



R V College of Engineering
Department of Computer Science and Engineering
CIE - I: Question Paper

Course:(Code)	IOT & Embedded Computing (CS344AI)	Semester : 4 th semester
Date : April 2025	Duration : 90 Minutes	Staff : KB/MH/MSS/SDV/NSK/KB Ramesh
Name:	USN :	Section : A/B/C/D/E/CD/CY

sl.n o	PART - A	Mar ks	BT	CO
1	ARM 7 CPU supports 3 stage pipeline and all Data manipulation instructions takes 3 cycles for execution, then how many cycles are needed for executing the following program ADD R3,R1,R2 SUB R4,R1,R2 MOV R5,R4,LSR #2 MOV R6,R3,LSL #3	2	L3	CO2
2	What are the different onboard buses supported by LPC2148?	2	L2	CO1
3	Write the embedded C code to make LPC2148 P0.31 as output and common anode LED connected to P0.31 as ON.	2	L2	CO2
4	Write an embedded C code to read a value from Pin P1.19 and check whether it is 0 or 1?	2	L3	CO3
5	In common cathode LED with segment 'a' at LSB and dp at MSB, what is the code for displaying '3'?	2	L3	CO3

1	PART B	10	L2	CO2
2	With neat Block diagram explain the LPC2148 architecture. List the Peripherals associated and their corresponding applications. a) List the differences between the RISC and CISC architecture. b) Explain the Operating Modes of ARM using the Register organization.	10	L3	CO1
3	Interface 5-digit seven segment display to LPC 2148 and write an embedded C program to display the moving string "IOT BOARD".	10	L3	CO3
4	Design a Bank locker system as per the specifications given below by clearly indicating the interface diagram and embedded C code. Requirements: a) Use LPC 2148 Microcontroller and suitable interfacing components. b) Enter a 4digit key to open the locker, If the key entered was correct open the locker door, driven by stepper motor. c) Provide a Key, to close the door. Make suitable assumptions.	10	L4	CO3

5	a) Explain how embedded system are classified. b) Discuss the PINSEL register and how they can be used to configure the GPIO pins to different functionalities. Explain with an example.	10	L3	CO2
---	---	----	----	-----

Course Outcomes: After completing the course, the students will be able to:-

CO 1	Apply Embedded System and IoT fundamentals and formulate sustainable societal relevant cost effective solutions.
CO 2	Demonstrate the development of software programs using Embedded C, using Microcontrollers and different sensors and peripherals to build embedded system applications.
CO 3	Design smart systems using various I/O peripherals, Sensors, embedded protocols like UART,I2C,SPI using modern tools like Keil IDE software for various domains like Healthcare, automation, agriculture, smart cities and others.
CO 4	Indulge in developing Novel multi-disciplinary IoT projects using prototype boards, with effective oral & written communication skills and working in teams.
CO 5	Engage in Lifelong Learning by investigating and executing real world societal problems using engineering tools – Cross compilers, debuggers and simulators, emerging processor and controller-based hardware platforms, IOT cloud infrastructure & protocols.

BT LEVELS	L1	L2	L3	L4	L5	L6	COS	CO1	CO2	CO3	CO4
								12	24	24	



R V College of Engineering
Department of Computer Science and Engineering
CIE - II: Question Paper

Course:(Code)	IOT & Embedded Computing (CS344AI)	Semester : 4th semester
Date : May 2025	Duration : 120 Minutes	Staff : KB/MH/MSS/SDV/NSK/KB Ramesh
Name:	USN :	Section : A/B/C/D/E/CD/CY

sl.n o	PART - A	Mar ks	BT	CO
1	A 10-bit ADC operates over 0 to 3.3V. Calculate the step size (resolution) in millivolts	1	L2	CO2
2	An analog signal of 3V is fed into an 8-bit ADC with a 0–5V range. What is the digital output?	1	L2	CO2
3	The resistance of an LDR _____ with increase in light intensity.	1	L1	CO1
4	For DAC operation in LPC2148, the main register used to write the digital value is _____.	1	L1	CO2
5	The LPC 2148 microcontroller operates at a maximum frequency of _____ MHz.	1	L1	CO2
6	List any two use-cases of IoT in healthcare.	1	L2	CO1
7	_____ Protocol is commonly used for lightweight communication in IoT.	1	L1	CO1
8	Why do we need to delay between DAC updates during waveform generation?	1	L1	CO2
9	The common types of relays used for switching high power devices are _____ and _____ relays.	1	L1	CO1
10	What are IoT enabling technologies? Give example.	1	L1	CO1

PART B

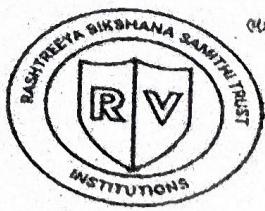
1	Describe the working of DAC module of LPC 2148 Microcontroller and indicate the Resolution, input and output ranges. Write an embedded C program to generate square and saw tooth waveforms.	10	L3	CO3
2	a) Describe how an LDR is interfaced with LPC2148 using the ADC module. Write an Embedded C code to measure light intensity. b) Explain the concept of relays in interfacing with high-power devices and their role in switching high-power loads.	6	L3	CO2
		4	L2	CO2

3	a) Explain the working principle and interfacing of a LCD (2x16) with LPC2148 microcontroller. b) Explain the characteristics of IOT and their use cases in Agriculture and Smart City.	5	L2	CO3
4	With diagram explain IoT level 1 and Level 2 deployment. Suggest any one application of Level 3 and Level 4 IOT deployment.	10	L3	CO3
5	Design an IOT Level 2 deployment application for weather monitoring and Device control in the house using ESP32 and Thing speak cloud platform, with suitable block diagram, interfacing, flowcharts and brief description. The proposed system consists of single node that monitors the room temperature and humidity using DHT 11 sensor, and based on the temperature / humidity, device(fan) should be turned on using a Relay. The controller also sends the sensor data to the cloud, where it will be displayed on the dash board.	10	L4	CO3

Course Outcomes: After completing the course, the students will be able to:-

CO 1	Apply Embedded System and IoT fundamentals and formulate sustainable societal relevant cost effective solutions.
CO 2	Demonstrate the development of software programs using Embedded C, using Microcontrollers and different sensors and peripherals to build embedded system applications.
CO 3	Design smart systems using various I/O peripherals, Sensors, embedded protocols like UART,I2C,SPI using modern tools like Keil IDE software for various domains like Healthcare, automation, agriculture, smart cities and others.
CO 4	Indulge in developing Novel multi-disciplinary IoT projects using prototype boards, with effective oral & written communication skills and working in teams.
CO 5	Engage in Lifelong Learning by investigating and executing real world societal problems using engineering tools – Cross compilers, debuggers and simulators, emerging processor and controller-based hardware platforms, IOT cloud infrastructure & protocols.

BT LEVELS	L1	L2	L3	L4	L5	L6	COS	CO1	CO2	CO3	CO4	CO5
MARKS	7	17	26	10				5	15	40		



R V College of Engineering
Department of Computer Science and Engineering
CIE - Improvement Quiz/Test Question Paper

Course:(Code)	IOT & Embedded Computing (CS344AI)	Semester : 4th semester
Date : 03-06-25	Duration : 90 Minutes	Staff : KBR/KB/MH/MSS/SDV/NSK
Name:	USN :	Section : A/B/C/D/E/CD/CY

SLN o.	PART - A	Mar ks	BT	CO
1	Calculate the total time required to transmit 60 pages of text, each with 80×25 characters. Assume 9600 baud rate, 8 bits per character and 1 stop and 1 start bit.	2	L3	CO1
2	What are the logic signals / Pins specified by I2C and SPI ?	2	L2	CO3
3	Name the different Interrupt Types, with their priorities supported by LPC 2148 and Highlight the operation of the below instruction. VICVectCnt6 = (1<< 5) 4;	2	L2	CO3
4	Examine the communication protocols used by ThingSpeak and AWS IoT.	2	L4	CO4
5	How interrupt technique is different from polling? Illustrate with example and compare their performances.	2	L2	CO4

PART B

1	With the suitable block diagram, describe the working of UART Peripheral of LPC 2148. Write the code snippets to initialize UART0 for 19600 baud rate and the program to transmit the given string.	10	L3	CO2 CO3
2	With the suitable block diagram, describe the working of Timer Peripheral of LPC 2148. Write the Embedded C Code, to generate a 10 ms delay using the timers, with detailed comments.	10	L3	CO2 CO3
3	With the suitable block diagram, describe the working of PWM Module of LPC 2148. Write the Embedded C code, to generate PWM waveform of 80% duty cycle using PWM channel, with detailed comments.	10	L3	CO2 CO3
4	Design using the 10 steps of IOT Design Methodology, a scalable IoT solution for Smart Irrigation using various sensors, actuators, microcontrollers, cloud services and mobile or web application.	20	L6	CO1 CO4

R V College of Engineering

R V Vidyanikethan Post
Mysuru Road Bengaluru - 560 059

IV Semester BE Regular/Supplementary Examinations June/July-2025
Common to CS / CD / CY
Course : IOT and Embedded Computing-CS344AI

Time : 3 Hours

Maximum Marks : 100

Instructions to the students

1. Answer all questions from Part A. Part A questions should be answered in the 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, and 9 and 10.

Part A

Question No	Question	M CO BT
1.1	List two desirable features of embedded systems	02 1 2
1.2	ARM 7 CPU supports 3 stage pipeline and all Data manipulation instructions takes 3 cycles for execution, then how many cycles are needed for executing the following program ADD R3,R1,R2	02 1 3
1.3	SUB R4,R1,R2	
	MOV R5,R4,LSR #2	
	MOV R6,R3,LSL #3	
1.4	What is the difference between a common anode and a common cathode 7-segment display?	02 2 2
1.5	What is key bouncing, and how can it be handled using a software-based solution?	02 2 2
1.6	Mention the different onboard buses supported by LPC2148.	02 1 1

Indicate the value to be loaded into match Register MR0, so that timer counter TOTC reaches the MR0 value after 5 milliseconds. Assume the PCLK = 10MHz, CCLK=40MHz, TOTC=0, Pre-scaler Register=0

1.7	What is the difference between physical and logical design in IoT?	02	1	2
1.8	Give any two use-cases of IoT in healthcare.	02	1	2
1.9	List any two features of NodeMCU/ESP32	02	2	1
1.10	Why is Device & Component Integration important in IoT applications?	02	3	1

Part B

Question No	Question	M	CO	BT
2a	Write an Embedded C program to blink an LED connected to P0.10 of the LPC2148 microcontroller with a delay of 500ms. Also, explain the steps to configure the GPIO pin and provide the connection schematic."	08	2	3
2b	Embedded systems are tailored for domain-specific requirements. Select any four distinct application domains and compare how embedded systems differ in design objectives, constraints, and functionalities across these domains	08	1	3
3a	Interface 5-digit seven segment display to LPC 2148 and write an embedded C program to display the moving string "IOT BOARD".	10	3	3
3b	Explain features of ADC module in LPC 2148.	06	2	1

OR

4a	Explain DAC and its applications. Write an embedded C program to generate Sine and Triangular wave using DAC.	10	2	3
4b	Interface three LEDs (Red, Yellow, Green) to LPC2148 microcontroller and write an Embedded C program to simulate a traffic light system. Configure pins P0.0, P0.1, and P0.2 as outputs since LEDs are output devices.	06	3	3
5a	With the suitable block diagram, describe the working of UART Peripheral of LPC 2148. Write the code snippets to initialize UART0 for 19600 baud rate and the program to transmit the given string.	10	4	6

5b	Differentiate between a Timer and a Counter. Also, mention any four applications of Timers in embedded systems.	06	2	1
	OR			
6a	Illustrate the functional operation of LPC2148 Timers using a labeled block diagram. Implement a use case where Timer0 is used to generate required time delay.	08	3	3
6b	Design and implement a UART-based communication system using LPC2148 to send temperature data from a sensor to a PC terminal. Write the embedded C program to initialize UART0, read sensor data (assume dummy values), and transmit the data at 9600 baud rate. Include connection diagram, baud rate calculation, and code explanation	08	3	4
7a	Explain the key characteristics of IoT systems. How do they differ from traditional internet-based systems?	08	1	2
7b	What are the main challenges faced in the deployment of IoT systems?	08	1	2
	OR			
8a	Explain how IoT levels apply to an intelligent transportation system (ITS) that includes traffic monitoring, vehicle tracking, and automated toll collection. Provide a layered view of system components.	08	4	4
8b	Explain the fundamental concepts of Internet of Things (IoT) and its architecture.	08	4	4
9a	Explain the key features and interfaces of the ESP32 (or RV-IoT-Board) used in IoT applications. Support your answer with a block diagram.	08	4	3
9b	Draw the deployment design of the weather monitoring IOT system. Further, show the mapping of IOT Level to Functional Groups for the weather monitoring IoT system.	08	4	3
	OR			
10a	Describe the architecture and functionalities of Raspberry Pi as an IoT end device. How does it differ from a microcontroller-based device like NodeMCU?	08	4	4
10b	Describe the steps involved in deploying a simple sensor-based IoT application using ThingSpeak cloud services.	08	4	5