Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/M.TECH (MT)/SEM-2/MTI-205/2012

2012

COMPUTER CONTROL OF MACHINES AND PROCESSES

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.

Answer any *five* questions from the following :

5 × 14 = 70

1.	a)	Define computer control system of automated manufacturing.	2
	b)	Name the three components of communication.	3
	c)	Explain the binary system with an example.	4
	d)	Explain attenuation of signal in communication.	2
	e)	Explain the mechanism of serial transmission.	3
2.	a)	Explain the working principle of synchronous transmission system.	4
	b)	Distinguish between modulation and demodulation.	3
	c)	Discuss the construction of fiber optic cable.	4
	d)	List the names of hardwares designed for communication.	3

3. a) Explain frequency division multiplexing. 4

b) Explain the RS-232C connector. 3

c) Name three common network architectures. 3

d) Explain the function of physical layer of OSI reference model of network. 2

e) Name the elements of LAN. 2

4. a) Explain discrete binary data. 2

b) Define transducer. 2

c) List the computer process interface hardwares. 3

d) Explain the principle of sampling in analog - to - digital converter. 4

e) Explain the principle of successive approximation in analog-to-digital converter. 3

5. a) Define material handling function in a factory. 3

b) List the different types of flexibilities of material handling. 4

c) A closed loop conveyor is to be designed to deliver parts from a single load to a single unload station. The handling system will provide a delivery function only, no storage. The load and unload stations are separated by a distance of 300 ft. It is assumed that the forward loop and the return loop will be of equal length. The speed of the conveyor = 150 ft/min. The time required to load

parts onto and unload parts from the conveyor at the respective station are $T_L = T_U = 0.15$ minutes. The specified flow rate of parts that must be delivered between the two stations is 300 parts/hour. Determine the required parameters of the conveyor system that will achieve this flow rate i.e., determine the values of number of carriers n_c, number of parts in each carrier n_p and distance between two carriers s_c which must be integers. 7

6. a) State three laws of robotics. 3

   b) Classify the robots according to coordinate system. 4

   c) Distinguish between repeatability and accuracy of robot. 4

   d) Define degrees of freedom of a robot. 3

7. a) Distinguish between NC machine tools and CNC machine tools. 3

   b) Explain the closed loop control system used for CNC machine tool with a neat diagram. 4

   c) Distinguish between absolute coordinate and incremental coordinate in manual part programming of CNC machine. 3

   d) A typical block word address format of mannual part program is given below :

   N 115 G41 X120·5 Y 55·0 Z–12 R 2·0 F 150 M 3

   Explain the code. 4

8. a) Define a Programmable Logic Controller (PLC). 3

b) Show the different logic elements and other components used in Ladder Logic Diagram. 3

c) Show the main components of PLC with neat block diagram. 3

d) Define automated storage / retrieval system (AS/RS) according to Material Handling Institute. 3

e) Name the basic components of AS/RS. 2