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

IV B.Tech I Semester Regular Examinations, November 2005
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 the principle of rotary ultrasonic machine? Explain how it improves the material removal rate. [3+5=8]
   (b) A hole in to be drilled in 20mm thick tungsten carbide sheet by ultrasonic method. The slurry in made of 1 part of 320 grit (15 micron radius) boron carbide mixed with 1 parts of water. The static stress is $1.4 \times 10^{-2} kg/mm^2$ and the amplitude of tool oscillation is 0.025mm. The machine operates at 25,000 cycles/sec. The compression fracture strength of tungsten carbide is 225 kg/mm^2. Calculate the time required for drilling the required hole. Assume that the pulse efficiency is 10%. [8]

2. (a) Explain the process of AJM. How is it different from sand blasting. [4+4=8]
   (b) Compare AJM, WJM with regard to [4x2=8]
      i. Mechanics of material removal
      ii. Process capability
      iii. Accuracy and
      iv. Specific energy

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. (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. (a) Explain about the hole drilling &surface machining capabilities of electron beam. [8]

   (b) How machining rate can be controlled in EBM process. [8]

8. What types of defects are observed in confined explosive forming? 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 2005
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 the principle of rotary ultrasonic machine? Explain how it improves the material removal rate. [3+5=8]
   (b) A hole in to be drilled in 20mm thick tungsten carbide sheet by ultrasonic method. The slurry in made of 1 part of 320 grit (15 micron radius) boron carbide mixed with 1 parts of water. The static stress is $1.4 \times 10^{-2} kg/mm^2$ and the amplitude of tool oscillation is 0.025mm. The machine operates at 25,000 cycles/sec. The compression fracture strength of tungsten carbide is 225 kg/mm^2. Calculate the time required for drilling the required hole. Assume that the pulse efficiency is 10%. [8]
2. (a) Explain the principle used in abrasive water jet machine. [8]
   (b) Explain the characteristics of water jet cutting process. [8]
3. (a) Compare and contrast Electro Chemical Grinding with Conventional Grinding operation. [8]
   (b) What are the advantages and limitations of Electro Chemical Grinding? [4+4=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. (a) With a neat sketch, explain how the component is machined using E.D.M. process. [3+5]
   (b) How do you classify the various E.D.M. processes? Briefly, explain them? [4+4]
6. Sketch and explain the power supply source using vacuum tube type of controlled pulse circuit used in E.D.Macining. [8+8]
7. (a) What is the principle of the plasma arc system and how does it differ from orthodox flame torch systems? Has it any application in the metal removal field? [4+2+2]
   (b) Discuss the factors that influence the quality of the cut in PAM. [8]
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. 3**

IV B.Tech I Semester Regular Examinations, November 2005
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 the principle of rotary ultrasonic machine? Explain how it improves the material removal rate. [3+5=8]
   (b) A hole in to be drilled in 20mm thick tungsten carbide sheet by ultrasonic method. The slurry in made of 1 part of 320 grit (15 micron radius) boron carbide mixed with 1 parts of water. The static stress is $1.4 \times 10^{-2} kg/mm^2$ and the amplitude of tool oscillation is 0.025mm. The machine operates at 25,000 cycles/sec. The compression fracture strength of tungsten carbide is 225 kg/mm^2. Calculate the time required for drilling the required hole. Assume that the pulse efficiency is 10%. [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) Compare and contrast Electro Chemical Grinding with Conventional Grinding operation. [8]
   (b) What are the advantages and limitations of Electro Chemical Grinding? [4+4=8]

4. (a) What are the various advantages of using ECM? [8]
   (b) What are the various limitations of ECM? [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. 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. (a) Explain the working of solid state pulsed laser with neat sketch. [6+2]
   (b) Explain the working of CO2 gas laser with neat sketch. [5+3]

8. What types of defects are observed in unconfined explosive forming? 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. 4**

IV B.Tech I Semester Regular Examinations, November 2005
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 the principle of rotary ultrasonic machine? Explain how it improves the material removal rate. [3+5=8]
   (b) A hole in to be drilled in 20mm thick tungsten carbide sheet by ultrasonic method. The slurry in made of 1 part of 320 grit (15 micron radius) boron carbide mixed with 1 parts of water. The static stress is $1.4 \times 10^{-2} kg/mm^2$ and the amplitude of tool oscillation is 0.025mm. The machine operates at 25,000 cycles/sec. The compression fracture strength of tungsten carbide is 225 kg/mm^2. Calculate the time required for drilling the required hole. Assume that the pulse efficiency is 10%. [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. "Taper production is simplest while using Chemical Machining techniques in comparison to other methods". Justify this statement and describe the procedure used for taper production. [8+8]
4. (a) What are the various advantages of using ECM? [8]
   (b) What are the various limitations of ECM? [8]
5. Explain how to sink a square blind hole in tungsten work electrode using copper as tool electrode using E.D.M. [16]
6. What are the tool electrodes used in E.D.M. Discuss their merits, demerits, and applications. [4+4+4+4]
7. (a) Explain the working of solid state pulsed laser with neat sketch. [6+2]
   (b) Explain the working of CO2 gas laser with neat sketch. [5+3]
8. What is hydraulic forming? With the help of a neat sketch explain the electro-hydraulic forming process. [4+4+8]

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