



RN-7421

**B. E. - IV (Sem. VII) (Instrumentation & Control)  
Examination**

May / June - 2010

**Digital & Distributed Control System**

Time : 4 Hours]

[Total Marks : 100

**Instructions :**

(1)

नीचे दर्शाविए निशानीवाणी विगतो उत्तरवडी पर अवश्य लखवी. Fillup strictly the details of signs on your answer book.	Seat No. :
Name of the Examination :	<input type="text"/>
<b>B. E. 4 (Sem. 7) (I &amp; C)</b>	<input type="text"/>
Name of the Subject :	<input type="text"/>
<b>Digital &amp; Distributed Control System</b>	<input type="text"/>
Subject Code No. : <input type="text" value="7"/> <input type="text" value="4"/> <input type="text" value="2"/> <input type="text" value="1"/>	Section No. (1, 2,.....): <input type="text" value="1&amp;2"/>
	Student's Signature

- (2) Answers to the two sections must be written in separate answer books.
- (3) Figures to the right indicate full marks.
- (4) Draw neat figures wherever required.

**SECTION - I**

- 1 Answer the short questions :
- (i) Define reliability. If a control system failed only once in a year, it would have a MTBF of 17520 hours. If the MTTR was 1 hour, what would be the availability ? 2
- (ii) What do you mean by fault tolerant computer system ? 3
- (iii) Brief about "Local Control Unit". 3
- (iv) Draw symbolic diagram for following : 3
- (1) Pressure loop : Supervisory set point control (hard wired), analog controller complete with conventional faceplate.
- (2) Temperature loop : Computer control with analog backup.
- (v) To send the data at the speed of 10 MBPS in a network without noise interference, and with least cost which of the cables, available for networking, will be suitable to connect nodes. 2
- (vi) List out the major work or duties carried out by computer control system. 2

- 2** Attempt any two : **18**
- (a) What is position algorithm ? How it differs from velocity algorithm ? What is the significance of four-point difference technique in position algorithm ?
- (b) Explain operating configuration and controller function configuration in context of DCS system.
- (c) Discuss the organization of process control computer programs. Discuss functions carried out by major parts of it. Why standardization of process control languages is required ?
- 3** (a) Discuss advantages of DCS in following terms : **8**
- (i) Installation and Computing cost,
- (ii) Reliability
- (iii) Interfacing
- (iv) Back-up.
- (b) What is optimization ? For the case of empirical process, what do you mean by parallel design and sequential design of experiments ? **4**
- OR**
- 3** (a) How plant variables are monitored ? Discuss the duties carried out by level 1A and level 1B devices. Brief about limitations of direct digital control system and supervisory control and data acquisition systems. **8**
- (b) Brief about HLOI of DCS systems. **4**
- (c) List out the various cost components of DCS cost estimation process. Discuss the checklist for specifying communications-related items. **5**

## SECTION - II

- 4** Answer the short questions : (each question is of 2 marks) **12**
- (i) What do you mean by token passing network access protocol ?
- (ii) Give comparison between RS-232 and RS-485 interface.
- (iii) Show SDLC protocol frame structure.
- (iv) Define bandwidth. What is FDM ?
- (v) Draw diagrams for :
- (a) Bus configuration and
- (b) Ring configuration.
- (vi) What is CSMA/CD ?

- 5** Attempt any two : **18**
- (a) What is HART ? Discuss HART protocol structure and various command types.
  - (b) Compare multi-channel possibilities of data acquisition systems with the help of block diagram (any three).
  - (c) State important characteristics of multiplexer designs. How multiplexing of electronic as well as pneumatic signal is carried out ? Explain supercommutation and subcommutation.
- 6** (a) Give comparison between MODBUS protocol and PROFIBUS protocol. **8**
- (b) Discuss smart transmitters. What features are provided by smart transmitter other than conventional electronic transmitter ? **6**
- OR**
- 6** (a) Brief about FIPBUS, its BUS access method, features and acceptance. **8**
- (b) Show the various components of optical link. Discuss the disadvantages of fiber optic cables. **6**
- (c) Draw a block diagram showing organization of DATA EXCHANGE within a production company. **6**
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