

B. Tech V Semester Regular/Supplementary Examinations, Nov-2023

FORMAL LANGUAGES & AUTOMATA THEORY

(CSE,IT)

Time: 3 hours**Max Marks: 70M**

Note: 1. Answer any five Questions with 'either or choice'. One Question from Each Unit
 2. All Questions carry Equal Marks $5 \times 14 = 70M$

UNIT - I

1. a) State and prove the equivalence of NFA and DFA. i.e., For every NFA **7M** there exists an equivalent DFA corresponding to it.

- b) Construct the following NFA to DFA, where the transition function of NFA is given by $\delta(q_0, 0)=\{q_0, q_3\}$, $\delta(q_0, 1)=\{q_0, q_1\}$, $\delta(q_1, 0)=\Phi$, $\delta(q_1, 1)=q_2$, $\delta(q_2, 0)=q_2$, $\delta(q_2, 1)=q_2$, $\delta(q_3, 0)=q_4$, $\delta(q_3, 1)=\Phi$, $\delta(q_4, 0)=q_4$, $\delta(q_4, 1)=q_4$, q_0 is an initial state and q_2, q_4 are the final states.

(OR)

2. a) Write different applications of Automata Theory along with its limitations **7M**

- b) Differentiate between Mealy and Moore Machine along with their mathematical definitions of it. **7M**

UNIT - II

3. a) Derive a Finite Automata for the following regular expression $(ab+a)^*(aa+b)$ **7M**

- b) Minimize the following DFA, where Q0 and Q4 are the initial and final states respectively **7M**

State	0	1
Q0	Q1	Q3
Q1	Q2	Q4
Q2	Q1	Q4
Q3	Q4	Q2
Q4	Q4	Q4

(OR)

4. a) Prove that the set $L=\{a^p / p \text{ is prime}\}$ is not regular. **7M**

- b) Prove that $(1+00^*1) + (1+00^*1)(0+10^*1)^*(1+10^*1) = 0^*1(0+10^*1)^*$. **7M**

UNIT - III

5. a) Determine a grammar in CNF equivalent to $S \rightarrow \lambda S / [SoS] / p/q$ **7M**

- b) Prove the following grammar is ambiguous $S \rightarrow i C t S / i c t S e S / a$, $C \rightarrow b$. Show the derivation tree for the string considered. **7M**

(OR)

6. a) Convert the following grammar into GNF. **7M**

 $A_1 \rightarrow A_2 A_3, A_2 \rightarrow A_3 A_1 / b, A_3 \rightarrow A_1 A_2 / a$

- b) Simplify the CFG with no useless symbols, unit productions equivalent to : **7M**
 $S \rightarrow AB / CA, B \rightarrow BC / AB, A \rightarrow a / B, C \rightarrow aB / b,$

UNIT - IV

7. a) Explain the significance of a PDA and give an example of a language handled by PDA. **7M**

- b) Construct an equivalent PDA for the following CFG $S \rightarrow AA/a$, $A \rightarrow SA/b$ **7M**

(OR)

8. a) Construct PDA for the Language $L = \{wcw^r / w \in \{0, 1\}^*\}$

7M

b) Construct PDA accepting $L=\{0^n 1^m 0^{m+n} / m,n \geq 0\}$

7M

UNIT - V

9. a) Design a TM over $\Sigma=\{0,1\}$ to accept the language $L=\{ 0^m 1^{2m} / m>0\}$

7M

b) Examine the formal definition of a TM to answer the following questions and explain with your reasoning.

7M

- a) Can a TM ever write the blank symbol B on its tape?
- b) Can the tape alphabet Γ be the same as input alphabet Σ ?
- c) Can a TM's head ever be in the same location in two successive steps
- d) Can a TM Contain just a single state?

(OR)

10. a) Design a TM to compute $m-n$, where m and n are positive integers and $m>n$

7M

b) Design a TM that recognizes the language of all strings of even length over alphabet $\{a,b\}$.

7M

*****End of Question Paper*****

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OPERATIONS RESEARCH

(CSE, IT, AI&DS, AI&ML)

Time: 3 hours**Max Marks: 70M**

Note: 1. Answer any five Questions with 'either or choice'. One Question from Each Unit.
2. All Questions carry Equal Marks.

5 X 14 = 70M

UNIT - I

1. a) Briefly explain the applications of Operation Research. **7M**
 b) A company is manufacturing two different types of products, A and B. Each product has to be processes on two machines M₁ and M₂. Product A requires 2 hours on machine M₁ and 1 hour on machine M₂, product B requires 1 hour on machine M₁ and 2 hours on machine M₂. The available capacity of machine M₁ is 104 hours and that of machine M₂ is 76 hours. Profit per unit for product A is Rs.6 and that for B is Rs.11. Calculate (i) Formulate the problem (ii) Find out the optimal solution by Simplex method. **7M**

(OR)

2. What do you mean by LPP? What are its limitations? Use penalty (or Big-M) method to maximize $z = 3x_1 - x_2$ Subject to the constraints: $2x_1 + x_2 \geq 2$; $x_1 + 3x_2 \leq 3$; $x_2 \leq 4$, where $x_1, x_2 \geq 0$. **14M**

UNIT - II

3. Find the optimum solution to the transportation problem given in the Table for which the cost, origin-availabilities, and destination-requirements are given. **14M**

	D1	D2	D3	D4	Supply
O1	5	3	6	2	19
O2	4	7	9	1	37
O3	3	4	7	5	34
Demand	16	18	31	25	90

(OR)

4. a) State the characteristics of transportation problem. **7M**
 b) Solve the following transportation problem by North West corner rule? **7M**

	F ₁	F ₂	F ₃	Supply
W ₁	2	7	4	5
W ₂	3	3	1	8
W ₃	5	4	7	7
W ₄	1	6	2	14
Demand	7	9	18	

UNIT - III

5. a) Briefly explain the Hungarian Method procedure with example. Also write the assumptions. **7M**
 b) Consider the problem of assigning five operators to five machines. The assignment costs are given in below table. **7M**

	M ₁	M ₂	M ₃	M ₄	M ₅
A	7	7	-	4	8
B	9	6	4	5	6
C	11	5	7	-	5
D	9	4	8	9	4
E	8	7	9	11	11

Operator A can not be assigned to machine M₃ and operator C can not be assigned to machine M₄. Find the optimum assignment schedule.

(OR)

6. a) What is sequencing problem? Explain the following terms in context of sequence problems: (i) Total elapsed time and Idle time (ii) no passing rule (iii) processing order. **7M**

- b)** Six jobs go first over Machine-I and then over Machine-II. The orders of completion of jobs have no significance. The following gives the machine times in hours for six jobs and the two machines. Find the Optimal total time and the idle times of the machine.

Job	1	2	3	4	5	6
Machine I	5	9	4	7	8	6
Machine II	7	4	8	3	9	5

- 7** Solve the following game graphically.

14M

		Player B	
		1	2
		5	4
Player A	-7	9	
	-4	-3	
	2	1	
			OR

- 8 a)** Solve the following game using dominance properties.

7M

B

A	1	7	2
	0	2	7
	5	1	6

- b)** State MaxiMin , MiniMax principle and define saddle point .

7M

UNIT - V

- 9. a)** Briefly explain what you mean by “individual and group replacement policy”.

7M

- b)** A machine owner finds from his past records that the costs per year of maintaining a machine whose purchase price is Rs.6000/-areas given below

7M

Year	1	2	3	4	5	6	7	8
Maintenance cost	1000	1200	1400	1800	2300	2800	3400	4000
Resale price	3000	1500	750	375	200	200	200	200

Determine at what age are placement is due.

(OR)

- 10. a)** Describe the EOQ problem with one price break.

7M

- b)** The initial cost of an item is Rs.20,000 and maintenance and running cost (in Rs) for different years are given below.

7M

Year	1	2	3	4	5	6	7
Running Cost	3000	3500	4500	5500	6500	8500	10500

What is the replacement policy to be adopted If the capital worth is 10% and there is no salvage value?

*****End of Question Paper*****

COMPUTER NETWORKS

(IT)

Time: 3 hours**Max Marks: 70M****Note: 1. Answer any five Questions with 'either or choice'. One Question from Each Unit****2. All Questions carry Equal Marks****5 X 14 = 70M****UNIT - I**

1. a) Explain the functions, protocols and services of each layer? **7M**
b) Discuss various types of networks topologies in computer network **7M**

(OR)

2. a) Compare Connection oriented and connectionless service. **7M**
b) What are the different types of networks? Explain in detail? **7M**

UNIT - II

3. a) Explain in detail about Wavelength-Division Multiplexing? **7M**
b) Explain in detail Circuit Switched Networks? **7M**

(OR)

4. a) Write notes on Frequency-Division Multiplexing? **7M**
b) Distinguish Between Datagram Network and Virtual Circuit Networks? **7M**

UNIT - III

5. a) Briefly discuss about data link layer design issues? **7M**
b) Explain different error detection and correction mechanisms with examples? **7M**

(OR)

6. a) Write notes on Simplex stop and wait protocol? **7M**
b) Describe in detail about Go-back N sliding window protocol for data link layer. **7M**

UNIT - IV

7. a) Explain about the Carrier Sense Multiple Access Protocols? **7M**
b) Explain the concept of ALOHA in detail? **7M**

(OR)

8. a) Describe in detail about distance vector routing with an example? **7M**
b) Write notes on CDMA channelization problem? **7M**

UNIT - V

9. a) Discuss the features of HTTP Operational Model? **7M**
b) Illustrate Client-Server communication with an example? **7M**

(OR)

10. a) What is URL explain it's important in Internet? **7M**
b) Explain in detail about Browsers in web architecture? **7M**

*****End of Question Paper*****

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E - COMMERCE

(IT, AI&ML)

Time: 3 hours**Max Marks: 70M**

Note: 1. Answer any five Questions with 'either or choice'. One Question from Each Unit.
 2. All Questions carry Equal Marks.

5 X 14 = 70M

UNIT - I

1. a) Explain about the anatomy of E-commerce application. **7M**
 b) Write and explain various functions of E-Commerce **7M**

(OR)

2. a) Define e-commerce. What are its functions? Mention its significance **7M**
 b) Explain briefly E-Commerce Consumer application. **7M**

UNIT - II

3. a) Explain Retailing payments w.r.t Electronic funds transfer. **7M**
 b) Explain about smart card-based electronic payment system. **7M**

(OR)

4. a) Define EDI? Write Applications of EDI. **7M**
 b) List Any three advantages and disadvantages of EDI. **7M**

UNIT - III

5. a) Explain the supply chain management characteristics in electronic commerce. **7M**
 b) Explain the primary models of supply chain management and their three primary elements. **7M**

(OR)

6. a) Explain the concept of bull whip effect? How is it useful to ensure optimization of supply chain? Give examples of intra organizational commerce? **7M**
 b) Write about work flow management in intra organizational commerce. **7M**

UNIT - IV

7. a) Explain Digital Document Management: Issues and Concerns. **7M**
 b) Explain about different types of data warehouses. **7M**

(OR)

8. a) Explain the capabilities: of structured documents and different standards used in structured documents. **7M**
 b) Explain the guidelines that each firm should follow for advertising on the Internet. **7M**

UNIT - V

9. a) Explain about Electronic Commerce Catalogs or Directories. **7M**
 b) List the typical features of Information filtering process. **7M**

(OR)

10. a) Explain various types of Codec's. In this context explain various moving pictures Experts group (MPEG). How MPEG different from JPEG. **7M**
 b) What are the characteristics of Digital Video? **7M**

*****End of Question Paper*****

DATA WAREHOUSING & DATA MINING

(CSE/IT)

Time: 3 hours**Max Marks: 70M**

Note: 1. Answer any five Questions with 'either or choice'. One Question from Each Unit.
2. All Questions carry Equal Marks.

5 X 14 = 70M

UNIT - I

1. a) Compare and contrast online transaction processing with online analytical processing. **7M**
b) What is the importance of data marts in data warehouse? **7M**

(OR)

2. a) Describe 3-tier Architecture of Data Warehouse with a neat sketch. **7M**
b) Design Fundamental structure of ETL architecture, **7M**

UNIT - II

3. a) Differentiate between data retrieval and data mining. **7M**
b) Describe the process of data cleaning. **7M**

(OR)

4. a) What causes major issues in Data Mining. Discuss. **7M**
b) Justify the statement "Data preprocessing is necessary before data mining process". Explain. **7M**

UNIT - III

5. a) Define Classification. Denote General Approach to solve a Classification problem. **7M**
b) State Bayes theorem. How can it be applied for data classification? **7M**

(OR)

6. a) Explain Decision tree induction algorithm for classification. Discuss the usage of information gain in this. **7M**
b) Take any suitable example and explain Bayesian belief network. **7M**

UNIT - IV

7. a) Can we design a method that mines the complete set of frequent item sets without candidate generation. Explain with example. **7M**
b) Illustrate FP-growth algorithm with a suitable example. **7M**

(OR)

8. a) Explain (i) Apriority Principle (ii) Support counting. **7M**
b) How to represent Frequent Itemset in compact format? **7M**

UNIT - V

9. a) Discuss the similarity measures and distance measures frequently used in clustering the data. **7M**
b) Explain about the basic Agglomerative Hierarchical clustering algorithm. **7M**

(OR)

10. a) List out additional Issues of K-means algorithm. **7M**
b) Analyze Strengths and Weaknesses of DBSCAN Algorithm. **7M**

*****End of Question Paper*****