Roll No. | | | | | | | | | | | |

Total No. of Pages : 02

Total No. of Questions : 08

PHD (Mech. Engg.)

NON-CONVENTIONAL MACHINING

Time : 3 Hrs.

Max. Marks : 100

INSTRUCTIONS TO CANDIDATES :

1. Attempt any FIVE questions out of EIGHT questions.
2. Each question carries TWENTY marks.
3. Assume any missing data suitably.

1. a) What do you understand by hybrid machining? Explain with the help of a suitable example.

   b) Explain the mechanism of material removal in abrasive jet machining process. What is the effect of nozzle tip distance on the shape and size of the machining cut in this process?

2. Differentiate between die-sinking EDM and wire-EDM with the help of neat sketches and give the limitations of both the variants of this process.

3. a) Explain the step-by-step procedure of the chemical machining process. What are the problems associated with this process?

   b) Discuss the role of electrolyte in the ECM process and describe the various methods that are used to ensure good electrolyte flow between the tool and the workpiece.

4. a) Describe the various types of lasers that are used in manufacturing operations. What are the other applications of lasers besides machining?

   b) A laser beam with a power intensity of 105 W/mm2 falls on a tungsten sheet. Find out the time required for the surface to reach melting temperature. The given thermal properties of tungsten are; melting temperature = 3400°C, thermal conductivity = 2.15 W/cm-°C, volume specific heat = 2.71 J/cm3-°C. Assume that 10% of the power of the beam is absorbed.

5. a) Describe the details of the machining set-up used for electrochemical deburring. What are the process parameters 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?

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

   b) Draw a neat schematic of the electron beam machining process and explain its various components.

7. Explain the mechanism of the ultrasonic machining process. What are the important process parameters? Discuss the effect of each process parameter on material removal rate and surface finish obtained by this process.

8. Write short notes on : a) Abrasives in electrochemical grinding process. b) RC relaxation circuit in EDM. c) Water jet machining. d) EDM electrode materials.