Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 51439

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2023.

Sixth/Seventh Semester

Mechanical Engineering

ME 8073 – UNCONVENTIONAL MACHINING PROCESSES

(Common to: Manufacturing Engineering/Mechanical Engineering (sandwich)/Mechanical and Automation Engineering/Production Engineering)

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Identify the types of abrasive feeding mechanism in AWJM.

2. Outline the properties of tools used in USM process.

3. Brief the material removal mechanism in EDM process.

4. Summarize the limitations of EBM process.

5. Mention the advantages of ECM over other machining process.

6. State the applications of chemical machining.

7. What is the purpose of abrasives in magnetic abrasive finishing process?

8. Identify the applications of chemo-mechanical polishing process.

9. List the needs for hybrid machining processes.

10. Mention the limitations of nontraditional machining processes.

PART B — (5 × 13 = 65 marks)

11. (a) Classify the advanced machining processes with a neat flow chart and compare.

Or

(b) Identify a suitable advanced machining process with the following properties: no dust, high cutting speed, multidirectional cutting capacity, no fire hazards, no thermal or deformation stresses with a typical sketch. Also discuss the process in detail.

12. (a) Outline wire cut EDM with a neat sketch and explain its significant process parameters for good surface finish.

Or

(b) Describe Laser Beam Machining (LBM) process with clear illustration, in terms of mechanism of metal removal, process characteristics, accuracy, surface quality and application.

13. (a) (i) Derive an equation for MRR in ECM process to evaluate machining efficiency. (7)

(ii) In electrochemical machining of pure iron, a material removal rate of 600 mm^3/min is required. Estimate current requirement. (6)

Or

(b) Describe Electrochemical grinding (ECG) process with clear illustration, in terms of mechanism of metal removal, process characteristics, accuracy, surface quality and application.

14. (a) Explain the mechanism of material removal during the magnetorheological AFF Process with a neat sketch. Also, mention the process capabilities, process parameters and application.

Or

(b) Discuss the abrasive flow machining with a neat illustration and mention its applications.

15. (a) Explain the benefits of hybrid unconventional machining technologies and elaborate the challenges and opportunities.

Or

(b) Describe any one laser assisted machining process with constructional details.

PART C — (1 × 15 = 15 marks)

16. (a) With a case study, explain the chemical machining process. Discuss in detail about selections of etchants and maskants according to the required work piece materials and process parameters.

Or

(b) With a suitable case study, analyse the volumetric material removal rate in USM process from the workpiece due to.

(i) Throwing mechanism. (8)

(ii) Hammering mechanism. (7)