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



**End Semester Examination – Nov/Dec – 2017**

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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. |  | Convert the following block diagram into signal flow graph   1. Find out the overall transfer function. 2. Verify the same using block diagram reduction rules.   C(s)  R(s)  G1  G2  G3  H2  H1  H3 | CO1 | 15+5 |
| (OR) | | | | |
| 2. |  | Write the differential equations governing the mechanical rotational system shown below and determine the transfer function | CO1 | 20 |
| 3. |  | A unity feedback system is characterized by open looptransfer function  .  Obtain the Delay time, Rise time, Peak time, Peak overshoot, Settling time for a unit step input. | CO2 | 20 |
| (OR) | | | | |
| 4. | a. | Determine ,,and steady state error for a systems with open loop transfer function as: where the input is unit step . | CO2 | 14 |
|  | b. | A unity feedback system is characterized by open looptransfer function  .  Obtain the damping ratio, damped frequency and natural frequency. | CO2 | 6 |
| 5. |  | Sketch the Bode plots of the following transfer function.  Determine the gain cross over frequency, phase cross over frequency, Phase Margin and Gain margin. | CO3 | 20 |
| (OR) | | | | |
| 6. |  | Draw the polar plot for the following open loop transfer function and determine Gain Margin and phase margin. | CO3 | 20 |
| 7. | a. | Find the range of K such that the closed loop system is stable whose characteristic equation is | CO3 | 8 |
|  | b. | The open loop transfer function of a unity feedback control system is given by  By applying Routh criterion, determine marginal value of K and frequency of sustained oscillations. | CO3 | 12 |
| (OR) | | | | |
| 8. |  | Sketch the root locus for the open loop transfer function of unity feedback control system given below | CO3 | 20 |
|  | | **Compulsory**: |  |  |
| 9. |  | State model of system is given by  = +U and Y=  Find the following:  i. Transfer function. ii. State Transition Matrix | CO3 | 10+10 |

ALL THE BEST