NON-TRADITIONAL MACHINING – QUESTION BANK

Semester: VII	Department: Mechanical Engineering	AY: 2026–27
Course Code: _____	Course Name: NON-TRADITIONAL MACHINING	Credits: 03

Q. No.	Question	M	L (RBTL)	C (CO)
MODULE–01: INTRODUCTION TO NON-TRADITIONAL MACHINING				
1.	Explain the need for non-traditional machining processes and compare them with conventional machining processes.	8	L2	CO1
2.	Classify non-traditional machining processes based on the nature of energy employed, with examples.	8	L2	CO1
3.	Explain the general characteristics of non-traditional machining processes.	8	L2	CO1
4.	Discuss the factors governing the selection of a suitable non-traditional machining process for a given application.	8	L3	CO1
5.	Compare the advantages and limitations of non-traditional machining with those of conventional machining.	8	L2	CO1
6.	Explain the role of mechanical, electrical, electrochemical, chemical and thermal energy in non-traditional machining.	8	L2	CO1
7.	Select a suitable non-traditional machining process for machining a hard, brittle and heat-sensitive material, giving reasons.	8	L3	CO1
8.	Discuss the important process parameters that influence the performance of non-traditional machining.	8	L2	CO1
9.	Analyse the suitability of non-traditional machining for producing intricate shapes and difficult-to-machine materials.	8	L4	CO1
10.	Summarise the major applications of non-traditional machining in modern manufacturing.	8	L2	CO1
MODULE–02: ULTRASONIC MACHINING (USM) AND ABRASIVE JET MACHINING (AJM)				
11.	Explain the principle and working of Ultrasonic Machining (USM) with a neat labelled sketch.	8	L2	CO2
12.	Describe the main components of USM equipment and explain their functions.	8	L2	CO2
13.	Explain how amplitude and frequency affect the material removal rate in USM.	8	L2	CO2
14.	Discuss the effects of abrasive grain diameter and slurry characteristics on USM performance.	8	L2	CO2
15.	Explain the influence of slurry flow rate and tool/work material properties on USM.	8	L2	CO2
16.	Describe the principle and working of Abrasive Jet Machining (AJM) with a neat sketch.	8	L2	CO2
17.	Explain the functions of the carrier gas, abrasive particles, nozzle and mixing chamber in AJM.	8	L2	CO2
18.	Discuss the effects of abrasive type, grain size, stand-off distance and gas pressure on AJM.	8	L2	CO2
19.	Compare USM and AJM in terms of principle, material removal, accuracy, surface finish and applications.	9	L4	CO2
20.	Recommend either USM or AJM for machining a brittle non-metallic component and justify your choice.	8	L3	CO2
MODULE–03: ELECTROCHEMICAL MACHINING (ECM) AND CHEMICAL MACHINING (CHM)				
21.	Explain the principle of Electrochemical Machining (ECM) and the role of electrolysis in material removal.	8	L2	CO3
22.	Draw and explain the ECM equipment setup, identifying its major elements.	8	L2	CO3
23.	Explain the effects of current density, tool-feed rate, inter-electrode gap and electrolyte flow on ECM.	8	L2	CO3
24.	Discuss the influence of electrolyte type and concentration on ECM performance.	8	L2	CO3
25.	Explain the ECM tooling technique and describe the requirements of tool insulation materials.	8	L2	CO3
26.	Describe electrochemical grinding and electrochemical honing, and state their applications.	8	L2	CO3
27.	Explain the principle and sequence of operations in Chemical Machining (CHM).	8	L2	CO3
28.	Describe chemical blanking and chemical milling with suitable applications.	8	L2	CO3

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29.	Compare ECM and CHM with respect to working principle, process parameters, accuracy and surface finish.	9	L4	CO3
30.	Discuss the advantages, limitations and industrial applications of ECM and CHM.	8	L2	CO3
MODULE–04: ELECTRICAL DISCHARGE MACHINING (EDM) AND PLASMA ARC MACHINING (PAM)				
31.	Explain the principle and mechanism of material removal in Electrical Discharge Machining (EDM).	8	L2	CO4
32.	Draw and explain the EDM setup, including the relaxation-type spark erosion generator.	8	L2	CO4
33.	Explain the functions and desirable properties of an EDM electrode and tool-feed control system.	8	L2	CO4
34.	Describe the different EDM flushing methods: pressure flushing, suction flushing, side flushing and through-tool flushing.	8	L2	CO4
35.	Explain the effects of spark frequency, current, spark gap and surface finish in EDM.	8	L2	CO4
36.	Discuss the effects of electrode material, electrode polarity and heat-affected zone on EDM performance.	8	L2	CO4
37.	Explain the principle, equipment and mechanism of material removal in Plasma Arc Machining (PAM).	8	L2	CO4
38.	Discuss the process parameters and safety precautions associated with PAM.	8	L2	CO4
39.	Compare EDM and PAM in terms of process principle, work materials, applications and limitations.	9	L4	CO4
40.	Explain the applications, advantages and limitations of EDM and PAM in manufacturing.	8	L2	CO4
MODULE–05: LASER BEAM MACHINING (LBM) AND ELECTRON BEAM MACHINING (EBM)				
41.	Explain the principle and working of Laser Beam Machining (LBM) with a neat labelled sketch.	8	L2	CO5
42.	Describe laser generation and identify the major components of LBM equipment.	8	L2	CO5
43.	Explain the mechanism of material removal in LBM and discuss the factors affecting it.	8	L2	CO5
44.	Discuss the advantages, limitations and industrial applications of LBM.	8	L2	CO5
45.	Explain the principle and working of Electron Beam Machining (EBM) with a neat labelled sketch.	8	L2	CO5
46.	Describe the EBM equipment and explain the functions of the electron gun, focusing system and vacuum chamber.	8	L2	CO5
47.	Explain the mechanism of material removal in EBM and the importance of maintaining a vacuum.	8	L2	CO5
48.	Compare LBM and EBM with respect to energy source, operating environment, accuracy and applications.	9	L4	CO5
49.	Select a suitable process between LBM and EBM for producing fine holes in a precision component and justify your selection.	8	L3	CO5
50.	Discuss the advantages, limitations and applications of EBM in modern manufacturing.	8	L2	CO5

Note:

1. Each module contains 10 questions; total questions: 50.
2. Marks are assigned as 8 or 9, within the template's permitted range of 6–10 marks.
3. RBTL levels are assigned using the question keywords (L2: Understand, L3: Apply, L4: Analyse).
4. Course Outcomes follow the supplied syllabus: CO1—Introduction; CO2—USM/AJM; CO3—ECM/CHM; CO4—EDM/PAM; CO5—LBM/EBM.
5. M: Marks; L: RBTL level; C: Course Outcome.

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