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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| **Code :** | **14ME2042** | **Duration :** | **3hrs** |
| **Sub. Name :** | **MECHATRONICS AND 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. | Write the differential equations governing the mechanical system shown below and determine the transfer function. | CO1 | 15 |
| b. | Explain the open loop and closed loop temperature control system. | CO1 | 5 |
| (OR) | | | | |
| 2. | a. | Determine the transfer function of the given mechanical rotational system shown below. | CO1 | 15 |
| b. | Discuss the basic elements of Mechatronic system. | CO1 | 5 |
| 3. | a. | Obtain the differential equations governing the given electrical system. Also derive the transfer function of the system shown below. | CO1 | 15 |
|  | b. | Explain current-voltage relation of R,L andC. | CO1 | 5 |
| (OR) | | | | |

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| 4. | a. | Find the transfer function of the block diagram using block diagram reduction techniques. | CO1 | 15 |
|  | b. | Write any five rules for reducing block diagrams. | CO1 | 5 |
| 5. | a. | Find the overall gain C(s)/R(s) for the signal flow graph shown in fig. | CO1 | 15 |
|  | b. | What are the basic properties of signal flow graph? | CO1 | 5 |
| (OR) | | | | |
| 6. | a. | Construct Routh array and determine the stability of the system represented by the characteristic equation, s6+2s5+8s4+12s3+20s2 +16s+16=0.Comment on the location of the roots of characteristic equation. | CO1 | 15 |
|  | b. | What is the necessary condition for stability? Explain the relation between stability and coefficient of characteristic Polynomial. | CO1 | 5 |
| 7. | a. | Explain the working principle of pneumatic actuating systemin detail. | CO2 | 15 |
|  | b. | Illustrate the workingof Stepper motor with a neat sketch. | CO3 | 5 |
| (OR) | | | | |
| 8. | a. | Explain the problems of loading when a measurement system is being assembled from a sensor, signal conditioner and display. | CO3 | 15 |
|  | b. | What are the steps involved in initializing Data Acquisition Card? | CO4 | 5 |
|  | | **Compulsory:** |  |  |
| 9. | a. | Explain the internal hardware architecture of 8085 microprocessor with neat diagram. | CO4 | 15 |
|  | b. | Explain the function of Programmable logic Controller. | CO5 | 5 |