

SECOND SEMESTER P.G. DEGREE EXAMINATION, APRIL 2021

(CCSS)

Computer Science

CSC 2C 07—DESIGN AND ANALYSIS OF ALGORITHMS

(2019 Admissions)

Time : Three Hours

Maximum : 80 Marks

Answer any five full questions.

1. A) Define an algorithm. Explain different properties of an algorithm. (6 marks)
- B) Write an algorithm to perform multiplication of two matrices. (5 marks)
- C) Solve the following recurrence relations $x(n) = x(n-1) + 5$ for $n > 1$ $x(1) = 0$. (5 marks)
2. A) Apply quick sort the list E, X, A, M, P, L, E in alphabetical order. Draw the tree of the recursive calls made. (8 marks)
- B) What are the major variations of decrease and conquer technique ? Explain with an example for each. (8 marks)
3. A) Define minimum cost spanning tree. Write Kruskal's algorithm to construct minimum cost spanning tree. (8 marks)
- B) Explain job sequencing problem. Solve the following job sequencing problem $n = 5$, $(p_1, p_2, p_3, p_4, p_5) = (20, 15, 10, 5, 1)$ and $(d_1, d_2, d_3, d_4, d_5) = (2, 2, 1, 3, 3)$ (8 marks)
4. A) Explain Floyd's Algorithm for all pair shortest path algorithm with example and analyse its efficiency. (8 marks)
- B) Solve the below instance of assignment problem using branch and bound algorithm :

	Job 1	Job 2	Job 3	Job 4
Person a	9	2	7	8
Person b	6	4	3	7
Person c	5	8	3	8
Person d	7	6	9	4

(8 marks)

Turn over

5. A) Explain the classes of NP - Hard and NP - Complete. (8 marks)
- B) What do you mean by approximation algorithm ? Explain in detail. (8 marks)
6. A) Explain the general plan for analysing the efficiency of a recursive algorithm. Suggest a recursive algorithm to find factorial of a number. Derive its efficiency. (8 marks)
- B) Illustrate mathematical analysis of recursive algorithm for Towers of Hanoi. (8 marks)
7. A) What is binary search ? What is the concept used in binary search ? Write the procedure to search an element in a list of n elements. (8 marks)
- B) Explain Heap sort algorithm. Sort the given list of numbers using heap sort : 2, 9, 7, 6, 5, 8. (8 marks)
8. Explain the following :
- a) Warshalls algorithm.
 - b) Backtracking.
 - c) Cooks theorem.
 - d) Median finding algorithm.

(16 marks)

SECOND SEMESTER P.G. DEGREE EXAMINATION, APRIL 2021

(CCSS)

Computer Science

CSC 2C 08—ADVANCED DATABASE MANAGEMENT SYSTEMS

(2019 Admissions)

Time : Three Hours

Maximum : 80 Marks

Answer any five full questions.

1. A) Explain the architecture of a database management systems. (8 marks)
B) Describe the fundamental operators in Relational Algebra. (8 marks)
2. A) What do you mean by database normalization ? Explain 1NF, 2NF and 3NF with examples. (8 marks)
B) Why is concurrency control needed ? Explain lost update, Inconsistent retrievals and Uncommitted dependency anomalies. (8 marks)
3. A) Explain delete and update SQL statement with examples. (8 marks)
B) What is Serializability ? What are its types ? What is serializable schedule ? Give examples. (8 marks)
4. A) What are stored procedures ? Explain its advantages in database programming.
B) What is a Cursor ? Explain its types and implementation. (8 + 8 = 16 marks)
5. A) Compare and contrast OODBMS and RDBMS. (8 marks)
B) List the advantages and disadvantages of distributed database management systems. (8 marks)
6. A) Explain the function and syntax of any two DCL statements in SQL with example.
B) Explain Two phase locking protocol. (8 + 8 = 16 marks)

Turn over

7. Consider the following tables :

Employee (Emp_no, Name, Emp_city)

Company (Emp_no, Company_name, Salary)

- (i) Write suitable SQL statement to create above two table and insert data into these Tables. (5 marks)
 - (ii) Write a SQL query to display Employee name and company name. (2 marks)
 - (iii) Write a SQL query to display employee name, employee city, company name and salary of all the employees whose salary >10000. (3 marks)
 - (iv) Write a query to display all the employees working in 'XYZ' company. (3 marks)
 - (v) Write a SQL query to list all employees whose salary is higher than the average salary. (3 marks)
8. A) Explain the architecture of distributed database management system. (8 marks)
- B) Explain the characteristics of Big Data. (8 marks)

SECOND SEMESTER P.G. DEGREE EXAMINATION, APRIL 2021

(CCSS)

Computer Science

CSC 2C 09—OPERATING SYSTEM CONCEPTS

(2019 Admissions)

Time : Three Hours

Maximum : 80 Marks

Answer any five full questions.

1. A) Differentiate between multiprogramming and multitasking Operating Systems.
B) Compare and contrast compilers and interpreters.
C) Explain the different services offered by an Operating System. (6 + 4 + 6 = 16 marks)
2. A) What is a deadlock ? Explain the different methods for handling deadlock. (8 marks)
B) Explain the uses of semaphores in concurrent systems. (8 marks)
3. A) Explain any two disk scheduling algorithms in detail. (8 marks)
B) What is segmentation ? Explain how it differ from paging. Also explain the implementation of segmentation. (8 marks)
4. A) What is authentication ? Describe why authentication is important for file protection. (8 marks)
B) Discuss the various mechanism for data encryption. (8 marks)
5. A) Explain the structure of UNIX file system. (8 marks)
B) Explain the function and syntax of any two-loop construct used in UNIX shell programming. (8 marks)
6. A) State the basic requirement of critical section problem solution. (6 marks)
B) Differentiate between buffering and spooling. (6 marks)
C) Explain any four options of Is command in UNIX. (4 marks)
7. A) What is page fault ? Explain the different methods for handling page faults.
B) Explain the concept of macro definition and expansion with the help of an example. (8 + 8 = 16 marks)
8. A) What are the different file access methods ? Explain. (8 marks)
B) What is thread ? Explain the procedure for managing thread. (8 marks)

SECOND SEMESTER P.G. DEGREE EXAMINATION, APRIL 2021

(CCSS)

Computer Science

CSC 2C 10—OBJECT ORIENTED PROGRAMMING WITH JAVA

(2019 Admissions)

Time : Three Hours

Maximum : 80 Marks

Answer any five full questions.

1. (A) Explain any four object oriented features supported by Java with examples. (8 marks)
- (B) Explain how to declare two dimensional arrays in Java with illustration. (4 marks)
- (C) Write a short note on JVM. (4 marks)
2. (A) What is super class ? Explain how a super class variable can access reference a subclass object with illustration. (8 marks)
- (B) What are constructors ? Explain the different ways of passing parameters in Java with suitable examples. (8 marks)
3. (A) Differentiate between AWT and Applets. Also explain about AWT container class.
- (B) What are the pros and cons of Java applets. Develop an applet that receives N numerical values as input from the user and then displays the average of these numbers on the screen. Write the HTML code that calls the applet. (8 + 8 = 16 marks)
4. (A) Write a program that creates a user interface to perform integer division. The user enters two numbers through command line arguments as Num 1 and Num 2, perform division and returns the remainder. If Num 1 and Num 2 are not integers, then Number Format Exception has to be generated. If Num 2 is Zero, Arithmetic Exception has to be generated. (8 marks)
- (B) How will you define a thread ? Explain thread life cycle in detail. (8 marks)

Turn over

5. (A) Create a Swing applet that has two buttons named *beta* and *gamma*. When either of these buttons pressed, it should display *beta pressed* or *gamma pressed* respectively. (8 marks)
- (B) What is InetAddress ? Explain the steps for creating a socket in Java for making communication between two JVMs. (8 marks)
6. (A) What is an Interface ? Explain the needs and properties of Interface in Java. (8 marks)
- (B) What are the different types of JDBC statements ? Explain each one. (8 marks)
7. (A) Explain about the primitive data types in Java with example. (8 marks)
- (B) Explain the hierarchy of input stream classes in Java. (8 marks)
8. (A) Explain the way of implementing different types of polymorphism in Java with illustrations. (8 marks)
- (B) Describe the AWT event hierarchy in detail. (8 marks)

[5 × 16 = 80 marks]

SECOND SEMESTER P.G. DEGREE EXAMINATION, APRIL 2021

(CCSS)

Computer Science

CSC 2C E01—ARTIFICIAL INTELLIGENCE

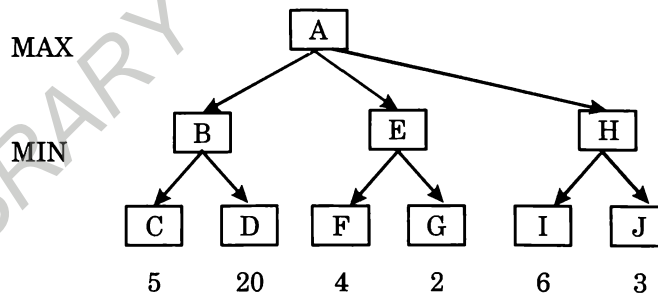
(2019 Admissions)

Time : Three Hours

Maximum : 80 Marks

Answer any five full questions.

1. (A) What are some of the task domains of Artificial Intelligence ? Briefly explain.
(B) Differentiate Production system and Control Strategy. Explain each.
2. (A) Differentiate DFS and BFS. Give the algorithm and also explain both with an example.
(B) Write short notes on the following :
 - (i) A* algorithm.
 - (ii) AO* algorithm.
3. (A) Consider the game tree given below. Calculate the value at the root of the tree using minimax algorithm. Perform Alpha Beta Pruning to show which nodes will be pruned.



- (B) Explain the algorithm and implementation of Breadth First Search.
4. (A) What are scripts ? What are the components of a script ? Give examples.
(B) Define Unification algorithm. Explain with an example and also give its algorithm.

Turn over

5. (A) Explain Perceptron network to classify with an example.
(B) Explain Genetic Algorithm with its different operators.
6. (A) Write a short note on and/or Graphs with an example.
(B) Give evidence from your own experience that suggests a script-like or frame-like organization of human memory.
7. (A) Explain Hill climbing with an example.
(B) Using conceptual dependencies, define a script for “Interacting with a used car salesperson”.
8. (A) Explain application of Heuristic algorithm in Games.
(B) Define a classifier system. What are its components? Explain.

(5 × 16 = 80 marks)

**SECOND SEMESTER M.Sc. DEGREE (SUPPLEMENTARY) EXAMINATION
APRIL 2021**

(CUCSS)

Computer Science

CSS 2C 01—DESIGN AND ANALYSIS OF ALGORITHMS

(2014 Admissions)

Time : Three Hours

Maximum : 36 Weightage

Section A

*Answer all questions.
Each question carries 1 weightage.*

1. What are combinatorial problems ? Give a suitable example
2. If elements are arranged in sorted order, What is the best search algorithm ? State the reason.
3. Explain Brute force approach for designing algorithms.
4. Weight $W [] = \{ 60, 30, 50 \}$; profit $P [] = \{ 4, 5, 8 \}$ Max weight = 90 ; what will be maximum profit; solve using 0/1 Knapsack problem.
5. What is Big-Oh ratio theorem.
6. What is the advantage of Strassen's matrix multiplication method over normal matrix multiplication algorithm ?
7. What is Hamiltonian cycle ?
8. What is P type problem ? Mention two examples.
9. What is PRAM model for analyzing algorithm ?
10. What are the parameters for analyzing Parallel algorithms ?
11. Write a recursive algorithm for computing $\sum_{i=0}^m i$ where i and m are integers ?
12. Suggest a suitable algorithm to compute the cost required for calculating a cable network with in a city with optimal cost ? Justify it.

(12 × 1 = 12 weightage)

Section B

Answer any **six** questions.

Each question carries 2 weightage.

13. Write an algorithm to find the repeated occurrences of letters in a given string.
14. Derive best, worst and average case complexities of linear search algorithm.
15. Explain geometrical problem type with a suitable example.
16. Consider the job-assignment problem- There are three people and three jobs. The cost matrix associated is shown below :

	Job 1	Job 2	Job 3
A	9	3	4
B	7	8	4
C	10	5	2

Suggest a suitable algorithm and find the minimal cost to complete all three jobs by the three people. Assume that exactly one job should be assigned to one person.

17. What is Space and Time complexity of the following code segment ?

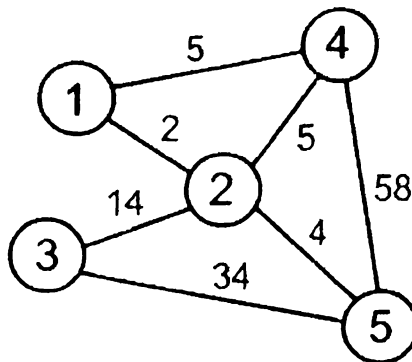
```

int a = 0, b = 0;
for (i = 0; i < N; i++) {
    a = a + rand();
}
for (j = 0; j < M; j++) {
    b = b + rand();
}

```

18. Explain Travelling sales person problem and state its type.
19. What is deterministic symmetry breaking with respect to parallel computing ?

20. Compute the minimum spanning tree and its cost using Kruskal method.



21. What is greedy approach ? State an example when it fails.

(6 × 2 = 12 weightage)

Section C

Answer any **three** questions.

Each question carries 4 weightage.

22. Define Algorithm ? Explain the steps involved in designing algorithm ?
23. Write an algorithm to perform matrix addition operation and compute its time complexity.
24. Differentiate between NP-Hard and NP Complete problems with suitable examples.
25. Solve the following recurrence relation using Master's theorem.

$$T(n) = 3T(n/4) + n \log n.$$

26. What is parallel algorithm ? Also explain Amdahl's law.
27. Write an algorithm for quick sort and state its complexity in best and worst case.

(3 × 4 = 12 weightage)

**SECOND SEMESTER M.Sc. DEGREE (SUPPLEMENTARY) EXAMINATION
APRIL 2021**

(CUCSS)

Computer Science

CSS 2C 03—COMPUTER NETWORKS

(2014 Admissions)

Time : Three Hours

Maximum : 36 Weightage

Section A

Answer all questions.

Each question carries 1 weightage.

1. Distinguish between internet and intranet.
2. List any *four* network topologies.
3. What do you mean by protocol ? Give any *one* network protocol.
4. What is DNS ?
5. What is the use of FTP ?
6. What do you mean by mobility ?
7. What is the use of Router ?
8. What is PPP ?
9. Define ARP.
10. What is ATM in networking ?
11. What is the significance of firewalls in networks ?
12. What is digital signature ?

(12 × 1 = 12 weightage)

Section B

*Answer any **six** questions.*

Each question carries 2 weightage.

13. Explain the categories of networks.
14. Compare and contrast circuit switching and packet switching.

Turn over

15. What are the different services offered by network layer ? Explain.
16. Briefly explain the working of a wireless network.
17. Explain the functions of Bridges.
18. List out the migration issues from IPv4 to IPv6.
19. Explain about any *two* prominent wireless technologies.
20. What is Asymmetric Cipher Model ? Explain.
21. What are the different types of attack in computer network ? Explain.

(6 × 2 = 12 weightage)

Section C

*Answer any **three** questions.*

Each question carries 4 weightage.

22. Give a detailed account on different wired transmission media.
23. Write a socket program to copy a file from one host to another in a computer network.
24. Explain in detail about different congestion control mechanisms.
25. What is IP address ? Explain the different classes of IP addresses.
26. What is CRC ? If the generating polynomial for CRC code is $X^4 + X^3 + 1$ and message word is 11110000, determine check bits and coded word.
27. What is cryptography ? Explain the use of private and public keys in cryptography mechanism.

(3 × 4 = 12 weightage)

**SECOND SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY)
EXAMINATION, APRIL 2021**

(CBCSS)

Computer Science

CSS 2C 06—DESIGN AND ANALYSIS OF ALGORITHMS

(2019 Admissions)

Time : Three Hours

Maximum : 30 Weightage

General Instructions

1. *In cases where choices are provided, students can attend **all** questions in each section.*
2. *The minimum number of questions to be attended from the Section / Part shall remain the same.*
3. *There will be an overall ceiling for each Section / Part that is equivalent to the maximum weightage of the Section / Part.*

Section A

*Answer any **four** questions.*

Each question carries 2 weightage.

1. Outline the general method of Greedy algorithms.
2. Explain the Longest common Subsequence problem.
3. Identify the importance of the selection of appropriate data structures while designing an algorithm.
4. State and explain with an example Big Oh ratio theorem.
5. Compare Big omega and Little Omega.
6. Compare NP Hard and NP complete problems. Give examples.
7. Bring out the relevance of Amdahl's law.

(4 × 2 = 8 weightage)

Section B

*Answer any **four** questions.*

Each question carries 3 weightage.

8. Explain Merge sort algorithm.
9. Illustrate the concept of backtracking with suitable example.

Turn over

10. Demonstrate a geometric problem with suitable example.
11. Analyse the time complexity of Binary search algorithm in terms of Big Oh.
12. Bring out the importance of algorithm analysis.
13. Give an overview of P versus NP problems.
14. Explain an algorithm for parallel sorting.

(4 × 3 = 12 weightage)

Section C

Answer any two questions.

Each question carries 5 weightage.

15. Explain Knapsack problem. Illustrate with example how Branch-and-Bound approach is used to solve Knapsack problem.
16. Illustrate the following problem types with appropriate examples : Searching, string processing and graph problems.
17. Demonstrate with examples different methods for solving recurrences.
18. Explain Euler tour technique.

(2 × 5 = 10 weightage)

**SECOND SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY)
EXAMINATION, APRIL 2021**

(CBCSS)

Computer Science

CSS 2C 07—OPERATING SYSTEM CONCEPTS

(2019 Admissions)

Time : Three Hours

Maximum : 30 Weightage

General Instructions

1. *In cases where choices are provided, students can attend **all** questions in each section.*
2. *The minimum number of questions to be attended from the Section / Part shall remain the same.*
3. *There will be an overall ceiling for each Section / Part that is equivalent to the maximum weightage of the Section / Part.*

Section A

*Answer any **four** questions.*

Each question carries 2 weightage.

1. Explain Process Control Block.
2. List the requirements of Mutual exclusion.
3. Explain “race condition”.
4. Differentiate between logical and physical address space.
5. Explain the principle of FCFS scheduling.
6. Identify the role of “granularity” in multiprocessor scheduling.
7. Explain any two characteristics of mobile operating systems.

(4 × 2 = 8 weightage)

Section B

*Answer any **four** questions.*

Each question carries 3 weightage.

8. Demonstrate the concept of multi-threading with examples.
9. Give an overview of Linux thread management.

Turn over

10. Demonstrate the use of Semaphores.
11. Explain any two page replacement algorithms with examples.
12. Explain the implementation of virtual memory concept.
13. Consider the following set of processes with arrival time and burst time in ms. Calculate average turnaround time and waiting time if Shortest job first is applied :

Process	Arrival time (ms)	Burst Time (ms)
P1	0	4
P2	1	8
P3	2	6
P4	3	10
P5	4	3
P6	5	5

14. Identify features of Three tier Client-server architecture.

(4 × 3 = 12 weightage)

Section C

Answer any **two** questions.

Each question carries 5 weightage.

15. Discuss principles of deadlock, deadlock detection and recovery.
16. Discuss the need and implementation details of paging and segmentation.
17. List and analyse the characteristics of Real time OS. Compare Deadline scheduling with Rate monotonic scheduling.
18. Discuss the need, features and implementation details of Remote Procedure Calls.

(2 × 5 = 10 weightage)

**SECOND SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY)
EXAMINATION, APRIL 2021**

(CBCSS)

Computer Science

CSS 2C 08—COMPUTER NETWORKS

(2019 Admissions)

Time : Three Hours

Maximum : 30 Weightage

General Instructions

1. *In cases where choices are provided, students can attend **all** questions in each section.*
2. *The minimum number of questions to be attended from the Section / Part shall remain the same.*
3. *There will be an overall ceiling for each Section / Part that is equivalent to the maximum weightage of the Section / Part.*

Section A

*Answer any **four** questions.*

Each question carries 2 weightage.

1. Explain different transmission modes.
2. Define carrier signal and its role in analog transmission.
3. What is a WAP Gateway ? What are its functions ?
4. Distinguish between Error Detection and Error Correction.
5. Distinguish between a low-pass channel and a band-pass channel.
6. Explain DNS with example.
7. What are the three important characteristics of a periodic signal ?

(4 × 2 = 8 weightage)

Section B

*Answer any **four** questions.*

Each question carries 3 weightage.

8. What are the three major multiplexing techniques ? Explain.
9. Explain the principles of cryptography.

Turn over

10. Explain symmetric key distribution.
11. Distinguish between DNS and SMTP.
12. Differentiate flat name space and hierarchical name space.
13. Explain error detection in block coding.
14. Illustrate fixed and variable size framing.

(4 × 3 = 12 weightage)

Section C

*Answer any two questions.
Each question carries 5 weightage.*

15. What are the major switching techniques ? Explain.
16. Explain the concept of client server model with example.
17. Explain WWW architecture.
18. Explain error detection and correction using Hamming codes with example.

(2 × 5 = 10 weightage)

**SECOND SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY)
EXAMINATION, APRIL 2021**

(CBCSS)

Computer Science

CSS 2C 09—COMPUTATIONAL INTELLIGENCES

(2019 Admissions)

Time : Three Hours

Maximum : 30 Weightage

General Instructions

1. *In cases where choices are provided, students can attend all questions in each section.*
2. *The minimum number of questions to be attended from the Section / Part shall remain the same.*
3. *There will be an overall ceiling for each Section / Part that is equivalent to the maximum weightage of the Section / Part.*

Section A

Answer any four questions.

Each question carries 2 weightage.

1. What do you mean by “Problem Space” ?
2. Give an example of application of heuristics in games.
3. Explain ISA relationship.
4. Give a simple example of knowledge representation using rules.
5. Highlight the role of “Alpha-Beta Pruning”.
6. Explain the term “Artificial life”.
7. Explain the concept of learning in Artificial Neural networks.

(4 × 2 = 8 weightage)

Section B

Answer any four questions.

Each question carries 3 weightage.

8. Write a note on Symbolic reasoning under uncertainty.
9. Write a note on strategies for space search.

Turn over

10. Give an overview of inference rules.
11. Write a note on “Problem reduction”.
12. Give an overview of Planning system components.
13. Write short notes on : (i) Expert system shells ; and (ii) Knowledge representation in expert systems.
14. Illustrate the terms “representation”, “Selection”, “Crossover” and “Mutation” in Genetic algorithm with suitable examples.

(4 × 3 = 12 weightage)

Section C

Answer any two questions.

Each question carries 5 weightage.

15. Describe means-ends analysis.
16. Explain “Resolution” and “natural deductions” with examples.
17. Summarize the concepts in Semantic nets.
18. Give a comprehensive account of different learning strategies.

(2 × 5 = 10 weightage)

**SECOND SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY)
EXAMINATION, APRIL 2021**

(CBCSS)

Computer Science

CSS 2C 10—PRINCIPLES OF SOFTWARE ENGINEERING

(2019 Admissions)

Time : Three Hours

Maximum : 30 Weightage

General Instructions

1. *In cases where choices are provided, students can attend all questions in each section.*
2. *The minimum number of questions to be attended from the Section/Part shall remain the same.*
3. *There will be an overall ceiling for each Section/Part that is equivalent to the maximum weightage of the Section/Part.*

Section A

Answer any four questions.

Each question carries 2 weightage.

1. Highlight two challenges in Software engineering.
2. Explain the use of ER diagram.
3. List any four methods for collecting requirements.
4. List the key steps in Project scheduling.
5. Explain any two key characteristics of User interface Design.
6. Identify any four sources of information for literature survey.
7. Explain the term “Key Deliverables”.

(4 × 2 = 8 weightage)

Section B

Answer any four questions.

Each question carries 3 weightage.

8. Write a note on “Agile model”.
9. Discuss structured analysis.

Turn over

10. Explain the essential features of a Requirement Specification.
11. Write a note on UI design methodologies. .
12. Give an overview of different types of testing
13. Explain the key features of a good report.
14. Write a note on Different forms of communication.

(4 × 3 = 12 weightage)

Section C

Answer any two questions.

Each question carries 5 weightage.

15. Discuss the features of Waterfall model and compare it with prototype model.
16. Analyse different aspects of Object oriented modelling. Illustrate Class diagram and activity diagram with examples.
17. Discuss the concepts and steps in risk management.
18. Discuss the steps in literature survey. Analyse the key points in writing a literature review.

(2 × 5 = 10 weightage)

SECOND SEMESTER M.A./M.Sc./M.Com. DEGREE EXAMINATION, JUNE 2020

(CUCSS)

Computer Science

CSS 2E 05 (F)—NUMERICAL AND STATISTICAL METHODS

(2014 Admissions)

Time : Three Hours

Maximum : 36 Weightage

Part A*Answer all questions.**Each question carries a weightage of 1.*

1. What are modelling errors in computing ?
2. What are data errors in computing ?
3. What is linear interpolation in curve fitting ?
4. Name the different iterative methods of linear equations ?
5. Explain error analysis in Simpson's 1/3 rule.
6. What is composite Trapezoidal rule ?
7. What is a random variable ? Give an example.
8. Explain with an example continuous and discrete functions in probability ?
9. Consider the following linear equations.

Maximize $w = 3x - 8y + 4z$

subject to the constraints

$$2x + 3y \leq 5$$

$$5y - z \leq 3$$

$$x - y \geq -1$$

$$x \geq 0, y \geq 0, z \geq 0.$$

Formulate the dual for this Linear Programming Problem.

Turn over

10. Explain the degeneracy conditions in Dual Simplex method.
11. A bag contains two red, three green and two blue balls. Two balls are drawn at random. What is the probability that none of the balls drawn is blue ?
12. Explain the multiplication theorem in probability.

(12 × 1 = 12 weightage)

Part B

Answer any six questions.

Each question carries a weightage of 2.

13. Differentiate between absolute and relative errors ?
14. What is the main idea of Gauss Seidel method ?
15. From the following table, find the area bounded by the curve and x -axis from $x = 7.47$ to $x = 7.52$ using Simpson 3/8 rule :

x	7.47	7.48	7.49	7.50	7.51	7.52
$f(x)$	1.93	1.95	1.98	2.01	2.03	2.06

16. You toss a fair coin three times :
 - (a) What is the probability of three heads, HHH ?
 - (b) What is the probability that you observe exactly one heads ?
 - (c) Given that you have observed at least one heads, what is the probability that you observe at least two heads ?
17. Find solution using Graphical method :

Maximize $z = 10x_1 + 6x_2$
 subject to $5x_1 + 3x_2 \leq 30$
 $x_1 + 2x_2 \leq 18$
 and $x_1, x_2 \geq 0$.
18. Explain bisection method and its limitations.
19. What is conditional probability ? Explain with an example.
20. Describe Adams-Bashforth method.
21. Explain different applications of transportation problem.

(6 × 2 = 12 weightage)

Part C

Answer any **three** questions.

Each question carries a weightage of 4.

22. Find a root of an equation $f(x) = 2x^3 - 2x - 5$ using False Position method.
23. Solve linear equations $7y + 2x = 11, 3x - y = 5$ using Gauss Elimination method.
24. Find $y(2)$ for $y' = (x - y)/2, y(0) = 1$, with step length 0.2 using Runge-Kutta 4th order method.
25. Explain Bayes theorem. The urns contain 6 green, 4 black ; 4 green, 6 black and 5 green, 5 black balls respectively. Randomly selected an urn and a ball is drawn from it. If the ball drawn is Green, find the probability that it is drawn from the first urn.
26. Find Solution using Least Cost method :

	D ₁	D ₂	D ₃	D ₄	Supply
S ₁	11	13	17	14	250
S ₂	16	18	14	10	300
S ₃	21	24	13	10	400
Demand	200	225	275	250	

27. Find Solution of Assignment problem using Hungarian method (MIN case) :

Job \ Work	I	II	III
A	6	3	5
B	5	9	2
C	5	7	8

(3 × 4 = 12 weightage)

SECOND SEMESTER P.G. DEGREE EXAMINATION, APRIL 2020

(CCSS)

M.Sc. Computer Science

CS 2C 07—DESIGN AND ANALYSIS OF ALGORITHMS

(2014 Admissions)

Time : Three Hours

Maximum : 80 Marks

Answer any five full questions.

1. (A) What is an algorithm ? Explain the different notion of algorithm. (8 marks)
- (B) Explain the steps involved in mathematical analysis of recursive algorithms. (8 marks)
2. (A) Compare time complexity and space complexity of selection sort and bubble sort algorithms. (8 marks)
- (B) Compare and contrast DFS and BFS algorithm. (8 marks)
3. (A) Apply quick sort algorithm to the list 5, 3, 1, 9, 8, 2, 4, 7. (8 marks)
- (B) Draw the binary search tree whose elements are inserted in the following order :
45, 72, 65, 35, 54, 78, 96, 12, 15, 69. (8 marks)
4. (A) Define AVL-Tree. Explain the algorithm for deletion of a node from AVL-Tree.
- (B) Explain the algorithm for solving Knapsack problem. Apply the algorithm to the instance given by :

<i>Item</i>	<i>Weight</i>	<i>Value</i>
1	18	25
2	15	14
3	10	15
4	20	20

(8 + 8 = 16 marks)

Turn over

5. (A) Discuss the solution of Traveling Sales Man problem using branch and bound technique with the following example :

Cities	A	B	C	D	E
A	∞	25	40	31	27
B	05	∞	17	30	25
C	19	15	∞	06	01
D	09	50	24	∞	06
E	22	08	07	10	∞

(8 marks)

- (B) Explain the concept of branch and bound technique with suitable example. (8 marks)

6. (A) Define NP-Hard problem. Give an example for NP-Hard problem. (8 marks)

- (B) State and explain Cook's theorem. (5 marks)

- (C) What is Hamiltonian cycle ? (3 marks)

7. (A) Explain Heap sort algorithm to sort an array of number. Also give its time and space complexity. (8 marks)

- (B) Explain graph traversal algorithm with an example. (8 marks)

8. (A) Write a note on dynamic programming. (8 marks)

- (B) State Master's theorem. What are the conditions in case master method cannot be used to solve recurrence ?

(8 marks)

SECOND SEMESTER P.G. DEGREE EXAMINATION, APRIL 2020

(CCSS)

M.Sc. Computer Science

CS 2C 08—ADVANCED DATABASE MANAGEMENT SYSTEMS

(2014 Admissions)

Time : Three Hours

Maximum : 80 Marks

Answer any five full questions.

1. (a) Explain the three layer architecture of a database systems. (8 marks)
(b) Who is a DBA ? Explain the responsibilities of a DBA. (8 marks)
2. (a) With relevant examples, explain 1NF, 2NF and 3NF. (8 marks)
(b) Give an account on Relational Algebra and Relational Calculus. (8 marks)
3. (a) Explain how aggregate functions and grouping are used in SQL commands. (8 marks)
(b) Explain the function and syntax any two DCL and DML statements in SQL. (8 marks)
4. (a) Discuss the function of Cursors and triggers with example. (8 marks)
(b) What are stored procedures ? Explain the way of creating and executing stored procedures in SQL. (8 marks)
5. (a) Explain the salient features of distributed database systems. (8 marks)
(b) Describe the different database schemas supported by Data Warehouse. (8 marks)
6. (a) What is E-R Model ? Explain the different mapping cardinality representation in E-R Model with example. (8 marks)
(b) Explain two-phase locking protocol in detail. (8 marks)
7. (a) Explain different query optimization techniques. (8 marks)
(b) Let $R(A,B,C)$ is relational schema, r_1 and r_2 be the relations on the schema R. Give expressions in domain relational calculus equivalent to :

i) $\Pi_A(r_1)$.	ii) $r_1 \bowtie r_2$.
ii) $r_1 \bowtie r_2$.	iv) $r_1 - r_2$.

(8 marks)
8. (a) Discuss why concurrency control and recovery is needed in transaction processing in DBMS. (8 marks)
(b) Distinguish between OLTP and OLAP. (8 marks)

SECOND SEMESTER P.G. DEGREE EXAMINATION, APRIL 2020

(CCSS)

M.Sc. Computer Science

CSC 2C 07—DESIGN AND ANALYSIS OF ALGORITHMS

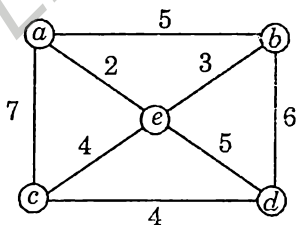
(2019 Admissions)

Time : Three Hours

Maximum : 80 Marks

Answer any five full questions.

1. (A) What are the steps that have to be followed while designing and analysing an algorithm ? Explain. (7 marks)
- (B) Sort the list E, X, A, M, P, L, E in alphabetical order using selection sort. (5 marks)
- (C) Write an algorithm for obtaining n^{th} Fibonacci number. (4 marks)
2. (A) Explain divide and conquer technique. Write a recursive algorithm for searching maximum and minimum element from a list. (8 marks)
- (B) Discuss Strassen's matrix multiplication and derive its time complexity. (8 marks)
3. (A) Solve the greedy knapsack problem where $m = 40$, $n = 3$, $P = (50, 48, 30)$ and $W = (36, 30, 20)$. (5 marks)
- (B) What are AVL trees ? Explain AVL rotations with examples. (5 marks)
- (C) Apply Prim's algorithm to find the minimum cost spanning tree to the following graph :



(6 marks)

Turn over

4. (A) Write the pseudocode for backtracking algorithm. Let $w = \{3, 5, 6, 7\}$ and $m = 15$. Find all possible subsets of w that sum to m . Draw the state space tree that is generated.

(8 marks)

- (B) Solve the Travelling sales man problem using branch and bound technique, whose cost matrix is :

$$\begin{bmatrix} \infty & 7 & 3 & 12 & 8 \\ 3 & \infty & 6 & 4 & 9 \\ 5 & 8 & \infty & 6 & 18 \\ 9 & 3 & 5 & \infty & 11 \\ 18 & 4 & 9 & 8 & \infty \end{bmatrix}$$

5. (A) Explain NP-completeness reduction with an example. (8 marks)

- (B) State and explain Cook's theorem. (8 marks)

6. (A) Give general plan for analysing the efficiency of non-recursive algorithms and explain it with an example.

(6 marks)

- (B) Explain best case, worst case and average case analysis. (6 marks)

- (C) Give strengths and weakness of Brute force algorithm. (4 marks)

7. (A) Write an algorithm for the binary search and discuss its time complexities.

- (B) Write the Huffman's Algorithm. Construct the Huffman's tree for the following data and obtain its Huffman's Code.

Character	A	B	C	D	E	-
Probability	0.5	0.35	0.5	0.1	0.4	0.2

(16 marks)

8. Explain the following :

- Hamilton cycle.
- N-Queen's problem.
- Floyd's algorithm.
- Balanced search tree.

(16 marks)

[5 × 16 = 80 marks]

SECOND SEMESTER P.G. DEGREE EXAMINATION, APRIL 2020

(CCSS)

M.Sc. Computer Science

CSC 2C 08—ADVANCED DATABASE MANAGEMENT SYSTEM

(2019 Admissions)

Time : Three Hours

Maximum : 80 Marks

Answer any five full questions.

1. (A) Explain the notational conventions used in the ER model. (6 marks)
(B) Explain the overall structure of a database management systems. (10 marks)
2. (A) Compare and contrast BCNF and 3NF with examples. (8 marks)
(B) Give an account on timestamp ordering protocol. (8 marks)
3. (A) The Employee Database Management System contains following Schema :
Employee : EmpID, Name, Address, DeptID, Designation, Salary.
Department : DeptID, DeptName, HeadID
Write appropriate SQL statements for creating and inserting data into these two tables. (6 marks)
(B) Write SQL query for retrieving the employee details (EmpID, Name, Address, DeptName, Designation and Salary) who gets maximum salary. (3 marks)
(C) Write SQL query to list the names of all employees who earn salary more than Rs. 1,00,000 in a year. (3 marks)
(D) Give the SQL statement for obtaining the name of the employee who heads the department where employee with EmpID 100 works. (4 marks)
4. (A) Explain the various data types in SQL. (6 marks)
(B) What is triggers ? Explain the implementation of a trigger with example. (8 marks)
(C) What do you mean by cursors ? (2 marks)

5. (A) Explain the architecture of distributed database Management Systems. (8 marks)
(B) Compare and contrast OODBMS and RDBMS. (8 marks)
6. (A) What are the different referential Integrity Constraints ? Explain. (8 marks)
(B) Explain the ACID properties of transaction. (8 marks)
7. (A) Explain the use of HAVING and GROUP BY clause in SQL with example. (8 marks)
(B) Explain the difference between implicit and explicit locking in multiple-granularity locking scheme. (8 marks)
8. (A) Explain the concept of Object-Oriented Database Management systems. (8 marks)
(B) What are stored procedures ? Explain how to pass and return data to and from the stored procedures with examples. (8 marks)

CHMK LIBRARY UNIVERSITY OF CALICUT

SECOND SEMESTER P.G. DEGREE EXAMINATION, APRIL 2020

(CCSS)

M.Sc. Computer Science

CSC 2C 09—OPERATING SYSTEM CONCEPTS

(2019 Admissions)

Time : Three Hours

Maximum : 80 Marks

Answer any five full questions.

1. (A) Explain the concept of macro definition and expansion with the help of an example. (6 marks)
- (B) What are the different types of operating systems ? Explain each *one*. (6 marks)
- (C) Explain the functions of a Linker. (4 marks)
2. (A) What is deadlock ? Explain any *four* necessary conditions for the occurrence of deadlock. (8 marks)
- (B) What are the different states of a process ? Explain process state transition diagram. (8 marks)
3. (A) What is paging ? Explain the paging hardware. (8 marks)
- (B) Explain the differences between internal and external fragmentation. (8 marks)
4. (A) Explain the access matrix model used for protection purpose. (8 marks)
- (B) Describe the various authentication measures used for protecting the Operating System. (8 marks)
5. (A) Explain the different components of UNIX Operating System. (8 marks)
- (B) Write a Shell script to list all the login names available in `/etc/passwd` file. (8 marks)

Turn over

6. (A) Write and explain an algorithm to solve critical section problem. (8 marks)
- (B) Compare and contrast the salient features of UNIX and Microsoft Windows XP operating systems. (8 marks)
7. (A) Explain the different file access methods used in operating system design. (8 + 8 = 16 marks)
- (B) What is an assembler ? Explain the structure of two-pass assembler. (8 + 8 = 16 marks)
8. (A) Compare between Pre-emptive and Non-pre-emptive scheduling algorithms. (5 × 16 = 80 marks)
- (B) What is encryption ? Explain the various mechanisms for data encryption. (8 + 8 = 16 marks)

SECOND SEMESTER P.G. DEGREE EXAMINATION, APRIL 2020

(CCSS)

M.Sc. Computer Science

CSC 2C 10—OBJECT ORIENTED PROGRAMMING WITH JAVA

(2019 Admissions)

Time : Three Hours

Maximum : 80 Marks

Answer any five full questions.

1. (A) Explain the primitive data types in Java with examples. (10 marks)
(B) Explain the salient features of Java programming language. (6 marks)
2. (A) Compare and contrast method overloading and method over-riding in Java with suitable examples.
(B) What is a Class ? Explain the general form of a Class. Also describe how objects are declared using class with example. (8 + 8 = 16 marks)
3. (A) Describe the AWT event hierarchy in detail. (8 marks)
(B) Write an applet program that receives three numeric values as input from the user and then display the largest of three on the screen. (8 marks)
4. (A) What is the difference between an error and an exception ? Explain the purpose of the *finally* clause of *try-catch-finally* statement. (8 marks)
(B) Explain the purpose of streams. List out the various methods of reader and writer abstract classes. (8 marks)
5. (A) Explain any *two* features of Swings. (3 marks)
(B) Explain the components and containers used in Swings. (5 marks)
(C) What is Socket ? Explain how will you create a simple socket in Java. (8 marks)
6. (A) Describe the structure of a Java program. (4 marks)
(B) What are the different types of Inheritance in Java ? Also give its implementation of with illustration. (12 marks)

Turn over

7. (A) Explain the architecture of JDBC with suitable diagram. (8 marks)
- (B) What is package ? Explain how packages are created and accessed in Java. (8 marks)
8. (A) Write a Java program to create two threads, one thread will print odd numbers and second thread will print even numbers between 1 to 20 numbers. (8 marks)
- (B) What are the differences between an applet and an application ? Explain the different stages of an applet life cycle ? (8 marks)

CHMK LIBRARY UNIVERSITY OF CALICUT

SECOND SEMESTER P.G. DEGREE EXAMINATION, APRIL 2020

(CCSS)

M.Sc. Computer Science

CSC 2E 01—ARTIFICIAL INTELLIGENCE

(2019 Admissions)

Time : Three Hours

Maximum : 80 Marks

Answer any five full questions.

1. (A) What are the different scopes and applications of Artificial Intelligence ? (8 marks)
- (B) What are the strategies for State Space Search ? Explain. (8 marks)
2. (A) What are the situations where heuristics can be employed by AI problem solvers ? Explain. (8 marks)
- (B) Write short notes on the following :
 - (i) Breadth First Search.
 - (ii) Depth First Search.(8 marks)
3. (A) Explain Alpha-Beta Pruning with an example. (8 marks)
- (B) What is the simplest way to implement heuristic search ? Explain. (8 marks)
4. (A) Explain Conceptual Dependency with an example. (8 marks)
- (B) What are the different issues in Knowledge Representation ? Explain. (8 marks)
5. (A) What are the different types of Machine Learning ? Explain with example. (8 marks)
- (B) Explain learning in Artificial Neural Networks with an example. (8 marks)

Turn over

6. (A) How do you explain the aspect of complexity issue of combinatorial problems ? (8 marks)
- (B) Differentiate Forward *vs* Backward reasoning. (8 marks)
7. (A) Draw an and/or graph for an English language parser and sentence generator and also explain the rules. (8 marks)
- (B) Explain full Breadth First Search of 8 puzzle graph. (8 marks)
8. (A) What are the components of Genetic Programming ? How is it different from Genetic Algorithm ? (8 marks)
- (B) What are the different characteristics of a Production system ? Explain with example. (8 marks)
- [5 × 16 = 80 marks]

SECOND SEMESTER P.G. DEGREE EXAMINATION, APRIL 2020

(CCSS)

M.Sc. Computer Science

CSC 2E 03—COMPUTER GRAPHICS

(2019 Admissions)

Time : Three Hours

Maximum : 80 Marks

Answer any five full questions.

1. (A) What are the different applications of Computer Graphics. Explain. (8 marks)
(B) Briefly explain Flat panel devices. (8 marks)
2. (A) What are the basic two-dimensional geometric transformations ? Explain them. (8 marks)
(B) Define Polygon Clipping. Why line clipping cannot be applied for Polygons ? (8 marks)
3. (A) Explain Window to Viewport co-ordinate transformation. (8 marks)
(B) What are the two different approaches in Visible surface detection method ? Briefly explain. (8 marks)
4. (A) Define a Bezier curve. What are the properties of the same ? (8 marks)
(B) What are fractals ? How are they classified ? (8 marks)
5. (A) Write a short note on OpenGL programming in terms of colouring and transformation. (8 marks)
(B) Briefly explain XYZ and RGB color model. (8 marks)
6. (A) Explain DDA line drawing algorithm. (8 marks)
(B) Explain any two applications of fractals with illustrations. (8 marks)
7. (A) Differentiate Diffuse and Specular reflection with diagram. (8 marks)
(B) What are the different applications of Computer graphics ? Explain. (8 marks)
8. (A) Derive clockwise and anticlockwise transformation matrices about the origin. (8 marks)
(B) What is the role of light in computer graphics ? Discuss the lambert's cosine law. (8 marks)

[5 × 16 = 80 marks]