

**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) Registers R0-R31 of ATmega 328 are used for what type of work?
(a) They are used for arithmetic and logic instructions
(b) They are used for data copy
(c) They are used for calculations
(d) They are used for program branch operation.
 - (ii) In 8051 Microcontroller, using instruction: MOV TMOD, #50H, sets
(a) Timer0 in Mode1 (b) Counter1 in Mode1
(c) Timer1 in Mode0 (d) None of above.
 - (iii) In PIC microcontroller, during any ALU operation default register is
(a) Accumulator (b) W Register
(c) FSR (d) None of above.
 - (iv) In microcontroller 8051, bit addressable space is allocated in
(a) 00h - 1Fh (b) 20h - 2Fh
(c) 30h - 7Fh (d) 80h - FFh.
 - (v) In ATmega328 what is the ISR address for an external hardware interrupt 1
(a) 0000H (b) 0002H
(c) 0004H (d) 0006H.
 - (vi) Size of internal EEPROM data memory of ATmega 328 is
(a) 2 KB (b) 1 KB (c) 32 KB (d) 64 KB.
 - (vii) Total number of I/O ports in PIC16F877
(a) 3 (b) 4 (c) 5 (d) 6.

- (viii) Brown out reset is available in
(a) 8251 (b) 8051
(c) AT mega 328 (d) PIC microcontroller.
- (ix) In PIC microcontroller, prescaler is assigned through
(a) STATUS Register (b) INTCON Register
(c) OPTION Register (d) none of above.
- (x) Among the following which processor is following RISC architecture
(a) 8251 (b) 8051
(c) AT mega 328 (d) PIC microcontroller.

Group - B

2. (a) Differentiate between single purpose and general purpose processor.
(b) What is DMA operation? How DMA controller manages the high speed data transfer?
(c) Write the main features of ARM. **3 + (2 + 4) + 3 = 12**
3. (a) Differentiate between RISC and CISC architecture.
(b) Explain the features of flash memory, DRAM and OTPROM.
(c) What is the purpose of Watch dog timer? Explain with example. **2 + 6 + 4 = 12**

Group - C

4. (a) Name and discuss the function of different general purpose registers of ATmega 328.
(b) Explain the function of different flag bits of ATmega 328 with suitable example.
(c) Write a program to transfer a block of ten data from one memory location to another memory location. **2 + 6 + 4 = 12**
5. (a) Write a program to transmit continuously the message 'YES' serially at 9600 baud rate, 8 bit data, 1 stop bit. (Assume the clock frequency as 8 MHz.)
(b) Write short notes on (**any two**)
(i) RS 232 standard
(ii) USART
(iii) ADMUX and ADCSRA registers of ATmega 328. **6 + (2 × 3) = 12**

Group - D

6. (a) What is Interrupt Latency? Explain the factors affecting it?
(b) Explain briefly the operation of round-Robin with interrupts.
(2 + 4) + 6 = 12
7. (a) Explain the function of an OS.
(b) Discuss the Task Control Block (TCB). Mention some of the component of TCB.
6 + 6 = 12

Group - E

8. Design an interface between ATmega 328 and LCD. Write a program to display 'HITK' on the LCD.
12
9. Interface one DIP switch (SW_0) to Port A and one stepper motor to Port D of ATmega 328. Write a program to rotate the stepper motor clockwise if switch is open ($SW_0 = 0$), otherwise rotate anti-clockwise.
12