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**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

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

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

**End Semester Examination – Nov/Dec - 2016**

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|  |  | **Semester :** | **2016-17 ODD** |
| **Code :** | **09EI219/ 10EI205/ EI203** | **Duration :** | **3 hrs** |
| **Sub. Name :** | **Control Systems** | **Max. marks :** | **100** |

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| **Q. No.** | **Questions** | **Marks** |
| **PART-A(10X1=10 MARKS)** | | |
| 1. | \_\_\_\_\_\_\_\_ compares the feedback signal and the reference input and generates the error signal. | (1) |
| 2. | Write the Mason’s gain formula. | (1) |
| 3. | If the damping ratio is equal to zero then the system is \_\_\_\_\_\_\_. | (1) |
| 4. | List the standard test signals used in analysis of control systems. | (1) |
| 5. | What is order of the transfer function G(s) = 2 / [s3 + 2s +1]? | (1) |
| 6. | What is a steady state error? | (1) |
| 7. | In a Bode plot for, the slope of the line is \_\_\_\_\_\_\_\_\_\_\_\_\_db/dec. | (1) |
| 8. | What is Phase crossover frequency? | (1) |
| 9. | What is Characteristic equation? | (1) |
| 10. | Consider the polynominal P(s) = s4 + 2s3 + 15s2 + 18s +12, mention whether the system is stable or unstable. | (1) |

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| **PART B(5 X 3= 15 MARKS)** | | |
| 11 | Distinguish open and closed loop systems. | (3) |
| 12 | What are the applications of Potentiometer? | (3) |
| 13 | Derive the response for a first order system with unit step input. | (3) |
| 14 | Write short notes on Polar Plot. | (3) |
| 15 | What is Auxiliary polynomial? | (3) |

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| **PART C(5 X 15= 75 MARKS)** | | | |
| 16. | Find the overall gain C(s)/R(s) for the signal flow graph given below. | | (15) |
| (OR) | | | |
| 17. | a. | Find the transfer function of the given mechanical rotational system. | (10) |
| b. | Reduce the block diagram shown into a single block to find the transfer function C(s)/R(s). | (5) |
| 18. | a. | Describe the construction and working of Synchros with necessary diagrams. | (7) |
| b. | Illustrate the working of potentiometer with an application. | (8) |
| (OR) | | | |
| 19. | a. | Explain with neat diagram the principle and operation of Stepper motors. | (8) |
| b. | With a neat diagram, demonstrate the working of Gyroscope in detail. | (7) |
| 20. | Obtain the response of a second order system for critically damped and over damped systems with unit step input. | | (15) |
| (OR) | | | |
| 21. | For a unity feedback control system the open loop transfer function  . | |  |
| a. | Find the position, velocity and acceleration error constants. | (5) |
| b. | The steady state error for the given input, | (10) |
| 22. | Plot Bode diagram for the transfer function  and determine the Gain Margin and Phase margin. | | (15) |
| (OR) | | | |
| 23. | 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. | | (15) |
| 24. | a. | Determine the location of roots on s-plane and hence comment on the stability of a control system whose characteristic equation is given by, | (10) |
| b. | Determine the Range of K for stability of unity feedback system whose open loop transfer function is | (5) |
| (OR) | | | |
| 25. | Obtain the root locus for the following open-loop transfer function | | (15) |

ALL THE BEST