

## **CHAPTER-1**

### **UNCONVENTIONAL MACHINING PROCESS**

#### **USM**

1. USM is a material removal process used to \_\_\_\_\_ material.

- a) Corrode b) erode c) melt d) form

Answer: b

**Clarification:** It is a material removal process, used to erode material in the form of fine holes and cavities in hard or brittle work-pieces. It uses formed tools, vibrations of high frequency and suitable abrasive slurry-mix.

2. During USM, the work-piece is thermally affected. a) True b) False Answer a

**Clarification:** USM is a non-thermal and non-chemical process which creates no change in the chemical, physical or metallurgical properties of the work piece. It is therefore, widely used in the manufacturing of hard and brittle materials, which are commonly infeasible to a machine by other non-traditional methods.

3. In USM, material removal occurs due to \_\_\_\_\_ a) abrading action b) corroding action c) chemical action d) chip formation

Answer: a

**Clarification:** Ultrasonic machining accomplishes the material removal through the abrading action of the grit-loaded slurry which is kept circulated between the tool and the workpiece. The cutting is actually performed by the abrasive particles which are suspended in the slurry.

4. During USM, which of the following vibrates at ultrasonic frequency?

- a) Slurry mix b) Work-piece c) Tool d) Abrasive particles only

Answer: c

**Clarification:** The tool is vibrated at ultrasonic frequency and this will be in the range of 20 kHz. The slurry is made to flow through this in this zone so that the abrasive particles will come in contact with the work piece.

5. Material removal in USM can be attributed to \_\_\_\_\_ mechanisms.

- a) 2 b) 3 c) 4 d) 5

**Answer: c**

**Clarification: Following are the mechanisms that could be attributed to the material removal in USM; • Hammering, that causes brittle fracturing of the work material • Impact action of abrasives • Cavitation.**

**6. The development of USM was started in \_\_\_\_\_ a) 1920 b) 1927c) 1947 d) 1980**

**Answer: b**

**Clarification: The development of USM was started in 1927. It was accidentally discovered during investigating the ultrasonic grinding of abrasive powders.**

**7. The abrasive grains are driven by the reciprocations across the gap in between the tool and the work piece.**

**a) True b) False**

**Answer: a**

**Clarification: The abrasive grains are driven by the high speed reciprocations across the small gap in between the tool and the work piece, as already discussed. Uniform force is used to gradually feed the tool. The impact of the abrasive is the energy source that is mainly responsible for material removal. Due to the impact of abrasives, the material removal takes place in the form of small particles, which are carried away by the abrasives slurry.**

**8. Which of the following is true about USM?**

**a) There is direct contact between the tool and the work piece b) There is no direct contact between the tool and the work piece c) This process is not suitable for machining of brittle materials d) This process consumes very less power**

**Answer: b**

**Clarification: There is no direct contact of the tool and the work piece due to the slurry used and it makes it a wet cutting process the surfaces so produced are free from stress and damages. This process is free from burrs and distortions. However, the process is very much suitable for machining brittle materials.**

**9. Which of the following materials is not suitable for USM?**

**a) Lead b) Glass c) Ceramic d) Carbides**

**Answer: a**

**Clarification:** Soft materials like lead and plastics are not suitable for machining by this process, since that they tend to absorb the abrasive particles rather than the chip under the impact.

**10. During USM \_\_\_\_\_ is converted into mechanical vibrations.**

- a) pressure energy of the slurry**
- b) electrical energy**
- c) chemical energy of the chemical used for the slurry**
- d) mechanical energy of the tool**

**Answer: b**

**Clarification:** During USM, high frequency electrical energy is converted into mechanical vibrations through a transducer. The high frequency vibrations are transmitted to the abrasive particles in the slurry via an energy focusing device called horn or tool assembly.

### **EDM**

**1. Which of the following machine uses non conventional machining technique for metal removal?**

- a) Grinding machine**
- b) Milling machine**
- c) Electric discharge machine**
- d) None of the mentioned**

**Answer: c**

**Explanation:** Electronic discharge machine is a non conventional machining technique for metal removal.

**2. Which of the following material cannot be machined using electronic discharge machine?**

- a) Iron**
- b) Aluminum**
- c) Copper**
- d) Wood**

**Answer: d**

**Explanation:** Wood is a bad conductor of electricity and hence cannot be machined using electronic discharge machine.

**3. Which of the following material can be machined using electronic discharge machine?**

- a) Iron**
- b) Rubber**

**c) Plastic**

**d) Wood**

**Answer: a**

**Explanation: Iron is a good conductor of electricity and hence can be machined using electronic discharge machine.**

**4. Which of the following EDM machine is used for cutting shapes cut out of a flat sheet or plate of metal?**

**a) Wire EDM**

**b) Sinker EDM**

**c) Wire and Sinker EDM both**

**d) None of the mentioned**

**Answer: a**

**Explanation: Wire EDM used for cutting shapes cut out of flat sheet or plate of metal. It is an unconventional process of machining.**

**5. Which of the following EDM machine is used for die cast tooling?**

**a) Wire EDM**

**b) Sinker EDM**

**c) Wire and Sinker EDM both**

**d) None of the mentioned**

**Answer: b**

**Explanation: Sinker EDM is used for die cast tooling. It is an unconventional process of machining.**

**6. Dielectric medium in EDM is used for**

**a) Flushing away the debris**

**b) To make the medium conducting**

**c) To decrease the material removal rate**

**d) None of the mentioned**

**Answer: a**

**Explanation: Dielectric in EDM is used for flushing away the debris generated during the process of machining, which may slow down the material removal rate if not removed instantly.**

**7. Material removal rate in EDM increases with**

**a) Increase in melting point of work piece**

**b) Increase in Current**

**c) Decrease in current**

**d) None of the mentioned**

**Answer: b**

**Explanation: MRR is directly proportional to the current.**

**8. Material removal rate in EDM increases with**

- a) Increase in melting point of work piece
- b) Decrease in Current
- c) Decrease in melting point of work piece
- d) None of the mentioned

**Answer: c**

**Explanation: MRR is inversely proportional to a melting point of work piece.**

**9. For maximum power delivery using resistance capacitance relaxation circuit in EDM, discharge voltage should \_\_\_ % of the supply voltage?**

- a) 80
- b) 23
- c) 65
- d) 72

**Answer: d**

**Explanation: Find optimum value using L-C circuits.**

**10. In an EDM machine, metal removal rate is 1.937 cubic mm / min. If total amount of material to removed is 600 cubic mm. Time required in min will be**

- a) 100
- b) 200
- c) 309
- d) 402

**Answer: c**

**Explanation: Time required= (Total material to be removed/material removal rate).**

### AJM

**1. In advanced machining processes, what is the full form of AJM?**

- a) Automatic Jet manufacturing
- b) Abrasive Jet Machining
- c) Automated Jet Machining
- d) Abrasive Jet Manufacturing

**Answer: b**

**Explanation: In advanced machining processes, full form of AJM is Abrasive jet machining.**

**2. In AJM, which of the following materials are used as abrasive grains?**

- a)  $Al_2O_3$
- b) SiC
- c) Glass beads
- d) All of the mentioned

**Answer: d**

**Explanation: In Abrasive jet machining, any of the particles mentioned above can be used as abrasive grains.**

**3. In Abrasive jet machining, work piece material of removed by which of the following means?**

- a) Vaporization
- b) Electro plating
- c) Mechanical abrasion
- d) Corrosion

**Answer: c**

**Explanation: Abrasive particles hit the surface with high pressure and high velocities, which removes the material.**

**4. Which type of materials can be machined using Abrasive jet machining?**

- a) Glass
- b) Ceramics
- c) Hard materials
- d) All of the mentioned

**Answer: d**

**Explanation: Materials like ceramics, glass, hard and super hard materials can be machined using Abrasive jet machining.**

**5. In machining system of AJM, which is the medium of carrying the abrasive grains for machining?**

- a) Liquids
- b) Gases
- c) Any fluids
- d) None of the mentioned

**Answer: b**

**Explanation: In AJM, different types of gases are used as the medium for carrying abrasives.**

**6. In machining system of AJM, what is/are the gas/es used for carrying the abrasives?**

- a) CO<sub>2</sub>
- b) Air
- c) Nitrogen
- d) All of the mentioned

**Answer: d**

**Explanation: In AJM, gases like CO<sub>2</sub>, air or nitrogen are used to carry the abrasives.**

**7. What is the pressure of gas that is to be supplied, for carrying the abrasives?**

- a) 0.1 to 1.0 kg/cm<sup>2</sup>
- b) 2.0 to 8.0 kg /cm<sup>2</sup>
- c) 10.0 to 18.0 kg/cm<sup>2</sup>
- d) 25.0 to 35.5 kg/cm<sup>2</sup>

**Answer: b**

**Explanation: The pressure of the carrying gas should range between 2 to 8 kg/cm<sup>2</sup>.**

**8. Which of the following gas, should never be used as the carrier of abrasives?**

- a) Nitrogen
- b) CO<sub>2</sub>
- c) Oxygen
- d) Air

**Answer: c**

**Explanation: Oxygen should not be used as carrier because it causes a violent chemical reaction with abrasives or work piece.**

**9. What is the frequency of mixing chamber, consisting of gas and abrasives?**

- a) 10 Hz
- b) 30 Hz
- c) 50 Hz
- d) 70 Hz

**Answer: c**

**Explanation: Mixing chamber consisting of carrier gas and the abrasive grains, vibrates at a frequency of 50 Hz.**

**10. In Abrasive jet machining, what may be the size of the abrasive grains used?**

- a) 10 – 40 μm
- b) 50 – 100 μm
- c) 100 – 150 μm
- d) 200 – 300 μm

**Answer: a**

**Explanation: Abrasive grains of size, between 10 – 40 μm can be used for machining.**

**11. What are the processes where Abrasive jet machining can be used?**

- a) Cleaning
- b) Cutting
- c) Deburring
- d) All of the mentioned

**Answer: d**

**Explanation: Abrasive jet machining can be used for deburring, cutting, cleaning and for many other heavy duty applications.**

**12. State whether the following statement is true or false.**

**“In Abrasive jet machining, commercial grades powders can be used for machining.”**

- a) True
- b) False

**Answer: b**

**Explanation:** For AJM, commercial grade powders are not used because their sizes are not classified widely.

**13. In machining system of AJM, which of the following controls the relative motion between work piece and nozzle?**

- a) Cam drives
- b) Pantographs
- c) Trace mechanisms
- d) All of the mentioned

**Answer: d**

**Explanation:** Relative motion in Abrasive jet machining can be controlled by the above mentioned means.

**14. Masks, which are used to confine the jet stream location on work piece are made of, which type of materials?**

- a) Copper
- b) Glass
- c) Rubber
- d) All of the mentioned

**Answer: d**

**Explanation:** Masks can be made of any of the above-mentioned materials.

### LBM

**1. What is the full form of LBM in advanced machining processes?**

- a) Laser Beam Manufacturing
- b) Laser Beam Machining
- c) Light Blast Manufacturing
- d) Light Beam Machining

**Answer: b**

**Explanation:** The full form of LBM is Laser Beam Machining in the advanced machining processes.

**2. LBM offers a good solution for which material properties below?**

- a) Thermal conductivity
- b) Specific heat
- c) Boiling temperature
- d) All of the mentioned

**Answer: d**

**Explanation:** LBM offers good solution for material properties such as thermal conductivity, specific heat, melting and boiling temperatures.

**3. What is the abbreviation of Laser?**

- a) Light allowed simple emission of radiation
- b) Light amplification by stimulated emission of radiation



- c) Light amplified simultaneous emission of rays
- d) Light amplified stimulated emanation of rays

**Answer: b**

**Explanation: Full form of laser is Light Amplification by Stimulated emission of radiation.**

**4. Which of the following are the properties of a laser?**

- a) Highly collimated
- b) Monochromatic
- c) Coherent light beam
- d) All of the mentioned

**Answer: d**

**Explanation: Highly collimated, high monochromaticity and the coherence of the light beam are the properties of a laser.**

**5. Laser beam machining uses which type of power sources for machining?**

- a) Very low power
- b) Low power
- c) Medium power
- d) High power

**Answer: d**

**Explanation: High power densities are used for the generation of laser and for machining in Laser beam machining.**

**6. Which of the following are different types of lasers used in Laser beam machining?**

- a) Solid-state ion
- b) Neutral gas
- c) Semiconductor
- d) All of the mentioned

**Answer: d**

**Explanation: Laser such as solid-state ion, neutral gas, molecular, semiconductor etc., can be used in LBM.**

**7. Which types of lasers are used in Laser beam machining?**

- a) Continuous wave
- b) Pulsed mode
- c) Continuous wave & Pulsed mode
- d) None of the mentioned

**Answer: c**

**Explanation: Laser may be in continuous wave (CW) or in Pulsed mode (PM) for machining in LBM.**

**8. What is the wavelength value of Ruby laser used in Laser beam machining?**

- a) 633 nm
- b) 694 nm

- c) 856 nm
- d) 1064 nm

**Answer: b**

**Explanation: The value of wave length of Ruby laser used in Laser Beam machining is 694 nm.**

**9. What is the wavelength value of Nd-YAG and Nd-glass lasers used in LBM?**

- a) 633 nm
- b) 694 nm
- c) 856 nm
- d) 1064 nm

**Answer: d**

**Explanation: The value of wave length of Nd-YAG and Nd-glass lasers used in LBM is 1064 nm.**

**10. What is the wavelength value of neutral gas laser used in LBM?**

- a) 633 nm
- b) 694 nm
- c) 856 nm
- d) 1064 nm

**Answer: a**

**Explanation: The value of wave length of Neutral gas laser used in Laser beam machining is 633 nm.**

**11. What is the wavelength value of CO<sub>2</sub> laser used in Laser beam machining?**

- a) 0.16  $\mu\text{m}$
- b) 1.6  $\mu\text{m}$
- c) 10.6  $\mu\text{m}$
- d) 106  $\mu\text{m}$

**Answer: c**

**Explanation: The value of wave length of CO<sub>2</sub> laser used in Laser Beam machining is 10.6  $\mu\text{m}$ .**

**12. What are the values of wavelengths of GaAs laser used in LBM?**

- a) 100 – 200 nm
- b) 200 – 400 nm
- c) 600 – 700 nm
- d) 800 – 900 nm

**Answer: d**

**Explanation: The wavelengths of GaAs laser used in LBM range from 800 – 900 nm.**

**13. What are the values of wavelengths of Excimer laser used in LBM?**

- a) 100 – 200 nm
- b) 200 – 500 nm
- c) 600 – 700 nm

d) 800 – 900 nm

Answer: b

Explanation: The wavelengths of Excimer laser used in LBM range from 200 – 500 nm.

14. What are the values of wavelengths of Argon laser used in LBM?

a) 120 – 230 nm

b) 220 – 310 nm

c) 330 – 530 nm

d) 760 – 940 nm

Answer: c

Explanation: The wavelengths of Argon laser used in LBM range from 330 – 530 nm.

### ECM

1. Which of the following is un-conventional machining process?

a) Grinding

b) Milling

c) Turning

d) Electro chemical machining

Answer: d

Explanation: Electro chemical machining is an un-conventional machining process used for large material removal from the surface using electricity generated due to chemical reactions.

2. Which of the following is conventional machining process?

a) Electro chemical machining

b) Milling

c) Electron discharge machining

d) None of the mentioned

Answer: b

Explanation: Milling is a conventional machining process used for material removal from the surface.

3. In ECM, heavy electrical sparks are created.

a) True

b) False

Answer: b

Explanation: Sparks are generated in EDM, by using high voltage current, for proper erosion of material.

4. In ECM, tool does not touch the work piece.

a) True

b) False

Answer: a

Explanation: Tool is very near to work piece but does not touch it in ECM.

5. Which of the following is correct about ECM?

a) Erosion of metal takes place as a reverse process of electroplating

b) Thermal stresses are induced

c) Mechanical stresses are induced

d) None of the mentioned

Answer: a

Explanation: In ECM, erosion of metal takes place as reverse process of electroplating.

6. Which of the following material cannot be machined using electro chemical machining?

a) Iron

b) Aluminum

c) Copper

d) Wood

Answer: d

Explanation: Wood is a bad conductor of electricity and hence cannot be machined using electro chemical machining.

7. Which of the following material can be machined using electro chemical machining?

a) Iron

b) Rubber

c) Plastic

d) Wood

Answer: a

Explanation: Iron is a good conductor of electricity and hence can be machined using electro chemical machining.

8. Electrode gap in electro chemical machining is generally ranged from

a) 0.5 mm to 0.9 mm

b) 1.1 mm to 1.2 mm

c) 0.1 mm to 0.2 mm

d) 3.1 mm to 4.2 mm

Answer: c

Explanation: Electrode gap in electro chemical machining is generally ranged from 0.1 mm to 0.2 mm.

9. Electrolytes used in ECM must possess

a) Low electrical conductivity

- b) Low chemical stability
- c) High electrical conductivity
- d) None of the mentioned

Answer: c

Explanation: Electrolytes used in ECM must have high electrical conductivity.

10. Which of the following is not a function of electrolyte in ECM?

- a) It completes the circuit
- b) It helps in electrochemical reaction
- c) It carries away heat and waste product
- d) It provide non reactive environment

Answer: d

Explanation: Electrolyte provides reactive environment for chemical reactions to takes place.

## PAM

1. Plasma refers to.

- A) Hot ionized gas
- B) Electrode holder
- C) Rectifier
- D) Inverter

ANSWER (A) Hot ionized gas

2. The following welding process has greater directional stability due to the passage of arc through a copper orifice is...

- A) Oxy-acetylene welding
- B) Gas metal arc welding (MIG)
- C) Gas tungsten arc welding (TIG)
- D) Plasma arc welding

ANSWER= (D) Plasma arc welding

3. The high-temperature plasma jet is suitable for.

- A) Welding
- B) Cutting
- C) Gouging
- D) All of the above

ANSWER= (D) All of the above

**4. In the non-transferred plasma arc welding process, an arc is struck between the tungsten electrode and \_\_\_\_\_**

- A) Work piece
- B) Earth clamp
- C) Insulated copper nozzle
- D) Gas cylinder

**ANSWER= (C) Insulated copper nozzle**

**5. The temperature range obtained by the Plasma arc welding process is about.**

- A) 5000°C to 10000°C
- B) 3000°C to 8000°C
- C) 8000°C to 12000°C
- D) 20000°C to 30000°C

**ANSWER= (D) 20000°C to 30000°C**

**6. In a plasma welding torch a tungsten electrode is located within the nozzle, which is made up of \_\_\_\_\_**

- A) Ceramic
- B) Copper
- C) Brass
- D) Tin

**ANSWER= (B) Copper**

**7. Which of the following are not common when compared to GTAW & PAW?**

- A) Non-consumable tungsten electrode
- B) Constricting nozzle
- C) Shielding gas
- D) Gas cylinder

**ANSWER= (B) Constricting nozzle**

**8. What technique is employed with PAW to produce full penetration welds without edge preparation?**

- A) Stringer bead
- B) Weave bead

- C) Keyhole
- D) Backstep

ANSWER= (C) Keyhole

9. What is the maximum temperature of the plasma arc cutting process

- A) 14000°C
- B) 10000°C
- C) 8000°C
- D) 6000°C

ANSWER= (A) 14000°C

## EBM

1. Mechanism of material removal in Electron Beam Machining is due to \_\_\_\_\_

- a) mechanical erosion due to impact of high of energy electrons
- b) chemical etching by the high energy electron
- c) sputtering due to high energy electrons
- d) melting and vaporization due to the thermal effect of impingement of high energy electron

Answer: d

Explanation: EBM is typically used with higher power density to machine materials. The mechanism of material removal is primarily by melting and rapid vaporization due to intense heating by the electrons and laser beam respectively.

2. Electron beam machining is a/an \_\_\_\_\_ process

- a) adiabatic
- b) thermal
- c) iso-thermal
- d) isentropic

Answer: b

Explanation: Electron Beam Machining (EBM) is a thermal process considering the mechanisms of material removal. However electrical energy is used to generate high-energy electrons in case of Electron Beam Machining (EBM).

3. Electron beam machining is carried out in \_\_\_\_\_

- a) high pressure vessel
- b) thermally insulated area
- c) vacuum
- d) in a room at atmospheric pressure

Answer: c

**Explanation:** Electron Beam Machining is required to be carried out in vacuum. Otherwise, the electrons would interact with the air molecules, thus they would lose their energy and cutting ability.

**4. During EBM \_\_\_\_\_ is kept under vacuum.**

- a) electron gun
- b) whole setup
- c) the workpiece
- d) laser generation setup

**Answer: c**

**Explanation:** The workpiece to be machined is located under the electron beam and is kept under vacuum. The high-energy focused electron beam is made to impinge on the workpiece with a spot size of 10 – 100  $\mu\text{m}$ .

**5. As the electrons strike the work material \_\_\_\_\_**

- a) heat energy is converted to kinetic energy
- b) atomic energy is converted to heat energy
- c) kinetic energy is converted to heat energy
- d) electrical energy is converted to heat energy

**Answer: c**

**Explanation:** The kinetic energy of the high velocity electrons is converted to heat energy as the electrons strike the work material. Due to high power density instant melting and vaporization starts and “melt – vaporization” front gradually progresses.

**6. The gun in EBM is used in \_\_\_\_\_ mode.**

- a) wave guide
- b) biasing
- c) pulsed
- d) high intensity

**Answer: c**

**Explanation:** Unlike in Electron Beam Welding, the gun in EBM is used in pulsed mode. Holes can be drilled in thin sheets using a single pulse. For thicker plates, multiple pulses would be required. Electron beam can also be manoeuvred using the electromagnetic deflection coils for drilling holes of any shape.

**7. Which of the following is not a function of electron beam gun?**

- a) generation of electrons
- b) accelerating the electrons
- c) focusing the beam
- d) absorbing the electron beam

**Answer: d**

**Explanation:** Electron beam gun is the heart of any electron beam machining facility. The basic functions of any electron beam gun are to generate free electrons at the



cathode, accelerate them to a sufficiently high velocity and to focus them over a small spot size. Further, the beam needs to be manoeuvred if required by the gun.

8. \_\_\_\_\_ is used to make cathode for electron beam gun.

- a) Aluminum
- b) Rubidium
- c) Molybdenum
- d) Tantalum

Answer: d

Explanation: The cathode is generally made of tungsten or tantalum. Such cathode filaments are heated, often inductively, to a temperature of around 2500°C.

9. Heating to a high temperature leads to thermo-ionic emission.

- a) True
- b) False

Answer: a

Explanation: In EBM, temperature in the electron beam gun is around 2500°C. Such heating leads to thermo-ionic emission of electrons, which is further enhanced by maintaining a very low vacuum within the chamber of the electron beam gun.

10. In the electron beam gun, cathode cartridge is highly negatively biased.

- a) True
- b) False

Answer: a

Explanation: In the electron beam gun, cathode cartridge is highly negatively biased so that the thermo-ionic electrons are strongly repelled away from the cathode. This cathode is often in the form of a cartridge so that it can be changed very quickly to reduce downtime in case of failure.

**CHAPTER-2**  
**PLASTIC PROCESSING**

1) Which plastic materials contain strong cross linking's in their molecular structure?

- a. Thermoplastic materials
- b. Thermosetting materials
- c. Both a. and b.
- d. None of the above

**ANSWER: Thermosetting materials**

2) Which of the following statements are correct for plastic?

- 1. Plastic is a non-metallic material that can be moulded to any shape
- 2. Plastic is a natural or synthetic resin
- 3. Plastic is of organic nature composed of hydrogen, oxygen, carbon and nitrogen
  - a. only statements 1 and 2 correct, statement 3 is wrong
  - b. only statements 1 and 3 correct, statement 2 is wrong
  - c. only statements 2 and 3 correct, statement 1 is wrong
  - d. all of above statements 1, 2 and 3 are correct

3) The plastics which soften when heat is applied with or without pressure, but requires cooling to set them to shape are called as

- a. thermosofting materials

- b. thermosetting materials**
- c. thermoplastic materials**
- d. thermostating materials**

**ANSWER: thermoplastic materia**

- 4) Thermosetting materials are**
- a. the plastics which can be softened even after they have set and hardened**
  - b. the plastics which require heat and pressure to mould them into shape**
  - c. both a. and b.**
  - d. none of the above**

**ANSWER: the plastics which require heat and pressure to mould them into shape**

- 5) Which of the following is an example of thermoplastic material?**
- a. Camera bodies**
  - b. Automobile parts**
  - c. Electric plugs**
  - d. Electric insulation**

**ANSWER: Electric insulation**

- 6) Which of the following characteristics does not affect the properties of plastics?**
- a. Their molecular structure**
  - b. Their degree of polymerization**
  - c. Both a. and b**
  - d. None of the above**

**ANSWER: None of the above**

- 7) Specific gravity of the plastics is usually**
- a. less than the specific gravity of metals**
  - b. more than the specific gravity of metals**
  - c. similar to the specific gravity of metals**
  - d. Unpredictable**

**ANSWER: less than the specific gravity of metals**

**8) The process of combining two or more distinct polymer molecules to form a new product with different characteristics is called as**

- a. binding**
- b. stabilizing**
- c. filling**
- d. blending**

**ANSWER: blending**

**9) The materials such as lead and barium, which are added with polymers to minimize the effect of heat, sunlight and ozone are called as**

- a. binders**
- b. blenders**
- c. stabilizers**
- d. fillers**

**ANSWER: stabilizers**

**10) Why are the plasticizers added with polymers?**

- a. To hold other constituents of plastic together**
- b. To reduce the cost and enhance the strength and hardness of plastics**
- c. To improve flexibility and to reduce the temperature and pressure required for molding of plastics**
- d. None of the above**

**ANSWER: To improve flexibility and to reduce the temperature and pressure required for molding of plastics**

**11. How is the die used in injection molding cooled?**

- a) Oil**
- b) Air**
- c) Water**
- d) Contact with cold surface**

**Answer: c**

**Clarification: When it comes to molding of polymers in thermoplastics, injection**

**molding process is the most common of the methods. In this method, whenever the die has to be cooled, there is water used to cool it.**

**12. How does the piston in the clamping unit move?**

- a) Hydraulic energy b) Pneumatic energy c) Heat energy d) Suction**

**Answer: a**

**Clarification: There is a clamping unit employed for holding the two halves together and for the opening and closing of the mold. A moving piston is provided which operates the power press. This piston works on hydraulic energy.**

**13. Where does the granular molding material get loaded into?**

- a) Barrel b) Hopper c) Pellets d) Split**

**Answer: b**

**Clarification: In a ram or plunger type injection molding system, the granular molding material has to be first loaded into a hopper, after which, with the help of a feeding device it gets metered out inside a cylinder.**

**14. Which of the following material is not made by injection molding?**

- a) Nuts b) Tubes c) Car handles d) Electrical fittings**

**Answer: b**

**Clarification: Injection molding is one of the most widely used method of molding among molding with polymers. There are various applications of this method such as nuts, bolts, cups, car handles, electrical fitting parts, but not tubes and rods.**

**15. What is the minimum temperature allowed to be given to the injection molding process?**

- a) 120°C b) 130°C c) 140°C d) 150°C**

**Answer: d**

**Clarification: In the molding process of polymers in thermoplastics, injection molding process is the most common of the methods. The minimum allowable temperature that can be given to the system is 150°C.**

**16. Which of the following factors is not considered in a ram type injection molding?**

- a) Inner pressure of material b) Outer pressure of material c) Volume of material  
d) Temperature of material

**Answer: c**

**Clarification:** Among the following, the inner pressure of the material, the outer pressure of the material as well as the mold and the temperature of the material and mold are important factors to be considered. The volume of material is not counted among important factors.

**17. What is the minimum pressure allowed to be given to the injection molding process?**

- a) 90 MPa b) 100 MPa c) 140 MPa d) 170 MPa

**Answer: b**

**Clarification:** None.

**18. What is the maximum temperature allowed to be given to the injection molding process?**

- a) 300°C b) 320°C c) 350°C d) 400°C

**Answer: a**

**Clarification:** The maximum allowable temperature that can be given to the system is 300°C, in this particular method of molding.

**19. The barrel is used for the opening and closing of the mold.**

- a) True b) False

**Answer: b**

**Clarification:** A barrel is an instrument that is placed near the nozzle, and it plays no role in the opening and closing of the mold. There is a clamping unit employed for holding the two halves together and for the opening and closing of the mold.

**20. There is a varied pressure provided in the solidification unit of injection molding process.**

- a) True b) False

**Answer: b**

**Clarification:** Injection molding is considered to be one of the most widely used

methods. In this method, there are dies that eject the solidified component, before which it is kept under constant pressure.

### **EXTRUDING; CASTING; CALENDERING**

1. Which of the following is not a type of calendar?

a) I type b) L type c) Z type d) M type

Answer: d

Clarification: M type is not a type of calender. In I type of roller setup, the rollers are placed horizontally. In L type arrangement of roller setup, is I type setup mirrored vertically. In Z type arrangement of rollers, each pair of rollers is placed at right angles to the next pair in chain.

2. Calendaring and extrusion are similar processes.

a) True b) False

Answer: b

Clarification: This is a false statement. Calendaring and extrusion are different processes. Extrusion is a process of passing the molten plastic through a shaping device, to give it any form. Whereas, calendaring is a complementary process to film and sheet extrusion, which involves the formation of continuous sheets of controlled thickness by passing plastic materials through rollers.

3. As defined by ASTM, the thickness of a plastic film (after single extrusion) should be not more than \_\_\_\_\_

a) 0.25mm b) 0.50mm c) 0.01cm d) 1mm

Answer: a

Clarification: As defined by ASTM, the thickness of a plastic film (after single extrusion) should be not more than 0.25mm. ASTM, American Society for testing materials is an international standards organization which functions to set standards for miscellaneous materials.

4. Which of the following is not used for conversion of extruded plastic into sheets?

a) Cast Film Extrusion b) Slit Die Extrusion c) Blown Film Extrusion d) Micro Extrusion

Answer: d

**Clarification:** Micro Extrusion is not used for conversion of extruded plastic into sheets. Micro extrusion is the process to create comparatively smaller sized objects. Whereas, Cast Film Extrusion, Slit Die Extrusion and Blown Film Extrusion are used for conversion of extruded plastic into sheets.

5. Tubular Extrusion is also known as \_\_\_\_\_

a) Flat Film Extrusion b) Blown Film Extrusion c) Slit Die Extrusion d) Cast Film Extrusion Answer: b

**Clarification:** Tubular Extrusion is also known as Blown Film

Extrusion. Flat Film extrusion is also known as Cast Film and Slit Die Extrusion. Like Flat Film Extrusion, Tubular extrusion is also used to convert extruded plastic into sheets. It is done by blowing air through the center of tubular die, due to which the thin tube from extruder is inflated into a thin bubble and cooled, after which it is flattened and wound up.

6. Compression ratios for single screw extrusion should lie between \_\_\_\_ and \_\_\_\_

a) 2:1, 3:1 b) 1:2, 4:1 c) 2:1, 4:1 d) 1:2, 1:3

Answer: c

**Clarification:** Compression ratios for single screw extrusion should lie between 2:1 and 4:1. Compression ratio is an important parameter for any extrusion process. Compression ratio is the ratio of the volume of one flight of the screw at the in-fees end to the volume of one flight at the die end.

7. The term BUR in extrusion and calendaring of thermoplastics refers to \_\_\_\_\_

a) Blow Up Ratio b) Bauxime Up Ratio c) Bottom Upper Ratio d) Bottom Up Ratio

Answer: a

**Clarification:** The term BUR in extrusion and calendaring of thermoplastics refers to Blow Up Ratio. It is the ratio of bubble diameter to die diameter. BUR for most blown films in packaging generally lies between 2:1 and 4:1.

8. Flexibility of plastic packaging films increases with increasing density. \_\_\_\_\_



a) True b) False

Answer: b

**Clarification:** The statement is false. Flexibility of packaging films increases with decreasing density. As the density increases, the forces amongst the monomers increases and the rigidity increases. Hence, flexibility decreases.

9. \_\_\_\_\_ is a process which combines layers of two or more plastics together at the point of extrusion.

a) Lamination b) Plating c) Co-extrusion d) Calendaring

Answer: c

**Clarification:** Co-extrusion is a process which combines layers of two or more plastics together at the point of extrusion. Lamination is the process of packaging via combination of two or more materials by a solvent, adhesive or heat. Calendaring is a complementary process to film and sheet extrusion, which involves the formation of continuous sheets of controlled thickness by passing plastic materials through rollers. Plating is the process of coating any surface (especially metal) by other metal, mostly by electrochemical cell.

10. Co-extrusion uses adhesives for binding between two layers.

a) True b) False

Answer: b

**Clarification:** The statement is false. Co-extrusion doesn't use adhesives for binding between two layers. Co-extrusion uses solely heat for binding different layers of plastics. Lamination used adhesives for binding between two layers. Hence, co-extruded films are generally thicker than laminated films.

## **CHAPTER NUMBER -05**

### **MAINTENANCE OF MACHINE TOOLS**

1. What does TPS stand for?

- Total Production Streamlining
- Toyota Production System
- Taguchi's Production S's

- **Total Process Simplification**
- **Transparent Processing System**
- **ANS:-B**

**2. The starting material of the Stereo lithography method is....**

- **Solid**
- **Liquid**
- **Powder**
- **Gas**
- **ANS:-B**

**3. Which of the following is NOT one of the Seven Wastes?**

- **overproduction**
- **transportation**
- **assignment**
- **defective product**
- **motion**
- **ANS:-B**

**4. Which of the following is generally found in most Lean environments?**

- **a push or pull system, depending upon the rate of demand**
- **a push system for high margin items and a pull system for low margin items**
- **a push system for purchased parts and a pull system for manufactured parts**
- **push systems**
- **pull systems**
- **ANS:-D**

**5. What is the format for prototyping machine file?**

- **.prt**
- **.slt**
- **.stl**
- **.iges**
- **ANS:-C**

**6. Which of the following are the process in RP cycle?**

- **Post-processing**
- **Transfer to machine**
- **Pre-processing**
- **All of these**
- **ANS:-D**

**7. The list of 5Ss, although it looks like a housekeeping directive, supports lean production by:**

- **identifying non-value items and removing them, in the "sort/segregate" category.**
- **reducing inventory, in the "standardize" category.**
- **increasing variability through standardized procedures, in the "standardize" category.**
- **eliminating wasted motion through ergonomic studies, in the "support" category.**
- **building good safety practices, in the "shine/sweep" category.**

- **ANS:-A**

**8. Which one of the process is subtractive prototyping?**

- **5 axis CNC Milling**
- **Fused Deposition Modeling**
- **Digital Light Process (DLP)**
- **Stereo lithography Apparatus**
- **ANS:-A**

**9. Which of the following is the process of pre-processing stage?**

- **Remove support**
- **Checking 3D CAD data**
- **De-powdering loose material**
- **Dip in binder to strengthen the part**
- **ANS:-B**

**10. Processes in which we turn standard stock into finished products is called...**

- **secondary**
- **Second**
- **2nd**
- **2 nd**
- **ANS:-A**

**11. Consists of two assemblies: a cold end to pull and feed the thermoplastic from the spool, and a hot end that melts the thermoplastic.**

- **Slicer**
- **Nozzle**
- **Extruder**
- **Print bed**
- **ANS:-C**

**12. What were the variable we used in Tinker cad?**

- **x,y,z**
- **a,b,c**
- **x,y**
- **ANS:-A**

**13. What does CLIP stand for?**

- **Continuous Light Interface Production**
- **Continuous Laser Interface production**
- **Continuous Liquid Interface Production**
- **Continuous Liquid Interactive Production**
- **ANS:-C**

**14. What is the purpose of using melting wax in SGC Rapid prototype process\_\_\_\_\_**

- **As support material**
- **As liquid resin**
- **As cavity filling material**
- **All the above**

- **ANS:-C**

**15. State the statement is True or False: The main purpose of the STL file format is to encode the surface geometry of a 3D object.**

- **True**
- **False**
- **ANS:-A**

**16. Select few benefits of Rapid Prototyping**

- **Speed**
- **Affordability**
- **Multiple part production/fabrication**
- **All Of above**
- **ANS:-D**

**17. Statement -1 : Most liquid-based rapid prototyping systems build parts in a vat of photo-curable liquid resin, an organic resin. Statement-2 :The cures or solidifies under the effect of exposure to laser radiation, usually in the UV range.**

- **Statement-1 is true and Statement-2 is False**
- **Statement-1 is False and Statement-2 is True**
- **Both statements are true**
- **Both statements are false**
- **ANS:-C**

**18. \_\_\_\_\_ is the process of tiling a surface with one or more geometric shapes such that there are no overlaps or gaps.**

- **tessela**
- **Tessellation**
- **None of these**
- **ANS:-C**

**19. A SL machine consists of a build platform (substrate) which is mounted in a vat of resin \_\_\_\_\_ type laser is used.**

- **Argon ion laser**
- **UV Helium-Cadmium**
- **UV Helium-Magnesium**
- **Both A & B**
- **ANS:-D**

**20. UV-curable resins which are formulated from photo initiators and reactive liquid monomers.**

- **Photo-polymerization**
- **Stereo lithography**
- **Ionography process**
- **Electrostatic process**
- **ANS:-A**

**21. List few disadvantages of SLA**

- **Printing tends to take a long time.**
- **Resins are comparatively fragile.**

- **SLA printing costs are comparatively lower than DLP**
- **Both A & B**
- **ANS:-D**

**22. Which of the process, the input material are in Liquid form?**

- **SLA**
- **SGC**
- **FDM**
- **MJM**
- **ANS:-D**

**23. Select any two aspects of Prototype model**

- **The implementation of the prototype; from the entire product (or system) itself to its sub-assemblies and components.**
- **The form of the prototype; from a physical prototype to a virtual prototype**
- **The degree of the approximation of the prototype; from a very rough representation to an exact replication of the product.**
- **Option A & C**
- **ANS:-D**

**24. List few inputs of Rapid Prototyping**

- **CAD model**
- **STL file**
- **Physical Object**
- **Point data from digitalize**
- **All Of above**
- **ANS:-D**

**26. Select any one Liquid type RP from following.**

- **SLS**
- **LOM**
- **SGC**
- **FDM**
- **ANS:-C**

**27. Which process is not a Powdered based Rapid Prototyping**

- **SLS**
- **EBM**
- **MJS**
- **Micro-fabrication**
- **ANS:-D**

**28. Which Rapid Prototyping process uses Photo-sensitive liquid as starting material.**

- **Laminated Object Manufacturing**
- **Stereo lithography**
- **Selective Laser Sintering**
- **CNC**
- **ANS:-B**

**29. The following are the starting material of the Additive Rapid Prototyping process,**

**EXCEPT...**

- Powder
- Solid
- Liquid
- Gas
- ANS:-D

**30. What is Rapid Prototyping?**

- The process by which a model of the final product can quickly be made
- Changing the design of something after production has already begun
- When companies or teams are working on multiple aspects of the same design at one time
- Designing something while competing against other departments
- ANS:-A

**31. Which is the correct order of the Product Life Cycle**

- Acquisition, distribution, disposal, processing, manufacturing, design, packaging, use
- Use, packaging, design, manufacturing, processing, disposal, distribution, acquisition
- Design, acquisition, processing, manufacturing, packaging, distribution, use, disposal
- Acquisition, design, manufacturing, processing, packaging, distribution, use, disposal
- ANS:-C

**32. Is when a liquid material is poured into a mold, which represents a hollow version of the part.**

- Forming
- Joining
- Machining
- Casting
- ANS:-D

**33. Is the process where a raw material is reshaped to form the desired part**

- Casting
- Forming
- Machining
- Joining
- ANS:-B

**34. The process of bring together two materials using some type of adhesive or fastener.**

- Forming
- Joining
- Casting
- Machining
- ANS:-B

**35. Precise or controlled removal of the raw material, usually with a drill, chisel, or saw**

**blade to reveal the products desired shape.**

- **Joining**
- **Machining**
- **Forming**
- **Casting**
- **ANS:-B**

**36. Who is considered the father of the assembly line?**

- **Henry Ford**
- **Henry**
- **Ford**
- **None of these**
- **ANS:-A**

**37. Processes in which we turn raw materials into standard stock.**

- **Secondary Process**
- **Machining**
- **Subtractive Manufacturing**
- **Primary Process**
- **ANS:-D**

**38. Creating identical or nearly identical parts to be mass produced. These parts can then be put together to form a product.**

- **Forming**
- **Additive Manufacturing**
- **Interchangeable Parts**
- **Subtractive Manufacturing**
- **ANS:-C**

**39. Using Manufacturing Processes to remove materials from goods as they are created.**

- **Forming**
- **Interchangeable Parts**
- **Subtractive Manufacturing**
- **Additive Manufacturing**
- **ANS:-C**

**40. 3D Printing; the process of making a part from a digital model by adding material in layers**

- **Interchangeable Parts**
- **Subtractive Manufacturing**
- **Forming**
- **Additive Manufacturing**
- **ANS:-D**

**41. Modifying a product to suit an individual, task, or need.**

- **Assembly Line**
- **Continuous Manufacturing**
- **Batch Manufacturing**
- **Custom Manufacturing**

- **ANS:-D**

**42. Products made in groups, where the components of a product are traditionally completed at one station before moving to the next station.**

- **Continuous Manufacturing**
- **Custom Manufacturing**
- **Assembly Line**
- **Batch Manufacturing**
- **ANS:-D**

**43. Workers and machines make one part of the product and pass it on to another person who adds onto the creation.**

- **Assembly Line**
- **Batch Manufacturing**
- **Custom Manufacturing**
- **Continuous Manufacturing**
- **ANS:-A**

**44. Products made with no interruption in the production line. Goods are being created 24/7, all day every day.**

- **Custom Manufacturing**
- **Batch Manufacturing**
- **Continuous Manufacturing**
- **Assembly Line**
- **ANS:-C**

**45. An 8 step process or method that is used to solve technological challenges to change and improve products for the way we live.**

- **Industrial Revolution**
- **Manufacturing**
- **Engineering Design Process**
- **Assembly Line**
- **ANS:-C**

**46. Before this historical event we mainly created good by hand, and after by machine/factory.**

- **Industrial Revolution**
- **Manufacturing**
- **Engineering Design Process**
- **Assembly Line**
- **ANS:-A**

**47. Materials that satisfy human wants and provide utility (1 word only)**

- **Goods**
- **Good**
- **good**
- **All Of above**
- **ANS:-D**



**48. The process of making goods.**

- **Engineering Design Process**
- **Joining**
- **Manufacturing**
- **Machining**
- **ANS:-C**

**49. True or False? Reinforced plastics are a type of composite.**

- **True**
- **False**

**ANS:-A**

**50. Additive manufacturing \_\_\_\_\_.**

- **builds objects layer by layer**
- **can rapidly create prototypes**
- **can create fully functional parts**
- **All of these options**

**ANS:-D**

## **POSSIBLE QUESTIONS**

### **CHAPTER-01**

#### **Modern machining process**

**Short question**

1. What is the difference between traditional and nontraditional machining process?
2. What is plasma?
3. *Define LASER.*
4. Explain the use of dielectric in EDM process?
5. *Explain the use of servo controller in EDM process?*
6. Explain the main components of electron gun.
7. What is monochromatic light?
8. What are the abrasive materials?

*Long question*

1. Explain the working principle of EDM.
2. Explain the working principle of ECM.
3. Explain the working principle of PAM.
4. Explain the working principle of EBM.
5. Explain the working principle of LBM.
6. Explain the working principle of AJM.
7. Explain the working principle of USM.

**CHAPTER - 02**

**Processing of plastics**

**Short question**

1. What is plastic process?
2. What is reaction moulding?
3. Define resins.

*Long questions*

**1. Write short notes**

1. Injection moulding
2. Calendaring
3. Extruding
4. Transfer moulding
5. Reinforcements

**CHAPTER NUMBER -03**

***ADDITIVE MANUFACTURING PROCESS***

**Short question**

4. What is AM?
5. What is the need of AM?
6. Define automation
7. What is FMS?
8. .Define rapid prototype.

*Long questions*

1. What are the fundamental AM?
2. Advantage and disadvantage of AM
3. Difference between CNC and AM.
4. Explain the production tools of turret and capstan lathe.
5. Explain the applications of designing AM.

**CHAPTER NUMBER -04**

***SPECIAL PURPOSE MACHINE (SPM)***

### **Short question**

1. Define SPM?
- .2. What are the general elements of SPM

### *Long questions*

1. Explain principle of SPM design.

## **CHAPTER NUMBER -05**

### **MAINTENANCE OF MACHINE TOOLS**

### **Short question**

1. What are the types of maintenance?

### *Long questions*

#### **SHORT NOTE ON**

- Repair cycle analysis.
- Repair complexity
- Maintenance record

