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B TECH
(SEM VI) THEORY EXAMINATION 2017-18
UNCONVENTIONAL MANUFACTURING PROCESSES

Time: 3 Hours**Total Marks: 100**

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

Section A**1. Attempt all questions in brief.****2 x 10 = 20**

- a) List out the limitations of traditional machining process.
- b) Why abrasive jet machining is not recommended to machine ductile materials.
- c) What is the function of servomechanism in EDM process?
- d) What are the different types of electrolytes used in ECM?
- e) Can you machine electrically non conductive materials by PAM. Justify yours answer?
- f) Discuss the limitations of chemical machining process.
- g) Define cladding.
- h) Write down the principle of HERF.
- i) Explain Photolithography.
- j) Write down the application of electro chemical grinding.

SECTION B**Attempt any three of the following:****10 x 3 = 30**

- a) A manufacturer is making an estimate of the consumption of abrasives per meter of groove (1 mm deep), cut by AJM. M and V are constant for the machine. Abrasive and work piece materials are also fixed. Groove width remains constant at 0.35 mm.
If $MRR = Vg \times \omega \times d = 1.04 \times (M / \rho^{0.25}) \times (V^{1.5} / H^{0.75})$
Where M = abrasive mass flow rate in kg/s
 ρ = density of abrasive material = 3000 kg/m³
 V = Velocity of abrasive-gas jet = 200 m/s
 H = hardness of work material = 4×10^9 N/m²
 Vg = grooving speed, d = depth of groove, ω = width of groove
Find the consumption of abrasive per meter of groove.
- b) What is mask in Chemical Machining process? Discuss the different Methods of preparing the masks.
- c) Explain the different types of control circuits used in EDM.
- d) What is transferred mode of plasma arc? Explain the advantages and Differences between transferred and non-transferred mode of plasma arc.
- e) With the help of neat sketch explain working principle of electrohydraulic forming. Also write down their application and limitations.

SECTION C**3. Attempt any *One* of the following (10 X 1=10)**

- a) A square through hole of 5mm* 5mm has to be drilled in 5 mm thick tungsten carbide sheet. The slurry is made of 1 part of 10 μ -radius boron carbide grains mixed with 1.5 part of water. The feed force is 4N.the tool oscillates with amplitude of 0.015 mm at 25 kHz. Assuming that only 20% of pulses are effective, calculate the time required to complete the job.
- b) What is Abrasive Jet machining? Explain the effect of 'grain size' and 'pressure' on the accuracy and rate of metal removal of in abrasive water jet machining.

4. Attempt any *ONE* of the following. (10 X 1=10)

- a) A 10 mm diameter hole has to be drilled in 5 mm HSS sheet by EDM using relaxation circuit. The required surface finish is 20 μ . Determine the capacitance to be used when the supply and discharge voltage of 220V and 150V, respectively, the resistance being 50 Ω . Also estimate the time required to complete the job.
- b) Explain the principle of electron beam machining. Also explain the features of an electron gun used electron beam machining.

5. Attempt any *ONE* of the following. (10 X 1=10)

- a) The equilibrium gap when machining (Electrochemically) iron, using NaCl solution in water as the electrolyte is found to be 0.2mm with an operating voltage of 12. Iron dissolves at a valency 2, the density of iron is 7.8g/cm³, and the specific resistance of the electrolyte is 2.8 Ω -cm. calculate the metal removal rate per unit surface area. The over voltage may be taken as 1.5V.
- b) What do you mean by unconventional welding .explain plasma arc welding with their application and limitations?

6. Attempt any *ONE* of the following. (10 X 1=10)

- a) A laser beam with power intensity of 2*10⁵W/mm³ is used to drill a 0.2 mm diameter through hole in a tungsten sheet of 0.4mm thickness. If the efficiency of operation is only 10%, estimate the time required.
- b) With neat sketch explain electro-discharge forming. Also write down their advantages and limitations.

7. Writes the short notes on any two of the following (5 X 2=10)

- a) Water hammer forming.
b) Metalizing.
c) Underwater welding