



Regulation R17

Subject code: 1P4BD

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A' Grade)

B.Tech II Year II Semester Supplementary Examinations, July 2021
CONTROL SYSTEMS

(EEE)

Maximum Marks: 70

Date:22.07.2021 Duration: 3 hours

- Note:
1. This question paper contains two parts A and B.
 2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
 3. Part B consists of 5 Units. Answer any one full question from each unit.
 4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10x2M=20 Marks)

- 1 Explain the effect of negative feedback in control systems
- 2 Write the importance of SFG in control systems
- 3 Syncro acts as error detector? Justify?
- 4 Define the standard test signals in control systems.
- 5 Define angle of departure and angle of arrival in root locus
- 6 Write the drawbacks of RH criteria
- 7 Define polar plot.
- 8 What are the different types of electrical compensators
- 9 Define Gain margin and Phase margin.
- 10 What are the advantages of state space representation?

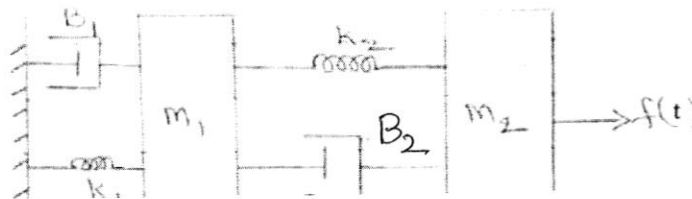
Part-B

Answer All the following questions. (5X10M=50Marks)

- 11 a) Explain any two examples of closed loop control systems.[5]
b) Discuss electrical analogous of mechanical rotational systems. [5]

OR

- 12 a) Discuss the characteristics of feedback in control systems. [5]
b) Write the differential equations to represent the following system in figure 2 below and draw its electrical equivalent circuit. [5]



- 13 a) Explain time domain specifications. [5]
b) Find all time domain specifications for the system transfer function $\frac{64}{(s^2 + 8s + 64)}$ [5]

OR

- 14 a) Find out the output of the undamped second order system when the input applied to the system is unit step input. [5]
 b) Explain effects of proportional derivative and proportional integral controllers in system performance. [5]

- 15 The open loop transfer function of a unity feedback system is given by, [10]

$$G(s) = \frac{K(s+1)}{s^3 + as^2 + 2s + 1}$$

Determine the value of K and a so that the system oscillates at a frequency of 2 rad/sec.

OR

- 16 a) How RII Stability criterion can be used to study the relative stability? [5]
 b) Explain the effects of adding poles and zeros to G(s)H(s) on the root loci by considering one the example. [5]
- 17 Develop Nyquist plot whose open loop transfer function is given by G(s)H(s)=KS²/(S³+4S+3) and examine closed loop stability in terms of parameter K. [10]

OR

- 18 a). What is compensator? Explain about lead compensator. [5]
 b). Plot the bode plot of the transfer function and determine the system gain K for the gain cross over frequency to be 5 rad/sec. $G(s) = \frac{Ks^2}{(1+0.2s)(1+0.02s)}$ [5]

- 19 Compose the state model of the system whose transfer function is $Y(s)/U(s)=(S+2)/(S^3+3S^2+2S+5)$ [10]

OR

- 20 A svstem is characterized hv the following state space equations [10]

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

$$Y = [1 \ 0] \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

- a) Find the transfer function of the system.
 b) Compute the state transition matrix.