CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
B.C.A. SECOND SEMESTER DEGREE EXAMINATION MAY 2024
COMPUTER APPLICATIONS
Data Structures using C

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

PART A

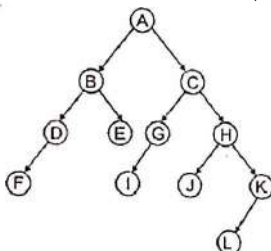**Answer any FIVE questions:**   (5×2= 10)

1) What are the different types of data structure? Give examples.

2) What is dynamic memory allocation?

3) What is a prefix expression?

4) What is a root node?

5) Evaluate the postfix expression 3 4 * 7 8 + * .

6) What are the operations on queue?

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) What are the advantages of binary search over a linear search? Explain.

9) Write the code to insert a node in the following positions in singly linked list
   a) Beginning   b) End

10) Differentiate complete binary tree and a strict binary tree with example.

11) How to represent a queue using array? Explain.

12) Find the post -order pre-order and in- order traversal of the given tree.

PART C

13) What is complexity? What are the various asymptotic notations in algorithms? Explain with an example.

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

15) What is binary search tree? Construct a binary search tree using the following sequence of insertion. 45, 65, 35, 40, 33, 70, 60, 75, 69.

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CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
B.C.A. SECOND SEMESTER DEGREE EXAMINATION MAY 2024
COMPUTER APPLICATIONS
Object Oriented Concepts using JAVA

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

PART A

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

1) State the syntax for declaration of symbolic constants.

2) List any two keywords used by the guarding statements.

3) When do we declare a method as final?

4) List two parsing methods to convert numeric strings to primitive numbers.

5) How do we define a try block?

6) What java interface must be implemented by all threads?

PART B

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

7) How is java strongly associated with the internet?

8) Explain any six mathematical functions with example.

9) Explain how to declare, define and initialize an array with the help of a program code.

10) Explain any one exit controlled loop with syntax and example.

11) What are packages? State the benefits of organising classes into packages.

12) Explain the syntax of the APPLE T tag.

PART C

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

13) Explain Streams in java.

14) Explain any two control statements in java with the help of an example.

15) Explain multilevel inheritance with an example code.

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CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
BCA SECOND SEMESTER DEGREE EXAMINATION MAY 2024
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 $A=\{x \mid x^2 - 5x + 6 = 0\}$, $B = \{2,4\}$, $C = \{4,5\}$ find
$(A - B) \times (B - C)$.

b. Let R and S be two relations on a set of positive integers I, $R = \{(x, 2x)/x \in I\}$.
Find $R \cdot R$.

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

d. If P: John is smart and Q:Mark is happy, then write the symbolic form of statements
(i) "Neither John is smart nor Mark is happy"
(ii) "John is smart or Mark is happy"

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

f. If $gcd(a, b) = 4000$ and $lcm(a, b) = 350$, then find ab.

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) Length of the path   (ii) Distance

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 $M_R = \begin{bmatrix} 1 & 0 & 1 \\ 1 & 1 & 0 \\ 1 & 1 & 1 \end{bmatrix}$ 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	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 a given finite set and $\rho(A)$ be its power set. Consider the poset $(\rho(A), \subseteq)$ and draw the Hasse diagram of the poset $(\rho(A), \subseteq)$ for

(i) $A = \{a\}$ (ii) $A = \{a, b\}$ (iii) $A = \{a, b, c\}$

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.

b. Let $X = \{1, 2, 3\}$ and f, g, h are functions from $X \to X$ given by $f = \{(1, 2), (2, 3), (3, 1)\}, g = \{(1, 2), (2, 1), (3, 3)\}, s = \{(1, 1), (2, 2), (3, 3)\}$. Find $f \circ s, g \circ s, s \circ g, s \circ s$.

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 Spanish 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 truth table for $(Q \wedge (P \to Q)) \to P$.

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

c. Use the Euclidean algorithm to obtain integers x and y satisfying $gcd(24, 138) = 24x + 138y$.
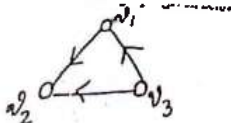
d. Solve: $9x \equiv 21(mod\, 30)$.

PART - E

5. Answer any 2 questions. Each question carries 6 marks: (6×2= 12 Marks)
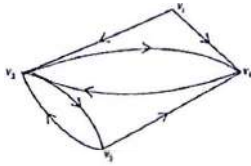
a. In the graph G given below, Find R(v) for each v.
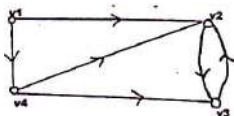
b. Find the path matrix of the digraph given below.

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

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

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