

**III B. Tech I Semester Supplementary Examinations, June/July-2022**  
**MACHINE TOOLS AND METROLOGY**

(Automobile Engineering)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions **ONE** Question from **Each unit**

All Questions Carry Equal Marks

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**UNIT-I**

1. a) Explain with a neat sketch how chip formation occurs in orthogonal cutting. [8M]  
b) Enumerate the differences between orthogonal cutting and oblique cutting. [7M]

**(OR)**

2. a) Explain Merchant force circle with a neat sketch. [8M]  
b) Discuss the essential properties of a cutting fluid. [7M]

**UNIT-II**

3. a) Describe the important features of automatic lathes. [8M]  
b) What are the different attachments used in lathe machine? Explain any two attachments. [7M]

**(OR)**

4. a) How is a Lathe specified? Explain in brief. [6M]  
b) What are the essential differences between single spindle and multi-spindle automatic lathes? [9M]

**UNIT-III**

5. a) What is centreless grinding? Mention the advantages and limitations. [8M]  
b) Define the following angles of a twist drill: [7M]  
(i) Rake angle  
(ii) Lip clearance angle  
(iii) Point angle  
(iv) Chisel edge angle.

**(OR)**

6. a) Sketch and discuss a tool and cutter grinder. [8M]  
b) Explain the working principle of deep hole drilling machine. Where are they preferred and why? [7M]



**UNIT-IV**

7. a) A hole and mating shaft are to have a nominal assembly size of 50mm. The assembly is to have a maximum clearance of 0.15mm and a minimum clearance of 0.05mm. The hole tolerance is 1.5 times the shaft tolerance. Determine the limits for both hole and shaft: By using (i) Hole basis system (ii) Shaft basis system. [10M]
- b) Compare and contrast unilateral and bilateral tolerance system. [5M]

**(OR)**

8. a) Explain the construction and working principle of dial indicator. [8M]
- b) Explain the Taylor's principle applied in limits. [7M]

**UNIT-V**

9. a) With a neat sketch explain the working of mechanical comparator. [8M]
- b) The heights of peak and valleys of 20 successive points on a surface are 35, 25, 40, 22, 37, 19, 41, 21, 42, 18, 42, 24, 44, 25, 40, 18, 40, 18, 39, 21 microns respectively, measured over a length of 20mm. Determine CLA and RMS values of roughness surface. [7M]

**(OR)**

10. a) Explain the Roughness parameters and Roughness profiles. [8M]
- b) Explain the principle of optical flat and auto collimator. [7M]

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