

St Aloysius (Deemed to be University), Mangaluru
SEMESTER I - PG EXAMINATION - MCA (Master of Computer Applications)
JANUARY - 2025

MATHEMATICAL FOUNDATION FOR COMPUTER APPLICATIONS

Time : 2½ Hours

Max. Marks : 60

Answer any **FIVE FULL** Questions; **ONE FULL** question from every section

SECTION - I

- 1.a) (a) Given $A = \{1, 2, 3, 4\}$ and $B = \{2, 4\}$ }:
 (i) Verify if $B \subseteq A$.
 (ii) Write all proper subsets of B.
 (iii) How many subsets does A have?
 (b) Let $X = \{p, q\}$:
 (i) Write the power set of X. (6)
 (ii) Verify the number of elements in the power set.
 b) In a group of 100 students: 60 study Mathematics, 45 study Physics, 40 study Chemistry, 20 study both Mathematics and Physics, 15 study both Mathematics and Chemistry, 10 study both Physics and Chemistry, 5 study all three subjects.
 (a) Find how many students study at least one subject. (6)
 (b) Find how many students study only Mathematics.
 (c) Find how many students study none of the three subjects.
 2.a) Let $A = \{1, 2, 3\}$, $B = \{4, 5\}$ and $C = \{5, 6, 7\}$. (6)
 (a) Find $B \cup C$, $B \cap C$, and $B \setminus C$
 (b) Calculate $A \times (B \cup C)$, $A \times (B \cap C)$, and $A \times (B \setminus C)$
 b) In a survey of 150 people: 90 people like coffee, 70 people like tea, 50 people like juice, 40 people like both coffee and tea, 30 people like both coffee and juice, 20 people like both tea and juice, 10 people like all three drinks.
 (a) Draw a Venn diagram to represent this information. (6)
 (b) Find how many people like only coffee.

SECTION - II

- 3.a) Simplify $\neg [\neg \{(p \vee q) \wedge r\} \vee \neg q]$ (6)
 b) Examine whether the compound proposition $(p \vee (q \wedge r)) \vee \sim (p \vee (q \wedge r))$ is a tautology. (6)
 4.a) Prove without using Truth table. $[\sim p \wedge (\sim q \wedge r)] \vee [(q \wedge r) \vee (p \wedge r)] \Leftrightarrow r$ (6)
 b) Construct the truth table for, $\{(p \rightarrow q) \wedge (q \rightarrow r)\} \rightarrow \{(p \rightarrow r)\}$ (6)

SECTION - III

- 5.a) Solve the system of equations using Jacobi iteration method.

$$\begin{aligned} 27x + 6y - z &= 8 \\ 6x + 15y + 2z &= 72 \\ x + y + 54z &= 110 \end{aligned}$$
 (6)
 b) Solve the following system of equations using the Gauss Jordan method.

$$\begin{aligned} x_1 + x_2 + x_3 &= 1 \\ 4x_1 + 3x_2 - x_3 &= 6 \\ 3x_1 + 5x_2 + 3x_3 &= 4 \end{aligned}$$
 (6)
 6.a) Determine the largest eigen value and its corresponding eigen vector of

$$\begin{bmatrix} 4 & 1 & 0 \\ 1 & 20 & 1 \\ 0 & 1 & 4 \end{bmatrix}$$
 (6)
 b) Solve the following system of equations using the Gauss elimination method.

$$\begin{aligned} x + 2y - z &= 3 \\ 3x - y + 2z &= 1 \\ 2x - 2y + 3z &= 2 \end{aligned}$$
 (6)

Contd...2

SECTION - IV

7.a) A discrete random variable X has the p.m.f.:

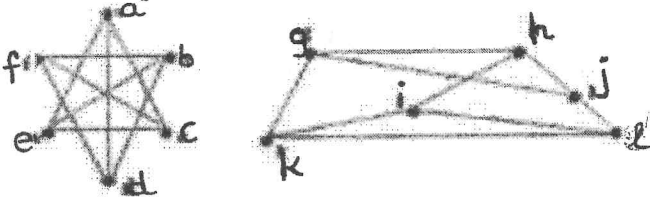
x	1	2	3	4	5	6	7
f(X)	k	2k	2k	3k	k ²	2k ²	7k ² +k

- a. Find k

(b) Evaluate $P(X<3)$, $P(X\geq 6)$
- (6)
- b) The probability that a bomb dropped hits the target is 0.2, find the probability that out of 6 bombs dropped (i) Exactly two will hit the target (ii) Atleast 2 will hit the target
- (6)
- 8.a) A can hit a target 3 times in 5 shots, B hits target 2 times in 5 shots, C hits target 3 times in 4 shots. Find the probability of target being hit when all of them try.
- (6)
- b) The probability of germination of a seed in a packet of seeds is found to be 0.7. If 10 seeds are taken for experimenting on germination in a laboratory, find the probability that (i) 8 seeds germinate (ii) at least 8 seeds germinate (iii) at most 8 seeds germinate
- (6)

SECTION - V

9.a) Define Isomorphism. Check whether the following graphs are isomorphic or not.



- b) Define the following terms related to graph with example
- (6)
- i. directed and undirected graphs (ii) simple graph (iii) complete Bipartite graph
- 10.a) Explain Adjacency Matrix and Incidence Matrix with an example.
- (6)
- b) Write a note on the applications of graphs.
- (6)

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St Aloysius (Deemed to be University), Mangaluru
SEMESTER I - PG EXAMINATION - MCA (Master of Computer Applications)
JANUARY - 2025
Advanced Database Management Systems

Time : 2½ Hours

Max. Marks : 60

Answer any **FIVE FULL** Questions; **ONE FULL** question from every section:**SECTION - I**

- 1.a. Define the concept of a data model, and elaborate on the hierarchical and network data models, providing thorough explanations for each. (6)
- b. Illustrate any six symbols used in an Entity-Relationship Diagram (ERD) with examples to demonstrate their meaning and usage. (6)
- 2.a. How does the DIKW pyramid illustrate the progression of information from raw data to actionable wisdom? Discuss the significance of each level in the hierarchy and provide examples to demonstrate the transformation of data into knowledge and ultimately wisdom. (6)
- b. Provide an in-depth explanation of the ANSI/SPARC Architecture of DBMS, including a detailed diagram for better comprehension. (6)

SECTION - II

- 3.a) Differentiate between : i) TRUNCATE and DELETE
ii) CHAR and VARCHAR
iii) DDL and DML (6)
- b) Explore various forms of Outer Join and highlight distinctions between Cross Join and Full Join. (6)
- 4.a) With reference to relational model explain 'Union', 'Intersection' and 'Difference' operations with examples. (6)
- b) Explain the concepts of 'Business Rule' and 'Constraints'. Describe the process of adding them in Oracle and provide an example for each. (6)

SECTION - III

- 5.a) Explain the concepts of public key and private key cryptography with appropriate illustrations. (6)
- b) Define Sequence and delineate the syntax for creating a Sequence in SQL, emphasizing its components, and provide an example. (6)
- 6.a) Explain how set operators and inner joins are employed in SQL queries, outlining their distinct roles and practical uses. (6)
- b) Define Normalization and elaborate on the concepts of 2nd Normal Form (2NF) and 3rd Normal Form (3NF) using examples to illustrate each. (6)

SECTION - IV

- 7.a) Elaborate on conditional and looping statements in PL/SQL, providing examples to illustrate their usage. (6)
- b) Highlight the distinctions between Stored Functions and Triggers, and explain the components used in their respective syntax. (6)
- 8.a) Elucidate Hardware failure and Catastrophic failure and also explain the contents and purpose of Transaction Log. (6)
- b) Discuss Basic 2PL, Strict 2PL, and Rigorous 2PL, highlighting their advantages and disadvantages. (6)

SECTION - V

- 9.a) What do you mean by 'Data fragmentation'? Explain all the data fragmentation strategies with the help of example (6)
- b) What are the key steps involved in the query optimization process? (6)
- 10.a) Compose an explanation on Distributed Database Systems, and elucidate the SP2D and MP2D architectures. (6)
- b) How would you create an explicit cursor? Explain the attributes of an explicit cursor using an example (Printing details of Employees). (6)

St Aloysius (Deemed to be University)
Mangaluru

SEMESTER I - PG EXAMINATION - MCA (Master of Computer Applications)
JANUARY - 2025

ENTERPRISE COMPUTING WITH ADVANCED JAVA

Time : 2½ Hours

Max. Marks : 60

Answer any **FIVE FULL** Questions; ONE FULL question from every section

SECTION - I

- 1.a) What is an interface? Create an interface for Stack. Implement Dynamic Stack class. (6)
- b) What is inheritance? Give an example for hierarchical inheritance (6)

- 2.a) What are the different access specifiers in Java. Discuss their scope. (6)
- b) What the keywords used in Java to handle exceptions? Give an example for
ArrayIndexOutOfBoundsException (6)

SECTION - II

- 3.a) Differentiate between ServletConfig and ServletContext objects (6)
- b) Discuss about some of the methods of the HttpSession interface with example (6)

- 4.a) Explain the services provided by a JEE container. (6)
- b) Explain the differences between Web Server and Application server (6)

SECTION - III

- 5.a) Write a JSP program to illustrate the use of scriptlets. (6)
- b) Brief about various JSP tag libraries (6)

- 6.a) Show how session tracking is accomplished in JSP (6)
- b) Explain various JSP Scripting elements (6)

SECTION - IV

- 7.a) Illustrate how you navigate a ResultSet object's contents. (6)
- b) What are different methods to obtain a connection using a driver manager? (6)

- 8.a) Discuss about prepared statements with an example (6)
- b) Discuss about the different types of JDBC drivers. (6)

SECTION - V

- 9.a) Differentiate Bean Managed Persistence (BMP) and Container Managed Persistence (CMP) (6)
- b) Explain the Client Session Management service provided by the EJB container. (6)

- 10.a) Explain the Persistence service provided by the EJB container. (6)
- b) Explain the Transaction Management service provided by the EJB container. (6)

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St Aloysius (Deemed to be University),Mangaluru
SEMESTER I- PG EXAMINATION - MCA (Master of Computer Applications)
JANUARY - 2025
Web Application Development using Python

Time : 2½ Hours

Max. Marks : 60

Answer any **FIVE FULL** Questions; **ONE FULL** question from every section:

SECTION - I

- 1.a. Explain the significance of following keywords, a) continue b) pass c) break (6)
- b. Explain with an example, how + and * operators, range slicing [:] work with strings. (6)

- 2.a. What is a module in Python? How do you import a module into a Python script? Explain any 2 math functions available in math module. (6)
- b. What are operators in Python? Describe specifically about identity operator and membership operator (6)

SECTION - II

- 3.a) Discuss the following dictionary methods with an example. i) get() ii) keys() iii) pop() iv) update() v) values() vi) items(). (6)
- b) Describe with example file access mode. (6)

- 4.a) What are the different operations that can be performed on a list? Explain with examples. (6)
- b) Write Python program to count the total number of vowels, consonants and blanks in a String. (6)

SECTION - III

- 5.a) Write a short note on i) isinstance() ii) __init__(). (6)
- b) What is inheritance? How does Python support Inheritance? Explain with an example? (6)

- 6.a) What is operator overloading? With an example, explain operator overloading in Python (6)
- b) Describe in detail about power of pattern search in regex in python. (6)

SECTION - IV

- 7.a) What is a cursor object? Explain various methods and attributes of cursor object. (6)
- b) Write a program to insert records into a table and fetch one row and fetch all the rows from the table. (6)

- 8.a) Discuss with an example exceptions with arguments in Python (6)
- b) What is the difference between else block and finally block in exception handling? Explain with an example program (6)

SECTION - V

- 9.a) Explain in detail about Django Installation and Configuration. (6)
- b) Explain in detail about the template system of Django with an example. (6)

- 10.a) Explain in detail about working with HTML forms in Django. (6)
- b) What is the purpose of the admin site in a Django project? (6)
