Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE SEM-V Examination-Nov/Dec.-2011

Subject code: 151704 **Date: 03/12/2011**

Subject Name: Industrial Control Systems

Time: 2.30 pm -5.00 pm

Total marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Draw cascade control scheme for any one application. Discuss the advantages of cascade control configuration. **07**

(b) With neat sketch explain DDC in detail. Discuss the benefits of DDC. **07**

Q.2 **(a)** Discuss various control valve characteristics compare the sensitivities of the three valve characteristics. **07**

(b) Draw a hierarchical DCS structure and explain the function of each level. **07**

OR

(b) With necessary sketch explain the three main components of SCADA. **07**

Q.3 **(a)** Compare the followings. **07**

(i) Open loop Control & Closed loop Control

(ii) Feed forward Control & Feed back Control

(b) (I) Differentiate between distributed and lumped parameter System with the help of an example. **04**

(II) Compare two- position and multi position mode, **03**

OR

Q.3 **(a)** Discus Process Reaction Curve Method for Controller Tuning. **07**

(b) **04**

(I) Design a proportional –integral controller with a proportional band of 30 % and an integration time of 10 seconds. The 4-20 mA input converts into 0-2 V error signal. The output is to be in between 0-10 V.

(II) Design a 1:4 Demultiplexer using PLC ladder diagram. **03**

Q.4 **(a)**

(I) List the advantages of PLC over relay based logic. **04**

(II) Define static error, offset and velocity error. **03**

(b) Consider the error Voltage E_p is given by the following relation : **07**

E_p = t% (0-1 sec)

E_p = 1% (1- 3 sec)

E_p = (-1/2) t +2.5% (3-5 sec)

Find the controller output for a three mode controller which produces an output with K_p =5, K_i =0.5 sec^{-1}, K_d =0.5s and P_0 =20%.

OR

Q.4 **(a)** Explain the cavitation and flashing phenomena in control valve with the help of a diagram. **07**

Q.4 **(b)** Explain the role of Functional Identification and loop Identification In P & I Diagrams. **07**

Q.5 **(a)** With Necessary sketches explain Various configurations of ratio control. **07**

(b) Discuss proportional control mode in detail. What is the drawback of proportional control mode? How it can be eliminated? **07**

OR

Q.5 **(a)** With neat sketch discuss globe valve in detail. **07**

(b) Discuss "Integral windup and Anti-windup" **07**

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