This question paper contains **3** printed pages]

GF—21—2023

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (CS) (Second Year) (Third Semester) EXAMINATION

APRIL/MAY, 2023

(CBCS/Revised Pattern)

COMPUTER SCIENCE

Paper BCS-302

(Computer Network)

(Tuesday, 25-4-2023) **Time : 2.00 p.m. to 5.00 p.m.**

Time—Three Hours *Maximum Marks*—75

N.B. :— (*i*) Attempt *all* questions.

(*ii*) *All* questions carry equal marks.

1. Attempt the following (any *five*) : 15

(*a*) Explain various transmission medias.

(*b*) Explain listen service primitive.

(*c*) What is de-multiplexing ?

(*d*) Explain serial transmission mode.

(*e*) What is IP Address ?

(*f*) Explain concept of email.

(*g*) Explain concept of analog signal.

P.T.O.

2. Attempt the following (any *three*) : 15

(*a*) Explain concept of LAN in detail.

(*b*) What is connection oriented service ?

(*c*) Explain TCP/IP model in detail.

(*d*) Explain concept repeater and router.

(*e*) Explain concept of packet switching.

3. Attempt the following (any *three*) : 15

(*a*) Discuss the applications of computer network.

(*b*) Explain the concept of error control.

(*c*) Explain various network devices.

(*d*) What is synchronous transmission ?

(*e*) What do you mean by pipelining ?

4. Attempt the following (any *three*) : 15

(*a*) Explain the concept of time division multiplexing.

(*b*) Explain architecture of ISDN.

(*c*) What is FDDI ?

(*d*) Explain Star and ring topology in detail.

(*e*) What do you mean by routing ?

5. Write short notes on the following (any *three*) : 15

(*a*) NIC Cards

(*b*) Internet service provider

(*c*) Packet switching

(*d*) PBX

(*e*) Protocol heirarchies.

This question paper contains **6** printed pages]

GF—12—2023

FACULTY OF SCIENCE

B.Sc. (Third Semester) EXAMINATION

APRIL/MAY, 2023

(CBCS/Revised Course)

COMPUTER SCIENCE

Paper AF-13

(Elective-A)

(Discrete Mathematics)

(Friday, 21-4-2023) **Time : 2.00 p.m. to 5.00 p.m.**

Time—Three Hours *Maximum Marks*—75

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

1. Solve any *five* of the following (**3** marks each) : 15

(*a*) If set A = {1, 3, 5}, B = {2, 4, 6} and C = {0, 2, 4, 6, 8}.

Then :

(*i*) Find universal set

(*ii*) $(A \cup B) \cap C$

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

(*b*) Define any *three* types of set with the appropriate example.

(*c*) The equation of a line given by the $2x - 6y + 3 = 0$. Find the slope and both the intercepts.

P.T.O.

(*d*) Find the truth table for the following compound statement and also comment whether it is tautology, contradiction or contigency :

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

(*ii*) $\sim (p \vee q) \vee [(\sim p) \wedge q] \vee p$

(*e*) Find x, y, z, t if :

$$\begin{bmatrix} x & 2y \\ z & 4t \end{bmatrix} + \begin{bmatrix} 3 & z \\ -1 & -6 \end{bmatrix} = \begin{bmatrix} 0 & -7 \\ 3 & 26 \end{bmatrix}.$$

(*f*) Find cartesian product of the set :

$$A = \{1, 2, 3\} \text{ and } B = \{3, 4, 5\}.$$

(*g*) Construct Binary tree for the following expression :

$$(a + b) * (d/c).$$

2. Attempt/Solve any *three* of the following (**5** marks each) : 15

(*a*) Prove that :

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

$$A = \{4, 5, 7, 8, 10\}, \ B = \{4, 5, 9\}, \ C = \{1, 4, 6, 9\}$$

(*b*) Explain any *two* properties of set using suitable example.

(*c*) Verify given equivalence using properties only :

$$(p \Rightarrow \sim q) \wedge (p \Rightarrow \sim r) \equiv \sim [p \wedge (q \vee r)].$$

(*d*) In a survey among 140 students, 60 likes to play video games, 70 likes to play indoor games, 75 likes to play outdoor games, 30 plays indoor and outdoor both, 18 plays outdoor and video games, 42 plays video

games and indoor games and 8 likes to play all three. Use Venn diagram to find :

(*i*) Students who plays only outdoor games

(*ii*) Students who plays exactly one game

(*iii*) Students who plays at most two games.

(*e*) Prove that, $p \Rightarrow q \equiv \sim p \vee q$, using truth table.

3. Attempt any *three* of the following (**5** marks each) : 15

(*a*) Prove that the given compound preposition is tautology using the truth table :

$$[(p \rightarrow q) \vee (q \leftrightarrow r)] \wedge (p \vee q).$$

(*b*) Find adjoint of A,

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 1 & 3 & 4 \\ 1 & 4 & 3 \end{bmatrix}.$$

(*c*) Find inverse of matrix :

$$A = \begin{bmatrix} 1 & 0 & -1 \\ 3 & 4 & 5 \\ 0 & -6 & -7 \end{bmatrix}.$$

(*d*) If

$$A = \begin{bmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & x & 1 \end{bmatrix} \text{ and } A^{-1} = \begin{bmatrix} 1/2 & -1/2 & 1/2 \\ -4 & 3 & y \\ 5/2 & -3/2 & 1/2 \end{bmatrix},$$

find x and y.

(*e*) Find equation of line passing through (7, 5) and (–9, 5).

P.T.O.

4. Attempt any *three* of the following (**5** marks each) : 15

(*a*) Equation of circle is $x^2 + y^2 - 12x - 16y + 19 = 0$. Find centre and radius of circle.

(*b*) Find the equation of line that passes through point (–2, 3) and is parallel to the line $4x + 4y = 8$.

(*c*) Explain all the properties of Relation in brief.

(*d*) The relation R on the set A = {1, 2, 3, 4, 5} defined by a rule $(x, y) \in R$ if $x + y \leq 6$. Find :

(*i*) The element of R

(*ii*) The element of R^{-1}

(*iii*) The domain R

(*iv*) The range of R

(*v*) The domain R^{-1}

(*vi*) The range R^{-1}

(*e*) Let $F : A \to B$ and $g : B \to C$ are defined by formula :

$$F(x) = x + 9$$

$$g(x) = x^2 + 3.$$

Then find :

(*i*) goF(x)

(*ii*) FoF(x)

(*iii*) Fog(x)

(*iv*) gog(x)

(*v*) goF(b)

(*vi*) Fog(a)

(*vii*) goF(3)

(*viii*) Fog(3)

5. Attempt any *three* of the following (**5** marks each) : 15

(*a*) Explain in brief Isomorphic Graph with proper diagram.

(*b*) Explain Center of Tree and Binary Tree briefly.

(*c*) Show that, the matrix :

$$A = \begin{bmatrix} 2 & 3 \\ 1 & 2 \end{bmatrix} \text{ as } A^3 - 4A^2 + A = 0$$

(*d*) Describe each of the following in Roster form :

(*i*) $A = \{x \mid x \text{ is an even prime}\}$

(*ii*) $B = \{x \mid x \in R,\ x^2 - 1 = 0\}$

(*iii*) $B = \{x \mid x \text{ is a prime number, } 11 < x < 20\}$

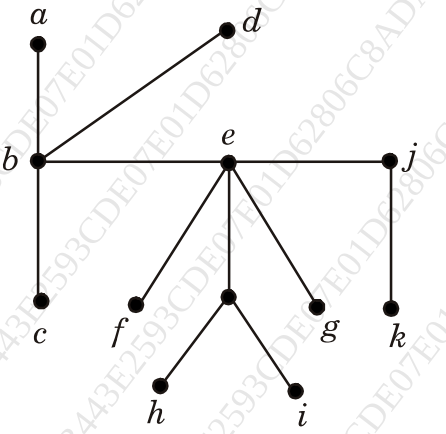
(*iv*) $E = \{x \mid x \text{ is a perfect square } x < 30\}$

(*v*) $E = \{x \mid x \text{ is an integer; } -3 < x < 3\}$

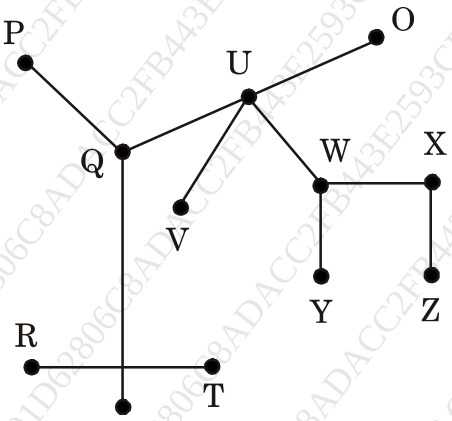
P.T.O.

(*e*) (*i*) Find the center of tree for given 2 graph :

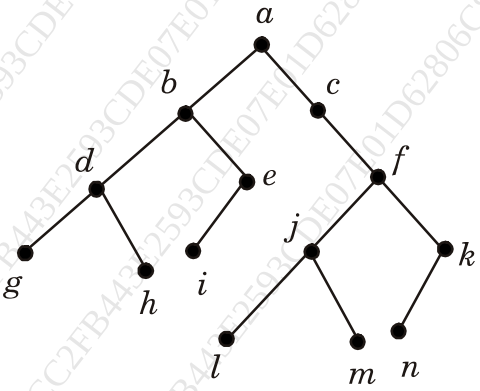
(I)



(II)



(*ii*) Write down the left child and right child of each vertex or node of tree.



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GF—13—2023

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (CS) (Second Year) (Third Semester) EXAMINATION

APRIL/MAY, 2023

(CBCS/Revised Pattern)

COMPUTER SCIENCE

(Mathematical Techniques in Computer Science)

(Friday, 21-4-2023) **Time : 2.00 p.m. to 5.00 p.m.**

Time—Three Hours *Maximum Marks*—75

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

(*iii*) Assume suitable data, if required.

(*iv*) Each question carries equal marks.

1. Attempt any *five* of the following : 15

(*a*) Write a note on complement of a set.

(*b*) State divisibility test of 5 and 7.

(*c*) Describe equality of matrices.

(*d*) Explain transpose of a matrix.

(*e*) Explain self-loop and parallel edges.

(*f*) Describe probability.

(*g*) Explain relation on sets.

P.T.O.

2. Attempt any *three* of the following : 15

(*a*) Explain types of sets.

(*b*) State and verify two distributive properties of set union and intersection with the help of suitable example.

(*c*) Describe arithmetic progression and geometric progression.

(*d*) If sets

$$A = \{a, b, e, i, o, u, x, y\},$$

$$B = \{c, d, e, f, k, m, u, w, z\} \text{ and}$$

$$U = \{a, b, c, ..., x, y, z\}$$

then find :

(*i*) $A \cup B$

(*ii*) $A \cap B$

(*iii*) $A - B$

(*iv*) $B - A$

(*v*) $A' \cup B$

(*e*) Rohit runs 175 meters race in 25 seconds. His speed is in km/hr is how much ?

3. Attempt any *three* of the following : 15

(*a*) Explain Time and Work, Time and Distance.

(*b*) If

$$A = \begin{bmatrix} 2 & -3 & 1 \\ 5 & 4 & 3 \\ -1 & 1 & 6 \end{bmatrix} \text{ and } B = \begin{bmatrix} 5 & -4 & 1 \\ -2 & 3 & 2 \\ 4 & -1 & 4 \end{bmatrix}$$

then find :

(*i*) A + B

(*ii*) A.B

(*c*) Find H.C.F. and L.C.M. of

$2^4 \times 3^4 \times 5^3$; $2^3 \times 3^2 \times 5^2 \times 7^2$ and $2^2 \times 3^5 \times 5 \times 6^3 \times 7^2$

(*d*) Verify that :

$$A \,.\, \text{adj}\, A = |A| \,.\, I;$$

given that :

$$A = \begin{bmatrix} 1 & 1 & 2 \\ 2 & -1 & 1 \\ 2 & 2 & 1 \end{bmatrix}.$$

(*e*) A and B together can complete a piece of work in 6 days and A can complete the same work alone in 10 days. In how many days can B alone complete the work ?

4. Attempt any *three* of the following : 15

(*a*) Explain sample space.

(*b*) A coin is thrown 3 times, what is the probability that at least one head is obtained ?

(*c*) What is the probability of getting a sum of numbers on upper faces is 7, when two dice are thrown ?

(*d*) Explain types of relation.

(*e*) Describe properties of relation.

P.T.O.

5. Attempt any *three* of the following : 15

(*a*) Explain subgraph.

(*b*) Describe walk, path and circuit.

(*c*) Write a note on isomorphism of graphs.

(*d*) Prove that the number of vertices of odd degree in a graph is always even.

(*e*) Determine whether Relation R in the set Z of all integers defined as :

$$R = \{(x, y) : x - y \text{ is as integer}\}$$

is reflexive, symmetrie and transitive.

This question paper contains **2** printed pages]

GF—04—2023

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (CS) (Second Year) (Third Semester) EXAMINATION

APRIL/MAY, 2023

(CBCS/Revised Pattern)

COMPUTER SCIENCE

Paper BCS-301

(Object Oriented Programming)

(Wednesday, 19-4-2023) **Time : 2.00 p.m. to 5.00 p.m.**

Time—Three Hours *Maximum Marks*—75

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

1. Attempt any *five* of the following : 15

   (*a*) Explain applications of OOPs.

   (*b*) Explain the concept of manipulators.

   (*c*) Explain concept of static member function.

   (*d*) Explain the use of constructor.

   (*e*) Explain various data types used in C++.

   (*f*) Discuss structure of C++ program.

   (*g*) Write a program in C++ for addition and subtraction of two numbers.

2. Attempt any *three* of the following : 15

   (*a*) Explain the concept of copy constructor in C++.

   (*b*) Write a program in C++ to describe concept of function overloading.

   (*c*) Discuss concept of call by reference in detail.

   (*d*) Write a C++ program to describe concept of class and object.

   (*e*) Explain concept of friend function in detail.

P.T.O.

3. Attempt any *three* of the following : 15

(*a*) Explain concept of default argument with example.

(*b*) Explain if and if-else statement used in C++ with syntax and example.

(*c*) Write a C++ program to describe Multiple inheritance.

(*d*) Explain various stream classes used in C++.

(*e*) Write a program in C++ to reverse the digits of a given number.

4. Attempt any *three* of the following : 15

(*a*) Explain the concept of class and object in detail.

(*b*) Explain the concept of pointer to object with example.

(*c*) Write a C++ program to describe concept of Binary operator overloading.

(*d*) Explain concept of STL in detail.

(*e*) Write a C++ program to describe concept of for loop.

5. Write short notes of any *three* of the following : 15

(*a*) Virtual base class

(*b*) Friend function

(*c*) Static member function

(*d*) Command line arguments

(*e*) Operator overloading.