Reg. No															

B.Tech. DEGREE EXAMINATION, JUNE 2023

Fifth Semester

18MEE328T - NON-TRADITIONAL MACHINING TECHNIQUES

(For the candidates admitted during the academic year 2018-2019 to 2021-2022)

Note:

i. **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40 minutes.
ii. **Part - B** and **Part - C** should be answered in answer booklet.

Time: 3 Hours **Max. Marks: 100**

	Part - A (20 × 1 Marks = 20 Marks) Answer **All** Questions	Marks	BL	CO
1.	In Ultrasonic machining, the material is removed by (A) anodic dissolution (B) thermal melting (C) abrasive action (D) electrochemical oxidation	1	1	1
2.	AJM nozzles are made of (A) low carbon steel (B) HSS (C) WC (D) stainless steel	1	1	1
3.	Material removal in AJM of glass is around (A) 0.1 mm^3/min (B) 15 mm^3/min (C) 15 mm^3/s (D) 1500 mm^3/min	1	1	1
4.	Material removal takes place in AJM due to (A) electrochemical action (B) mechanical impact (C) fatigue failure of the material (D) sparking on impact	1	1	1
5.	In electrochemical machining (ECM) removal of metal from the work piece takes place by (A) anodic dissolution (B) abrasive action (C) thermal melting (D) erosion	1	2	3
6.	WJM cannot be used to machine (A) frozen food (B) plywood (C) leather (D) steel plates	1	2	2
7.	Abrasive water jet velocity increases with (keeping all other parameters unchanged) (A) increasing traverse velocity of the job (B) decreasing mass flow rate of abrasive (C) decreasing traverse velocity of the job (D) increasing mass flow rate of abrasive	1	2	2
8.	In an environment friendly development concerning AWJM, the following is used as abrasive (A) dry ice (B) cubic boron nitrite (C) diamond (D) tungsten carbide	1	1	2
9.	Increasing volume concentration of abrasive in slurry would affect MRR in the following manner (A) increase MRR (B) decrease MRR (C) would not change MRR (D) initially decrease and then increase MRR	1	2	2

10.	In electrochemical machining (A) both tool and workpiece are stationary (B) both tool and workpiece move (C) tool is stationary and workpiece moves (D) tool moves and workpiece is stationary	1	2	3
11.	Commercial ECM is carried out at a combination of (A) low voltage high current (B) low current low voltage (C) high current high voltage (D) low current high voltage	1	2	3
12.	In which of the following, an electrochemical oxidation on the work surface takes place? (A) Electrochemical grinding (B) Electrical discharge Machining (C) Electrochemical Machining (D) Ultrasonic Machining	1	1	3
13.	Which of the following materials cannot be machined by EDM ? (A) Steel (B) WC (C) Titanium (D) Glass	1	2	4
14.	Which of the following is used as dielectric medium in EDM ? (A) tap water (B) kerosene (C) NaCL solution (D) KOH solution	1	1	4
15.	Which of the following is not true in case of Electrical discharge machining (EDM)? (A) Erosion takes place both on Work piece and the tool. (B) Gap between tool and work piece is controlled by servo mechanism. (C) The electrode (tool) is made of graphite or copper. (D) The size of impression on work piece is exactly the same as that on electrode (tool).	1	2	4
16.	The Electrical Discharge machining (EDM) process is (A) Burr free (B) Not for hard metals (C) Direct contact machining (D) Capable of producing sharp corners	1	1	4
17.	In which of the following processes, the shape of tool is not same as that of cavity produced? (A) Ultrasonic Machining (B) Electrical discharge Machining (C) Electrochemical Machining (D) Plasma arc machining	1	2	5
18.	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 vaporisation due to thermal effect of impingement of high energy electron	1	2	5
19.	Mechanism of material removal in Laser Beam Machining is due to (A) Mechanical erosion due to impact of high of energy photons (B) Electro-chemical etching (C) Melting and vaporisation due to thermal effect of impingement of high energy laser beam (D) Fatigue failure	1	2	5
20.	In Plasma arc welding the electrode is made of (A) tungsten (B) copper (C) brass (D) steel	1	1	5

Part - B (5 × 4 Marks = 20 Marks)

Answer **any 5** Questions

		Marks	BL	CO
21.	Discuss the importance of nontraditional machining process. List out various energy methods to shape materials?	4	3	1
22.	Distinguish traditional and non-traditional machining processes.	4	2	1
23.	Write about the influence of process parameters on MRR for Water Jet Machining?	4	2	2
24.	An iron work piece is subjected to ECM using copper electrode and NaCl as electrolyte. Supply voltage and current are 16V and 6000 A. Gap between tool and work piece is 0.05 cm Calculate metal removal rate (MRR). (Atomic weight of iron = 56, Valency = 2 density = 7.87 g/cm^3	4	3	3
25.	What is the significance of using electrolyte solution in ECM and dielectric in EDM process?	4	2	3
26.	Mention the advantages and limitations of EDM	4	2	4
27.	Define population inversion and stimulated emission	4	1	5

Part - C (5 × 12 Marks = 60 Marks)

Answer **All** Questions

		Marks	BL	CO
28.	a. i. Material removal rate in AJM is 0.5 mm^3/s. Calculate material removal per impact if mass flow rate of abrasive is 3 g/min, density is 3 g/cc and grit size is 60 µm as well as indentation radius.[6 Marks] ii. Mention the advantages and limitations of AJM.[6 Marks] **(OR)** b. Discuss the effect of machining parameters on MRR in Ultrasonic machining process with suitable graphs.	12	2	1
29.	a. Explain the mechanism of material removal and operation of Water Jet Machining process with neat diagram. **(OR)** b. Explain the mechanism of material removal and operation of magnetic abrasive machining.	12	2	2
30.	a. Explain Electro-chemical machining of steel with a neat diagram indicating various reactions involved in the process. **(OR)** b. Sketch the set-up of Electro-chemical Grinding process and explain its operation	12	2	3
31.	a. With a neat diagram, explain spark erosion machining process and list various applications. **(OR)** b. Explain the working principle and operation of wire-cut EDM process with a neat diagram.	12	2	4
32.	a. Explain the influence of various parameters in Plasma Arc Machining. **(OR)** b. Explain the basic principle and the operation of Laser Beam Machining.	12	2	5

* * * * *