**18EE502**

**Hall Ticket Number:**

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| **III/IV B.Tech (Regular) DEGREE EXAMINATION** | | | |
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| **January, 2022** | **Electrical & Electronics Engineering** | | |
| **Fifth Semester** | **Control Systems** | | |
| **Time:** Three Hours | | **Maximum:**50 Marks | |
| ***Answer question 1 compulsory.*** | | | **(10X1 = 10Marks)** |
| ***Answer one question from each unit.*** | | | **(4X10=40Marks)** |

|  |  |  | CO | BL | M |
| --- | --- | --- | --- | --- | --- |
| 1 | a | What is the effect of negative feedback on overall gain of the system? | CO1 | L1 | 1M |
|  | b | What do you mean by nonlinear control system? | CO1 | L1 | 1M |
|  | c | Define signal flow graph. | CO1 | L1 | 1M |
|  | d | Define rise time. | CO2 | L1 | 1M |
|  | e | What are various compensation methods? | CO2 | L1 | 1M |
|  | f | Define gain crossover frequency. | CO2 | L1 | 1M |
|  | g | Defineabsolute stability | CO3 | L1 | 1M |
|  | h | Define phase margin. | CO3 | L1 | 1M |
|  | i | Define state and state variable | CO3 | L1 | 1M |
|  | j | Give the properties of state transition matrix. | CO4 | L1 | 1M |
| **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 | L2 | 5M |
|  | b | Compare closed loop and open loop systems | CO1 | L2 | 5M |
|  |  | **(OR)** |  |  |  |
| 3 | a | Obtain the transfer function C(s)/R(s) by using Block diagram algebra | CO1 | L3 | 5M |
|  | b | Define (i) Input node (ii) Forward path (iii) Loop (iv) Not touching loops | CO1 | L2 | 5M |
| **Unit-II** | | | | | |
| 4 | a) | Derive the expressions for rise time and peak time of a standard second order under damped system | CO2 | L3 | 5M |
|  | b) | Find all the time domain specifications for a unity feedback control system whose open loop transfer function is given by | CO2 | L2 | 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 | L2 | 5M |
|  | b) | Find static error constants for given system**.** | CO2 | L2 | 5M |
| **Unit-III** | | | | | |
| 6 |  | Sketch the root locus of the system whose open loop transfer function is G(s)H(s)= | CO3 | L2 | 10M |
| **(OR)** | | | | | |
| 7 |  | Draw the bode plot of. Compute Gain Margin & Phase Margin. Test the stability of closed loop system | CO3 | L2 | 10M |
| **Unit-IV** | | | | | |
| 8 | a) | Explain the effect of adding poles and zeros on over shoot, rise time of a system. | CO4 | L2 | 5M |
|  | b) | Derive lag compensator for RC network | CO4 | L3 | 5M |
| **(OR)** | | | | | |
| 9 | a) | Obtain the Transfer function for a system having state model  and Y= | CO4 | L2 | 5M |
|  | b) | Develop the state model of the system whose transfer function is given as | CO4 | L3 | 5M |

