

Con. 7114-13.

CS-7974

(2 Hours)

[ Total Marks : 60

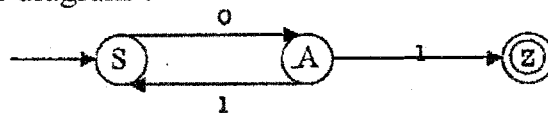
- N.B.** (1) All questions are compulsory.  
 (2) Figures to the right indicate full marks.  
 (3) Use of calculators and statistical tables are allowed.

1. Attempt any **three** of the following :—

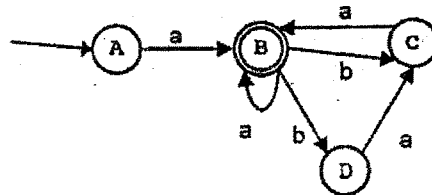
- (a) Define compiler. List and explain functions of various stages of compiler. 5  
 (b) What is Book keeping ? Why is it important in program translation ? 5  
 (c) Differentiate between call by value and call by reference. 5  
 (d) Write a short note on storage management in modern compilers. 5  
 (e) Explain in brief the role of lexical analyzer. 5

2. Attempt any **three** of the following :—

- (a) Define regular expression. Derive the regular expression for the following transition diagram : 5



- (b) What is a finite automaton ? Explain the types of automata with example. 5  
 (c) Consider the automaton shown in Figure : 5



Find if it is non-deterministic ? If yes, then convert the same to equivalent DFA.

- (d) What is input buffering ? Explain how does it help in recognition of tokens. 5  
 (e) What is cross compilation ? Explain with an example. 5

3. (a) Attempt any **one** of the following :—

- (i) Consider a CFG defined by  $(\{S, A\}, \{a, b\}, P, S)$ , where 7  
 $S \rightarrow aAS \mid b$   
 $A \rightarrow a \mid bSA$

Compute FIRST, FOLLOW, and l-lookaheads, and show that G is LL(1) and also parse string *abbab*.

- (ii) Consider the following grammar : 7

$\langle \text{assign} \rangle \rightarrow \langle \text{id} \rangle = \langle \text{expr} \rangle$   
 $\langle \text{id} \rangle \rightarrow A \mid B \mid C$   
 $\langle \text{expr} \rangle \rightarrow \langle \text{expr} \rangle + \langle \text{expr} \rangle \mid \langle \text{expr} \rangle * \langle \text{expr} \rangle \mid ( \langle \text{expr} \rangle ) \mid \langle \text{id} \rangle$

Find if it is ambiguous. If yes, draw the left and right derivation trees.

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(b) Attempt any **two** of the following :—

(i) Define Grammar. Also list and explain various types of grammar. 4

(ii) What is left factoring ? Left factor the following grammar. 4

$$S \rightarrow iCtS \mid iCtSeS \mid a$$

$$C \rightarrow b$$

(iii) Given the language : 4

$$E \rightarrow T \mid T + E$$

$$T \rightarrow F \mid F * T$$

$$F \rightarrow (E) \mid 0 \dots 9$$

Show step-by-step parsing for the input  $5*(1 + 3)$  using shift-reduce method.

4. (a) Attempt any **one** of the following :—

(i) What are LR Parsers ? Explain with a suitable block diagram the structure of LR Parsers. 7

(ii) Compute the LR(0) set of items for the following grammar : 7

$$X \rightarrow X+Y$$

$$X \rightarrow Y$$

$$Y \rightarrow Y*Z$$

$$Y \rightarrow Z$$

$$Z \rightarrow (X)$$

$$Z \rightarrow a$$

(b) Attempt any **two** of the following :—

(i) State and explain the characteristics of LALR Parsers. 4

(ii) Consider the following grammar rules and Parsing table for simple expressions : 4

$$E \rightarrow E + T$$

$$E \rightarrow T$$

$$T \rightarrow (E)$$

$$T \rightarrow id$$

Parsing Table with Possible ACTION and GOTO Entries							
State on top of stack	Action					GOTO	
	Id	+	(	)	\$	E	T
0	s4		s3			1	2
1		s5			accept		
2	r2	r2	r2	r2	r2		
3	s4		s3			6	2
4	r4	r4	r4	r4-	r4		
5	s4		s3				8
6		s5		s7			
7	r3	r3	r3	r3	r3		
8	r1	r1	r1	r1	r1		

Show step by step parsing of the string  $id + (id)$ .

(iii) Differentiate between Bottom-up and Top-down parsing. Give example. 4

**N.B. :** (1) All questions are **compulsory**.

(2) **Figures to the right indicate full marks.**

(3) Assume additional data if **necessary** but state the same **clearly**.

(4) Symbols have their usual meanings and tables have their usual standard design unless stated **otherwise**.

(5) Use of scientific calculator and statistical table are **allowed**.

- Q.1 Attempt any Three of the following
- a) Given an LTI system with impulse response 5

$$h(n_1, n_2) = a^{n_1, n_2} \quad -\infty \leq n_1, n_2 \leq \infty$$

and input to this system is

$$x(n_1, n_2) = \begin{cases} 2 & 0 \leq n_1, n_2 \leq 2 \\ 0 & \text{otherwise} \end{cases}$$

Find output of the system.

- b) When a two dimensional filter is said to be stable? State two 5  
dimensional difference equation.
- c) For two-dimensional FIR filters why problem of stability do not exist? 5  
What is the implication of stability condition of two dimensional  
signal?
- d) Give the example of the design of a circular symmetric lowpass filter. 5
- e) Discuss convolution property of z transforms for two dimensional 5  
signals.

- Q.2 Attempt any Three of the following
- a) Discuss design procedure for digital signal processing hardware. 5
- b) Explain term Fan-out related to digital circuits. Design an eight-bit 5  
data selector.
- c) Which is most used logical family in digital circuits. Why? 5
- d) Explain two-AE realization of the cascade structure 5
- e) Explain different parameters of Digital Touch-Tone Receiver. 5

- Q.3
- a) Attempt any one of the following
- (i) Explain working of Radix 2 pipeline FFT with neat diagram. 7
- (ii) How real time convolution via FFT can be achieved? 7
- b) Attempt any two of the following
- (i) Explain different methods of increasing computer speed. 4
- (ii) Discuss hardware considerations for Radix 2 Algorithms. 4
- (iii) Explain digital realization of a running sum. 4

Q.4

- a) Attempt any one of the following
    - (i) Compare Radix 2 and Radix 4 Pipeline FFT. 7
    - (ii) Explain simple technique for analyzing speech based on short-time spectrum analysis. 7
  
  - b) Attempt any two of the following
    - (i) With neat figure explain major blocks of modern radar system. 4
    - (ii) How DSP is useful in speech processing? 4
    - (iii) Explain structure of a general purpose computer. 4
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Con. 7398-13.

CS-8316

(2 Hours)

[Total Marks : 60

- N.B. :** (1) All questions are **compulsory**.  
 (2) **Figures** to the **right** indicate **full** marks.  
 (3) Use of calculators and statistical tables are **allowed**.

1. Attempt any **three** of the following :-
  - a) Define the term signal propagation. Explain multipath propagation with an example. 5
  - b) Explain the problem of hidden and exposed terminal. 5
  - c) Write a short note on CAMA/CD. 5
  - d) What is Aloha? How Slotted Aloha is better than Classical Aloha, Justify. 5
  - e) Define the term multiplexing. List different types of multiplexing scheme. Explain the most suitable multiplexing scheme according to you, for mobile communication. 5
2. Attempt any **three** of the following :-
  - a) Briefly explain GSM system Architecture. 5
  - b) Give the importance of Ad hoc network over infrastructure network. 5
  - c) What is handover? Explain Hard hand over and soft hand over. 5
  - d) Define footprint of a satellite. Explain types of satellite according to their orbits. 5
  - e) Briefly explain how multimedia object transfer protocol helps in telecommunication systems. 5
3. (a) Attempt any **one** of the following :-
  - (i) Explain the protocol architecture of HIPERLAN with neat labeled diagram. 7
  - (ii) Write a short note on Bluetooth user scenarios. 7
 (b) Attempt any **two** of the following :-
  - (i) List different types of WATM services 4
  - (ii) How selective retransmission works? Explain 4
  - (iii) Define backward handover and forward hand over with an example. 4
4. (a) Attempt any **one** of the following :-
  - (i) What is the need behind tunneling? Explain encapsulation in the process of tunneling. 7
  - (ii) Explain the mechanism of IP packet delivery with the help of agent advertisement and discovery. 7
 (b) Attempt any **two** of the following :-
  - (i) Briefly explain Dynamic Host Configuration Protocol. 4
  - (ii) Write a short note Indirect TCP 4
  - (iii) What is time out freezing? Explain with an example. 4

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Con. 7390–13.

CS–8487

(2 Hours)

[Total Marks : 60

- N.B. (1)** All questions are compulsory.  
**(2) Figures** to the right indicate full marks.  
**(3)** Use of calculator and statistical tables are allowed.

1. Attempt any *three* of the following:
  - (a) Explain data warehouse plan in detail. 5.
  - (b) Explain how to identify authoritative source of data from operational systems and explain how to analyze source data. 5.
  - (c) Explain information package by considering suitable example. 5.
  - (d) Explain with example denormalization process for dimension and fact tables. 5.
  
2. Attempt any *three* of the following:
  - (a) Define surrogate key. Why there is a need of this key? Explain with an example. 5.
  - (b) Consider single source facts as customer service transactions about a retailer. Form a fact table and hence identify at least two dimensions and create star schema. 5.
  - (c) Explain the need of data mining techniques. Can you apply these techniques on databases with less number of tuples? Explain. 5.
  - (d) Explain discretization process to handle noisy data in preprocessing of data. Discretize the set of attribute age: {4, 8, 16, 20, 21, 22, 27, 30, 32, 34} using equi-width binning method by taking bin width = 16. 5.
  
3. Attempt any *three* of the following:
  - (a) Differentiate between supervised and unsupervised learning methods. What are the advantages and disadvantages of these learning methods? Are the techniques used in cluster analysis are unsupervised learning? Justify your answer. 5.
  - (b) For each attribute of the following table write three classification rules of your choice and find the total error corresponding to each attribute using 1R classifier. According to you which is the best attribute and corresponding rule. Justify your answer. 5.

Outlook	Temperature	Humidity	Windy	Class
Sunny	Hot	High	False	N
Sunny	Hot	High	True	N
Overcast	Hot	High	False	Y
Rain	Mild	High	False	Y
Rain	Cool	Normal	False	Y
Overcast	Cool	Normal	True	Y
Sunny	Mild	High	False	N
Sunny	Cool	Normal	False	Y

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- (c) Represent the following distance matrix by dendrogram after clustering using average linkage criteria of agglomerative method. 5.

	M <sub>1</sub>	M <sub>2</sub>	M <sub>3</sub>	M <sub>4</sub>	M <sub>5</sub>
M <sub>1</sub>	0.00	1.00	5.10	8.94	4.00
M <sub>2</sub>	1.00	0.00	5.39	9.43	3.00
M <sub>3</sub>	5.10	5.39	0.00	4.24	7.07
M <sub>4</sub>	8.94	9.43	4.24	0.00	11.31
M <sub>5</sub>	4.00	3.00	7.07	11.31	0.00

- (d) Following table contains four types of medicines. Each medicine has two attributes x and y. 5.

Medicine	x	y
A	1	1
B	2	1
C	4	3
D	5	4

- (i) Consider each medicine as one point with attribute (x, y) and plot in a scatter diagram.  
 (ii) Take initially medicines A and B as two centroids and hence form two clusters using 2-medoid method. Use Euclidean distance formula.

4. Attempt any *three* of the following:

- (a) Using CART algorithm of classification, find the attribute that can be taken at the root of a decision tree for the following weather report: 5.

Outlook	Temperature		Humidity		Windy		Play						
	Yes	No	Yes	No	Yes	No	Yes	No					
Sunny or Rainy	5	4	Hot Or cool	5	3	High	3	4	False	6	2	9	5
Overcast	4	0	Mild	4	2	Normal	6	1	True	3	3		

- (b) Define an association rule. Can you use it for prediction? Justify your answer. Is there a difference between classification rule and association rule? Explain. 5.  
 (c) Calculate support and confidence for the rule  $YP \rightarrow X$  with the help of following information: 5.

Item ID	Product Bought
10	{R,X,P,Y}
11	{P,X,Z,Q,Y}
12	{Z,X,Y,Q}

- (d) Explain how to generate Frequent Pattern tree for the following data sets with minimum support 3: 5.

TID	Items bought
1	A, B, D, E
2	B, C, E
3	A, B, D, E
4	A, B, C, E
5	A, B, C, D, E
6	B, C, D