| BIEE-021 |

B.Tech. – VIEP – ELECTRICAL ENGINEERING (BTELVI)

Term-End Examination

December, 2017

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BIEE-021 : CONTROL SYSTEMS

Time : 3 hours   *Maximum Marks : 70*

Note : *Attempt any **five** questions. Each question carries equal marks. Use of scientific calculator is permitted.*

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1. (a) What are the basic differences between Open and Closed loop control systems ? Explain with examples. Which one is preferred mostly and why ?   7

    (b) Write a short note on Mason's Gain Formula which is used for solving the signal flow graph with suitable example.   7

2. (a) Write a short note on Steady State Error. Explain the concepts of Relative Stability and Absolute Stability   7

    (b) Write the step-wise procedure for plotting the root locus for a given open-loop transfer function.   7

3. A unity feedback control system has its open-loop transfer function given by $G(s) = \dfrac{(4s + 1)}{4s^2}$. Determine an expression for the time response when the system is subjected to

(a) unit impulse input function, and $\qquad$ *7*

(b) unit step input function. $\qquad$ *7*

4. Determine the stability of a closed-loop control system having characteristic equation as

$$s^5 + s^4 + 4s^3 + 4s^2 + 4s + 4 = 0.$$ $\qquad$ *14*

5. What are the advantages of plotting Bode plots ? Explain the concepts of gain margin and phase margin. Also explain how relative stability is determined from these values. $\qquad$ *14*

6. Write short notes on any *two* of the following : $\qquad$ *2×7=14*

(a) Servo Motor

(b) Nyquist Criterion

(c) Compensators

(d) PID Controllers

7. (a) Explain the relationship between the State equation and Transfer function. *6*

(b) The transfer function of a system is given by

$$\frac{Y(s)}{U(s)} = \frac{s^2 + 3s + 2}{s^3 + 9s^2 + 26s + 24}.$$

Determine the state model by using the direct decomposition method. *8*

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