# INTRODUCTION TO EMBEDDED SYSTEMS
# (AEIE 4182)

**Time Allotted : 3 hrs** **Full Marks : 70**

***Figures out of the right margin indicate full marks.***

***Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.***

***Candidates are required to give answer in their own words as far as practicable.***

## Group – A
## (Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**

(i) ARM stands for _____
(a) Advanced Rate Machines (b) Advanced RISC Machines
(c) Artificial Running Machines (d) Aviary Running Machines.

(ii) The additional duplicate register used in ARM machines are called as _____
(a) Copied-registers (b) Banked registers
(c) Extra registers (d) Extential registers.

(iii) Each instruction in ARM machines is encoded into _____ Word.
(a) 2 byte (b) 3 byte (c) 4 byte (d) 8 byte

(iv) Which of the following locates a parameter block by using an address pointer?
(a) OS (b) Kernel (c) System (d) Memory.

(v) ARM processors where basically designed for _____
(a) Main frame systems (b) Distributed systems
(c) Mobile systems (d) Super computers.

(vi) Size of internal EEPROM data memory of ATmega 328 is
(a) 2 KB (b) 1 KB (c) 32 KB (d) 64 KB.

(vii) Which of the following provides a buffer between the user and the low-level interfaces to the hardware?
(a) Operating system (b) Kernel
(c) Software (d) Hardware.

(viii) No. of general purpose registers present in ATmega 328 is
(a) 6 (b) 12 (c) 24 (d) 32.





(ix) In ATmega 328 what is the ISR address for an external hardware interrupt 1?
(a) 0000H (b) 0002H (c) 0004H (d) 0006H.

(x) How many Addressing modes are there is 8051?
(a) 2 (b) 4 (c) 5 (d) None of the above.

## Group – B

2. (a) Explain RISC architecture. Name some microprocessors based on RISC architecture. Why is ARM processor most popular in embedded system field?

(b) Write short note on:
(i) PIC microcontroller
(ii) NVRAM.

**(3 + 2 + 3) + (2 + 2) = 12**

3. (a) What is Arduino? What do you mean by open-source Hardware?

(b) Differentiate between Harvard and Princeton (Von Neumann) architecture in detail.

**(3 + 3) + 6 = 12**

## Group – C

4. (a) Describe the status Register of AVR microcontroller.

(b) How many Addressing Modes are there in AVR? Explain each with example.

**6 + 6 = 12**

5. (a) Explain the following functions of ATmega 328
(i) ADMUX and ADCSRA registers
(ii) TCNT0 and TCCR0 registers.

(b) Write an ALP/C program to convert two ASCII values on R0 and R1 registers into a packed BCD value. Store result in R2 in an ATmega32.

**(4 × 2) + 4 = 12**

## Group – D

6. What should be the goal of an OS? List the layers between application and hardware. Why does an OS function provide two modes, user mode and supervisory mode?

**(6 + 2 + 4) = 12**

7. (a) What is kernel? What are the different functions handled by a general purpose kernel?

(b) Explain the basic functions of a real-time kernel.

**(3 + 4) + 5 = 12**

## Group – E

8. Design an interface between ATmega 328 and LCD via Port C and Port D. Write a program to display "BTECH2020" word on the LCD.

**(4 + 8) = 12**

9. Draw connection to interface ADC with ATmega 328. Write a program to get data from channel 0 (ADC0) and display the data in port A and B forever.

**(4 + 8) = 12**