

BACHELOR OF TECHNOLOGY (C.B.C.S.) (2020 COURSE)
B.Tech.Sem - V Robotics & Automation Engineering : WINTER- 2022
SUBJECT : ELECTRICAL CONTROL SYSTEMS

Day : Monday

Time : 02:30 PM-05:30 PM

Date : 12/12/2022

W-24797-2022

Max. Marks : 60

N.B.

- 1) All questions are **COMPULSORY**.
- 2) Figures to the **RIGHT** indicate **FULL** marks.
- 3) Assume suitable data **WHEREVER** necessary.
- 4) Draw neat labeled diagrams **WHEREVER** necessary.

Q.1 Explain the fundamental concept of control system using block diagram. (10)
State the applications of control systems in industry.

OR

Q.1 Compare open loop and closed loop controls system. Give one example for each. (10)
Compare Block diagram reduction technique V/S Signal flow graph method to find transfer function in control system.

Q.2 Explain the concept of stability. State the necessary conditions for stability. (10)
State the drawbacks of Routh Hurwitz criterion. State the advantages of root locus method.

OR

Q.2 With suitable examples, write the stepwise procedure to obtain an electrical network from a mechanical system. (10)
Write a note on i) stepper motor and ii) optical encoder.

Q.3 Draw neat sketch of step response of control system and explain the following terms :- i) Delay time ii) Peak time iii) Rise time iv) maximum overshoot v) settling time. (10)

OR

Q.3 Write a note on analysis of steady state error. Define the different generalised error coefficients with their symbols. (10)

Q.4 Sketch a root locus for the transfer function $G(s) = \frac{k}{s(s+2)(s+4)}$. (10)
Enlist advantages and disadvantages of frequency response analysis.

OR

Q.4 Using Bode plot method determine the value of K for a unity feedback control system having open loop transfer function (10)

$$G(s)H(s) = \frac{k}{s(s+2)(s+4)}$$

Find the value of k for gain margin = 20 dB and value of k for phase margin = 60°.

Q.5 Explain what is compensation. State the need of compensation. Explain the effect of compensation on control system. (10)
Explain following: Lag compensator, lead compensator, lead-lag compensator, lag-lead compensator.

OR

Q.5 Explain what is a controller and its effect on control system. (10)
Describe with diagram Proportional, Integral and derivative controller. State transfer function of each respectively.

Q.6 Explain modeling of systems using state variables. (10)
Write note on: i) coordinate transformations and ii) canonical realizations.

OR

Q.6 Explain the concept of state and state variables. Enlist the advantages and disadvantages of state space analysis over conventional control theory. (10)
