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

ND—17—2023

FACULTY OF SCIENCE AND TECHNOLOGY

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

NOVEMBER/DECEMBER, 2023

(Revised/CBCS Pattern)

COMPUTER SCIENCE

Paper-CS-302

(Computer Networks)

(Monday, 4-12-2023) **Time : 2.00 p.m. to 5.00 p.m.**

Time—Three Hours *Maximum Marks*—75

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

(*ii*) Assume suitable data, if necessary.

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

(*a*) What is computer network ? Explain its applications.

(*b*) Explain Mesh Topology.

(*c*) Discuss any *two* design issues for layers.

(*d*) Explain the Packet Switching.

(*e*) Explain Bridges.

(*f*) Explain the concept of Parallel Transmission.

(*g*) What is Pipelining ? Explain.

P.T.O.

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

(*a*) Distinguish between Internet and Intranet.

(*b*) Explain TCP/IP Model.

(*c*) Explain Gateways and Repeater.

(*d*) What is Multiplexing ? Explain frequency division multiplexing.

(*e*) Explain SMTP Protocol.

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

(*a*) Explain FTP Protocol.

(*b*) Explain the concept of Asynchronous and Synchronous Transmission.

(*c*) What is HUB ? Explain types of Hub.

(*d*) Explain types of Network.

(*e*) Draw the diagram of OSI model and explain functions of physical layer and transport layer.

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

(*a*) Explain Connection Oriented and Connectionless Services.

(*b*) Explain Internet Service Providers.

(*c*) What is Switching ? Explain circuit switching.

(*d*) Explain sliding window protocols.

(*e*) What is a Topology ? Explain Star and Ring Topologies.

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

(*a*) E-mail

(*b*) SNMP protocol

(*c*) WWW-Client side and Server side

(*d*) Service Primitives

(*e*) Modulation and their application.

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

ND—25—2023

FACULTY OF SCIENCE AND TECHNOLOGY

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

NOVEMBER/DECEMBER, 2023

(CBCS/Revised Pattern)

COMPUTER SCIENCE

Paper BCS-303

(Data Structure and Algorithm)

(Wednesday, 6-12-2023) **Time : 2.00 p.m. to 5.00 p.m.**

Time—3 *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*) Use of any electronic media such as mobile phone, digital diary and electronic calculator is not permitted.

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

(*a*) What is Data Structure ?

(*b*) What is selection sort ? Explain.

P.T.O.

(*c*) What is Queue ? Explain in detail.

(*d*) Explain the concept of Linked list.

(*e*) Explain the operations on graph.

(*f*) What is Recursion ? Explain.

(*g*) Explain the concept of Header Nodes.

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

(*a*) Explain Algorithm complexity.

(*b*) Explain elementary data organization.

(*c*) Describe representation of linear array in memory.

(*d*) Write an algorithm for traversing a linked list.

(*e*) Explain PUSH and POP operation in stack.

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

(*a*) What is Polish Notation ? Explain.

(*b*) Describe in brief evaluation of postfix expression.

(*c*) Write an algorithm for insertion element in queue.

(*d*) What are the types of Binary tree ? Explain.

(*e*) Discuss graph theory terminology in brief.

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

(*a*) Write an algorithm for Deleting element from linear array.

(*b*) What is Binary Search ? Explain.

(*c*) Explain bubble sort with example.

(*d*) Write an algorithm for searching a linked list.

(*e*) Explain in detail two-way Linked List.

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

(*a*) Garbage collection

(*b*) Linear search

(*c*) Postfix and prefix notations

(*d*) Dqueue

(*e*) Traversing of binary tree.

This question paper contains **4** printed pages]

ND—09—2023

FACULTY OF SCIENCE & TECHNOLOGY

B.Sc. (C.S.) (Second Year) (Third Semester) EXAMINATION

NOVEMBER/DECEMBER, 2023

(CBCS/Revised)

DISCRETE MATHEMATICS

(Friday, 1-12-2023) **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 types of sets.

(*b*) Explain logical equivalence.

(*c*) Describe scalar multiplication of matrix.

(*d*) Explain determinants.

(*e*) Explain centre of tree.

(*f*) Explain relation

(*g*) Explain inverse of matrices.

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

(*a*) Explain set operations.

(*b*) Describe statement pattern and logical equivalence.

(*c*) Describe set in detail.

(*d*) if sets :

$A = \{0, 5, 7, 8, 9\}$,

$B = \{1, 3, 4, 6, 7, 8\}$

$C = \{2, 4, 6, 8\}$

$U = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$

then verify that :

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

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

(*e*) Construct the truth table for the following statement pattern :

$$(p \vee r) \leftrightarrow (q \rightarrow r)$$

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

(*a*) Obtain domain and range of the function :

$$f(x) = \frac{x+1}{3-x}$$

(*b*) Explain different logical connectives.

(*c*) Show that a relation F defined on the set of real numbers R as $(a, b) \in F$ if and only if $|a| = |b|$ is an equivalence relation.

(*d*) Explain Cartesian products.

(*e*) Determine whether the following statement pattern is a tautology or contradiction or contingency :

$$(q \leftrightarrow p) \vee r$$

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

(*a*) Explain transpose of matrix.

(*b*) Explain matrix in detail.

(*c*) What is the distance between two points P and Q whose coordinates are (–3, 1) and (5, – 4), respectively ?

(*d*) Find the adjoint of the matrix :

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

(*e*) Find the equation of a straight line that passes through the points (1, 3) and (–2, 4).

P.T.O.

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

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

(*b*) Find the Cartesian product C × D if C = {*p*, *q*, *r*,} and D = {*x*, *y*, *z*}

(*c*) Write a note on binary tree.

(*d*) If :

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

then show that A^2 is a null matrix.

(*e*) Explain isomorphism of graphs.

This question paper contains **4** printed pages]

ND—10—2023

FACULTY OF SCIENCE & TECHNOLOGY

B.Sc. (C.S.) (Second Year) (Third Semester) EXAMINATION

NOVEMBER/DECEMBER, 2023

(CBCS/Revised Pattern)

MATHEMATICAL TECHNIQUES IN COMPUTER SCIENCE

(Friday, 1-12-2023) **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*) Explain Venn diagrams.

(*b*) State divisibility test of 3 and 4.

(*c*) Describe matrix.

(*d*) Explain determinant of matrix.

(*e*) Explain complete graph.

(*f*) Describe axioms of probability.

(*g*) Explain equivalence relation.

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

(*a*) Explain properties of sets.

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

(*c*) Describe H.C.F. and L.C.M.

(*d*) If sets :

$A = \{3, 5, 6, 8, 9\}$,

$B = \{0, 2, 4, 7, 8\}$,

$C = \{1, 3, 4, 5, 8\}$

$U = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$

then find :

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

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

(*iii*) $C - B$

(*iv*) $A - C$

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

(*e*) A car is running at a speed of 108 kmph. What distance will it cover in 15 seconds ?

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

(*a*) Explain arithmetic and geometric progressions.

(*b*) If :

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

then find the inverse of matrix A.

(*c*) Find H.C.F. and L.C.M. of 120, 150 and 175.

(*d*) Find the adjoint of matrix :

$$A = \begin{bmatrix} 5 & 3 & -1 \\ 4 & 1 & 0 \\ 6 & 2 & -2 \end{bmatrix}$$

(*e*) A does a work in 8 days and B does the same work in 12 days. In how many days they together will do the same work ?

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

(*a*) Explain event.

(*b*) Two dice are thrown together. What is the probability that the number obtained on one of the dice is multiple of number obtained on the other dice ?

P.T.O.

(*c*) From a pack of 52 cards, three cards are drawn at random. Find the probability that each card is from different suit.

(*d*) Explain relation.

(*e*) Describe operation on set.

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

(*a*) Explain degree of vertices.

(*b*) Describe walk and path.

(*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 A = {1, 2, 3, 4, 5, 6) as R = $(x, y) : y$ is divisible by $x\}$ is reflexive, symmetric and transitive.

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

ND—03—2023

FACULTY OF SCIENCE AND TECHNOLOGY

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

NOVEMBER/DECEMBER, 2023

(CBCS/Revised Pattern)

COMPUTER SCIENCE

Paper BCS-301

(Object Oriented Programming)

(Wednesday, 29-11-2023) **Time : 2.00 p.m. to 5.00 p.m.**

Time—3 *Hours* *Maximum Marks*—75

N.B. :— (*i*) *All* questions carry equal marks.

(*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 reference variable.

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

(*d*) Explain the use of destructor.

P.T.O.

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

(*f*) Explain structure of C++ program with example.

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

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

(*a*) Explain how to overload a function in C++.

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

(*c*) Discuss concept of function prototyping.

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

(*e*) Explain concept of parameterized constructor.

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

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

(*b*) Explain while statement used in C++ with syntax and example.

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

(*d*) What are the different stream classes used for file handling in C++.

(*e*) Write a program in C++ to describe concept of visibility modes.

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

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

(*b*) Explain the concept of this pointer.

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

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

(*e*) Write a C++ program to describe concept of do-while loop.

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

(*a*) Virtual base class

(*b*) Friend function

(*c*) Pure virtual function

(*d*) Command line arguments

(*e*) Inline function.