Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.TECH(ME)/SEP.SUPPLE/SEM-7/ME-701/2012

2012

ADVANCED MANUFACTURING TECHNOLOGY

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A
(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : $10 \times 1 = 10$

   i) Mechanics of material removal in EDM is

      a) melting and evaporation aided by cavitation

      b) mechanical cutting action

      c) melting

      d) electrolysis.

   ii) Which one of the following is a binary sensor ?

      a) Accelerometer b) DC Tachometer

      c) Proximity switch d) Thermistor.

   iii) Diamond tools should be used for high speed machining of

      a) cast iron jobs b) mild steel jobs

      c) aluminium jobs d) carbide jobs.

iv) CAPP is fully integrated with

a) CAD and CAM b) only CAD

c) only CAM d) none of these.

v) The hardest manufactured cutting tool material is

a) diamond b) ceramic

c) carbon boron nitride d) tungsten carbide.

vi) The fundamental philosophy of Computer Integrated Manufacturing is

a) Sequential Engineering

b) Concurrent Engineering

c) Reserve Engineering

d) Value Engineering.

vii) The mechanism of AGV is based on the principle of

a) acoustic emission

b) embedded wire guided method

c) interferometry

d) triangulation.

viii) The dielectric fluid is used in

a) ECM b) USM

c) AJM d) EDM.

ix) In EBM process, the maximum material removal rate is

a) 20 mm^3/min b) 30 mm^3/min

c) 10 mm^3/min d) 40 mm^3/min.

x) Lower machining accuracy is obtained in

a) PAM b) LBM

c) EBM d) EDM.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. With a simple diagram explain the working of Plasma Arc Machining.
3. a) What do you mean by flexible manufacturing system ?
   b) Define rapid prototyping. 3 + 2
4. Use successive approximation method to convert an input signal of 6·8 V from analog to digital signal for a 6-bit Register of an ADC with a full scale range of 10 V.
5. Write down the benefits of FMs.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

6. a) Draw the resistance-capacitance relaxation circuit used in EDM. Show the variation of instantaneous voltage across the tool-workpiece gap along with the time. Prove that $V = V_0 \left\{ 1 - e^{\frac{t}{RC}} \right\}$. Notations have their usual meanings.

   b) During an electric discharge drilling of a 10 mm square hole in a low carbon steel plate of 5 mm thickness, brass tool and kerosene are used. The resistance and the capacitance in the relaxation circuit are 50 Ω and 10 μF, respectively. the supply voltage is 200 volts and the gap is maintained at such a value that the discharge (sparking) takes place at 150 volts. Estimate the time required to complete the drilling operation. Use the correlation $Q = 27{\cdot}7\,W^{1{\cdot}54}$. (2 + 2 + 4) + 7

7. a) Describe the fundamental principles of metal removal in Electro-chemical Machining. Briefly explain the significance of Electrolyte used in ECM and also the importance of 'Tool-work gap'.

   b) Discuss the mechanism of material removal for Abrasive Jet Machining. How to select the best possible abrasive and nozzle material to be used in this process ?

   c) Write a note on the special features of the equipments used in Water Jet Machining. 4 + 2 + 4 + 2 + 3

8. a) Explain the main factors that affect the AJM removal rate.

   b) Explain LBM and show using a line sketch, the material removal mechanism of the process.

   c) State three commonly used graphics standards and mention their advantages with reference to specific application. 3 + 7 + 5

9. a) Explain the selective layer sintering process.

   b) Under what circumstances is Reverse Engineering recommended ?

   c) Explain with a neat sketch the geometry of a drilled hole using LBM. 5 + 5 + 5

10. a) Explain detail integration of CAD with CAM.

    b) Describe the basic principle of operation of AGV.

    c) List application of AGV in CIM. 6 + 5 + 4

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