BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: B. TECH. **SEMESTER: VII**
BRANCH: PIE, MECH **SESSION: MO/2025**

SUBJECT: PE406 NON-CONVENTIONAL MACHINING PROCESSES

TIME: 3 Hours **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

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Q.1(a)	During AJM, the mixing ratio used is 0.2. Calculate the mass ratio if the ratio of the density of abrasive particles and the density of the carrier gas is equal to 20.	[2]	1	4
Q.1(b)	With a schematic diagram, explain the working principle of WJM.	[3]	1	2
Q.1(c)	Briefly discuss how vibration frequency, amplitude of vibration, abrasive slurry characteristics, and static loading influence the machining performance and material removal rate in USM.	[5]	1	3
Q.2(a)	Define Chemical Machining (ChM) and mention any two industries where it is commonly used.	[2]	2	2
Q.2(b)	Describe the effect of hydrogen bubble generation in ECM and how it influences machining accuracy.	[3]	2	3
Q.2(c)	Discuss the factors affecting accuracy, surface quality, and productivity in ECM. Explain how electrolyte flow, inter-electrode gap, voltage, and tool insulation influence the final output.	[5]	2	3
Q.3(a)	State the basic principle of Electro Discharge Machining (EDM) and mention any two conditions necessary for spark generation.	[2]	3	2
Q.3(b)	Explain the role of the dielectric fluid in EDM. Highlight any three major functions it performs during machining.	[3]	3	2
Q.3(c)	Explain the working principle of Dry Electrical Discharge Machining (Dry EDM). Describe how replacing liquid dielectric with a gaseous dielectric influences spark formation, heat distribution, and overall machining performance.	[5]	3	3
Q.4(a)	Why is Electron Beam Machining (EBM) always performed in a high-vacuum chamber?	[2]	4	3
Q.4(b)	What is sputtering in Ion Beam Machining (IBM)? Briefly explain how ion energy and angle of incidence influence the sputtering yield.	[3]	4	2
Q.4(c)	With a neat schematic diagram, describe the complete mechanism of material removal in Laser Beam Machining (LBM).	[5]	4	2
Q.5(a)	With a neat schematic, explain the construction and working principle of Electrochemical Discharge Machining (ECDM).	[5]	5	2
Q.5(b)	Describe the construction and working principle of Laser-Assisted Oxygen Cutting (LAOC).	[5]	5	2

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