constant C for mild steel as 0.36 and neglecting the effect of friction. Calculate the thrust force and torque acting on the drill and also power required for drilling. (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 80minutes is obtained at a speed of 30mpm and 8 minutes at 60mpm. Determine the tool life equation and cutting speed for 4min 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 40paise/min cost of tool change Rs.10 cutting speed 35mpm tool life 60 minutes index of Taylor's tool life equation = 0.22. (04 Marks)

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