B. E. PRODUCTION ENGINEERING EXAMINATION 2019
(THIRD YEAR SECOND SEMESTER)

NON-TRADITIONAL MACHINING

Full Marks:100   Time: Three Hours

Part-I

(50 Marks)

Use Separate Answer scripts for each part.

*Answer Question 1 and any **TWO** Questions from the rest.*

1. a) Classify energy beam based advanced machining processes.

    b) Distinguish between AJM and AWJM.

    c) How is Laser beam different for ordinary torch light?

    d) What are the types and the function of nozzles used in AWJM?

    e) What are the differences between stationary USM and rotary USM?

    f) What are the various shapes of horn used in USM.

    g) What are different types of gases used in CO_2 laser?

    h) What are the lasing mediums used in fibre lasetr?

    i) Mention four applications of PAM.?

    j) Mention four application of EBM?

                                                              (10✗2)

2. a) Discuss on various elements of Abrasive Water Jet Machining (AWJM) System.

    b) What are the effects of process parameters on performances in AJM?

    c) What are the applications and limitations of WJM?

                                                              (5+6+4)

3. a) Discuss on mechanism of material removal in USM.

    b) What are the types of transducers and their functions in USM?

    c) Discuss the effect of various process parameters on machining criteria in USM?

                                                              (4+3+8)

4. a) Briefly describe the laser beam generation principle ?

    b) Discuss on the Nd:YAG or CO_2 Laser beam machining system with sketch.

    c) What are the advantages of Laser Beam Machining (LBM)?

                                                              (5+6+4)

5. a) Discuss on working principle of Plasma Arc Machining System with sketch.

    b) Discuss on process parameters and machining criteria of Electron Beam Machining.

                                                              (8+7)

B. PRODUCTION ENGG. EXAMINATION, 2019
(3rd Year, 2nd Semester)
NON-TRADITIONAL MACHINING

Full Marks: 100   Time: Three Hours

Part: II
(50 Marks)

*Answer **question 1** and any **two** questions from the rest*

1.   Answer any *four* from the following:
  (i) Define 'Non-Traditional Machining (NTM) Processes'. Identify some major reasons for the development of NTM processes.
  (ii) Make a comparative analysis of the existing NTM processes on the basis of energy requirement and metal removal rate.
  (iii) Explain about various types of voltage drop in the inter electrode gap during Electrochemical Machining (ECM) operation.
  (iv) Differentiate between electrolyte and dielectric. Explain their applications in non-traditional machining processes.
  (v) What is hybrid machining? Explain one hybrid machining process.   5X4

2. (a) Deduce the mathematical formulation of electrolyte flow velocity in the machining zone for avoiding overheating of electrolyte due to heat generation by the flow of current during electrochemical machining operation.   7
   (b) During Electrochemical Machining of iron work pieces (Atomic weight=55.85, Valency=2, Density=7.85 g/cm^3), the equilibrium gap is approximately 0.4mm and the measured value of specific conductance of electrolyte is 0.2 $\Omega^{-1}cm^{-2}$, Applied voltage and over voltage is 10 V and 1.5 V respectively. Calculate the value of tool feed rate.   8

3.   For a Relaxation Circuit based EDM operation, deduce mathematical formulations to determine the following:
       (i) time constant of the circuit is the time taken by the condenser to reach 0.638 time
          the charging voltage.   4
       (ii) the voltage for the maximum power delivery to the spark gap for the RC circuit
          is ¾ th of the supply voltage.   8
       (iii) the frequency of charging and critical resistance.   3

4. (a) Describe setup details of Wire-cut EDM. Identify the major advantages and limitations of this
      machining process.   5+3
   (b) Why deionized water is used as dielectric in WEDM? Identify some wire materials and explain
      stratified wire.   7