Total No. of Questions : 10]

SEAT No. :

P2145

[Total No. of Pages : 4

[5254]-541

B. E. (Mechanical Engineering)

ADVANCED MANUFACTURING PROCESSES

(2012 Pattern) (End Semester) (Theory)

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.l0.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***
4) ***Neat diagrams must be drawn wherever necessary.***

Q1) In following table,advanced manufacturing processes are given on left hand side and two characteristics/applications of each process are given on right hand side. Match the process with their correct application/characteristic.**[10]**

Advanced processes	Process characteristics and/or applications
A. Chemical etching	i) Burr-free sharpening of hypodermic needles
	Profiling of worn locomotive traction motor gears
B. Hydroforming	ii) Electrohydraulic forming
	Radar dishes
C. Electrochemical grinding	iii) Bending of thin tubes into complex shapes
	Ball Joint Assembly
D. Friction stir welding	iv) Non consumable rotating tool
	A solid phase process
E. HERF	v) Dedicated expensive toolings
	Automotive wheels and suspension parts
F. Squeeze casting	vi) Undercutting effect
	Machining of Silicon substrate

P.T.O.

G.	High velocity forming	vii)	Turbulated cooling holes
			Sulfuric, Nitric, and hydrochloric acids
H.	Shear spinning	viii)	Products free from shrink, voids and gas pocket etc.
			Automobile steering wheel
I.	Shaped tube electrolytic	ix)	Production of conical and axisymmetric parts
	machining		Flow turning
J.	Vacuum die casting	x)	Medical and commercial cookware applications
			Aluminium tubes for bicycle frames

OR

Q2) State whether the following statements are true or false : **[10]**

a) Non-traditional or unconventional machining processes are the processes where in there is direct contact between tool and work piece.

b) In Roll forming, side rolls and cluster rolls are used to provide greater precision and flexibility and to limit stresses on the material.

c) Electrolytic in-process dressing, Electro-jet machining and Laser assisted electrochemical machining are hybrid machining processes.

d) Electrochemically ground specimens havehigh fatigue strength and good dimensional tolerances.

e) In forward flow forming spun material flows under the roller in opposite direction of the feed motion of roller and towards the unsupported end of the mandrel.

f) Large and thick parts can be economically and efficiently shaped by explosive forming in comparison to Electromagnetic Forming (EMF) process.

g) The spinnability of the material is dependent on the material to be shear form.

h) Shaped-Tube Electrolytic Machining (STEM) is usually used to obtain small aspect ratio circular holes.

i) Using Electrochemical grinding on hard materials higher MRR and good tolerances are achieved as compared to conventional grinding.

j) Electromagnetic forming (EMF) process is applicable only for small size electrically conducting work pieces.

Q3) a) Friction stir welding is considered as 'Green technology', comment on the statement. **[6]**

b) State with sketch the working principle of the Electrolytic in-processdressing. **[4]**

OR

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

b) Roll forming is ideal for producing constant-profile parts with long lengths and in large quantities. Justify the statement. **[4]**

Q5) a) With a schematic of diamond turn machine (DTM) name the various components of DTM based on their functionality. **[8]**

b) In what way the micro-electric discharge machining (micro-EDM) process differs from Electric discharge machining process. Also, state the process parameters which affect the oversize and aspect ratio obtained using micro-EDM process. **[8]**

OR

Q6) a) With a schematic explain the principle of Ultrasonic micromachining process (USMM). Also, state the various process parameters which influence the USMM performance. **[8]**

b) List four properties of diamond tools which considered them as the most suitable tool for diamond micromachining? Also, state the applications of diamond micromachining. **[8]**

Q7) a) State the advantages and applications of additive manufacturing processes. Also, categorize the additive manufacturing processes as specified by ASTM standard. **[8]**

b) What is Direct Write technology (DW)? Classify Direct Write technology and explain any one of them with neat schematic. **[8]**

OR

Q8) a) State with sketches the principle of Laminated Object Manufacturing (LOM) and Fused Deposition Modeling (FDM). **[8]**

b) Describe the process steps for manufacturing a component from design/drawing stage to finished component using an additive manufacturing process. **[8]**

Q9) a) State advantages of electron microscopes over optical microscopes.Also, name the various types of electron microscopes. **[6]**

b) Explain with sketch the principle of online dimensional measurement using laser-based diffraction technique. **[6]**

c) With a schematic state the working principle of interference microscope. Also, state the applications of interference microscopy. **[6]**

OR

Q10)Write Short notes on : **[18]**

a) Atomic force microscope (AFM)

b) Scanning tunneling microscope (STM)

c) Interference comparators