(b) Explain the Concept of Linearity and Causality. 6

Unit-II

2 (a) A system is describe by the state equation

$$x(t) = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ -1 & 0 & -2 \end{bmatrix} x(t) + \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix} u(t) \; . \; x(0) = x^0$$

Using Laplace Transform Technique, Transform of state equation into a set of Liner equation in the from

$$\hat{x}(s) = \hat{G}(s)\, x^0 + H\hat{(}s)\, u\hat{(}s) \qquad 10$$

(b) Explain the difference between Modern Control Theory and Conventional Control Theory 6

Or

2 (a) Construct the state model for a system characterized by the differen--tial equation 8

$$\frac{d^3y}{d\,t^3} + \frac{6\,d^2y}{dt^2} + \frac{11dy}{dt} + 6y = u$$

(b) Explain the following terms:-

(i) State space equation 4

(ii) State vector 4

Unit-III

3 (a) A feed back system is characterized by the closed loop transfer function

$$T(S) = \frac{S^2 + 3S + 3}{S^3 + 2S^2 + 3S + 1}$$

Draw a suitable signal fliw graph and thereform construct a state model of the system. 10

(b) Derive state space representation using canonical variable's equation 6