CBCS Scheme

USN ☐☐☐☐☐☐☐☐☐☐

15MEB405/15ME45B/15MA45

Fourth Semester B.E. Degree Examination, Dec.2017/Jan.2018
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 a neat sketch, the main parts of an Engine or Center Lathe. **(08 Marks)**
  b. Write important specifications of : i) Milling machine ii) Shaping machine. **(08 Marks)**

OR

2 a. Explain with a neat sketch, a Horizontal shaping machine. **(08 Marks)**
  b. Sketch and label a Center less Grinding machine. **(08 Marks)**

Module-2

3 a. Explain briefly the motions involved in a machining process. **(08 Marks)**
  b. Discuss with a neat sketch, any Four machining process in :
    i) Lathe   ii) Milling. **(08 Marks)**

OR

4 a. Briefly explain the following machining parameters with respect to turning operation :
    i) Cutting speed   ii) Machine time   iii) Metal Removal Rate. **(08 Marks)**
  b. Explain with a neat sketch, the following operations :
    i) Broaching   ii) Reaming   iii) Grinding   iv) Counter sinking. **(08 Marks)**

Module-3

5 a. List and briefly explain the properties of a cutting tool material. **(08 Marks)**
  b. With a neat sketch of a single point cutting tool, explain tool geometry. **(08 Marks)**

OR

6 a. Explain the different types of cutting fluids. **(08 Marks)**
  b. Write a brief note on : i) Surface finish   ii) Effect of Machining parameters on surface finish. **(08 Marks)**

Module-4

7 a. Derive the equation for the coefficient of friction between chip and tool face. (Ernst – Merchants solution). **(12 Marks)**
  b. Compare Orthogonal and Oblique cutting. **(04 Marks)**

OR

8 a. Explain the different types of chips formation. **(06 Marks)**
  b. In an Orthogonal cutting operation following observations were made :
    Cutting speed = 25m/min ,   Width of cut = 2.5mm ,   Feed = 0.24mm/rev ,
    Chip thickness = 0.4mm ,   Cutting force = 1400N ,   Thrust force = 400N ,
    Tool rake angle = 5^0. Calculate
    i) Shear angle (ϕ)   ii) Friction angle (τ)   iii) Chip flow velocity (V_f)
    iv) Shear strain (γ)   v) Power consumed at tool in KW (P). **(10 Marks)**

Module-5

9 a. Explain the common mechanism of tool wear. **(08 Marks)**
   b. In a turning operation, it was observed that the tool life was 150min, when the cutting speed was 20m/min. As the speed was increased to 25m/min, the tool life dropped to 25.2min. If the time required to change the tool was 2min and if the cost of regrinding the tool was 10 times the cost of turning per minute, calculate
      i) The most economical cutting speed   ii) Tool life for maximum production. **(08 Marks)**

OR

10 a. Explain the factors affecting tool life. **(08 Marks)**
    b. Write short notes on :
       i)   Choice of feed.
       ii) Taylor's tool life equation. **(08 Marks)**

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