M.E. MECHANICAL ENGINEERING FIRST YEAR SECOND SEMESTER 2023

ADVANCED METHODS OF MACHINING

Time: Three hours   **Full Marks: (5 X 20=100)**

Answer any five (5) questions.

Assume relevant data, if necessary.

1. a) In brief explain the process of CHM. Give a schematic schedule in PCM process.

   b) 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 equal to 20.

   c) Diameter of the nozzle is 1.0 mm and jet velocity is 200 m/s. Find the volumetric flow rate (cm³/s) of the carrier gas and abrasive mixture, V_{a+g}.   [8+6+6]

2. a) Discuss the model proposed by M.C. Shaw in connection with work MRR and also derive an expression for the same in USM.

   b). Show the variation of MRR with feeding force, frequency and amplitude in USM.

   [14+6]

3. a). Discuss the tool design for ECM process.

   b). EDM is used to machine a metallic sheet. Calculate surface finish value if C = 15μm V_b = 130 V, K_6 = 4.0. Use the equation based on experimental results.   [14+6]

4. a). Write the differences (in table form) between WJM, AJM, AFM, and AWJM processes (working principles, applications, limitations, and merits of the processes).

   b). Explain the mechanics of EDM process and also the inaccuracies introduced during EDM operation.

   [10+10]

5. a) With the help of a neat sketch explain the LAM process.

   b) Discuss about high speed machining and hard machining.

   c) Explain deformation machining.   [5+10+5]

6. a). Explain with neat sketch IBM process. Discuss about electrode characteristics, discharge mechanism, cathode emission and cathode sputtering.

b). Write the different advantages and disadvantages of IBM process   [15+5]

7.a). Discuss about the use of catcher and its types in AWJM. Also discuss about environmental issues relevant to AWJM.

b). Discuss about selective dissolution in ECM.   [10+10]

8. Write the short notes on **any four** of the following.   [5x4=20]

a) Ductile regime machining.

b) Peel grinding

c) WEDM

d) Surface finish using EDM

e) Working principle of LBM

f) Sporadic breakdown of anodic file in ECM

g) Mechanics of EDM