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 :** | **14EI2016** | **Duration :** | **3hrs** |
| **Sub. Name :** | **DIGITAL 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. | a. | Illustrate the working of Digital to Analog converter in detail. | CO1 | 7 |
| b. | Describe the working of R-2R ladder type D/A Converter with its equivalent circuits. | CO1 | 7 |
| c. | Describe about the basic discrete-time signals. | CO1 | 6 |
| (OR) | | | | |
| 2. | a. | Determine the Initial Value  and Final value  of the given z-domain signal. | CO1 | 5 |
| b. | Determine the one-sided z-transform of the discrete sequence generated by sampling the given Continuous time functions mathematically. | CO1 | 10 |
| c. | With a neat sketch, explain the configuration of the basic digital control scheme. | CO2 | 5 |
| 3. | a. | Using Bilinear transformation method, check whether the given sampled data control system is Stable or Not. | CO3 | 12 |
|  | b. | Explain the procedure for finding whether the sampled data control system is stable or not using Jury’s Stability test. | CO3 | 8 |
| (OR) | | | | |
| 4. | a. | Demonstrate the working of practical Sample-and-hold circuit and also obtain the model of Sample-and-Hold Operation. | CO1 | 12 |
| b. | With necessary graphs, illustrate the concept of aliasing in detail. | CO1 | 8 |
| 5. | a. | Explain the z-domain description of sampled continuous-time plants. | CO1 | 12 |
| b. | Elaborate the Non-Recursive method of realization in detail. | CO2 | 8 |
| (OR) | | | | |
| 6. | a. | Derive the relation between the spectrums of the continuous-time signal to that of the discrete-time sequence and illustrate the process of sampling in detail. | CO1 | 15 |
| b. | Using Parallel realization, realize the given pulse transfer function | CO1 | 5 |
| 7. | a. | Illustrate the procedure for tuning a controller using Ziegler-Nichols tuning method based on Ultimate gain and Period. | CO2 | 10 |
| b. | Illustrate the basic routes to the design of digital controller in detail. | CO2 | 5 |
| (OR) | | | | |
| 8. | a. | A Single-input system is described by the following state equations.    Using Ackerman’s formula, design a state feedback controller which will give closed-loop poles at -1+j2,-1-j2,-6. | CO2 | 12 |
|  | b. | Find the Inverse of the given Modal Matrix, M= | CO2 | 3 |
|  | c. | Describe about the importance of Pole placement technique. | CO2 | 5 |
|  | | **Compulsory:** |  |  |
| 9. | a. | Explain the hardware features, control schemes and the design of control algorithm for a Digital Temperature Control in an Air-flow System. | CO2 | 12 |
| b. | A discrete-time system has the transfer function,. Determine the state model of the system in Jordan canonical form. | CO2 | 8 |

ALL THE BEST

Course Outcome:

CO1: Use Z transforms to analyse Discrete Systems.

CO2: Design controllers for a digital process.

CO3: Test the Stability of Discrete Systems