

SPECIAL SUPPLE 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) Abrasive jet machining (AJM) can be classified as which of the following types of non-traditional machining process?
(a) Electrical (b) Optical
(c) Mechanical (d) Chemical.
- (ii) Element of machine which is used to convert high frequency electrical impulse into mechanical vibration in Ultrasonic machining is known as
(a) generator (b) transducer
(c) feeding unit (d) tool.
- (iii) Dielectric medium in Electric Discharge Machining (EDM) is used to
(a) make the medium conducting (b) flush away the debris
(c) decrease the material removal rate (d) resist tool wear.
- (iv) Plasma Arc Machining (PAM) can be used for machining
(a) electrically conducting material
(b) electrically non-conducting material
(c) both conducting and non conducting material
(d) none of these.
- (v) Electro-Hydraulic forming process is operated at a
(a) high pressure (b) low pressure
(c) moderate pressure (d) high temperature.
- (vi) Circular Interpolation (clockwise) in CNC is implemented by which of the following G-codes?
(a) G00 (b) G01 (c) G02 (d) G03.

- (vii) Robotic arm is an integrated part of
 - (a) Flexible Manufacturing System
 - (b) Co-ordinate Measuring Machine
 - (c) Computer Aided Drawing
 - (d) Laser Beam Machining.

- (viii) Diamond tools should be used for high speed machining of
 - (a) cast iron jobs
 - (b) mild steel jobs
 - (c) aluminium jobs
 - (d) carbide jobs.

- (ix) The fundamental philosophy of Computer Integrated Manufacturing (CIM) is
 - (a) value engineering
 - (b) reverse engineering
 - (c) concurrent engineering
 - (d) sequential engineering.

- (x) Stereolithography is a
 - (a) CAPP process
 - (b) CAD system tool
 - (c) rapid prototyping process
 - (d) type of measuring instrument.

Group - B

- 2. (a) What do you mean by Flexible Manufacturing System (FMS)? Write down the benefits of Flexible Manufacturing System (FMS).
- (b) Describe Automated Storage and Retrieval System (AS/RS).
- (c) Explain how CAD-CAM improves productivity of a Manufacturing System?
(2 + 3) + 4 + 3 = 12

- 3. (a) Explain any one Automated Guided Vehicle (AGV) with suitable figure.
- (b) Write a manual part program for machining a component as shown in Fig.1 in a CNC Turning Centre. Raw material is Mild Steel cylindrical bar of 40 mm diameter.

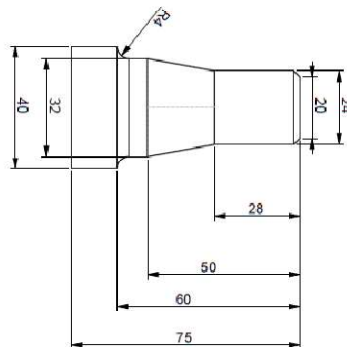


Fig. 1

4 + 8 = 12

Group – C

4. (a) Explain with the help of a sketch the working principle of a Co-ordinate Measuring Machine (CMM).
- (b) What is Group Technology (GT), explain with proper example?
- (c) What are the objectives of computer aided quality control (CAQC)?
4 + 5 + 3 = 12
5. (a) Under what circumstances is Reverse Engineering recommended?
- (b) Name any three modern cutting tool materials with composition.
- (c) What do you mean by Rapid prototyping? Explain any one rapid prototyping method.
4 + 3 + (2 + 3) = 12

Group – D

6. (a) In an ECM process with a pure iron workpiece, a removal rate of 7 cm³/min is desired. Determine the current required. Given: the atomic weight, valency and density of iron are 56, 2 and 7.8 gm/cm³ respectively.
- (b) Explain the working principle of Ultrasonic Machining (USM) Process with the help of suitable diagrams.
- (c) Draw the resistance-capacitance relaxation circuit used in EDM. Show the variation of instantaneous voltage across the tool work gap along with the time.
4 + 4 + (2 + 2) = 12
7. (a) During an electric discharge drilling of a 12 mm square hole in a low carbon steel of 6 mm thickness, brass tool and kerosene are used. The resistance and capacitance in the relaxation circuit are 50 Ω and 10 μF, respectively. The supply voltage is 220 volts and the gap is maintained at such a value that the discharge takes place at 150 volts. Estimate the time required to complete the drilling operation.
- (b) Describe how abrasive size, abrasive shape, nozzle geometry and nozzle to tip distance affect the Material Removal Rate in Abrasive Jet Machining. State the limitations of Abrasive Jet Machining process.
6 + (4 + 2) = 12

Group - E

8. (a) Explain the working principle of Laser Beam Machining (LBM) Process. Also write down its process parameters.

(b) Explain why vacuum is needed in Electron Beam Machining (EBM) Process. What are the applications of Electron Beam Machining (EBM)?

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

9. (a) Describe with a neat sketch the working principle of Electro-Magnetic Forming process.

(b) With suitable diagram, explain the basic principle behind the Explosive forming process giving its application.

6 + 6 = 12