

**ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM**  
**I MTech I Semester (Common to CST & CST with Big Data Analytics wef 2017-18)**  
**MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE**  
**MODEL QUESTION PAPER**

**Time: 3hrs.**

**Max. Marks: 75**

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**SECTION-A (4 X 15 = 60 M)**

**Answer ALL Questions**

- |           |  |            |
|-----------|--|------------|
| <b>1.</b> | <b>a)</b> Discuss primitive recursive functions with an example?               | <b>15M</b> |
|           | <b>Or</b>  |            |
|           | <b>b)</b> Statements and applications of Euler's and Fermat's Theorems?        | <b>15M</b> |
| <b>2.</b> | <b>a)</b> Define DFA and NFA with examples. Differentiate them?                | <b>7M</b>  |
|           | <b>b)</b> Design a DFA which accepts Even number of 0's and 1's?               | <b>8M</b>  |
|           | <b>Or</b>  |            |
|           | <b>c)</b> State and prove equivalence of NFA and DFA?                          | <b>15M</b> |
| <b>3.</b> | <b>a)</b> State and prove pumping lemma for CFL?                               | <b>15M</b> |
|           | <b>Or</b>  |            |
|           | <b>b)</b> Design a PDA for the language $L = \{WW^R/W \text{ in } (a,b)^*\}$ ? | <b>15M</b> |
| <b>4.</b> | <b>a)</b> Explain techniques for construction of Turing machines?              | <b>15M</b> |
|           | <b>Or</b>  |            |
|           | <b>b)</b> Briefly discuss different grammars with examples?                    | <b>15M</b> |

**SECTION- B (5×3=15M)**

**Answer any FIVE Questions**

- 5. Write a short note on**
- a)** Function and relation
  - b)** Alphabet and string
  - c)** Regular expressions
  - d)** Context free languages
  - e)** Non deterministic push down automata
  - f)** Turing machines
  - g)** Undecidability of PCP
  - h)** Chomsky hierarchy

**ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM**  
**I MTech I Semester (Common to CST & CST with Big Data Analytics wef 2017-18)**  
**DATA STRUCTURES AND ALGORITHMS**  
**MODEL QUESTION PAPER**

**Time: 3hrs.**

**Max. Marks: 75**

**SECTION-A (4 X 15 = 60 M)**

**Answer ALL Questions**

- |  |            |
|--|------------|
| <b>1. a)</b> Explain the basics of time complexity estimates with an example.            | <b>15M</b> |
| <b>Or</b>  |            |
| b) Explain quick sort analysis to find average, worst and best cases of time complexity. | <b>15M</b> |
|  |            |
| <b>2. a)</b> Define ADT. Explain implementation of double linked list.                   | <b>15M</b> |
| <b>Or</b>  |            |
| b) Define Binary Search Tree .Explain the implementation of AVL Trees.                   | <b>15M</b> |
|  |            |
| <b>3. a)</b> Explain the Collision Resolution Techniques with examples.                  | <b>15M</b> |
| <b>Or</b>  |            |
| b) Implement Insertion Sort.   | <b>7M</b>  |
| c) Explain Heap Sort with an Example.  | <b>8M</b>  |
|  |            |
| <b>4. a)</b> Explain the Topological Sort with an Example.                               | <b>8M</b>  |
| b) Explain the shortest-path algorithm with an Example.                                  | <b>7M</b>  |
| <b>Or</b>  |            |
| c) Explain the find and union algorithms of Dynamic sets with Examples.                  | <b>8M</b>  |
| d) Explain union by rank algorithm analysis with an example.                             | <b>7M</b>  |

**SECTION- B (5×3=15M)**

**Answer any FIVE Questions**

**5. Write a short note on**

- a) Applications of stack.
- b) Explain the splay trees with an example.
- c) Explain Hash-Function with Examples.
- d) Explain Network Flow Problem.
- e) Applications of DFS with an example.
- f) Explain NP- Complete problem.
- g) Explain minimum spanning tree algorithm with an example.
- h) Explain Representation of Queues.

**ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM**  
**I MTech I Semester (Common to CST & CST with Big Data Analytics wef 2017-18)**  
**DATABASE MANAGEMENT SYSTEMS**  
**MODEL QUESTION PAPER**

**Time: 3hrs.**

**Max. Marks: 75**

**SECTION-A (4 X 15 = 60 M)**

**Answer ALL Questions**

- |           |  |                              |
|-----------|--|------------------------------|
| <b>1.</b> | <b>a)</b> Explain Entity Relationship model with an example?<br><b>Or</b><br><b>b)</b> Explain how normalization and schema refinement?    | <b>15M</b><br><br><b>15M</b> |
| <b>2.</b> | <b>a)</b> Explain B+ tree index structure and various operations.<br><b>Or</b><br><b>b)</b> Explain static and dynamic hashing techniques? | <b>15M</b><br><br><b>15M</b> |
| <b>3.</b> | <b>a)</b> Explain Query processing and Optimization?<br><b>Or</b><br><b>b)</b> What is Concurrency control? Explain.                       | <b>15M</b><br><br><b>15M</b> |
| <b>4.</b> | <b>a)</b> Differentiate interquery and intraquery parallelism.<br><b>Or</b><br><b>b)</b> Explain different Database system architectures?  | <b>15M</b><br><br><b>15M</b> |

**SECTION- B (5×3=15M)**

**Answer any FIVE Questions**

- 5. Write a short note on**
- a)** Suppose that we decompose the schema  $R=(A,B,C,D,E)$  into  $(A,B,C)$  and  $(A,D,E)$ . show that this decomposition is lossless if the FDs  $A \rightarrow BC$ ,  $CD \rightarrow E$ ,  $B \rightarrow D$ ,  $E \rightarrow A$  holds.
  - b)** Write SQL queries for grant and revoke operations.
  - c)** XML representation of data.
  - d)** Write a servlet that authenticates a user based on user names and passwords stored I database relation and sets a session variable called userid after authentication.
  - e)** Write a short notes on transaction states.
  - f)** Consider the relations  $r_1(A,B,C)$ ,  $r_2(C,D,E)$  and  $r_3(E,F)$ , with primary keys  $A,C$ , and  $E$  respectively. Assume that  $r_1$  has 1000 tuples,  $r_2$  has 1500 tuples and  $r_3$  has 750 tuples. Estimate the size of  $r_1 \times r_2 \times r_3$  ?
  - g)** Write a short notes on data replication and fragmentation.
  - h)** Describe a good way to parallelise aggregation by the count operation.

**ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM**  
**I MTech I Semester (Common to CST & CST with Big Data Analytics wef 2017-18)**  
**COMPUTER ORGANIZATION AND ARCHITECTURE**  
**MODEL QUESTION PAPER**

**Time: 3hrs.**

**Max. Marks: 75**

**SECTION-A (4 X 15 = 60 M)**

**Answer ALL Questions**

- |    |   |     |
|----|---|-----|
| 1. | a) Explain arithmetic micro operations          | 5M  |
|    | b) Write about bus and memory transfers         | 5M  |
|    | c) Explain design of basic computer.            | 5M  |
|    | <b>Or</b>                                       |     |
|    | d) Explain register transfer language           | 5M  |
|    | e) Explain input-out interrupts.                | 10M |
| 2. | a) Explain design of control unit               | 8M  |
|    | c) Explain various types of addressing modes    | 7M  |
|    | <b>Or</b>                                       |     |
|    | d) Write notes on stack organization            | 5M  |
|    | e) Explain data transfer and manipulation       | 10M |
| 3. | a) Explain direct memory access                 | 5M  |
|    | c) Explain cache memory and virtual memory      | 10M |
|    | <b>Or</b>                                       |     |
|    | d) Explain modes of transfer                    | 5M  |
|    | e) Explain memory hierarchy                     | 5M  |
|    | f) Write about auxiliary memory                 | 5M  |
| 4. | a) Explain evolution of computer system         | 8M  |
|    | b) Explain parallel computer structures         | 7M  |
|    | <b>Or</b>                                       |     |
|    | c) Explain parallelism in uni-processor system  | 8M  |
|    | d) Explain architectural classification schemes | 7M  |

**SECTION- B (5×3=15M)**

**Answer any FIVE Questions**

5. **Write a short note on**
- a) Logic Micro Operation
  - b) Instruction Cycle
  - c) Timing & Control
  - d) Addressing sequencing
  - e) I/O Interface
  - f) Associative memory
  - g) Computer Instructions
  - h) Microprogram with examples

**ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM**  
**I MTech I Semester (Common to CST & CST with Big Data Analytics wef 2017-18)**  
**ADVANCED OPERATING SYSTEMS**  
**MODEL QUESTION PAPER**

**Time: 3hrs.**

**Max. Marks: 75**

**SECTION-A (4 X 15 = 60 M)**

**Answer ALL Questions**

- |           |   |            |
|-----------|---|------------|
| <b>1.</b> | <b>a)</b> Illustrate the role of middleware in a distributed system?  | <b>8M</b>  |
|           | <b>b)</b> Briefly discuss about Hybrid Architectures in a distributed system  | <b>7M</b>  |
|           | <b>Or</b>   |            |
|           | <b>c)</b> What is Distributed Operating Systems? Explain the Application Layers involved In Distributed OS and its architecture | <b>8M</b>  |
|           | <b>d)</b> Describe the goals of Distributed Systems   | <b>7M</b>  |
| <b>2.</b> | <b>a)</b> Discuss about thread implementation and Illustrate threads in Distributed systems                                     | <b>15M</b> |
|           | <b>Or</b>   |            |
|           | <b>b)</b> Briefly explain different code migration approaches.  | <b>8M</b>  |
|           | <b>c)</b> Discuss about Software agents in Distributed Systems  | <b>7M</b>  |
| <b>3.</b> | <b>a)</b> Compare Static versus Dynamic method invocation.  | <b>8M</b>  |
|           | <b>b)</b> What is RPC and define RPC operations.  | <b>7M</b>  |
|           | <b>Or</b>   |            |
|           | <b>c)</b> Discuss about Bekely Sockets and Message queuing model  | <b>8M</b>  |
|           | <b>d)</b> Briefly explain middleware protocols.   | <b>7M</b>  |
| <b>4.</b> | <b>a)</b> What is meant by fault tolerance and discuss failure models   | <b>15M</b> |
|           | <b>Or</b>   |            |
|           | <b>b)</b> With suitable examples explain in brief about Lamports logical clock  | <b>8M</b>  |
|           | <b>c)</b> Compare Centralized algorithm and Distributed algorithm   | <b>7M</b>  |

**SECTION- B (5×3=15M)**

**Answer any FIVE Questions**

- 5. Write a short note on**
- a)** Homogeneous and heterogeneous multi computer systems
  - b)** Decentralized Algorithm
  - c)** Server Clusters
  - d)** Physical Clocks
  - e)** Deadlocks
  - f)** Agent Technology
  - g)** Token ring algorithm
  - h)** Failure Masking

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**I MTech I Semester (Common to CST & CST with Big Data Analytics wef 2017-18)**  
**COMPUTER NETWORKS**  
**MODEL QUESTION PAPER**

**Time: 3hrs.**

**Max. Marks: 75**

**SECTION-A (4 X 15 = 60 M)**

**Answer ALL Questions**

- |           |  |            |
|-----------|--|------------|
| <b>1.</b> | <b>a)</b> Write a brief history of OSI Reference Model                             | <b>15M</b> |
|           | <b>Or</b>  |            |
|           | <b>b)</b> Write about different kinds of switching techniques                      | <b>15M</b> |
| <b>2.</b> | <b>a)</b> Explain Various Sliding window Protocols                                 | <b>15M</b> |
|           | <b>Or</b>  |            |
|           | <b>b)</b> Explain Leaky Bucket Algorithm   | <b>15M</b> |
| <b>3.</b> | <b>a)</b> Explain about Packet Fragmentation                                       | <b>15M</b> |
|           | <b>Or</b>  |            |
|           | <b>b)</b> Explain TCP Protocol   | <b>15M</b> |
| <b>4.</b> | <b>a)</b> Write about the learning bridges, spanning tree bridges                  | <b>15M</b> |
|           | <b>Or</b>  |            |
|           | <b>b)</b> Briefly discuss about Mobile Adhoc Networks and Virtual Private Networks | <b>15M</b> |

**SECTION- B (5×3=15M)**

**Answer any FIVE Questions**

**5. Write a short note on**

- a)** Write about various kinds of Networks
- b)** Briefly explain different types of Multiplexing Techniques
- c)** Explain shortest path routing.
- d)** Explain various types of Error correction Techniques
- e)** Briefly explain IPv4 Protocol Header format
- f)** Write the difference between TCP and UDP
- g)** Explain DNS, DHCP, SNMP and ICMP.
- h)** Explain about wireless access points, transceivers.