

B.Tech 6th Semester Exam., 2019

NON-CONVENTIONAL MANUFACTURING

Time : 3 hours

Full Marks : 70

Instructions :

- (i) The marks are indicated in the right-hand margin.
- (ii) There are **NINE** questions in this paper.
- (iii) Attempt **FIVE** questions in all.
- (iv) Question No. 1 is compulsory.

1. Choose the correct answer of the following
(any seven) : 2×7=14

- (a) Which one of the following is **not** among the limitations of EDM?
- (i) Low material removal rate
 - (ii) Long lead time (to prepare the tool)
 - (iii) Workpiece material must be conductive
 - (iv) Can cut only one hole at a time

(b) The current used during EDM is

- (i) AC
- (ii) DC
- (iii) pulsed AC
- (iv) pulsed DC

(c) LBM system cannot effectively machine

- (i) refractory materials
- (ii) tungsten carbide
- (iii) copper
- (iv) MS

(d) In AWJM, mixing process takes place in

- (i) intensifier
- (ii) catcher
- (iii) mixing chamber
- (iv) orifice

(e) In USM, the frequency of oscillation is

- (i) 10 kHz-15 kHz
- (ii) below 10 kHz
- (iii) above 15 kHz
- (iv) None of the above

(f) In which welding process the electric energy required for welding is stored in the capacitor?

- (i) Percussion welding
- (ii) Explosion welding
- (iii) Diffusion welding
- (iv) Thermit welding

(g) In which welding process pressure is applied by detonating a layer of explosive?

- (i) Percussion welding
- (ii) Explosion welding
- (iii) Diffusion welding
- (iv) Thermit welding

(h) In metal forming process the hardness of the material

- (i) decreases
- (ii) remains same
- (iii) increases then decreases
- (iv) increases

(i) Which of the following methods is used for analyzing metal forming processes?

- (i) Slab method
- (ii) Upper bound method
- (iii) Slip line method
- (iv) All of the above

(j) Machining of complicated shapes like jet engine blades and turbine blades is done by

- (i) plasma arc machining
- (ii) electrical discharge machining
- (iii) laser beam machining
- (iv) electrochemical machining

2. (a) Classify the different types of unconventional machining processes based on thermal energy. 5

(b) Elaborate the functions of electrolyte in ECM. 5

(c) What are the desirable properties of carrier gas in AJM? 4

3. (a) Give the principle of material removal in USM. Explain ultrasonic sinking and contour machining with a sketch. 7
- (b) List the factors which affect the MRR in USM and write short notes on each of them. 7
4. (a) Discuss about the types of maskants used in chemical machining. 7
- (b) Explain the basis, why surface finish of a chemically machined surface of an alloy is poor. 7
5. (a) Describe the working principle and construction of LBM. Mention its merits, demerits and applications. 7
- (b) Write short notes on the following : 7
- (i) Underwater welding
- (ii) Water hammer forming
6. (a) A tapered hole is produced using sinking ECM with an uninsulated tool. If machining has occurred for time t , find the expression for taper (θ) in terms of various parameters associated with ECM. Ignore any viscosity, pressure and temperature effect. 7

- (b) Find MRR, if 18-4-1 HSS is machined by ECM process using 500 A current. Following table can be used as data for the calculation : 7

Element	Atomic weight	Valency	Density (g/cm ³)
Iron (Fe)	56	2	7.8
Tungsten (W)	184	6	19.5
Chromium (Cr)	52	2	7.2
Vanadium (V)	50	2	7.5

7. (a) Define the term 'high velocity forming process' in terms of probable advantage and operational problem. 7
- (b) Briefly discuss electrodischarge forming process. 7
8. (a) With a neat sketch, explain the process of plasma arc welding along with the effect of all the process parameters. 7
- (b) Does any melting take place in metal during explosive welding? Explain why explosive welding is good for joining dissimilar metals. Mention the limitations of explosive welding. 7

9. (a) Explain the working principle, elements and characteristics of EDM process. 7
- (b) What are the basic requirements of tool materials in EDM process? Name any four tool materials. 7
