Roll No. ....

206602

May, 2019
B.Tech. (EIC) VI SEMESTER
Computer Based Instrumentation and Control (EI-306-C)

Time : 3 Hours]   [Max. Marks : 75

Instructions :

1. *It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*

2. *Answer any four questions from Part-B in detail.*

3. *Different sub-parts of a question are to be attempted adjacent to each other.*

PART-A

COs

1. (a) Differentiate between on line and off line computer based plant automation.   (1.5) CO1

    (b) Why sync pulses are required in TDM?   (1.5) CO2

    (c) Find the number of comparators required in a 3 bit comparator type ADC.   (1.5) CO2

    (d) What items must be added to a standard personal computer before it can be used as an industrial controller?   (1.5) CO2

(e) Explain which type of controller mode builds up corrective action proportional to the length of time the disturbances persists. What are the two key characteristics of this control mode. (1.5) CO3

(f) What do you mean by integral overshoot? How can it be corrected? (1.5) CO3

(g) By considering an example, differentiate between relay and ladder diagram. (1.5) CO4

(h) What is scan cycle and scan time. How are these related to each other? (1.5) CO4

(i) What are advantages And Disadvantages of Simulation? How can we offset the disadvantages of simulation? (1.5) CO5

(j) What is SCADA system? What are various functions performed by SCADA? (1.5) CO3

PART–B

2. (a) Differentiate between classical and computer based plant automation. What are the advantages of computer based plant automation over classical approach. (8) CO1

(b) Differentiate among dedicated computer control, centralised and distributed computer control system. Give advantaged and disadvantages of each relative to other. (7) CO1

3. (a) Define sampling theorem. What happen if the sampling frequency is

(i) $f_s \geq 2f_m$ and (ii) $f_s < 2f_m$.

Where f_s is sampling frequency and f_m is maximum frequency present in the signal. What do you mean by undersampling. What are its effects and their remedy? (8) CO2

(b) What are various data transfer mode? Give example of each. With proper diagram, specify the sequence of action for

(i) Transmission of a data word by a processor to a serial input device through a MODEM.

(ii) Receiving a data word by a processor from a serial input device through a MODEM. (7) CO2

4. (a) What are fundamental aspects of automatic process control. Explain any one method of multivariable control loop. (7) CO3

(b) Derive an expression for position algorithm of DDC system. Explain how is it related with position algorithm and for what purposes these are used. (8) CO3

5. (a) List the conditions for drawing the ladder logic? Draw and explain ladder diagram of PLC that will allow three switches in a room to control a single light source. Switching on any three switches turns the light ON, but all the three switches have to be off to turn OFF the light source. Also write down their corresponding Boolean Mnemonics. (8) CO4

(b) Write down the instruction set of PLC for Timer and Counter operation. Also give their Boolean mnemonics. (7) CO4

6. (a) Define modeling and simulation of a plant. What are various models used for mathematical modeling of a plants. Explain various steps to model and simulate a plant. (10) CO5

(b) What are advantages of Hierarchical structure? Explain hierarchical structure of DDC by describing functions performed at each level. (5) CO3

7. (a) What is the structure of Industrial Automation? By considering example of water treatment plant, explain various steps for automation of an industrial plant. (10) CO6

(b) Why we need interfacing. Explain programmable communication interface 8255 USART. (5) CO2