21COAC201   Reg No   :   ....

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
BCA SECOND SEMESTER DEGREE EXAMINATION MAY/JUNE 2023
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 binary search?

3) What is a prefix expression?

4) What is a parent node?

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

6) Write the code to delete a node from the end of the linked list.

PART B

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

7) What are the various control structures used in a programming language? Explain with example.

8) Write an algorithm for merge sort.

9) What are the application of queue? Explain.

10) What is a binary tree? Explain complete binary tree .

11) Find postfix and prefix expression for the following expression?
    ((A+B)/C * (D+E) - F)

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

PART C

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

13. Define complexity of an algorithm. Explain the following with examples.

    a) Best case   b) Average case   c) Worst case.

14. Define linked list. Explain the various types of linked list.

15. Define tree. Explain the following with example.

    a) Degree of a node   b) Level   c) Edge   d) Path

    e) Depth   f) Height of a tree   g) Height of a node.

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CREDIT BASED SEMESTER SCHEME
BCA SECOND SEMESTER DEGREE EXAMINATION MAY/JUNE 2023
COMPUTER APPLICATIONS
Database Management Systems Theory

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

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

1. Define DBMS.

2. What are Simple & Composite attributes in an E-R model? Give an example.

3. What is a DML compiler?

4. Define degree of a relationship type .

5. What is Functional Dependency?

6. What is the structure of PL/SQL program?

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

7. Explain the DBMS System Utilities.

8. a) Explain the various levels of data abstraction
   b) What is Data independence? Explain.

9. Explain the OUTER UNION operation with example.

10. What are Spurious Tuple? Explain with example.

11. Write SQL Query to
    a) Find the total BALDUE of clients residing in CITY 'Delhi'
    b) Display NAME of employees starting with 'R' from the table EMPLOYEE.

12. Explain   a) ALTER TABLE command   b) DELETE command.

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

13. Explain the 3-schema architecture of DBMS. What are mappings?

14. Explain the disadvantages of file processing system.

15. Explain in detail Update operations on relations & the types of integrity constraints that must be checked for update operations.

16. Consider the table CLIENTMASTER(Clientno, Name, City, Balancedue, Penalty).
Write Sql queries

i) Display details of clients residing in ' Bangalore' or 'Delhi' or 'Mangalore'

ii) Calculate Penalty for all clients as 20% of balancedue, if balancedue exceeds Rs.10,000

iii) Find the number of clients with balancedue more than Rs. 50,000 and their total balance due.

iv) List details of clients whose second character in NAME is 'a'.

v) Display total balance due for each city.

17. What are the various types of cursors that can be defined in a PL/SQL program? Explain in detail explicit cursor with example.

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21COAC202   Reg No   :   ....

Duration:2 Hours   **Max Marks:60**

PART A

Answer any FIVE questions: **(5×2= 10)**

1) List any two optional statements in the general structure of a java program.

2) Name any two promising areas for application of OOP.

3) Write the syntax to define a subclass.

4) Differentiate between a vector and an array.

5) What is an interface?

6) What do you mean by running state in the life cycle of a thread?

PART B

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

7) Explain the classification of java variables based on its scope. Give examples.

8) Explain any six java development tools.

9) Explain the methods of the wrapper classes to convert numbers to strings and string objects to numeric objects.

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

11) What is a finally block? When and how is it used? Give a suitable example.

12) Explain the different attributes of an APPLET tag.

PART C

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

13) Explain the different forms of implementation of the if statement with syntax and example.

14) Explain any two entry controlled loops with syntax and example.

15) Write a note on:
    a) Overriding methods   b) final variables, methods and classes

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CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME

BCA SECOND SEMESTER DEGREE EXAMINATION MAY/JUNE 2023

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

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

c. Let $X = \{1, 5, p, Jack\}, Y = \{2, 5, 7, q, Jill\}$ and
$f = \{(1, 2), (5, 7), (p, q), (Jack, q)\}$. Find domain of f and $f(p)$.

d. Write the following in symbolic form. "If Roses are red and violets are blue, then Jack went up the hill"

e. Construct the truth table for $((\neg Q \wedge P) \wedge Q)$.

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

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

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

PART - B

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

a. Prove that $\sim (A \cup B) = \sim A \cap \sim B$ if
$A = \{13, 9, 7, 4\}, B = \{20, 9, 4, 15\}, E = \{13, 20, 9, 5, 4, 7, 15, 10\}$.

b.
If $M_R = \begin{bmatrix} 1 & 0 & 1 \\ 1 & 1 & 0 \\ 1 & 1 & 1 \end{bmatrix}$ and $M_s = \begin{bmatrix} 1 & 0 & 0 & 1 & 0 \\ 1 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 1 & 0 \end{bmatrix}$ are two relation

matrices find $M_{R \circ S}$, $M_{R^\sim \circ S^\sim}$.

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

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

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=30   (ii) m=12   (iii) m=45

PART - C

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

a. 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 $f \circ g, f \circ h \circ g, f \circ h$.

b. Let $f : R \to R$ be given by $f(x) = 8x + 4$. Is f bijective. Justify your answer.

c. (i) Let $\{a_n\}$ be a sequence satisfying the recurrence relation
$a_n = a_{n-1} - a_{n-2}$ for $n = 2, 3, 4, \ldots$ and suppose that $a_0 = 3$ and $a_1 = 5$. What are a_2 and a_5 ?
(ii) 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,...

d. A total of 1232 students have taken a course in Spanish, 879 have taken a course in French and 114 have taken a course in Russian. Further, 103 have taken courses in both Spanish and French, 23 have taken courses in both French and Russian and 14 have taken courses in both French and Russian. If 2092 students have taken at least one of Spanish, French and Russian, how many students have taken a course in all these languages?

PART - D

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

a. Construct the table for $\neg(P \wedge Q) \leftrightarrows (\neg P \vee \neg Q)$.

b. Without constructing the truth table prove the following:

$$(\neg P \wedge (\neg Q \wedge R)) \vee (Q \wedge R) \vee (P \wedge R) \Leftrightarrow R$$

c. Use the Euclidean algorithm to obtain integers x and y satisfying $gcd(119, 272) = 119x + 272y$.

d. Solve: $6x \equiv 15(mod\,21)$.
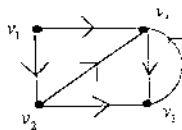

PART - E

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

a. Define the following terms,

   i)   Simple Path

   ii) Reachable

   iii) Strongly Connected

   iv) Multigraph

   v) Null graph

   vi) Subgraph

b. Find the Path matrix $P(v_1, v_5)$ of the graph given below:
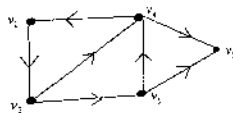
c. Define Node base in a digraph and find the node base of the following graph.

d. Convert the following tree to a Binary Tree:

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