



# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad -500 043

## MECHANICAL ENGINEERING

### TUTORIAL QUESTION BANK

Course Name	UNCONVENTIONAL MACHINING PROCESSES
Course Code	AME507
Class	VII Semester
Branch	Mechanical Engineering
Year	2019 – 20
Course Coordinator	Mr. VKVS Krishnam Raju, Assistant Professor.
Course Faculty	Mr. VKVS Krishnam Raju, Assistant Professor.

#### COURSE OBJECTIVES:

The course should enable the students:

I	Understand the need and importance of non-traditional machining methods and process selection.
II	Gain the knowledge to remove material by thermal evaporation, mechanical energy process.
III	Apply the knowledge to remove material by chemical and electro chemical methods.
IV	Analyze various material removal applications by unconventional machining process.

#### COURSE OUTCOMES (CO'S):

CO 1	Compare non-traditional machining, classification, material applications in material removal process
CO 2	Summarize the principle and processes of abrasive jet machining.
CO 3	Understand the principles, processes and applications of thermal metal removal processes.
CO 4	Identify the principles, processes and applications of EBM.
CO 5	Understand the principles, processes and applications of Plasma Machining.

#### COURSE LEARNING OUTCOMES:

Students, who complete the course, will have demonstrated the ability to do the following:

AME507.01	Develop utilization of understanding of fundamentals of the traditional cutting tools compare it with other tools.
AME507.02	Identify and utilize fundamentals of metal cutting as applied to machining.
AME507.03	Understand a problem and apply the fundamental concepts and enable to solve problems arising in metal removal process.
AME507.04	Explore the ability to define and formulate the properties of cutting tool materials and characteristics.
AME507.05	Develop the skills of effective utilization of cutting fluids and applications for better productivity.
AME507.06	Competent to design and analyze problems of engineering particularly having relevance to manufacturing.

AME507.07	Comparison between non-traditional machining process with the traditional parameters, energy sources, economics of processes, shape and size of the material.
AME507.08	Identify ability to arrive at cutting parameters for machining.
AME507.09	Develop methods of working for minimizing the production cost.
AME507.07	Apply the best suitable advanced manufacturing process for processing of unconventional materials employed in modern manufacturing industries.
AME507.11	Study the parametric influences during processing of materials using developed models.
AME507.12	Relate distinctive knowledge of unconventional machining processes and performance parameters
AME507.13	Apply unconventional machining process in various industrial applications.
AME507.14	Analyse and simulate various industrial problems in advanced machining processes.
AME507.15	
AME507.16	Explore the use of modern engineering tools, software and equipment to prepare for competitive exams, higher studies etc.

<b>UNIT – I</b>				
<b>INTRODUCTION</b>				
<b>Part - A (Short Answer Questions)</b>				
<b>S No</b>	<b>QUESTION</b>	<b>Blooms Taxonomy level</b>	<b>CO'S</b>	<b>Course Learning Outcomes</b>
1	What is the need for unconventional machining processes	Remember	CO 1	AME507.01
2	Explain the characteristics of UCM processes?	Remember	CO 1	AME507.02
3	Differentiate between the conventional and unconventional machining processes in terms of principles.	Remember	CO 1	AME507.02
4	Classify the different types of unconventional machining processes based on the energy.	Remember	CO 1	AME507.03
5	Identify the mechanism of material removal, transfer media and energy source for USM.	Remember	CO 1	AME507.01
6	List the conventional machining processes.	Remember	CO 1	AME507.02
7	Summarize the unconventional machining processes.	Remember	CO 1	AME507.02
8	List the factors to be consider in process selection.	Remember	CO 1	AME507.01
9	What is coefficient of magnetostrictive elongation.	Remember	CO 1	AME507.02
10	What are the materials used for tool holder in ultrasonic machining.	Remember	CO 1	AME507.02
11	What are the materials used for tool in ultrasonic machining process.	Remember	CO 1	AME507.03
12	What factors to be consider while selecting abrasive for ultrasonic Machining.	Remember	CO 1	AME507.01
13	List out the abrasives used in ultrasonic machining.	Remember	CO 1	AME507.02
14	What is the Volume of material removed in ultrasonic machining as per model proposed by SHAW.	Remember	CO 1	AME507.02
15	Explain in detail the process parameters for controlling the ultrasonic machining performance.	Remember	CO 1	AME507.03
16	What is the effect of amplitude and frequency of vibration on material removal and surface finish obtainable in ultrasonic machining.	Remember	CO 1	AME507.01
17	What is the effect of abrasive grit size on material removal and surface finish obtainable in ultrasonic machining.	Remember	CO 1	AME507.02
18	What is the effect of Static load on material removal and surface finish obtainable in ultrasonic machining.	Remember	CO 1	AME507.02
19	What are the basic elements of ultrasonic machining.	Remember	CO 1	AME507.03
20	What are non-traditional machining methods.	Remember	CO 1	AME507.01
21	State the industrial need for unconventional machining processes	Remember	CO 1	AME507.02
<b>Part - B (Long Answer Questions)</b>				
<b>S No</b>	<b>QUESTION</b>	<b>Blooms Taxonomy level</b>	<b>CO'S</b>	<b>Course Learning Outcomes</b>
1	Explain the reasons for the development of Unconventional Machining Process with a neat sketch.	Understand	CO 1	AME507.01
2	Discuss about the criteria recommended in selection of these processes in detail.	Remember	CO 1	AME507.02
3	Make a comparison between traditional and unconventional machining processes in terms of cost, Application, scope, Machining time, advantages and limitations.	Understand	CO 1	AME507.02

4	What are the main parameters to be considered while selecting a Particular processes. Why.	Understand	CO 1	AME507.03
5	Explain the factors, which influence the metal removal rate in USM. Explain briefly.	Understand	CO 1	AME507.02
6	What are the basic requirements of tool feed mechanism in USM Processes? Explain.	Understand	CO 1	AME507.02
7	Comment about the applications of modern machining methods.	Understand	CO 1	AME507.03
8	Explain the basic mechanism of metal removal in ultrasonic machining.	Understand	CO 1	AME507.01
9	Explain the principle and working of ultrasonic machining in detail with a neat sketch.	Remember	CO 1	AME507.02
10	Discuss on the transducers and abrasives used in ultrasonic machining.	Understand	CO 1	AME507.02
11	List the commonly used abrasive powder for the tooling of USM and their properties.	Remember	CO 1	AME507.03
12	Discuss in detail about the methods of generating the ultrasonic, characteristics of the various types of tool holder and tool feed mechanisms in USM	Understand	CO 1	AME507.01
13	Define "Ultrasonic" and describe the process in which these are used to machine the material	Understand	CO 1	AME507.02
14	outline a method by which the volume rate of material removal could be computed.	Understand	CO 1	AME507.02
15	Describe the entire range of applications of Ultrasonic machining where it can be used economically	Understand	CO 1	AME507.03
16	What is the effect of Static load on material removal and surface finish obtainable in ultrasonic machining.	Understand	CO 1	AME507.03
17	What is the effect of abrasive grit size on material removal and surface finish obtainable in ultrasonic machining.	Understand	CO 1	AME507.03
18	How is the effect of amplitude and frequency of vibration on material removal and surface finish obtainable in ultrasonic machining.	Understand	CO 1	AME507.03
19	What is the Volume of material removed in ultrasonic machining as per model proposed by SHAW.	Understand	CO 1	AME507.03
20	What is the need for unconventional machining processes. Briefly discuss about the mechanisms involved in material removal by USM.	Understand	CO 1	AME507.01

**Part - C (Problem Solving and Critical Thinking Questions)**

<b>S No</b>	<b>QUESTION</b>	<b>Blooms Taxonomy level</b>	<b>CO'S</b>	<b>Course Learning Outcomes</b>
1	Explain the need for non-traditional machining methods. What are the main parameters to be considered while selecting a particular process.	Understand	CO 1	AME507.01
2	Explain ultrasonic machining process with a neat sketch. Explain the factors, which influence the metal removal rate in ultrasonic machining.	Understand	CO 1	AME507.02
3	What are the main parameters to be considered while selecting a particular process. Explain the various applications of non-traditional machining process in detail.	Understand	CO 1	AME507.02
4	State and explain the factors to be considered during the selection of an unconventional machining process for a given job.	Understand	CO 1	AME507.03
5	How are the developments in the area of materials partly responsible for evolution of advanced machining technique.	Understand	CO 1	AME507.01

6	Classify the unconventional machining process on the basis of the type of energy employed, metal removal, transfer media and energy sources used	Understand	CO 1	AME507.02
7	Calculate the depth of indentation produced on a glass surface in ultrasonic machining by throwing action of abrasive grain of 100 $\mu\text{m}$ diameter. The following data are given. Amplitude of vibration = 0.1 mm, Frequency = 20kc/s. Abrasive density = 3.0 $\text{Kg/m}^3$ , Yield strength of glass = $4.0 \times 10^{11} \text{ N/m}^2$ .	Understand	CO 1	AME507.02
8	Discuss in detail about the methods of generating the ultrasonic, characteristics of the various types of tool holder and tool feed mechanisms in USM.	Understand	CO 1	AME507.01
9	Describe the design procedure for the Horn (Velocity transformer) used in Ultrasonic Machining process.	Understand	CO 1	AME507.02
10	Compare and contrast the various unconventional machining process on the basis of the type of energy employed, material removal rate, transfer media and economical aspects.	Understand	CO 1	AME507.02

## UNIT - II

### ABRASIVE JET MACHINING

#### Part – A (Short Answer Questions)

S No	QUESTION	Blooms Taxonomy level	CO'S	Course Learning Outcomes
1	Why is AJM not suitable for UCM processes.	Remember	CO 2	AME507.04
2	Why WJM is not suitable for brittle materials? Explain.	Understand	CO 2	AME507.05
3	List out the applications of water jet machining.	Understand	CO 2	AME507.05
4	Why WJM is not suitable for brittle materials? Explain.	Understand	CO 2	AME507.06
5	List out the applications of WJM.	Understand	CO 2	AME507.05
6	Summarize the different types of abrasives	Remember	CO 2	AME507.04
7	Explain about electro chemical honing.	Remember	CO 2	AME507.06
8	Explain about deburring process.	Remember	CO 2	AME507.04
9	Give the electro-chemistry associated with electro-chemical machining.	Remember	CO 2	AME507.05
10	Mention the abrasives used for different applications.	Remember	CO 2	AME507.04
11	Name different gases used in AJM. Which of these is most widely used?	Remember	CO 2	AME507.05
12	What is the effect of the grain size on the material removal rate (MRR) in the AJM?	Remember	CO 2	AME507.05
13	What is the effect of jet velocity on the MRR in AJM?	Remember	CO 2	AME507.06
14	Define mixing ratio. What is the effect of mixing ratio on the MRR?	Remember	CO 2	AME507.05
15	What is the effect of the abrasive powder flow rate on the MRR in AJM?	Remember	CO 2	AME507.04
16	What are common materials used for the nozzle in AJM?	Remember	CO 2	AME507.04
17	Why are masks used in AJM? Which material is used for fabrication of masks?	Remember	CO 2	AME507.05
18	Mention the abrasives used for different applications.	Remember	CO 2	AME507.05
19	Name different gases used in AJM. Which of these is most widely used?	Understand	CO 2	AME507.06
20	What is the effect of the grain size on the material removal rate (MRR) in the AJM?	Remember	CO 2	AME507.05

**Part - B (Long Answer Questions)**

<b>S No</b>	<b>QUESTION</b>	<b>Blooms Taxonomy level</b>	<b>CO'S</b>	<b>Course Learning Outcomes</b>
1	State and explain the working principle of abrasive jet machining in detail.	Understand	CO 2	AME507.04
2	Briefly explain the various process parameters that affect the material removal rate and surface quality in ECM.	Understand	CO 2	AME507.05
3	Explain the different variables that influences the rate of metal removal and accuracy in Abrasive Jet Machining?	Understand	CO 2	AME507.05
4	What is the principle of WJM? Describe the working of a WJM system with a neat sketch.	Understand	CO 2	AME507.06
5	Describe the apparatus, process parameters, process capabilities and applications of Abrasive-water Jet machining.	Understand	CO 2	AME507.05
6	Explain the principle of electro-chemical grinding. State its process capabilities and applications with a neat sketch.	Understand	CO 2	AME507.04
7	Explain the working of ECM process, write down the advantages, disadvantages and applications.	Understand	CO 2	AME507.05
8	Discuss in detail about the AJM process variables that influence the rate of material removal and accuracy in the machining	Understand	CO 2	AME507.05
9	How the restriction offered bypass way governs MRR and quality of surface produced in AFM.	Understand	CO 2	AME507.06
10	Explain the effect of following parameters on the metal removal rate in AJM, Velocity of fluid, Design of nozzle, Gas pressure effect in AJM.	Understand	CO 2	AME507.05
11	Discuss why the AJM technique, when applied to ductile materials, leads to a low rate of metal removal.	Understand	CO 2	AME507.04
12	Explain the principle of ECM process with a neat sketch. Briefly explain various parameters effect the surface quality in ECM.	Understand	CO 2	AME507.04
13	Briefly explain the various process parameters that affect the material removal rate and surface quality in ECM.	Understand	CO 2	AME507.05
14	Explain the different variables that influences the rate of metal removal and accuracy in Abrasive Jet Machining	Understand	CO 2	AME507.05
15	What is the principle of WJM? Describe the working of a WJM system with a neat sketch	Understand	CO 2	AME507.06
16	Explain the principle of ECM. Derive an equation for metal removal rate in electro-chemical machining.	Understand	CO 2	AME507.05
17	Comment about surface finish and accuracy in electro-chemical machining.	Understand	CO 2	AME507.04
18	Explain the influence of nature of abrasives on metal removal rate in abrasive jet machining.	Understand	CO 2	AME507.04
19	Derive an equation for metal removal rate in ECM. What are essential characteristics of an electrolyte used in ECM process?	Understand	CO 2	AME507.05
20	Discuss about the electrochemical honing and electrochemical grinding. What are the factors on which the selection of a resist for use in chemical machining	Understand	CO 2	AME507.06

**Part – C (Problem Solving and Critical Thinking)**

<b>S No</b>	<b>QUESTION</b>	<b>Blooms Taxonomy level</b>	<b>CO'S</b>	<b>Course Learning Outcomes</b>
1	Briefly explain the various process parameters that affect the material removal rate and surface quality in ECM.	Understand	CO 2	AME507.04
2	Write the advantages, limitations, and applications of electro chemical honing	Understand	CO 2	AME507.05

3	What is the principle of WJM? Describe the working of a WJM system with a neat sketch.	Understand	CO 2	AME507.05
4	What the reaction are possible in cathode (tool) and anode (workpiece) in ECM process? (Assume electrolyte NaCl). What are the operations performed in ECM	Understand	CO 2	AME507.06
5	Draw the schematic diagram and explain the principle of operation of electrochemical grinding process.	Understand	CO 2	AME507.05
6	In a certain electro chemical dissolution process of iron, a MRR of $2 \text{ cm}^3 / \text{min}$ was desired .determine the amount of account of current required for the process. Assume Atomic weight of iron =56gm; Valancy at which dissolution occur =2; Density of iron =7.8 gm/cm <sup>3</sup> .	Understand	CO 2	AME507.04
7	A glass is being machined at MRR of $6 \text{ mm}^3 / \text{min}$ by Al <sub>2</sub> O <sub>3</sub> abrasive grits having a grit diameter of 150µm. If 100 µm grits were used, what would be the MRR?	Understand	CO 2	AME507.05
8	List out the materials of abrasives and nozzles used in Abrasive jet machining process. Explain the magnetic abrasive finishing process with neat diagrams.	Understand	CO 2	AME507.05
9	How is metal removed in abrasive jet machining process? Explain the mechanism with neat diagram. Explain the process elements of abrasive flow finishing process	Understand	CO 2	AME507.06
10	In a certain electro chemical dissolution process of iron, a MRR of $5 \text{ cm}^3 / \text{min}$ was desired .determine the amount of account of current required for the process. Assume Atomic weight of iron =56gm; Valancy at which dissolution occur =1; Density of iron =6.8 gm/cm <sup>3</sup> .	Understand	CO 2	AME507.05

### UNIT-III (CIE-I)

#### THERMAL METAL REMOVAL PROCESSES

##### Part - A (Short Answer Questions)

S No	QUESTION	Blooms Taxonomy level	CO'S	Course Learning Outcomes
1	Write down the limitations of Electric discharge machining.	Understand	CO 3	AME507.09
2	What are the roles of dielectric fluid in EDM.	Understand	CO 3	AME507.08
3	Name some of the tools material used in EDM.	Remember	CO 3	AME507.08
4	What are the dielectric fluids commonly used in EDM.	Understand	CO 3	AME507.07
5	What factor are to be considered for the selection of tool material in electric discharge machining.	Understand	CO 3	AME507.07
6	What is wire Electric discharge machining.	Understand	CO 3	AME507.09
7	Write down the limitations of Electric discharge machining.	Understand	CO 3	AME507.09
8	What do you mean by recast layer with reference to the EDM?	Understand	CO 3	AME507.07
9	Why copper is generally used as electrode in EDM process?	Remember	CO 3	AME507.09
10	What are the tool materials used in EDM process	Understand	CO 3	AME507.09

##### Part – B (Long Answer Questions)

S No	QUESTION	Blooms Taxonomy level	CO'S	Course Learning Outcomes
1	Discuss the effect of process parameters on the metal removal in Electric discharge machining.	Understand	CO 3	AME507.09
2	Explain how the pulses can be controlled in electrical discharge machine using relaxation circuit.	Understand	CO 3	AME507.08

3	Explain the working of electric discharge grinding with the help of a line diagram.	Understand	CO 3	AME507.08
4	Explain the basic mechanism of metal removal in electrical discharge machining.	Understand	CO 3	AME507.07
5	Discuss the advantages of EDM as compared to other non-traditional methods with regard to Metal removed rate, Accuracy and Surface finish.	Understand	CO 3	AME507.07
6	Name some of the dielectric fluids commonly used in EDM. Name some of the tool material used in EDM.	Understand	CO 3	AME507.09
7	Compare the R-C and R-C-L power operating circuit in EDM process, What are the observations of spark eroded surface in EDM process?	Understand	CO 3	AME507.09
8	Sketch and explain the electrode feed control system in EDM process. Develop an expression for the MRR in EDM	Understand	CO 3	AME507.07
9	Discuss the advantages of EDM as compared to other UCMP with regard to Surface finish, Accuracy.	Understand	CO 3	AME507.09
10	Enumerate with neat schematic diagram principle of EDM, Mention selection of tool electrode and dielectric fluids in EDM process	Understand	CO 3	AME507.09

**Part – C (Problem Solving and Critical Thinking)**

<b>S No</b>	<b>QUESTION</b>	<b>Blooms Taxonomy level</b>	<b>CO'S</b>	<b>Course Learning Outcomes</b>
1	Mention selection of tool electrode and dielectric fluids in EDM process.	Understand	CO 3	AME507.09
2	Discuss the advantages of EDM as compared to other UCMP with regard to process parameters.	Understand	CO 3	AME507.09
3	Develop an expression for MRR in EDM. Compare the R-C and R-C-L power operating circuit in EDM process.	Understand	CO 3	AME507.09
4	What are the observations of spark eroded surface in EDM process.	Understand	CO 3	AME507.08
5	Enumerate with neat schematic diagram principle of EDM, Develop an expression for material removal rate in electrical discharge machine.	Understand	CO 3	AME507.08

**UNIT-III (CIE-II)**

**THERMAL METAL REMOVAL PROCESSES**

**Part - A (Short Answer Questions)**

<b>S No</b>	<b>QUESTION</b>	<b>Blooms Taxonomy level</b>	<b>CO'S</b>	<b>Course Learning Outcomes</b>
1	What are the applications of Wire EDM?	Understand	CO 3	AME507.09
2	What is the use of dielectric in EDM process?	Remember	CO 3	AME507.08
3	What the dielectric fluids commonly used in EDM?	Understand	CO 3	AME507.08
4	List the desirable characteristics of a dielectric.	Understand	CO 3	AME507.07
5	What is tool wear in the EDM process?	Understand	CO 3	AME507.07
6	How to minimize tool wear in EDM?	Understand	CO 3	AME507.09
7	Identify the characteristics of an electrode material in order to serve as a good tool.	Understand	CO 3	AME507.09
8	Explain characteristics of spark eroded surface.	Understand	CO 3	AME507.07
9	What are the applications of Wire EDM.	Understand	CO 3	AME507.09
10	Explain wire EDM.	Understand	CO 3	AME507.09



<b>Part – B (Long Answer Questions)</b>				
<b>S No</b>	<b>QUESTION</b>	<b>Blooms Taxonomy level</b>	<b>CO'S</b>	<b>Course Learning Outcomes</b>
1	Comment about the nature of spark eroded surfaces.	Understand	CO 3	AME507.09
2	Define electric. Write a note on it indicating its function and characteristics.	Understand	CO 3	AME507.08
3	Explain the process of wire cut EDM and list any two of its advantages, limitations and applications.	Understand	CO 3	AME507.08
4	What are the desirable properties of a dielectric fluid. Give	Understand	CO 3	AME507.07
5	Explain the process of wire cut EDM with a neat sketch	Understand	CO 3	AME507.07
6	Name some of the dielectric fluids commonly used in EDM. Name some of the tool material used in EDM.	Understand	CO 3	AME507.09
7	Explain the process of wire cut EDM with a neat sketch	Understand	CO 3	AME507.09
8	Mention selection of tool electrode and dielectric fluids in EDM process	Understand	CO 3	AME507.07
9	For a relaxation circuit used in EDM process prove that $V_e = V_o (1 - e^{-t/RC})$ .	Understand	CO 3	AME507.09
10	Differentiate between electro discharge grinding and wire EDM process	Understand	CO 3	AME507.09

**Part – C (Problem Solving and Critical Thinking)**

<b>S No</b>	<b>QUESTION</b>	<b>Blooms Taxonomy level</b>	<b>CO'S</b>	<b>Course Learning Outcomes</b>
1	Discuss the nature of inaccuracies of machining surface obtained by EDM and WEDM process and mention the methods of reducing their effects?	Understand	CO 3	AME507.09
2	What are the observations of spark eroded surface in EDM process.	Understand	CO 3	AME507.08
3	Name some of the dielectric fluids commonly used in EDM how selection of dielectric fluids is made.. Name some of the tool material used in EDM.	Understand	CO 3	AME507.08
4	Explain the principles, equipment's, dielectric system, electrode, tools, process capabilities, applications and advantages of Electro Discharge Machining.	Understand	CO 3	AME507.09
5	Explain the principles, equipment's, positioning system, wire drive system, process capabilities applications and advantages of Electro Discharge Wire cutting.	Understand	CO 3	AME507.08
6.	What are the desirable properties of a dielectric fluid? Gives some examples for dielectric fluids. Explain the functions of dielectric fluid.	Understand	CO 3	AME507.08

**UNIT-IV**

**ELECTRON BEAM MACHINING**

**Part – A (Short Answer Questions)**

<b>S No</b>	<b>QUESTION</b>	<b>Blooms Taxonomy level</b>	<b>CO'S</b>	<b>Course Learning Outcomes</b>
1	Explain principle involved in EBM.	Remember	CO 4	AME507.11
2	What is the principle of LBM.	Remember	CO 4	AME507.10
3	Summarize the major components of the electron gun.	Remember	CO 4	AME507.11

4	Distinguish between EBM and LBM	Understand	CO 4	AME507.12
5	What are the applications of LBM.	Understand	CO 4	AME507.11
6	Explain the mechanism involved in material removal of electron beam machining.	Understand	CO 4	AME507.10
7	Discuss the advantages of EDM as compared to other non-traditional methods with regard to metal removal rate?	Understand	CO 4	AME507.11
8	Discuss the advantages of EDM as compared to other non-traditional methods with regard to accuracy?	Understand	CO 4	AME507.12
9	Discuss the advantages of EDM as compared to other non-traditional methods with regard to surface finish?	Understand	CO 4	AME507.11
10	Compare between thermal and nonthermal features of EBM.	Understand	CO 4	AME507.11
11	Compare between LBM and EBM processes on the basis of their applications and limitations.	Understand	CO 4	AME507.10
12	Distinguish between thermal and Non-thermal process in EBM process.	Understand	CO 4	AME507.11
13	What are the limitations of laser beam machining.	Understand	CO 4	AME507.12
14	Comment about accuracy of cut in electron beam machining.	Understand	CO 4	AME507.11
15	What materials are generally used for generation of lasers.	Understand	CO 4	AME507.10
16	Discuss the thermal features of laser beam.	Understand	CO 4	AME507.11
17	Comment about accuracy of cut in electron beam machining.	Remember	CO 4	AME507.10
18	Explain the principle of Laser beam.	Remember	CO 4	AME507.11
19	Name and explain the device which produces electron beam.	Remember	CO 4	AME507.12
20	What is meant by laser beam drilling.	Remember	CO 4	AME507.11

**Part – B (Long Answer Questions)**

<b>S No</b>	<b>QUESTION</b>	<b>Blooms Taxonomy level</b>	<b>CO'S</b>	<b>Course Learning Outcomes</b>
1	Explain the basic components of Electron beam machining	Understand	CO 4	AME507.11
2	List out the applications of laser beam machining.	Understand	CO 4	AME507.10
3	Describe how the laser beam is used for machining. Enumerate the advantages and limitations of the process.	Remember	CO 4	AME507.11
4	Compare EBM and LBM on the aspects, machining rate, tool wear rate, accuracy.	Remember	CO 4	AME507.12
5	Discuss the features of LBM. With a neat sketch explain the EBM process.	Understand	CO 4	AME507.11
6	What is the need of doping of LASER and mention various doping materials and their relative advantages?	Understand	CO 4	AME507.10
7	Differentiate between EBM and LBM considering atleast five aspects?	Understand	CO 4	AME507.11
8	Compare the edge production in EBM and LBM. What are the factors influencing edge for maintain in both the processes?	Understand	CO 4	AME507.12
9	Explain variation of temperature with distance from the surface for various pulse durations in EBM.	Understand	CO 4	AME507.11
10	Describe the principles, equipment's, solid state laser, gas laser, thermal features applications and advantages of Laser Beam Machining.	Understand	CO 4	AME507.10
11	Explain the construction and working of Electron beam machining process with a neat sketch.	Understand	CO 4	AME507.11
12	Describe the suitability of LBM and its machining performance, and industrial applications?	Remember	CO 4	AME507.12

13	What are the various LASERS used in practice for machining and explain the requirements of “LASERS”?	Remember	CO 4	AME507.11
14	Compare EBM and LBM on the following aspects: i) Machining rate ii) Tool wear rate iii) Accuracy.	Understand	CO 4	AME507.10
15	How does vacuum and heating of cathode help the performance of electron beam?	Remember	CO 4	AME507.11
16	Describe the thermal features of melting and evaporation process in LBM?	Understand	CO 4	AME507.10
17	Explain briefly about laser. Explain the working of CO <sub>2</sub> laser with neat sketch.	Understand	CO 4	AME507.11
18	Explain the production of laser beam with a neat sketch.	Understand	CO 4	AME507.12
19	Write an equation to compute specific energy of vaporization and mention the applications of EBM.	Understand	CO 4	AME507.11
20	Explain the working of electron gun used in EBM with a neat sketch.	Understand	CO 4	AME507.10

**Part – C (Problem Solving and Critical Thinking)**

S No	QUESTION	Blooms Taxonomy level	CO'S	Course Learning Outcomes
1	Explain why machining of electrically non-conducting materials using EBM process.	Understand	CO 4	AME507.11
2	Explain the working of CO <sub>2</sub> laser in detail with neat sketch.	Understand	CO 4	AME507.10
3	Explain the basic components of Electron beam machining, why machining of electrically non-conducting materials using EBM process	Understand	CO 4	AME507.11
4	Describe how the laser beam is used for machining? Enumerate the advantages and limitations of the process	Understand	CO 4	AME507.11
5	Enumerate LBM and EBM on the aspects of cutting speed, accuracy of cut, tool wear rate.	Understand	CO 4	AME507.10
6	Discuss the thermal features of LBM compared to EBM in detail.	Understand	CO 4	AME507.11
7	Explain the principle and elements of EBM, also how the work table is protected from getting damaged by electron beam	Understand	CO 4	AME507.12
8	Describe the construction and working of “Micro-Drilling” by LASER with a neat sketch.	Understand	CO 4	AME507.11
9	Explain is the need of doping of LASER and mention various doping materials and their relative advantages in doping of laser.	Understand	CO 4	AME507.10

**UNIT-V**

**PLASMA MACHINING**

**Part - A (Short Answer Questions)**

S No	QUESTION	Blooms Taxonomy level	CO'S	Course Learning Outcomes
1	What are the limitations plasma arc machining.	Understand	CO 5	AME507.13
2	What are the applications of chemical machining.	Remember	CO 5	AME507.14
3	What are the steps involved in the chemical machining.	Remember	CO 5	AME507.15
4	What is the function of maskant.	Remember	CO 5	AME507.13
5	List out the etchants used in chemical machining.	Understand	CO 5	AME507.15
6	Generalize techniques of applying maskant.	Understand	CO 5	AME507.13

7	What are the criteria used for selection of etchant.	Understand	CO 5	AME507.14
8	What are the applications of Wire EDM?	Understand	CO 5	AME507.13
9	What is metal resu mechanism in plasma arc cutting?	Understand	CO 5	AME507.14
10	What is etch factor.	Understand	CO 5	AME507.15
11	How maskants are applied to the work piece?	Remember	CO 5	AME507.13
12	Explain PAM parameters.	Remember	CO 5	AME507.15
13	What are the applications of plasma jets.	Remember	CO 5	AME507.13
14	What are the advantages of non- transferred mode of plasma arc.	Understand	CO 5	AME507.14
15	Classify torches in plasma machining	Understand	CO 5	AME507.13
16	List out the etchant used in chemical machining.	Understand	CO 5	AME507.14
17	Summarize the applications of etchants.	Remember	CO 5	AME507.15
18	Explain the principle of plasma arc surfacing.	Understand	CO 5	AME507.13
19	Explain the principle involved in plasma spraying.	Understand	CO 5	AME507.15
20	What are the elements in plasma arc cutting	Understand	CO 5	AME507.13

**Part - B (Long Answer Questions)**

<b>S No</b>	<b>QUESTION</b>	<b>Blooms Taxonomy level</b>	<b>CO'S</b>	<b>Course Learning Outcomes</b>
1	What are the various Etchants used in chemical machining? Mention their characteristics?	Understand	CO 5	AME507.13
2	Explain the advantages of dual gas and water injected plasma torch.	Understand	CO 5	AME507.14
3	What is Etch factor and how can it be controlled in chemical machining.	Understand	CO 5	AME507.15
4	What are the various process parameters to be considered to obtain higher MRR and quality of machined surface.	Understand	CO 5	AME507.13
5	Describe the quality of machining and accuracies obtainable in chemical Machining.	Understand	CO 5	AME507.15
6	Explain what is meant by non-transferred and transferred mode of plasma arc. What are the advantages of each.	Understand	CO 5	AME507.13
7	What are the advantages of water circulation in the torch of the PAM.	Understand	CO 5	AME507.14
8	Why the surface finish and tolerance obtained are poor in Plasma Arc Machining.	Understand	CO 5	AME507.13
9	How the material removal takes place in chemical machining.	Understand	CO 5	AME507.14
10	Explain the advantages of various types of plasma torches.	Understand	CO 5	AME507.13
11	Explain the working of PAM with a neat sketch.	Understand	CO 5	AME507.14
12	Explain the construction details of air plasma torch. With a neat sketch.	Understand	CO 5	AME507.15
13	What are the factors to be considered while selecting maskant.	Understand	CO 5	AME507.13
14	What do you understand by fourth state of matter with reference to PAM.	Understand	CO 5	AME507.15
15	Explain the metal removal mechanism, process parameters, accuracy, surface finish of Plasma Machining.	Understand	CO 5	AME507.13
16	Write short notes on the following i) Shaped tube Electrolytic Machining. ii) Electro Stream Drilling.	Understand	CO 5	AME507.14

17	Explain the construction details of air plasma torch.	Understand	CO 5	AME507.13
18	Write short notes on the following i) Abrasive flow finishing. ii) Magnetic Abrasive Finishing.	Understand	CO 5	AME507.14
19	What are the advantages of water circulation in the torch of the PAM.	Understand	CO 5	AME507.15
20	Why the surface finish and tolerance obtained are poor in Plasma Arc Machining.	Understand	CO 5	AME507.13
<b>Part – C (Problem Solving and Critical Thinking)</b>				
<b>S No</b>	<b>QUESTION</b>	<b>Blooms Taxonomy level</b>		<b>Course Learning Outcomes</b>
1	Explain with the help of suitable diagrams explain the use of various modes of plasma for various purposes in industry. .	Understand	CO 5	AME507.13
2	Explain with neat diagram explain the principle of plasma arc machining. State its advantages, limitations and application.	Understand	CO 5	AME507.14
3	Discuss the criteria's that are applied in the selection of etchant and maskants.	Understand	CO 5	AME507.15
4	Describe the Process parameters of PAM and influence on machining quality? Explain briefly.	Understand	CO 5	AME507.13
5	Describe the quality of machining and accuracies obtainable in chemical machining?	Understand	CO 5	AME507.15
6	What are the essential difference between a plasma arc cutting torch and welding torch. Discuss with neat sketch, metal removal mechanism in PAM	Understand	CO 5	AME507.13
7	Discuss the important considerations in the design of plasma torch, Explain types of plasma arc systems.	Understand	CO 5	AME507.14
8	Distinguish between transferred and Non-transferred Arc type in PAM process based on principle, construction and working. List the advantages, limitations and practical application.	Understand	CO 5	AME507.13

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