CLASS: B Tech   SEMESTER : VII
BRANCH: EEE   SESSION : MO/2024

SUBJECT: EE439APPLIED CONTROL THEORY
TIME: 02 Hours   FULL MARKS: 25

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. **Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates**

			CO	BL

Q.1(a) What are the advantages of state space model over the transfer function model?   [2] 1 2

Q.1(b)

The close loop transfer function of a system is given by $\dfrac{Y(s)}{U(s)} = \dfrac{2s^2 + 8s + 6}{s^3 + 8s^2 + 16s + 6}$ Find   [3] 1 4

the phase variable state space model and the block diagram.

Q.2(a) Find the derivation of transfer function for a given state space model.   [2] 2 3 3

Q.2(b) The model of DC motor with shaft velocity as output is given as   [3] 2 6
                                                                                    3
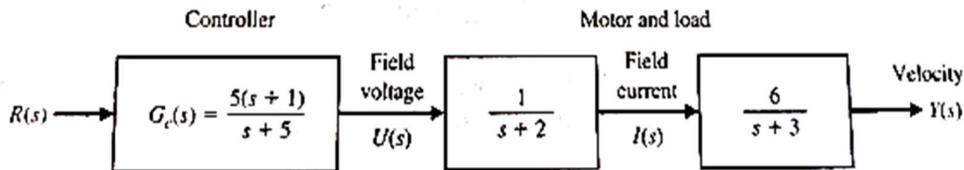
Find the state model in canonical form

Q.3(a) What are the properties of state transition matrix?   [2] 1 2 1

Q.3(b)   [3] 1 3
                                                                                    2
Find the state transition matrix for a given system matrix $A = \begin{pmatrix} 0 & -2 \\ 1 & -3 \end{pmatrix}$.   3

Q.4(a) Using Laplace transformation method derive the expression for solution of state Equation.   [2] 2 1

Q.4(b) A LTA system is characterized by the state equation   [3] 1 4
                                                                                    2

$$\dot{x} = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix} x + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$$

$$y = \begin{bmatrix} 1 & 0 \end{bmatrix} x$$

Where u is unit step function and X(0)= $\begin{bmatrix} 1 \\ 0 \end{bmatrix}$

Obtain the solution of this equation

Q.5(a) What is eigen value and eigen vector?   [2] 1 2 2

Q.5(b)   [3] 1 3
                                                                                    2
Find the controllability and observability of the system given by $\dot{x} = \begin{bmatrix} -1 & 0 \\ 0 & -2 \end{bmatrix} x + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$ 3

$$y = \begin{bmatrix} 1 & 2 \end{bmatrix} x$$

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