

M.TECH/AEIE/2ND SEM /AEIE 5204/2016

- (vi) `>>> s = 'Monty Python'`
`>>> print s[0:5]`
The following output is seen at console for the above Python code:
(a) Python (b) Monty
(c) Monty Python (d) TypeError: string slicing not allowed
- (vii) `PORTD=0b11000011;`
The hexadecimal equivalent contents of PORTD is
(a) 0x123 (b) 0xC3 (c) 0xFF (d) 0xC1.
- (viii) Which of the following describes best "hard" real-time systems?
(a) An on-line celebrity cricket bat auction
(b) A missile tracking and destroying system
(c) A library book reservation system
(d) A bank's credit card defaulters notice generation program
- (ix) For following command
`PORTB = 0x00;`
`PORTB = (1<<5);`
the binary contents of PORTB is:
(a) 0b00000000 (b) 0b10000000
(c) 0b00001000 (d) 0b00100000
- (x) Which micro-controller is used to design a genuine Arduino UNO?
(a) ATmega328 (b) ATmega328p-pu
(c) ATtiny 2313 (d) None of the above.

Group - B

2. (a) What do you understand by monolithic kernel? How is monolithic kernel different from micro kernel?
(b) Explain the function of data direction and port registers in an AVR. Write a simple code to read the state of a switch connected to PB0 and use it to turn ON or OFF an LED connected to PB5 pin of an ATmega328p, running at 16MHz clock.
(3+3) + (3+3) = 12
3. (a) What do you understand by a Child process? Describe the creation of a process using fork() system call under UNIX.
(b) Write a simple Arduino code to print the temperature value form a LM35 temperature sensor and print in over the serial console, draw proper circuit diagram.
6 + 6 = 12

M.TECH/AEIE/2ND SEM /AEIE 5204/2016

Group - C

4. (a) What do you understand by Real Time operating systems (RTOS)? State some advantages and disadvantage RTOS have over conventional operating systems.
(b) Write a C program using fork() system call to perform multiplication of two integer numbers as a child process.
(3+3) + 6 = 12
5. (a) What is Priority Inversion in an operating system? State two methods by which Priority Inversion can be prevented.
(b) Consider an AVR, Atmega 328p running at clock speed of 16MHz. Write a code snippet to blink a LED one time a second using bit twiddling connected at Port B's PB5 pin. Draw appropriate circuit diagram.
(4+2) + 6 = 12

Group - D

6. (a) List down the fields of a process control block structure (i.e., task_struct) in a Linux based generic operating system. Write down the Linux terminal commands to view user process and system process.
(b) Write a C program using fork() system call to generate fibonacci numbers (up to 6th term) as a child process.
(3+3) + 6 = 12
7. (a) What do you understand by an operating system process? Explain the various parts of a process under execution.
(b) Explain the various states of a process with an appropriate flow diagram.
(3+3) + 6 = 12

Group - E

8. (a) Explain in brief the Analog to Digital converter registers of an Atmega328p.
(b) What is the maximum word length (in bits) generated for given analog voltage value.

M.TECH/AEIE/2ND SEM /AEIE 5204/2016

- (c) Write a program to interface a LDR (Light Dependent Resistor) with an ATmega328p running at 16MHz, to indicate light intensity with 7 LEDs connected to PORTB. Draw appropriate circuit diagram.

5 + 2 + (3+2) = 12

9. (a) What is thread? Explain with diagram showing CPU switch from process to process.

- (b) State the distinction points between a SPI and an i²c bus.

- (c) Consider a data logger application; use an EEPROM 25LC256 interfaced with an ATmega 328p. Write the necessary code and draw the required circuit diagram for writing 10 memory locations on the EEPROM.

(1+2) + 3 + 6 = 12

**M.TECH/AEIE/2ND SEM /AEIE 5204/2016
2016**

**EMBEDDED SYSTEMS
(AEIE 5204)**

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 alternatives for the following: **10 × 1=10**
- (i) Which of the following commands under linux can list the contents of a directory?
(a) ls (b) ls -l (c) rm (d) ps -el.
- (ii) What is the maximum number of slave devices that can be hooked up to an SPI bus:
(a) 127 (b) 255
(c) 8 (d) Depends on number of CS lines
- (iii) The ATmega328p is ____ bit processor.
(a) 8 (b) 10 (c) 32 (d) 64.
- (iv) What will be the output of the following python program?
>>a='banana'
>>print 'a'
(a) a (b) banana (c) Error (d) ananab.
- (v) The BCM2835 of Raspberry Pi is ____ bit processor.
(a) 8 (b) 10 (c) 32 (d) 64.