

END TERM EXAMINATION

SECOND SEMESTER [MCA] MAY-JUNE 2026

Paper Code: MCA-102

Subject: Data and File Structures

Time: 3 Hours

Maximum Marks: 60

Note: Attempt all questions as directed. Internal choice is indicated.

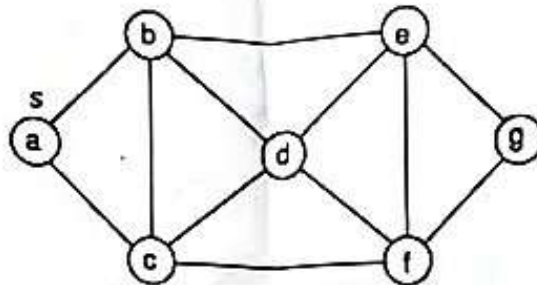
- Q1 Attempt any four of the following questions: (4x5=20)
- a) Explain what do you understand by recursion? Discuss the various types of recursion using appropriate examples.
 - b) Write an algorithm for the evaluation of a postfix expression, explain its working through a suitable example, and trace the algorithm to show the stack at each step.
 - c) Write the algorithm/ pseudocode for the insert and delete operations in the Queue data structure.
 - d) Compare Merge, Quick and Heap sort algorithms based on their space and time complexity.
 - e) Write an algorithm/pseudocode to insert an element into a binary search tree.
 - f) Write an algorithm to insert a node at a specific position in a doubly linked list.
 - g) Create a Binary Search Tree of the Given sequence and write the preorder, postorder and inorder traversal sequence of the created binary search tree 80,60,100,50,70,95,110,66,78,98,97.
 - h) What is the advantage of a B Tree? Create a B Tree of order 5 for the following sequence: F,G,L,M,P,W,B,C,K,S,T,A,U,R,D,J,O,E,Z.
- Q2 a) Write an algorithm/C function for merging two sorted linked lists. (6)
- b) Deletion of a node given its value in a circular linked list. (4)
- OR
- Q3 Write an algorithm for:
- a) Implement a double stack in an array, with functions, push(), pop(), isempty() and isfull() for the stacks.
 - b) Sort the given list of integers using Radix Sort algorithm: 345, 1024, 390, 556, 645, 927, 158. What is the time complexity of Radix sort. (5+5=10)
- Q4 a) What are Heaps? What are their properties? How can heaps be used to implement priority queues?
- b) Construct a max heap to perform heap sort, on the given sequence: 18, 20, 9, 15, 6, 4, 25, 10, 30, 5
- Show the heap and the array after each pass. (3+7=10)
- OR
- Q5 Define AVL Trees. (10)
- Consider the list:-
- 50, 40, 20, 60, 80, 35, 90, 45, 55, 90, 30, 25, 100, 95, 65, 83
- Construct an AVL Tree. Illustrate and explain in detail all the different types of rotations required to balance the tree height.

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- Q6 a) Explain the BFS algorithm and trace it for the following graph: (5+5=10)



- b) What is a minimum spanning tree? Write an algorithm to find the minimum spanning tree

OR

- Q7 Explain using an appropriate example the Dijkstra's Algorithm for single-source shortest path. Show every step and discuss its limitations, and also its time complexity. (10)

- Q8 Consider a file created in C, containing student details written in the file through a "STUDENT" structure storing details like Roll No, Name, Father's Name, Address, Phone No, Marks in 5 subjects, Total Marks and Average Marks. Write a C function for the following operations:

- 1) A C function that modifies the ADDRESS and PHONE NO of a student having ROLL NO 15
- 2) A C function that Adds a new student structure at the end of the file.
- 3) A C function that Searches and displays the details of a student having the given roll number.
- 4) A C function that returns the size of the file in bytes. (10)

OR

- Q9 a) Explain what is relative file organisation and how are they different from sequential files?
- b) Explain External Sorting. Use K way merge sorting technique to merge the following data on tape, assuming internal memory can store 3 records. 95, 11, 80, 12, 35, 25, 100, 98, 45, 56, 42, 9, 15, 50. (4+6=10)

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SECOND SEMESTER [MCA] MAY-JUNE 2026

Paper Code: MCA-104

Subject: Object Oriented Software Engineering

Time: 3 Hours

Note: Attempt any five questions including Q.No1 which is compulsory.

Select one question from each unit.

Q1 Attempt any Four of the following questions: (5x4=20)

- Describe the purpose of a UML activity diagram. Provide an example scenario where an activity diagram would be used in software development.
- Explain the difference between a UML class diagram and a UML object diagram. Provide a brief example for each to illustrate their use.
- Illustrate the statement, "Link and association can be applied interchangeably" through a suitable example.
- Defend the need of reflexive association through suitable example.
- Explain the concept of multiplicity in UML. How is multiplicity represented in a class diagram, and why is it important in modeling relationships between classes? Formulate the following multiplicity: Each customer must have at least one account at our bank and should not have more than five accounts in total.
- Elaborate the property that can allow the first transformation of model to design model.
- Elaborate pair programming and its advantages in terms of delivering output.
- List the principles of agile software development.

UNIT-I

- Contrast traditional life cycle model with their object-oriented counterparts. (5)
- Identify and justify the relationship that the following objects may share: (5)
 - Bus and Passengers
 - Table of Contents and Book
 - Savings Account and Bank Account
 - Attendance Sheet and Student
 - Professor and Students.

- Elaborate is-a relationship in detail with suitable example? (5)
- Describe the various architectural views that can be represented using UML. How do these views help in understanding and communicating the software architecture? (5)

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UNIT-II

- Case study: Online Shopping Paragraphs Corporation sells books and CDs using through online shopping. The customer adds items to her shopping cart. She may remove items or go to the check-out to make her purchases at any time. The customer reviews her purchases, chooses a payment method and pays. A sales employee at Paragraphs Corporation gets the order and purchase confirmation from the system, and sends the electronic order to the warehouse. The warehouse employee updates the order status. The customer may check the order status. Model the above scenarios through a Use case Diagram. (5)
- Evaluate the inter-relationship between association and aggregation. (5)

- A company wants to develop a new software system to manage its inventory. They need a system that can track items, suppliers, purchase orders, and sales orders. Create a UML class diagram that represents the main entities and their relationships in this system. Include attributes and relationships between the classes. (5)

- Make a use case diagram for the Buy a Product scenario (5)

- Customer browses catalog & selects items to buy
- Customer goes to check out.
- Customer fills in shipping information (address, next-day or 3-day delivery)
- System presents full pricing information
- Customer fills in credit card information
- System authorizes purchase
- System confirms sale immediately 8. System sends confirming email to customer

UNIT-III

- With appropriate example, justify the purpose of construction phase in object-oriented analysis model. (5)
- Evaluate the Iterator design pattern with an appropriate example. (5)

- Explain the concept of design patterns and their importance in software development. (5)
- Elaborate the need of various design patterns through appropriate examples. (5)

UNIT-IV

- Elaborate the XP practices that embody the basic practices of Extreme Programming. (5)
- Contrast the various types of black box testing strategies. (5)
- Analyze the stakeholders that affect a scrum project. (5)
- Contrast acceptance testing, alpha testing and beta testing. (5)

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SECOND SEMESTER [MCA] MAY-JUNE 2026

011213044128

Paper Code: MCA-106

Subject: Python Programming

Time: 3 Hours

Maximum Marks: 60

Note: Attempt all questions as directed. Internal choice is indicated.

- Q1 Attempt **any Four** of the following questions: (4x5=20)
- (a) Explain command line arguments with some examples.
 - (b) What are iterators and decorators. Explain both with a use case.
 - (c) Differentiate between Indexing and Slicing.
 - (d) Write a program to swap two numbers in python.
 - (e) What do you understand by short circuit evaluation? Explain with some examples.
 - (f) Explain lambda, map and reduce functions with an example.
 - (g) Explain various important functions of NumPy.
 - (h) What do you mean by synchronization of threading, how is it implemented.
- Q2 a) Write four important functions of dictionary. (10)
b) Write a python program for a linear search of an element and report a success or failure.
- OR**
- Q3 Write a program to implement List which behaves as a stack and show the operation of push and pop of stack in this list for 5 data items. (10)
- Q4 Explain in detail how files can be handled in python. Also explain the usage of seek function in files. (10)
- OR**
- Q5 What is threading. Explain and implement a code which can explain the concept of threading in detail. (10)
- Q6 Explain implementation of encapsulation, inheritance and polymorphism features in python with the help of an example. (10)
- OR**
- Q7 Describe about Exception handling. Explain in detail about the usage of try-catch block with the help of an example (10)
- Q8 Using the pandas library. Import a Csv file, Do all preprocessing steps, Apply matplotlib Lib to draw bar/ line graph. (10)
- OR**
- Q9 What do you mean by Tkinter package of python. Write a code in tkinter to make an application where you make two labels label 1 and label 2. Also make buttons add and subtract. Input two values in these two labels and when we click on add/ subtract buttons, label 3(result) , the result would be shown on label3 as the result of addition/ subtraction. (10)

Please write your exam roll no.)

Exam Roll No. 01121304425

END TERM EXAMINATION

SECOND SEMESTER [MCA] MAY-JUNE-2026

Paper Code: MCA126

Subject: Information Security

Time: 3 Hours

Maximum Marks: 60

Note: Attempt all questions as directed. Internal Choice is indicated.

- Q1 Attempt any Four of the following questions: (4x5=20)
- a) Explain the role of integrity in information security. How does it protect the accuracy of data?
 - b) How does secure software development help reduce security risks in software applications?
 - c) How can quantitative and qualitative approach be used in risk control to assess and manage IT risks?
 - d) How do policies, standards, and practices work together to create a comprehensive information security framework?
 - e) How does IDS/IPS differ from firewalls, and why are both necessary in an organization's overall security strategy?
 - f) Operating Systems plays a critical role in ensuring the security of the devices and networks. Discuss
 - g) How can organizations integrate biometric systems with other access control mechanisms to enhance security and user convenience?
 - h) What role does encryption play in securing remote communications, and what types of encryption methods are commonly used?
- Q2 What is the difference between vulnerabilities, threats, and attacks in information security? What are some effective countermeasures organizations can implement to prevent or respond to security threats? (10)
- OR
- Q3 How do laws and ethics intersect in the realm of information security? What are the key components of a code of ethics in information security? (10)
- Q4 What is the significance of information security with respect to ISO standards, and how do they guide organizations in managing information security? (10)
- OR
- Q5 What steps are involved in risk assessment, and how do organizations evaluate the potential impact and likelihood of risks? (10)
- Q6 How do access control models influence security decisions within an organization? What are some of the common challenges organizations face when implementing access control, and how can they overcome these challenges? (10)
- OR
- Q7 What are the different processing modes of firewalls and how do they differ in terms of security effectiveness? (10)
- Q8 What is vulnerability assessment? How does it differ from penetration testing in identifying potential weaknesses in an organization's security? (10)
- OR
- Q9 What is digital forensics? How does it contribute to investigations of security incidents and breaches? (10)

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Exam Roll No. 01121304
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SECOND SEMESTER [MCA] MAY-JUNE 2026

Paper Code: MCA-128

Subject: Digital Marketing

Time: 3 Hours

Maximum Marks: 60

Note: Attempt all questions as directed. Internal choice is indicated.

- Q1 Attempt **any four** of the following questions: (4x5=20)
- (a) ☒ Elaborate the role of Internet in digital marketing and discuss the characteristics of digital marketing.
 - (b) Explain medium-initiated and consumer-initiated contact approaches of marketing with examples of each.
 - (c) ☒ Discuss the importance of search advertising. Elaborate the AdRank calculation process of Google.
 - (d) Explain various types of adverts used in Facebook marketing.
 - (e) ☒ Describe blog marketing and interactive marketing with suitable examples.
 - (f) Explain the best practices to form the content strategy for Twitter (X) marketing.
 - (g) Illustrate the working of search engine. Differentiate between search engine optimization and search engine marketing.
 - (h) ☒ Explain various metrics of web analytics with their importance.
- Q2 (a) ☒ Explore the evolution of digital marketing from traditional to modern era. (5)
- (b) ☒ Considering the case of purchasing a smart phone, explain the consumer decision journey through AIDA model. (5)
- OR**
- Q3 Explain various phase of digital marketing plan. Discuss the technological advancements that have driven changes in the marketing environment. (10)
- Q4 (a) Explain programmable digital marketing. Differentiate between demand-side and supply-side platforms in programmable digital marketing. (5)
- (b) Explain email marketing. Differentiate between single opt-in and double opt-in email. (5)
- OR**
- Q5 (a) ☒ Discuss various types of ads available in YouTube. List the buying models of YouTube ads. (5)
- (b) ☒ Explain viral marketing with its advantages and disadvantages. (5)

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- Q6 (a) Describe the main points to form a successful Instagram marketing strategy. (5)
(b) Elaborate on-device and off-device advertising model of mobile advertisement. (5)

OR

- Q7 Discuss the role of social media in digital marketing. Elaborate the phase of social media marketing strategy. (10)

- Q8 (a) Explain on-page optimization in SEO. List some common SEO tactics which are used to improve website visibility. (5)
(b) What is the importance of backlinks in SEO, and how can high-quality be acquired? (5)

OR

- Q9 Elaborate the phase of search engine optimization. Discuss the important of SEO for business and organization. (10)
