Code No: 138FA

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech IV Year II Semester Examinations, July - 2023
UNCONVENTIONAL MACHINING PROCESSES
(Mechanical Engineering)

Time: 3 Hours **Max. Marks: 75**

Note: i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

1.a) How does non-traditional machining differ from conventional machining? [2]
b) Draw the schematic diagram of material removal process in ultrasonic machining. [3]
c) Summarize different parameters affecting the performance of water jet machining. [2]
d) Explain the principle of electrolysis and its relevance to electrochemical machining. [3]
e) List the advantages of Electro Discharge Machining (EDM). [2]
f) What are the functions of an adaptive control system used for EDM? [3]
g) What is the purpose of vacuum chamber in Electron Beam Machining (EBM)? [2]
h) Compare Laser Beam Machining (LBM) with Electron Beam Machining (EBM) on the basis of working principle. [3]
i) Specify the limitations chemical machining. [2]
j) What do you understand by 'fourth state of matter'? Explain in brief. [3]

PART – B

(50 Marks)

2.a) Classify nontraditional machining processes according to the source of energy used to generate machining action.
b) Enumerate the limitations of traditional machining processes. [6+4]

OR

3.a) Explain in detail about the factors affecting material removal rate in ultrasonic machining.
b) Discuss the functions of transducers in ultrasonic machining? In what the transducer is different from amplifier. [6+4]

4.a) Draw the schematic diagram of Abrasive Jet Machining (AJM) and explain the various elements in the system.
b) Discuss the different variables which control the abrasive water jet machining. [6+4]

OR

5.a) During ECM, electrode feed rate is calculated as 2 mm/min. The electrolyte conductivity is 0.2 Ω^{-1} cm^{-1}. It is now decided to change the feed rate to 3 mm/min without changing any other parameter except conductivity. What is the new value of conductivity for the same performance of the process?
b) Explain the mechanism of material removal during Electro Chemical Grinding (ECG) and how it is different from Electro Chemical Machining (ECM). [4+6]

6.a) What are the functions of dielectric fluid used in Electric Discharge Machining? Also mention the commonly used dielectric fluids in EDM.

b) Discuss the effect of pulse current, pulse on-time, pulse off-time on the material removal rate (MRR) and surface roughness in EDM Process. [4+6]

OR

7.a) During calculation of 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.

b) Explain the wire EDM-principle and enumerate its applications. [6+4]

8.a) Distinguish between thermal and Non-thermal process in EBM process.

b) Explain the various process parameters which influence in Metal removal Rate in EBM process? [4+6]

OR

9.a) Specify the type of Lasers that are used for material-processing applications. Also indicate the mode of operation and active media in each case.

b) Discuss the relationship between thickness of material and drilling time for various diameter hole sizes. [6+4]

10.a) Discuss the parameters that govern the performance of plasma arc machining.

b) Explain the working principle of chemical machining with neat sketch. [5+5]

OR

11.a) Draw the schematic diagram of a shaped-tube electrolytic machining system. Name and brief the various elements in this process.

b) Write a short note on magnetic abrasive finishing. [6+4]

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