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VTU QUESTION PAPERS INDEX LIST JULY- AUGUAT 2021

CBCS SCHEME

20MCA11

USN ☐☐☐☐☐☐☐☐☐☐

First Semester MCA Degree Examination, July/August 2021
Data Structures with Algorithms

Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions.*

1 a. What are data structures? Explain the classification of data structures with neat diagram.
       (06 Marks)
   b. Define prefix and postfix expression. Write a program to convert infix to postfix expression.
       (10 Marks)
   c. Explain polish and reverse polish expression.
       (04 Marks)

2 a. Define stack. Write a program to implement basic operation of stack.   **(08 Marks)**
   b. Convert the following expression to prefix and postfix expression:
       i) $(A + B \cap C) / D + E$
       ii) $A * B/C + (B + C) * D$ **(06 Marks)**
   c. Write a program to evaluate postfix expression.   **(06 Marks)**

3 a. What is recursion? Write a program to generate n Fibonacci series, using recursion.
       (10 Marks)
   b. What is Queue? Explain various types of Queue and operation performed on it. **(10 Marks)**

4 a. Define circular Queue. Explain its advantages over ordinary Queue, write a function to
       demonstrate insert and delete operation on circular Queue.   **(10 Marks)**
   b. Explain in detail on:
       i)   Priority Queue
       ii)   Factorial of a number using recursion.   **(10 Marks)**

5 a. Discuss about different types of memory management functions.   **(10 Marks)**
   b. Write a function for each of the following operation of linked list:
       i)   Insertion of node at the beginning.
       ii)   Insertion of node at the end.
       iii) Insertion of node at a given position.   **(10 Marks)**

6 a. Explain linked implementation of stacks with suitable diagrams, write algorithm to
       implement stack push and pop operation using singly linked list.   **(10 Marks)**
   b. Differentiate:
       i)   Static and dynamic memory allocation.
       ii)   getnode( ) and freenode( ) operations.   **(10 Marks)**

7 a. Define algorithm. Explain the steps involved in algorithm design and analysis process with a
       neat diagram.   **(10 Marks)**
   b. List out important problem types. Explain any 5 of them.   **(10 Marks)**

8   a.   What is asymptotic notation? List and explain the asymptotic notations.   **(10 Marks)**

     b.   List the steps involved in analyzing the time efficiency of recursive algorithm. Explain the tower of Hanoi problem and analyze its efficiency.   **(10 Marks)**

9   a.   Write an algorithm for merge sort and find its time complexity of merge sort.   **(10 Marks)**

     b.   Write an algorithm to sort given n elements using bubble sort and obtain an expression for number of times basic operation is executed.   **(05 Marks)**

     c.   Obtain the topological ordering of the given graph by using the source removal method. (Refer Fig.Q.9(c)).   **(05 Marks)**
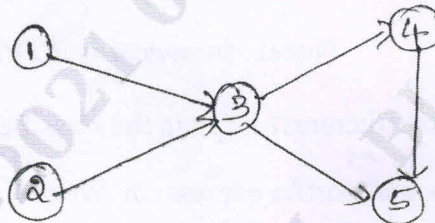

Fig.Q.9(c)

10   a.   Write a Prim's algorithm. Apply this algorithm to the following graph to construct minimum spanning tree. (Refer Fig.Q.10(a)).   **(10 Marks)**
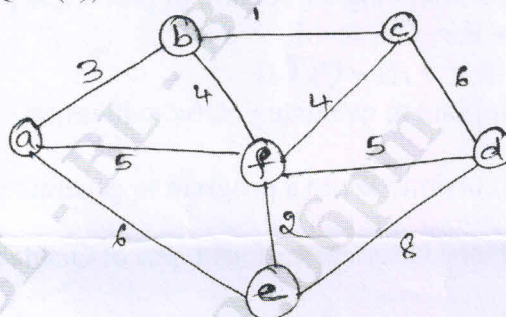

Fig.Q.10(a)

     b.   Obtain the shortest distance and shortest path from "a" node to all other nodes in a graph. (Refer Fig.Q.10(b)).   **(10 Marks)**
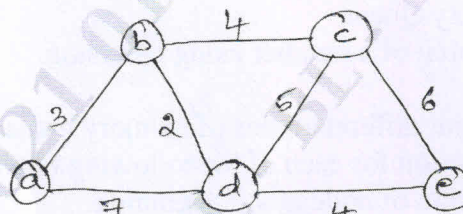

Fig.Q.10(b)

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First Semester MCA Degree Examination, July/August 2021
Operating System with UNIX

Time: 3 hrs.

Max. Marks: 100

Note: *Answer any FIVE full questions.*

1 a. What is an operating system? Explain with a neat diagram the component of operating system. **(10 Marks)**

  b. What is process, process state and Process Control Block (PCB)? Describe the contents of PCB. **(10 Marks)**

2 a. Consider the following set of processes with given length of CPu burst. Draw the Gantt chart for SJF (Preemptive)2 SJF (Non Preemptive). Find the average waiting time for each scheduling algorithm.

Processes	P_1	P_2	P_3	P_4	P_5
Burst time	6	2	8	3	4
Arrival time	2	5	1	0	4

(10 Marks)

  b. What do you mean by CPU scheduling? Explain the scheduling criteria of Algorithm. **(10 Marks)**

3 a. Write and explain Bankers Algorithm for deadlock avoidance. **(10 Marks)**

  b. With a neat diagram, explain Resource allocation graph. **(10 Marks)**

4 a. Explain the difference between internal and external fragmentation. **(10 Marks)**

  b. What is page fault? What action does the operating system take when a page fault occurs? Explain with the diagram. **(10 Marks)**

5 a. Explain UNIX file system with a neat diagram. **(10 Marks)**

  b. What is the use of ls command? In detail explain the output of $ls-l$. **(10 Marks)**

6 a. Explain the relative and absolute permission with examples. **(10 Marks)**

  b. Describe hard links and softlinks with suitable examples. **(10 Marks)**

7 a. Explain the process in UNIX and mechanism of process creation. **(10 Marks)**

  b. State the difference between internal and external commands in UNIX. **(10 Marks)**

8 a. Explain the use of set, set-x, test and IJ with example. **(10 Marks)**

  b. Explain : i) If conditional statement, case statement
       ii) While and for looping with examples **(10 Marks)**

9 a. What is AWK? Explain the built-in variable and built-in function used by AWK. **(10 Marks)**

  b. Write an AWK script to compute gross salary of an employee accordingly to rule given below.
  If a basic salary is < 10,000 then
  HRG = 15% of basic 2 DA = 45% of basic
  If basic salary is > = 10,000 then HRA = 20% of basic 2, DA = 50% of basic. **(10 Marks)**

10 a. Explain the following : i) Exec ii) export iii) eval. **(10 Marks)**

  b. Write an awk program the folds long lines into 40 columns. **(10 Marks)**

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20MCA13

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First Semester MCA Degree Examination, July/August 2021
Computer Networks

Time: 3 hrs. Max. Marks: 100

Note: *Answer any FIVE full questions.*

1 a. Explain the applications of computer Networks. **(06 Marks)**
   b. What are the cost effective resource sharing techniques adapted in computer networks? Explain. **(09 Marks)**
   c. With a neat diagram, explain the TCP/IP architecture. **(05 Marks)**

2 a. How long a message of 25MB will take time to transfer over a link of bandwidth 10mbps? **(06 Marks)**
   b. List the design requirement perspectives of computer networks and discuss. **(06 Marks)**
   c. With a neat diagram, describe the functions of each layers in OSI model. **(08 Marks)**

3 a. Elaborate the design issues of getting network connected. **(10 Marks)**
   b. Draw the NRZ, NRZI and Manchester encoding schemes for the BIT pattern 1101001011. **(06 Marks)**
   c. Describe parity error detection scheme with sufficient examples. **(04 Marks)**

4 a. Explain the working of Byte oriented protocols. **(10 Marks)**
   b. Write short notes on :
      i) CRC algorithm ii) Distributed system of wireless communication. **(10 Marks)**

5 a. Discuss the source routing switching approach and different ways of handling headers of source routing. **(10 Marks)**
   b. Explain Distance vector routing protocol. **(10 Marks)**

6 a. Elaborate the header format of IPV4 packet. **(10 Marks)**
   b. With an example, describe fragmentation forwarding and assembly of packet in internetworks. **(10 Marks)**

7 a. Write the differences between TCP and UDP. **(08 Marks)**
   b. What are the four services offered by transport layer? **(04 Marks)**
   c. What is Congestion? Explain the approaches to control congestion. **(08 Marks)**

8 a. Discuss connection establishment and termination in TCP. **(10 Marks)**
   b. Explain Leaky bucket and token bucket protocols. **(10 Marks)**

9 a. Mention the security threats in internetwork. **(04 Marks)**
   b. With a neat diagram, discuss the working of symmetric key encryption using Cyber Block Chaining (CBC). **(08 Marks)**
   c. State the strengths and weakness of firewall. **(08 Marks)**

10 a. Describe the working components of email. **(10 Marks)**
    b. Write short notes on :
       i) DNS ii) SNMP. **(10 Marks)**

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First Semester MCA Degree Examination, July/August 2021
Mathematical Foundation for Computer Applications

Time: 3 hrs.

Max. Marks: 100

Note: *1. Answer any FIVE full questions.*
2. Distribution tables are allowed.

1   a. Define: i) Symmetric difference of two sets   ii) Power set , with an illustration for each.
       (06 Marks)

   b. State pigeonhole principle. ABC is an equilateral triangle whose sides of length 1m. If we select 10 points inside the triangle, prove that at least two of these points are such that the distance between them is less than $1/3$m.   **(07 Marks)**

   c. Find all the eigen values and eigen vectors of the matrix
       $$A = \begin{bmatrix} -1 & 3 \\ -2 & 4 \end{bmatrix}$$ **(07 Marks)**

2   a. For any two sets A and B, prove that
       i) $A - (A \cap B) = A - B$
       ii) $A - (A - B) = A \cap B$.   **(06 Marks)**

   b. Among the integers from 1 to 200, find the number of integers that are
       i)   Not divisible by 5
       ii)   Divisible by 2 or 5 or 9
       iii) Not divisible by 2 or 5 or 9.   **(07 Marks)**

   c. State and prove Demorgan laws, distributive laws of set theory.   **(07 Marks)**

3   a. State the laws of logic.   **(06 Marks)**

   b. Prove the following is valid argument:
       $\sim p \leftrightarrow q$
       $q \rightarrow r$
       $\underline{\sim r}$
       $\therefore p$ **(07 Marks)**

   c. Negate and simplify each of the followings
       i) $\exists x, [p(x) \vee q(x)]$
       ii) $\forall x, [p(x) \wedge \sim q(x)]$
       iii) $\exists x, [\{p(x) \vee q(x)\} \rightarrow r(x)]$.   **(07 Marks)**

4   a. Prove the following logical equivalences without using truth tables:
       i) $[p \vee q \vee (\sim p \wedge \sim q \wedge r)] \Leftrightarrow (p \vee q \vee r)$
       ii) $[(\sim p \vee \sim q) \rightarrow (p \wedge q \wedge r)] \Leftrightarrow p \wedge q$ **(06 Marks)**

   b. Define converse, inverse and contra positive of a conditional $p \rightarrow q$. State the converse, inverse and contrapositive of the conditional. "If a quadrilateral is a parallelogram, then its diagonal bisect each other".   **(07 Marks)**

   c. Define Tautology; contradiction and contingency, prove that, for any propositions p, q, r the compound proposition $\{p \rightarrow (q \rightarrow r)\} \rightarrow \{(p \rightarrow q) \rightarrow (p \rightarrow r)\}$ is a tautology.   **(07 Marks)**

1 of 3

5   a.   Define partial order relation R defined on the set A. Let A = {1, 2, 3, 4, 6, 12}, define the relation R by aRb, if and only if a divides b. Prove that R- is a partial order on A, draw Hasse diagram for the relation.   **(06 Marks)**

      b.   Consider A = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12}. The relation R is defined as $(x, y) \in R$, if and only if $x - y$ is multiple of 5. Verify that R- is an equivalence relation.   **(07 Marks)**

      c.   Let A = {1, 2, 3}, and B = {1, 2, 3, 4}. The relations R and S from A to B are represented by the matrices.

$$M_R = \begin{bmatrix} 1 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ 1 & 1 & 1 & 0 \end{bmatrix}, \quad M_S = \begin{bmatrix} 1 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 \\ 0 & 1 & 0 & 1 \end{bmatrix}$$

         Determine the relations $\overline{R}$, $\overline{S}$, $R \cup S$, $R \cap S$, S^C and their matrix representations.   **(07 Marks)**

6   a.   Let A = {1, 2, 3, 4, 6} and R be the relation on A defined by aRb if and only if a is multiple of b. Represent the relation R as a matrix and draw its diagraph.   **(06 Marks)**

      b.   Let A = {a, b, c}, and R and S be relations on A whose matrices are given as

$$M_R = \begin{bmatrix} 1 & 0 & 1 \\ 1 & 1 & 1 \\ 0 & 1 & 0 \end{bmatrix}; \quad M_S = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 1 & 0 & 1 \end{bmatrix}$$

         Find the composite relations ROS, SOR, ROR, SOS and their matrices.   **(07 Marks)**

      c.   Let A = {1, 2, 3, 4, 5}. Define a relation R on A × A by $(x_1, y_1) R(x_2, y_2)$ if and only if $x_1 + y_1 = x_2 + y_2$

         i)   Verify that R- is an equivalence relation on A × A.

         ii)   Determine the equivalent classes [(1, 3)], [(2, 4)] and [(1, 1)].   **(07 Marks)**

7   a.   The probability distribution function P(X) of a variate X is given by the following table.

         X: 0   1   2   3   4   5   6

        P(X):   K   3K   5K   7K   9K   11K   13K

         i)   For what value of K, above data represent a valid probability distribution.

         ii)   Find $P(X < 4)$, $P(X \geq 5)$ and $P(3 < X \leq 6)$.   **(06 Marks)**

      b.   Given 2% of fuses manufactured by a firm are defective. Find the probability that a box containing 200 fuses has

         i) At least one   ii) 3 or more   iii) exactly two, defective fuses.   **(07 Marks)**

      c.   In a test on electric bulbs, it was found that the life of a particular brand was distributed normally with an average life of 2000 hours and standard deviation of 60 hours. If a firm purchases 2500 bulbs find the number of bulbs that are likely to last for

         i)   More than 2100 hrs

         ii)   Less than 1950 hrs

         iii)   Between 1900 to 2100 hrs.   **(07 Marks)**

8   a.   For the standard normal distribution of a random variable Z, evaluate the followings:

         i) $P(0 \leq z \leq 1.45)$ ii) $P(-3 \cdot 40 \leq z \leq 2.65)$ iii) $P(-2.55 \leq z \leq -0.8)$ iv) $P(z \leq -3.35)$.   **(06 Marks)**

      b.   The length of a telephone conversation has an exponential distribution with a mean of 3-minutes. Find the probability that a call ends.

         i) in less than 3-minutes   ii) taken between 3 and 5 minutes.   **(07 Marks)**

      c.   A random variable X has the following probability function for various values of x

x:	0	1	2	3	4	5	6	7
p(x):	0	k	2k	2k	3k	k^2	$2k^2$	$7k^2 + k$

         i) Find k   ii) evaluate $p(x < 6)$, $p(x \geq 6)$, $p(3 < x \leq 6)$ **(07 Marks)**

9 a. Explain the followings: i) Circuit   ii) Euler and Hamiltonian path   iii) Konigsberg bridge problem. **(06 Marks)**

b. Prove that whether the two following graphs are isomorphic or not: **(07 Marks)**
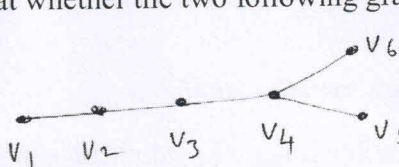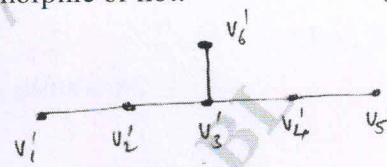
Fig.Q.9(b)(i)   Fig.Q.9(b)(ii)

c. Determine whether the following graphs given are bipartite or not. **(07 Marks)**
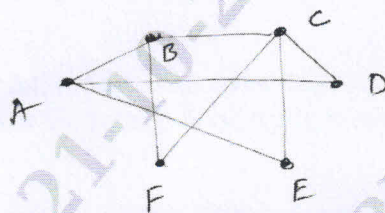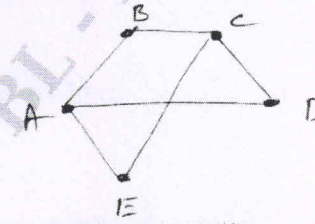
Fig.Q.9(c)(i)   Fig.Q.9(c)(ii)

10 a. Define the terms:
   i)   Regular graph
   ii) K-regular graph
   iii) Complete graph **(06 Marks)**

b. Find the in-degree and out-degree of each vertex of each of the following directed graphs. Also verify that the sum of the in-degrees (or the out-degrees) equals the number of edges. **(07 Marks)**
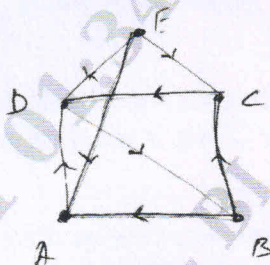
Fig.Q.10(b)

c. Determine whether the graphs shown are isomorphic. **(07 Marks)**
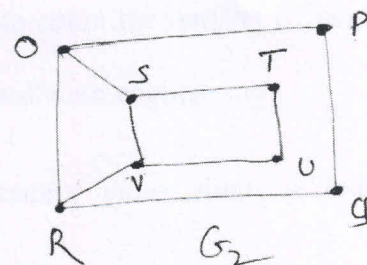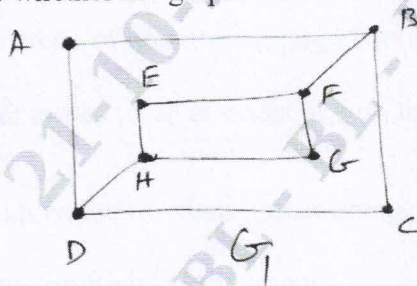
Fig.Q.10(c)

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18MCA14

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First Semester MCA Degree Examination, July/August 2021
Software Engineering

Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions.*

1   a. What are the attributes of a good software?   (04 Marks)
    b. Explain IEEE/ACM code of software engineering ethics.   (08 Marks)
    c. Differentiate between :
        i) Software engineering and computer science
        ii) Software engineering and system engineering   (08 Marks)

2   a. Explain waterfall model with advantages and disadvantages.   (10 Marks)
    b. List and explain the principle of Agile method.   (10 Marks)

3   a. Explain with different types of Nonfunctional requirements.   (10 Marks)
    b. Explain the steps involved in Requirements engineering process.   (10 Marks)

4   a. Differentiate between (i) CBSE for Reduce   (ii) CBSE with Reuse.   (10 Marks)
    b. Explain the different types of components composition.   (10 Marks)

5   a. Write a sequence diagram for ATM withdrawal process.   (10 Marks)
    b. Explain the three different types of architectural views.   (10 Marks)

6   a. Write a state machine diagram to depict the working of a microwave oven.   (10 Marks)
   b. List and explain all the architectural style for C and C view.   (10 Marks)

7   a. What is a structure chart? Explain with an example program.   (10 Marks)
    b. Explain the advantages and disadvantages of Distributed software engineering.   (10 Marks)

8   a. Apply the steps of structure Design Methodology to count the number of words in a given
        input file.   (12 Marks)
    b. Explain the issues to be considered for Distributed software engineering.   (08 Marks)

9   a. Explain equivalence class partitioning and Boundary value Analysis with a suitable
        example.   (12 Marks)
    b. Write a note on Risk Management.   (08 Marks)

10 a. What is White Box Testing? Write and explain program flow graph for binary search
        program.   (12 Marks)
    b. Write a note on COCOMO Model.   (08 Marks)

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First Semester MCA Degree Examination, July/August 2021
Computer Organization

Time: 3 hrs.

Max. Marks: 100

Note: *Answer any FIVE full questions.*

1 a. Convert the following: i) $(153)_{10} = (?)_8$ ii) $(630.4)_8 = (?)_{10}$ iii) $(B65F)_{16} = (?)_{10}$
   iv) $(0.6875)_{10} = (?)_2$ v) $(10110001101011.11110010)_2 = (?)_{16}$ **(10 Marks)**
   b. Define binary logic. Explain three basic operations of binary logic with their truth tables.
   (10 Marks)

2 a. Prove the following using basic Boolean theorems:
   i) $(x + y)(x + z) = x + yz$ ii) $xy + xz + y\bar{z} = xz + y\bar{z}$ **(10 Marks)**
   b. Simplify the following Boolean functions using Karnaugh map:
   i) $F(w, x, y, z) = \sum(0, 1, 2, 4, 5, 6, 8, 9, 12, 13, 14)$
   ii) $F = \overline{ABC} + \overline{BCD} + \overline{ABCD} + A\overline{BC}$ **(10 Marks)**

3 a. Explain a full adder with its truth table, Karnaugh maps for simplifying the expressions for sum and carry along with a neat diagram. **(10 Marks)**
   b. What is multiplexer? With block diagram and logic diagram explain 4 to 1 line multiplexer.
   (10 Marks)

4 a. Define a flip-flop and explain JK flip-flop with logic diagram and truth table. **(10 Marks)**
   b. Describe 4-bit binary ripple counter with a neat sketch. **(10 Marks)**

5 a. With a neat diagram, explain the basic functional units of a computer. **(10 Marks)**
   b. Discuss the basic operational concept of a system with a neat diagram. **(10 Marks)**

6 a. Explain following:
   i) Big-Endian and Little-Endian assignments
   ii) Basic instruction types. **(10 Marks)**
   b. What are addressing modes? Explain immediate addressing, indirect addressing and relative addressing with examples. **(10 Marks)**

7 a. What are assembler directives? Explain following assembler directives:
   i) EQU ii) ORIGIN iii) DATAWORD iv) RESERVE. **(10 Marks)**
   b. Discuss enabling and disabling interrupts. **(10 Marks)**

8 a. With a neat diagram, explain use of DMA controllers in a computer system. **(10 Marks)**
   b. What is bus arbitration? What are different approaches to bus arbitration? Explain any one in detail. **(10 Marks)**

9 a. With a neat diagram, explain 16×8 memory organization. **(10 Marks)**
   b. With a neat sketch explain asynchronous DRAMS. **(10 Marks)**

10 a. Explain following: i) ROM ii) PROM iii) EPROM iv) EEPROM. **(10 Marks)**
    b. Explain the direct mapped cache and associative mapping with neat diagrams. **(10 Marks)**

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18MCA21

Second Semester MCA Degree Examination, July/August 2021
Programming Using Java

Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions.*

1 a. Briefly explain the characteristics of java programming language. **(08 Marks)**
  b. What is narrowing and widening? Explain with an example. **(04 Marks)**
  c. Explain about the primitive data types available in java. **(08 Marks)**

2 a. Write a short notes on : i) finalize ( )   (ii) this. **(06 Marks)**
  b. Explain working of for-each loop with example. **(06 Marks)**
  c. How arrays are defined and initialized in java? Explain with an example. **(08 Marks)**

3 a. How string is defined in java? Explain two methods for each (i) Searching string (ii) String comparison (iii) Modifying string. **(10 Marks)**
  b. What is Varargs? Variable length arguments. Explain with example. **(05 Marks)**
  c. Write a program for constructor overloading. **(05 Marks)**

4 a. What is static block? Explain with an example **(07 Marks)**
  b. Explain inner class outer class with suitable example. **(07 Marks)**
  c. What is method overloading? Explain with an example. **(06 Marks)**

5 a. What is method overriding? Write a program to demonstrate method overriding in subclasses. **(08 Marks)**
  b. Explain the order of constructor execution in multilevel hierarchy of classes. **(08 Marks)**
  c. Differentiate between abstract class and interface. **(04 Marks)**

6 a. How is multiple inheritance achieved in java? Write a program to demonstrate the same. **(08 Marks)**
  b. Define Package. Explain the creation of package and imparting package with an example. **(06 Marks)**
  c. Why keyword 'final' is used with variables, methods and classes? **(06 Marks)**

7 a. Write a Java program to implement a Queue using user defined Exception Handling (also make use of throw, throws). **(10 Marks)**
  b. What is the two ways of creating thread? Explain any one method with example. **(10 Marks)**

8 a. Write a Java program to implement producer consumer concept using synchronized Threads. **(10 Marks)**
  b. Explain the two methods used to determine when a thread ends. **(05 Marks)**
  c. Write a program for catching subclass exception. **(05 Marks)**

9 a. Explain values ( ) and Valueof ( ) methods in enumeration. **(06 Marks)**
  b. What is auto boxing? Explain with an example. **(08 Marks)**
  c. Write short notes on Jnet Address class in Java. **(06 Marks)**

10 a. Write a Java program, which uses Datagram socket for client server communication. **(10 Marks)**
  b. What is annotations in java? Give the example. **(05 Marks)**
  c. Mention any 4 collection classes; explain the 4 methods of anyone of the class. **(05 Marks)**

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18MCA22

Second Semester MCA Degree Examination, July/August 2021
Data Structures Using C++

Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions.*

1   a.   What are Data Structures? Explain the classifications of Data Structures, with neat diagrams.
        (10 Marks)
    b.   Write an ADT for string.   **(04 Marks)**
    c.   Define stack, write an ADT for stack.   **(06 Marks)**

2   a.   Write a program convert infix notiation to postfix notiation.   **(10 Marks)**
    b.   Write a algorithm to convert an infix expression to postfix, trace the algorithms for the
        following infix expressions. $((A + (B - C) * D) \wedge E + F)$ **(10 Marks)**

3   a.   What is Recursion? Write a program to implement towers of Hanoi problem using recursion
        and trace output for 3 disks.   **(10 Marks)**
    b.   Write a program calculate the sum for a given number 'n' from 1 to n using recursion.
        (05 Marks)
    c.   Write a program calculate GCD and LCM of 3 integers numbers using recursion.   **(05 Marks)**

4   a.   What are Priority Queue? Write a program to simulate the working of Priority Queue.
        (10 Marks)
    b.   Write a program simulate the working of dequeue.   **(10 Marks)**

5   a.   Write a algorithm to implement following operations on singly linked list:
        i)   Insert at the beginning
        ii)   Insert at the end.   **(10 Marks)**
    b.   Discuss implementation of queue operation using doubly linked list, suggest algorithm to
        implement insert and delete operations of queue using doubly linked list.   **(10 Marks)**

6   a.   Simulate the working of double linked list to implement stack and queue.   **(10 Marks)**
    b.   Write algorithm for performing following operations on circular linked list:
        i)   Delete from the beginning
        ii)   Delete from the end.   **(10 Marks)**

7   a.   Construct the BST for the items 40, 60, 50, 33, 55, 11, write and explain C++ module to
        insert an element in to BST.   **(10 Marks)**
    b.   Write a C++ program to traverse a given binary tree inorder, preorder and post order.
        (10 Marks)

8 a. Write algorithm for:
   i)   Inserting a node in BST
   ii) Deleting a node from a BST   **(10 Marks)**
   b. Explain the following with an example to each:
   i)   Binary tree
   ii) Level of a tree
   iii) Complete binary tree
   iv) Skewed tree
   v)   Strictly binary tree.   **(10 Marks)**

9 a. Write a C++ program for binary search.   **(10 Marks)**
   b. Explain different hash collision resolution technique.   **(10 Marks)**

10 a. Write a C++ program bubble sort.   **(10 Marks)**
   b. Write an algorithm for selection sort, trace the algorithm for the following set of value:
       28, 56, 18, 10, 50.   **(10 Marks)**

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CBCS SCHEME

Second Semester MCA Degree Examination, July/August 2021
Discrete Mathematical Structures and Statistics

Time: 3 hrs.   Max. Marks: 100

Note: Answer any FIVE full questions.

1 a. Examine whether the compound proposition $[(p \vee q) \to r] \leftrightarrow [\sim r \to \sim (p \vee q)]$ is a tautology. Also show that u an v are logically equivalent, where $u = [(p \vee q) \to r]$, $v = [\sim r \to \sim (p \vee q)]$. **(07 Marks)**

   b. Negate and simplify the following:
      (i) $\exists x, [p(x) \vee q(x)]$ (ii) $\forall x, [p(x) \wedge \sim q(x)]$ (iii) $\forall x, [p(x) \to q(x)]$ **(07 Marks)**

   c. Write the following conditional in the form of disjunction.
      "If I am awake, then I will work on the computer or read a novel". **(06 Marks)**

2 a. Using the laws of logic prove the following conditional :
      $[(p \vee q) \vee (\sim p \wedge \sim q) \wedge r] \Leftrightarrow (p \vee q \vee r)$ **(07 Marks)**

   b. Summarize the laws of logic. **(07 Marks)**

   c. Prove that for all integers K and ℓ, if K and ℓ are both odd, then $(K + \ell)$ is even and $K\ell$ is odd. **(06 Marks)**

3 a. Prove the Demorgon laws for the following:
      i) $\overline{A \cup B} = \overline{A} \cap \overline{B}$ ii) $\overline{A \cap B} = \overline{A} \cup \overline{B}$ **(07 Marks)**

   b. For any three sets A, B, C prove that $\overline{(A \cap B) \cup C} = (\overline{A} \cup \overline{B}) \cap \overline{C}$ **(07 Marks)**

   c. State and prove the addition theorem in probability. **(06 Marks)**

4 a. Three students X, Y, Z . Write an examination. Their chances of passing are $\frac{1}{2}$, $\frac{1}{3}$ and $\frac{1}{4}$ respectively. Find the probability that : (i) All of them pass (ii) At least one of them pass
      (iii) Al least two of them pass **(07 Marks)**

   b. Determine the sets A and B, given that A – B = {1, 3, 7, 11}, B – A = {2, 6, 8}, $A \cap B = \{4, 9\}$. **(07 Marks)**

   c. Let A and B are events with P(A $\cup$ B) = 7/8, P(A $\cap$ B) = ¼ and $P(\overline{A})$ = 5/8. Then find P(A), P(B) and $P(A \cap \overline{B})$. **(06 Marks)**

5 a. How many 3-digit numbers can be formed by using the digits 2, 3, 5, 6, 7, 9 without repetitions?
      (i)   How many of these are less than 400?
      (ii) How many of them are even?
      (iii) How many of these are multiple of 5? **(07 Marks)**

   b. Prove by mathematical induction that
      $$s(n) = 1.3 + 2.4 + 3.5 + \ldots + n(n + 2) = \frac{n}{6}(n + 1)(2n + 7)$$ **(07 Marks)**

   c. A sequence {An} is defined recursively by $a_1 = 4$, $a_n = a_{n-1} + n$ for $n \geq 2$. Find a_n in explicit form. **(06 Marks)**

6 a. Find the coefficient of x^0 in the expansion of $\left(2x^2 - \dfrac{3}{x^3}\right)^{25}$. (Term independent of x) **(07 Marks)**

  b. There are 12 points in a plane of which four are collinear. Find the number of (i) Straight lines (ii) Triangles, which can be formed form these points. **(07 Marks)**

  c. The Lucas numbers are defined recursively by $L_0 = 2$, $L_1 = 1$ and $L_n = L_{n-1} + L_{n-2}$ for $n \geq 2$. Evaluate L_2 to L_{10}. **(06 Marks)**

7 a. The probability distribution of a finite random variable X is given by

x_i	1	2	3	4	5
$P(x_i)$	0.2	0.35	0.25	0.15	0.05

Find the mean, variance and standard deviation of the probability distribution. **(07 Marks)**

  b. The probability that a pen manufactured by a company will be defective is 0.1. If 12 such pens are selected, find the probability that (i) exactly 2 will be defective   (ii) at least two will be defective (iii) none of them will be defective. **(07 Marks)**

  c. The life of a certain type of electrical lamps is normally distributed with a mean of 2040 hours and standard deviation 60 hours. In a consignment of 2000 lamps, find how many would be expected to burn for: (i) More than 2150 hours (ii) less than 1950 hours (iii) between 1920 hours and 2160 hours. Given A(1.5) = 0.4332, A(1.83) = 0.4664 and A(2) = 0.4772. **(06 Marks)**

8 a. Obtain the mean and standard deviation of Binomial distribution. **(07 Marks)**

  b. The probability that an individual suffers a bad reaction from a certain injection is 0.001. Using Poisson distribution, determine the probability that out of 2000 individuals, (i) exactly 3   (ii) more than 2 will suffer a bad reaction **(07 Marks)**

  c. The length of a telephone conversation has an exponential distribution with a mean of 3 minutes. Find the probability that a call: (i) ends less than 3 minutes   (ii) takes between 3 and 5 minutes. **(06 Marks)**

9 a. By the method of least squares, find the straight line that fits the following data: (st-line : y = a + bx)

x	1	3	4	6	8	9	11	14
y	1	2	4	4	5	7	8	9

(07 Marks)

  b. The following table gives the ages (in years) of 10 married couples. Calculate the coefficient of correlation between the ages:

Age of husband, x	23	27	28	29	30	31	33	35	36	39
Age of wife, y	18	22	23	24	25	26	28	29	30	32

(07 Marks)

  c. Obtain the lines of regression y = ax + b and x = ay + b, using the data $r = 0.81$, $\sigma_x = \sqrt{2}$, $\sigma_y = \sqrt{5.2}$, $\bar{x} = 3$, $\bar{y} = 5$ **(06 Marks)**

10 a. Compute the coefficient of correlation and the equation of the lines of regression for the following data: **(10 Marks)**

x	1	2	3	4	5	6	7
y	9	8	10	12	11	13	14

  b. Fit a non-linear curve of type $y = a + bx + cx^2$ by the method of Least Squares. **(10 Marks)**

x	0	1	2	3	4
y	1	1.8	1.3	2.5	2.3

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CBCS SCHEME

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18MCA31

Third Semester MCA Degree Examination, July/August 2021
Database Management System

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions.

1 a. Explain the three-schema architecture of DBMS with neat diagram. **(10 Marks)**
   b. Explain the advantages of using the DBMS approach over the traditional file system approach. **(10 Marks)**

2 a. List and explain the actors on the scene and workers behind the scene. **(10 Marks)**
   b. Explain the centralized and client/server architectures. **(10 Marks)**

3 a. Describe the entity integrity and referential integrity constraints in detail with necessary example. **(10 Marks)**
   b. Describe about the different unary relational operations and binary relational operators. **(10 Marks)**

4 a. Explain about the various notations used in E-R diagram with example. **(10 Marks)**
   b. Describe the steps involved in ER-to-relation mapping with a suitable example. **(10 Marks)**

5 a. Explain about the basic structure of SQL statement with all the clauses. **(10 Marks)**
   b. Explain about views and database authorization. **(10 Marks)**

6 a. Explain about SQL data definition and data types. **(05 Marks)**
   b. Describe about database programming issues and techniques. **(10 Marks)**
   c. Explain in detail about Embedded SQL with example. **(05 Marks)**

7 a. Describe about the informal guidelines for relational schemas. **(08 Marks)**
   b. Define Normalization. Explain about 1NF, 2NF, 3NF and BCNF. **(12 Marks)**

8 a. Explain about functional dependency with example. **(05 Marks)**
   b. What is stored procedure? Explain it with example. **(10 Marks)**
   c. Describe about DML trigger with suitable example. **(05 Marks)**

9 a. Define Transaction. Explain about ACID properties of transaction. **(10 Marks)**
   b. What is a lock? Describe the two-phase locking protocol. **(10 Marks)**

10 a. Describe in detail about deadlock handling. **(10 Marks)**
    b. Explain about recovery and atomicity. **(10 Marks)**

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USN [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]   **18MCA32**

Third Semester MCA Degree Examination, July/August 2021
Programming using Python

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions.*

1 a. List out the rules for declaring a variable in Python. Demonstrate any 3 uses of a variable, with example. **(06 Marks)**

   b. Give the output of the following and justify your answers.
   i)   −9 % 2
   ii) 9% −2
   iii) 4 + 3 * 5 ** 4
   iv) 5 − 2 * 3/6
   v)   ((((4 ** 3))))
   vi) (100 − 70) * 10/5 **(06 Marks)**

   c. Write a Python script to find the average of best 2 marks from 3 test marks accepted as input from the user. **(08 Marks)**

2 a. Discuss on the memory model for storing a variable in python. Explain with example. **(06 Marks)**

   b. Discuss on the print function for displaying information is Python. **(08 Marks)**

   c. Explain how to define and call a user defined function in python, using an example. **(06 Marks)**

3 a. Discuss on the different forms of "if" – statements with syntax and example. **(08 Marks)**

   b. What are strings in Python? Explain how strings can be accessed using indices with example. **(06 Marks)**

   c. Explain how to use special characters in strings with suitable example for each. **(06 Marks)**

4 a. Discuss on the significance of docstrings. **(04 Marks)**

   b. Define a module. Explain how to create a module and make use of it is python programs. **(08 Marks)**

   c. Give the output of the following ; with reasons

   i) print ('one\t two\n three\t four')
   ii) >>> a = '''Hai ,
                  Hello
                  How are you'''
       >>> a
   iii) >>> a·split(',')
        >>> a·split('c')
   iv) >>> a = 'Good Morning'
       >>> a·count('oo')
       >>> a·find('oo') **(08 Marks)**

5 a. Explain the working of for and while loop in Python with suitable examples.   (08 Marks)
   b. Give the expressions for performing the following operations on the list
      ℓ = [1, 2, 87, 23, 56, 89] using : i) Slicing ii) Negative indexing.
      i)   Reversing the list
      ii) Print first element1 from the list
      iii) Print the last element 89, from the list
      iv) Print alternate elements from the list starting from 2.   (08 Marks)
   c. Explain any one method of processing lists using for loop with an example.   (04 Marks)

6 a. Write a Python script to insert an element into a sorted list.   (06 Marks)
   b. What do you mean by aliasing a list? Explain with an example.   (06 Marks)
   c. Demonstrate the use of break and continue statements with a code snippet.   (08 Marks)

7 a. Discuss on the different methods of opening a file is python, with syntax and example.
                                                                                   (06 Marks)
   b. Write short notes on the different file types supported by python.   (05 Marks)
   c. What is a dictionary? Write a python script to invert a dictionary that contains duplicate
      values.   (09 Marks)

8 a. What is a tuple? Explain the following operations on a tuple with example for each :
      i)   Sum of 2 tuples
      ii) Assignment of tuples to variables
      iii) Slicing a tuple
      iv) Comparison of tuples.   (10 Marks)
   b. Write a python script to read the contents of a file and display the contents in the following
      format.

Input file		Output
Good Morning	Line 1 :	Good Morning
How are you	Line 2 :	How are you
Welcome	Line 3 :	Welcome

                                                                                   (06 Marks)
   c. Compare the collection objects lists and strings.   (04 Marks)

9 a. Discuss on object class and isinstance( ) method with an example.   (05 Marks)
   b. Write short notes on the various phases involved in object oriented programming. (06 Marks)
   c. What is inheritance? Explain how python supports inheritance with an example.   (09 Marks)

10 a. Discuss on the different ways of managing the layout of wedgets in a tkinter GUI program.
                                                                                   (10 Marks)
   b. Explain any 10 GUI widgets with respect to tkinter.   (10 Marks)

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USN ☐☐☐☐☐☐☐☐☐☐   **18MCA33**

Third Semester MCA Degree Examination, July/August 2021
Design and Analysis of Algorithms

Time: 3 hrs.   Max. Marks: 100

Note: Answer any FIVE full questions.

1 a. Explain the steps involved in problem solving with a neat flow chart.   **(10 Marks)**
   b. Consider the following algorithm and answer the following :
   Algorithm Unknown (n)
   // Input : A non-negative integer n
   s←0
   for i←1 to n do
       s ← s + i * i
   return s
   (i)   What does this algorithm computers?
   (ii)   What is its Basic Operation?
   (iii) How many times the B.O is executed?
   (iv)   What is the efficiency class of this algorithm?
   (v)   Suggest an improvement or a better algorithm and indicate its efficiency class.
                                                                                       (10 Marks)

2 a. Explain the notations used to compare and rank the order of growth of algorithm with a suitable example.   **(10 Marks)**
   b. Give the general plan for analyzing the recursive algorithm. Design and analyze the algorithm for finding the factorial of a given number.   **(10 Marks)**

3 a. Write an algorithm to sort given elements using Bubble sort and find the time efficiency.
                                                                                       (10 Marks)
   b. Write an algorithm to find the key element in the list using Binary search algorithm. Apply the same for the given data A[10, 20, 30, 40, 50] when (i) key = 30 (ii) key = 20 and (iii) key = 60. Find the number of times the B.O executed for each case.   **(10 Marks)**

4 a. Write an algorithm to sort given elements using merge sort.   **(07 Marks)**
   b. Apply Quick Sort algorithm to the given list, A[e, x, a, m, p, l, e] in alphabetical order. Draw the tree of the recursive calls made.   **(07 Marks)**
   c. Obtain the tree traversal for the given trees in inorder, preorder, postorder. **(06 Marks)**

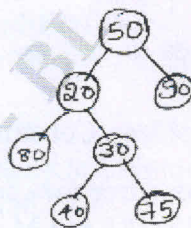Fig. Q4 (c)

5 a. Write the differences and similarities between DFS and BFS.   **(06 Marks)**
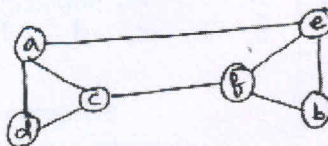   b. Travers the given graph using BFS and DFS.   **(08 Marks)**

Fig. Q5 (b)

   c. Write an algorithm to traverse the graph using DFS method.   **(06 Marks)**

6   a.   Find the minimum spanning tree for the given graph using Prim's algorithm.   **(07 Marks)**
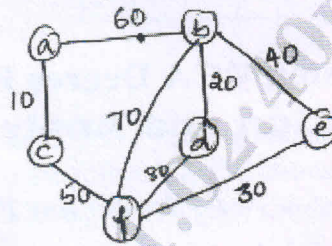

Fig. Q6 (a)

b.   Obtain the Huffman's Tree and Huffman's code for the following data and encode :
(i) AMAR, (ii) RAM.

Character	A	M	R	-
Frequency	400	200	300	100

(07 Marks)

c.   Write an algorithm to find the single source shortest path problem using Dijkstra's algorithm.   **(06 Marks)**

7   a.   Write an algorithm to sort given n elements using comparison counting method and apply the same for A[25, 45, 10, 20, 50, 15]   **(10 Marks)**

b.   Write an algorithm to compute Binomial co-efficient and find 7C3.   **(10 Marks)**

8   a.   Write an algorithm to find transitive closure or path matrix using Warshall's algorithm. Find the path matrix for the given graph.   **(10 Marks)**
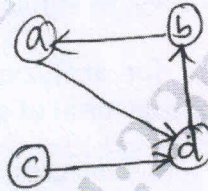

Fig. Q8 (a)

b.   Apply the bottom-up dynamic programming to the following instance of knapsack problem and find the objects.   **(10 Marks)**

Item	Weights	Values
1	2	12
2	1	10
3	3	20
4	2	15

Maximum capacity = 5

9   a.   Write the decision tree to sort the elements using selection sort and show that the lower bound is $\log_2 N!$ **(10 Marks)**

b.   Explain N-Queens problem. Construct the state space tree for placing 4 Queens.   **(10 Marks)**

10 a.   Construct the state-space tree for sum of subset problem for the given data:
Set = {5, 10, 12, 13, 15, 18} and M = 30.   **(10 Marks)**

b.   Find the optimal solution for the given assignment problem using branch and bound method.

	J_1	J_2	J_3	J_4
a	9	2	7	8
b	6	4	3	7
c	5	8	1	8
d	7	6	9	4

J_1, J_2, J_3, J_4 = Jobs
a, b, c, d = Persons

(10 Marks)

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USN | | | | | | | | | | | **18MCA34**

Third Semester MCA Degree Examination, July/August 2021
System Software

Time: 3 hrs.   Max. Marks: 100

Note: Answer any FIVE full questions.

1   a.   Differentiate between System Software and Application Software.   **(05 Marks)**
    b.   Describe the architecture of SIC/XE Assembler.   **(15 Marks)**

2   a.   Assume that two sets of 100 words are stored from location ALPHA and BETA respectively. Write a program to ADD them, store in another location GAMMA.   **(08 Marks)**
    b.   Describe the architecture of VAX assembler.   **(12 Marks)**

3   a.   Describe the following with example:
       (i) WORD   (ii) TIX   (iii) LDA   (iv) STL.   **(12 Marks)**
    b.   Describe various data structures used by the SIC assembler.   **(08 Marks)**

4   a.   Describe the structure of the following records with respect to SIC assembler:
       (i) Header   (ii) Text   (iii) End   **(10 Marks)**
    b.   Design Pass-1 of a Two-pass assembler.   **(10 Marks)**

5   a.   Explain Bit-Mask Technique to relocate a program in memory.   **(10 Marks)**
    b.   Design an algorithm for a Bootstrap loader.   **(10 Marks)**

6   a.   Design a format for the following records.
       (i) Define   (ii) Refer   (iii) Modification   **(10 Marks)**
    b.   Design an algorithm for a linking loader (Pass-1).   **(10 Marks)**

7   a.   Discuss the different data structures used by macroprocessor.   **(10 Marks)**
    b.   Design a 1-pass macroprocessor algorithm.   **(10 Marks)**

8   a.   Describe the generation of unique labels.   **(08 Marks)**
    b.   Explain the conditional macro expansion.   **(12 Marks)**

9   a.   Discuss the different phases of a compiler.   **(10 Marks)**
    b.   Construct a parse tree for the following expression:

       VARIANCE := SUMSQ DIV 100 – MEAN * MEAN   **(10 Marks)**

10 a. Consider the following automata and check whether the following strings are recognized or not. [Refer Fig.Q10(a)]
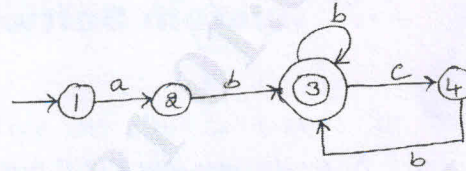

Fig.Q10(a)

(i) abbbcb   (ii) abc   (iii) abcb
(iv) acccb   (v) abccc   **(10 Marks)**

b. Design an algorithm to recognize an identifier with an underscore (_) where underscore (_) does not appear as the starting and ending character.   **(10 Marks)**

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CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐ 18MCA351

Third Semester MCA Degree Examination, July/August 2021
Software Testing

Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions.*

1 a. Briefly Explain Error, Fault and Failure with a neat diagram.   **(06 Marks)**
   b. What is software quality? Explain in details.   **(07 Marks)**
   c. Explain the testing life cycle with neat diagram.   **(07 Marks)**

2 a. Briefly explain the six basic principles of software testing.   **(08 Marks)**
   b. Differentiate between:
      i)   Verification and Validation
      ii)   Software and Hardware Testing
      iii) Static and Dynamic metrics
      iv)   Static and Dynamic Testing.   **(12 Marks)**

3 a. Write algorithm to generate a minimal BRO-constraint set from an abstract syntax tree
      $P_r = (a + b) \wedge (c - d)$ **(10 Marks)**
   b. Describe about the SATM screens with the problem statement.   **(10 Marks)**

4 a. Explain Boundary Value Analysis testing and generalizing boundary value analysis with
      appropriate diagrams.   **(10 Marks)**
   b. Define the decision table with an example and explain the test case for triangle problem with
      decision table.   **(10 Marks)**

5 a. Write the program graph, DD-path, program for the triangle program.   **(10 Marks)**
   b. Explain about Equivalence class testing with an example of triangle program and write the
      test cases.   **(10 Marks)**

6 a. List the level of testing and explain each of them with example. Write the context diagram
      of the SATM.   **(10 Marks)**
   b. Compare the integration and system testing. Explain the McCabe's basic path with your
      example.   **(10 Marks)**

7 a. Define DD-path. Write a DD-path graph for triangle problem and table showing program
      graph nodes. DD-path name case of definition.   **(10 Marks)**
   b. Define definition, use testing, du-path, definition-clear path, write du-paths for stacks, locks
      barrels of commission program.   **(10 Marks)**

8 a. Explain the slice-based testing. Write the slice for stocks, locks, barrels of commission
      program.   **(10 Marks)**
   b. Differentiate between the traditional view of testing levels and alternative life cycle models
                                                                                             (10 Marks)

9 a. Write a note on monitoring the process and improving the process.   **(10 Marks)**
   b. Explain documenting analysis and report.   **(10 Marks)**

10 a. Define Scaffolding. Briefly explain generic vs specific Scaffolding.   **(10 Marks)**
   b. Write a note on Test oracles.   **(10 Marks)**

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USN ☐☐☐☐☐☐☐☐☐☐   **18MCA354**

Third Semester MCA Degree Examination, July/August 2021
Management Information Systems

Time: 3 hrs.   Max. Marks: 100

Note: Answer any FIVE full questions.

1   a.   Define MIS. Explain the role and impact of MIS in the organization.   **(10 Marks)**
     b.   What is corporate planning? Discuss about essentiality of strategic planning.   **(10 Marks)**

2   a.   Explain management as a control system with a neat diagram.   **(10 Marks)**
     b.   What are the tools of planning? Explain in detail.   **(10 Marks)**

3   a.   Define information. Discuss the various parameters to measure information as a quality product.   **(10 Marks)**
     b.   Explain the Herbert Simon Model for the decision making process.   **(06 Marks)**
     c.   Discuss any one method for deciding from various decision alternatives.   **(04 Marks)**

4   a.   What is rational decision-making? What are the problems in making rational decisions?   **(10 Marks)**
     b.   Explain the general model of human as an information processor with neat diagram.   **(06 Marks)**
     c.   Discuss different dimensions used to measure quality of information.   **(04 Marks)**

5   a.   What are the different levels of processing required to meet the information needs? Briefly explain about them.   **(10 Marks)**
     b.   Explain TQM of Information System in detail.   **(10 Marks)**

6   a.   Discuss OLAP for analytical Information.   **(10 Marks)**
     b.   Discuss about Evaluation and Feasibility of IT solutions.   **(10 Marks)**

7   a.   Define E-business. What are the characteristics of E-business? Write about the driving factors of E-business.   **(10 Marks)**
     b.   Discuss about hardware and software required to make the Internet functional and effective.   **(05 Marks)**
     c.   Discuss the applications of Internet in brief.   **(05 Marks)**

8   a.   Discuss models of E-business with types of E-business applications in each one of them.   **(10 Marks)**
     b.   Describe the components of Web.   **(05 Marks)**
     c.   Discuss the applications of Web.   **(05 Marks)**

9   a.   Discuss about three-tier model for building E-commerce application with a neat diagram.   **(10 Marks)**
     b.   Discuss the steps in web page design and production.   **(10 Marks)**

10   a.   Explain JDBC infrastructure with the help of a neat diagram.   **(10 Marks)**
     b.   Discuss about different categories of E-services.   **(10 Marks)**

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CBCS SCHEME

18MCA51

Note: *Answer any FIVE full questions.*

1 a. Explain the benefits and architecture of •NET framework. **(10 Marks)**
   b. What are CTS types? Explain in brief. **(05 Marks)**
   c. What is assembly? Describe the information stored in assembly manifest. **(05 Marks)**

2 a. What is the difference between value types and reference types and also write the program for boxing and unboxing. **(10 Marks)**
   b. What is jagged array? Write a program in C# to read a jagged array and display the sum of all elements present in jagged array of 3 inner arrays. **(10 Marks)**

3 a. What are sealed classes and sealed methods in •NET? Explain with an example. **(10 Marks)**
   b. Discuss the different ways of enforcing encapsulation. Give examples for both the methods. **(10 Marks)**

4 a. Explain indexers with suitable example and also give difference between properties and indexers. **(10 Marks)**
   b. What are partial classes and partial methods in C#? Give an example program of each. **(06 Marks)**
   c. Explain array of objects with the help of a program. **(04 Marks)**

5 a. How delegates are used in C#? Discuss multicast and single cast delegators with examples. **(10 Marks)**
   b. Explain how custom exceptions will be created in C# with suitable example. **(10 Marks)**

6 a. Describe the architecture of ADO•NET with a neat diagram. **(10 Marks)**
   b. Explain the components of ADO•NET with an entity framework. **(05 Marks)**
   c. Explain data adopter for creating dataset with an example program. **(05 Marks)**

7 a. What is combobox control in windows applications? Explain the common properties used with combobox control. **(10 Marks)**
   b. Write a program for addition of two numbers from text boxes and display the result in form using button click event. **(05 Marks)**
   c. Explain the steps involved in creating MDI form. **(05 Marks)**

8 a. Explain WPF architecture with a neat diagram. **(10 Marks)**
   b. Write a note on : i) XAML in WPF ii) Markup extensions. **(10 Marks)**

9 a. Explain any two validation controls with example supported by ASP•NET. **(10 Marks)**
   b. Explain session tracking using cookies and HTTP session state. **(10 Marks)**

10 a. What is AJAX and why it is need? **(08 Marks)**
   b. Explain the controls from AJAX control toolkit. **(12 Marks)**

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Fifth Semester MCA Degree Examination, July/August 2021
Mobile Applications

Time: 3 hrs.   Max. Marks: 100

Note: Answer any FIVE full questions.

1   a. Describe the factors affecting the cost of development of mobile applications.   **(06 Marks)**
    b. Describe why Mobile Development is difficult.   **(04 Marks)**
    c. How to make effective use of screen real state? Illuminate Gestalt principles in understanding mobile application users.   **(10 Marks)**

2   a. Write a note on mobile myths.   **(06 Marks)**
    b. Discuss the key design patterns of mobile information design.   **(08 Marks)**
    c. Explain mobile application development platforms in detail.   **(06 Marks)**

3   a. Explain the architecture of Android with a neat diagram.   **(10 Marks)**
    b. Dissect the anatomy of an Android application.   **(10 Marks)**

4   a. What are the events defined by the activity class? Explain them by showing life cycle of an activity.   **(12 Marks)**
    b. What are the tools required to begin Android application development? Briefly explain them.   **(08 Marks)**

5   a. What are the view groups supported by Android? Explain each of them with suitable examples.   **(12 Marks)**
    b. How is location data obtained in Android? Elaborate it.   **(08 Marks)**

6   a. Write a note on basic views that are used to design the UI of an Android app.   **(10 Marks)**
    b. What are the ways of developing APK files? Describe each one of them.   **(10 Marks)**

7   a. Write a detailed description on SMS messaging in Android.   **(10 Marks)**
    b. What are the means involved in performing asynchronous calls?   **(10 Marks)**

8   a. What are the steps to create own services? Explain them.   **(10 Marks)**
    b. Elaborate the process of binding activities to services.   **(10 Marks)**

9   a. Discuss the basics of objective C.   **(12 Marks)**
    b. What is the significance of a storyboard? Neatly depict a sample story board in IOS.   **(08 Marks)**

10 a. What are tools required for Windows Phone 7? Explain them in detail.   **(10 Marks)**
    b. Elaborate the components of a Windows Phone 7 project.   **(10 Marks)**

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18MCA53

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Fifth Semester MCA Degree Examination, July/August 2021
Machine Learning

Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions.*

1 a. What do you mean by a well-posed learning problem? Explain the important features that are required to well-define a learning problem. **(10 Marks)**

   b. Define learning program for a given problem. Describe the following problems with respect to Tasks, performance and Experience.

   i)   Checkers learning problems

   ii) Handwritten recognition problem

   iii) Robot driving learning problem. **(10 Marks)**

2 a. Define concept and concept learning. With example explain how the concept learning task determines the Hypothesis for given target concept. **(10 Marks)**

   b. Illustrate find S algorithm over EnjoySport concept. Training instances given below.

Example	Sky	Air Temp	Humidity	Wind	Water	Forecast	Enjoy Sport
1	Sunny	Warm	Normal	Strong	Warm	Same	Yes
2	Sunny	Warm	High	Strong	Warm	Same	Yes
3	Rainy	Cold	High	Strong	Warm	Charge	No
4	Sunny	Warm	High	Strong	Cool	Change	Yes

(10 Marks)

3 a. Explain the concept of decision tree learning. Discuss the necessary measure required to select the attribute for building a decision tree using ID3 algorithm. **(10 Marks)**

   b. Consider the following set of training examples:

   i)   What is the entropy of this collection of training example with respect to the target function classification?

   ii) What is the information gain of A_2 relative to these training examples?

Instance	Classification	A_1	A_2
1	+	T	T
2	+	T	T
3	-	T	F
4	+	F	F
5	-	F	T
6	-	F	T

(10 Marks)

4 a. Discuss Inductive Bias in Decision Tree learning. Differentiate between two types of biases. Why prefer short Hypotheses? **(10 Marks)**

   b. What are issues in decision tree learning? Explain briefly how we can overcome. **(10 Marks)**

5 a. Define perception. Explain the concept of single perceptron with neat diagram. **(10 Marks)**

   b. Explain the back propagation algorithm. Why is it not likely to be trapped in local minima? **(10 Marks)**

6 a. Discuss the perception training rule and delta rule that solves the learning problem of perception. **(10 Marks)**

   b. List the appropriate problems for neural network learning. **(05 Marks)**

   c. Write a note on representation of feed forward networks. **(05 Marks)**

7 a. Explain Naive Bayes classifier with an example. **(10 Marks)**

   b. The following table gives data set about stolen vehicles. Using Naive Bayes classifier classify the new data {Color: Red, Type: SUV, Origin: Domestic}

Color	Type	Origin	Stolen
Red	Sports	Domestic	Yes
Red	Sports	Domestic	No
Red	Sports	Domestic	Yes
Yellow	Sports	Domestic	No
Yellow	Sports	Imported	Yes
Yellow	SUV	Imported	No
Yellow	SUV	Imported	Yes
Yellow	SUV	Domestic	No
Red	SUV	Imported	No
Red	Sports	Imported	Yes

(10 Marks)

8 a. Explain Bayesian belief network and conditional independence with example. **(10 Marks)**

   b. Define Bayesian theorem. What is the relevance and features of Bayesian theorem? **(10 Marks)**

9 a. Explain locally weighted linear regression. **(10 Marks)**

   b. What are instance based learning? Explain key features and disadvantages of these methods. **(10 Marks)**

10 a. Explain k-nearest neighbor learning algorithm. **(10 Marks)**

   b. Explain sample error, true error, confidence intervals and Q-learning function. **(10 Marks)**

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18MCA542

Fifth Semester MCA Degree Examination, July/August 2021
Internet of Things

Time: 3 hrs.

Max. Marks: 100

Note: *Answer any FIVE full questions.*

1	a.	Explain IoT solution with a neat diagram.	(05 Marks)
	b.	Discuss the emerging applications of IoT in various domains.	(08 Marks)
	c.	Describe the system components of an M2M solution, with a neat diagram.	(07 Marks)
2	a.	Compare the main characteristics of M2M and IoT.	(10 Marks)
	b.	Explain Megatrends, Capabilities and Implications of IoT.	(10 Marks)
3	a.	Explain the five fundamental roles of I-GVC (Information-Driven Global Value Chain).	(10 Marks)
	b.	Illustrate the design principles and needed capabilities of IoT.	(10 Marks)
4	a.	Explain an IoT architecture outline.	(10 Marks)
	b.	With a neat diagram, explain Information-Driven Value Chain for IoT.	(10 Marks)
5	a.	Illustrate the properties of device and its deployment scenarios.	(10 Marks)
	b.	Explain Knowledge Reference Architecture for M2M and IoT.	(10 Marks)
6	a.	Discuss the different stages of managing M2M data with neat diagram.	(10 Marks)
	b.	Explain the different phases of CRISP-DM [Cross Industry Standard Process for Data Mining] process model with a neat diagram.	(10 Marks)
7	a.	Explain any five ETSI M2M service capabilities.	(10 Marks)
	b.	With a neat diagram, explain IoT reference model.	(10 Marks)
8	a.	Briefly explain IoT domain model.	(10 Marks)
	b.	Explain Open Geospacial consortium architecture with a diagram.	(10 Marks)
9	a.	Explain Service-Oriented Architecture-based device integration with a neat diagram.	(10 Marks)
	b.	Explain the components of building automation system and its example use cases.	(10 Marks)
10	a.	Describe SOCRADES Integration Architecture.	(10 Marks)
	b.	Illustrate IMC-AESOP cloud-based architecture vision.	(10 Marks)

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