Code No: RR410309 **Set No. 1**

IV B.Tech I Semester Regular Examinations, November 2006
UNCONVENTIONAL MACHINING PROCESS
(Common to Mechanical Engineering and Production Engineering)
Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. Describe the effects of the following machining parameters on the material removal rate in Ultrasonic machining.
   (a) Viscosity of fluid in slurry [8]
   (b) Mean grain diameter [8]
2. (a) Explain Abrasive Jet Machining (AJM) [4]
   (b) Explain the effect of following parameters in AJM
      i. the abrasive [4]
      ii. the gas [4]
      iii. the size and position of the nozzle [4]
3. (a) Compare Electro Chemical Machining with a single point machining and describe the differences. [4+4=8]
   (b) What are the limitations and industrial applications of Electro Chemical Machining? [4+4=8]
4. (a) What is the influence of Electro Chemical Machining on the Mechanical properties of machined components.? [8]
   (b) Comment on the fatigue strength of machined components in Electro Chemical Machining. Describe the methods tailored to improve fatigue strength. [4+4]
5. What are the different modes of dielectric flushing used in E.D.M. Which method of flushing the inter electrode gap yields improved M.R.R. and why? [5+2+9]
6. (a) What are the various process parameters which influence the MRR? [8]
   (b) What materials are used for Electrodes? Mention the relative advantages. [4+4]
7. Write notes on : [4x4=16]
   (a) Electron pressure
   (b) Back pressure of evaporating atoms.
   (c) Surface tension.
   (d) Hydro static pressure of molten metal with respect to electron beam machining.

8. What types of defects are observed in radial extrusion? What are the reasons for them? What remedies are suggested by you to avoid these defects? [4+6+6]

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Code No: RR410309 **Set No. 2**

IV B.Tech I Semester Regular Examinations, November 2006
UNCONVENTIONAL MACHINING PROCESS
(Common to Mechanical Engineering and Production Engineering)
Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) With the help of a neat sketch, explain how material is removed from a work piece in ultrasonic machining process. [4+4=8]
   (b) Explain the various factors affecting the material removal rate in ultrasonic machining process. [8]

2. (a) Explain the effect of the following on material removal rate in AJM. [8]
      i. Pressure of carrier gas
      ii. Abrasive flow rate
   (b) Explain the functions of the following in abrasive jet machining. [8]
      i. Carrier Gas
      ii. Abrasive material

3. (a) Distinguish between selective etching and step etching in Chemical Machining operations. What are their importance and industrial applications? [4+4=8]
   (b) Define Chemical Blanking operation. Describe different types of Chemical Blanking operations. [3+5=8]

4. Why are Chemical Machining and Electro Chemical Machining considered as chipless machining? Explain the mechanisms of metal.removal in both these cases and compare it with conventional grinding process. [16]

5. Write short notes on
   (a) Wire E.D.M. [4]
   (b) Pulse Energy [3]
   (c) Longitudinal wear and lateral wear of tool electrode [3]
   (d) E.D.Machined surfaces. [3]
   (e) E.D.M. copying process. [3]

6. For a relaxation circuit used in E.D.M. process prove that [16]
   $V_c = V_0(1 - e^{-t/RcC})$ Where
   V_c = Charged voltage of condenser in volts
   V_0 = e.m.f. Applied across the circuit for charging the condenser in volts
   R_c = Charging resistance in ohms
   C = Capacitance of condenser in farads
   t = time in sec.

7. With the aid of sketches compare and contrast LBM and EBM. [16]

8. With the help of a neat sketch explain the basic principle of working, advantages, disadvantages, limitations and applications of radial extrusion. [3+3+3+3+4]

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Code No: RR410309 **Set No. 3**

IV B.Tech I Semester Regular Examinations, November 2006
UNCONVENTIONAL MACHINING PROCESS
(Common to Mechanical Engineering and Production Engineering)
Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) What is a piezoelectric transducer? Explain how it is used for producing ultrasonic waves. [3+5=8]
   (b) Explain with the help of a neat sketch the working principle of ultrasonic machining. [4+4=8]
2. (a) What are the applications of Abrasive jet machining? Explain. [3+5=8]
   (b) Explain the effects of various parameters on metal removal rate in abrasive jet machining. [8]
3. (a) Distinguish between selective etching and step etching in Chemical Machining operations. What are their importance and industrial applications? [4+4=8]
   (b) Define Chemical Blanking operation. Describe different types of Chemical Blanking operations. [3+5=8]
4. (a) What are the various advantages of using ECM? [8]
   (b) What are the various limitations of ECM? [8]
5. (a) What are the advantages & applications of EDM over other unconventional processes? [4+4]
   (b) Sketch and explain the constructions & working of EDM process. [4+4]
6. What are the different forms of current pulses used in E.D.M.? Explain why a trapezoidal pulse results in more anode metal removal and less cathode metal removal. [6+10]
7. Describe the working of LBM with neat sketch. State the applications, advantages, disadvantages, limitations of LBM. Also discuss about the economics of LBM. [3+3+2+2+2+2+2]
8. Derive an expression for the pressure to be applied by the hydraulic system in hydrostatic extrusion. [16]

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Code No: RR410309 **Set No. 4**

IV B.Tech I Semester Regular Examinations, November 2006
UNCONVENTIONAL MACHINING PROCESS
(Common to Mechanical Engineering and Production Engineering)
Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain the influence of work piece hardness and tool hardness on metal removal rate in ultrasonic machining process. [8]
   (b) Describe how abrasive grit size influences the surface roughness of the machined surfaces in USM. [8]
2. (a) Explain the working principle of abrasive jet machine, with the help of suitable diagram. [5+3=8]
   (b) Explain the advantages of water jet cutting over traditional cutting process with suitable examples. [8]
3. (a) Distinguish between etch rate and etch factor. Why are they important in Chemical Machining? How do you estimate them? [3+3+4=10]
   (b) What is the care required in demasking? How is it achieved? [3+3=6]
4. (a) In a certain Electro Chemical Machining of a metallic die, a metal removal rate of $2cm^3/min$ is desired. Determine the current required for machining given that: Atomic weight: 56 gms
   Valency of dissolution: 2
   Density of material: 7.8 gms/cm^3
   Voltage: 45 volts
   Electrolyte velocity: 20 m /sec.
   Inter Electrode gap: 0.05 mm
   Electrolyte type & concentration: 20% sodium chloride. [8]
   (b) State the assumptions made in the above case. [8]
5. What are the different modes of dielectric flushing used in E.D.M. Which method of flushing the inter electrode gap yields improved M.R.R. and why? [5+2+9]
6. What are the tool electrodes used in E.D.M. Discuss their merits, demerits, and applications. [4+4+4+4]
7. (a) What do you mean by Laser Beam machining (LBM)? [6]
   (b) What is a spontaneous emission? [4]
   (c) Explain the physical principal of laser with suitable diagram. [4+2]
8. What is high-energy rate forming? Give the classification. Explain briefly each of them. [4+4+8]

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