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Total Number of Pages: 02

**M.TECH**  
**PDPC202**

**2<sup>nd</sup> Sem Regular / Back Examination – 2015-16**  
**NON-TRADITIONAL MANUFACTURING PROCESS**  
**Q.CODE: W790**  
**Time: 3 Hours**  
**Max marks: 70**

**Answer Question No.1 which is compulsory and any five from the rest.**  
**The figures in the right hand margin indicate marks.**

- Q1 Answer the following questions: (2 x 10)
- a) Explain the need for development of non-traditional machining.
  - b) Differentiate between fluiding and non-fluiding electrolyte.
  - c) What do you understand by transferred and non transferred arc in plasma arc machining?
  - d) What are the limitations of laser beam machining process?
  - e) What do you understand by, 'transducer' and 'magnetostriction effects'?
  - f) What are the different ways of gap-flushing used in EDM?
  - g) Discuss the factors influencing the choice of electrode material in EDM. Name the best electrode material for finish machining a small die made of WC by EDM.
  - h) Explain the effect of 'focusing' on the performance of laser beam machining.
  - i) How the worktable is protected from getting damaged by the electron Beam which has completely penetrated the work piece.
  - j) Derive an expression for MRR in working of ductile material using USM.
- Q2 a) Explain various parameters that influence the performance of chemical machining process. (5)
- b) If suppose USM is used for drilling a hole (under the same machining conditions) in Aluminium and Cast Iron. Which one will have higher depth of the drilled hole and why? (5)
- Q3 Material removal rate in AJM is  $0.5 \text{ mm}^3/\text{s}$ . Calculate material removal per impact if mass flow rate of abrasive is  $3 \text{ gm/min}$ , density is  $3 \text{ gm/cc}$  and grit size is  $60 \mu\text{m}$  as well as indentation radius. (10)
- Q4 Find out the approximate time required to machine a hole diameter equal to  $6.0 \text{ mm}$  in a tungsten carbide plate (fracture hardness =  $6900 \text{ N/MM}^2$ ) of thickness equal to one and half times of hole diameter. The main abrasive grain size is  $0.015 \text{ mm}$  diameter. The feed force is equal to  $3.5 \text{ N}$ . The amplitude of tool oscillation is  $25 \mu\text{m}$  and the frequency is equal to  $25 \text{ kHz}$ . The tool material used is copper having fracture hardness equal to  $1.5 \times 10^3 \text{ N/mm}^2$ . The slurry contains one part abrasive to one part of water. Take the values of different constants as  $K_1 = 0.3$ ,  $K_2 = 1.8 \text{ mm}^2$ ,  $K_3 = 0.6$ , and abrasive density =  $3.8 \text{ g/cm}^3$ . (10)

Also calculate the ratio of the volume removed by throwing mechanism to the volume removed by hammering mechanism.

- Q5 a) With a neat sketch, explain briefly the working of abrasive jet machining (AJM). (5)  
b) Discuss the effects of the following parameters on MRR as applied to USM process. (5)  
I) Amplitude and frequency of vibrations II) Grain size  
III) Applied static load IV) Effect of slurry
- Q6 a) Write a note on abrasive slurry used in AJM indicating types of abrasive, and their properties, sizes used and liquid media with functions and characteristics. (5)  
b) Explain the mechanism of EDM showing the circuit and movements of ions. Name the common dielectric fluids used in EDM. (5)
- Q7 a) With a neat sketch, explain how the electron beam is generated in the electron beam machining. Explain the working principle. (5)  
b) With a neat sketch, explain the plasma arc machining process. (5)
- Q8 Answer any two (5 x 2)  
a) Etchants and maskants  
b) Water jet machining  
c) Electrode materials in EDM  
d) LBM