

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION MO/2023)

CLASS: B. TECH
BRANCH: PRODUCTION

SEMESTER: VII
SESSION: MO/2023

SUBJECT: PE406 NON-CONVENTIONAL MACHINING PROCESSES

TIME: 03 Hours

FULL MARKS: 50

INSTRUCTIONS:

1. The question paper contains 5 questions, each of 10 marks and a total of 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates

		CO	BL
Q.1(a)	How do material improvements and complex product demands drive the necessity for non-conventional machining over traditional methods?	[2] 2	4
Q.1(b)	How does considering physical parameters, workpiece shape, and economic factors influence the selection of non-conventional machining processes for different machining tasks?	[3] 2	4
Q.1(c)	Discuss the impact of vibration amplitude, frequency, feed force, abrasive size, and slurry concentration on Material Removal Rate (MRR) in Ultrasonic Machining (USM) and their corresponding underlying mechanisms represented by trendlines.	[5] 3	4
Q.2(a)	Describe different masking methods used in chemical etching processes. Elaborate on the application areas and techniques involved in each method.	[5] 2	2
Q.2(b)	What factors dictate the preferential use of electrochemical machining (ECM) over other machining processes for specific applications? Discuss the intricacies behind ECM's superior suitability and effectiveness compared to alternative methods in specific industrial applications.	[5] 5	5
Q.3(a)	How do the High-Pressure Theory, Static Field Theory, and High Temperature Theory explain material removal in Electro-Discharge Machining (EDM)? Discuss the factors influencing material erosion and how each theory correlates with experimental results and limitations in explaining electrode erosion.	[5] 3	4
Q.3(b)	What is Dry EDM, and briefly explain its significance in machining? Provide two advantages of using Dry EDM over traditional EDM techniques.	[5] 1	2
Q.4(a)	Discuss the specific industrial applications where Laser Beam Machining (LBM) excels over other traditional machining processes. Support your argument by highlighting its unique capabilities, underlying principles, and the technical attributes that make it the optimal choice for such applications.	[5] 5	4
Q.4(b)	Explain the basic principles of Plasma Arc Machining (PAM) and highlight its key advantages and applications as a material removal process.	[5] 1	2
Q.5(a)	What is Electrochemical Discharge Machining (ECDM), and how does it work? Provide a brief overview of its basic principles with neat sketches and enumerate its applications.	[5] 4	2
Q.5(b)	How do the operational mechanisms of Electrochemical Grinding (ECG), Electro Discharge Grinding (EDG), and Abrasive Electro Discharge Grinding (AEDG) differ? Compare and contrast the fundamental principles, advantages, and distinctive features of each technique in precision material removal processes.	[5] 4	4

:23/11/2023 M:::