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Question Paper Code : 90798

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2025.

Fifth/Sixth/Seventh/Eighth Semester

Mechanical Engineering

CME 387 – NON-TRADITIONAL MACHINING PROCESSES

(Regulations 2021)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. Classify non-traditional machining processes based on the energy used.
2. List two applications of Abrasive Jet Machining (AJM).
3. Illustrate Electrochemical Honing (ECH) process.
4. Write the advantages of Electrochemical Deburring.
5. What are the advantages of Laser Beam Machining?
6. How does Ion Beam Machining differ from Electron Beam Machining?
7. Enumerate the steps involved in Chemo Mechanical Polishing (CMP) process.
8. Give the advantages of Magnetic Abrasive Finishing (MAF).
9. List the process parameters in hybrid non-traditional machining processes.
10. What are the challenges in the implementation of hybrid non-traditional machining processes?

PART B — ($5 \times 13 = 65$ marks)

11. (a) Explain the working principle, advantages, and limitations of Abrasive Water Jet Machining (AWJM) with an illustration.

Or

- (b) Explain the working principle, applications, and advantages of Ultrasonic Machining (USM).

12. (a) Draw and explain the working principle, applications Electro-chemical machining with neat sketch.

Or

- (b) Elucidate the working principle of electrochemical grinding and discuss the process capabilities and applications.

13. (a) Describe the working principle, equipment and applications of Electric Discharge Machining (EDM).

Or

- (b) Expound the working principle of Plasma Arc Machining (PAM). Discuss its process parameters, applications and advantages.

14. (a) Discuss the mechanism of material removal in Abrasive Flow Machining (AFM).

Or

- (b) Elaborate on the working principles of Magnetorheological Finishing (MRF) and Magnetorheological Abrasive Flow Finishing (MRAFF) with illustrations.

15. (a) Detail the significance of Laser-Assisted Machining (LAM) process. Explain how it can improve material removal rates and surface finishes, particularly in difficult-to-machine materials.

Or

- (b) Explain Electrochemical Discharge Machining (ECDM). Discuss how this method improves machining performance. Highlight its applications, advantages, and limitations.

PART C — (1 × 15 = 15 marks)

16. (a) Examine the environmental sustainability of nano finishing processes by analyzing their effects on resource consumption, waste production, and energy usage. Suggest methods to improve the eco-friendliness of these processes and evaluate their potential impact on the manufacturing industry.

Or

- (b) Analyze the impact of modern Wire EDM technologies, such as micro-WEDM and high-speed WEDM, on manufacturing efficiency. Evaluate their application in industries that demand fine features and high-quality surface finishes.