

**ADVANCED MANUFACTURING TECHNOLOGY  
(MECH 4102)**

Time Allotted : 3 hrs

Full Marks : 70

*Figures out of the right margin indicate full marks.*

*Candidates are required to answer Group A and  
any 5 (five) from Group B to E, taking at least one from each group.*

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

**Group - A  
(Multiple Choice Type Questions)**

1. Choose the correct alternative for the following: **10 × 1 = 10**
- (i) Abrasive Jet Machining (AJM) uses a jet of  
(a) abrasive particles suspended in oil  
(b) abrasive particles mixed with glycerine  
(c) abrasive particles suspended in water  
(d) abrasive particles mixed with air.
- (ii) Mechanics of material removal in EDM is  
(a) melting and evaporation aided by cavitation  
(b) mechanical cutting action  
(c) melting  
(d) electrolysis.
- (iii) In Ultrasonic machining, function of transducer is to  
(a) convert mechanical energy into heat  
(b) convert electrical energy into heat  
(c) convert electrical energy into mechanical vibrations  
(d) convert mechanical energy into electrical energy.
- (iv) In which of the following processes, the shape of tool is not same as that of cavity produced?  
(a) Plasma Arc Machining  
(b) Ultrasonic machining  
(c) Electro Discharge Machining  
(d) All of these.
- (v) Electrolytes used in ECM must possess  
(a) low electrical conductivity  
(b) low chemical stability  
(c) moderate chemical stability  
(d) high electrical conductivity.
- (vi) Thermal conductivity of cutting tool must be  
(a) High  
(b) Low  
(c) Very low  
(d) None of the mentioned.

- (vii) In CNC Machine Tool G00 code is used for,  
(a) Linear Interpolation (b) Circular Interpolation  
(c) Rapid traverse (d) none of these.
- (viii) Which of the following is the guidance mechanism of AGV?  
(a) Wire guided (b) Rail guided  
(c) Laser guided (d) All of them.
- (ix) MIPLAN is related to  
(a) retrieval type process planning (b) generative type process planning  
(c) manual process planning (d) automated process planning.
- (x) In Automated Manufacturing CMM relates to  
(a) Centralized Manufacturing Module (b) Coordinate Measuring Machine  
(c) Contour Measuring Machine (d) none of these.

### Group - B

2. (a) Discuss the terms CAD, CAM and CAE. With proper example explain the term Intelligent Manufacturing.  
(b) What do you mean by Flexible Manufacturing System (FMS)? Write down the benefits of Flexible Manufacturing System.

(3 + 3) + (3 + 3) = 12

3. (a) Describe with suitable sketches, the Axis system of CNC Turning and CNC Milling. Write down the advantages of CNC machines over traditional machines.  
(b) Write a manual part program for machining a component as shown in Fig.1 in a CNC Machining Centre. Raw material is a rectangular Mild Steel plate 100mm × 100mm with 12mm thickness. The outer profile needs to be machined upto a depth of 5 mm using a slot drill of  $\Phi 16$  mm. Two through holes of  $\Phi 8$  mm at locations shown in the drawing are also to be machined.

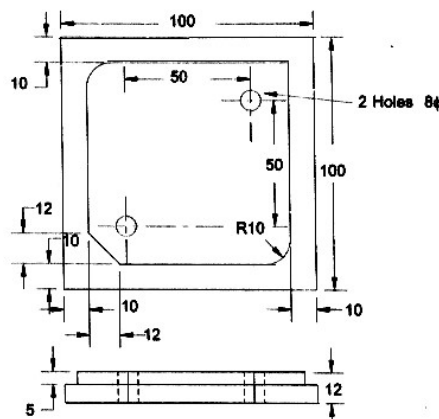


Fig.1

(2 + 3) + 7 = 12

### Group - C

4. (a) What are the advantages and disadvantages of computer aided process planning over manual process planning?

(b) Explain high speed machining with an example.

**6 + 6 = 12**

5. (a) Write short note on Fused Deposition Modelling (FDM).

(b) What is a Co-ordinate Measuring Machine (CMM)? Explain the various types of structure of a CMM.

**5 + (2 + 5) = 12**

### **Group - D**

6. (a) Explain the principle of metal removing process in Ultrasonic Machining (USM) and also state the different types of feed mechanism used in USM process with suitable diagrams.

(b) Explain the different applications and limitations of Water Jet Machining (WJM). Describe the process parameters which control the Abrasive Jet Machining (AJM) quality.

**(3 + 3) + (3 + 3) = 12**

7. (a) Draw the basic electrical waveform and briefly describe spark initiation and material removal mechanism in Electrical Discharge Machining (EDM) process.

(b) How electrolysis is used in Electro-chemical Machining process (ECM)? Show chemical reactions that takes place in electrolyte, anode and cathode during Electro-chemical Machining (ECM) process.

**(2 + 4) + (2 + 4) = 12**

### **Group - E**

8. (a) Explain the principle of Laser Beam Machining (LBM) with neat sketch and list out the advantages and disadvantages?

(b) Explain the principle of Plasma Arc Machining (PAM) with neat sketch and list out the advantages and disadvantages?

**6 + 6 = 12**

9. (a) Explain with proper sketch, the basic principle behind the Explosive Forming process.

(b) Write down the applications, advantages and limitations of Electro-Hydraulic Forming process.

**6 + 6 = 12**

Department & Section	Submission link:
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