

KATHMANDU UNIVERSITY
End Semester Examination
June/July, 2023

Marks Scored:

Level : B.E.

Year : III

Course : COMP 306

Semester : II

Exam Roll No. :

Time: 30 mins.

F. M. : 10

Registration No.:

Date

: 11 JUL 2023

SECTION "A"

[20 Q. × 0.5 = 10 marks]

Encircle the most appropriate option.

1. Which of these designs considers both the software and hardware during the embedded design?
 - a. Peripheral Design
 - b. Platform-Based Codesign
 - c. Software/Hardware Design
 - d. Memory Design
2. What does API stand for?
 - a. Application Programming Interface
 - b. Application Program Interface
 - c. Application Programming Interfacing
 - d. None of them
3. Which activity is concerned with identifying the task at the final embedded systems?
 - a. scheduling
 - b. task-level concurrency management
 - c. high-level transformation
 - d. compilation
4. How an embedded system communicates with the outside world?
 - a. Memory
 - b. Output
 - c. Peripherals
 - d. Input
5. Identify the standard software components that can be reused in an embedded system design?
 - a. memory
 - b. application software
 - c. application manager
 - d. operating system
6. Which of the following is **TRUE** about interrupt latency in an embedded system?
 - a. It is the time between the occurrence of an interrupt and the start of its processing.
 - b. It is the time between the start of interrupt processing and the completion of interrupt processing.
 - c. It is the time taken by the system to acknowledge an interrupt.
 - d. It is the time taken by the system to return from an interrupt.
7. Which ports are used in the multi-master system to avoid errors?
 - a. bidirectional port
 - b. tridirectional port
 - c. multi directional port
 - d. unidirectional port
8. Which of the following is the common method for connecting the peripheral to the processor?
 - a. software
 - b. exception
 - c. external interrupts
 - d. internal interrupts

9. Which of the following is a part of RTOS kernel?
- register
 - Interrupt Service Routine
 - memory
 - input
10. Which of the following language can describe the hardware?
- C
 - C++
 - JAVA
 - VHDL
11. Which of the following services use TCP?
- DHCP
 - SMTP
 - HTTP
 - TFTP
 - FTP
- i and ii
 - ii, iii and v
 - i, ii and iv
 - i, iii and iv
12. Which of the following works by dividing the Embedded System processor's time?
- single task operating system
 - multitask operating system
 - kernel
 - applications
13. Which of the following decides which task can have the next time slot?
- single task operating system
 - applications
 - kernel
 - software
14. Which of the following is a real-time operating system (RTOS)?
- Windows
 - Linux
 - VxWorks
 - MacOS
15. While executing the main program, if two or more interrupts occur, then the sequence of appearance of interrupts is called
- multi-interrupt
 - nested interrupt
 - interrupt within interrupt
 - nested interrupt and interrupt within interrupt
16. While CPU is executing a program, an interrupt exists then it
- follows the next instruction in the program
 - jumps to instruction in other registers
 - breaks the normal sequence of execution of instructions
 - stops executing the program
17. How is data detected in a UART?
- counter
 - timer
 - clock
 - first bit
18. Which command takes the object file and searches library files to find the routine calls?
- Emulator
 - Simulator
 - Linker
 - Debugger
19. A half subtractor is an arithmetic circuit which performs subtraction operation on _____ input bits.
- 2
 - 3
 - 4
 - 1
20. How many full adders are required for an n-bit binary adder?
- $n/2$
 - n
 - $2 \times n$
 - n^2

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F. M. : 40

SECTION "B"
[6Q. × 4= 24 marks]

Attempt *ANY SIX* questions.

1. Explain the different data types and directives available in 8051 microcontrollers. Discuss their sizes, ranges, and typical use cases in embedded programming.
2. Describe the key components and features of the **assembly language programming paradigm**. Discuss the advantages and disadvantages of using assembly language for low-level system programming compared to higher-level languages. Provide examples to support your discussion.
3. What are the major issues while making decision on implementation in software or hardware in Embedded Systems? Explain in brief.
4. In an alarm system of a bank, three sensors are implemented and the alarm is triggered when at least two sensors detect the change. Assuming sensors to output digital values, design a combinational logic circuit for alarm system.
5. Give the basic overview of TCP/IP protocol suite and explain any two layers.
6. Implement a CRC generator using the polynomial equation $x^4 + x + 1$. The input data to the generator is a sequence of 8-bit bytes. The output of the generator is a 4-bit CRC value.
7. Write short notes on
 - a. RTOS Kernel Functions
 - b. IP Phone

SECTION "C"
[2Q. × 8 =16 marks]

Attempt *ANY TWO* questions.

8. What are the major challenges and considerations in the development process of embedded systems for safety-critical applications? Explain with a real time example.
9. Explain the concept of a Universal Asynchronous Receiver-Transmitter (UART) communication interface. Describe the advantages and limitations of UART compared to other communication interfaces.
10. How would you design an optimized hardware architecture and efficient interface in an embedded system for real-time processing; taking into account factors such as memory constraints, communication interfaces, clock circuitry, etc.?