2054

B.E. (Mechanical Engineering)
Sixth Semester
MEC-606: Advanced Manufacturing Techniques

Time allowed: 3 Hours   Max. Marks: 50

NOTE: Attempt _five_ questions in all, including Question No. 1 (Part-A) which is compulsory
and selecting two questions each from Part B-C. Use of calculator is allowed. Assume
missing data if necessary.

x-x-x

Part – A

1   a   What is relationship between abrasive grain size and penetration rate in USM?   2
   b   What is hybrid machining process? Give example in terms of EDM.   2
   c   Laser beam machining is suitable for which type of materials?   2
   d   Write limitation of ECHM?   2
   e   Write important properties of wheel in ECG.   2

Part - B

2   a   What is Magneto-Strictive transducer? State its advantages and disadvantages.   5

   b   The mixing ratio used is 0.2 in AJM. Calculate mass ratio if the ratio of density of abrasive and density of carrier gas is equal to 20.   5

3   a   What is the effect of alkaline solution on material removal rate and surface characteristics in CHM?   5

   b   What are process capabilities of AJM?   5

4   a   Explain process parameters of CHM and its applications.   5

   b   Describe various transducers used in USM and its working principle.   5

Part – C

5   Find out the approximate time required to machine a hole of diameter equal to 6.0 mm in a tungsten carbide plate (Flow strength of work material = 6.9×10^9 N/m^2) of thickness equal to one and half times of hole diameter. The mean abrasive grain size is 0.015mm diameter. The feed force is equal to 3.5 N. The amplitude of tool oscillations is 25 microns and the frequency is equal to 25 kHz. The tool material is copper having flow strength= 1.5×10^9 N/m^2. The slurry contains one part of abrasives to one part of water. Take the values of different constant as K1 = 0.3, K2 = 1.8×10^{-6} (In SI units) and K3= 0.6 and abrasive slurry density = 3.8 g/cm^3. Also calculate the ratio of the volume removed by throwing mechanism to the volume removed by hammering mechanism.   10

6   Electrochemical machining is performed to remove material from an iron surface of 20 x 20mm under the following conditions: -   10
Inter electrode gap = 0.2mm
Supply voltage (DC) = 12 V
Specific resistance of electrolyte = 2Ω-cm
Atomic weight of iron = 55.85
Valency of iron = 2
Faradays constant = 96540Couloumbs
Calculate material removed rate (in g/s).

7   a   Write working principle of PAM, advantages, disadvantages and its applications.   5
   b   What are the primary factors influencing the decision to perform deburring before or after surface treatment? justify. What is role of hydrogen embrittlement in Deburring process?   5

x-x-x