Name : ....

Roll No. : ....

Invigilator's Signature : ....

CS/B.Tech (AUE)/SEM-7/AUE-711/2010-11
2010-11
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 × 1 = 10

   i) A big advantage of electrochemical machining over electrodischarge machining is that

   a) it can cut harder materials

   b) it is most cost accurate and precise

   c) it consumes less power

   d) its cost is low

   e) tool wear is negligible.

   ii) Tool in case of ultrasonic machining is made of

   a) HSS

   b) Diamond

   c) Plain carbon

   d) Stainless steel

   e) Brass or copper.

iii) Laser beam machining process is used for machining

    a) very thick materials

    b) thin materials

    c) heavy sections

    d) is not used for machining

    e) there is no such limitation.

iv) The size of abrasive grains in abrasive jet machining varies between

    a) 1 to 10 microns

    b) 10 to 50 microns

    c) 50 to 100 microns

    d) 100 to 500 microns

    e) 500 to 1000 microns.

v) Electron beam machining process is suitable for which of the following types of material ?

    a) Low melting point and high thermal conductivity

    b) Low melting point and low thermal conductivity

    c) High melting point and high thermal conductivity

    d) High melting point and low thermal conductivity

    e) All of these.

vi) The type of layout suitable for the concept, principles and approaches of 'group technology' is

    a) product layout

    b) job-shop layout

    c) fixed position layout

    d) cellular layout

    e) none of these.

vii) Crater wear occurs mainly due to which of the following phenomena ?

    a)   Abrasion

    b)   Diffusion

    c)   Oxidation

    d)   Adhesion

    e)   All of these.

viii) Electrodischarge machining uses the which of the following dielectric fluids ?

    a)   Water

    b)   Aqueous salt solution

    c)   Sodium hydroxide

    d)   Kerosene

    e)   Lard oil.

ix) Chromium in H.S.S cutting tool material is

    a)   1%

    b)   4%

    c)   18%

    d)   0·6%

    e)   16%.

x) In electro-chemical machining, best surface finish is obtained

    a)   with low current density

    b)   with high current density

    c)   with slow rate of metal removal

    d)   with high rate of metal removal

    e)   at all metal removal rates.

GROUP – B

(Short Answer Type Questions)

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

2. What are the reasons for failure of cutting tools ? Distinguish between high speed steel and carbide as tool materials.

3. Write a short note on 'cutting tool management system'.

4. Write flow-chart of DDA algorithm for linear interpolation for graphics terminals.

5. Explain with neat sketch the working principle of plasma arc machining.

6. Explain with suitable diagram the main elements of electrochemical machining in detail.

GROUP – C

(Long Answer Type Questions)

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

7. a) What are the advantages of solid modelling in comparison with surface modelling ? Compare different techniques of solid modelling.

   b) A square with an edge length of 10 units is located on the origin with one of the edges at an angle of 30° with the *x*-axis. Calculate the new position of the square if it is rotated about *z* axis by an angle 30° in the clockwise direction.
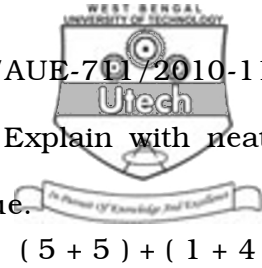
c) Define the term 'rapid prototyping'. Explain with neat sketch stereo lithography RP technique.

(5 + 5) + (1 + 4)

8. a) Explain the term 'Group Technology'.

b) Apply the rank order clustering technique to the part machine incidence matrix in the following table to identify logical part families and machine groups. Parts are identified by letters and machines are identified numerically.

Parts						
Machines	A	B	C	D	E	F
1	1				1	
2				1		1
3	1	1				
4			1	1		
5		1			1	
6			1	1		1

c) Write a short note on composite parts.

d) What is computer aided process planning (CAPP) ? Explain the principle of Retrieval CAPP.   2 + 7 + 3 + 3
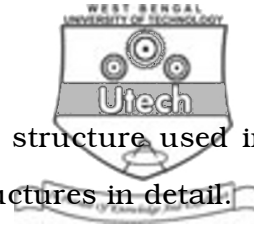
9. a) What is the communication network structure used in CIM database ? Explain the basic structures in detail.

   b) Explain the different components of flexible manufacturing sytem (FMS).

   c) Four machines are used to produce a family of parts to be arranged in a GT cell. The From – To data for the parts processed by the machines are shown in the table below. Additional information is that 50 parts enter the machine grouping at machine 3, 20 parts leave after processing at machine 1 and 30 parts leave after machine 4. Determine :

      i) the most logical sequence of machines for this data

      ii) the flow diagram of the data showing where and how many parts enter and leave the system

      iii) the percentage of in sequence move and percentage of back tracking moves in the solution.

To :		1	2	3	4
From :	1	0	5	0	25
	2	30	0	0	15
	3	10	40	0	0
	4	10	0	0	0

5 + 4 + 6

10. a) With neat sketches discuss the working principle of main components of an ultrasonic machining.

   b) Discuss the process parameters of abrasive jet machining with suitable figure.

   c) The composition of a mnemonic alloy turbine blade is given below :

Metal	Co	Cr	Ni
% weight	18	20	62
Gram atomic weight	58·93	51·99	58·71
Valency	2	6	2
Density (g/cm^3)	8·85	7·19	8·90

   It is being machined electrochemically with a current of 1500 amp. Calculate the material removal rate $(in \ cm^3/min)$. 5 + 4 + 6

11. a) Describe with diagram how material is removed in EDM process.

   b) Draw a neat sketch of Resistance-Capacitance Relaxation Circuit as pulse generators in EDM. Prove that for maximum power delivery in Resistance-Capacitance Relaxation Circuit of EDM discharge voltage should be 72% of supply voltage.

   c) Write a short note on the process of laser beam machining. 4 + 6 + 5