

G 1189

(Pages : 2)

Reg. No.....

Name.....

**B.TECH. DEGREE EXAMINATION, MAY 2016**

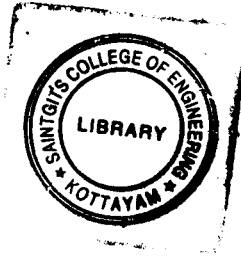
**Eighth Semester**

Branch : Applied Electronics and Instrumentation Engineering

**MODERN CONTROL THEORY (A)**

(Old Scheme—Prior to 2010 Admissions)

[Supplementary/Mercy Chance]



Time : Three Hours

Maximum : 100 Marks

**Part A**

*Answer all questions.  
Each question carries 4 marks.*

1. What are the differences between classical control theory approach and modern control theory approach ?
2. Express an  $n^{\text{th}}$  order system in its state variable form.
3. Given :

$$\frac{Y(s)}{X(s)} = \frac{s}{s^2 + 2s + 3}$$

Find the revolvant matrix and express this transfer function in state variable form.

4. Convert the state model in to transfer function  $\dot{X} = \begin{bmatrix} 1 & 1 \\ 2 & 6 \end{bmatrix} X + \begin{pmatrix} 1 \\ 1 \end{pmatrix} u$ .
5. What is stabilizability ? How will we test it ?
6. Check the controllability of the s/m :  $\dot{X} = \begin{bmatrix} 0 & 1 \\ 2 & 1 \end{bmatrix} X + \begin{pmatrix} 1 \\ 1 \end{pmatrix} u$ .
7. What is Bass Gura pole placement formula ?
8. What is a regulator system ?
9. Draw a simulink model for an interacting water take system.
10. Write commands for checking the observability of a system.

(10 × 4 = 40 marks)

**Turn over**

**Part B**

*Answer all questions.  
Each full question carries 12 marks.*

11. Derive the lagrange equation.

*Or*

12. Drive the state model of a armature controlled d.c. motor.

13. Decompose the transfer function  $\frac{u(s)}{u(s)} = \frac{10(s+4)}{s(s+1)(s+3)}$  in to direct, cascade and parallel form.

*Or*

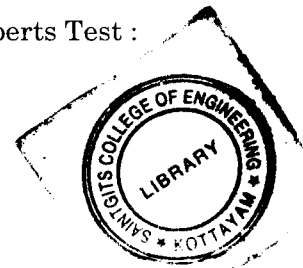
14. How is the state transition matrix computed. Explain all the methods.

15. Test the observability of the system using Kalman's and Gilberts Test :

$$\dot{X} = \begin{bmatrix} 0 & 0 & 1 \\ -2 & -3 & 0 \\ 0 & 2 & -3 \end{bmatrix} X + \begin{pmatrix} 0 \\ 2 \\ 0 \end{pmatrix} u.$$

*Or*

$$y = [1 \ 0 \ 0] X.$$



16. Derive the state model for a missile guidance system.

17. What are the three methods that are used to design a state feedback control law for a regulator system?

*Or*

18. Consider the system  $\dot{X} = \begin{bmatrix} -1 & 1 \\ 1 & -2 \end{bmatrix} X + 0 u \quad y = [1 \ 0] X.$

Design a full order observer. The desired eigen values of the observer matrix are  $\mu_1 = -5$  ;  $\mu_2 = -5$ .

19. What are the different blocks available in simulink. Explain each.

*Or*

20. What is m-file ? Write a M file to find the step response of a RLC circuit.

(5 × 12 = 60 marks)