

**III B.Tech II Semester Supplementary Examinations,
November/December 2005
ADVANCED MANUFACTURING TECHNOLOGY
(Mechatronics)**

Time: 3 hours

Max Marks: 80

**Answer any FIVE Questions
All Questions carry equal marks**

1. (a) Define the following angles with the help of neat sketches.
 - i. Side cutting edge angle
 - ii. Side relief angle
 - iii. Back rake angle
 - iv. Side rake angle.(b) A single point cutting tool has a back rake of 10^0 and side rake of 12^0 . Calculate its
 - i. Orthogonal rake and
 - ii. Inclination angle when the approach angle is 70^0 .

[8+8]
2. (a) Distinguish between 3 jaw and 4 jaw chuck.
(b) What is the purpose of tool post? Explain different types of tool posts generally used on lathe machine.

[6+10]
3. (a) Explain with a neat sketch the operation and the need for a clapper box in a mechanical shaper.
(b) Name the important shaping tools and explain their applications.

[8+8]
4. (a) Sketch the designation of twist drill as per Indian standard and enumerate the various elements of it.
(b) What are the fields of application and the operating advantages of a radial drill press?

[8+8]
5. (a) Describe the process of generating a helical groove on a work piece using milling machine.
(b) Discuss the principle parts of vertical column milling machine.

[8+8]
6. (a) Explain the advantages and limitations of using centreless grinding.
(b) Explain the factors involved in selecting the appropriate type of abrasive for a particular grinding operation

[8+8]
7. (a) How would you select a jig and fixture? Discuss.
(b) What is angular indexing? Explain briefly.

[8+8]

8. (a) Explain with the help of neat sketch, the working principle of Ultrasonic machining.
- (b) Explain the various industrial applications of Electric Discharge Machining.

[10+6]

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1. (a) Enumerate the differences between orthogonal cutting and oblique cutting.
(b) Write a brief note on tool signature. [6+10]
 2. (a) How a centre lathe is specified? Discuss.
(b) What are constructional features of tail stock? Explain with the help of neat sketch. [6+10]
 3. (a) Describe the operation of the quick return motion in a mechanical shaper.
(b) Describe how a three dimensional contour be provided on a planner. [8+8]
 4. (a) What are the various types of drilling machines? Explain their relative merits and demerits.
(b) Distinguish between boring and drilling. [10+6]
 5. With the help of neat sketch explain the working of a Universal milling machine. Discuss the important operations that can be performed on this machine and corresponding tools required. [16]
 6. (a) Discuss the different types of bonds used in making of grinding wheels and mention their applications.
(b) Which type of grinding processes is suitable for machining the thermoplastic work pieces and explain why? [8+8]
 7. (a) How would you select a jig and fixture? Discuss.
(b) What is angular indexing? Explain briefly. [8+8]
 8. (a) Explain the applications of Ultrasonic Machining process.
(b) Discuss the following terms with respect to Electron Beam Machining.
 - i. Surface tension.
 - ii. Back pressure of evaporating atoms
 - iii. Electron pressure
 - iv. Hydrostatic pressure of molten metal.
- [8+8]

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1. (a) Explain with the help of sketches the different systems of specifying tool geometry.
(b) Calculate
 - i. Back rake
 - ii. Side rake and
 - iii. Normal rake for cutting tool having an inclination of 5^0 and an orthogonal rake of 12^0 with a side cutting edge angle of 15^0 .

[7+9]

2. Describe the following lathe parts with the help of neat sketch

- (a) Face plate
- (b) Tail stock
- (c) Carrier and catch plate
- (d) Steady and follower rest.

[4x4]

3. (a) With simple sketches explain the various shaping operations.
(b) Describe the following principal parts of planer.

- i. Power Transmission
- ii. Tool head
- iii. Table.

[7+9]

4. (a) Enumerate the differences between gang drilling and multispindle drilling
(b) Explain briefly the significance of the following parts in a twist drill with the help of the neat sketch
 - i. Body
 - ii. Shank
 - iii. Land
 - iv. Point

[8+8]

5. (a) Define cutting speed, feed and depth of cut in milling process.

- (b) With the help of neat sketch explain the working of straddle milling. [6+10]
6. (a) Explain the advantages and limitations of using centreless grinding.
(b) Explain the factors involved in selecting the appropriate type of abrasive for a particular grinding operation [8+8]
7. (a) Describe the different methods of accurate location of holes in jig boring.
(b) Calculate the indexing requirement for 209 divisions on a milling machine equipped with a differential indexing head. The index plates available are

Plate No.1:	15	16	17	18	19	20 holes
Plate No.2:	21	23	27	19	31	33 holes
Plate No.3:	37	39	41	43	47	49 holes

The change gear set available is 24, 24, 28, 32, 40, 44, 48, 56, 64, 72, 86, 100
[8+8]

8. (a) Briefly explain the characteristics of Ultrasonic Machining process.
(b) Enumerate the differences between Laser Beam Machining and Electron Beam Machining. [8+8]

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1. (a) Discuss the main requirements of cutting tool materials.
(b) Define tool wear and explain the reasons of tool failure. [8+8]
2. Briefly discuss the following lathe parts with the help of neat sketches.
(a) Head Stock
(b) Tool Post
(c) Three Jaw Chuck
(d) Steady and follower rest [4x4]
3. (a) Describe the operation of the quick return motion in a mechanical shaper.
(b) Describe how a three dimensional contour be provided on a planner. [8+8]
4. (a) Explain the working of horizontal boring machines.
(b) Explain the following operations performed on a drilling machine and write the corresponding tools required.
 - i. Counter sinking
 - ii. Reaming
 - iii. Centre drilling
 - iv. Tapping.[8+8]
5. Describe the different types, applications and relative merits of the following milling cutters that are used in milling operation
(a) Plain milling cutters
(b) End mill cutters [8+8]
6. What are the various types of surface grinding machines? Describe their principle, advantages and limitations [16]
7. (a) How would you select a jig and fixture? Discuss.
(b) What is angular indexing? Explain briefly. [8+8]
8. (a) Explain the modifications to be made to Electroplating to be viable as Electro Chemical Machining.

- (b) Describe the working of Laser Beam Machining with the help of neat sketch.
[6+10]
