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



**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **14ME2024** | **Duration :** | **3hrs** |
| **Sub. Name :** | **MECHATRONICS** | **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. | Define the term mechatronics. | CO1 | 3 |
| b. | Draw the block diagram for a general measurement system and discuss about an element in a mechatronic systems. | CO1 | 7 |
| c. | Derive the canonical form of a closed loop system. | CO1 | 10 |
| **(OR)** | | | | |
| 2. | a. | List out advantages, disadvantages and applications of automation. | CO1 | 6 |
| b. | Illustrate the multidiscipline nature of mechatronics with neat sketch. | CO1 | 4 |
| c. | Draw and discuss the working of a pneumatic cascade system to give A+B+A-B- sequence. | CO2 | 10 |
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| 3. | a. | Draw the DC compound motor circuit diagram and list the elements. | CO2 | 4 |
| b. | Discuss the working and the application of relay in the starting of the car engine. | CO2 | 8 |
| c. | Illustrate the construction and working of hybrid Stepper motor. | CO2 | 8 |
| **(OR)** | | | | |
| 4. | a. | Draw the symbol and name the parts for 4/2 DCV double solenoid valve and sketch various DCV switching mechanisms. | CO2 | 8 |
| b. | Explain the working of hydraulic gear motor with a neat diagram. | CO2 | 6 |
| c. | State the characteristic features, merits, demerits and applications of a stepper motor. | CO2 | 6 |
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| 5. | a. | Describe the Fleming’s Right Hand Rule. | CO1 | 2 |
| b. | List the various factors to be considered in order to determine the requirements for force or torque calculations for a solenoid. | CO1 | 6 |
| c. | State the characteristics, merits and demerits of a DC motor. | CO2 | 6 |
| d. | Sketch the physical and block diagram of automatic control system for the speed of rotation of a shaft and find out various essential elements of control system. | CO1 | 6 |
| **(OR)** | | | | |
| 6. | a. | Illustrate the working principle of inductive type proximity sensor with neat sketch. | CO1 | 7 |
| b. | Discuss the working principle of photo electric sensor with neat sketch. | CO1 | 6 |
| c. | Discuss the working principle of Capacitive proximity sensor with neat sketch. | CO1 | 7 |
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| 7. | a. | Enumerate the differences between Microprocessor and Microcontroller. | CO1 | 4 |
| b. | Describe about the micro controllers developments. | CO1 | 8 |
| c. | Discuss the pin diagram of atmega micro controller. | CO1 | 8 |

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| **(OR)** | | | | |
| 8. | a. | Discuss the Rougth’s criterion and also determine the stability of the system represented by the following characteristic equation: 2S4+8S3+16S2+16S+8=0. | CO2 | 10 |
| b. | List out the rules of block diagram reduction and find the transfer function of the closed loop system shown in below: | CO2 | 10 |
|  | | **Compulsory**: |  |  |
| 9. | a. | Draw the PLC controlled pneumatic circuit for AND logic with latching condition. | CO2 | 8 |
| b. | Draw the architecture of PLC and discuss the functions of various components in detail. | CO2 | 6 |
| c. | Discuss various input and output devices used in the automation in detail with neat sketches. | CO2 | 6 |