**18EE502**

**Hall Ticket Number:**

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| **III/IV B.Tech (Regular/ Supplementary) DEGREE EXAMINATION** | | | |
| **January, 2022** | **Electrical and Electronics Engineering** | | |
| **Fifth Semester** | **Control Systems** | | |
| **Time:** Three Hours | | **Maximum: 5**0 Marks | |
| *Answer* ***Question No.1***Compulsory*.* | | | (1X10 = 10 Marks) |
| *Answer* ***ANY ONE*** *question from each unit.* | | | (4X10=40 Marks) |

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| 1. | a) | What is the effect of negative feedback on overall gain of the system? | CO1 |  |
|  | b) | What do you mean by nonlinear control system? | CO1 |  |
|  | c) | Define signal flow graph. | CO1 |  |
|  | d) | Define rise time. | CO2 |  |
|  | e) | What are various compensation methods? | CO4 |  |
|  | f) | Define gain crossover frequency. | CO3 |  |
|  | g) | Define absolute stability. | CO3 |  |
|  | h) | Define phase margin. | CO3 |  |
|  | i) | Define state and state variable. | CO4 |  |
|  | j) | Give the properties of state transition matrix. | CO4 |  |
| **Unit-I** | | | | |
| 2. | a) | Obtain the transfer function *E*o(s)/*E*i(s). (Capacitors *C*1 and *C*2 are not charged initially.) | CO1 | 5M |
|  | b) | Compare closed loop and open loop systems. | CO1 | 5M |
| **(OR)** | | | | |
| 3. | a) | Obtain the transfer function C(s)/R(s) by using Block diagram algebra. | CO1 | 6M |
|  | b) | Define (i) Input node (ii) Forward path (iii) Loop (iv) Not touching loops. | CO1 | 4M |
| **Unit-II** | | | | |
| 4. | a) | Derive the expressions for rise time and peak time of a standard second order under damped system. | CO2 | 5M |
|  | b) | Find all the time domain specifications for a unity feedback control system whose open loop transfer function is given by **.** | CO2 | 5M |
| **(OR)** | | | | |
| 5. | a) | Using R-H criteria asses the system stability whose characteristic equation is P(s) = s6+2s5+8s4+12s3+20s2+16s+16. | CO2 | 5M |
|  | b) | Find static error constants for given system**.** | CO2 | 5M |
| **Unit-III** | | | | |
| 6. |  | Sketch the root locus of the system whose open loop transfer function is G(s)H(s)= . | CO3 | 10M |
| **(OR)** | | | | |
| 7. |  | Draw the bode plot of. Compute Gain Margin & Phase Margin. Test the stability of closed loop system. | CO3 | 10M |
| **P.T.O.**  **18EE502**  **Unit-IV** | | | | |
| 8. | a) | Explain the effect of adding poles and zeros on over shoot, rise time of a system. | CO4 | 4M |
|  | b) | Derive lag compensator for RC network. | CO4 | 6M |
| **(OR)** | | | | |
| 9. | a) | Obtain the Transfer function for a system having state model  and Y= | CO4 | 5M |
|  | b) | Develop the state model of the system whose transfer function is given as | CO4 | 5M |

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