

Name:
Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2021

Course: Embedded Systems and IoT
Program: M. Tech A&RE
Course Code: ECEG7003

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

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

SECTION A

S.No.	Answer All the questions	Marks	CO
1	Define pipeline in embedded systems. Comment on the memory architecture that supports pipelining	4	CO3
2	In AVR (ATMega8), what is the size and types of flash memories available? What is the advantage of using flash memories?	4	CO1
3	In LCD, what is the use of CGRAM and DDRAM memories? Explain the method of accessing each	4	CO4
4	Define and explain the different states of a task in a RTOS	4	CO1
5	With an example, explain why a Personal Computer cannot be used for all embedded applications	4	CO4

SECTION B

S.No	Answer all the questions	Marks	CO
7	For ARM7, write a C code and algorithm to interface LCD and display your roll number in row 1 and SAP ID in row 2. Move the data in row 1 to left by 5 positions and data in row 2 to right by 5 positions	10	CO1
8	Consider both common anode and common cathode types of 7-segment displays and write the hex codes for digits 0 to 9. Interface the seven segment with ATMega8 to display 0 to 9 with a delay of 1 second between each display. Write the complete code and algorithm.	10	CO2
9	In ATMega8 what are the different system clock options available to provide the clock source? Draw the complete block diagram and explain how flash memory can be clocked from internal and external clock source	10	CO3
10	What is RSSI? Explain the importance of RSSI in wireless communication. Using ESP8266 write a C code to measure RSSI. OR Elucidate the advantages and disadvantages of using hardware/software co-design process while designing an application in embedded system. Draw and explain a typical co-design process.	10	CO4

SECTION-C

S. No	Answer all the questions	Marks	CO
11	Design a LED interfacing system with ATMega8 to interface 2 LEDs with Pin 2 and 3. Generate the delay using millis function. Analyze the function (code) present in millis	20	CO3

	function and comment on its working. Can a millis function be written without the help of Real-time clock? If yes, then mention how.		
12	<p>Design an IoT enabled control system using MQTT to switch ON/OFF the inbuilt LED of ESP8266 by sending 0 and 1 respectively from MQTT. Write the complete C code and also draw the block diagram of the required system</p> <p style="text-align: center;">OR</p> <p>Design a embedded system using RTOS to</p> <ol style="list-style-type: none"> i) Scan switches and switch ON and OFF motors according to the position of switch ii) Check pressure from pressure gauge every 100millisecond. If the pressure goes beyond above threshold (assume any value) open valve to release excess amount of pressure and if pressure goes below threshold then pump extra pressure from the motor iii) Check for any incoming messages on serial port and store the message in an array (assume suitable size) iv) If all the three tasks are to be performed simultaneously then what will be the priority assignment among the tasks. <p>Write the C code for each task and draw a block diagram for the complete system</p>	20	CO4