

**IV B.Tech I Semester Supplementary Examinations, February 2008
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**

1. (a) Explain the influence of grain size of abrasives in ultrasonic machining on the surface finish characteristics of the machined surface. [8]
(b) Explain how various process parameters influence the material removal rate in ultrasonic machining process. [8]
2. (a) With the help of neat sketch explain the mechanism of material removal in abrasive jet machining process. [3+5=8]
(b) What are the factors affecting the material removal rate in abrasive jet machining? Explain. [8]
3. (a) What is Electro Chemical Deburring? Why is it preferred over conventional deburring? [4+4=8]
(b) Sketch a component ideally suited for Electro Chemical Deburring and comment on the tooling, electrolyte flow, and tool control. [2+2+2+2=8]
4. (a) A Nimonic 75 alloy has the following composition. Ni -72.5%, Cr -19.5%, Fe- 5.0%, Ti -0.4% and the rest of elements can be ignored. The atomic weights of Ni, Cr, Fe, and Ti are 58.71, 51.99, 55.85 and 47.9 respectively and their valencies are 2, 3, 2, and 2 respectively. This is machined using Electro Chemical Machining at a current of 560 Amp. Determine the theoretical machining rate using the percentage weight method. Time of machining 10 minutes. State the assumptions made, if any. [6]
(b) Calculate the anodic efficiency in the above case if the actual metal removal rate is found as 174 gms and comment on the result. [6]
(c) Can the efficiency value in the above case be improved? If so, suggest a method? [4]
5. What are the various thermal metal removal processes? Clearly, bring out the differences between them and explain them in brief. [8+8]
6. For a relaxation circuit used in E.D.M. process prove that [16]

$$V_c = V_0(1 - e^{-t/R_c C})$$
 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.

Code No: RR410309

Set No. 1

7. (a) Discuss the main industrial applications of plasma cutting systems. [8]
(b) What are the advantages and disadvantages of plasma cutting process? [4+4]
8. What types of defects are observed in liquid forging? What are the reasons for them? What remedies are suggested by you to avoid these defects? [4+6+6]

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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) Explain the use of Electro Chemical Machining in air craft industries. [5]
(b) With a suitable sketch explain the tooling arrangement to produce one of the products for aircraft industry. [5]
(c) Perform economic analysis on the above product with data assumed. Suitably. [6]
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. (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) What are the essential differences between a cutting and a welding torch? [8]
(b) What are the essential differences between plasma spray and oxy-gas spraying? Discuss in detail. [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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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. (a) What are the advantages and disadvantages of E.D.M. process -explain in detail. [4+4]
(b) With neat sketch, explain the closed loop hydraulic circuit used in E.D.M. process. [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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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) Describe the effects of distance of nozzle from work on diameter of cut in abrasive jet machining. [6]
(b) Explain the desired properties of abrasive materials used in AJM. [6]
(c) Which are the abrasive materials used in water jet machining. [4]
3. (a) Explain the use of Electro Chemical Machining in air craft industries. [5]
(b) With a suitable sketch explain the tooling arrangement to produce one of the products for aircraft industry. [5]
(c) Perform economic analysis on the above product with data assumed. Suitably. [6]
4. Choosing an example of your own, describe the Tipton's method of designing a tool in Electro Chemical Machining. What are its advantages and limitations? [8+4+4]
5. What do you understand by the term Die-sinking with E.D.M. -Explain in details with applications. [4+8+4]
6. What are the tool electrodes used in E.D.M. Discuss their merits, demerits, and applications. [4+4+4+4]
7. With the aid of sketches compare and contrast LBM and EBM. [16]
8. What is high-energy rate forming? Give the classification. Explain briefly each of them. [4+4+8]
