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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.   Which memory storage is widely used in PCs & Embedded systems? (CO1,K1)   1
       (a) EEPROM
       (b) Flash memory
       (c) SRAM
       (d) DRAM

1-b.   Which type of memory is suitable for low-volume production of embedded systems? (CO1,K1)   1
       (a) Non-volatile
       (b)RAM
       (c) Volatile
       (d) ROM

1-c.   What is the standard form of ARM? (CO2,K1)   1
       (a) Advanced RISC Machine
       (b) Automatic RISC Machine
       (c) Automatic RISC Motor
       (d) None of the above

1-d. How many registers does ARM have? (CO2,K1)   1
    (a) Four
    (b) Eight
    (c) Sixteen
    (d) Thirty Seven

1-e. What feature does CMSIS-SVD provide for ARM Cortex-M programming? (CO3,K1)   1
    (a) Standard RTOS APIs
    (b) Peripheral register views
    (c) Digital signal processing
    (d) Analog-to-digital conversion

1-f. Which ARM peripheral can trigger an interrupt when a signal changes state? (CO3,K2)   1
    (a) Timer
    (b) PWM
    (c) GPIO
    (d) UART

1-g. What is the function of the Global Pin Control Low Register (GPCLR) in KL25Z? (CO4,K2)   1
    (a) Controls all pin configurations
    (b) Writes 32-bit values to pin configurations
    (c) Reads the pin state
    (d) Manages GPIO interrupts

1-h. Which timer in KL25Z can generate DMA requests? (CO4,K1)   1
    (a) TPM
    (b) PIT
    (c) LPTMR
    (d) SysTick

1-i. Which of the following is true about I2C? (CO5,K1)   1
    (a) Full-duplex
    (b) Synchronous communication
    (c) Requires separate clock for each device
    (d) Uses parallel data transfer

1-j. What type of accelerometer is MMA8451? (CO5,K1)   1
    (a) Digital accelerometer
    (b) Analog accelerometer

(c) Capacitive accelerometer

(d) Optical accelerometer

2-Attempt all parts:-

2.a.	Illustrate the use of the boot program.(CO1,K3)	2
2.b.	Write an Assembly Language program to divide any number by 8 using shifting. Take two numbers in R2 and R3 and Store the Answer in R7. (CO2,K6)	2
2.c.	What is the purpose of CMSIS? (CO3,K2)	2
2.d.	Name two clock sources in the KL25Z system. (CO4,K1)	2
2.e.	What is the function of the SCL line in I2C? (CO5,K2)	2

SECTION – B   30

3-Answer any <u>five</u> of the following-

3-a.	With the help of a proper block diagram explain Von-Neuman and Harvard Architecture. Also, give differences between them. (CO1,K4)	6
3-b.	With the help of a proper diagram explain ARM Cortex-M Series architecture. (CO1,K2)	6
3-c.	Explain the steps of the Program-Generation Flow with the help of a proper diagram. (CO2,K2)	6
3-d.	Write short notes on ARM Nomenclature. (CO2,K2)	6
3-e.	Explain the working of a PWM-based motor control system. (CO3,K2)	6
3-f.	What are the primary functions of the MCG in KL25Z?(CO4,K1)	6
3-g.	Describe the features and functions of UART in KL-25Z. (CO5,K2)	6

SECTION – C   50

4.Answer any <u>one</u> of the following-

4-a.	Explain the process of pipeline in ARM family processors with the help of a proper diagram. (CO1,K2)	10
4-b.	Write short notes on (i) API (ii) CLI (iii) GUI (CO1,K2)	10

5-Answer any <u>one</u> of the following-

5-a.	What are the different addressing modes in ARM, Explain all with suitable examples.(CO2,K2)	10
5-b.	Write an assembly language program with a proper explanation to add five numbers at the memory location starting from 0x1500, using based index addressing modes.(CO2,K6)	10

6-Answer any <u>one</u> of the following-

6-a.	Describe the process of interfacing an LCD with ARM Cortex-M. Write a program for the same, displaying "Hello".(CO3,K6)	10
6-b.	How does CMSIS-SVD enhance register-level programming? (CO3.K2)	10

7-Answer any <u>one</u> of the following-

7-a.	Explain the internal working of the MCG module with a block diagram. (CO4,K2)	10
7-b.	Describe how PORT control registers support interrupt-based configurations. (CO4,K2)	10

8-Answer any <u>one</u> of the following-

8-a.	Explain the role and structure of UART in KL-25Z communication.(CO5,K2)	10
8-b.	Discuss the role of the MMA8451 accelerometer in IoT applications. (CO5,K2)	10