

C033512(033)

**B. Tech. (Fifth Semester) Examination,
Nov.-Dec. 2023**

(Information Technology Engg. Branch)

THEORY of COMPUTATION

(BT-3033)

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

*Note : Attempt all questions. Each question of part
(a) is compulsory and carries 4 marks.
Attempt any two parts from (b), (c) and (d)
of each question and each carries 8 marks.*

Unit-I

1. (a) Define the Automata theory in brief.

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- (b) Explain Myhill Nerode theorem using example. 8
- (c) Explain properties and limitation of FSM. 8
- (d) Explain Finite Automata with output using a suitable example. 8

Unit-II

2. (a) Define properties of Regular expression. 4
- (b) State Arden's theorem and also explain using an example. 8
- (c) Explain Pumping lemma for regular set and its application. 8
- (d) Explain Decision Algorithm for Regular sets and Regular grammar. 8

Unit-III

3. (a) What is Grammar and also explain its type? 4
- (b) Describe Decision algorithm for context free language. 8

- (c) What is Ambiguity in Grammar? Explain ambiguity in grammar using an example. 8
- (d) Explain Greibach normal form using an example. 8

Unit-IV

4. (a) What is Push Down Automata? 4
- (b) What are the difference between Deterministic Push Down Automata and Non-deterministic Push Down Automata? 8
- (c) Construct a Push Down Automata for all length palindrome. 8
- (d) Compare Push Down Automata and Context Free Language. 8

Unit-V

5. (a) What is Halting Problem of Turing Machine? 4
- (b) Explain Church's Hypothesis in brief. 8
- (c) Describe the following : 8
- (i) Recursive function

(ii) Partial Recursive function

(d) What is Turing Machine? Construct a Turing Machine for a simple problem.

8

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B. Tech. (Fifth Semester) Examination,

Nov.-Dec. 2023

(New Scheme)

(Information Technology Engg. Branch)

**SOFTWARE ENGINEERING and PROJECT
MANAGEMENT**

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Attempt all questions. Part (a) is compulsory and carries 4 marks each. Attempt any two parts from (b), (c) & (d) in each unit and carries 8 marks each.

Unit-I

1. (a) Define Software and Software Engineering. 4

- (b) Explain in detail Object Oriented Model 8
- (c) Describe Waterfall Model with advantages and disadvantages. 8
- (d) Write short notes on : 8
 - (i) Rapid Application Development Model
 - (ii) Incremental Model

Unit-II

- 2. (a) Explain about functional requirements and non functional requirements. 4
- (b) What is SRS? How SRS is useful in software development? 8
- (c) Describe Requirement Engineering Process with neat diagram 8
- (d) What do you mean by requirement elicitation, and what are the various techniques to do this process? 8

Unit-III

- 3. (a) Define Design Process. List the principle of a Software Design. 4
- (b) What is Cohesion and Coupling? Explain about the various type of Coupling in detail. 8
- (c) Describe Architectural design and User Interface design 8
- (d) Explain Top-Down and Bottom-up strategies of software design. 8

Unit-IV

- 4. (a) Describe Software Configuration Management (SCM) Process. 4
- (b) Explain about Capability Maturity Model (CMM) in detail. 8
- (c) What are the 4'P with respect to Software Project Management. 8
- (d) Write short notes on : 8
 - (i) Reactive Risk Strategies
 - (ii) Proactive risk Strategies.

Unit-V

5. (a) What do you mean by Business Process Reengineering. 4
- (b) Describe white box and black box testing in detail. 8
- (c) Distinguish between Verification and Validation. 8
- (d) Write short notes on : 8
- (i) System Testing
 - (ii) Debugging

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**B. Tech. (Fifth Semester) Examination,
Nov.-Dec. 2023**

(Information & Technology Engg. Branch)

PRINCIPLES of COMMUNICATION SYSTEM

(BT-3033)

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Attempt all the questions. Part (a) of all questions is compulsory and having 4 marks. Attempt any two from (b), (c) and (d) and having 8 marks in each question.

Unit-I

I. (a) Define the term Modulation.

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- (b) How VSB is transmitted? Explain with the help of block diagram. Discuss it's advantages and application. 8
- (c) Discuss frequency components present in AM wave. Draw spectrum and specify the bandwidth. 8
- (d) Explain the generation of DSB-SC signals using block diagram. 8

Unit-II

- 2. (a) What is difference between AM and FM? 4
- (b) Explain Armstrong method for generation of WBFM signal with the suitable example and block diagram. 8
- (c) Compare the FM modulation and PM modulation atleast at 6 points. 8
- (d) What is the basic principle of FM Detector? Explain any one method of it. 8

Unit-III

- 3. (a) What is Quantization? Explain the significance of Quantization. 4
- (b) What are the drawbacks of Delta Modulation? Explain Adaptive Delta modulation transmitter with suitable block diagram. 8
- (c) Compare performance of PAM, PPM and PWM. 8
- (d) What is the significance of sampling in digital communication? State the prove sampling theorem. 8

Unit-IV

- 4. (a) Define ASK modulation technique with example. 4
- (b) Explain performance comparison of BPSK and DPSK. 8
- (c) Explain FSK. Draw the functional block diagram of modulator and demodulator of FSK. 8
- (d) Explain the generation and detection of QPSK along with diagram. 8

Unit-V

5. (a) What is Dispersion? Explain it with example. 4
- (b) Explain in detail losses in optical fibers. 8
- (c) Explain block diagram of Satellite communication system. 8
- (d) Derive expression for link budget equation for satellite communication. 8

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B. Tech. (Fifth Semester) Examination,

Nov.-Dec. 2023

(New Scheme)

(IT Branch)

**ARTIFICIAL INTELLIGENCE and
MACHINE LEARNING**

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Attempt all questions. Part (a) is compulsory and carries 4 marks. Attempt any two parts from (b), (c) and (d) of each carries 8 marks.

Unit-I

- 1. (a) Define Turing Test with suitable example. 4
- (b) Solve Water Jug Problems using production rules with state space concept. 8

- (c) What is Search? Explain DFS and BFS with proper algorithms and examples. 8
- (d) What explain Heuristic Function? Solve A* problem with proper Algorithm and Example. 8

Unit-II

- 2. (a) What is Predicates? Explain it with Example. 4
- (b) Using Conceptual Dependency Solve the following : 8
 - (i) Jhon took the Book from mary
 - (ii) Ramesh fertilized the field
 - (iii) Sunil pushed the cart.
 - (iv) John is tall.
- (c) Explain Semantic network with two examples. 8
- (d) What is first order predicate logic (FOPL)? Convert the following in FOPL : 8
 - (i) Everyone is loyal to someone.
 - (ii) All mangoes are sweet.
 - (iii) All employees of Software Company are programmers
 - (iv) All purple mushrooms are poisonous.

Unit-III

- 3. (a) Define NLP and mention some latest application area of NLP. 4
- (b) Explain the RTN briefly and solve the following example : 8

“The big tree shades the old house by the stream”
- (c) Define Goal Stack Planning with block world’s problem along with example. 8
- (d) Explain parsing with suitable example. 8

Unit-IV

- 4. (a) What is Machine Learning? 4
- (b) Differentiate between Supervised and unsupervised learning. 8
- (c) Explain Baye’s Theorm with suitable Example. 8
- (d) Explain Probably Approximately Correct (PAC) Learning. 8

Unit-V

- 5. (a) What is Multivariate Data? 4
- (b) Describe Multivariate classification. 8
- (c) Explain K-means clustering. 8
- (d) Explain Decision tress : Multivariate trees. 8

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**B. Tech. (Fifth Semester) Examination,
Nov.-Dec. 2023
(IT Engg. Branch)**

DESIGN and ANALYSIS of ALGORITHMS

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Attempt all questions. Part (a) from each question is compulsory. Part (a) carries 4 marks. Attempt any two parts from (b), (c) and (d) of each question & carries 8 marks each.

Unit-I

1. (a) Define Algorithm. Write characteristic of an algorithm. 4

(b) Solve the following recurrence equations by using Master method :

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

(ii) $T(n) = 9T(n/3) + n$

(c) Solve the equation by substitution method :

$$T(n) = 2T(n/2) + n$$

(d) Explain the asymptotic notation and their types. 8

Unit-II

(a) Define Divide and Conquer method with advantages and disadvantages. 4

(b) Write algorithm of Merge Sort and give an example, also find Time Complexity of Merge Sort. 8

(c) Multiply the Matrix using Strassen's matrix Multiplication : 8

$$A = \begin{bmatrix} 2 & 4 \\ 6 & 3 \end{bmatrix} \quad B = \begin{bmatrix} 3 & 7 \\ 5 & 1 \end{bmatrix}$$

(d) Describe Quick Sort algorithm with example and analyze it. 8

Unit-III

3. (a) Difference between Dynamic programming and Greedy method. 4

(b) Define Knapsack Problem. Solve the given instance of problem obtain optimal solution for the Greedy method Knapsack problem. Maximum Knapsack capacity (M) = 55, Profits are (P_1, P_2, P_3, P_4) = (30, 65, 40, 40), Weights are (W_1, W_2, W_3, W_4) = (15, 25, 18, 14). 8

(c) Define Longest Common Subsequence (LCS). Find out the longest Common subsequence for sequence X and Y . 8

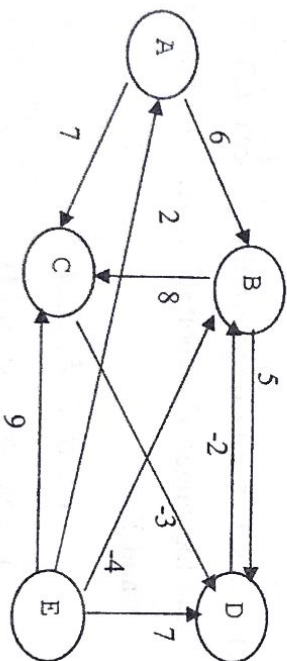
$$X = (A, B, C, B, D, A, B)$$

$$Y = (B, D, C, A, B, A)$$

(d) Explain Travelling salesman problem with help of an example. 8

Unit-IV

4. (a) Explain topological sorting of nodes of an Acyclic graph and what are its applications.
- (b) Discuss Floyd – Warshall's all pairs shortest path algorithm with an example.
- (c) Describe Dijkstra's algorithm with suitable example and also find the time complexity.
- (d) Find shortest path in the given weighted graph using Bellman Ford algorithm from A to E.



Unit-V

5. (a) Difference between polynomial and Non polynomial time complexity. 4
- (b) Describe Backtracking with example and also write application of backtracking. 8
- (c) Explain Knuth Morris and Pratt algorithms with example. 8
- (d) Write short notes on : 8
 - (i) P-class problem
 - (ii) NP-hard

NP-complete classes