



CBGS SCHEME

21ME/SM42

Fourth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026 Machining Science and Jigs and Fixtures

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. With neat sketch, explain the construction and working of shaping machine. (10 Marks)
- b. With neat sketch, explain the construction and working of radial drilling machine. (10 Marks)

OR

- 2 a. What are the basic components of CNC? Describe. What are the basic elements in CNC machining centre? Explain. (10 Marks)
- b. How do you classify milling machines? Sketch and briefly explain horizontal milling machine. (10 Marks)

Module-2

- 3 a. Derive expression for shear plane angle for orthogonal cutting process. Define orthogonal cutting. (10 Marks)
- b. Draw neat sketch of single point tool geometry, indicating all the elements. Write tool signature. (10 Marks)

OR

- 4 a. In an orthogonal cutting test, the following data was obtained.
Uncut chip thickness = 0.2 mm Chip thickness = 0.5 mm
Chip width = 2 mm Cutting force = 900 N
Thrust force = 600 N Rake angle = 8°
Cutting speed = 0.6 m/s
Calculate friction angle at chip-tool interface, shear stress, shear force, friction force and energy consumed. (10 Marks)
- b. What are cutting fluids? Briefly describe different characteristics of cutting fluids and selection of cutting fluid. (10 Marks)

Module-3

- 5 a. Explain about tool life, tool life equation and brief about factors affecting tool life. (10 Marks)
- b. Mild steel rods of 50 mm diameter are to be turned over a length of 160 mm with a depth of cut of 1.5 mm, feed = 0.2 mm/rev at 230 rpm by HSS tools. If the tool life equation is given by $VT^{0.2} f^{0.3} d^{0.12} = 50$. Determine how many components may be turned before regrinding the tool. (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.

OR

- 6 a. Explain briefly i) Honing ii) Lapping.
- b. For a production turning operation, past records have shown that the tool life varies with cutting speed as shown in the table.

Cutting speed, V , m/s	Tool life, T in min
2.08	110
2.54	37

Estimate the tool life for this operation at a speed of 2.3 m/s. Write the tool life equation for same. (10 Marks)

Module-4

- 7 a. Write the classification of advanced machining processes. With neat sketch explain ultrasonic machining process. (10 Marks)
- b. With neat sketch explain Electric Discharge Machining (EDM), its advantages and limitations. (10 Marks)

OR

- 8 a. Explain the importance of hybrid machining process. Explain the process of powder assisted electric discharge machining. (10 Marks)
- b. Explain with neat sketch laser beam machining and applications. (10 Marks)

Module-5

- 9 a. What are jigs and fixtures? Differentiate between jigs and fixtures. Give examples for both. (10 Marks)
- b. Explain the factors to be considered for design of jigs/fixtures. Explain channel jig with sketch. (10 Marks)

OR

- 10 a. Briefly explain about turning fixtures with necessary sketch. (10 Marks)
- b. Explain about welding fixtures, highlighting the important points. (10 Marks)
