

**R15**

Code No: 127JH

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****B. Tech IV Year I Semester Examinations, May/June - 2019****UNCONVENTIONAL MACHINING PROCESSES****(Mechanical Engineering)****Time: 3 Hours****Max. Marks: 75****Note:** This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

**PART- A****(25 Marks)**

- 1.a) List the single-action, mechanical, nontraditional machining processes. [2]
- b) Name the important factors that should be considered in the selection of an unconventional machining process for a given job. [3]
- c) List the common abrasives used in abrasive jet machining (AJM). [2]
- d) State and write the expressions for Faraday's laws of electrolysis. [3]
- e) Draw the relaxation circuit diagram electrodischarge machining (EDM). [2]
- f) Enumerate the advantages of electrodischarge machining (EDM). [3]
- g) Can you machine electrically non-conducting materials using electron beam machining (EBM) process? [2]
- h) What are the present different types of LASERS? [3]
- i) What do you mean by plasma? [2]
- j) Discuss the limitations of chemical machining. [3]

**PART-B****(50 Marks)**

- 2.a) How the developments in the area of materials are partly responsible for evolution of advanced machining techniques?
- b) Differentiate between the traditional and nontraditional machining processes. [5+5]

**OR**

- 3.a) Explain the influence of various controlling parameters on the metal removal rate in ultrasonic machining?
- b) Calculate the depth of indentation produced on glass surface in ultrasonic machining by the throwing action of abrasive grain of 100mm diameter. The following data are available

Amplitude of vibration	: 0.1mm;	Frequency	: 20 KHz	
Abrasive density	: 3 kg/m <sup>3</sup> ;	Yield strength of glass	: 0.4 MPa	[5+5]

- 4.a) With the help of sketches, show the effect of stand-off-distance on width of cut and material removal rate in abrasive jet machining (AJM).
- b) During AJM, the mixing ratio used is 0.25. Calculate mass ratio if the ratio of density of abrasive and density of carrier gas is equal to 20. [5+5]

**OR**

- 5.a) Draw the schematic diagram of electro-chemical machining (ECM).
- b) Derive an equation for the maximum permissible feed rate during ECM. Also deduce the relationship for electrolyte temperature change for a given feed rate of tool. [5+5]

- 6.a) Describe the various methods for dielectric flushing used in EDM.  
b) During calculation of Material removal rate (MRR) in EDM, supply voltage was used as 60V in place of the actual supply voltage of 40V. What is the ratio of actual and calculated MRR? Assume that the condition for maximum power delivery to the discharging circuit is satisfied.  
c) Plot heat-affected zones on a machined part in EDM Process. [10]

**OR**

- 7.a) Discuss the working principle and advances in wire cut electrode discharge machining process.  
b) Sketch and explain the effects of following parameters on MRR during EDM:  
i) resistance ii) current density iii) pulse energy iv) capacitance [5+5]

- 8.a) Differentiate between 'Thermal type' and 'Non-thermal type' electron beam machining (EBM) process  
b) How the work-table is protected from getting damaged by the electron beam which has completely penetrated the workpiece? [5+5]

**OR**

- 9.a) How does machining by laser occurs? Present the expressions for power density of the laser beam and explain the terms involved in it.  
b) Enumerate the Parameters affecting the quality of laser-drilled holes. [5+5]

10. Explain different types of plasma arc machining process with a neat sketch. Also state its advantages, disadvantages and applications. [10]

**OR**

- 11.a) Explain the Process parameters, accuracy and surface finish of plasma in manufacturing industry  
b) Briefly explain the characteristics of Cut and Peel Maskants. [5+5]

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**R16**

Code No: 136ED

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year II Semester Examinations, May - 2019

UNCONVENTIONAL MACHINING PROCESSES

(Mechanical Engineering - Mechatronics)

Time: 3 hours

Max. Marks: 75

**Note:** This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

**PART - A****(25 Marks)**

- 1.a) Classify different unconventional machining processes. [2]
- b) What are the applications of ultrasonic machining and write its limitations? [3]
- c) Write the advantages and disadvantages of electro chemical honing. [2]
- d) Write about the Economic aspects of electro chemical machining. [3]
- e) Discuss about the mechanics of metal removal in electric discharge machining. [2]
- f) What do you mean by spark erosion? [3]
- g) Enumerate different process parameters in electron beam machining. [2]
- h) How do you estimate the material removal in laser beam machining process? [3]
- i) Write the applications and advantages of electro stream drilling. [2]
- j) Write a short note on magnetic abrasive finishing. [3]

**PART - B****(50 Marks)**

- 2.a) Explain in detail the electrical and physical parameters in the selection of a non traditional method.
- b) With the help of a neat diagram explain the equipment and principle of ultrasonic machining. [5+5]

**OR**

- 3.a) Develop a mathematical model relating MRR with ultrasonic machining process variables.
- b) Explain in detail the variation in MRR with different process parameters. [5+5]
- 4.a) Explain the influence of process parameters of AJM on metal removal rate?
- b) Explain the mechanism of metal removal in electro chemical grinding. [5+5]

**OR**

- 5.a) With the help of line diagrams explain the basic principle, equipment, applications and limitations of electro chemical machining.
- b) Explain in detail the equipment and principle of material removal in electro chemical honing process. [5+5]

- 6.a) With the help of a neat sketch explain the working of electric discharge grinding.  
b) Draw the basic electrical waveform in EDM used in EDM process. [5+5]

**OR**

- 7.a) Explain in detail mechanics of material removal in Wire EDM process.  
b) Compare and contrast between Electric discharge machining and electric discharge grinding process. [5+5]

- 8.a) Explain in detail about the process capabilities of laser beam machining.  
b) Explain the thermal characteristics of laser beam and write its limitations. [5+5]

**OR**

- 9.a) Explain in detail the construction and working of Electron beam machining.  
b) Explain in detail the effect of process parameters on surface finish and material removal rate in laser beam machining. [5+5]

- 10.a) Explain in detail the application of plasma in manufacturing industries.  
b) Explain the working principle of abrasive flow finishing process. [5+5]

**OR**

- 11.a) Explain the construction and working of electro chemical machining process and state its limitations.  
b) Derive a equation for metal removal rate in electro chemical machining. [5+5]

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Code No: RT41034

**R13**

**Set No. 1**

**IV B.Tech I Semester Supplementary Examinations, October/November-2019**

**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 THREE questions from Part-B*

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**PART-A (22 Marks)**

1. a) What is meant by conventional and unconventional machining process? [4]
- b) What are the economic aspects of ECM process? [4]
- c) What are the principle components of EDM process? [3]
- d) Mention advantages and limitation of LBM process? [4]
- e) Differentiate between nontransferred and transferred mode of a plasma torch? [4]
- f) Explain about the principle of water jet machining. [3]

**PART-B (3x16 = 48 Marks)**

2. a) Classify the common nontraditional methods. Give a list of such operations. [8]
- b) Discuss the effects of the amplitude and frequency of vibrations, abrasive grain size and mass flow rate on the rate of material removal and surface finish obtainable in ultrasonic machining. [8]
3. a) Explain the mechanism of material removal during ECG and how is different from ECM? [8]
- b) Explain the working principle of chemical machining with neat sketch. [8]
4. a) Explain the function of dielectric fluid in EDM. Name the common dielectric fluids used in EDM. [8]
- b) Explain the principle of Wire EDM with suitable diagram. [8]
5. a) Discuss about the generation of laser during LBM process. [8]
- b) Explain the working principle of electron beam machining. [8]
6. a) Describe the commonly used gas mixture in plasma machining and their corresponding work materials. [8]
- b) Explain the principle of plasma generation and mechanism of metal removal in plasma arch machining. [8]
7. a) What is the abrasive water jet machining? Explain its principle of operation. [8]
- b) With a neat sketch, explain abrasive flow machining process. [8]



Code No: RT41034

**R13**

**Set No. 1**

**IV B.Tech I Semester Regular Examinations, November - 2016**

**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 THREE questions from Part-B*

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**PART-A (22 Marks)**

1. a) List the machining characteristics of the Unconventional Machining Processes. [3]
- b) List the elements used in the Electro Chemical Machining process. [4]
- c) Explain the term "Sinking" in Electro Discharge Machining Method. [4]
- d) Explain briefly how material is removed in EBM process. [4]
- e) Write about the accuracy levels that can be achieved by Plasma Arc Machining. [4]
- f) List the process variables which affect the MRR in Abrasive Jet Machining (AJM). [3]

**PART-B (3x16 = 48 Marks)**

2. a) Explain the importance of Unconventional Machining Processes. [8]
- b) Discuss the classification of Unconventional Machining Processes. [8]
3. a) What are the advantages of Electro Chemical Machining process? [8]
- b) What are the tool design aspects in Electro Chemical Machining process? [8]
4. a) Explain the operating principle of circuits in Electro Discharge Machining. [8]
- b) Explain the working of Resistance – Capacitance relaxation circuit. [8]
5. a) Explain the equipments used in Electron Beam Machining (EBM) process. [8]
- b) Draw and label the parts of the Laser Beam Machine. [8]
6. a) Explain the principle and operation of Plasma Arc Machining. [8]
- b) Discuss the metal removal mechanism in Plasma Arc Machining. [8]
7. a) Explain the working of an Abrasive Jet Machine with the help of a neat sketch. [8]
- b) Discuss the different variables which control the abrasive flow finishing process? [8]



Code No: RT41034

**R13**

**Set No. 2**

**IV B.Tech I Semester Regular Examinations, November - 2016**  
**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 THREE questions from Part-B*

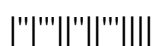
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**PART-A (22 Marks)**

1. a) Draw a graph showing the relation between MRR and Power consumption. [4]
- b) Write the functions of an electrolyte. [4]
- c) Write short notes on grinding by EDM process. Draw a figure. [4]
- d) List few applications of Electron Beam Machining process? [3]
- e) Explain briefly about the metal removal mechanism in Plasma Arc Machining. [4]
- f) Define the term "Mixing ratio". [3]

**PART-B (3x16 = 48 Marks)**

2. a) Explain the types of energy sources used in Unconventional Machining Processes. [8]
- b) Write about any four UCMP processes. [8]
3. a) Discuss the classification of Electro Chemical Machining process. [8]
- b) Draw a neat sketch of Electro Chemical Machining process scheme and explain. [8]
4. a) Describe with a neat sketch the working of a Wire EDM. [8]
- b) Explain the metal removing mechanism in Electro Discharge Machining process. [8]
5. a) Explain the advantages and disadvantages of the Electron Beam Machining process. [8]
- b) With the help of a neat diagram explain the working of a Laser Beam Machine. [8]
6. a) Explain the Plasma Arc Machining (PAM) process with a neat sketch. [8]
- b) Discuss the surface finish and tolerances obtained in PAM. [8]
7. a) Discuss the major process variables that affect the MRR in Abrasive Jet Machining. [8]
- b) What is Abrasive flow finishing process? Explain with a neat sketch. [8]



Code No: RT41034

**R13**

**Set No. 3**

**IV B.Tech I Semester Regular Examinations, November - 2016**

**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 THREE questions from Part-B*

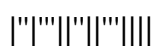
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**PART-A (22 Marks)**

1. a) Explain the principle used in Ultra Sonic Machining(USM) process? [4]
- b) Explain briefly the Electro Chemical deburring with a figure. [4]
- c) Write the different types of power supply circuits used in Electro Discharge Machining (EDM) process. [3]
- d) Explain a) Solid state laser and b) Gas laser. [4]
- e) Draw the schematic set up of Plasma Arc Machining process. [4]
- f) Write briefly about Electro stream drilling. [3]

**PART-B (3x16 = 48 Marks)**

2. a) Write the advantages and disadvantages of USM process [8]
- b) Explain the various parameters influencing the MRR in USM process. [8]
3. a) How is the MRR determined in the Electro Chemical machining process? [8]
- b) Explain the process Electro Chemical Honing, with a neat sketch. [8]
4. a) Explain the selection of different types of electrode materials in EDM process. [8]
- b) Discuss the factors to be considered in the selection of di-electric fluid used in EDM. [8]
5. a) Explain the production of Laser beam. [8]
- b) Differentiate between the EBM and LBM processes. [8]
6. a) Explain non-transferred and transferred modes of Plasma arc. [8]
- b) Explain with a figure about the Plasma arc torch. [8]
7. a) Explain water jet machining (WJM) system. [8]
- b) List the advantages and disadvantages of WJM system. [8]





Code No: RT41034

**R13**

**Set No. 4**

**IV B.Tech I Semester Regular Examinations, November - 2016**  
**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 THREE questions from Part-B*

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**PART-A (22 Marks)**

1. a) Draw the graph showing the effect of slurry viscosity and MRR, in Ultra Sonic Machining (USM). [4]
- b) Write a short note on the types of reactions in Electro Chemical Machining (ECM). [4]
- c) List the factors which govern the MRR in Electro Discharge Machining (EDM). [3]
- d) What are the advantages of Laser Beam Machining (LBM)? [3]
- e) What is meant by "Fourth state of matter" in Plasma Arc Machining (PAM)? [4]
- f) Write short notes on abrasives used in Abrasive Jet Machining (AJM). [4]

**PART-B (3x16 = 48 Marks)**

2. a) Explain USM with a neat diagram. [8]
- b) Explain Magnetostrictive transducer. [8]
3. a) Explain the process of metal removal in Electro Chemical Grinding. [8]
- b) List the advantages and disadvantages of ECM process. [8]
4. a) Discuss the applications of Wire EDM process. [8]
- b) Explain the working of a R-L-C Circuit used in EDM. [8]
5. a) Explain the principle of Electron Beam Machining. Draw and label the parts of an EBM machine. [8]
- b) What is meant by "Doping" of LASER? List the doping materials with their advantages. [8]
6. a) Explain the principle of PAM. Discuss the application of plasma for machining. [8]
- b) What are the advantages of using a) Dual gas and b) water injected plasma torch? [8]
7. a) Explain the Abrasive Flow Finishing process. [8]
- b) Distinguish between abrasive flow finishing and Magnetic abrasive finishing process. [8]

