



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.*

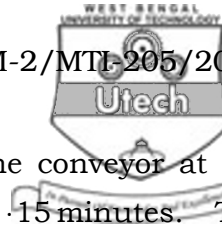
Answer any *five* questions from the following :

$$5 \times 14 = 70$$

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 hardware. 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.

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 manual 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
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