Eighth Semester B. Tech. Degree Examination, May 2017

(2013 Scheme)

13.805.2 DISCRETE CONTROL &NAVIGATION SYSTEMS (Elective –V)

Time:3 Hours Max.Marks:100

PART – A

Answer **All** Questions.

1. Explain the advantages of Digital data System.
2. Explain the conditions to be satisfied for reconstruction of a sampled signal into continuous signal.
3. Obtain the transfer function of a Zero Order Hold circuit.
4. Draw the block diagram of the system described by the state model,

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \\ \dot{x}_3 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 0 & 1 \\ 0 & a_2 & a_3 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} \begin{bmatrix} u \end{bmatrix} \qquad y = x_1$$

5. Explain Liapunov Stability Analysis.
6. Define the concept of observability.
7. Write the properties of the state transition matrix of discrete time system.
8. Write a note on servo systems.
9. Explain Radar as a Navigation system.
10. What are the three main feedback parameters required by an autopilot system?

(10*2=20Marks)

PART-B

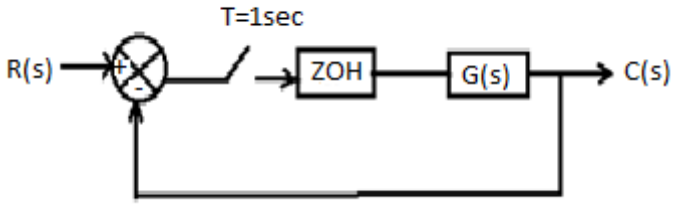
Answer **any one** question from **each module**. Each question carries **20 marks.**

Module I

11. (a)Explain the basic sampled data control system with a neat block diagram.
    (b)Define the following parameters:
    (i)Acquisition time
    (ii)Aperture time
    (iii)Settling time

OR

12. (a)The input – output relation of a sampled data system is described by the equation : Y(k+2)+5y(k+1)+6y(k)=x(k+1)-x(k).Determine the pulse transfer function
    (b)Find the Range of gain, K to make the system stable where G(s)= $\frac{3k}{s(s+3)}$



Module II

13. (a)The state modl of a linear time invariant system is given by
$\dot{X}(t)=AX(t)+BU(t)$
$Y(t)=CX(t)+DU(t)$.
Obtain the expression for transfer function of the system.
(b)Draw the block diagram of Full Order observer and explain briefly.

OR

14. (a)Explain the concept of controllability
(b)The state model of a system is given by

$$\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\\ \dot{x}_3\end{bmatrix}=\begin{bmatrix}0 & 0 & 1\\ -2 & -3 & 0\\ 0 & 2 & -3\end{bmatrix}\begin{bmatrix}x_1\\ x_2\\ x_3\end{bmatrix}+\begin{bmatrix}0\\ 2\\ 0\end{bmatrix}\begin{bmatrix}u\end{bmatrix} \qquad y=\begin{bmatrix}1 & 0 & 0\end{bmatrix}\begin{bmatrix}x_1\\ x_2\\ x_3\end{bmatrix}$$

Convert the state model to controllable phase variable form.

Module III

15. Explain different types of techniques used for depth measurement in detail

OR

16. Explain the Principle of speed measurement using electromagnetic induction.

Module IV

17. (a)Explain LORAN-C navigation system. Explain how a position fix is obtained in LORAN-C.
(b) How GPS is used for satellite navigation? Explain GPS antennas and GPS receiver architecture in detail.

OR

18. (a)Explain the principle of Autopilot system with suitable block diagram.
(b)Write a note on Radio finding system in detail.

(20*4=80 Marks)