R18

Code No: 155AR

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year I Semester Examinations, February - 2022

CONTROL SYSTEMS

(Common to ECE, EIE)

Time: 3 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks

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1.a) With a neat closed loop block diagram, explain automobile driving system.
b) Compare and contrast open loop and closed loop system. [8+7]

2.a) With a neat closed loop block diagram explain temperature control system.
b) Explain the benefits of feedback system. [8+7]

3. Find stability of the following system with characteristic equation using Routh Hurwitz criterion [15]

$$2s^4+s^3+3s^2+5s+10=0$$

4. Elucidate Root Locus techniques with suitable example. [15]

5. Draw Nyquist plot for the system having following characteristics equation. [15]

$$Ks^3+(2K+1)s^2+(2K+5)s+1=0$$

6. Draw Bode plot for the system with the following transfer function. [15]

$$L(s)=\frac{2500}{s(s+5)(s+50)}$$

7. The transfer function of a lag-lead compensator is given by

$$D(s)=\underbrace{\left[\frac{\tau_1 s+1}{\beta\tau_1 s+1}\right]}_{\text{Lag Section}}\underbrace{\left[\frac{\tau_2 s+1}{\alpha\tau_2 s+1}\right]}_{\text{Lead Section}};\ \beta>1,\ \alpha<1,\ \tau_1,\ \tau_2>0$$

Give an op amp circuit that realizes this D(s). [15]

8. A system is given by the state equation

$$\dot{\mathbf{x}}=\begin{bmatrix}0 & 1 & 0\\ 0 & 0 & 1\\ -1 & 0 & -3\end{bmatrix}\mathbf{x}+\begin{bmatrix}0\\0\\1\end{bmatrix}u\ ;\ \mathbf{x}(0)=\mathbf{x}^0$$

Using Laplace transform technique, transform the state equations into a set of linear algebraic equations. [15]

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