Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_

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**End Semester Examination – Nov/Dec– 2018**

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| **Code :** | **14EI2005** | **Duration :** | **3hrs** |
| **Sub. Name :** | **CONTROL SYSTEM** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Write the advantages of feedback in control system with an suitable example. | CO1 | 5 |
| b. | Determine the transfer function X2(S)/F(S) of the system shown in fig.    f(t) | CO1 | 15 |
| (OR) | | | | |
| 2. | a. | Derive the transfer function of the network given below,  [Image result](https://www.google.co.in/url?sa=i&rct=j&q=&esrc=s&source=imgres&cd=&cad=rja&uact=8&ved=2ahUKEwjJgaLYnKfaAhUDvbwKHetsBuEQjRx6BAgAEAU&url=https://www.electrical4u.com/rl-circuit-transfer-function-time-constant-rl-circuit-as-filter/&psig=AOvVaw2resJTnr5JhyRODW-LO1A5&ust=1523158223399245) | CO1 | 5 |
| b | Using block diagram reduction technique find overall transfer function Y(S)/R(S) of the system shown in fig. | CO1 | 15 |
|  |  |  |  |  |
| 3. | a. | For the system with following transfer function, determine type and order of the system.  i) ii) . Also find its poles. | CO2 | 5 |
| b. | Using Masons gain formula obtain the transfer function of the system represented by signal flow graph. | CO1 | 15 |
| (OR) | | | | |
| 4. | a. | Write any five rules of block diagram rules. | CO2 | 5 |
| b. | The open loop transfer function of a unity feedback system is given by . Determine the gain K, so that the system will have a damping ratio of 0.5. For this value of K, determine settling time, peak overshoot and time at peak overshoot for a unit step input. | CO2 | 15 |
|  |  |  |  |  |
| 5. |  | For a unity feedback system’s open loop transfer function is given by,  Using Routh-Hurwitz criterion, find:   1. The range of k for stability 2. the value of k for marginal stable condition 3. the location of closed loop poles when the system is marginally stable. | CO3 | 20 |
| (OR) | | | | |
| 6. |  | The open loop transfer function of a unity feedback system is given by . Draw the Bode plot. Find the gain margin and phase margin of the system. | CO3 | 20 |
|  |  |  |  |  |
| 7. |  | The open loop transfer function of a unity feedback system is . Sketch the Polar plot and determine the Gain margin and Phase margin. | CO3 | 20 |
| (OR) | | | | |
| 8. |  | Draw the root locus diagram for the system which has open loop transfer function  . Comment on the stability | CO3 | 20 |
|  | |  |  |  |
|  | | **Compulsory**: |  |  |
| 9. |  | The state variable model of the system is given below. Determine the controllability and observability of the system. | CO2 | 20 |