

Adikavi Nannaya University, Rajahmundry
MCA IV Semester

MCA 4.1 Information Security and Cryptography (Model Question Paper)

Time: 3 Hours

Max. Marks: 75

SECTION – A (4X15=60 Marks)

Answer ALL Questions

- | | | |
|-----------|--|------------|
| 1. | a) Explain Principles of Security | 7M |
| | b) Discuss Substitution and Transportation techniques? | 8M |
| | Or | |
| | c) What is Modulo Arithmetic and discuss its properties? | 8M |
| | d) What is Totient Function and explain how to calculate Totient Function with an example | 7M |
| 2. | a) Show that DES decryption is the inverse of DES encryption? | 8M |
| | b) Discuss different block cipher modes of operation? | 7M |
| | Or | |
| | c) Explain RSA algorithm with an example? | 8M |
| | d) Explain how to generate digital signatures? | 7M |
| 3. | a) What is authentication and discuss different authentication mechanisms? | 7M |
| | b) Explain SHA1? | 8M |
| | Or | |
| | c) What is Virus? And discuss different types of Viruses? | 5M |
| | d) Write short notes on Intruders and Trusted Systems? | 10M |
| 4. | a) Briefly explain SSL protocol? | 7M |
| | b) Explain SET in detail? | 8M |
| | Or | |
| | c) Explain about IP Security architecture? | 8M |
| | d) What is Firewall and discuss different types of Firewalls? | 7M |

SECTION – B (5X3=15 Marks)

Answer any FIVE Questions

- 5.**
- a)** Explain any five Security attacks?
 - b)** What is Key and what are different types of keys?
 - c)** Briefly discuss Differential cryptanalysis?
 - d)** Define Prime number and explain relatively prime numbers with an example?
 - e)** Differentiate between Symmetric and Asymmetric key cryptography?
 - f)** What are the requirements of Hash Functions?
 - g)** Explain SHTTP?
 - h)** Briefly discuss Virtual Private Network?

Adikavi Nannaya University, Rajahmundry
MCA IV Semester
MCA 4.2 Operations Research (Model Question Paper)

Time: 3 Hours

Max. Marks: 75

SECTION – A (4X15=60 Marks)

Answer ALL Questions

1. a) Explain simplex algorithm to find optimum solution for a given LPP 7M
 b) Use simplex method to solve the following LPP. 8M
 Maximize $Z=5x_1+4x_2$
 Subject the constraints
 $4x_1+5x_2 \leq 10$
 $3x_1+2x_2 \leq 9$
 $8x_1+3x_2 \leq 12, x_1 \geq 0, x_2 \geq 0$
- Or**
- c) Use two-phase simplex method to 15M
 Maximize $Z=3x_1+2x_2$
 Subject to the constraints
 $2x_1+x_2 \leq 2$
 $3x_1+4x_2 \geq 12$
 $x_1 \geq 0, x_2 \geq 0.$
2. a) Explain dual simplex Algorithm 8M
 b) Use dual simplex method to solve the following LPP. 7M
 Maximize $Z=2x_1+3x_2$
 Subject to the constraints
 $2x_1-x_2-x_3 \geq 3$
 $x_1-x_2+x_3 \geq 2, x_1, x_2, x_3 \geq 0$
- Or**
- c) Solve the following transportation problem whose unit cost matrix, supply and demand are given below. 15M

	D1	D2	D3	D4	D5	Supply
1	7	7	10	5	11	45
2	4	3	8	6	13	90
3	9	8	6	7	5	95
4	12	13	10	6	3	75
5	5	4	5	6	12	105
Demand	20	80	50	75	85	

3. a) A project is composed of eleven activities, the time estimates for which are given below

15M

Activity	Optimistic Time (Days)	Pessimistic Time (Days)	Most Likely Time (Days)
1-3	10	60	20
1-4	5	15	10
2-5	50	110	65
2-6	30	50	40
3-6	50	90	55
3-7	1	9	5
4-7	40	68	48
5-8	5	15	10
6-8	20	52	27
7-8	30	20	40

- Draw the network diagram for the project
- Calculate slacks for each mode.
- Determined the critical path
- What is the probability of completing the project in 125 days?

Or

- b) Find the optimum integer solution to the following linear programming Problem

15M

$$\text{Maximize } Z=5x_1+8x_2$$

$$\text{Subject to } x_1+2x_2\leq 8$$

$$4x_1+x_2\leq 10$$

$$x_1, x_2\geq 0 \text{ and integers.}$$

4. a) Solve the game where pay off matrix is given below, using dominance

15M

Player B				
	I	II	III	IV
I	18	4	6	4
II	6	2	13	7
III	11	5	17	3
IV	7	6	12	2

Or

- b) Explain static and dynamic EOQ models.

15M

SECTION – B (5X3=15 Marks)

Answer any FIVE Questions

5.

- Vogel's approximation.
- When do you get degeneracy in transportation problem?
- What is the difference between regular simplex method and dual simplex method.
- Write mathematical formulation of assignment problem
- What are the advantages of networks?
- Explain recursive nature of dynamic programming.
- Minimax principle
- Rules for detecting saddle point.

SECTION – A (4X15=60 Marks)

Answer ALL Questions

1. a) Define balanced binary search tree. Construct binary search tree for the data 8, 10,3,2,1,5,4,6, and 11. Insert an element 7 into binary search tree and balance the tree using AVL rotation. **8M**
b) Write a routine for inserting an element into an AVL tree. **7M**
Or
c) Explain about hash table restructuring with examples. **8M**
d) Explain about the analysis of closed hashing for successful search and deletion. **7M**
2. a) Sort the following elements using heap sort **8M**
9, 17, 5, 28, 3,11, 7, 78, 1, 33, 8, 45, 2, 4, 12, 6, 34.
b) Explain about the lower bound on worst case complexity. **7M**
Or
c) Sort the following elements using merge sort **8M**
9, 17, 5, 28, 3, 11, 7, 78, 1, 33, 8, 45, 2, 4, 12, 6, 34
d) Explain about the lower bound on average case complexity. **7M**
3. a) Write a routine for Kruskal's algorithm. **8M**
b) Explain about the Warshall's algorithm **7M**
Or
c) Explain about Knapsack problem using Greedy Paradim. **8M**
d) Construct an Optimal Binary Search Tree for the following data: **7M**
- | | | | | | | |
|----------------|---|------|------|------|-----|------|
| i | – | 1 | 2 | 3 | 4 | 5 |
| P _i | – | 0.24 | 0.22 | 0.23 | 0.3 | 0.01 |
4. a) Explain about amortized analysis of Skew Heaps. **8M**
b) Explain about k-d Trees with examples. **7M**
Or
a) Explain about amortized analysis of AA-Trees. **8M**
b) Explain about pairing heaps with examples. **7M**

SECTION – B (5X3=15 Marks)

Answer any FIVE Questions

5. Write a Short note on
- Stack ADT
 - Splay Trees
 - Equivalence Relation
 - Smart Union Algorithms
 - Randomized Algorithms
 - NP-Completeness
 - Fibonacci heaps
 - Deterministic Skip Lists

Adikavi Nannaya University, Rajahmundry
MCA IV Semester
MCA 4.3.2 Computer Graphics (Model Question Paper)

Time: 3 Hours

Max. Marks: 75

SECTION – A (4X15=60 Marks)

Answer ALL Questions

1. a) List out the applications of graphics in different areas **8M**
Or
b) With a neat diagram explain the components of refresh CRT. Explain how color images are formed on refresh CRTs **7M**
2. a) Explain Bresenham's line generation algorithm with an example **15M**
Or
b) Using Midpoint circle generation algorithm generate the pixels on a circle with radius 10 whose center is at (5,9). **15M**
3. a) How is rotation about a pivot point done? **8M**
b) Explain reflection and shearing transformations with an example **7M**
Or
c) Given a clipping window with lower left-hand corner at(-3,1) and upper right-hand corner at (2,6)) clip the following lines using Liang-Barsky line clipping algorithm
i) A(-1,5) and B(3,8)
ii) C(-4,7) and D(-2,10)
iii) E(-2,3) and F(1,2) **15M**
4. a) Write notes on Bezier Curves **15M**
Or
b) Explain parallel and perspective projection transformations **15M**

SECTION – B (5X3=15 Marks)

Answer any FIVE Questions

5. **Write a Short note on**
- a) Write a brief note on the different hard copy devices
 - b) What are the various flat panel devices? How does each work?
 - c) Explain the methods of displaying characters
 - d) Write short notes on antialiasing
 - e) Derive the transformation matrix for doubling the size of a 2D object and subsequently rotating it by 45° anticlockwise about the origin.
 - f) Explain with an example Sutherland –Hodgeman polygon clipping algorithm
 - g) Explain how 3D objects are represented
 - h) Explain all the 3D transformations

Adikavi Nannaya University, Rajahmundry
MCA IV Semester
MCA 4.3.3 Distributed Systems (Model Question Paper)

Time: 3 Hours

Max. Marks: 75

SECTION – A (4X15=60 Marks)

Answer ALL Questions

1. a) What are Distributed Systems? Give some examples. Explain the advantages and limitations of distributed systems. **15M**
Or
b) Explain the various issues to be addressed while designing a distributed system **15M**
2. a) Explain and compare the mutual exclusion algorithms **15M**
Or
b) What are physical and logical clocks? Explain the various clock synchronization algorithms. **15M**
3. a) Compare the different system models **7M**
b) What are threads? Explain the design issues for thread packages **8M**
Or
c) Explain the different processor allocation algorithms **15M**
4. a) Explain Strict Consistency, Sequential Consistency and Causal Consistency with appropriate examples. **15M**
Or
b) Explain cache consistency protocols for bus based multiprocessors with shared memory **8M**
c) How can sequential consistency be achieved in replicated pages in page based distributed shared memory? **7M**

SECTION – B (5X3=15 Marks)

Answer any FIVE Questions

5. **Write a Short note on**
- a) Differentiate tightly coupled and loosely coupled hardware.
 - b) What are the essential properties of transactions?
 - c) Explain Ring Election Algorithm.
 - d) Explain RPC semantics in the presence of any two types failures
 - e) Write briefly about file service interface.
 - f) What are faults? Explain the types of component faults and processor faults
 - g) Compare the various shared memory systems.
 - h) Explain PRAM consistency.

Adikavi Nannaya University, Rajahmundry
MCA IV Semester

MCA 4.4 Object Oriented Software Engineering (Model Question Paper)

Time: 3 Hours

Max. Marks: 75

SECTION – A (4X15=60 Marks)

Answer ALL Questions

1. a) What is software engineering? Explain software engineering activities **15M**

Or

b) What is requirement engineering? Explain requirements engineering activities **15M**
2. a) Discuss how usability principles play a significant role in user interface design **15M**

Or

b) Explain static and dynamic elements of UML. **15M**
3. a) What is software architecture? Explain architectural patterns with examples. **15M**

Or

b) What is the role of patterns in software engineering? Explain any four patterns **15M**
4. a) Explain the types of defects that occur in the cases of ordinary algorithms, numerical algorithms and timing and co-ordination **15M**

Or

b) Explain RUP **15M**

SECTION – B (5X3=15 Marks)

Answer any FIVE Questions

5. **Write a Short note on**
 - a) Software quality
 - b) Reusability in software engineering.
 - c) Purpose of use case diagram.
 - d) Specialization and generalization.
 - e) Design principles.
 - f) Information about a pattern.
 - g) Black box testing.
 - h) Spiral model

Adikavi Nannaya University, Rajahmundry
MCA IV Semester

MCA 4.5 Data Warehousing and Data Mining (Model Question Paper)

Time: 3 Hours

Max. Marks: 75

SECTION – A (4X15=60 Marks)

Answer ALL Questions

1. a) Explain with a neat diagram the three-tier architecture of a Data Warehouse **7M**
b) Explain the OLAP operations in a Multidimensional data. **8M**

Or

c) Why do we pre-process data? Explain different techniques in data cleaning, integration and transformation **15M**

2. a) Data Mining should be applicable to any kind of data repositories, including data streams. What are the different kinds of data on which mining can be applied? **10M**
b) Mention different issues in Data Mining. **5M**

Or

c) Explain in detail how the data is measured differently in statistical descriptions **8M**
d) Where can data mining be applied? Explain different domains of applications **7M**

3. a) Explain FP-Growth Algorithm with an example. **8M**
b) Explain AOI Algorithm. **7M**

Or

c) Explain Apriori property and explain the algorithm associated with it **8M**
d) How to generate Closed and Max patterns **7M**

4. a) What is the difference between classification and Prediction? How a decision tree is constructed **10M**
b) Explain Support Vector Machines concept **5M**

Or

c) Explain Bayesian Classification Methods. How Classification by back propagation is obtained **7M**
d) Explain k-means Clustering and compare that with k-medoids algorithm **8M**

SECTION – B (5X3=15 Marks)

Answer any FIVE Questions

5. **Write a Short note on**
 - a) DBSCAN Algorithm
 - b) Tree Pruning
 - c) Concept Description.
 - d) Frequent Item sets using vertical data format
 - e) Multilevel Association Rules
 - f) Data Visualization
 - g) Similarity and Dissimilarity of data
 - h) Data Cube Technology