

CBCS SCHEME

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15ME45B/15MEB405

Fourth Semester B.E. Degree Examination, Jan./Feb. 2023 Machine Tools and Operations

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Explain with neat sketch crank and slotted link type of quick return mechanism of a shaper. (08 Marks)
b. Explain with neat sketch external centerless grinding. (08 Marks)

OR

- 2 a. Describe :
i) Gang drilling machine (08 Marks)
ii) Multi spindle drilling machine. (08 Marks)
b. Explain with neat sketch radial drilling machine. (08 Marks)

Module-2

- 3 a. Explain thread cutting operation in a lathe. (08 Marks)
b. Explain with sketch
i) Traverse grinding
ii) Plunge grinding. (08 Marks)

OR

- 4 a. Explain the following milling methods :
i) Peripheral milling
ii) Facemilling
iii) Endmilling. (09 Marks)
b. Show the calculation for setting dividing head mill 69teeth on a spurgear blank by compound indexing. Index plate with circles of holes patented by porous and sharp manufacturing company are as follows :
Plate No 1 – 15, 16, 17, 18, 19, 20
Plate No 2 – 21, 23, 27, 29, 30, 33
Plate No 3 – 37, 39, 41, 43, 47, 49. (07 Marks)

Module-3

- 5 a. What are the desirable properties of an ideal cutting tool material. (07 Marks)
b. Explain with neat sketch the nomenclature of a single point cutting tool, clearly stating the different angles. (09 Marks)

OR

- 6 a. Explain the effect of machining parameters on surface finish. (06 Marks)
b. Calculate the machining time required to mill a groove 5mm deep in a steel component. The component is 300mm long, 100mm wide and 60mm high. The cutter diameter is 90mm and has 20 teeth, with a feed rate of 0.08mm/tooth. Take the cutting speed of 25m/min. Allow 5mm clearance on either side before and after the cutting operation. (10 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.

Module-4

- 7 a. Explain with neat sketch : i) Orthogonal cutting ii) Oblique cutting. (08 Marks)
b. In an orthogonal cutting process the following data were obtained chip length obtained = 96mm, uncut chip length = 240mm, rake angle used = 20° , Depth of cut = 0.6mm. Horizontal component of cutting force = 2400N and vertical component of cutting force = 240N. Calculate : i) shear plane angle ii) Chip thickness iii) Friction angle iv) Resultant cutting force. (08 Marks)

OR

- 8 a. Derive an expression for shear angle in terms of chip thickness co-efficient and rake angle for orthogonal cutting. (10 Marks)
b. Briefly explain the types of chip formation with neat sketches. (06 Marks)

Module-5

- 9 a. List and explain the various causes of tool wear. (06 Marks)
b. Explain the forms of tool wear. (05 Marks)
c. A 50mm bar of steel was turned at 284rpm and tool failure occurred after 10min. The speed was changed to 232rpm and the tool failed in 60min of cutting time, what cutting speed should be used to obtain 30mins of tool life. (05 Marks)

OR

- 10 a. List and explain the factors that affect the tool life. (06 Marks)
b. Define tool life. Explain Taylor's tool life equation. (05 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. Also, state the type of tool material based on the value of n. (05 Marks)
