



WEST BENGAL STATE UNIVERSITY
B.A./B.Sc. Honours/Programme 2nd Semester Examination, 2023

CMAHGEC02T/CMAGCOR02T-COMPUTER APPLICATION (GE2/DSC2)

Time Allotted: 2 Hours

Full Marks: 40

*The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.
All symbols are of usual significance.*

Answer Question No. 1 and any four from the rest

1. Answer any *four* questions from the following: 2×4 = 8
 - (a) What is integrity constraints?
 - (b) What is the main function of DBA?
 - (c) What is foreign key?
 - (d) Mark the differences between Naive users and sophisticated users.
 - (e) Define metadata.
 - (f) What do you mean by redundancy?
 - (g) Differentiate between Schema and Instance.

2. (a) Define the relational data model and explain its advantages over other data models. 4+4
(b) Discuss the components of a typical DBMS architecture.

3. (a) What is data independence? Explain the different types of data independence. 4+4
(b) Explain the following:
 - (i) Ternary relationship
 - (ii) Weak entity set.

4. (a) What is the use of DROP command and what are the differences between DROP, TRUNCATE and DELETE commands? 5+3
(b) Discuss the purpose of drawing ER diagram.

5. Consider the following database schema to write nested queries in SQL: 2×4 = 8
Supplier (id, name, city)
Parts (pno, pname, pdescription)
Supply (id, pno, cost)
 - (a) Find the names of the parts supplied by "Raj".
 - (b) Find the names of the suppliers who supply "Nuts".
 - (c) Find the cost of bolts being supplied by Kolkata suppliers.
 - (d) Find the name and city of the supplier who supplied highest cost product.

6. (a) Given a relation R with 6 attributes ABCDEF and the following FDs: 4+4

$$C \rightarrow F, E \rightarrow A, EC \rightarrow D \text{ and } A \rightarrow B.$$

Find the highest normal form. Justify your answer.

(b) Given a relation R with attributes A, B, C and D, and functional dependencies $F: \{A \rightarrow B, B \rightarrow C, C \rightarrow D\}$, identify the candidate keys for R.

7. Write short notes on: (any *two*) 4×2 = 8

- (a) Transitive Dependency
- (b) Limitations of file-based systems
- (c) Database Languages.

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CMAACOR04T-COMPUTER APPLICATION (CC4)
COMPUTER SYSTEM ARCHITECTURE

Time Allotted: 2 Hours

Full Marks: 50

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1. Answer any *five* questions from the following: 2×5 = 10
- (a) Perform the binary subtraction $1101 - 1011$ by 1's complement method.
 - (b) Differentiate between Fixed Point and Floating Point Number.
 - (c) What is content addressable memory?
 - (d) What is the equivalent Hexadecimal of $(532.03)_8$?
 - (e) What do you mean by micro-operations?
 - (f) What is synchronous data transfer?
 - (g) What is auxiliary memory?
 - (h) What do you mean by cache coherence?

Answer any *five* questions from the following 8×5 = 40

2. (a) Differentiate between Combinational circuit and Sequential circuit with example. 4+4
(b) Explain Instruction Cycle using a flowchart.
3. (a) Realise a full subtractor with the help of half subtractors. 4+4
(b) Briefly explain the concepts of Direct mapping and set-associative mapping.
4. (a) What is Memory Address Register (MAR) and Memory Data Register (MDR)? 4+4
(b) Evaluate the following expression using 2 address and 3 address instructions separately.
$$F = (A + B) * (C - D)$$
5. Explain Booth's algorithm. Apply Booth's algorithm to multiply the two numbers 4+4
 $(+14)_{10}$ and $(-12)_{10}$.

6. Define hit ratio. What is the difference between associative and set associative mapping? What do you mean by locality of reference? 2+4+2
7. Represent the decimal value -32.75 in IEEE 754 single precision floating point format. Explain and draw 4-bit binary decremter circuit. 4+4
8. (a) Explain the working of DMA by analyzing the modes of DMA. Transfer and discuss its pros and cons. (2+2)+
(2+2)
- (b) What is the purpose of interrupt in Computer Organization? Discuss Interrupt Cycle in brief.
9. Explain the following: (Any *two*) 4×2 = 8
- (a) Micro-programmed and hardwired control unit
 - (b) Decoder (3×8)
 - (c) I/O module
 - (d) Half and full adder with truth table.

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CMAACOR03T-COMPUTER APPLICATION (CC3)

Time Allotted: 2 Hours

Full Marks: 40

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Answer Question No. 1 and any four from the rest

1. Answer any **four** questions from the following: 2×4 = 8
 - (a) What are the difference between Array and Linked list?
 - (b) Differentiate linear and non-linear data structure.
 - (c) How do you test for an empty queue?
 - (d) What is a *sparse matrix*? Why is it required?
 - (e) Explain Internal and External path-lengths of a tree with an example.
 - (f) What is a threaded binary tree?
 - (g) What is an AVL tree?

2. (a) "All binary search trees are binary trees, but the reverse is not true." — Do you agree? Give reasons. 2+4+2
 - (b) Write down the non-recursive algorithm for *in-order traversal of a binary tree*.
 - (c) Draw a *Binary search tree* which when traversed in order generates the string:
E A C K F H D B G

3. (a) What are the advantages of a circular queue over a linear queue? Illustrate with an example. 3+5
 - (b) Write an algorithm for Insert and Delete operation in a circular queue.

4. (a) What do you mean by dynamic memory allocation? 2+6
 - (b) Write and explain the algorithm for create and traverse operations in single linked list with example.

5. (a) Construct the binary search tree if the elements are in the following order— 4+4
60, 70, 30, 20, 55, 90, 95, 80, 55, 35, 45, 40, 50
 - (b) Write an algorithm for PUSH() and POP() an element into a stack.

6. (a) Write an algorithm to find factorial of a positive number using recursion. 3+(2+2)+1
(b) Define hashing. What are the collision resolution methods?
(c) Mention the types of sorting techniques.
7. Write an algorithm for merge sort. Sort the following number: 4+4
38, 27, 43, 3, 9, 82, 10
Show output after each pass.
8. (a) Explain the limitations of recursion in problem-solving. In what scenarios might recursion not be the best approach? Provide examples where using recursion could lead to performance issues or inefficiencies. 4+4
(b) Consider a two dimensional array A of order [254]. The base address of the array is 400, words per memory cell is 4. Find the address of A[12,4] using row major and column major addressing.

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