

B. E. PRODUCTION ENGINEERING 3<sup>RD</sup> YEAR 2<sup>ND</sup> SEMESTER EXAMINATION, 2018

## NON-TRADITIONAL MACHINING

Full Marks:100

Time: Three Hours

## Part-I

(50 Marks)

Use Separate Answer scripts for each part.

## 1. Answer any TEN questions: 10X3 =30

- a) Classify mechanical type non-traditional machining processes.
- b) What are the applications and limitations of AJM?
- c) What are the process parameters and responses of AJM?
- d) What are the types and the function of catcher used in WJM?
- e) What are the applications and limitations of WJM?
- f) Distinguish between AJM and WJM.
- g) What is hybrid machining? Give examples of it.
- h) What are the types of nozzles used in AWJM?
- i) Discuss on different types of abrasives used in USM.?
- j) What are the types and functions of a horn used in USM?
- k) What are the types and functions of transducer used in USM?
- l) What are the applications of USM?

m) During AJM, the mixing ratio used is 0.2. Calculate mass ratio if the ratio of density of abrasive and density of carrier gas is 20. Diameter of the nozzle is 1.0 mm and jet velocity is 200 m/s. Find the volumetric flow rate in cubic cm per sec of the carrier gas and abrasive mixture.

## 2. Answer any FOUR questions: 5x4=20

- a) Discuss about the laser generation principle with sketch.
- b) Describe the working principle of Nd:YAG or CO<sub>2</sub> Laser beam machining system with sketch. What are the various applications of Laser Beam Machining?
- c) Differentiate between Transferred Arc and Non-Transferred Arc Plasma Cutting system. Mention various elements of Plasma Arc Machining (PAM) System.
- d) Describe the Electron Beam Machining System with Sketch. What are the various applications of Electron Beam Machining?
- e) Analyse the effects of process parameters on machining performance during Electron Beam Machining (EBM) process.
- f) What are the various process parameters of PAM? What are the industrial applications of PAM process?

-----

[ Turn over

**B. PRODUCTION ENGG. EXAMINATION, 2018**  
**(3<sup>rd</sup> Year, 2<sup>nd</sup> 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) Stating the basic principles underlying the non-traditional machining processes, exhibit the modules of classifying the processes into various classes. 5
- (ii) Differentiate between mechanism of Electrochemical Machining and Electro Discharge Machining. 5
- (iii) What are the differences between Electrochemical Machining and Chemical Machining. 5
- (iv) Explain mechanism of Electron Beam Machining and its advantages. 5
- (v) Differentiate between Electro Discharge Machining and Wire Electro Discharge Machining. 5
- (vi) Describe the needs of hybrid machining with examples. 5

2.(a) What is “stray current” effect in ECM? How to minimize it ? State the reason for which flowing electrolyte is necessary in ECM operation. 7

(b) The geometry of a copper workpiece surface with single curvature is given by the equation:  
 $y = 10 + 0.4x - 0.05x^2$ , where x and y are in cm. The electrochemical machining process data are as follows:

Applied voltage = 15 V, Over voltage = 0.6 V, Tool feed rate (y direction) = 0.7 mm/min

Electrolyte conductivity =  $0.3 \text{ ohm}^{-1} \text{ cm}^{-1}$ .

Determine the equation of the tool surface geometry. 8

3.(a) Identify the limitations of R-C circuit in EDM. How these can be overcome by the controlled pulse generator circuit? 5

(b) A 10 mm diameter hole has to be drilled in a 5 mm HSS sheet by EDM using RC-circuit. The required surface finish is 20 micron. Determine the capacitance to be needed in the circuit when supply and discharge voltages are 220 V and 150 V respectively. The value of the resistance in the circuit is 50 ohm. Also estimate the time required to complete the job. 10

4. (a) Explain in brief different features of Wire-cut EDM. Why hydrocarbon oil is not used as dielectric in WEDM? 5+3

(b) Describe the possible alteration in the surface of parts machined by Electro-Discharge Machining (EDM) process and how it can be minimized? 7