Code No: 127JH **R15**

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) Sate 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^3; 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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