



**ST. ANNE'S COLLEGE OF ENGINEERING AND TECHNOLOGY**  
(Accredited by NAAC, Approved by AICTE, New Delhi. Affiliated to Anna University, Chennai)  
ANGUCHETTYPALAYAM, PANRUTI – 607 106.

**DEPARTMENT OF MECHANICAL ENGINEERING**

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**ME8073-UNCONVENTIONAL MACHINING PROCESSES**

**REGULATION - R-2017**

**FINAL YEAR - SEVENTH SEMESTER**

**PREPARED BY**

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## UNIT – I

Q.No	QUESTIONS
1	State the industrial needs for unconventional machining processes.
2	Why is unconventional mechanical machining process not popular?
3	List the requirements that demand the use of nontraditional machining processes.
4	Classify modern machining processes on the basis of the type of energy employed.
5	Write the importance of surface finishing in machining operations.
6	What are the advantages of unconventional machining process?
7	List the unconventional machining process which uses mechanical energy.
8	Distinguish traditional and non-traditional machining.
9	List out the limitation of traditional machining processes.
10	Why abrasive jet machining is not recommended to machine ductile materials?
11	Reuse of abrasives is not recommended in abrasive jet machining process.
12	List the different type of abrasives used in AJM.
13	List the applications of WJM.
14	Name any four process variables that control the material removal rate in AJM process.
15	Identify the transfer medium in AJM and also abrasives used?
16	List the limitations in ultrasonic machining
17	Define the functions of transducers in ultrasonic machining.
18	Give the range of frequency required for ultrasonic machining.
19	Mention the functions of a horn in ultrasonic machining.
20	What is feed mechanism and state its types?

Q. No	QUESTIONS
1	Explain the basis on selection of unconventional machining process for given job.
2	(i) Why electro chemical process is found to be most potential process for gear finishing? (7) (ii) Explain its principle, key process parameters and other applications. (6)
3	(i) Elaborate the classification of modern machining process on the basic of energy employed. (7) (ii) Discuss the mechanism of material removal and energy transfer in each

4	How are the developments in the area of materials partly responsible for evolution of advanced machining techniques?
5	Classify the unconventional machining process on the basis of type of energy employed, MRR, Transfer medial and energy resources used.
6	Summarize the needs for development of unconventional machining processes? Explain with examples.
7	(i) What are the factors that affect the performance of WJM process? (8) (ii) Discuss their effect of MRR. (5)
8	Draw the schematic layout of abrasive jet machine and explain wear rate of nozzle in AJM
9	Describe the apparatus, metal removal rate, process principles and application of Water Jet Machining.
10	Explain the principles, equipments, transducer, tool holders, tools, abrasives, applications, advantages of Ultrasonic Machining.
11	Write a brief note on Types of transducers used in USM
12	Describe the methods of generating the ultrasonic and characteristics of the various types of tool holders and the tool feed mechanism in USM process and the process parameters.
13	Write short notes on the following related to Ultra Sonic Machining: (i) Functions of slurry and oscillator in USM (8) (ii) Grain size vs Machining rate. (5)
14	Draw the schematic layout of abrasive jet machine and explain wear rate of nozzle in AWJM
1	(i) What are the basic limitations of conventional manufacturing process? (8) (ii) Justify the need of unconventional manufacturing process in today's industries. (7)
2	How are the developments in the area of materials partly responsible for evaluation of advanced machining techniques?
3	Do you think it should be possible to produce spur gears by advanced machining processes, starting with round blank? Explain.
4	With appropriate sketches, describe the principles of various Fixing methods and devices that can be used for USM.

## UNIT II

Q.No	QUESTIONS
1	Name some of the most commonly used dielectric fluids in EDM.
2	List the desirable properties of a good dielectric fluid.
3	What are the roles of dielectric fluid in EDM?
4	List the EDM flushing techniques.
5	List the applications of wire EDM.
6	Label the difference between wire cut EDM and EDM process.
7	Assess the influence of current in MRR in EDM process.
8	Assess the ways of gap-flushing used in EDM.
9	What are the factors affecting metal removal rate?
10	How the tool materials are classified?
11	What do you mean by plasma?

12	What is the advantage of EBM over LBM?
13	State the working principle of Plasma arc Machine Process.
14	Narrate the principle of electron beam machining.
15	Write the advantages of Plasma Arc Machining.
16	List various types of lasers.
17	Distinguish vacuum and non-vacuum EBM.
18	What is the Acronym of LASER?
19	What is the function of electron beam gun?
20	Discuss commonly used gas mixture in PAM.

Q.No	QUESTIONS
1	Sketch and explain of metal removal in EDM process.
2	(i) Explain the general arrangement of an Electrical discharge machining process (8) (ii) List out its advantages, disadvantages and applications of EDM. (5)
3	(i) Describe the principle, construction and working of Wire-cut electrical discharge machining process (WCEDM). (8) (ii) State its merits and demerits. (5)
4	Briefly explain various types of dielectric fluid and its functions in EDM process.
5	Explain the following on wire EDM technology (i) Dielectric System (7) (ii) Deionized water (6)
6	Explain the break down mechanism in EDM process.

7	Discuss the types of tool wear in EDM process.
8	What is LASER? Explain how it is used to machine the materials.
9	Describe the process parameters of LBM and influence on machining quality.
10	Explain the following in LBM process (i) Advantages (5) (ii) Disadvantages (4) (iii) Application. (4)
11	Explain the principles of EBM with neat sketch.
12	Explain the control of following parameter in EBM (i) current (5) (ii) Spot diameter (4) (iii) Focus distance of magnetic lens. (4)
13	Briefly explain on under water plasma cutting.
14	Describe the principles, equipments, solid state laser, gas laser thermal features applications and advantages of Plasma Arc Machining.
1	In which of the manufacturing activities in industry is the wire EDM process most applicable?
2	Why do different material-removal processes affect the fatigue strength of materials to different degrees?
3	Describe your thoughts regarding the laser beam machining of nonmetallic material. Give several possible applications, including their advantages as compared to other process.
4	Describe the types of surfaces produced by EBM, PAM and Laser cutting.

### UNIT III

Q.No	QUESTIONS
1	State the principle of chemical machining process.
2	What are the three different layers that can be identified in spark eroded surface?
3	What do you understand by charging of electrolyte?
4	Define maskants in Electrochemical machining process.
5	List the factors that affect MRR in ECM
6	Summarize the application of ECM.
7	Name the electrolytes which are used in electro chemical machining
8	Calculate the amount of current required when iron is subjected to electro chemical process. The material removal rate $5\text{cm}^3/\text{min}$ . Assume weight of iron $58\text{kg}$ , valency 2, density of iron $7.78\text{ g/cm}^3$ .
9	What are etchant in chemical machining process?
10	List the advantages of ECM process.
11	What is the advantage of ECG over conventional grinding?
12	Give the application of electro chemical grinding.
13	What are the parameters that affect the material removal rate in Electrochemical Grinding?

14	Experiment the difference between electroplating and ECM
15	State the principle of electro chemical grinding process
16	State the principle of electro chemical honing process
17	List the advantages of ECH process.
18	Generalize techniques of applying maskant.
19	Explain etchant.
20	List the process parameters of ECH process.

<b>Q.No</b>	<b>QUESTIONS</b>
1	With the help of a simple diagram, explain briefly the working of Electro-chemical machining process.
2	Explain the principle of electro chemical deburring process.
3	Discuss about the types of maskants used in chemical machining.
4	Explain the followings with respect to chemical machining process: (a) Characteristics of cut and peel maskants (5) (b) Selection of maskants (4) (c) Limitations (4)
5	Explain the following on Electro Chemical Machining process with suitable sketches: (a) Cathode tool (7)

6	(i)With a neat sketch, explain the principle of electro-chemical grinding. (8)(ii)State its process capabilities and application (5)
7	Explain the electro-chemical Honing process with a neat sketch.
8	Compare the Chemical Machining (CHM) with Electro-ChemicalMachining (ECM) with respect to their process parameters.
9	Explain a neat sketch, explain the chemical machining process.
10	Discuss the effect of high temperature and pressure of electrolyte of ECMprocess.
11	Explain the process parameters MRR and surface finish in CHM.
12	Explain the requirement of tool material for ECM process; Write thecommonly used tool materials.
13	Calculate amount of current required the iron is subjected to ECM process.The metal removal rate of iron is $4\text{cm}^3/\text{min}$ . assuming atomic weight iron $N=56$ Kg, valancy $n=2$ , density of iron $\rho = 7.787 \text{ g/cm}^3$ .
14	Predict the MRR by ECG comprise. What are the functions of abrasiveparticles?
1	Explain the basis, why surface finish of chemically machine surface of analloy is poor.
2	During the machining of iron (Fe) using aqueous solution of Nacl. What arethe possible reactions at electrode?
3	Briefly discuss about electro chemical deburring process parameters ofchemical machining process that influence the performance of the machining?
4	Explain why the life of the ECG wheel is much higher than conventionalgrinding.

## UNIT IV

Q.No	QUESTIONS
1	What is abrasive flow machining ?
2	Name the classifications of AFM machine.
3	List the key components of AFM process.
4	Write a note on process input parameters of AFM.
5	Mention the operating range of AFM.
6	Compare the difference between one way and two way AFM.
7	What are the advantages of one way AFM?
8	Write about applications of AFM.
9	What is Chemical-mechanical polishing?
10	Give a note on Damascene process.
11	State the use of PVA in CMP.
12	Mention the role of slurry in CMP process.
13	Write any two applications of CMP.
14	List any two advantages of CMP.
15	What is magneto rheological finishing?

16	Name the components of MR fluid.
17	Generalize the desired properties of MR fluid.
18	Write any two advantages of MRF.
19	List the limitations of MRF process.
20	Mention the applications of MRAFF process.

<b>Q.No</b>	<b>QUESTIONS</b>
1	Describe briefly the role of CMP in Semiconductor manufacturing.
2	Write about the origin and evolution of CMP process.
3	Explain the Copper dual-damascene process with a sketch.
4	Mention the working of CMP Planarization process.
5	Explain the working principle of AFM with a neat sketch.
6	Elaborate on the one way and two way AFM with neat diagram.
7	Write in detail about the process parameters of AFM and their effect on output responses.
8	Describe the working principle of orbital AFM. (7) Write about the operating range and advantages of AFM. (6)
9	Explain in detail about the MR fluid in Magnetorheological Finishing



10	With a neat sketch explain the schematic of MR finishing.
11	Elaborate on the process parameters of MRF and their applications.
12	Write about the magnetic abrasive finishing process working principle with a neat diagram.
13	Explain about the magnetorheological polishing fluid
14	Write about the mechanism of magnetorheological abrasive honing (MRAH)
1	Write about the current & future developments of CMP.
2	Explain with cases how AFM is applied in different industries.
3	Elaborate about the recent ball-end magnetorheological finishing used in industries.
4	Write about the applications of Magnetic assisted abrasive flow machining.

## UNIT V

Q.No	QUESTIONS
1	What is rapid prototyping?
2	What are the materials used in rapid prototyping?
3	How do development of a CAD model.
4	List the Trends in manufacturing industries.
5	Write the disadvantage of conventional machining.
6	Write the purpose of supporting structures.
7	What are the desirable features of Stereo lithography resin?
8	What is the need for a prototype in new product development?
9	list the need and importance of rapid prototyping
10	Classify rapid prototyping systems.
11	List the application areas of stereolithography process.
12	What is fusion deposition modelling?
13	What is the power source used to heat-up the material?
14	Give the application of fusion deposition modelling.
15	What are the materials used in FDM system.
16	What are the steps involved in producing a part by solid base curing?
17	List the applications of the solid ground curing.
18	Write the limitations of LOM.
19	What are the materials used in SLS system.
20	Define concept modeling.

1	(ii) Discuss the evolution of RP systems indicating the history and their growth rate in the industrial sector.	(5)
2	(i) Explain the advantages and limitations.	(8)
	(ii) Write a note on history of RP systems.	(5)
3	Discuss the steps followed in rapid prototyping process.	
4	Describe the role of RP in product development.	
5	Discuss about photo polymerization.	
6	Explain the advantages and disadvantages of SLA and SCG.	
7	Explain the process details on the quality of product in SLA.	
8	Explain the working principle and details of process parameters of an FDM machine.	
9	With neat sketches explain solid ground curing process and its	

10	Describe laminated object manufacturing process and discuss the principle and effect of process parameters on qualities of final product.
11	Explain the working principle and details of process parameters of an SLS machine.
12	Describe the working principle Solid Ground Curing (SGC)
13	Compare the features of SLA and SGC with example.
14	Distinguish the following process: FDM, LOM, SGC and SLS.
1	Discuss the suitable measures to reduce distortions in SLA process.
2	Describe laminated object manufacturing process and discuss the principle and effect of process parameters on qualities of final product.
3	Explain in detail about process details and machine details of 3-D printing
4	Discuss the recent development in UCMP with case study.

