

Total No. of Questions :10]

SEAT No. :

P1856

[4859]-1024

[Total No. of Pages :4

B.E. (Mechanical Engineering)

ADVANCED MANUFACTURING PROCESSES

(2012 Pattern) (End - Sem.) (Semester - I) (402045 D) (Elective- II)

Time : 2½ Hours]

[Max. Marks :70

Instructions to the candidates:

- 1) All questions are compulsory i.e. Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.*
- 2) Figures to the right indicate full marks.*
- 3) Assume suitable data, if necessary.*
- 4) Neat diagrams must be drawn wherever necessary.*

Q1) a) In following table, advanced machining processes are given on left hand side and two applications of each process are given on right hand side. Match the process with their correct applications. **[4]**

- | | |
|------------------------------------|--|
| i) High Energy Rate Forming (HERF) | a) Burr-free sharpening of hypodermic needles |
| ii) Electromagnetic Forming (EMF) | b) Profiling of worn locomotive traction motor gears |
| iii) Hydroforming | c) Crimping of metal strips |
| iv) Electrochemical Grinding (ECG) | d) Radar dishes |
| | e) Bending of thin tubes into complex shapes |
| | f) Ball Joint Assembly |
| | g) Medical and commercial cookware applications |
| | h) Aluminium tubes for bicycle frames |

- b) Explain the importance of tool design in Friction Stir Welding (FSW)? Name any four commonly used tool (pin) profiles in FSW with neat sketches? **[6]**

OR

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Q2) a) Write down at least two applications of Friction stir welding in each of the following industries: [6]

- i) Aerospace,
- ii) Railway and
- iii) Land transport.

b) State whether the following statements are true or false: [4]

- i) In Roll forming, side rolls and cluster rolls are used to provide greater precision and flexibility and to limit stresses on the material.
- ii) Electrochemically ground specimens show relatively poor fatigue strength and poor dimensional tolerances.
- iii) Simultaneous drilling of multiple holes having high aspect ratio and different shapes can be obtained with ease using shaped-tube electrolytic machining (STEM).
- iv) Electromagnetic forming (EMF) process is only applicable for electrically conducting materials and is not suitable for large work pieces.

Q3) a) State with sketch the working principle and applications of the Electrolytic in-process dressing. [6]

b) Write down the advantages and limitations (four each) of the High Energy Rate Forming (HERF) process. [4]

OR

Q4) a) Explain with neat sketch the different machining zones in electrochemical grinding. [6]

b) Write down the unique features and process parameters of Electromagnetic Forming (EMF) process (four each)? [4]

- Q5)** a) List the performance characteristics of the ultrasonic micromachining process (USMM) and with cause and effect diagram show the various process parameters in USMM which influence the micromachining performance? [8]
- b) With a schematic of diamond turn machine (DTM) name the various components of DTM based on their functionality? [6]
- c) Differentiate the micro-electric discharge machining (micro-EDM) and EDM processes in terms of their interelectrode gap and specific energy of material removal? [2]

OR

- Q6)** a) State any four applications of micro-EDM process and with cause-effect diagram show the different process parameters in micro-EDM process which influence the process? [8]
- b) Explain the different contributing mechanisms of material removal that are involved in ultrasonic micromachining process (USMM)? [6]
- c) List four properties of diamond tools which considered them as the most suitable tool for diamond micromachining? [2]
- Q7)** a) What is additive manufacturing and classify the various processes according to the raw material used in the process? Also, state the advantages of additive manufacturing processes in comparison to subtractive manufacturing processes? [8]
- b) State with sketch the principle of Fused Deposition Modeling (FDM)? Also, list the general applications of FDM process. [6]
- c) State the applications of the Direct Write technology (DW)? [2]

OR

- Q8)** a) State with sketch the principle of Laminated Object Manufacturing (LOM)? Also, state the advantages and disadvantages of the LOM process (four each)? [8]

- b) Describe the process steps for manufacturing a component from design/drawing stage to finished component using an additive manufacturing process? [6]
 - c) Give at least four points of comparison between the Selective Laser Melting (SLM) and Electron Beam Melting (EBM) process. [2]
- Q9)**
- a) State the advantages and limitations of Electron microscopes over Optical microscopes? (Three each) [6]
 - b) Describe with schematic the basic components of Scanning Tunneling Microscope? [6]
 - c) State with sketch the principle of the stylus type surface profilers? Also, state advantages and limitations of these contact-type profilers? [6]

OR

- Q10)**
- a) List out the equipments used for measurement of micro-machined parts and group them into two categories based on the principles used for dimensional and topographic inspection? [6]
 - b) State with schematic the principle of Atomic Force Microscope (AFM)? Also, compare AFM with electronic microscopes in terms of characteristics of images captured? [6]
 - c) State with schematic the principle and applications of Interference Microscopy? Also, state the major limitation of interferometry? [6]

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