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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: V - THEORY EXAMINATION (2024-2025)

Subject ARM Architecture for IOT

Time: 3 Hours

Max. Marks:100

General Instructions:**IMP:** Verify that you have received question paper with 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. How is the protection and security for an embedded system made? 1
(CO1, K2)
(a) Security chips
(b) Memory disk security
(c) IPR
(d) OTP
- 1-b. Which is the first company that defined RISC architecture? 1
(CO1, K1)
(a) Intel
(b) IBM
(c) Motorola
(d) MIPS
- 1-c. How many operating modes does ARM have? (CO2, K1) 1
(a) Four

- (b) Seven
 - (c) Sixteen
 - (d) Thirty Seven
- 1-d. When the processor is executing in ARM state, then all instructions are.....wide. (CO2, **K1**) 1
- (a) 8-bits
 - (b) 16-bits
 - (c) 32-bits
 - (d) All of the above
- 1-e. Which module in CMSIS provides drivers for Cortex-M processor peripherals? (CO3, **K1**) 1
- (a) CMSIS-DSP
 - (b) CMSIS-Core
 - (c) CMSIS-RTOS
 - (d) CMSIS-SVD
- 1-f. Which ARM peripheral uses timers to control the PWM signal? (CO3, **K1**) 1
- (a) TPM
 - (b) ADC
 - (c) DAC
 - (d) I2C
- 1-g. What happens in the KL25Z when the processor enters low-power modes like STOP or DOZE? (CO4, **K2**) 1
- (a) System clock is disabled
 - (b) GPIO remains active
 - (c) Timers continue running
 - (d) Peripheral clocks are paused
- 1-h. What type of clock is supported by the Low-Power Timer (LPTMR) in KL25Z? (CO4, **K2**) 1
- (a) External clock only
 - (b) Internal and external clock
 - (c) Timer-generated clock
 - (d) PLL clock
- 1-i. Which of the following is not a component of UART data transmission? (CO5, **K1**) 1

- (a) Start bit
 - (b) Data frame
 - (c) CRC field
 - (d) Stop bit
- 1-j. What type of communication is used by the MMA8451 accelerometer to transmit data? (CO5, **K1**) 1
- (a) UART
 - (b) SPI
 - (c) I2C
 - (d) RS-232
2. Attempt all parts:-
- 2.a. What do you mean by AMBA? Name Sub-protocols of AMBA. (CO1, **K2**) 2
- 2.b. What is a program image? (CO2, **K2**) 2
- 2.c. What is the function of the Keil μ Vision IDE? (CO3, **K2**) 2
- 2.d. Describe the term "OpenSDA." (CO4, **K2**) 2
- 2.e. List two primary uses of UART in ARM-based IoT systems. (CO5, **K1**) 2

SECTION – B

30

3. Answer any five of the following-
- 3-a. Explain RISC and CISC. Also, give differences between them. (CO1, **K4**) 6
- 3-b. Define Real-Time Operating System (RTOS) and explain its importance in embedded applications. (CO1, **K4**) 6
- 3-c. Write about ARM Registers available in user mode. (CO2, **K1**) 6
- 3-d. Explain how ARM processors handle interrupt management through NVIC.(CO2, **K2**) 6
- 3-e. Explain the architecture of CMSIS Core.(CO3) 6
- 3-f. Explain the significance of PORT control registers in KL25Z. (CO4, **K2**) 6
- 3-g. What are the differences between synchronous and asynchronous communication? (CO5, **K4**) 6

SECTION – C

50

4. Answer any one of the following-

- 4-a. Why do we use an operating system? Can we design Embedded systems without OS? Justify your answer with appropriate Example. (CO1, **K3**) 10
- 4-b. What is Concurrency? Elaborate with example. (**CO1, K2**) 10
5. Answer any one of the following-
- 5-a. Write short notes on the following with respect of ARM processor: 10
(i) Instructions (ii) Load-store architecture (iii) Pipelining.(CO2, **K2**)
- 5-b. Write an assembly language program with a proper explanation to add four numbers at the memory location starting from 0x2500, using register indirect addressing modes..(CO2, **K6**) 10
6. Answer any one of the following-
- 6-a. Describe an embedded C example for interfacing a water flow sensor.CO3, **K2**) 10
- 6-b. Discuss the importance of digital-to-analog conversion in embedded systems. (CO3, **K2**) 10
7. Answer any one of the following-
- 7-a. Write an embedded C program to control an RGB LED using PWM on KL25Z.(CO4, **K6**) 10
- 7-b. Write a program to generate PWM using TPM in KL25Z. (CO4, **K6**) 10
8. Answer any one of the following-
- 8-a. Explain the significance of programmable interrupt settings in KL-25Z. (CO5, **K2**) 10
- 8-b. Explain the process of data parsing in UART.(CO5, **K2**) 10