

Exam.Code:1015
Sub. Code: 35217

2056
M.E. (Mechanical Engineering)
Second Semester
MME-202: Advanced Manufacturing Processes

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, selecting atleast two questions from each Unit.

x-x-x

UNIT - I

- I. a) Classify advanced manufacturing processes based on the type of energy source utilized. Discuss their key features and typical applications.
b) What is Hybrid machining? Explain how it differs from non-conventional machining. (2x5)
- II. a) With a neat sketch, explain the main elements and working principle of Ultrasonic Machining (USM).
b) Discuss the role of process parameters (amplitude, frequency, abrasive size, and slurry concentration) on the performance of USM. (2x5)
- III. a) What is the fundamental principle of Chemical Machining (CM)? How does the strength of the etchant influence material removal?
b) Explain the critical differences between Chemical Machining (CM) and Electro-Chemical Machining (ECM). (2x5)
- IV. In AJM, the desired mass ratio is 8. The abrasive density is 2800 kg/m^3 and gas density is 1.4 kg/m^3 . Find: a) Required mixing ratio, b) If gas flow rate is $2 \times 10^{-3} \text{ m}^3/\text{s}$, find abrasive mass flow rate. (10)

UNIT - II

- V. a) State Faraday's laws of electrolysis. What are the fundamental electrolytic reactions in the ECM process for a given electrolyte?
b) Explain the fundamentals of the ECM process with the help of a neat sketch. (2x5)

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(2)

- VI. a) Explain the principle of material removal in Electron Beam Machining (EBM). Why is a vacuum chamber essential for this process?
b) Define LASER in the context of Laser Beam Machining (LBM). What is the principle of LASER generation for machining purposes? (2x5)
- VII. a) Discuss the influence of plasma gases (such as Argon, Nitrogen, or Hydrogen) on the machining quality and MRR in Plasma Arc Machining (PAM).
b) Explain the advantages and limitations of beam-based processes including IBM. (2x5)
- VIII. Explain the following terms used in the analysis of Electro-Discharge Machining (EDM):
a) Wear ratio
b) Over-cut
c) Discharge gap
d) Cathode and Anode (4x2½)

x-x-x