

Name:  
Enrolment No:



**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**  
**End Semester Examination, December 2020**

**Course: Sensing Devices**  
**Program: B. Tech APE+UP,CE+RP,GIE,FSE,ECE,ASE**  
**Course Code: MRIO0201**

**Semester: I**  
**Time 03 hrs.**  
**Max. Marks: 100**

**Instructions: Read all the questions carefully. Assume in any missing data.**

**SECTION A**

| S.No. | Answer All the questions  | Marks | CO  |
|-------|---|-------|-----|
| 1     | What is RISC architecture? highlight its importance in advanced controllers.  | 5     | CO3 |
| 2     | In AVR, what is the purpose of flash memory and why it is a non-volatile memory?  | 5     | CO1 |
| 3     | What is the need of separate data and program memories in AVR architecture? What is effect on CPU cycle speed if a single memory is used for both data and program? | 5     | CO4 |
| 4     | In Status register of AVR, explain the working of two's compliment flag with an example   | 5     | CO1 |
| 5     | Using a simple example explain how a potentiometer can be used as both a sensor and as an actuator.   | 5     | CO4 |
| 6     | What is a logic converter? Explain its role while interfacing sensors to a microcontroller  | 5     | CO2 |

**SECTION B**

| S.No | Answer all the questions   | Marks | CO  |
|------|--|-------|-----|
| 7    | In AVR with an example for each for both hexadecimal and binary data, explain the working of<br>i) DDR Register<br>ii) PORT Register<br>iii) PIN Register  | 10    | CO1 |
| 8    | Classify the electronic equipment's present at your home into types of embedded systems. Minimum 5 equipment's should be considered. List the hardware present in each type.   | 10    | CO2 |
| 9    | What is the difference between smart home and home automation? List minimum 10 differences   | 10    | CO3 |
| 10   | In embedded systems what is<br>i) NRE and RE cost<br>ii) ASIC and FPGA<br>iii) Why the performance of ASIC is better than FPGA<br>iv) Why the design of FPGA is more flexible than ASIC  | 10    | CO4 |
| 11   | Consider that you have visited a grocery center in a super market. List the sensors, actuators, controllers and other hardware required if the following functions are to implemented<br>i) As soon as you reach near the bread stand, your phone should vibrate and give an alarm if the bread section of your refrigerator at home is empty. | 10    | CO2 |

|                  | ii) To distinguish between white and brown bread<br>iii) To identify the situation where a false alarm may be generated and method to avoid the same.<br>iv) How do you ensure that all the operations will happen in real-time with minimal delay   |           |            |
|------------------|--|-----------|------------|
| <b>SECTION-C</b> |  |           |            |
| S.No             | Answer all the questions   | Marks     | CO         |
| 12               | <p>In AVR/Arduino, connect 8 LEDs to any one port and display the following patterns</p> <ul style="list-style-type: none"> <li>i) All ON and all OFF with a delay of one second</li> <li>ii) Alternate ON-OFF with a delay of one second</li> <li>iii) Curtain effect from left to right and right to left</li> <li>iv) Converge and Diverge without overlap</li> <li>v) Right and left shift</li> </ul> <p>Implement the circuit on tinkercad and draw the flowchart. Show the steps used in the program in the form of an algorithm and share the tinkercad link with the solution.</p> <p>Note: Use only registers for programming, use for loop wherever required. The length of the code in the solution provided will be one of the prime evaluation criteria.</p> <p><b>Mail the tinkercad link separately</b></p> | <b>20</b> | <b>CO3</b> |