Roll No. | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 08

Ph.D in Faculty of Engineering (ME)

NON-CONVENTIONAL MACHINING

M.Code : 77365

Time : 3 Hrs. Max. Marks : 100

INSTRUCTIONS TO CANDIDATES :

1. Attempt any FIVE questions out of EIGHT question.
2. Each question carry TWENTY marks.

1. a) Discuss the significant advantages of the non-conventional machining processes over conventional machining processes.

   b) Explain the mechanism of material removal in abrasive jet machining process? Compare the performance of the various types of abrasives used in this process.

2. Explain the mechanism of material removal in EDM process. How is die-sinking EDM different from wire-EDM process? Give applications of both the variants. Is the dielectric fluid different in these variants? Why?

3. a) Derive an expression for the material removal rate obtained in ultrasonic machining process. Explain why this process is not suitable for the machining of ductile materials?

   b) Find -out the approximate time required to machine a 5 mm × 5 mm square hole in a tungsten carbide plate of 4 mm thickness by USM process. The abrasive grains are of 0.01 mm diameter and the feeding is done with a constant force of 3.5 N. The amplitude of tool oscillation is 25 m and the frequency is 25 kHz. Take fracture hardness of WC as 6900 N/mm2. The slurry contains 1 part of abrasive to 1 part of water.

4. Explain the principle and working of electrochemical machining with the help of a neat sketch. List the common electrolytes used in this process. What are the differences between electrochemical machining and chemical machining?

5. Draw the schematic of an Electron Beam Machine and describe its various components. Discuss the effect of the various process parameters on material removal rate and surface finish obtained in this process. What are its limitations?

6. a) Describe the principle and working of Plasma arc machining process. Give some specific applications of this process.

   b) Which of the non-conventional machining processes would you recommend for producing very small and deep holes in hard materials? Why?

7. a) What are the process parameters of Laser Beam Machining process? Discuss the effects of each process parameter on the machining characteristics of this process.

   b) Derive an expression for the time required for the workpiece surface to reach melting temperature in Laser Beam Machining. Clearly state the assumptions made.

8. Write short notes on :

   a) Hybrid machining

   b) RC relaxation circuit in EDM

   c) Electrochemical deburring

   d) EDM electrode materials

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.