

CS/B. TECH/AUE/ODD SEM/SEM-5/AUE-505/2016-17

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**MAULANA ABUL KALAM AZAD UNIVERSITY OF
TECHNOLOGY, WEST BENGAL**
Paper Code : AUE-505
**MACHINE TOOLS AND MACHINING
TECHNOLOGY**

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own
words as far as practicable.*

GROUP - A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following :

10 × 1 = 10

- i) Laser beam machining process is used for machining
- a) very thick materials
 - b) thin materials
 - c) heavy sections
 - d) is not used for machining.

- ii) Electro-discharge machining uses the dielectric fluid,
- a) Water
 - b) Aqueous salt solution
 - c) Sodium hydroxide
 - d) Kerosene.
- iii) Tungsten content in High Speed Steel cutting tool material is
- a) 18%
 - b) 4%
 - c) 1%
 - d) 16%.
- iv) In electro-chemical machining, best surface finish is obtained
- a) with low current density
 - b) with high current density
 - c) with slow rate of metal removal
 - d) with high rate of metal removal
 - e) at all metal removal rates.
- v) Which of the following is non-chip removal process ?
- a) Spinning on lathe
 - b) Thread cutting
 - c) Milling
 - d) Gear hobbing.

- vi) Improved surface finish of electric discharge machine (EDM) surfaces can be obtained by
- a) increasing the current in the sparks
 - b) increasing the frequency of sparks
 - c) decreasing the frequency of sparks
 - d) none of these.
- vii) Ceramic tools are made from
- a) Tungsten oxide
 - b) Silicon carbide
 - c) Cobalt
 - d) Aluminium oxide.
- viii) Which process provides best surface finish ?
- a) Hand grinding
 - b) Cylindrical turning
 - c) Milling
 - d) None of these.

- ix) The cutting edges of a standard twist drill are called
- a) Flutes
 - b) Lips
 - c) Wedges
 - d) Flanks.
- x) Which of the following materials cannot be machined by EDM ?
- a) Steel
 - b) Titanium
 - c) Tungsten carbide
 - d) Glass.

GROUP - B

(Short Answer Type Questions)

Answer any *three* of the following $3 \times 5 = 15$

2. Discuss the process parameters of abrasive jet machining with a neat sketch.

3. a) What is the effect of chip thickness ratio on shear plane angle ?

b) Compute shear strain for orthogonal cutting. $2 + 3$

4. What are the desirable properties of a cutting tool material ?

5. What are the fundamental differences between a shaper and planer?
6. Explain with neat sketch the working principle of plasma arc machining.

GROUP - C**(Long Answer Type Questions)**

Answer any *three* of the following. $3 \times 15 = 45$

a) Describe with neat sketch tool angles and cutting tool nomenclatures.

b) Explain the causes of failure of a cutting tool. Discuss on crater wear and flank wear of cutting tool.

c) A seamless tube of 35 mm diameter turned in a lathe with an orthogonal tool of rake angle $\nu = 10^\circ$, longitudinal feed 0.1 mm/rev, length of chip/rev is 50 mm, cutting velocity is 2m/s. Calculate shear angle, chip thickness, chip velocity and shear velocity.

 $5 + 5 + 5$

8. a) A C.I plate measuring 450 mm \times 150 mm \times 60 mm is to be rough shaped along its wider face. Calculate the machining time with the following data : cutting speed = 10mm/min, return speed = 15mm/min, approach = 30 mm, over travel = 30 mm, allowances on either side of the plate width = 6mm, feed/cycle = 1.5 mm.

b) Obtain indexing for 77 divisions.

c) Sketch a HSS twist drill to show principle geometrical specifications. $5 + 5 + 5$

9. a) Describe with diagram how material is removed in ECM process.

b) With neat sketches discuss the working principle of main components of an Electric Discharge Machining?

c) Explain with neat sketch the working principle of Laser beam machining. $5 + 5 + 5$

10. a) Describe twist drill nomenclature using sketches.

b) Calculate the change gears for indexing to give 83 divisions.

c) Derive an expression for economic tool life using Gilbert's model. $5 + 5 + 5$

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11. Distinguish between any *three* : 3 × 5

- a) ☒ Shaper and Planer *surface*
 - b) Turret lathe and Capstan lathe
 - c) Centre lathe and Turret lathe
 - d) ☒ Gang milling machine and Multi-spindle drilling machine
 - e) ☒ Upmilling and Downmilling.
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