



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal, Hyderabad - 500 043

MECHANICAL ENGINEERING

DEFINITIONS AND TERMINOLOGY QUESTION BANK

Course Name	:	UNCONVENTIONAL MACHINING PROCESSES
Course Code	:	AME507
Program	:	B.Tech
Semester	:	VII
Branch	:	Mechanical Engineering
Course Faculty	:	Mr. VKVS KrishnamRaju, Assistant Professor.

OBJECTIVES:

The course should enable the students to:	
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.

DEFINITIONS AND TERMINOLOGY QUESTION BANK

S N o	QUESTION	ANSWER	Blooms Level	CO's	CLO	CLO Code
UNIT-I						
INTRODUCTION TO UNCONVENTIONAL MACHINING PROCESSES						
1	What is the need for unconventional machining processes?	a. High production rate b. Low cost of production c. Better surface integrity d. High surface finish	Remember	CO 1	CLO 01	AME507.01
2	What are the characteristics of UCM processes?	a. Performance is independent of strength barrier b. Use different kinds of energy in direct form c. In general, low MRR but better quality products d. Comparatively high initial investment cost e. Tool material need not be harder than the work piece material. f. Machined surface do not have any residual stresses.	Understand	CO 1	CLO 02	AME507.02
3	What is meant by conventional machining processes?	In conventional machining processes, metal is removed by using some sort of tool which is harder than work piece and is subjected to wear. In this process, tool and work piece are in direct contact with each other	Remember	CO 1	CLO 01	AME507.01
4	What is meant by Unconventional machining processes?	The unconventional machining processes do not employ a conventional or traditional tool for metal removal. Instead they directly utilize some form of energy for metal machining. In this process there is no direct physical contact between the	Understand	CO 1	CLO 03	AME507.03

		tool and work piece.				
5	Differentiate the conventional and unconventional machining processes in terms of principles.(or) Distinguish between traditional and non traditional machining processes?	In conventional processes, the material is removed in the form of chips by the advancing cutting tool that plastically deforms (shearing) the material ahead. In the case of the UCM processes, energy (Electrical, Chemical, Thermo-Electric, and Mechanical) in its direct form is utilized for the material removal and so there is no physical contact between the work piece and tool.	Remember	CO 1	CLO 01	AME507.01
6	What are the various types of energy sources used in non-traditional machining techniques? Give examples for each. (or) How non – traditional machining processes are classified?	Pneumatic pressure - AJM, Hydraulic pressure - WJM, USM, AWJM, Corrosion - CHM, CHB, PCM, High current density in electrolytes - ECM, High voltage - EDM (for sparking); IBM, EBM (ionizing); LBM, (Creating avalanche in lasing medium); PAM (for ionizing the plasma gases)	Understand	CO 1	CLO 02	AME507.02
7	Identify the mechanism of material removal, transfer media and energy source for EDM.	Mechanism of material removal- Fusion of materials by arcs, Transfer media - Electron stream, Energy source – Electrical spark	Remember	CO 1	CLO 03	AME507.03
8	Identify the mechanism of material removal, transfer media and energy source for ECM & ECG.	Mechanism of material removal- Ion displacement, Transfer media – Electrolyte, Energy source - High current	Understand	CO 1	CLO 02	AME507.02
9	Identify the mechanism of material removal, transfer media and energy source for EBM.	Mechanism of material removal- Vaporization, Transfer media - Electron stream, Energy source - High speed electrons	Remember	CO 1	CLO 02	AME507.02
10	Identify the mechanism of material removal, transfer media and energy source for LBM.	Mechanism of material removal- Vaporization, Transfer media - Amplified coherent light radiation, Energy source – powerful radiation	Remember	CO 1	CLO 01	AME507.01
11	Identify the mechanism of material removal, transfer media and energy source for PAM	Mechanism of material removal- Vaporization, Transfer media - Ionised gas stream, Energy source - High voltage	Remember	CO 1	CLO 02	AME507.02
12	Identify the mechanism of material removal, transfer media and energy source for USM	Mechanism of material removal – Erosion, Transfer media - High velocity particles, Energy source - Hydraulic pressure.	Understand	CO 1	CLO 03	AME507.03
13	Identify the mechanism of material removal, transfer media and energy source for AJM.	Mechanism of material removal- Erosion, Transfer media - High velocity particles, Energy source - Pneumatic pressure (Mechanical and fluid motion)	Remember	CO 1	CLO 01	AME507.01
14	Identify the mechanism of material removal, transfer media and energy source for WJM	Mechanism of material removal- Erosion, Transfer media - High velocity water jet, Energy source – pneumatic / Hydraulic pressure.	Remember	CO 1	CLO 02	AME507.02
15	Identify the energy source applied in the following processes: i) IBM ii) CHM iii) ECG iv) ECM v) EDM vi) EBM vii) AJM viii) LBM	IBM – Ionised substance ii) CHM – corrosive agent iii) ECG – Electrical current and Mechanical motion iv) ECM – Electrical current v) EDM – Electrical spark vi) EBM – High speed electrons vii) AJM – Mechanical and fluid motion viii) LBM – Powerful Radiation.	Understand	CO 1	CLO 02	AME507.02

16	What is the necessity for unconventional machining processes? (or) What are the importance of unconventional machining? (or) Enlist the requirement that demands the use of advanced machining process	A harder and difficult to machine materials such as carbides, stainless steel, nitralloy, hastalloy and many other high strength temperature resistant alloys find wide application in aerospace and nuclear engineering industries. Many of these materials also find applications in other industries, owing to their high strength to weight ratio, hardness and heat resisting qualities.	Remember	CO 1	CLO 01	AME507.01
17	Explain the classification of Unconventional machining according to major energy source employed.	Unconventional machining are classified according to major energy source as follows: a. Thermal Energy methods: In this method, heat energy is concentrated on a small area of the work piece to melt and vaporize tiny bits of work material. Examples i) Laser beam machining ii) Plasma Arc machining iii) Electron beam machining iv) Ion beam	Understand	CO 1	CLO 02	AME507.02
18	Name the unconventional machining processes which are i) used to remove maximum material ii) used to remove minimum material iii) consumes maximum power iv) consumes minimum power	i) used to remove maximum material – Electro chemical machining, plasma arc machining ii) used to remove minimum material – Electron beam machining iii) consumes maximum power – Laser beam machining iv) consumes minimum power – Plasma arc machining.	Understand	CO 1	CLO 01	AME507.01
19	Name the unconventional machining processes for machining following materials: i) Non metals like ceramics, plastics and glass ii) Refractories iii) Titanium iv) super alloys v) steel.	i) Non metals like ceramics, plastics and glass – USM, AJM, EBM, LBM ii) Refractories – USM, AJM, EBM, EDM iii) Titanium - EDM iv) super alloys – AJM, ECM, EDM, PAM v) steel – ECM, CHM, EDM, PAM.	Remember	CO 1	CLO 03	AME507.03
20	Name the Unconventional machining processes which produce best surface finish	i) Abrasive Jet machining (AJM) ii) Electro chemical grinding (ECG) iii) Electro chemical Deburring (ECD) iv) Ultrasonic machining (USM)	Understand	CO 1	CLO 02	AME507.02
UNIT-II						
ABRASIVE JET MACHINING						
1	Define ECM?	It is the controlled removal of metals by the anodic dissolution in an electrolytic medium, where the work piece (anode) and the tool (cathode) are connected to the electrolytic circuit, which is kept, immersed in the electrolytic medium.	Understand	CO 2	CLO 04	AME507.04
2	Write the Faraday's first law of electrolysis?	The amount of any material dissolved or deposited is proportional to the quantity of electrolyte passed.	Remember	CO 2	CLO 05	AME507.05
3	Write the Faraday's second law of electrolysis?	The amount of different substances dissolved or deposited by the same quantity of electricity are proportional to their chemical equivalent weight.	Remember	CO 2	CLO 06	AME507.06
4	Write Ohm's law?	Current, $I = V/R$ $V =$ Voltage (volt), $R =$ resistance (ohm)	Understand	CO 2	CLO 05	AME507.05

5	What are the factors that influence oxidation in ECM?	Nature of work piece. 2. Type of electrolyte. 3. Current density. 4. Temperature of the electrolyte.	Remember	CO 2	CLO 05	AME507.05
6	What are the materials used to make the tool electrode? (or) What are the materials used for tools in ECM?	Copper and copper alloys, titanium, aluminum, Graphite, platinum, tungsten carbide, brass, bronze, carbon, Monel and reinforced plastic.	Remember	CO 2	CLO 04	AME507.04
7	What are the main functions of electrolysis in the ECM?	i) For completing the electric circuit between the tool and the work piece and to allow the reaction to proceed efficiently. ii) To remove the products of machining from the cutting region. iii) To carry away the heat generated during the chemical reaction. iv) To avoid ion concentration at the work piece- tool gap. v) It cools the cutting zone which becomes hot due to the flow of high current.	Understand	CO 2	CLO 05	AME507.05
8	What are the properties expected from the electrolysis used in the ECM?	1. High thermal conductivity. 2. Low viscosity and high specific heat. 3. Should be chemically stable even at high temperature. 4. Should be non-toxic and non-corrosive.	Remember	CO 2	CLO 05	AME507.05
9	What are the electrolytes commonly used in ECM?	15 -20 % NaCl in water, sodium nitrate, potassium nitrate, sodium sulphate, sodium chromate and potassium chloride.	Remember	CO 2	CLO 05	AME507.05
10	What are the results due to improper selection of electrolyte in ECM?	1. Low machining rate. 2. Over cut and stray cutting.	Understand	CO 2	CLO 04	AME507.04
11	What are the methods generally used to filter the electrolyte?	1. Running the system until it is contaminated completely and replaces it. 2. Centrifugal separation. 3. Sedimentation. 4. Use of clarifiers	Remember	CO 2	CLO 05	AME507.05
12	What are the characteristics (requirements) of a good ECM tool?	1. It should be a good conductor of electricity and heat. 2. Easily machinable. 3. Resistant to chemical reaction. 4. It offers resistance to the high electrolyte pressure.	Remember	CO 2	CLO 05	AME507.05
13	What are the parameters that affect the MRR?	1. Feed rate. 2. Voltage. 3. Concentration of the electrolyte. 4. Temperature of the electrolyte. 5. Current density. 6. Velocity of the electrolyte.	Understand	CO 2	CLO 05	AME507.05
14	How does the current density affect the MRR?	Current density is controlled not only by the amount of current but also by the size of the gap between the tool and the work piece. A small gap results in high current densities, which in turn produce more material removal.	Remember	CO 2	CLO 04	AME507.04
15	What are the advantages of ECM?	Advantages: 1. ECM is simple, fast and versatile method. 2. Surface finish can be extremely good. 3. Fairly good tolerance can be obtained. 4. No cutting forces are involved. 5. Wear and tear of tool is negligible. 6. Metal removal rate is high.	Remember	CO 2	CLO 05	AME507.05

16	What are the disadvantages of ECM?	Disadvantages: 1. Large power consumption and the related problems. 2. Non conducting materials cannot be machined. 3. Maintenances of higher tolerances require complicated contours. 4. Initial investment is quite high 5. More space is required.	Understand	CO 2	CLO 05	AME507.05
17	Define ECG. (or) State the principle of ECG process.	ECG is the material removal process in which the material is removed by the combined effect of Electro-Chemical effect and conventional grinding operation. The major portion of the metal (about 90%) is removed by electrochemical effect.	Remember	CO 2	CLO 05	AME507.05
18	Which materials used to make the grinding wheel?	Metal bonded diamond (or) Aluminum oxide.	Remember	CO 2	CLO 04	AME507.04
19	What are the important functions of abrasive particles used in ECG?	It acts as insulator to maintain a small gap between the wheel and work piece. They are electrolysis products from the working area. To cut chips if the wheel should contact the workpiece particularly in the event of power failure.	Understand	CO 2	CLO 05	AME507.05
20	What are the limitations of ECG?	1. The work material must be conductive. 2. Not suitable for machining soft material. 3. Require dressing tools for preparing the wheels.	Understand	CO 2	CLO 05	AME507.05

UNIT-III
THERMAL METAL REMOVAL PROCESSES

1	Define electrical discharge machining?	EDM is the controlled erosion of electrically conductive materials by the initiation of rapid and repetitive spark discharge between the electrode tool to the cathode and work to anode separated by a small gap kept in the path of dielectric medium. This process also called spark erosion.	Remember	CO 3	CLO 07	AME507.07
2	What are functions of dielectric fluid used in EDM?	i) It acts as an insulating medium ii) It cools the spark region and helps in keeping the tool and work piece cool. iii) It maintains a constant resistance across the gap. iv) It carries away the eroded metal particles. v) It remains electrically non conducting until the required breakdown voltage has been reached.	Understand	CO 3	CLO 08	AME507.08
3	What are the basic requirements of dielectric fluid used in EDM?	Stable Dielectric strength. ii) It should have optimum viscosity. iii) It should have high flash point. iv) It should be chemically stable at high temperature and neutral. v) It should not emit toxic vapors.	Remember	CO 3	CLO 07	AME507.07
4	What is the dielectric fluids commonly used in EDM?	1. Petroleum based hydrocarbon fluids. 2. Parafin, white sprite, transformer oil. 3. kerosene, mineral oil. 4. Ethylene glycol and water miscible compounds.	Understand	CO 3	CLO 08	AME507.08

5	What are the prime requirements of tool material in EDM?	1. It should be electrically conductive. 2. It should have good machinability. 3. It should have low erosion rate. 4. It should have low electrical resistance. 5. Melting point of the tool should be high.	Remember	CO 3	CLO 08	AME507.08
6	What is the effect of capacitance in EDM?	Increasing the capacitance causes the discharge to increase and increase both the peak current and discharge time.	Remember	CO 3	CLO 09	AME507.09
7	Name some of the tool material used in EDM?	1. Copper, brass, alloys of Zinc & tin. 2. Hardened plain carbon steel 3. Copper tungsten, silver tungsten, tungsten. 4. Copper graphite and graphite.	Understand	CO 3	CLO 08	AME507.08
8	What are the process parameters which affect efficiency?	1. Energy discharge 2. Capacitance. 3. Size of work piece. 4. M/c tool design	Remember	CO 3	CLO 08	AME507.08
9	Write the formula for finding the energy discharge in EDM?	$W=(1/2) \times EIT$ W-discharge energy I- Current, T-time , E-voltage	Remember	CO 3	CLO 09	AME507.09
10	Define W/T (Tool Wear) ratio?	It is the ratio of volume of work material removed to the volume of electrode (tool) consumed.	Understand	CO 3	CLO 08	AME507.08
11	Explain electrode wear?	A crater is produced in the electrode, which is likewise dependent on the electrode material and the energy of the discharge.	Remember	CO 3	CLO 08	AME507.08
12	What are types of power supply circuits used in EDM?	1. R-C circuit. 2. Rotary impulse generator. 3. Controlled pulse (vacuum tube). 4. Oscillator controlled pulse. 5. Transistor pulsed circuit	Remember	CO 3	CLO 09	AME507.09
13	Why the servo controlled system is needed in EDM?	EDM requires that a constant arc gap (called spark gap) to be maintained between the electrode and the work piece to obtain maximum machining efficiency. Therefore EDM tool in corporate some form of servo control.	Remember	CO 3	CLO 09	AME507.09
14	Define electrical discharge machining?	EDM is the controlled erosion of electrically conductive materials by the initiation of rapid and repetitive spark discharge between the electrode tool to the cathode and work to anode separated by a small gap kept in the path of dielectric medium. This process also called spark erosion	Understand	CO 3	CLO 09	AME507.09
15	What are the factors affecting metal removal rate?	MRR increases with forced circulation of dielectric fluid. ii) MRR increases upto optimum value of work – tool gap, after that it drops suddenly.iii) MRR is maximum when the pressure is below atmospheric pressure.	Remember	CO 3	CLO 09	AME507.09
16	How the tool materials are classified?	Tool or Electrodes can be classified into four groups: i) Metallic electrodes – Brass, copper tungsten, chromium copper, aluminium tungsten, silver tungsten ii) Non – metallic – Graphites iii) Combined metallic and non – metallic – Copper graphite iv) Metallic coating with insulators – Copper on moulded plastic and copper on	Remember	CO 3	CLO 09	AME507.09

		ceramic.				
17	What are the principal components of EDM process?	Power supply, dielectric system, electrodes: work piece and tool, and servo system (tool feed)	Understand	CO 3	CLO 09	AME507.09
18	What is tool wear in EDM? How does tool wear occur in EDM?	Partial removal of the tool material from the tool surface while machining the work piece due to discharge spark produced between the tool and work piece. Due to the spark action, the intense heat generated near the zone melts and evaporates the material near the sparking zone. Since the tool is also within this zone, it also gets eroded.	Remember	CO 3	CLO 08	AME507.08
19	How to minimize tool wear in EDM?	Tool wear can be minimized by using a tool material that has a high melting point and high thermal conductivity. Also by properly configuring the tool design, tool wear can be minimized	Remember	CO 3	CLO 08	AME507.08
20	Identify the characteristics of an electrode material in order to serve as a good tool	i) It should be a good conductor of heat and electricity. ii) It should be easily machinable to any shape at a reasonable cost. iii) It should produce efficient material removal rates from the work piece. iv) It should resist the deformation during erosion process. v) It should exhibit low tool wear rates.	Understand	CO 3	CLO 09	AME507.09

**UNIT-IV
ELECTRON BEAM MACHINING**

1	What is Laser?	It is acronym of light amplification by stimulated emission of radiation. It is an electromagnetic radiation. It produces a powerful, monochromatic, collimated beam of light in which the waves are coherent	Remember	CO 4	CLO 10	AME507.10
2	State the principle of LBM	In laser beam machining process, laser beam is focused on the work piece by means of lens to give extremely high energy density to melt and vaporize the work material.	Understand	CO 4	CLO 10	AME507.10
3	What are the characteristics of laser used in laser machining	(i) It can be focused to maximum intensity or to minimum intensity as needed. (ii) It can be moved rapidly on the work piece. (iii) It is projected on the work piece at particular distance from the lens. (iv) Dedicated to an online process. (v) Power is shared on a job.	Remember	CO 4	CLO 10	AME507.10
4	Give the examples of i) solid state laser ii) gas laser	i) solid state laser–Ruby laser, Neodymium doped Yttrium–Aluminium– Garnet(YAG) laser, Neodymium doped glass laser ii) gas laser – carbon dioxide laser, Helium – Neon laser.	Remember	CO 4	CLO 10	AME507.10

5	What are basic requirements of laser welding?	(i) The focus of the beam should be adjusted to the thickness of the material. (ii) The wave length of the laser beam must be compatible with the material being welded.	Understand	CO 4	CLO 10	AME507.10
6	What is solid state Laser?	Solid state Laser is the Lasers, which consist of a hot nat, which may be crystalline solid / glass, doped with an active material whose atoms provide the lasing action.	Remember	CO 4	CLO 11	AME507.11
7	How does Laser melting works?	It melts and vaporizes the unwanted material by means of narrow pulsed laser operating at 2 to 100 pulses/sec Because of this high accuracy is not possible to micro sized holes.	Remember	CO 4	CLO 10	AME507.10
8	What are the characteristics of Laser beam?	1. Material removal 2. Material shaping 3. Welding 4. Thermo kinetic change.	Understand	CO 4	CLO 10	AME507.10
9	What are the fundamentals of photons used in Laser?	In the Laser the photons are in ground state at 0°C they are brought to the excited state by means of absorption of energy by temperature change, collision.	Remember	CO 4	CLO 11	AME507.11
10	What are the advantages of Laser drilling?	No physical contact between work root pair hence there is no possibility if breakage or wear of root. Precision location is ensured by focusing of the beam Large aspect ratio can be achieved	Remember	CO 4	CLO 11	AME507.11
11	List the applications of LBM.	i) It is used for making small holes, difficult welding of non conductive and refractory materials, cutting complex profiles in thin and hard materials ii) It can be used for mass micro machining production iii) It can also be used for selective heat treating of materials.	Understand	CO 4	CLO 11	AME507.11
12	List the advantages and limitations of LBM	Advantages: i) Machining of any materials including non metal is possible ii) Micro sized holes can be machined iii) Heat affected zone is small around the machined surface. Limitations: i) Highly skilled operators are needed ii) Rate of production is low iii) initial investment is high iv) Life of flash lamp is short.	Remember	CO 4	CLO 10	AME507.10
13	What materials can be machined by using Laser Beam?	All materials except those having high thermal conductivity and high reflectivity	Remember	CO 4	CLO 12	AME507.12
14	What are the characteristics of Laser used in Laser machining?	1. Can be focused to maximum intensity or to lower intensity as needed. 2. Can be moved rapidly on the work. 3. Remote cutting over long standoff distances.	Understand	CO 4	CLO 11	AME507.11
15	State the working principle of EBM.	When the high velocity beam of electrons strike the work piece, its kinetic energy is converted into heat. This concentrated heat raises the temperature of work material and vaporizes a small amount of it, resulting in removal of metal from the work piece	Remember	CO 4	CLO 10	AME507.10

16	State any four limitations of EBM?	(i) The metal removal rate is very slow. (ii) It is not suitable for large work pieces. (iii) Cost of equipment is very high. (iv) A little taper produced on holes. (v) it is applicable only for thin materials.	Understand	CO 4	CLO 11	AME507.11
17	What is the drawback of electron beam machining?	One major drawback of electron beam welding has been the requirement of high degree of vacuum essential for satisfactory operation of this process because of degassing	Remember	CO 4	CLO 12	AME507.12
18	Write the application of electron beam?	1. Thin film machining. 2. Surface treatment. 3. Engraving metals and non-metals. 4. Cutting of materials	Remember	CO 4	CLO 12	AME507.12
19	Define EBM	It is the thermo-electrical material removal process on which the material is removed by the high velocity electron beam emitted from the tungsten filament made to impinge on the work surface, where kinetic energy of the beam is transferred to the work piece material, producing intense heat, which makes the material to melt or vaporize it locally.	Understand	CO 4	CLO 12	AME507.12
20	What are the two types of EBM? Explain	(i) Thermal type. (ii) Non-thermal Type. In thermal type, the electron beam is used to heat the material up to the point where it is selectively vaporized. In Non-thermal type, the EBM produces a chemical reaction.	Remember	CO 4	CLO 12	AME507.12
UNIT-V PLASMA MACHINING						
1	What is the principle of plasma arc machining? What are the two stages in which the process of material removal is affected?	In plasma arc machining process, material is removed by directing a high velocity jet of high temperature (11,000°C to 28,000°C) ionized gas on the work piece. This high temperature plasma jet melts the material of the work piece. Plasma formation and melting of work piece are the two stages in which the process of material removal is affected.	Remember	CO 5	CLO 13	AME507.13
2	What is the main industrial application of plasma cutting systems?	(i) It is used for cutting alloy steels, stainless steel, cast iron, copper, nickel, titanium, aluminum and alloy of copper and nickel etc. (ii) It is used for profile cutting.	Understand	CO 5	CLO 13	AME507.13
3	What do you understand by fourth state of matter?	The dynamical properties of this gas of free electrons and ions are sufficiently different from the normal ionized gas. So it can be considered a fourth state of matter, and is given a new name, 'PLASMA'	Remember	CO 5	CLO 13	AME507.13
4	What are the gases used in PAM?	The commonly used gases are nitrogen, hydrogen, air, mixture of nitrogen-hydrogen and argon – hydrogen etc.	Remember	CO 5	CLO 13	AME507.13
5	Define plasma.	Plasma is defined as the gas, which has been heated to a sufficiently high temperature to become ionized.	Understand	CO 5	CLO 13	AME507.13

6	What is the purpose of etchants in CHM?	Etchants are used to remove the metal from the work piece. The metal is removed by the chemical conversion of the metal into metallic salt.	Remember	CO 5	CLO 13	AME507.13
7	Name the etchants used in CHM.	Caustic soda, Hydrochloric acid, Nitric acid, Iron chloride.	Remember	CO 5	CLO 14	AME507.14
8	What is the use of maskant in CHM?	In CHM, the areas of work piece which are not to be machined are covered with a resistant, called a resist or maskant	Understand	CO 5	CLO 14	AME507.14
9	What are the advantages of plasma arc welding?	a. Exothermic oxidation takes place. b. DC power supply.	Remember	CO 5	CLO 14	AME507.14
10	What are the metals that can't be machined by plasma arc machining?	A. Stainless steel b. Monel c. Super alloys	Remember	CO 5	CLO 14	AME507.14
11	What is the basic heating phenomenon that takes place in plasma arc welding?	The basic heating phenomenon that takes place at the work piece is a combination of anode heating due to direct electron bombardment recombination of molecules on the workpiece.	Understand	CO 5	CLO 14	AME507.14
12	How the initial ionization is accomplished in plasma arc machining?	A high voltage arc established between electrode and nozzle accomplishes initial ionization.	Remember	CO 5	CLO 14	AME507.14
13	Why does gas formed in plasma do in P.A.M?	This gas stabilizes the arc and prevents it from diverging.	Remember	CO 5	CLO 14	AME507.14
14	How another source of heating achieved in P.A.M?	It is desirable to achieve a third source of heating by injecting oxygen into work area to take advantage of exothermic oxidation.	Understand	CO 5	CLO 15	AME507.15
15	Write the principle of P.A.M	Once the material has been raised to molten point the high velocity gas stream blows the material away.	Understand	CO 5	CLO 15	AME507.15
16	Write the circuitry details in PAM.	+ ve terminal connected to work piece and -- ve terminal connected to electrode.	Remember	CO 5	CLO 15	AME507.15
17	Which type of power supply is used in P.A.M?	DC power supply is used.	Understand	CO 5	CLO 15	AME507.15
18	Which part is constricted by plasma?	Nozzle duct is constricted by plasma.	Remember	CO 5	CLO 15	AME507.15
19	How does the basic plasma is generated?	The basic plasma is generated by subjecting a stream of gas to the electron bombardment of the electric arc.	Remember	CO 5	CLO 15	AME507.15
20	What are the metals that can't be machined by plasma arc machining?	1. Stainless steel 2. Monel 3. Super alloys	Understand	CO 5	CLO 15	AME507.15

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