

Code No:158AN

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****B.Tech IV Year II Semester Examinations, July/August-2022****CONTROL SYSTEMS DESIGN****(Electrical and Electronics Engineering)****Time: 3 Hours****Max.Marks:75**

**Answer any five questions**  
**All questions carry equal marks**

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- 1.a) Describe the time domain specifications which plays significant role in system design.
- b) Write the effects of addition of poles on system performance. [8+7]
- 2.a) Describe the correlation between time domain and frequency domain specifications.
- b) Define gain of a transfer function, how does the gain variations effect the transient performance of first order and second order systems. [7+8]
- 3.a) Distinguish between lag and lead compensators.
- b) Obtain the transfer function of lag compensator along with pole-zero plot. [6+9]
4. What is a Lead compensator? Explain the detailed procedure for the design of lead compensator using Root locus technique. [15]
5. The open loop transfer function of a certain unity feedback control system is given by  $G s = \frac{K}{s(s+1)}$ . It is desired to have the velocity error constant  $K_v = 10$  and the phase margin to be atleast  $60^\circ$ . Design a phase lag series compensator. [15]
6. Explain the design procedure of a lag-lead compensator using bode plot method. [15]
- 7.a) Discuss the different types of controllers used in the control systems.
- b) Enumerate the procedure for the design of PD controller in time domain. [5+10]
- 8.a) Explain the different types of nonlinearities in physical systems.
- b) Write the necessary conditions for the design of state feedback controller. [8+7]

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