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 – Nov/Dec – 2016**

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|  |  | **Semester :** | **2016-17 ODD** |
| **Code :** | **14EI3017** | **Duration :** | **3hrs** |
| **Sub. Name :** | **DESIGN OF LINEAR MULTIVARIABLE 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. | Discuss and Derive the equation for the system to be observability. | CO 1 | 10 |
| b. | Explain in detail about the system representations using detailed block diagram. | CO 1 | 10 |
| (OR) | | | | |
| 2. | a. | The characteristic equation is  $ P(z)=z^{3}-1.3z^{2}-0.08z+0.24=0$  Check the stability of the system using Jury Conditions. | CO 1 | 10 |
| b. | With an example, Derive the equation for converting state space to transfer function. | CO 1 | 10 |
| 3. | a. | Write the conditions for the Linear system. | CO 1 | 6 |
|  | b. | Write the performance criteria for LQG Control design. | CO 3 | 7 |
|  | c. | Write the Routh stability conditions for the system to be stable with an example. | CO 1 | 7 |
| (OR) | | | | |
| 4. | a. | Explain the concept in designing of Kalman filter with derivation. | CO 3 | 10 |
|  | b. | Discuss in detail about the determination of poles and zeros using minimal realization. | CO 1 | 10 |
| 5. | a. | Discuss in detail about the robust design stability analysis. | CO 2 | 10 |
|  | b. | Derive the Ricatti equation for linear quadratic regulator. | CO 1 | 10 |
| (OR) | | | | |
| 6. | a. | Explain the design concepts involved in H-infinity robust controller. | CO 2 | 10 |
|  | b. | Write short note on sensitivity functions. | CO 1 | 5 |
|  | c. | Write the problems in robust control design. | CO 2 | 5 |
| 7. | a. | What is the need of Model reduction methods and write the procedure for model reduction. | CO 1 | 10 |
|  | b. | Obtain the reduced model for the following function  Use Residualisation and Truncation method for reducing model. | CO 1 | 10 |
| (OR) | | | | |
| 8. | a. | Write short note on impact of interaction between the variables of Distillation column. | CO 2 | 15 |
|  | b. | Give the key issues in Modelling. | CO 1 | 5 |
|  | | **Compulsory:** | CO 1 |  |
| 9. |  | Derive the mathematical model of paper machine head box and validate the same. | CO 3 | 20 |

ALL THE BEST

**Course Outcome:**

CO1: Apply the concept of Multivariable control systems.

CO2: Design controller for multivariable control systems.

CO3: Use the corresponding controller synthesis techniques.