[Total No. of Questions - 8] [Total No. of Printed Pages - 3]
(2066)

16419(J)

M. Tech 2nd Semester Examination

Non Conventional Machining Processes

PE-207

Time : 3 Hours **Max. Marks : 100**

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt any five questions

1. (a) Classify non-conventional machining processes. What are the advantages of non-conventional machining processes over conventional machining processes?

   (b) What are the important process capabilities which need to be considered before selecting the nature of modern machining processes? Provide comparison. (10+10=20)

2. (a) Discuss the principle of EDM with a neat sketch. List out the parameters which will influence the selection of tool electrode and dielectric medium of electric discharge machining.

   (b) Develop an expression for the MRR in EDM. In an EDM operation, with R-C circuit, the following data is available.

   Supply Voltage 100V

   Discharge Voltage 75V

   Resistance 10 ohm, percentage of discharge energy used up in metal removal operation 20%. Calculate the time required to drill a 10mm diameter hole in a steel workpiece, having a thickness of 15mm. (8+12=20)

[P.T.O.]

3. (a) State principle of electro-chemical machining, ECM and provide schematic to show elements of electro-chemical machining. Also state advantages of electro-chemical machining process.

   (b) What are the elements of chemical machining? Discuss in detail about their functions. List out the advantages and applications of chemical machining separately. (10+10=20)

4. (a) How electron beam is produced in EBM? Calculate (i) the total force due to electron bombardment, (ii) backpressure of evaporating atoms (iii) Surface tension.

   (b) Explain mechanism of machining by laser. Differentiate between EBM and LBM considering at least five important aspects. (10+10=20)

5. (a) Discuss in brief about explosive forming. State its advantages. Also list its applications.

   (b) What is high velocity forming of metals? State its procedural detail and applications.

   (c) Differentiate between electro discharge grinding and wire EDM process. Provide neat sketches for both. (8+6+6=20)

6. (a) Define Ultrasonics and describe the process in which these are used to machine the material. Sketch and describe two types of tool feed systems. If suppose USM is used for drilling a hole (under the same machining conditions) in Aluminium and Cast Iron. Which one will have higher depth of the drilled hole and why?

   (b) Sketch and explain-the schematic diagram of Abrasive Jet machining (AJM) system.

(c) Discuss the reasons for inaccuracies in Abrasive Jet machining process. Why AJM when applied to ductile materials lead to a low rate of metal removal? (8+6+6=20)

7. (a) Describe the following terms for EDM process:

   (i) Duty factor

   (ii) Wear Ratio

   (iii) Heat affected zone (HAZ)

   (iv) Dielectric strength

   (b) Describe the working principle of Electro-hydraulic process along with its advantages, disadvantages and applications. (10+10=20)

8. Write notes on:

   (i) Quality of surfaces produced in chemical machining when compared to ECM.

   (ii) Slurry Constituents in USM.

   (iii) Economics of Electro chemical machining.

   (iv) Limitations of EDM process. (4×5=20)