

FACULTY OF SCIENCE  
M.C.A. I – SEMESTER REGULAR EXAMINATIONS, FEB- 2024  
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE  
PAPER – I

Time: 3 Hours]

[Max. Marks: 70

Note: Answer all questions from Section – A and Section – B

Section – A

(5x4=20)

Answer the following questions in not more than **ONE** page each:

1. List down the applications of propositional logic.
2. Give an example to explain the pigeon hole principle.
3. Explain homogeneous recurrence relation with the help of an example.
4. Discuss the properties of semi groups.
5. List and explain the properties of trees.

Section – B

(5x10=50)

Answer the following questions in not more than **FOUR** pages each:

6. a) Write an equivalent formula for  $P \wedge (Q \Leftrightarrow R) \vee (R \Leftrightarrow P)$  which does not contain the biconditional.

(OR)

- b) Let  $R = \{1,2, 3,4, 2,2\}$  and  $S = \{4,2, 2,5, 3,1, 1,3\}$ . Find  $R \circ S, SoR, R \circ (SoR), (R \circ S) \circ R$ .

7. a) Show that if  $R_1$  and  $R_2$  are equivalence relations on  $A$ , then  $R_1 \cap R_2$  is an equivalence relation.

(OR)

- b) Let the Relation  $R$  be  $R = \{(1,2), (2,3), (3,3)\}$  on the set  $A = \{1,2,3\}$ . What is the Transitive Closure of  $R$ ?

8. a) Give an example to explain the concept of generating functions.

(OR)

- b) Find and factor the characteristic polynomial for the recurrence relation  $a_n - 5a_{n-1} + 8a_{n-2} - 4a_{n-3} = 0$  for  $n \geq 3$ .

9. a) Show that every finite semi group has an idempotent element.

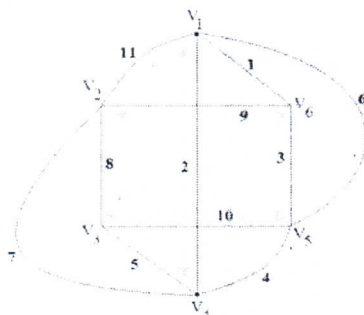
(OR)

- b) Prove that intersection of any two normal subgroups of a group  $(G, *)$  is a normal subgroup of a group  $(G, *)$ .

10. a) Explain isomorphism of two graphs with suitable example.

(OR)

- b) Determine the minimal spanning tree for the graph given below using Krushal's algorithm.



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MCA I – SEMESTER REGULAR EXAMINATIONS, FEB- 2024  
**DATA STRUCTURES USING 'C'**  
PAPER – II

Time: 3 hours]

[Max. Marks: 70

Note: Answer all questions from Section – A and Section – B

Section – A

Answer the following questions in not more than **ONE** page each:

(5x4 = 20)

1. Explain different data types in C Language.
2. Differentiate Structure and Union.
3. What is Stack? Write Stack Operations.
4. What are the applications of Binary Tree?
5. What are the types of sorting available compare?

Section – B

Answer the following questions in not more than **FOUR** page each:

(5x10=50)

6. a) Explain Branching and Looping Statements with example.

(OR)

b) What is String? What are string operations explain with suitable example?

7. a) Explain the Storage Classes in C with example program.

(OR)

b) Brief Call by Value and Call by Reference in detail.

8. a) What is a Queue? Explain its operations with example.

(OR)

b) Discuss operations of Doubly Linked List.

9. a) What is Binary Tree? Explain Binary Tree Traversals in detail.

(OR)

b) What is a Graph? Explain implementation of graph in detail.

10. a) What is Searching? Explain linear and binary search. Compare the complexity.

(OR)

b) What is Hashing? Explain various hashing Techniques.

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MCA I – SEMESTER REGULAR EXAMINATIONS, FEB- 2024  
**OBJECT ORIENTED PROGRAMMING USING JAVA**  
PAPER – III

Time: 3 hours]

[Max. Marks: 70

Note: Answer all questions from Section – A and Section – B

Section – A

Answer the following questions in not more than **ONE** page each: (5x4=20)

1. Discuss in detail about the Inner Class.
2. What is a Java Input Stream, and how is it used for reading bytes from a data source?
3. Explain the concept of arrays in Java.
4. Discuss the AWT class Hierarchy.
5. Write a short note on java Network Programming.

Section – B

Answer the following questions in not more than **FOUR** page each: (5x10=50)

6. a) Define inheritance. Discuss different forms of Inheritances.  
(OR)  
b) Write in detail about different types of constructors with suitable example code in java.
7. a) Describe Thread class and its methods with an example program.  
(OR)  
b) Explain the about the different exceptional handling constructs with suitable example code.
8. a) Explain the significance of the Random Access interface in Java. How does it differ from other collection interfaces, and in what scenarios is it particularly useful?  
(OR)  
b) Explain the purpose of the String Tokenizer class in Java. How does it facilitate the parsing of strings, and in what scenarios is it commonly used?
9. a) Examine scenarios where the Event Delegation Model is particularly advantageous. Explain the event-handling mechanism in java with an example.  
(OR)  
b) Explain the role of AWT controls in Java. What is their significance in graphical user interface (GUI) development?
10. a) Describe Serialization with an Example program.  
(OR)  
b) Write about Swings class Hierarchy and Discuss about the different Layouts.

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FACULTY OF SCIENCE  
M.C.A. I – SEMESTER REGULAR EXAMINATIONS, FEB-2024  
**COMPUTER ARCHITECTURE**  
PAPER – IV

Time: 3 Hours]

[Max. Marks: 70

Note: Answer all questions from Section – A and Section – B

Section – A

(5x4=20)

Answer the following questions in not more than **ONE** page each:

1. What are the Components of computer?
2. Explain about Timing and Control.
3. What are the Floating Point Arithmetic Operations?
4. Explain about Main Memory.
5. How the evaluation performance is carried out?

Section – B

(5x10=50)

Answer the following questions in not more than **FOUR** pages each:

6. a) Discuss about Data Representation.  
(OR)  
b) Describe Bus interconnection and structure.
7. a) Illustrate about Register Transfer Micro operations briefly.  
(OR)  
b) What is Instruction Cycle? Explain.
8. a) Summarize Micro programmed Control.  
(OR)  
b) Recite Addressing Modes.
9. a) Explain about Cache memory.  
(OR)  
b) Write about Memory organization.
10. a) Discuss about DMA  
(OR)  
b) Write about Instruction and RISC Pipelines.

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M.C.A. I SEMESTER REGULAR EXAMINATIONS, MAR- 2024  
PROBABILITY AND STATISTICS  
PAPER - V

Time: 3 Hours]

[Max. Marks: 70

Note: Answer all questions from Section – A and Section – B

## Section – A

(5x4=20)

Answer the following questions in not more than **ONE** page each:

1. Define subspace. Give two examples.
2. Discuss about Joint probabilities under Statistical Independence with suitable examples.
3. What are some disadvantages of probability sampling versus judgment sampling?
4. Explain the importance of Hypothesis testing.
5. Why do we use a chi-square test?

## Section – B

(5x10=50)

Answer the following questions in not more than **FOUR** pages each:

6. a) Let  $v_1 = \begin{bmatrix} 1 \\ -3 \\ 4 \end{bmatrix}$ ,  $v_2 = \begin{bmatrix} 6 \\ 2 \\ -1 \end{bmatrix}$ ,  $v_3 = \begin{bmatrix} 2 \\ -2 \\ 3 \end{bmatrix}$ , and  $v_4 = \begin{bmatrix} -4 \\ -8 \\ 9 \end{bmatrix}$ . Find a basis for the subspace  $W$  spanned by  $\{v_1, v_2, v_3, v_4\}$ .

(OR)

- b) Discuss the graphical interpretation of coordinates.

7. a) **Define Normal distribution. Discuss its characteristics.**

(OR)

- b) **i) State Baye's theorem.**

**ii) It is estimated that 50% of emails are spam emails. Some software has been applied to filter these spam emails before they reach your inbox. A certain brand of software claims that it can detect 99% of spam emails, and the probability for a false positive (a non-spam email detected as spam) is 5%. Now if an email is detected as spam, then what is the probability that it is in fact a non-spam email?**

8. a) **Discuss different types of Random sampling methods.**

(OR)

- b) **Explain the criteria of a good estimator.**

9. a) (i) **Explain null and alternate hypothesis with suitable examples.**

(ii) **Given a sample mean is 94.3, sample standard deviation is 8.4, and sample size is 6, test the hypothesis that the value of the population mean is 100 against the alternative hypothesis that it is less than 100. Use the 0.05 significance level. [Table value is 2.015]**

(OR)

- b) **Explain the procedure for testing differences between means with dependent samples.**

10. a) **Explain the testing procedure of ANOVA one way classification.**

(OR)

b) **In economics, the demand function for a product is often estimated by regressing the quantity sold ( $Q$ ) on the price ( $P$ ). The Bamsy Company is trying to estimate the demand function for its new doll "Ma'am" and has collected the following data:**

$P$	20.0	17.5	16.0	14.0	12.5	10.0	8.0	6.5
$Q$	125	156	183	190	212	238	250	276

- (i) **Plot these data.**

- (ii) **Calculate the least-squares regression line.**

- (iii) **Draw the fitted regression line on your plot from part (i)**

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M. C. A. I – SEMESTER REGULAR EXAMINATIONS, MAR- 2024  
**MANAGERIAL ECONOMICS AND ACCOUNTANCY**  
PAPER – VI

Time: 3 Hours]

[Max. Marks: 70

Note: Answer all questions from Section – A and Section – B

Section – A

(5x4=20)

Answer the following questions in not more than **ONE** page each:

1. Scope of managerial economics.
2. Equilibrium price.
3. Opportunity cost.
4. Components of discounted cash flow.
5. Need of trial balance.

Section – B

(5x10=50)

Answer the following questions in not more than **FOUR** pages each:

6. a) What is managerial economics? How it is useful to engineers?  
(OR)  
b) Explain about the risk and uncertainty theories profit with numerical examples.
7. a) Define the price elasticity of demand and explain the types of price elasticity of demand.  
(OR)  
b) Explain the different methods and factor affecting methods of demand forecasting.
8. a) Explain the stages of law of variable proportion theory and in which stage is rational decision is possible.  
(OR)  
b) What is an equilibrium? How does price and output determined under perfect competition.
9. a) Analyze the significance and determinants of working capital requirements.  
(OR)  
b) Calculate working capital turnover ratio from the following information:  
Current Assets Rs 1,80,000/-, Current Liabilities Rs 30,000/-, Cost of Revenue from Operations 10,00,000/- Gross Profit 20% of cost.
10. a) How to prepare the final accounts? Explain its concepts and importance.  
(OR)  
b) The ratio of X and Y is 6:5, If X =78, what is the value of Y?

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