

CBCS SCHEME

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18ME35A/18MEA305

Third Semester B.E. Degree Examination, Dec.2023/Jan.2024

Metal Cutting and Forming

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Explain Merchant's diagram and derive the equation for the co-efficient of friction between the chip and the tool face. (10 Marks)
- b. With a neat sketch, explain the following for a single point cutting tool:
i) Back rake angle ii) End clearance angle iii) Side cutting edge angle
iv) Nose radius v) Heel (10 Marks)

OR

- 2 a. Explain with a neat sketch, the main parts of a Lathe machine. (10 Marks)
- b. A seamless tubing 35mm outside diameter is turned orthogonally on a lathe. The following data is available, Rake angle = 35° , cutting speed = 15 m/min, Feed = 0.10 mm/rev, length of continuous chip in one revolution = 50.72mm, cutting force = 200 N, Feed force = 80 N. Calculate the coefficient of friction, shear plane angle, velocity of chip along tool face and chip thickness. (10 Marks)

Module-2

- 3 a. With a neat sketch explain the constructional features of a horizontal spindle column and knee milling machine. (10 Marks)
- b. With a neat sketch, explain the working principle of a horizontal Boring machine. (10 Marks)

OR

- 4 a. Define drilling. With a neat sketch explain bench drilling machine. (10 Marks)
- b. With a neat sketch briefly explain the common parts of a drilling machine. (10 Marks)

Module-3

- 5 a. Explain the following types of tool wear with necessary sketches:
i) Crater wear ii) Flank wear. (10 Marks)
- b. A cast iron bar stock was turned at 50 m/min, for which, the tool life was 3 hours. For the same material, at 40 m/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. (10 Marks)

OR

- 6 a. List the different types of cutting fluids used in metals cutting and explain any one type stating its advantages, limitations and applications. (10 Marks)
- b. What do you understand by the term economics of machining? How do you evaluate machining cost? (10 Marks)

Module-4

- 7 a. Classify and explain forging process with neat sketches. (10 Marks)
- b. Classify and explain the extrusion process. (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

- 8 a. Explain with a neat sketch of rolling mill (i) Four high rolling mill (ii) Tandem rolling mill. (10 Marks)
- b. A strip with a cross section of 150×6 mm is being rolled with 20% reduction area using a 400mm diameter steel rolls. Calculate the angle of contact of the rolls on the work metal. (10 Marks)

Module-5

- 9 a. Explain clearly with neat sketches, the following operation piercing and blanking. (10 Marks)
- b. Calculate the number of redraws assuming 50%, 40% and 30% reduction in 3 stages. The final size of the cup required is 75mm diameter and 200mm height. Determine the height of each draw and the force required for each reduction of the sheet. Take $\sigma_c = 600$ MPa and $t = 4$ mm. (10 Marks)

OR

- 10 a. Give the classification of dies in sheet metal forming and explain combination dies with neat sketch. (10 Marks)
- b. Estimate the LDR for steel sheet subjected to deep drawing using the following data:
- | | Strain ratio |
|----------------------------|--------------|
| Elongation in length = 25% | 2 → 2.5 |
| Decrease in width = 15% | 3 → 3.0 |
- (10 Marks)
