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Printed Page:-4 **Subject Code:- ACSIOT0501**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)
B.Tech
SEM: V - THEORY EXAMINATION (2025 - 2026)
Subject: Arm Architecture for IOT

Time: 3 Hours **Max. Marks: 100**

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*

1. This Question paper comprises of three Sections -A, B, & C. It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.

2. Maximum marks for each question are indicated on right -hand side of each question.

3. Illustrate your answers with neat sketches wherever necessary.

4. Assume suitable data if necessary.

5. Preferably, write the answers in sequential order.

6. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

SECTION-A 20

1. Attempt all parts:-

1-a. Select file extension from options below, which uploaded on microcontroller. (CO1, K1) 1

(a) .c
(b) .txt
(c) .hex
(d) .doc

1-b. Classify Correct Definition of Embedded System. (CO1, K2) 1

(a) Any system with specific application
(b) A hardware and software combination for general applications
(c) A hardware and software combination for specific applications
(d) None of above

1-c. The Cortex-M0+ architecture has how many interrupt priority levels? (CO2, K1) 1

(a) 2
(b) 4
(c) 8
(d) 16

1-d. The ARM Cortex-A processors are used primarily in: (CO2, K2) 1

(a) Embedded microcontrollers
(b) Real-time systems
(c) High-performance consumer electronics
(d) Safety-critical automotive applications

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1-e. Keil software is a _____ used for ARM Cortex-M? (CO3, K3) 1

(a) SDK
(b) MDK
(c) EDK
(d) ISE

1-f. In ARM Embedded C programming, what does the `BusOut` class represent? (CO3, K2) 1

(a) A group of input pins
(b) A group of output pins
(c) A GPIO pin
(d) An interrupt pin

1-g. LPTMR operates normally in which mode. (CO4, K1) 1

(a) Stop
(b) Run
(c) Wait
(d) All the above

1-h. P&E Debug interface provides _____ debugging. (CO4, K3) 1

(a) race-control
(b) run-control
(c) system-control
(d) None the above

1-i. I2C communication uses: (CO5, K1) 1

(a) Two lines
(b) Three lines
(c) Four lines
(d) Multiple lines based on configuration

1-j. The baud rate of UART communication must be:(CO5, K3) 1

(a) Same on both transmitting and receiving devices
(b) Different on transmitting and receiving devices
(c) Configurable for each device independently
(d) Irrelevant to device performance

2. Attempt all parts:-

2.a. Name one real-time application that uses RTOS. (CO1, K1) 2

2.b. Explain the term ‘load-store architecture’.(CO2, K2) 2

2.c. Define the role of a timer in embedded systems. (CO3, K3) 2

2.d. State the main purpose of the SIM module. (CO4, K2) 2

2.e. Describe the main function of a serial buffer.(CO5, K2) 2

SECTION-B 30

3. Attempt all parts:-

3.a. Answer any one of the following:-

3.a.(i)	Explain the purpose of a Direct Memory Access (DMA) controller in embedded systems.(CO1, K2)	6
3.a.(ii)	Explain the significance of instruction pipelining in RISC architectures. (CO1, K2)	6
3.b. Answer any one of the following:-		
3.b.(i)	ARM defines a standardized memory address space common to all Cortex-M cores Explain in Brief. (CO2, K3)	6
3.b.(ii)	Explain process of pipeline in ARM7 family processor. Also explain the differences in pipelining of ARM A and M series. (CO2, K3)	6
3.c. Answer any one of the following:-		
3.c.(i)	Write an ALP program for addition of five numbers located at memory stated from 0x1000 and store the result at 0x2000. (CO3, K3)	6
3.c.(ii)	Write and compile code of Proximity (PIR) Sensor interfacing for target board KL25Z (ARM M0+). Use mbed library. Asuume PIR sensor connected on Port-B pin 3 and LED is connected on PTB4. (CO3, K3)	6
3.d. Answer any one of the following:-		
3.d.(i)	Summarize Timer modules in FRDM-KL25Z. (CO4, K2)	6
3.d.(ii)	Explain the PWM operation modes available in the TPM module.(CO4, K2)	6
3.e. Answer any one of the following:-		
3.e.(i)	Explain parity bit in UART communication. How does it helps to identify Error in Serial communication? also what is the limitation of parity bit in UART. (CO5, K3)	6
3.e.(ii)	Does I2C has multi-Slave mode? If yes than explain how I2C multi-slave possible with only two wire communication? (CO5, K3)	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	Explain how embedded systems enhance healthcare devices, providing specific examples. (CO1, K2)	10
4-b.	Draw and explain ARM Cortex-M Series architecture in detail. (CO1, K2)	10

5. Answer any one of the following:-

5-a.	Differentiate ARM processor modes. Also draw and explain Programmers Models of ARM. (CO2, K2)	10
5-b.	Explain the role of ARM's Memory Protection Unit (MPU) and its application in embedded systems. (CO2, K2)	10

6. Answer any one of the following:-

6-a.	Write Embedded C Code using Mbed in ARM Cortex-M, Perform following:- (CO3, K3)) i) LED1 will blink every second ii) LED3 will toggle after 2.5 seconds iii) LED2 can be toggled through BUTTON1	10
6-b.	Write a C program to generate a PWM signal targeting ARM Cortex-M based development board using mbed library. (CO3, K3)	10

7. Answer any one of the following:-

7-a.	Write an embedded C program to control an RGB LED using PWM on KL25Z.	10

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	(CO4, K3)	
7-b.	Write and compile code for temperature sensor interfacing and for target board KL25Z, and send the temperature value using UART. (CO4, K3)	10

8. Answer any one of the following:-

8-a.	Write all features of UART used on ARM based KL-25z board. (CO5, K1)	10
8-b.	Draw and Explain I2C module block diagram used in ARM based KL-25z board. (CO5, K2)	10