B.TECH/ME/7TH SEM/MECH 4102(BACKLOG)/2021

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) CSG in Solid Modelling relates to (CO2)
(a) cylindrical surface generation (b) constructive solid geometry
(c) common solid grouping (d) creative surface generation.

(ii) The "G code" used for circular interpolation, anticlockwise is (CO1)
(a) G00 (b) G01 (c) G03 (d) G02.

(iii) Scanning Laser beam Method used in Computer Aided Quality Control (CAQC) is (CO2)
(a) electrical sensor based (b) optical sensor based
(c) ultrasonic sensor based (d) any one of the above.

(iv) In Automated Manufacturing CMM relates to (CO4)
(a) centralized manufacturing module
(b) coordinate measuring machine
(c) contour measuring machine
(d) none of these.

(v) Flexible Manufacturing System comprises of (CO3)
(a) single CNC machine & single robot
(b) two CNC machines & single robot
(c) two CNC machines & two robots
(d) several CNC machines & several robots.

(vi) In Ultrasonic machining, the tool (CO5)
(a) moves in transverse direction (b) moves in longitudinal direction
(c) vibrates in transverse direction (d) vibrates in longitudinal direction.

(vii) Laser beam machining can be used for (CO5)
(a) conductors (b) insulators
(c) metals (d) all of these.

(vii) In Electron Beam Machining, workpiece is held in (CO5)
(a) vacuum chamber (b) dielectric medium
(c) electrolyte (d) any one of the above.

(ix) In Abrasive Jet Machining (AJM) the commonly used abrasive is (CO5)
(a) aluminium oxide (b) diamond powder
(c) boron carbide (d) glass powder.

(x) Explosive forming process is operated at a (CO6)
(a) high pressure (b) low pressure
(c) moderate pressure (d) high temperature.

Group – B

2. (a) What are the differences between CAD, CAM and CAE? Mention any four applications of computer aided design in mechanical engineering. [(CO2) (Remember/LOCQ)]

(b) Develop a CNC part program with a diagram to remove 2 mm material from one end of the workpiece by facing operation in two cuts (1 mm in each cut). Where
Material: Mild steel
Workpiece diameter = 70 mm
Work piece length = 50 mm
Feed rate = 0.25mm/ revolution
Spindle speed is 1000 rpm. [(CO1) (Create/HOCQ)]

6 + 6 = 12

3. (a) Explain with the help of a suitable sketch, the working principle of an automated guided vehicle (AGV). [(CO3) (Understand/LOCQ)]

(b) Write a case study on automated storage and retrieval systems (AS/RS) used in industries. [(CO3) (Analyse/IOCQ)]

6 + 6 = 12

Group – C

4. (a) Describe Group Technology (GT). Also explain why GT is important in achieving CAD and CAM integration. [(CO4) (Analyze/IOCQ)]

(b) Interpret Generative type Computer Aided Process Planning (CAPP) method applied in industries. [(CO2) (Apply/IOCQ)]

6 + 6 = 12

5. (a) Discuss any two modern cutting tools with reference to materials used and improved geometry. [(CO4) (Remember/LOCQ)]

(b) Explain the Reverse Engineering process with a suitable example. [(CO4)(Understand/LOCQ)]

6 + 6 = 12

Group – D

6. (a) State any four process variables that control the material removal rate in the Abrasive Jet Machining process. Why is abrasive jet machining not recommended to machine ductile materials? [(CO5) (Analyse/IOCQ)]
   (b) Describe the apparatus, metal removal rate, process principles and application areas of the Water Jet Machining process. [(CO5) (Understand/LOCQ)]

6 + 6 = 12

7. (a) Describe the roles of dielectric fluid used in Electro Discharge Machining. Define the principle of Electron Beam Machining. [(CO5)(Understand/LOCQ)]
   (b) Illustrate with the help of a simple diagram the working principle of Electro-chemical machining process. [(CO5)(Apply/IOCQ)]

6 + 6 = 12

Group – E

8. (a) Summarize the commonly used gas mixtures and application areas of the Plasma Arc Machining process. [(CO5)(Understand/LOCQ)]
   (b) Summarize the process parameters of Laser Beam Machining and briefly describe how process parameters influence on machining quality. [(CO5)(Evaluate/HOCQ)]

6 + 6 = 12

9. (a) Write down the applications, advantages and limitations of high energy rate forming processes over conventional forming processes. [(CO6)(Remember/LOCQ)]
   (b) Describe with a neat sketch the working principle of Electro-Hydraulic Forming process. [(CO6)(Apply/IOCQ)]

6 + 6 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	50%	37.5%	12.5%

Course Outcome (CO):

After the completion of the course students will be able to

CO1	Acquire working knowledge on computer integration with mechanical systems.
CO2	Learn about computer aided design, manufacturing, process planning and quality control.
CO3	Form basic ideas on cellular, flexible manufacturing system and automated material handling, storage, retrieval system.
CO4	Understand reverse engineering, group technology, rapid prototyping, high speed machining and solid modeling techniques.
CO5	Learn various non-traditional machining processes and their application.
CO6	Familiarization with the high energy rate forming processes.

*LOCQ: Lower Order Cognitive Question; IOCQ: Intermediate Order Cognitive Question; HOCQ: Higher Order Cognitive Question

Department & Section	**Submission link:**
ME	**Submission Link:** https://classroom.google.com/c/NDY0MTYxMTA1MTAw/a/NDY0MTYxMTA1MTI2/details
	Google Classroom Code: ofx5u6v