CS344AI

USN 1 RV 22 CD 059

RV COLLEGE OF ENGINEERING®

(An Autonomous Institution Affiliated to VTU)

IV Semester B. E. Regular Examinations Sept/Oct – 2024

Common to CS/CY/CD

IOT AND EMBEDDED COMPUTING

Time: 03 Hours *Maximum Marks: 100*

Instructions to candidates:

1. Answer all questions from Part A. Part A questions should be answered in first three pages of the answer book only.
2. Answer FIVE full questions from Part B. In Part B question number 2 is compulsory. Answer any one full question from 3 and 4, 5 and 6, 7 and 8, 9 and 10.

PART-A

			M	BT	CO
1	1.1	Define Pipeline. How stages of pipeline do $ARM7$ Support?	02	1	1
	1.2	Which protocol is used to interface the SD card to the Microcontroller $LPC2148$?	02	1	2
	1.3	Given $PCLK = 15\,MHz$, required baud rate= 9600. Compute the values of $DLM:DLL$. (Assume $DivVal = 0, MulVal = 1$). Show the calculations.	02	2	2
	1.4	Write an Embedded C code to make common anode LED connected to $P0.31$ ON and cathode LED connected to $P0.28$ OFF	02	2	3
	1.5	Indicate the value to be loaded into match Register $MR0$, so that time counter $T0TC$ reaches the $MR0$ value after 10 milliseconds. Assume the $PCLK = 10\,MHz, CCLK = 40MHz, T0TC = 0$, Prescaler Register = 0.	02	3	3
	1.6	Write the five pins used on Raspberry pi for SPI interface.	02	1	4
	1.7	Describe the purpose and behavior of Smart home automation by using the standard IoT design methodology.	02	2	4
	1.8	What is the role of Things and Internet in IoT?	02	1	4
	1.9	List any four applications of IoT for logistics.	02	1	3
	1.10	List any four most commonly used sensors in IoT and mention any two applications of PWM in IoT.	02	2	2

PART-B

2	a	With the help of a neat block diagram of $LPC2148$, indicate the different peripheral blocks present inside the controller and their application.	10	2	2
	b	List the differences between the General–Purpose computing systems and Embedded systems.	06	2	1
3	a	Write an embedded C program to interface 4×4 matrix keyboard using Lookup table and display the key pressed on the terminal.	10	3	3
	b	Write a C program to display message "$RVCE$" and "CSE" on 5-digit seven segment display alternatively with a suitable delay.	06	3	3
		OR			
4	a	Explain the working of DAC module of LPC 2148 Microcontroller, and indicate the Resolution, input and output ranges. Write an embedded C program to generate Sine waveform.	10	3	3
	b	Interface $3LEDs$ (Red, Yellow, Green) to $LPC2148$ and write Embedded C program to simulate the traffic light system.	06	3	3

5	a	Explain the concept of *PWM* and its registers. Write an embedded C program to generate *PWM* wave to controls speed of *DC* motor. Control the duty cycle by analog input.	10	3	2
	b	Briefly explain how to interface high power devices using Relays?	06	2	2
		OR			
6	a	Describe the working of *UART* module of *LPC* 2148. Draw the connections between Microcontroller *UART and PC* serial port. Show the baud rate calculations also.	08	3	2
	b	With a neat diagram describe the working of *LCP* 2148 Timers.	08	2	3
7	a	List and explain any two IoT communication models with neat diagrams.	08	2	3
	b	Suggest (with brief description) any one-use case of IoT pertaining to following domains: Retail, Logistics, Agriculture, smart cities.	08	2	3
		OR			
8	a	With suitable block diagrams, explain IoT level 6 and its deployment. Indicate the significance of level 6 deployment.	08	3	4
	b	What is IoT? Explain different characteristics of IoT and their use cases in Industry.	08	2	4
9	a	Consider the Smart Lighting case study and write the following steps of IoT design methodology: i) Purpose and requirements specification ii) Domain model specification iii) Information model specification iv) Service specification	10	4	4
	b	Discuss the features and applications of serial protocols *I2C* and *SPI*.	06	2	4
		OR			
10	a	Design an IoT level 2 deployment application for Smart Parking using Rasberrypie with *IR* sensors and Could with mobile application to show the parking slots status.	06	4	4
	b	The purpose of the Home Intrusion Detection System is to detect Intrusion using sensors (*PIR* sensor and Door sensor). Design Home Intrusion Detection system using *RPie/ESP*32 with *PIR* motion sensor for motion detection and door sensor for detecting opening / closing of the door. Answer the following with necessary design / functional diagram. i) Process specification ii) Domain model iii) Deployment design iv) Functional and operational view specifications.	10	4	4