CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME

B.C.A SECOND SEMESTER DEGREE EXAMINATION MAY 2025

COMPUTER APPLICATIONS

Data Structures using C

Duration:3 Hours   **Max Marks:80**

I. Answer any FIVE of the following :   **(5×2= 10 Marks)**

1. Give any two disadvantages of using an array.

2. What is direct recursion? Give an example

3. What is insertion sort?

4. List various dynamic memory allocation functions.

5. What is complete binary tree? Give an example.

6. What are siblings in a tree? Give an example.

II. Answer any FIVE of the following :   **(5×6= 30 Marks)**

7. What is the importance of control structures in sorting algorithms. Explain with an example.

8. What is the difference between an algorithm and a flow chart? Explain.

9. What is a singly linked list? Explain with an example.

10. Write the algorithm to search an element using binary search technique.

11. Explain Priority queue with an example.

12. Write an algorithm to convert an infix expression to postfix expression.

III. Answer any FOUR of the following :   **(4×10= 40 Marks)**

13. (a) Explain the basic terminologies of a data structure.
    (b) Explain the features of the data structure.

14. (a) Explain pointer to an array with an example.
    (b) Explain how to access string to a pointer variable with an example.

15. Explain in detail the working of a stack as a linked list with diagram and algorithm.

16. Explain queue with an example.

17. Define Stack. Explain stack representation using arrays.

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CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME

B.C.A. SECOND SEMESTER DEGREE EXAMINATION MAY 2025

COMPUTER APPLICATIONS

Data Structures using C

Duration:2 Hours   Max Marks:60

PART A

Answer any FIVE questions: (5×2= 10)

1) How to represent a 2D array?

2) What is malloc() function?

3) What is FIFO?

4) What is a tree in data structure?

5) Evaluate the postfix expression 7 5 + 3 4 - *.

6) Write the code to insert a node in the beginning of the linked list?

PART B

Answer any FIVE questions :   (5×6= 30)

7) What is a Linear Data Structure? Give few examples.

8) Write an algorithm for merge sort and apply merge sort technique on the following data. 16 30 10 14 11 28

9) How to represent a stack using array? Explain.

10) For the tree below, write the in-order, post-order and pre-order traversal
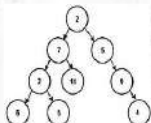
11) How to represent a queue using linked list? Explain.

12) Construct a binary tree using the following traversal.
    Pre-Order : 1 2 5 6 3 4 7 In-order : 5 2 6 1 4 3 7

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Answer any TWO questions :   (2×10= 20)

13) What is an algorithm? What are the different algorithmic notations? Explain.

14) Explain linear search algorithm with an array of elements having size 9.

15) Explain the following traversal operations in binary tree with example.
    a) In-order   b) Pre-Order   c) post-order

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CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
B.C.A. SECOND SEMESTER DEGREE EXAMINATION MAY 2025
COMPUTER APPLICATIONS
Object Oriented Concepts using JAVA

Duration:2 Hours   Max Marks:60

PART A

Answer any FIVE questions: (5×2= 10)

1) What are variables in Java? Give an example.

2) Enumerate the rules for creating identifiers in java.

3) What is the use of the finally statement in exception handling in java?

4) How can you obtain the length of an array?

5) Write the definition for an interface 'Item' that contains two variables 'code' and 'name', and a method display().

6) What is the use of the yield() method of a thread?

PART B

Answer any FIVE questions :   (5×6= 30)

7) Distinguish between the following:
   a) Inheritance and polymorphism   b) Dynamic binding and message passing

8) Explain the different types of arithmetic operators and relational operators in java.

9) Compare the break and continue statements in terms of their functions with examples.

10) With an example explain how to create objects and access class members.

11) Explain any six java system packages and their classes.

12) How to design and execute applets?

PART C

Answer any TWO questions :   (2×10= 20)

13) Explain reading and writing through Console input and output.

14) Explain any ten string methods of the class String with examples.

15) Explain the following inheritance:
    a) single inheritance   b) multilevel inheritance

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CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME

B.C.A SECOND SEMESTER DEGREE EXAMINATION MAY 2025

COMPUTER APPLICATIONS

Data Base Management Systems

Duration:3 Hours   **Max Marks:80**

I. Answer any FIVE of the following :   (5×2= 10 Marks)

1. List the DCL commands.

2. What is metadata?

3. What is the use of '_' character in selecting a tuple .

4. List the different iterative controls in PL/SQL.

5. What is Commit transaction?

6. Define Normalization.

II. Answer any FIVE of the following :   (5×6= 30 Marks)

7. Explain the constraints on relationship type.

8. Explain Entity-Relationship model.

9. Explain exception handling in PL/SQL with a programming example.

10. Explain the Relational model notation.

11. a) What are single-user system?   b) What is multi-user system?

12. Explain any three types of DBMS Interfaces.

III. Answer any FOUR of the following :   (4×10= 40 Marks)

13. Explain the different components of ER model?

14. Explain the characteristics and purpose of database approach.

15. Explain SQL commands.

16. Explain the SELECT and PROJECT opeartions of relational algebra with example.

17. Explain aggregate functions in DBMS.

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CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
BCA SECOND SEMESTER DEGREE EXAMINATION MAY 2025
COMPUTER APPLICATIONS
Discrete Mathematical Structures

Duration:3 Hours   **Max Marks:80**

I. Answer any EIGHT of the following :   **(8×3= 24 Marks)**

a. If A=$\{x|x^2 - 5x + 6 = 0\}$, $B = \{1, 2\}$, $C = \{4, 5\}$, find
   $(A - B) \times (B - C)$.

b. Let $R = \{(1, 2), (3, 4), (2, 2)\}$ and $S = \{(4, 2), (2, 5), (1, 3), (3, 1)\}$. Find
   $(R\,S) \cdot R$.

c. Write the inverse of the function $f = \{(3, b), (4, c), (5, a)\}$.

d. If $\lfloor x \rfloor$ =the greatest integer less than or equal to x . Find $\lfloor -3.56 \rfloor$, $\lfloor -0.9 \rfloor$.

e. Construct the truth table for bi-conditional statement.

f. Determine whether the statement $P \wedge \neg P$ is a tautology or a contradiction using a truthtable.

g. If $lcm(a, b) = 44$ and $ab = 132$, then find $gcd(a, b)$.

h. Draw a graph of (i) Directed graph (ii) Isolated graph

i. Show that the following digraphs are isomorphic.
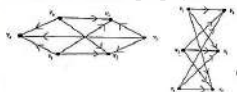
j. Calculate the range and the coefficient of range for
   $90, 50, 72, 69, 85, 100, 73, 85, 93$.

II. Answer any EIGHT of the following :   **(8×7= 56 Marks)**

a. Let $A = \{1, 2, 3\}, B = \{2, 3\}$ and $C = \{1, 3\}$ prove that
   $(A \cap B) \cup C = A \cap (B \cup C)$

b. Let $X = \{x_1, x_2, x_3, x_4\}, R = \{(x_1, x_2), (x_1, x_3), (x_3, x_4), (x_3, x_5)\}$. Draw
   the graph of R, give its matrix and check whether it is an equivalence relation.

c. Let $f(x) = x + 2, g(x) = x - 2, h(x) = 3x, \forall x \in R$ where R is a set of real numbers. Find $f \circ g, f \circ h \circ g, f \circ h$.

d. How many positive integers not exceeding 1000 are divisible by 7 or 11?

e. Use the Euclidean algorithm to obtain integers x and y satisfying
$$gcd(24, 138) = 24x + 138y.$$

f. Without constructing the truth table prove the following:
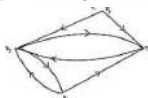$$(\neg P \wedge (\neg Q \wedge R)) \vee (Q \wedge R) \vee (P \wedge R) \Leftrightarrow R$$

g. Show that the truth values of the following formula is independent of its component:
$$((P \rightarrow Q) \wedge (Q \rightarrow R)) \rightarrow (P \rightarrow R)$$

h. Define root node. Convert the following graph to binary tree.

i. Obtain the Adjacency matrix A of the digraph given below. Find the elementary paths of lengths 1,2 and 3 from v1 and v4,

j. The following are the heights of 8 men and their wives. Find the coefficient of correlation between heights of husbands and heights of wives.

Husband(cms)	164	176	178	184	175	167	173	180
Wife(cms)	158	164	165	171	163	156	163	169

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CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
BCA SECOND SEMESTER DEGREE EXAMINATION MAY 2025
COMPUTER APPLICATIONS
Discrete Mathematical Structures

Duration:2 Hours   Max Marks:60

PART - A

I. Answer any 6 questions. Each question carries 2 marks: **(2×6= 12 Marks)**

a. If A={4} and B={1,2,3} what are $A \times B$. $B \times A$.

b. Let $R = \{(1,2),(3,4),(2,2)\}$ and $S = \{(4,2),(2,5),(1,3),(3,1)\}$. Find $R \cdot S$.

c. If $\lfloor x \rfloor$ = the greatest integer less than or equal to x . Find $\lfloor -2.56 \rfloor$, $\lfloor 7.38 \rfloor$.

d. Write the following in symbolic form .
"If either Vimala takes coffee or Jane takes tea, then viola takes malt".

e. Construct the truth table for bi-conditional statement.

f. Find $gcd(272, 1479)$

g. Given the truth values of P and Q as T and those of R and S as F. Find the truth table of $(P \wedge (Q \wedge R)) \vee \neg((R \vee S) \wedge (P \vee Q))$.

h. Define (i)Simple path (ii)Cycle

PART - B

2. Answer any 2 questions. Each question carries 6 marks: **(6×2= 12 Marks)**

a. If $A = \{1,2,3,4\}, B = \{2,3,7\}, C = \{1,2,5,7\}$ then prove that
$A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$.

b. If $M_R = \begin{bmatrix} 1 & 0 & 1 \\ 1 & 1 & 0 \\ 1 & 1 & 1 \end{bmatrix}$, $M_S = \begin{bmatrix} 1 & 0 & 0 & 1 & 0 \\ 1 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 1 & 0 \end{bmatrix}$ are two relation matrices

find $M_{RoS^\sim}$, $M_{\tilde{S}^\sim o \tilde{R}}$

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c. Find the maximal compatibility blocks and also draw the graph of the following compatibility relation:

2	1				
3	1	1			
4	0	0	1		
5	1	0	1	1	
6	0	0	1	0	1
	1	2	3	4	5

d. Let A be the set of all factors of a particular positive integer m and let $\leq$ be the relation divides ie., $\leq = \{(x,y)/x \in A \wedge y \in A \wedge (x \text{ divides } y)\}$. Draw the Hasse diagram for (i) m=6   (ii) m=30   (iii) m=45

PART - C

3. Answer any 2 questions. Each question carries 6 marks: (6×2= 12 Marks)

a. Let $f : R \to R$ be given by $f(x) = x + 5$. Is f bijective. Justify your answer.

b. Let $f(x) = x + 2, g(x) = x - 2, h(x) = 3x, \forall x \in R$ where R is a set of real numbers. Find $g \circ g, f \circ h \circ g, h \circ f$.

c. (i) Determine whether the sequence $\{a_n\}$ where $a_n = 3n$ for every non-negative integer n, is a solution of the recurrence relation $a_n = 2a_{n-1} - a_{n-2}$ for n=2,3,4,...
(ii) Find the first five terms of the sequence defined by the recurrence relation $a_n = 6a_{n-1}$ and initial condition $a_0 = 2$.

d. Suppose there are 1807 freshmen at your school. Out of these 453 are taking a course in Computer Science, 567 are taking a course in Mathematics and 299 are taking courses in both Computer Science and Mathematics. How many are not taking a course either in Computer Science or in Mathematics?

PART - D

4. Answer any 2 questions. Each question carries 6 marks: (6×2= 12 Marks)

a. Show that the truth values of the following formula is independent of its component: $(P \Rightarrow Q) \Leftrightarrow (((P \wedge Q) \vee (\neg P \wedge \neg Q))$.

b. Show that $((P \vee \neg P) \to Q) \to ((P \vee \neg P) \to R) \Rightarrow (Q \to R)$ is a tautology without constructing the truth table.

c. Use the Euclidean algorithm to obtain integers x and y satisfying $\gcd(24, 138) = 24x + 138y$.

d. Solve: $34x \equiv 60(mod\,98)$.

PART - E

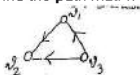5. Answer any 2 questions. Each question carries 6 marks: (6×2= 12 Marks)

  a. For the graph G given below write the following:
     i) A simple path starting from 1 and ending in 3,
     ii) An elementary path starting from 3 and ending in 1,
     iii) What is the length of the path in ii)
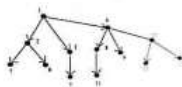   iv) A geodesic from 4 to 2
     v) A geodesic from 3 to 1.
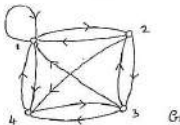
  b. Find the path matrix of the digraph given below:

  c. Define Indegree and Outdegree of a node. Find the indegree and outdegree of all the nodes of the following graph.
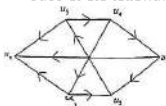
  d. What is the outdegree of the Leaf node? Convert the following tree to binary tree.

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