

FACULTY OF INFORMATICS

M.C.A. (3 Years Course) I - Semester (CBCS) (Backlog) Examination, October/November 2023

Subject: Discrete Mathematics

Time: 3 Hours

Max. Marks: 70

Note: I. Answer one question from each unit. All questions carry equal marks.

II. Missing data, if any, may be suitably assumed.

Unit – I

1. a) Define tautology and contradiction.
- b) How many total orderings are there on a set with n elements?

(OR)

2. a) Define digraph.
- b) If $A = \{1, 2, 3, 4\}$ and $R = \{(1, 2), (2, 3), (3, 4), (4, 2)\}$ and $S = \{(1, 3), (2, 4), (4, 2), (4, 3)\}$, then compute $R.S, S.R$ and R^2 .

Unit – II

3. If B is a Boolean algebra, for any $\forall a \in B$ then prove that $\overline{a+b} = \bar{a}.\bar{b}$ and $\overline{a.b} = \bar{a}+\bar{b}$.

(OR)

4. a) Write the dual of each Boolean equation (i) $x + \bar{x}y = x + y$ (ii) $(x.1)(0 + \bar{x}) = 0$.
- b) Show that the function $f(x, y) = x + y$ is primitive recursive.

Unit – III

5. a) Define Recurrence Relation.
- b) Solve the recurrence relation $a_n - 5a_{n-1} + 6a_{n-2} = 0$, for $n \geq 2$.

(OR)

6. a) Define Semi-group and Monoid.
- b) Prove that identity element is unique in any group.

Unit – IV

7. a) Define power set.
- b) How many different license plates are there that involve 1, 2, or 3 letters followed by 4 digits?

(OR)

8. a) What is the coefficient of x^3y^7 in $(x+y)^{10}$?
- b) Use the multinomial theorem to expand $(x_1 + x_2 + x_3 + x_4)^4$.

Unit – V

9. a) Define Isomorphic graph and subgraph.
- b) Draw a picture of the graph $G = (V, E)$, where $V = \{a, b, c, d, e\}$ and $E = \{\{a, b\}, \{b, c\}, \{a, c\}, \{a, d\}, \{d, e\}\}$ and state whether it is directed or non-directed and whether it is simple.

(OR)

- 10 a) Draw the graph of $K_{3,3}$ and $K_{2,4}$.
- b) A complete graph is planar iff $n \leq 4$.

FACULTY OF INFORMATICS

M.C.A. (2 Years Course) I-Semester (Backlog) Examination, October / November 2023

Subject: Object Oriented Programming using Java**Time: 3 Hours****Max. Marks: 70****Note: I. Answer one question from each unit. All questions carry equal marks.
II. Missing data, if any, may be suitably assumed.****Unit – I**

1. a) Discuss about Object Oriented Concepts in Java.
b) Explain about Control Statements in Java.
(OR)
2. a) What is Interface? How Multiple Inheritance can be implemented in Java?
b) What is an Array? How to create and access Multi dimensional Array in Java?

Unit – II

3. a) Explain about Input Output stream classes.
b) Write a short note on string handling methods in java.
(OR)
4. a) What is thread? Explain thread life cycle with neat diagram.
b) Write a Java program to demonstrate Exception Handling in Java.

Unit – III

5. a) Describe the classes and Interfaces in Collections Framework.
b) Write a java program to demonstrate the ArrayList Methods.
(OR)
6. a) Describe StringTokenizer and Calendar in Java.
b) Write a short note on Date, Timer and Calendar.

Unit – IV

7. a) Write a short note on Java AWT classes.
b) Write a java program to demonstrate Event Handling Mechanism Using ActionListener.
(OR)
8. a) Illustrate Check Boxes and Labels in AWT.
b) Write a short note on Dialog Boxes and Menus in AWT.

Unit – V

9. a) Explain about the Hierarchy of Java Swing Classes.
b) Write a short note on working with Image Packages.
(OR)
10. Explain about
 - a) Object Classes
 - b) Java Network Programming