FCS
END SEMESTER QUESTION PAPER 2025 – MCA

Programme Name: Amrita Ahead MCA

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Name of the QP Setter: Deepa Sreedhar

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MULTIPLE CHOICE QUESTIONS 1*50=50 marks

1. **What is the correct sequence of actions taken by the CPU during a memory write operation to ensure data is stored accurately in main memory?**
   a. The CPU places the data on the bus, sends the write signal, and then places the address on the bus.
   b. The CPU places the address and data on the bus, sends the write signal, and waits for acknowledgment.
   c. The CPU sends the write signal, places the address on the bus, then places the data on the bus.
   d. The CPU places the address on the bus, places the data on the bus, and then sends the write signal.

2. **In a scenario where a software development team is deciding between using an assembler or an interpreter for program execution, which of the following considerations is most accurate in terms of performance trade-offs and execution efficiency?**
   a. Assemblers translate the entire program into machine code before execution, providing faster runtime but requiring more memory upfront.
   b. Assemblers allow for on-the-fly execution of code, which reduces initial memory usage but can slow down execution speed.
   c. Interpreters convert mnemonics to machine code and execute them simultaneously, optimizing for both speed and memory usage.
   d. Interpreters compile the entire program before execution, leading to better error handling and debugging capabilities.

3. **When optimizing a computational routine for the 8085 microprocessor,**

   you must choose between utilizing register pairs for 16-bit arithmetic

   operations and employing them as address pointers for stack manipulations.

   Given limited memory resources and the need for efficient data processing,

   which approach should be prioritized and why?

   a. Use register pairs for 16-bit operations, as they effectively double the data capacity,

which is crucial for handling larger datasets within constrained memory.

b. Employ register pairs as address pointers for stack operations, maximizing memory efficiency by facilitating quick data retrieval and storage during recursive procedures.

c. Alternate between using register pairs for 16-bit arithmetic and stack operations, balancing computational efficiency and memory access speed without the need for additional resources.

d. Prioritize register pairs for stack operations since the speed of data retrieval outweighs the need for larger arithmetic operations in most scenarios.

4. During the instruction decode phase of the machine cycle, which of the following actions is most crucial for ensuring proper command execution by the CPU?

a. Decoding the instruction to determine the necessary arithmetic operation for execution.

b. Generating control signals to activate the appropriate circuits for the instruction execution.

c. Loading the instruction into a register for temporary storage before execution.

d. Fetching subsequent instructions to optimize the CPU pipeline.

5. In an unsigned binary system with 'n' bits, the maximum value of a number is 2^n.

a. True

b. False

6. Consider the effects of using a parity bit in standard ASCII and Extended ASCII. Which of the following statements are true about their representation capabilities?

a. Standard ASCII with a parity bit reduces the total number of representable characters, while Extended ASCII allows for more characters.

b. A parity bit in standard ASCII has no impact on the number of characters, but it adds error-checking capability; Extended ASCII inherently supports more characters.

c. The parity bit in both standard and Extended ASCII increases the total number of characters that can be represented.

d. Standard ASCII with a parity bit can represent special characters, whereas Extended ASCII cannot.

7. In a data processing system that utilizes a fixed bit-width for unsigned numeric data representation, consider a scenario where the system must handle both positive and negative values efficiently. What challenge arises when interpreting data trends if the system solely relies on unsigned representation, and how might this affect the accuracy of data analytics?

a. The lack of negative number representation leads to misinterpretation of overflow errors as valid data points, which can skew trend analysis in datasets containing extreme values.

b. The absence of a sign bit simplifies arithmetic operations, but requires additional logic to differentiate between positive and negative trends, potentially leading to erroneous forecasting.

c. Unsigned representation allows for more efficient storage of large datasets, but at the cost of losing granularity in trend detection, especially when dealing with datasets exhibiting rapid fluctuations.

d. The use of unsigned numbers eliminates the need for complex sign handling, yet this simplicity can cause the system to overlook critical inflection points when identifying patterns in data.

8. In a binary system utilizing the 1's complement method, solve the following problem: To add two negative numbers represented by 1's complement, first convert each number by _____, then perform the addition. If the resulting sum generates a carry, apply the _____ step to the sum, and finally verify the result by _____ the sum back to its original form.

a. inverting bits; end-around carry; reversing bits

b. adding one; overflow correction; subtracting one

c. complementing bits; end-around carry; complementing bits

d. flipping bits; overflow handling; flipping bits back

9. Unicode's ability to represent characters from multiple languages depends on its use of a larger bit size compared to ASCII, but this does not inherently lead to smaller file sizes.

a. True

b. False

10. Which of the following is a primary function of dual-mode operation in an operating system's kernel?

a. To increase the graphical capabilities of the system.

b. To prevent unauthorized access and ensure system security.

c. To enhance the audio output quality.

d. To improve network connectivity speed.

11. The kernel ensures an embedded operating system remains efficient and compact primarily by optimizing resource allocation rather than relying on extensive virtual memory systems.

a. True

b. False

12. An operating system ensures efficient use of resources by always terminating low-priority programs to free up resources when multiple programs request access simultaneously.

a. True

b. False

13. Using a distributed operating system makes data migration easier because it automatically synchronizes all data without additional configuration.

a. True

b. False

14. Why do user applications use system calls to interact with hardware resources?

a. To directly control hardware components

b. To safely communicate with hardware through the kernel

c. To avoid using the operating system's kernel

d. To store hardware control instructions within the application

15. In the context of process operations, what does "context switching" refer to?

a) Switching between different operating systems

b) Saving and loading the state of a process to enable multiple processes to share a single CPU

c) Changing the priority of a process in the scheduling queue

d) Moving a process from the disk to main memory

16. In a binary system, what does the ASCII code for the character 'A' look like?

a) 01000001

b) 10100000

c) 00100001

d) 10000101

17. Which logic gate outputs a 1 if at least one of its inputs is 1?

a) NOR gate

b) AND gate

c) OR gate

d) NOT gate

18. Which database model is characterized by using objects that combine data and methods?

a) Relational Model

b) Hierarchical Model

c) Network Model

d) Object-Oriented Model

19. Which key constraint ensures that a column's value is unique and cannot be null?

a) Primary Key

b) Foreign Key

c) Unique Key

d) Composite Key

20. What is the purpose of the SQL TRUNCATE command?

a) To delete specific rows from a table

b) To remove all rows from a table but keep the table structure

c) To remove the table structure and all of its data

d) To alter the structure of an existing table

21. How do you select unique values from a column City in the Customers table?

a) SELECT DISTINCT City FROM Customers;

b) SELECT UNIQUE City FROM Customers;

c) SELECT DIFFERENT City FROM Customers;

d) SELECT ONLY City FROM Customers;

22. Given the table Orders:

Which SQL statement finds the total amount of orders placed by customer 101?

a) SELECT SUM(Amount) FROM Orders WHERE CustomerID = 101;

b) SELECT TOTAL(Amount) FROM Orders WHERE CustomerID = 101;

c) GET SUM(Amount) FROM Orders WHERE CustomerID = 101;

d) SHOW TOTAL(Amount) FROM Orders WHERE CustomerID = 101;

23. Which network type is used to connect devices over large geographical distances, such as between cities or even countries?

a) LAN (Local Area Network)

b) MAN (Metropolitan Area Network)

c) WAN (Wide Area Network)

d) PAN (Personal Area Network)

24. In which network topology are all devices connected to a central hub or switch?

a) Bus Topology

b) Star Topology

c) Ring Topology

d) Mesh Topology

25. Which transmission medium is best suited for short-range, high-speed data transmission within a building?

a) Fiber Optic Cable

b) Satellite Communication

c) Twisted Pair Cable

d) Microwave Transmission

26. Which device is used to extend the range of a wireless network by retransmitting the signal?

a) Router

b) Switch

c) Access Point

d) Repeater

27. The Data Link Layer is responsible for:

a) Logical addressing and routing

b) Data encryption and decryption

c) Error detection and correction in data frames

d) Providing network services to end-user applications

28. In IPv6, how are addresses separated?

a) By dots

b) By slashes

c) By hyphens

d) By colons

29. What does WLAN stand for?

A) Wide Local Area Network

B) Wireless Local Area Network

C) Wired Local Area Network

D) Wireless Limited Area Network

30. What is a Piconet in Bluetooth terminology?

A) A large network consisting of multiple master and slave devices

B) A small network consisting of one master device and up to seven active slave devices

C) A network that spans multiple frequency bands

D) A network that connects devices across different geographic locations

31. What does the "fork" system call do in Unix-like operating systems?

a) Terminates the current process

b) Creates a new process by duplicating the current process

c) Loads a new program into the current process's address space

d) Suspends the current process

32. How is a decimal number encoded in Binary-Coded Decimal (BCD) representation?

a) Each decimal digit is represented by a 4-bit binary number

b) Each decimal digit is represented by an 8-bit binary number

c) Each decimal digit is represented by a single binary bit

d) Decimal numbers are converted directly to hexadecimal format

33. Which logic gate produces an output of 1 only when all of its inputs are 1?

a) OR gate

b) NAND gate

c) AND gate

d) XOR gate

34. Which of the following is a type of database model that organizes data into tables?

a) Hierarchical Model

b) Network Model

c) Relational Model

d) Object-Oriented Model

35. What is a "foreign key" in a relational database?

a) A key used to uniquely identify a record within the same table

b) A key that uniquely identifies a record in another table

c) A key that serves as a primary key in the same table

d) A key used to enforce data encryption

36) Which SQL command is used to set permissions on a database object?

a) GRANT

b) REVOKE

c) MODIFY

d) ALTER

37. Which SQL statement is used to update records in a table named Products where the Price is greater than 100?

a) UPDATE Products SET Price = 100 WHERE Price > 100;

b) MODIFY Products SET Price = 100 WHERE Price > 100;

c) ALTER Products SET Price = 100 WHERE Price > 100;

d) CHANGE Products SET Price = 100 WHERE Price > 100;

38. Given the table Employees:

EmployeeID	Name	Department	Salary
1	Alice	HR	50000
2	Bob	IT	60000
3	Charlie	IT	70000
4	David	HR	55000

Which SQL statement retrieves the names of employees in the IT department?

a) SELECT Name FROM Employees WHERE Department = 'IT';

b) SELECT Name FROM Employees WHERE Department = 'HR';

c) SHOW Name FROM Employees WHERE Department = 'IT';

d) GET Name FROM Employees WHERE Department = 'IT';

39. What type of network is typically limited to a single building or campus, such as an office or university?

a) WAN (Wide Area Network)

b) LAN (Local Area Network)

c) MAN (Metropolitan Area Network)

d) PAN (Personal Area Network)

40. In which topology does each device connect directly to every other device in the network?

a) Star Topology

b) Mesh Topology

c) Bus Topology

d) Ring Topology

41. Which type of transmission media uses electrical signals to transmit data over short distances?

a) Fiber Optic Cable

b) Coaxial Cable

c) Twisted Pair Cable

d) Satellite

42. What device is used to connect multiple devices in a network and broadcasts data to all devices in a network segment?

a) Switch

b) Hub

c) Router

d) Firewall

43. Which layer of the OSI model provides end-to-end communication control and error checking?

a) Session Layer

b) Transport Layer

c) Network Layer

d) Application Layer

44. What is the maximum number of unique addresses available in IPv4?

a) 2^{16}

b) 2^{32}

c) 2^{64}

d) 2^{128}

45. Which of the following is a standard for WLAN?

A) IEEE 802.11

B) IEEE 802.3

C) IEEE 802.15

D) IEEE 802.16

46. Bluetooth defines two types of networks. What are they?

A) Piconet and Scatternet

B) Mesh and Piconet

C) Scatternet and Mesh

D) Piconet and Ad-hoc

47. Which of the following binary numbers represents -5 in an 8-bit signed magnitude representation?

a) 00000101
b) 10000101
c) 01100101
d) 10100101

48. A thread is a basic unit of CPU utilization. It is having:

a) Its own memory space
b) Its own set of registers
c) A separate process address space
d) Its own independent CPU

49. Which queue is responsible for holding processes that are waiting for I/O operations to complete?

a) Ready queue
b) I/O queue
c) Wait queue
d) Dispatcher queue

50. In process scheduling, what is a "ready queue"?

a) A queue containing processes that are waiting for I/O operations

b) A queue containing processes that are currently being executed by the CPU

c) A queue containing processes that are waiting for CPU time

d) A queue containing processes that have terminated

SHORT ANSWER QUESTIONS – 4 x 5 marks=20 marks

1. Compare and contrast RISC and CISC architectures in terms of their instruction set design and execution.

2. Describe the functionality of Linux Directory Commands and provide examples of how to use it.?

3. Explain the Object-Oriented Database Model (OODM) and how it differs from the Relational Database Model.

4. In a public library, some networks connects public computers, library management systems, and digital catalog services. Patrons can use the networked computers to access the internet, search for books, and use digital resources. Library staff use the network for catalog management and internal communication. Identify the network and explain how it differ from other networks?