B.TECH/ME/7TH SEM/MECH 4102/2018
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) In Laser Beam Machining (LBM) material removal takes place by
(a) melting and erosion (b) vaporisation and dissolution
(c) melting and vaporisation (d) erosion and shear.

(ii) Electrolytes used in ECM must posses
(a) low electrical conductivity (b) low chemical stability
(c) moderate chemical stability (d) high electrical conductivity.

(iii) Electric Discharge Machining (EDM) tool material should be
(a) electric insulator (b) very hard
(c) thermal insulator (d) electrically conductive.

(iv) Abrasive Jet Machining (AJM) cannot be efficiently used for machining
(a) ceramic plate (b) boron carbide block
(c) elastomer material (d) mild steel plate.

(v) Flexible Manufacturing relates to
(a) product Layout (b) process Layout
(c) group Layout (d) all of these.

(vi) Two axis CNC Lathe has,
(a) X-Y axis (b) Y-Z axis (c) X-Z axis (d) none of these.

(vii) The type of transducer used in Ultrasonic Machining (USM) is
(a) electro-strictive (b) magneto-strictive
(c) piezo-electric (d) inductive.

(viii) For making a hole of 0.08 mm in diameter, the best process to use is
(a) Abrasive Jet Machining (b) Water Jet Machining
(c) Plasma Arc Machining (d) Laser Beam Machining.

(ix) CSG in Solid Modelling relates to
(a) Cylindrical Surface Generation (b) Constructive Solid Geometry
(c) Common Solid Grouping (d) Creative Surface Generation

(x) In CNC Machine Tool G00 code is used for,
(a) Linear Interpolation (b) Circular Interpolation
(c) Rapid traverse (d) none of these

Group – B

2. (a) Explain the terms CAD, CAM and CAE.

(b) Name and briefly explain the different Solid Modelling techniques used in CAD.

(c) What do you mean by Intelligent Manufacturing? Give an example.

3 + 6 + 3 = 12

3.(a) Describe with suitable sketches the Axis system in 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 Figure 1 in a CNC Turning Centre. Raw material is Mild Steel cylindrical bar of 90 mm diameter.

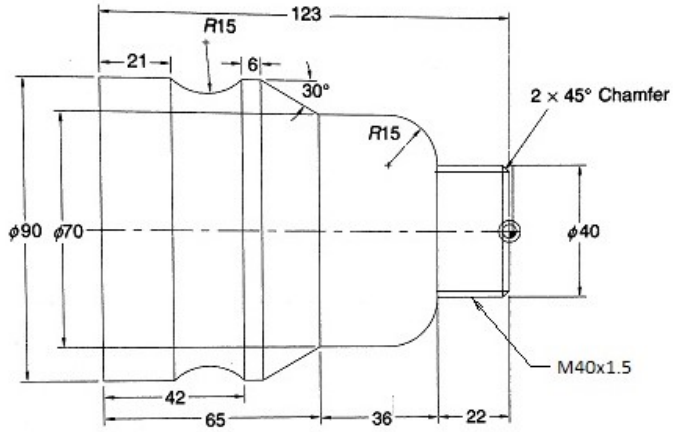

Figure 1

(2 + 3) + 7 = 12

Group – C

4. (a) Explain how Group Technology and Cellular Manufacturing are related. What are design family and production family? Give examples.

(b) Explain Generative type Computer Aided Process Planning (CAPP) method.

(c) Discuss how Touch Trigger Probe is used in Automated Inspection.

(2 + 3) + 4 + 3 = 12

5. (a) What is chip-breaking? How is chip-breaking action implemented in modern cutting tool inserts (Give examples)?

(b) Compare between traditional grinding and creep grinding processes. Write down the advantages of creep grinding process.

(c) Explain modern techniques of Reverse Engineering with an example.

(1 + 3) + (2 + 2) + 4 = 12

Group – D

6. (a) State Faraday's law of electrolysis. Show chemical reactions that takes place in electrolyte, anode and cathode during Electro-chemical Machining (ECM) process.

(b) Explain the principle of metal removal in Ultrasonic Machining (USM) process and also state that what are the different types of feed mechanism used in USM process with suitable diagrams.

(c) Briefly explain the significance of electrolyte used in Electro-chemical Machining (ECM).

(1 + 3) + (3 + 3) + 2 = 12

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

(b) Describe how process parameters affect the material removal rate in Water Jet Machining (WJM). State the limitations of Water Jet Machining (WJM) process.

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

Group – E

8. (a) With a suitable diagram, explain the working principle of Electron Beam Machining (EBM) process.

(b) Discuss the mechanism of metal removal for Abrasive Jet machining (AJM) with a neat sketch. How to select the best possible abrasive and nozzle material to be used in this process?

(c) What are the major applications of Laser Beam Machining (LBM) process?

5 + (3 + 2) + 2 =12

9.(a) With suitable sketches, explain Standoff Technique and Contact Technique in relation to High Energy Explosive Forming Process.

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

(3 + 3) + 6 = 12