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ST - 04

Total No. of Pages : 3

**SHIVAJI UNIVERSITY, KOLHAPUR**  
**Examination March/April-2024**  
**Semester - I**  
**Subject - Computer organization**  
**Subject Code : 89993**

Day and Date : Monday, 13-05-2024

Total Marks : 70

Time : 10.30 a.m. to 011.00 a.m.

**Instructions :**

- 1) All questions are compulsory
- 2) Figures to the right indicate full marks

**Q.1 Select an appropriate option from the following.**

**[10]**

- i. The three main parts of central processing unit (CPU processor) is
  - a) ALU, Control Unit, and Registers
  - b) ALU, Control Unit, and RAM
  - c) Cache, ALU, and RAM
  - d) Control Unit, RAM, and Cache
- ii. What is a "register"?
  - a) Digital circuit
  - b) Combinational circuit
  - c) Arithmetic circuit
  - d) Sequential circuit
- iii. Computer is an electronic device and works on electronic signals. In computer systems on and off signals denote ..... respectively.
  - a) 1 and 0
  - b) 2 and 9
  - c) 3 and 8
  - d) 4 and 6

- iv. The computer system is controlled by which component?
- CPU
  - RAM
  - ROM
  - CPU and RAM
- v. Which of the following register keeps track of how instructions are being executed?
- Instruction registers
  - Memory address registers
  - Program counter register
  - Memory and memory data register
- vi. Which of the following is the full form of CISC?
- Complex Instruction Sequential Compilation
  - Complete Instruction Sequential Compilation
  - Computer Integrated Sequential Compiler
  - Complex Instruction Set Computer
- vii. A ..... sign represents the operation performed by an OR gate.
- Dot (.)
  - Multiply (\*)
  - Plus (+)
  - Minus (-)
- viii. In a multiplexer, the selection of a particular input line is controlled by.....
- Data controller
  - Selected lines
  - Logic gates
  - Both data controller and selected lines
- ix. The S-R flip flops stand for .....
- Stand-Reset flip flops
  - Store-Reset flip flops
  - Set-Reset flip flop
  - Send Reset flip flop

x. The value of radix in hexadecimal number system is .....

- a) 8
- b) 10
- c) 2
- d) 16

**Q.2 Attempt any three questions**

[15]

- a. Explain in detail layers of computer architecture.
- b. Write in detail function and structure of computer.
- c. Explain in detail memory subsystem organization and interfacing
- d. Explain in detail I/O subsystem organization and interfacing.

**Q3. Attempt any three questions**

[15]

- a. What is logic gate? Implement the following equation
 

1) $(A.B.C)$	2) $(A \oplus B)$
3) $(A+B+C)$	4) $(A \oplus B)$
- b. Convert the following.
  - i.  $(115.625)_{10} (?)_2$
  - ii.  $(12E)_{16} (?)_{10}$
- c. State and prove Distributive theorem.
- d. What is Boolean function? Draw the circuit diagram of Following-
  - 1)  $(A.B) (B.C)$
  - 2)  $(A+B+C) (B+D) + (A.B)$

**Q.4 Attempt any three questions**

[15]

- a. What is sequential circuit? Explain T flip flop in detail.
- b. Explain full adder in detail.
- c. What is combinational circuit with example? Explain in detail design procedure
- d. What is Demultiplexer? Explain 1\*4 Demultiplexer input operations.

**Q5. Attempt any three questions**

[15]

- a. What is memory array organization? Explain types of memory arrays.
- b. Explain in detail memory interleaving.
- c. Write a brief note on auxiliary memory.
- d. What is the difference between microprogramming and hardwired control?



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**March-April 2024 Examination**  
**Semester II**  
**Data Communication & Network**  
**Subject Code: 90395**

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Day and Date : Wednesday, 15-05-2024  
Time : 02:30 pm to 05:00 pm

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Total Marks : 40

**Q.1 Select an appropriate option from the following. [10]**

- i. Transport layer aggregates data from different applications into a single stream before passing it to .....
- a. Network layer                      b. Data link layer  
c. Application layer                  d. Physical layer
- ii. A Computer network permits sharing of. ....
- a. Resources                              b. Information  
c. Data                                      d. All of the above
- iii. Which of the following is not a type of virus?
- a. Boot sector                            b. Polymorphic  
c. Multipartite                            d. Trojans
- iv. Checksum is used for .....
- a. Error Correction                      b. Error Detection  
c. Error Confirmation                  d. None of above

- v. .... is a collection of point to point links that may form a circle.
- a. Bus Topology
  - b. Ring Topology
  - c. Hierarchy
  - d. MAN
- vi. Which protocol layer uses the protocols are www, http, FTP, SMTP, e-mail etc.
- a. Application Layer Protocol
  - b. Transport Layer Protocol
  - c. Internet Layer Protocol
  - d. Hardware Layer
- vii. The internetworking protocol is known as
- a. SMTP
  - b. PPP
  - c. TCP/IP
  - d. MNTP
- viii. Which of the following are transport layer protocols used in networking?
- a. TCP and FTP
  - b. UDP and HTTP
  - c. TCP and UDP
  - d. HTTP and FTP
- ix. Which of them is not an ideal way of spreading the virus?
- a. Infected website
  - b. Emails
  - c. Official Antivirus CDs
  - d. USBs

x. .... I the technology that connects the machine and people within a site in a small area.

a. LAN

b. MAN

c. WAN

d. None of the above

**Q. 2 Attempt any three questions.**

**15M**

- i. Discuss the difference between client-server and peer to peer architecture?
- ii. What are the basic cryptography terminologies?
- iii. What is networking? Analyze the components of data communication.
- iv. What is transmission media? Represent the guided transmission Media.

**Q. 3 Attempt any three questions.**

**15M**

- i. Discuss on HTTP.
- ii. Write a note on Malware.
- iii. Analyze in detail the OSI reference model.
- iv. Represent the TCP/IP reference model in detail.

**Q.4 Attempt any three questions.**

**15M**

- i. Analyze the I/P address in detail.
- ii. Discuss on Logic bombs and keyloggers.
- iii. Represent the transport layer with its primitives?
- iv. Differentiate the TCP & UDP.

Q.5 Attempt any three questions.

- i. Discuss on distance vector and congestion control in detail.
- ii. Write a note on Trojan horse & Ransomware.
- iii. What is the difference between LAN, MAN, WAN?
- iv. Discuss on DNS.

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Total No. of Pages : 3

**March-April 2024 Examination**  
**Design & Analysis of algorithm**  
**Subject Code : 90391**

**Day and Date : Thursday, 09-05-2024**  
**Time : 02:30 pm to 05:00 pm**

**Total Marks : 70****Instructions :**

1. Attempt Any FIVE Questions from given Questions
2. Figures to the right represent full mark.

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**Q1 Select an appropriate of appropriate option from the following. 10**

- i. The Bellman Ford Algorithm returns ..... value?
  - a. String
  - b. Boolean
  - c. Integer
  - d. Double
- ii. Which of the following information is stored in a doubly-linked list's nodes?
  - a. Value of node
  - b. Address of next node
  - c. Address of previous node
  - d. All of above
- iii. Process of inserting an element in stack is called .....
  - a. Create
  - b. Push
  - c. Evaluation
  - d. Pop
- iv. The data structure required for Breadth First Traversal on a graph is?
  - a. Stack
  - b. Array
  - c. Queue
  - d. Tree



- v. Which of the following sorting algorithms provide the best time complexity in the worst-case scenario?
- a. Merge sort
  - b. Quick sort
  - c. Bubble sort
  - d. Selection sort
- vi. Representation of data structure in memory is known as?
- a. Storage structure
  - b. File structure
  - c. Recursive
  - d. Abstract Data Type
- vii. Data structure that contains a relationship between a pair of elements that is not necessarily hierarchical on nature.
- a. Tree
  - b. String
  - c. Graph
  - d. Array
- viii. Which of the following operations accesses each record exactly once so that certain items may be processed?
- a. Inserting
  - b. Deleting
  - d. Searching
  - c. Traversing
- ix. Which of the following is a nonlinear data structure?
- a. Array
  - b. Linked list
  - c. Stack
  - d. Graph
- x. Which of the following algorithms is the best approach for solving Huffman codes?
- a. Exhaustive search
  - b. Greedy algorithm
  - c. Brute force algorithm
  - d. Divide and conquer algorithm

**Q2 Attempt any three questions.****15M**

- i. What is sorting? Explain in detail Quick Sort and Counting Sort?
- ii. Explain solving recurrence in detail?
- iii. What is insertion sort write its procedure and algorithm.
- iv. What is Greedy Algorithm? Explain its characteristics.

**Q3 Attempt any three questions.****15M**

- i. Represent the types of data structure.
- ii. What is the difference between linear data structure and non-linear data Structure?
- iii. Represent the linked list with deletion from linked list?
- iv. What are the different components of Greedy strategy?

**Q4 Attempt any three questions.****15M**

- i. Write a difference between General Tree and Binary Tree.
- ii. What is Binary Search Tree? Explain its operations?
- iii. Represent the Red-Black and B-Tree in detail?
- iv. Explain Huffman code in detail?

**Q5. Attempt any three questions.****15M**

- i. Sort the following example using Quick sort: 50, 3, 1, 60, 65, 45, 90, 13, and 67.
- ii. Discuss the representation of stack.
- iii. Explain graph representation in detail?
- iv. What are the problem faced by travelling salesman?

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Total No. of Pages : 5

**March-April 2024 Examination**

**Mathematical Foundations**

**Subject Code : 89997**

Day and Date : Thursday, 09-05-2024

Total Marks : 70

Time : 10:30 am to 01:00 pm

**Instructions :**

- 1) All questions are compulsory
- 2) Figures to the right indicate full marks

**Q.1 Select an appropriate option from the following. [10]**

i. The number of elements in the Power set  $P(S)$  of the set  $S = \{1, 2, 3\}$  is:

- |      |                  |
|------|------------------|
| A. 4 | B. 8             |
| C. 2 | D. None of these |

ii. Which of the following is an Open walk?

- |                |              |
|----------------|--------------|
| A. 1-2-3-4-5-3 | B. 1-2-3-1   |
| C. 2-1-2       | D. 1-2-3-5-1 |

iii. All functions are .....

- |              |              |
|--------------|--------------|
| A. Set       | B. Functions |
| C. Relations | D. Matrix    |

iv. Boolean Algebra is denoted by.....

- |                              |                                 |
|------------------------------|---------------------------------|
| A. $(B, \wedge, \vee, ', 1)$ | B. $(B, \wedge, \vee, ', 0)$    |
| C. $(B, \wedge, ', 0, 1)$    | D. $(B, \wedge, \vee, ', 0, 1)$ |

- v. Partial ordered relation on non-empty set P is
- A. Reflexive  
B. Anti-Symmetric  
C. Transitive  
D. All above
- vi. Assume that L is a non-empty set closed only under two binary operations, \_\_\_\_\_, denoted by  $\wedge$  and  $\vee$ . It is called a lattice if L has a, b, and c elements, where a, b, and c are the elements in L.
- A. Meet  
B. Join  
C. Both A and B  
D. None of the above
- vii. Which of the following statement is a proposition?
- A. Get me a glass of milkshake  
B. God bless you!  
C. What is the time now?  
D. The only odd prime number is 2
- viii. What is/are the property/ies of Boolean algebra?
- A. Commutative  
B. Distributive  
C. Identity  
D. All of the above
- ix. Write  $X = \{1, 4, 9, 16, 25, \dots\}$  in set builder form.
- A.  $X = \{x: x \text{ is a set of prime numbers}\}$   
B.  $X = \{x: x \text{ is a set of whole numbers}\}$   
C.  $X = \{x: x \text{ is a set of natural numbers}\}$   
D.  $X = \{x: x \text{ is a set of square numbers}\}$

x. Which of the following are null set

A.  $\{0\}$

B.  $\Phi$

C.  $\{\}$

D. Both B and C

**Q2 Attempt any three questions**

**[15]**

a. Let A, B, C be three sets. Draw a Venn diagram and shade the area representing the given set

i)  $A \cup B \cup C$

ii)  $A \cap B \cap C$

iii)  $A \cup (B \cap C)$

iv)  $A - (B \cap C)$

v)  $A \cup (B \cap C)'$

b. What is set? Explain operations on set with example and draw Venn diagram for each.

c. Let set  $A = \{1, 2, 3, 4, 5, 6, 7, 8\}$ , and set  $B = \{3, 5, 7, 9, 11, 13\}$ . Find:

(i)  $A \cup B$

(ii)  $A \cap B$

(iii)  $(A \cap B)'$

d. State and explain Demorgans law of union and Intersection.

**Q3. Attempt any three questions**

**[15]**

a. How many words can be formed from the letters of the word DAUGHTER

i. Taking all letters together

ii. Beginning with D

iii. Beginning with D and ending with R

iv. Vowels being always together

b. What is Function? Explain domain, co-domain and types of function.

c. Find the inverse for the function  $f(x) = \frac{3x+2}{x-1}$

d. A large software development company employs 100 computer programmers. Of them, 45 are proficient in Java, 30 in C#, 20 in Python, six in C# and Java, one in Java and Python, five in C# and Python, and just one programmer is proficient in all three languages above. Determine the number of computer programmers that are not proficient in any of these three languages.

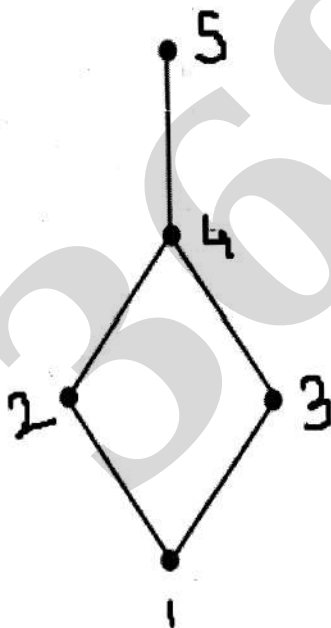
**Q4. Attempt any three questions**

**[15]**

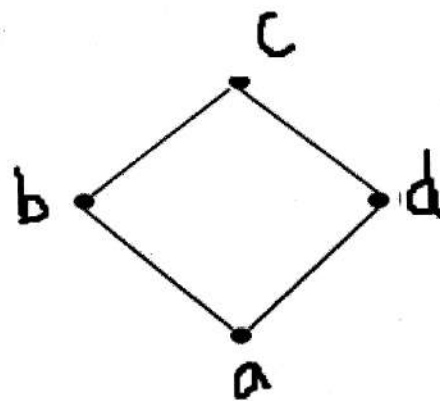
a. Consider the set  $A = \{4, 5, 6, 7\}$ . Let  $R$  be the relation  $\leq$  on  $A$ .

Draw the directed graph and the Hasse diagram of  $R$ .

b. Determine whether the following hasse diagram is lattice or not.



(i)



(ii)

c. Prove

i) Absorption law of Boolean algebra.

ii) Boundedness law of Boolean algebra.

d. What is poset? Draw Hasse diagram for  $D_m$ . Where  $D_m$  is positive divisor as  $m$  ordered by divisibility.

i)  $D_{12}$

ii)  $D_{15}$

iii)  $D_{16}$

**Q5. Attempt any three questions****[15]**

a. Construct the truth table of the following propositions.

i)  $\sim(p \vee q) \wedge (\sim p \vee q)$

ii)  $\sim(p \vee q) \vee (\sim p \wedge \sim q)$

b. Prove logical equivalence of

i)  $(p \rightarrow q) = (\sim p \vee q)$

ii)  $p \rightarrow (q \rightarrow p) = \sim p \rightarrow (p \rightarrow q)$

c. i) Prove that the proposition  $\sim(p \wedge q) \vee q$  is a tautology.

ii) Prove that the proposition  $p \wedge (q \wedge \sim p)$  is contradiction.

d. Find pdnf and penf for  $(p \rightarrow q) \rightarrow r$ .

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Total No. of Pages : 4

**March-April 2024 Examination**  
**Master of Computer Application (MCA)**  
**Operating System**  
**Sub. Code: 89994**

Day and Date : Friday, 10-05-2024

Total Marks : 70

Time : 10:30 am to 01:00 pm

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**Q1 Select an appropriate option from the following. [10]**

- i. In distributed system, each processor has its own .....
- A. Local memory
  - B. Clock
  - C. Both local memory and clock
  - D. None of the mentioned
- ii. MFD stands for?
- A. Main File Directory
  - B. Memory File Directory
  - C. Master File Directory
  - D. Master Format Directory
- iii. This is the written report or presentation.
- A. Documentation
  - B. Collection
  - C. Verification
  - D. Validation



- iv. Operating System acts as an intermediary between the ..... and the computer hardware.
- A. Computer Software                      B. Computer User  
C. Both A& B                                  D. None of the above
- v. Which of the following condition is required for a deadlock to be possible?
- A. Mutual Exclusion                          B. Hold and wait  
C. Circular Wait                              D. All of the above
- vi. This is the time when the process completes its execution
- A. Completion Time                        B. Waiting time  
C. Response time                            D. None of above
- vii. The purpose of a scheduling algorithm is/are
- A. Maximum CPU utilization  
B. Maximum throughput  
C. Fair allocation of CPU  
D. All of the above
- viii. RAID level 1+0 is used because, RAID level 0 provides ..... level 1 provides whereas RAID
- A. Performance, redundancy  
B. Performance, reliability  
C. Redundancy, performance  
D. None of the above

- ix. For most computers, the bootstrap is stored in .....
- A. RAM                                      B. ROM
- C. Cache                                      D. Tertiary storage
- X. CPU fetches the instruction from memory according to the value of
- A. Program counter
- B. Status register
- C. Instruction register
- D. Program status word

**Q.2 Attempt any three questions****[15]**

- i. What is Operating System? Explain the various function of Operating System.
- ii. Explain in detail the types of Operating system.
- iii. What is Process Control Block? Explain its structure.
- iv. Write a note on system call?

**Q.3 Attempt any three questions****[15]**

- i. What is CPU Scheduling? Explain its algorithms.
- ii. What is process Synchronization? Explain elements of process Synchronization.
- iii. Explain in detail Bankers Algorithm with advantages and disadvantages.
- iv. What is deadlock? Explain the necessary conditions for Deadlock with Advantages and disadvantages.

**Q.4 Attempt any three questions**

[15]

- i. What is memory management? Explain its techniques in detail.
- ii. What is segmentation? Explain advantages and disadvantages.
- iii. What is compaction in operating system?
- iv. Explain directory structure in file management.

**Q.5 Attempt any three questions**

[15]

- i. Rewrite the disk scheduling algorithm with example.
- ii. What is the difference between Distributed and centralized operating system
- iii. Write a note on RAID structure.
- iv. Explain disk structure in details.

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Total No. of Pages : 3

**Sem. II, Examination-April 2024**  
**Sub - Software Engineering**  
**Subject Code : 90393**

Day and Date : Saturday, 11-05-2024

Total Marks : 70

Time : 2.30 p.m. to 5.00 p.m.

**Instructions :**

- 1) All questions are compulsory
- 2) Figures to the right indicate full marks

**Q.1 Select an appropriate option from the following.**

**(10)**

1. What does SDLC stands for?
  - A. System Design Life Cycle
  - B. Software Design Life Cycle
  - C. Software Development Life Cycle
  - D. System Development Life cycle
2. Software Testing with real data in real environment is known as.....
  - A. Alpha Testing
  - B. Beta testing
  - C. Regression testing
  - D. Collaboration Testing
3. .... is not a project manager's activity.
  - A. Project Design
  - B. Project Management
  - C. Project Planning
  - D. Project Control
4. .... is not suitable for accommodating any change?
  - A. RAD Model
  - B. Waterfall Model
  - C. Build & Fix Mode
  - D. Prototyping Model
5. Risk management is one of the most important jobs for a
  - A. Client
  - B. Investor
  - C. Production team
  - D. Project manager

6. What is Scrum .....
  - A. A testing strategy
  - B. A communication technique
  - C. A project management framework
  - D. A Coding strategy
7. Which of the following document contains the user system requirements?
  - A. SRD
  - B. DDD
  - C. SDD
  - D. SRS
8. Agile Software Development is based on.
  - A. Linear Development
  - B. Iterative Development
  - C. Incremental Development
  - D. Both Iterative & Incremental Development
9. After which phase, we can proceed to the white box testing?
  - A. After the coding phase
  - B. After designing phase
  - C. After SRS creation
  - D. After the installation phase
10. RAD Software process model stands for .....
  - A. Rapid Application Development
  - B. Relative Application Development
  - C. Rapid Application Design
  - D. Recent Application Development

**Q.2 Attempt any 3 questions**

**[15]**

- a. Explain principles of software engineering.
- b. Write a note on SDLC in software engineering.
- c. Explain waterfall model in detail and its advantages.
- d. Describe Responsibilities of a Software Project Manager.

**Q.3 Attempt any 3 questions**

[15]

- a. What is Cohesion? Explain Advantages of High Cohesion.
- b. Write a note on Information hiding
- c. Write down the most common software requirement specifications problems
- d. Describe separation of concerns and modularity.

**Q.4 Attempt any 3 questions**

[15]

- a. Describe various good programming practices.
- b. Write a note on Coding & Code Review.
- c. Distinguish between Black box testing and White box testing.
- d. Write a note on integration testing and system testing.

**Q.5 Attempt any 3 questions**

[15]

- a. What are the key issues around deployment? Explain
- b. What are the benefits of continuous improvement in software development?
- c. Write a note on software evolution and release management.
- d. Describe components of software maintenance process.

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