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



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**End Semester Examination – April/May– 2017**

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

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

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| Q. No. | Sub Div. | Questions | Course  Outcome | Marks |
| 1. |  | Write differential equations governing the mechanical system shown in figure. Also draw the force current and force voltage analogous circuit. | CO1 | 20 |
| (OR) | | | | |
| 2. | a. | For the following block diagram, find the transfer function . | CO1 | 10 |
| b. | Find transfer function for the following signal flow graph. | CO1 | 10 |
| 3. | a. | Derive the Step response of Second order under damped system subjected to unit step input signal. | CO2 | 15 |
|  | b. | A second order system has a unity feedback and an open loop transfer function is  Find natural frequency and damping ratio. | CO2 | 5 |
| (OR) | | | | |
| 4. |  | Closed loop transfer function of a system is given by  Obtain the rise time, peak time, maximum overshoot and the settling time when the system is subjected to unit-step input. | CO2 | 20 |

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| 5. |  | A unit-feedback system is characterized by the open-loop transfer function       Using the Routh criterion,   1. Calculate the range of values of K for the system to be stable. 2. Find out marginal value of K and frequency of oscillation | CO3 | 20 |
| (OR) | | | | |
| 6. |  | Obtain the root locus diagram for the following open-loop transfer function | CO3 | 20 |
| 7. |  | 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) | | | | |
| 8. |  | The open loop transfer function of a unity feedback system is given by  .  Sketch the polar plot and determine the gain margin and phase margin. | CO3 | 20 |
|  | | **Compulsory:** |  |  |
| 9. |  | Evaluate the Observability and Controllability of the system with  = +U and Y=. | CO3 | 20 |

ALL THE BEST