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

Question Paper Code : 10851

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

Elective

Manufacturing Engineering

MF 4001 – MICRO MANUFACTURING

(Regulations 2021)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define the term micromachining.
2. Draw the principle diagram represents micro-turning process.
3. Write down the principle of electron beam micromachining.
4. Which type of grinding wheel is used in "Electrolytic in-process dressing?
5. List out the applications of magneto rheological finishing process.
6. What is the principle of elastic emission machining.
7. Write down the advantages of roller imprinting technology.
8. Highlight the applications of micro extrusion process.
9. Mention any one contact and noncontact method used for measurement of surface profile of a micromachined part.
10. List out any two precision applications of micro gear.

PART B — (5 × 13 = 65 marks)

11. (a) Explain the construction, working principle and capabilities of ultrasonic micromachining process with a neat sketch. (13)

Or

(b) What is the principle of electrochemical micromachining? Discuss in detail about their capabilities and applications with a neat sketch. (13)

12. (a) How laser beam machining overcomes the limitations of electron beam machining? Discuss the principle and applications of it with a neat sketch. (13)

Or

(b) What is the need for hybrid micromachining? Discuss about the principle and capabilities of electrochemical spark micromachining with a neat sketch. (13)

13. (a) Abrasive flow finishing is best suitable for which type of application? Extrapolate the principle, construction and process parameters with a neat sketch. (13)

Or

(b) What is the uniqueness of magneto rheological abrasive flow finishing? Discuss the construction, capabilities and applications with a neat sketch. (13)

14. (a) Extrapolate the principle, process parameters and capabilities of micro Laser welding process with a neat sketch. (13)

Or

(b) Discuss the process parameters that affect the performance of electron beam micro welding. Also highlight the various challenges involved in it. (13)

15. (a) What is the need for ductile regime machining? Extrapolate the principle and capabilities of ductile regime machining with a neat sketch. (13)

Or

(b) Discuss the applications of following micro part with a neat sketch.

(i) Micro nozzle (7)

(ii) Micro pin (6)

PART C — (1 × 15 = 15 marks)

16. (a) What is the importance of nanostructure surface on polymer based micro product? How nano structure formation is carried out? Discuss the steps involved in it with a neat sketch. (15)

Or

(b) A typical manufacturing industry is interested in the production precision micro part for the following requirements.

(i) Part accuracy: 10-20 μm

(ii) Surface finish: 70=200 nm

(iii) Operating environment: High temperature 2000°C

(iv) Material: Tantalum

(v) Type of part: Prismatic part with micro features

For the above requirements provide answer to the following:

(1) Which type of manufacturing processes can be adopted?

(2) Justify the answer with salient features of chosen process.

(3) Draw the schematic diagram and mention the major equipments.
