Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/M.TECH(ME)/SEM-2/MMT-202/2012

2012
NON-TRADITIONAL AND MODERN MACHINING

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

Answer any five questions. 5 × 5 = 25

1. a) What do you mean by process capability study ? 2

   b) What are the applications of AI in manufacturing ? 3

2. a) Discuss about major non-contact inspection methods. 3

   b) How is computer networking used in CIM ? 2

3. a) State the characteristic features of MI class parts coding system. 2

   b) Enumerate the philosophy of "Composite Part Approach". 3

4. a) How does FMS differ from Transfer Line ? 3

   b) What are the various components of FMS ? 2

5. a) State the hardware requirements of CIM. 3

   b) State the benefits of concurrent engineering. 2

6. a) What are the different modules of CAD ? 2

   b) What is meant by feature based design ? 3

7. a) State the factors that affect material removal in High Speed Machining. 2

   b) How CAPP is different from Manual Process Planning ? 3

GROUP - B

Answer any *three* of the following. $3 \times 15 = 45$

8. a) Derive an expression of ECM to justify that "feed is required to continue the process over a prolonged time". 7

   b) During the ECM of Fe with Cu-electrode working in 5(N) NaCl solution in water, an interelectrode gap of 0.2 mm has been achieved. Operating dc voltage has been 12 V, Specific resistance of NaCl solution is 2 ohm-cm, Valency at which Fe is dissolved is 2, Atomic weight of Fe is 55.85 and density of Fe is 7.8 gm/cm^3. Consider Faraday's constant to be 96540 coulombs.

      i) Determine the MRR

      ii) Find out the feed rate of the tool. 4 + 4

9. a) In EDM process prove that the condition for maximum power delivery to the discharging circuit is $V_c = 0.76\ V_o$, where V_c is the charged voltage of the condenser in volts and V_o is the e.m.f across the circuit for charging the condenser in volts. 7

b) During an electric discharge drilling of a 10 mm square hole in a low carbon steel plate of 5mm 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 sparking takes place at 150 volts. Find the time required to complete the drilling operation. 8

10. a) Identify logical part families and machine groups by applying the rank order clustering technique to the part-machine indices matrix in the following table below. Parts are identified by letters and machines are identified numerically. 7

		PARTS					
		A	B	C	D	E	F
MACHINES	1	**1**				**1**	**1**
	2				**1**		**1**
	3	**1**	**1**				
	4			**1**	**1**		
	5					**1**	
	6			**1**	**1**		**1**

b) Using the following From–to–Chart determine the machine sequence. 5

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

c) Explain various modules of CAD. 3

11. a) Explain the main factors that affect the AWJM removal rate. 4

b) Illustrate the geometry of a drilled hole using LBM process. 6

c) What are the effects of cutting speed, feed rate and tool geometry on precision machining ? 5

12. a) Calculate the velocity of electron impingement in an electric filed having a strength of 2.5×10^6 volts. Also determine the power of the electron beam if the beam current is 2×10^{-5} amps. 3

b) With the aid of a sketch describe the IBM process. 5

c) Explain the tool feeding mechanism in USM process. 7