Total No. of Questions : 10]

SEAT No. :

P1959

[Total No. of Pages : 3

[5059] - 541

B.E. (Mechanical Engineering)

ADVANCED MANUFACTURING PROCESSES

(2012 Pattern) (Semester - I)

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 and 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) a) Match the characteristics and/or application given on right hand side with the appropriate advanced manufacturing processes given on left hand side. **[4]**

Advanced Manufacturing Processes	Process characteristics and/or applications
i) Electromagnetic forming	A) Only female die is needed
ii) Flow forming	B) Magnetic pulse forming
iii) Electro Hydro forming	C) Vacuum in the die is prerequisite
iv) Roll forming	D) Capacitor bank
v) Shear spinning	E) Pivoted pointer
vi) High energy rate forming	F) Rollers with automated controlled movements
vii) Explosive forming	G) Hemispherical, hemi ellipsoidal profile forming
viii) Spinning	H) Flower design

b) State and explain the different parameters which affect the heat generation during Friction stir welding (FSW). **[6]**

OR

P.T.O.

Q2) a) State whether the following statements are true or false : **[4]**

i) Rolling, forging, drawing, extrusion are the bulk deformation processes wherein the work formed has a low surface area to volume ratio.

ii) Hydroforming is generally referred to manufacturing of hollow sections such as tubes and not applicable to from the planer surfaces such as angles, channels and sheets.

iii) High Energy Rate Forming (HERF) process is not suitable to form titanium and tungsten alloys under high strain rates.

iv) Flow stress is a critical parameter in metal forming process as it specifies the force and power requirements for the machinery to perform the process.

b) State the advantages in terms of metallurgical, environmental and energy benefits of friction stir welding (four each). **[6]**

Q3) a) State the advantages and applications of shaped tube electrolytic machining. **[4]**

b) Explain with a schematic the working principle of vacuum die casting process. **[6]**

OR

Q4) a) State the working principle of electrolytic in-process dressing with a neat sketch. **[4]**

b) State the advantages, limitations and applications of electrochemical grinding process (four each). **[6]**

Q5) a) With a schematic describe the five sub-systems (components) of a diamond turn machine tool. **[8]**

b) State different mechanisms which contribute in removal of material in ultrasonic micromachining process (USMM)? Also, state the factors which determine the type, size and hardness of abrasive particles during USMM. Name the abrasive particles used for cutting tungsten carbide and glass respectively when using USMM. **[8]**

OR

Q6) a) With a schematic of micro-electro discharge machining set-up describe the different peripherals of micro-EDM set-up. Also, state the applications of micro-EDM process (four each). **[8]**

b) Using cause and effect diagram state the various process parameters which affect the ultrasonic micromachining (USMM) process performance? Also, describe the effect of process parameters on material removal rate and tool wear when using USMM. **[8]**

Q7) a) What is additive manufacturing? Describe the different steps by which a part or component is build using additive manufacturing process. **[8]**

b) With a schematic state the principle of powder bed fusion (PBF) additive manufacturing process. Also, state the different fusion mechanisms used in PBF process. **[8]**

OR

Q8) a) With a schematic explain the working principle and process steps of extrusion based additive manufacturing process. **[8]**

b) With a schematic state the working principle of sheet lamination process. Also, state various methods to manufacture a component using this technique. **[8]**

Q9) a) Comment on importance of measuring techniques in micromachining. Also, classify measuring systems used for dimensional measurements and topographic inspection in micromachining. **[6]**

b) Explain with a neat sketch the working principle and applications of Interference comparators. **[6]**

c) With a schematic describe the functions of various components of Atomic force microscope (AFM). **[6]**

OR

Q10)Write short notes on following micro machining measuring instruments: **[18]**

a) Surface profilers.

b) Laser-based diffraction technique.

c) Optical and electron microscopes.

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