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May 2019/ENDSEM RE EXAM

S. Y. B. TECH. (E&TC) (SEMESTER - II)

COURSE NAME: Control Systems

COURSE CODE: ETUA22171

(PATTERN 2017)

Time: [2 Hours]

[Max. Marks: 50]

(*) Instructions to candidates:

- 1) Answer Q.1, Q.2, Q.3, Q.4, Q.5 OR Q.6, Q.7 OR Q.8
- 2) Figures to the right indicate full marks.
- 3) Use of scientific calculator is allowed
- 4) Use suitable data where ever required

Q.1) a) Differentiate Open-loop and Closed loop control Systems [6]

OR

b) Draw and explain Block diagram of Close loop control systems and write transfer function of the system. [6]

Q.2) a) What are the types of standard input. Explain any Four. [6]

OR

b) Draw and explain Time Domain specifications (Any Six) [6]

Q.3) a) The open-loop transfer function of a unity gain feedback system is given by

$$G(s) = \frac{k(s+20)}{(s+1)(s+2)(s+10)}$$

Construct Bode plot for $k=10$. Determine Phase Margin, Gain Margin. [6]

OR

b) State and explain the correlation between Time domain and Frequency domain parameters. [6]

Q.4) a) Sketch the approximate Root Locus for a unity feedback system with open-loop transfer function given below. (Note: No need to calculate Break away Point).

$$G(s) = \frac{k}{s(s^2+4)} \quad [4]$$

OR

b) By using Rouths Array Technique, determine how many roots of the following polynomial are in the RHS, LHS and on $j\omega$ -axis of the s plane.

$$p(s) = s^5 + 2s^4 + 2s^3 + 4s^2 + s + 2 = 0 \quad [4]$$

Q. 5) a) Assume a n – state variable system and represent the matrix form for state equations and output equations of the system.

Also Write advantages of State Space representations technique (any Four) [6]

b) A system is represented by the state and the output equations given below. Find Characteristic equation.

$$\text{Given } A = \begin{bmatrix} 0 & 1 & 2 \\ 0 & 3 & 4 \\ 1 & 3 & 2 \end{bmatrix}; \quad Y = [1 \quad 1 \quad 0] X \quad [4]$$

c) State and explain Properties of State transition Matrix (Any Four) [4]

OR

Q.6) a) Draw and explain the Block diagram of state and Output Equations. [6]

b) Define : 1) State 2) State Variable 3) State Vector 4) State Space [4]

c) State and Define Controllability and Observability. [4]

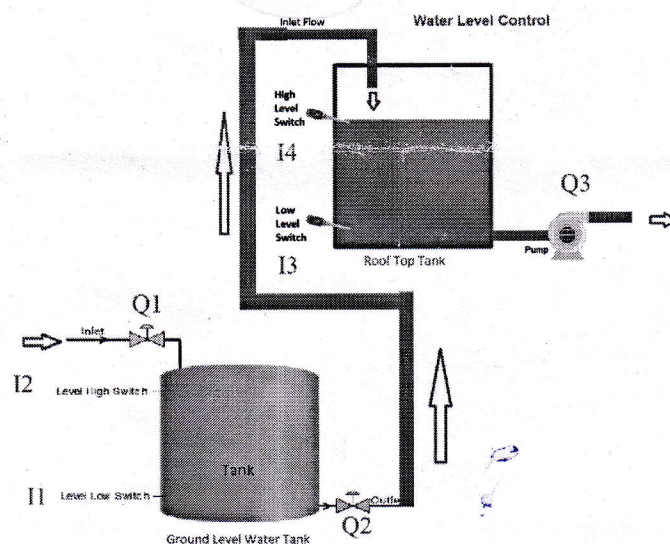
Q.7) a) Define PLC and write advantages of PLC over Electromechanical relay. Draw Ladder diagram programs for Digital gates (Any Three) [6]

b) What is PID controller. Explain two modes of PID controller in brief. [4]

c) What are the advantages of Digital control systems over Analog control system, support your answer on any Four comparison parameters. [4]

OR

Q.8) a) Write Ladder diagram program for Tooftop tank of a residential building water level controller system shown below. [6]



b) Draw Block diagram & Write Transfer function of Digital control system. [4]

c) What is PI and PD mode of the PID controller. Explain in Brief [4]