

B.Tech. DEGREE EXAMINATION, MAY 2023
Sixth Semester

18EEEC308J – EMBEDDED SYSTEM DESIGN

(For the candidates admitted from the academic year 2018-2019 to 2021-2022)

Note:

- (i) **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.
- (ii) **Part - B & Part - C** should be answered in answer booklet.

Time: 3 hours

Max. Marks: 100

PART – A (20 × 1 = 20 Marks)

Marks BL CO PO

Answer ALL Questions

- | | | | | |
|---|---|---|---|---|
| 1. The 8051 series of microcontrollers are made by which of the following company? | 1 | 1 | 1 | 1 |
| (A) Atmel | | | | |
| (B) Philips | | | | |
| (C) Qualcomm | | | | |
| (D) Intel | | | | |
| 2. When the microcontroller executes some arithmetic operations, the flag bits of which register is affected? | 1 | 1 | 1 | 1 |
| (A) PSW | | | | |
| (B) SP | | | | |
| (C) DPTR | | | | |
| (D) PC | | | | |
| 3. What is the file extension that is loaded in a microcontroller for executing any instruction? | 1 | 1 | 1 | 1 |
| (A) .doc | | | | |
| (B) .c | | | | |
| (C) .txt | | | | |
| (D) .hex | | | | |
| 4. How many bytes of bit addressable memory is present in 8051 based microcontrollers? | 1 | 1 | 1 | 1 |
| (A) 8 bytes | | | | |
| (B) 32 bytes | | | | |
| (C) 16 bytes | | | | |
| (D) 128 bytes | | | | |
| 5. How many analog pins are present in Arduino uno? | 1 | 1 | 2 | 1 |
| (A) 4 | | | | |
| (B) 5 | | | | |
| (C) 6 | | | | |
| (D) 12 | | | | |
| 6. The operating frequency of Atmega328 microcontroller is | 1 | 1 | 2 | 1 |
| (A) 8 MHz | | | | |
| (B) 16 MHz | | | | |
| (C) 32 MHz | | | | |
| (D) 20 MHz | | | | |
| 7. Arduino uses _____ architecture to store the program and data. | 1 | 1 | 2 | 1 |
| (A) Von-Neuman | | | | |
| (B) Harvard | | | | |
| (C) RISC | | | | |
| (D) CISC | | | | |
| 8. The size of memory used for bootloader code in ATmega328 is _____. | 1 | 1 | 2 | 1 |
| (A) 2 kB | | | | |
| (B) 1 kB | | | | |
| (C) 0.5 kB | | | | |
| (D) 2 kB | | | | |

9. When comparing PIC16C7X with PIC16C6X the enhanced capability is _____.
- (A) Digital to analog converter (B) Analog to digital converter
(C) Encoding (D) Decoding
10. In the PIC microcontroller, group of locations memory are termed as _____. Which can be accessed through various instruction.
- (A) Storage file (B) Register file
(C) Register locate (D) Register identify
11. In the PIC microcontroller, the register bank which as 32 bytes of special purpose registers is _____.
- (A) Bank 0 and bank 1 (B) Bank 1 and 2
(C) Bank 0 and 2 (D) Bank 0, 1 and 2
12. What is the length of PCLATH?
- (A) 13 (B) 8
(C) 5 (D) 4
13. ARM machine instructions are encoded with _____ word?
- (A) 2 byte (B) 3 byte
(C) 8 byte (D) 4 byte
14. The program counter is implemented using _____ in the ARM processor.
- (A) Caches (B) Heaps
(C) General purpose register (D) Special purpose register
15. Thumb instructions are used to access the _____.
- (A) Current program status register (B) Stack pointer
(C) Program counter (D) Address bus
16. Which of the following can provide hardware handshaking?
- (A) RS232 (B) Parallel port
(C) Counter (D) Timer
17. Secure digital card application uses which protocol.
- (A) UART (B) SPI
(C) I2C (D) USART
18. Hard real time operating system has _____ interrupt latency.
- (A) Minimal (B) Maximum
(C) Zero (D) Finite
19. The problem of priority inversion can be solved by _____.
- (A) Priority inheritance protocol (B) Priority inversion protocol
(C) Hybrid priority protocol (D) Unique address protocol
20. Semaphores are mostly used to implement _____.
- (A) System calls (B) IPC mechanisms
(C) System protection (D) Software protection

PART – B (5 × 4 = 20 Marks)

Answer ANY FIVE Questions

Marks BL CO PO

21. Compare the RISC and CISC type of architecture. 4 1 1 1
22. Mention the role of different variables used in embedded-C programming. 4 1 1 1
23. List the Arduino I/O function used for programming. 4 2 2 1
24. Write the Arduino programming for LED blinking in the digital port. 4 2 2 1
25. Write short note on AMBA bus in ARM processor. 4 1 3 1
26. Discuss in brief about Zigbee communication protocol. 4 1 4 1
27. Classify the various types of real time operating system with suitable examples. 4 1 5 1

PART – C (5 × 12 = 60 Marks)

Answer ALL Questions

Marks BL CO PO

28. a. Draw the architecture and explain the function units of 8051 microcontroller. 12 1 1 1

(OR)

- b. Discuss the different control and iteration structure used in embedded C-programming. 12 1 1 1

29. a. Write the Arduino program to control the line follower robot using IR sensor. 12 2 2 1

(OR)

- b. Discuss the Arduino mega board features, port configuration and memory organization. 12 2 2 1

30. a. Explain PIC microcontroller instructions sets using suitable examples. 12 1 3 1

(OR)

- b. What are types of ARM processor? Draw the functional diagram and explain its features. 12 1 3 1

31. a. Explain in detail about the SPI and I2C communication protocol used in embedded system applications. 12 1 4 1

(OR)

- b. Mention the advantages of USB protocol. Also discuss the pin configuration, types, operating mode and structure. 12 1 4 1

32. a. Discuss the following in real time operating systems.
(1) Semaphores
(2) Mail box 12 1 5 1

(OR)

- b. Classify the various types of task in real time operating system. Also explain the task scheduling types. 12 1 5 1

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