SHAHEED BHAGAT SINGH STATE TECHNICAL CAMPUS, FEROZEPUR

ROLL No.: | | | | | | | | | | |

Total number of pages:[01]

Total number of questions:05

M.Tech. -EE/ 1st Sem

Digital Control System

Subject Code: MTEE-104

Paper ID:

Time allowed: 3 Hrs

Max Marks: 100

Important Instructions:

- Attempt all questions
- Each question carries equal marks

Q. 1. a) Derive transfer function from the SISO system. CO2& CO3

b) The state space model of a SISO system is given below:

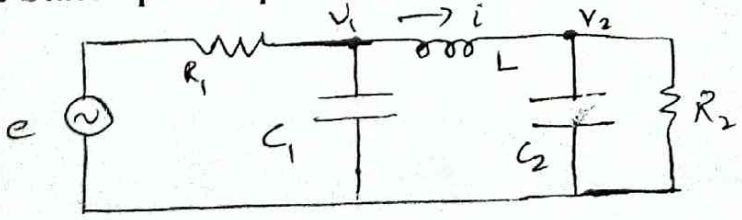
$$\dot{x}(t) = Ax(t) + Bu(t)$$
$$y(t) = Cx(t)$$

Or

a) Obtain State Space Representation for the transfer function CO2& CO3

$$\frac{C(s)}{R(s)} = \frac{s^2 + 2s + 1}{s^3 + 7s^2 + 14s + 8}$$

b) Write State Space Equation for electrical network



Q. 2. a) What is state transition matrix? List the properties and advantages of STM. CO2& CO3

b) Derive a state variable representation of the system with the following

$$T.F = \frac{Y(s)}{U(s)} = \frac{8}{(s+1)(s+2)(s+4)}$$

Or

b) Define the terms Sampler and Hold circuit. Drive the transfer function of ZOH circuit. CO2& CO3

a) Write properties of z-transform and find Z transform of

$$F(s) = \frac{4}{s(s^2+4)}$$

CO2

Q. 3.* a) What is sampled data control system? Explain in detail.

b) Discuss reconstruction of sampled signal.

Or

Describe controllability and observability in detail and discuss how one can check whether the given system is controllable and observable. CO2

CO3

Q. 4. Find controllability and obeservability of following system

$$T.F = \frac{Y(s)}{U(s)} = \frac{2}{s^3+6s^2+11s+6}$$

Or

Discuss methods that can be used for checking stability of discrete system in detail. Also determine the stability of the characteristic equation CO3

$$2z^4 + 8z^3 + 12z^2 + 5z + 1 = 0$$

Q. 5. Write short notes on CO1& CO4

i) Digital Compensator design using root locus plots

ii) State descriptions of Digitals Processors

Or

a) What is need of compensator in a digital control system? Discuss the procedure of design of digital controllers. CO1& CO4

b) Discuss the stepping motor-operation with control action included and disk drive system incorporated.