2025

COMPUTER SCIENCE

(Theory)

Full Marks : 70

Pass Marks : 21

Time : Three hours

All the questions are compulsory.

The figures in the right margin indicate full marks for the questions.

Select the correct answer from each of the following and rewrite it.

1. The statement fileobject.seek (5, 0) will position the _____. 1

   (A) File object at 5th byte position from the beginning of file.

   (B) File object at 5th byte position from the end of file.

   (C) File object at 5th byte position from the current position.

   (D) File object at the beginning of file.

2. Which of the following data structure is used to convert postfix expression to infix expression? 1

   (A) Stack

   (B) Queue

   (C) Linked Listn

   (D) Heap

3. In RDBMS, each row of data in a relation (table) is called : 1

(A) Attribute

(B) Tuple

(C) Domain

(D) Degree

4. In SQL, the word NULL represents : 1

(A) 0

(B) A blank space

(C) Missing or unknown value

(D) False or No

5. In which network topology, each communicating device is connected with every other device in the network? 1

(A) Bus Topology

(B) Mesh Topology

(C) Ring Topology

(D) Star Topology

6. Which data communication method enables IoT(Internet of Things) to control fans, lights, fridge, oven and other home appliances while sitting at office or driving a car? 1

(A) Simplex Communication

(B) Half-duplex Communication

(C) Full-duplex Communication

(D) All the above

7. Coaxial cable is used to carry signals of higher frequencies to a longer distance. The key factor for its success is : 1

(A) Its high bandwidth enables heavy data transfer.

(B) Its shielded design allows faster data transfer without interference.

(C) It is very economical and reliable.

(D) It is light, strong and long lasting.

Give the very short answer of the following questions.

8. Define Build-in exceptions. 1

9. Why is there a need for handling exceptions? 1

10. What is the advantage of Hashing over other searching methods? 1

11. Find the value of Mode – Median of the following data: 85, 90, 90, 100, 102, 110, 110, 110, 115. 1

12. Why do we apply data constraints on the fields of the relations in DBMS? 1

13. What will be the output of : SELECT POW(7, MOD(8, 3))? 1

14. Draw the diagram of relational operation : Music – Dance (i.e. Music MINUS Dance) where Music and Dance are relations. 1

15. What is the function of a Router? 1

16. Mention one dissimilarity point between Circuit switching and Packet switching? 1

17. While using internet service you may experience frequent pop-up windows prompting you to visit some websites or download some software or unknown program starts up automatically or behaves abnormally.

Suggest one measure to be taken up to rectify or to prevent your computer from such signs of Malware activities. 1

Give short answer of the following questions.

18. How is read() method different from readline() method? 2

19. Apply suitable algorithms to convert the infix expression X + Y / Z into postfix notation and evaluate with X=5, Y=6 and Z=2. 2

20. Write any two applications of Queue in Computer science. 2

21. What are Data? What is the purpose of Data Processing? 2

22. Why are traditional file systems being replaced gradually by modern DBMS? Give two reasons. 2

23. Give any two Multiple Row functions and write the purpose of each. 2

24. Consider the two relations A1 and A2 given below. Find the Cartesian product : A1 × A2 2

A1	
Serial	Country
1	INDIA
2	CHINA
3	JAPAN

A2	
Code	Game
A	Cricket
B	Football
C	Hockey

25. Draw a diagram showing the function of a modem in a typical communication system between two computers over telephone line. 2

26. Define the following terms : 2

    (a) Cookies

    (b) Hackers and Crackers

Give answer of the following questions.

27. Write Python code to accept two numbers and display the quotient. Appropriate exception should be raised if the user enters the second number (denominator) as zero(0). 3

OR

Write Python code to create a text file "hello.txt" and write the following lines to the file :

"Welcome my class"

"It is a fun place"

"You will learn and play"

28. Write Python codes for each of the following user defined functions for a stack : 3

(a) isEmpty()

(b) opPush()

(c) opPop()

OR

Write Python codes for each of the following user defined functions for a Deque :

(a) isEmpty()

(b) insertRear()

(c) deletionFront()

29. Write an algorithm for evaluation of a postfix expression to get its result. 3

OR

Write an algorithm to sort a list of numbers using selection sort method.

30. Give one point of difference between each pair of the following : 3

(a) Structured Data and Unstructured Data.

(b) Mean and Median.

(c) Range and Standard Deviation.

OR

Differentiate between each pair of the following :

(a) Data redundancy and Data Inconsistency

(b) Database schema and Database instance

(c) Degree and cardinality of a relation

31. Explain CREATE TABLE statement specifying its use and syntax. Give an example with appropriate data types, sizes and constraints for the attributes of the relation. 3

OR

Explain SELECT statement specifying its use and syntax with clauses: FROM, WHERE and DISTINCT. Write the purpose of each clause.

Give the answer of the following questions.

32. Write a Python program to sort the following list of marks obtained by 10 students in an examination and display the marks in descending order. Unsorted marks are: 56, 48, 35, 52, 67, 63, 41, 55, 39 and 60. Use Bubble sort technique. 5

OR

Write a Python program to find and display the tallest and the shortest among 10 students of class XII of a school. The heights of the students (in cm) are: 156, 148, 173, 152, 167, 163, 174, 165, 139 and 160. Use Selection sort or Insertion sort technique.

33. Write a Python program to find a key in a sorted list of numbers by using Binary search method. 5

OR

Write a Python program to search a key in a list L (34, 16, 2, 93, 80, 77, 51) by using 'Search by Hashing' method. Use modulo division (remainder division) as Hash function.

34. Consider a table EMPLOYEE of a database having the fields: EmpID, EmpName, Designation, Salary, Age and DeptName. Write SQL query or command to accomplish each of the following : 5

(a) Insert a new record with data :

'M/12', 'Th Malemnganba Singh', 'Manager', 85000, 34, 'Computer Science'

(b) Display a list of Managers of all departments in decreasing order of their age.

(c) Increase the salary of employees whose salary is less than 15000 by 1000.

(d) List the employees whose name ends with 'Singh' or 'Devi'.

(e) Display the total number of records in the EMPLOYEE table.

OR

Using Relational Data Model, a design stage of a schema diagram of STUDENT ATTENDANCE database of a school is shown below. Rewrite the schema diagram and complete the design by performing the following activities :

ATTENDANCE :

Attendance Date	Roll Number	Attendance Status

STUDENT :

RollNumber	SName	SDateofBirth	GUID

GUARDIAN :

GUID	GName	GPhone	GAddress

(a) Select a Primary key for each relation by underlining the appropriate attributes.

(b) Among the Primary keys double underline the Composite key(if any).

(c) Identify attributes which can serve as Foreign keys and ...

(i) draw a directed arrow between STUDENT and ATTENDANCE relations to establish Foreign key-Primary key relationship.

(ii) draw a directed arrow between STUDENT and GUARDIAN relations to establish Foreign key - Primary key relationship.

(d) Identify all the attributes which may contain NULL values and circle the attributes.

35. What is the name of the first Computer Network? What are the different types of Computer Network classified on the basis of geographical area covered and data transfer rate? Write two characteristics for each type of network. 5

OR

What is Protocol in data communication? What are its needs in data communication? Write the full form and purpose of the following protocols : HTTP, FTP, SMTP and TCP/IP.