

Code No: R1642032

R16

Set No. 1

IV B.Tech II Semester Regular Examinations, September - 2020

UNCONVENTIONAL MACHINING PROCESSES

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

Question paper consists of Part-A and Part-B

Answer ALL sub questions from Part-A

Answer any FOUR questions from Part-B

PART-A (14 Marks)

1. a) State the need for unconventional machining process. [2]
- b) What is meant by chemical machining? [2]
- c) What do you mean by recast layer with reference to the EDM? [3]
- d) What is the purpose of deflection coil in EBM process? [2]
- e) Write the various types of torches used in plasma arc machining. [3]
- f) Name different gases used in AJM. [2]

PART-B (4x14 = 56 Marks)

2. a) Explain the factors that should be considered during the selection of an appropriate unconventional machining process for a given job. [7]
- b) Write the functions of slurry and oscillator in USM. [7]
3. a) Discuss about the electrochemical honing and electrochemical grinding. [7]
- b) With the help of a simple schematic diagram, explain the working of Electrochemical machining process. [7]
4. a) Discuss any four power circuits used for EDM process. [7]
- b) Explain the process of wire cut EDM with a neat sketch. [7]
5. a) Explain the principles and elements of EBM, also how the work table is protected from getting damaged by electron beam. [7]
- b) With a neat sketch, explain the process of LBM along with the effect of all the process parameters. [7]
6. a) Explain the working principle involved in plasma machining method. [7]
- b) Discuss the surface finish and tolerances obtained in PAM. [7]
7. a) Discuss in detail about the AJM process variables that influence the rate of material removal and accuracy in the machining. [7]
- b) With a neat sketch explain shaped tube electrolytic machining. [7]



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1. a) List out the limitations of traditional machining processes. [3]
- b) Name the electrolytes used for machining of steel, titanium alloys and copper alloys. [2]
- c) What are the applications of Wire EDM? [2]
- d) Name and explain the device which produce electron beam. [3]
- e) What is plasma? [2]
- f) Write any two differences between electro stream drilling and electro chemical drilling. [2]

PART-B (4x14 = 56 Marks)

2. a) Compare and contrast the various unconventional machining process on the basis of type of energy employed, material removal rate, transfer media and economical aspects. [7]
- b) Discuss the influence of process parameters and applications of USM. [7]
3. a) With a neat sketch explain the working principle of chemical machining. [7]
- b) Briefly discuss Electro chemical deburring process. [7]
4. Explain the following in EDM with neat sketch
i) Electrode feed control system and [7]
ii) Factors to be considered for EDM machine tool selection [7]
5. a) Explain with a neat sketch, the working principle of Laser beam Machining process. List its applications. [7]
- b) Sketch the electron beam gun and explain the function of each part. [7]
6. a) Discuss the factors that affect the quality of the product machined using plasma machining process. [7]
- b) Explain with a figure about the Plasma arc torch. [7]
7. a) Explain the process parameters in WJM process. [9]
- b) Explain the method of AJM with help of schematic diagram. [5]



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PART-A (14 Marks)

1. a) Explain the principle used in Ultra Sonic Machining (USM) process. [3]
- b) List the elements used in the Electro Chemical Machining process [2]
- c) Write the applications of EDM. [2]
- d) List few applications of Electron Beam Machining process. [2]
- e) Briefly explain about the metal removal mechanism in Plasma Arc Machining. [3]
- f) Define the term "Mixing ratio". [2]

PART-B (4x14 = 56 Marks)

2. a) Explain the need for the development of Unconventional Machining Process by considering any four simple cases of your own interest. [7]
- b) Explain the USM machine setup and discuss various feed mechanisms. [7]
3. a) Briefly discuss about the effect of high temperature and pressure of electrolyte on the ECM process. [7]
- b) Explain the principle of ECG with sketch. [7]
4. a) What are the basic requirements of tool materials in EDM process? Name any four tool materials with their specific applications. [7]
- b) With a neat sketch, describe the mechanism of material removal in EDM. [7]
5. a) Discuss the process parameters of EBM and their influence on machining quality. [7]
- b) List out the advantages and limitations of LBM process. [7]
6. a) Discuss the advantages of using plasma machining. [7]
- b) Explain non-transferred and transferred modes of Plasma arc. [7]
7. a) Mention the advantages and limitations of AJM. [7]
- b) With a neat sketch explain Electro stream drilling. [7]



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PART-A (14 Marks)

1. a) Distinguish conventional and unconventional machining processes. [2]
- b) List out the factors that affect material removal rate in ECM. [2]
- c) Write short notes on grinding by EDM process. Draw a figure. [2]
- d) Write the advantages of EBM over LBM. [3]
- e) Write about the accuracy levels that can be achieved by Plasma Arc Machining. [3]
- f) List the process variables which affect the MRR in Abrasive Jet Machining (AJM). [2]

PART-B (4x14 = 56 Marks)

2. a) Is Unconventional machining process an alternate or complement to conventional machining process? Justify. [7]
- b) Write the different types of abrasives used USM. [7]
3. a) Describe the chemistry involved in ECM process. [7]
- b) Describe the Electrochemical Honing process with a neat sketch. [7]
4. a) Explain the different types of control circuits used in EDM process. [7]
- b) What is flushing in EDM process? Explain about various flushing techniques. [7]
5. a) Explain the process capabilities of EBM and LBM. [6]
- b) Explain the production of laser beam and working principle of LBM Process. [8]
6. a) Discuss the applications and limitations of Plasma Machining Process. [7]
- b) Discuss the metal removal mechanism in Plasma Arc Machining. [7]
7. a) Write the names of various elements of Abrasive Water Jet Machining (AWJM) and explain them in brief. [7]
- b) Briefly discuss the applications and limitations of WJM. [7]

