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Question Paper Code: U7702

B.E. / B.Tech. DEGREE EXAMINATION, APRIL/MAY 2025

Sixth Semester

Mechanical Engineering

21UME702- Mechatronics and IoT

(Regulations 2021)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Materials used in K Type Thermocouple are CO1-U
(a) Chromel/aluminum (b) Iron / Constantan
(c) Chromel/Constantan (d) Copper / Constantan
2. Thermocouple works on which Principle? CO1- U
(a) Peltier Effect (b) First Law of Thermodynamics
(c) None (d) See beck Effect
3. Identify the specific device used to avoid damage to a compressor due to excess pressure rise in a pneumatic system CO2-App
(a) DC Valve (b) Pressure Relief Valve
(c) Flow Control Valve (d) All the above
4. A relay is switch CO1- U
(a) A mechanical (b) An electronic
(c) An electromechanical (d) None of the above
5. The available digital I/O pins on the Arduino Uno are CO1- U
(a) 12 (b) 14 (a) 12 (b) 14

6. Which development board uses energy IDE for its programming? CO1- U
 (a) MSP430G2ET Launchpad (b) Arduino UNO
 (c) Arduino nano (d) Node MCU
7. The instruction is commonly used to copy the value from one address to another is CO1-U
 (a) GET (b) PUT
 (c) MOVE (d) None of the above
8. The acronym PLC stands for: CO1- U
 (a) Pressure Load Control (b) Programmable Logic Controller
 (c) Pneumatic Logic Capstan (d) Pressure Loss Chamber
9. In the level of integration of Mechatronics system, an example of the first level is ____ CO1-U
 (a) Fluid valves (b) Automatic machine tools
 (c) Industrial robots (d) Microprocessors
10. Prototyping involves ____ CO1- U
 (a) Conceptual design
 (b) Replacing non-computer systems with actual hardware
 (c) Database for maintaining project information
 (d) Sub models for eventual reuse

PART – B (5 x 2= 10 Marks)

11. Identify the inverse piezoelectric effect with examples, and explain how it is utilized in real-world applications CO2-App
12. Classify Electrical Motors briefly. CO1 - U
13. Apply and Explain the Arduino Uno in advanced embedded systems for real-world applications, considering its limitations in processing power, memory, and I/O capabilities. CO3-App
14. Illustrate PLC with short Notes CO1 - U
15. Outline the function of Oxygen sensor in Engine Management system CO1 - U

PART – C (5 x 16= 80 Marks)

16. (a) Summarize the Construction & working of Incremental Encoder & Absolute Encoder with neat sketch CO1- U (16)

Or

- (b) Review the operations of a) Potentiometer b) Linear Variable Differential Transformer c) Photoelectric Sensor and d) Liquid Level Detection Capacitive Sensor in Tanks CO1- U (16)
17. (a) Develop a keyboard interface using the 8255 PPI and explain its working with neat sketch. CO2-App (16)
- Or
- (b) Apply the concepts of 8051 and sensors to develop a temperature control system. CO2-App (16)
18. (a) Distinguish between a microcontroller and a microprocessor and select the appropriate hardware for an embedded system like the Arduino Uno. CO3- App (16)
- Or
- (b) Apply the specific embedded system applications which utilize the unique features of various microcontroller platforms and evaluate the advantages these features offer compared to traditional microcontroller architectures. CO3- App (16)
19. (a) Select a Ladder Diagram for A+B+B-A- Hydraulic cylinder sequence circuit & Explain the Program flow in ladder diagram CO2- App (16)
- Or
- (b) Select the effectiveness of different Programmable Logic Controllers (PLCs) in a specific automation scenario CO2- App (16)
20. (a) Organize a mechatronics system design like a Fuel Flow Metering and Control System. CO2- App (16)
- Or
- (b) Construct a pick-and-place robot utilizing mechatronic components and describe the control of the robot. CO2- App (16)

