

Group - E

8. (a) What do you understand by an operating system Process?
 (b) Explain, with detail diagram, the parts of a Process in memory.
 (c) What are the various states of a Process? Explain with a flow diagram.
- 2 + 4 + 6 = 12**
9. (a) What do you understand by a Child process? Describe the creation of a process using fork() system call under UNIX.
 (b) Write an appropriate C code for creating a child process under UNIX using fork() system call.
 (c) Consider a DC motor connected to pin 9 of an Arduino through a power transistor. Write an Arduino code to control the speed of the motor using PWM reading values off a potentiometer connected to pin A0.
- 4 + 4 + 4 = 12**

M.TECH/AEIE/2ND SEM/AEIE 5204/2017
EMBEDDED SYSTEM
(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 alternative for the following: **10 x 1=10**
- (i) 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.
- (ii) Which of the following commands under linux can list the contents of a directory along with file execution permissions?
 (a) ls (b) ls -l
 (c) rm (d) ps -el.
- (iii) What does if `__name__=='__main__'`: do in a Python code?
 (a) Tells the interpreter current code file has main in it
 (b) It does nothing
 (c) Finds out the main method, executes it first
 (d) None of the above .
- (iv)

```
>>> s = 'Monty Python'
>>> print s[0:5]
```


 Which of 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.

- (v) In AVR, which registers are there for the I/O programming of ports?
 (a) PORT (b) PIN
 (c) DDR (d) all of the mentioned.
- (vi) For following command
 PORTB = 0x00;
 PORTB = (1<<7);
 the binary contents of PORTB is
 (a) 0b00000000 (b) 0b10000000
 (c) 0b00001000 (d) 0b00100000.
- (vii) PORTD=0b00110011;
 The hexadecimal equivalent contents of PORTD is
 (a) 0x13. (b) 0x33
 (c) 0xFF (d) 0xC1.
- (viii) Identify which of the following describes best "hard" real-time system:
 (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) Which one of the following is output of the Linux command 'ls' ?
 (a) Displays list of files in a directory
 (b) Displays details of processor information
 (c) Creates a new directory
 (d) Deletes all files in a directory.
- (x) Identify which micro-controller is used to design an 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 PBO 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 is an i²c bus? Explain how such a bus works.
- (b) Write a simple ATmega 328p code to print the temperature value form a LM37 temperature sensor and print in over the serial console, draw proper circuit diagram.

$$6 + 6 = 12$$

Group - C

- 4.(a) What do you understand by the dual role of the PORT registers in an ATmega328p?
- (b) Consider a toggle switch connected to a pin 4 (PD2) and a LED to pin 19 (PB5) of an ATmega 328p running at 16MHz. Write a program to glow the LED as the switch is pressed.
- 5.(a) Discuss the various states a Process undergoes in an operating system, as it gets executed. What do you understand by a Process Control Block? Explain the various parts of a Process Control Block.
- (b) Write a simple Python code to blink a LED one time a second connected at GPIO7 of a Raspberry Pi.

$$6 + 6 = 12$$

$$(3 + 2 + 2) + 5 = 12$$

Group - D

- 6.(a) What do you understand by Real Time operating systems (RTOS)? State some advantages and disadvantages a RTOS have over conventional operating systems.
- (b) Write a simple Arduino code to blink a LED two times a second connected at pin 12.
- 7.(a) Explain how the SPI bus of a AVR makes use of shift registers for bit trading from and to a slave device.
- (b) Consider a 25LC256 EEPROM connected with an ATmega328p over the SPI bus. Write a program to read and write off the EEPROM. Draw proper circuit diagram.

$$6 + 6 = 12$$

$$4 + (4 + 4) = 12$$