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

PD—25—2024

FACULTY OF COMPUTER SCIENCE

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

MARCH/APRIL, 2024

(CBCS/Revised Pattern)

COMPUTER SCIENCE

(BCS–303)

(Data Structure and Algorithms)

(Wednesday, 10-04-2024) **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.

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

(*a*) Elementary data organization.

(*b*) POP operation.

(*c*) Two-way linked list.

P.T.O.

(*d*) Recursion.

(*e*) D-Queue.

(*f*) Threads.

(*g*) Insertion sort.

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

(*a*) Explain basic terminology of data structure.

(*b*) Explain data structure operation.

(*c*) Explain algorithm complexity.

(*d*) Explain types of Binary tree.

(*e*) Explain evaluation of postfix expression.

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

(*a*) What is Sorting ? Explain bubble sort.

(*b*) Explain searching methods.

(*c*) Explain insertion operation in linear array.

(*d*) Explain header nodes.

(*e*) Explain graph theory terminology.

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

(*a*) Explain representation of linked list in memory.

(*b*) Explain insertion into linked list.

(*c*) Explain the concept of binary tree.

(*d*) Explain the algorithm on deletion operation in queue.

(*e*) Explain linked representation of queue.

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

(*a*) Explain priority queue.

(*b*) Explain arithmetic expression.

(*c*) Explain traversing of binary tree.

(*d*) Explain PUSH and POP operations.

(*e*) Explain garbage collection in brief.

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

PD—09—2024

FACULTY OF SCIENCE AND TECHNOLOGY

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

MARCH/APRIL, 2024

(CBCS/Revised Pattern)

DISCRETE MATHEMATICS

(Thursday, 04-04-2024) **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*) Each question carries equal marks.

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

(*a*) Explain tree.

(*b*) Explain Venn diagram.

(*c*) Describe multiplication of matrices.

(*d*) Write a note on equal sets.

(*e*) Explain transpose of a matrix.

P.T.O.

(*f*) Define domain and range of function.

(*g*) Write the truth values of the following statements :

(*i*) 4 is a prime number and 3 is a rational number.

(*ii*) Delhi is in India or sun rises in the East.

(*iii*) If 6 + 5 = 10, then 4 – 3 = 2.

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

(*a*) Explain types of set.

(*b*) State different properties of set.

(*c*) Describe set in brief.

(*d*) If set A = {1, 3, 5, 7, 9}, B = {2, 4, 6, 7, 8}, C = {1, 4, 6, 9} and U = {0, 1, 2, 3, 4, 5, 6, 7, 8, 9,10}, then find :

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

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

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

$(p \wedge \sim q) \rightarrow (q \vee r)$

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

(*a*) If A = {*p, q, r*} and B = {*m, n*}, find A × B, B × A. Show that $A \times B \neq B \times A$.

(*b*) Explain different logical connectives.

(*c*) The relation R = {(2,2), (2,3), (2,4), (3,2), (3,3), (3,4)} on the set A = {1, 2, 3, 4, 5}. Decide whether it is reflexive, symmetric and transitive ?

(*d*) Explain types of function.

(*e*) Using truth values examine whether each of the following statements is tautology or contradiction or contingency :

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

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

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

(*a*) If $A = \begin{bmatrix} 2 & 0 & 4 \\ 6 & 1 & 3 \\ 4 & 5 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 3 & -1 & 2 \\ 5 & 0 & 1 \\ 4 & 2 & 6 \end{bmatrix}$

State whether AB = BA ? Justify your answer.

(*b*) Explain matrix in detail.

(*c*) Find the point on the X-axis which is equidistant from A (5, – 3) and B (– 2, 4).

(*d*) Find the inverse of the matrix $A = \begin{bmatrix} 5 & 2 & 1 \\ -1 & 3 & 4 \\ 6 & 4 & 5 \end{bmatrix}$.

(*e*) Find the co-ordinates of midpoint of the segment joining to the points P (16, 10) and Q (– 8, 14).

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

(*a*) Explain isomorphism of graph with example.

(*b*) Explain function.

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

(*d*) Evaluate the following determinant :

(*i*) $\begin{vmatrix} 5 & -4 \\ 1 & 7 \end{vmatrix}$

(*ii*) $\begin{vmatrix} 6 & -1 & 3 \\ 4 & 2 & 1 \\ 0 & 7 & 5 \end{vmatrix}$

(*e*) Explain types of graph.

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PD—10—2024

FACULTY OF COMPUTER SCIENCE

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

MARCH/APRIL, 2024

(CBCS/Revised Pattern)

COMPUTER SCIENCE

Paper-BCS-304 B

(Mathematical Techniques in Computer Science (MTCS))

(Thursday, 04-04-2024) **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.

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

(*a*) Explain Sets.

(*b*) Define matrix with its any two types.

(*c*) Describe Relation.

(*d*) Write the set A = {1, 4, 9, 16, 25,....} in set –builder form.

(*e*) Explain Probability.

P.T.O.

(*f*) Explain DIVISIBILITY of 8 and 15 with suitable example.

(*g*) Describe Graphs.

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

(*a*) Define event. Explain its types.

(*b*) Describe Arithmetic Progression. Describe types of relation.

(*c*) Find the 10th term of the following series :

5, 10, 20, 40.....

(*d*) Describe Sample Space with example.

(*e*) Explain Isomorphism graph in detail.

(*f*) Find the adjoint of matrix :

$$L = \begin{pmatrix} 5 & 3 \\ 1 & 4 \end{pmatrix}$$

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

(*a*) Explain Set operation in detail.

(*b*) Describe Arithmetic Progression.

(*c*) Explain walks, paths and circuit.

(*d*) How many natural numbers between 17 and 80 are divisible by 6 ?

(*e*) Find the HCF and LCM of the following :

0.63, 1.05, 2.1

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

(*a*) Explain properties of Sets.

(*b*) A car moves at the speed 120 km/hr. Find the speed of the car in meter per second.

(*c*) If A = {1, 2, 3, 4}, B = {3, 4, 5, 6), C = {5, 6, 7, 8}, find A $\cup$ B, A $\cup$ B $\cup$ C.

(*d*) A bag contains 6 red and 4 white balls, two balls are drawn at random. Find the probability that both the balls are red.

(*e*) Find AB where :

$$A = \begin{pmatrix} 3 & 2 \\ 0 & 7 \end{pmatrix}$$

$$B = \begin{pmatrix} 2 & 2 & 3 \\ -1 & 4 & 4 \end{pmatrix}$$

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

(*a*) What is the probability that a number selected from the numbers (1, 2, 3,.....15) is a multiple of 4.

(*b*) Explain Graph types in detail.

(*c*) Find the 7th term of the arithmetic progression 1, 3.5, 6, 8.5, ...

(*d*) A person crosses a 600 m long street in 5 minutes. What is his speed in km per hour ?

(*e*) Find the H.C.F. of 108, 288 and 360.

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

PD—03—2024

FACULTY OF SCIENCE & TECHNOLOGY

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

MARCH/APRIL, 2024

(Revised/CBCS Pattern)

COMPUTER SCIENCE

(BCS-301)

(Object Oriented Programming)

(Tuesday, 02-04-2024) **Time : 2.00 p.m. to 5.00 p.m.**

Time—3 *Hours* *Maximum Marks*—75

N.B. :— (1) *All* questions are compulsory.

(2) Figures to the right indicate full marks.

(3) Assume suitable data, if required.

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

(*a*) Explain the Scope Resolution Operator.

(*b*) Explain the Basic Input/Output Statements.

(*c*) Explain the Visibility modes in C++.

(*d*) Rules for operator overloading.

(*e*) Explain the C++ streams classes.

(*f*) Explain the file modes in C++.

(*g*) Explain the specifying a class and object in C++.

P.T.O.

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

(*a*) Explain in detail call by reference with example.

(*b*) Explain in detail function overloading with example.

(*c*) Explain in detail structure of a C++ program.

(*d*) Explain in detail Object Oriented programming.

(*e*) WAP in C++ to demonstrate on scope resolution operator.

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

(*a*) Explain in detail Formatted I/O operations.

(*b*) Explain in detail virtual functions with example.

(*c*) Explain in detail operating and closing file.

(*d*) WAP in C++ to copy a file from nanded.txt into latur.txt.

(*e*) WAP in C++ to demonstrate on multiple inheritance.

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

(*a*) Explain in detail Static members with example.

(*b*) What is Constructor ? Explain in detail any *two* constructors.

(*c*) Explain in detail Friend Functions with example.

(*d*) WAP in C++ to demonstrate on destructor.

(*e*) WAP in C++ to demonstrate on Pointer in objects.

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

(*a*) What is Inheritance ? Explain multilevel Inheritance with example.

(*b*) Explain in detail Polymorphism with example.

(*c*) Explain in detail pure virtual functions with example.

(*d*) WAP in C++ to demonstrate on unary operator C++.

(*e*) WAP in C++ to demonstrate Virtual Base Classes.