Con. 4021–13. **PB–5317**

(3 Hours) **[Total Marks : 75**

N. B.: (1) Attempt any **three** questions from **each section.**

(2) Answers to the two sections must be written in the **same answer sheet**.

(3) Figures to the right indicate full marks.

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

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

(6) Use of calculators and statistical tables is allowed.

Section I

Q.1 a)	What are compiler writing tools? Explain each one in details	6
b)	State properties of Higher level programming language	4
c)	Explain Fixed size multidimensional array	2
Q.2 a)	Compare Call-by-reference with call-by-name	6
b)	Explain static and dynamic storage management	4
c)	Define Regular Expression	2
Q.3 a)	What is Ambiguous grammar? Explain with example using parse tree	6
b)	Write an algorithm for minimizing number of states of DFA	4
c)	State notational conventions for CFG	2
Q.4 a)	Explain Regular expression vs Context Free Grammers	6
b)	Write an algorithm for Elimination of Left Recursion	4
c)	Check whether the following language is Context Free language L1={wcw| w is in (a|b)*}	2
Q.5 a)	Check whether the following grammar is LL(1) S->iCtSS'|a S'->eS|ε C->b Construct the Predictive Parsing table if the grammar is LL(1)	6
b)	Explain Canonical collection of LR(0) items	4
c)	Explain the structure of SLR parsing table with example.	2

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Section II

6 a. Convert the following infix expression to postfix expression 3

if a then if b then a-b else a+b else a/b

using ? as a ternary postfix operator.

b. Consider following productions used in a grammar for desk top calculator. 5

S -> E$
E -> E+E
E -> E*E
E -> (E)
E -> I
I -> Idigit
I -> digit

Write the semantic actions for above productions. Give the parse tree and translation for the expression 32+53

c. Write quadruples, triples and indirect triples for the expression 5

-(a+b)/(c+d)-(a-b+c)

7 a. Which programs of compiler affect symbol table? How symbol table can be effectively designed? 3

b. Describe addressing function to access P(A,B,C) element for three-dimensional array. 5

c. What is peephole optimization? State and discuss different methods of peephole optimization. 5

8 a. Draw parse tree for 3

A>B>C and B<C

b. Explain implementation of simple Stack-Allocation scheme. 5

c. Consider the following code: 5

```
begin
    max:=0
    for i:=1 to n do
        if a[i] > max then
          max:=a[i];
end
```

Assume a is one-dimensional array having static storage allocation & there are two bytes per word in a byte-addressed memory, produce three-address code for given code. Partition the program into basic blocks.

9 a. Define live and dead variables. 3

b. Give importance of code optimization phase, state different methods of code 5

optimization and discuss any two.

c. What is a loop? Explain the methods used in detecting loops in the flow graph. 5

10 a. What is cost of assembly instruction? How it is useful in code generation? 3

b. What is addressing mode? Normally what addressing modes are used in assembly language of general purpose microprocessor? 5

c. Consider a quadruple. 5

A:=B+C where B and C are simple variables in distinct memory locations. Give three different ways of code generation of the given quadruple. Assume suitable machine model and write your assumption of machine model clearly.

Con. 5602–13. **PB–5473**

(3 Hours) **[Total Marks : 75**

N. B.: (1) Attempt any **three** questions from **each section.**

(2) Answers to the two sections must be written in same **answer sheet.**

(3) Figures to the right indicate full marks.

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

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(6) Use of calculator and statistical tables are allowed.

Section I

1. a) Give the differences and similarities between DIF and DIT FFT algorithms. 2
   b) Give advantages and disadvantages of FIR filters. State and explain at least three characteristics of FIR filters. 5
   c) Let x(n)={2,2,2,1,2,3,-2,-3,-1,-1,1,2,-1} and h(n)={1,1} Compute x(n)*h(n) using overlap- add method. Explain each step in detail. 5

2. a) Define auto correlation and cross correlation of two sequences x(n) and y(n). 2
   b) Compute DFT of a sequence x(n) = {2, -1, 2, -1} using DIT FFT algorithm. Draw flow-graph diagram. 5
   c) What is digital filter realization? With a neat diagram explain the Direct Form I realization of a digital filter. Give example. 5

3. a) State the computational complexity for direct form-II realization of IIR system. 2
   b) Determine direct form-II realization for following LTI system 5
   $y(n) = 3x(n) - x(n-1) + 2x(n-2) - 2x(n-4)$
   c) Explain mapping of S-plane to Z-plane in the design of IIR filters. 5

4. a) Define all zero system and all pole system which are used in direct form-I realization of IIR system. 2
   b) Explain how a sequence is produced from an analog waveform by analog to digital converter (ADC). 5
   c) Write most general form of the z-transform of IIR filters. Discuss two theoretical methods for achieving a zero-phase IIR filter. 5

5. a) State characteristics of Chebyshev filters. 2
   b) What is a block floating point representation of numbers? What are advantages of such a system? 5
   c) What is the purpose of Bluestein's algorithm? How it is achieved? State the major significance of Bluestein algorithm. 5

Section II

6. (a) Define 2-dimensional DFT and Inverse of DFT. 3

(b) Given an LTI system with the input sequence: 5

$$x(n1,n2) = \begin{cases} 1 & 0 <= n1,n2 <= 3 \\ 0 & \text{Otherwise} \end{cases}$$

and impulse response is given as

$$h(n1,n2) = K^{n1}\, u(n1-n2) \qquad -\infty <= n1,n2 <= \infty$$

Determine y(n1,n2), the output of the system.

(c) Describe the two dimensional frequency domain techniques in detail. 5

7 (a) Explain the terms: Fan-In and Fan-Out. 3

(b) Differentiate between TTL and CMOS logic family. 5

(c) Illustrate with block diagram the Hierarchy of hardware leading to signal processing Algorithm. 5

8. (a) Explain how IIR filter is realized as a cascade of three second order sections each containing poles and two zeros. 7

(b) Write a note on MOS chip. 6

9. (a) Explain how real time convolution is carried by FFT using a Single RAM and One Arithmetic Element. 6

(b) Explain FFT indexing with respect to bit reversal and digital reversal of fixed indices. 7

10. (a) Write a note on Radar parameter: Range Resolution 3

(b) Explain with neat labeled diagram pitch period estimation algorithm. Write a note on Pitch measurements for extreme conditions. 5

(c) What is the significance of ambiguity function in radar signals? 5

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Con. 5750–13. **PB–5629**

(3 Hours) **[Total Marks : 75**

N.B. (1) Attempt any three questions from each section

(2) Answer to the two sections must be written in separate answer books.

(3) Figures to the right indicates full marks.

(4) Use of simple calculator is allowed.

(5) Abbreviations have their usual meanings unless stated otherwise.

Section I

Q. 1 (a) Explain the multiplexing technique used by cellular systems for mobile communications? Write the advantages and disadvantages of small cells used in cellular system. [6]

(b) Differentiate Demand assigned multiple access scheme with respect to explicit and implicit reservation . [4]

(c) Explain the radiation pattern of directed antenna and sectorized antenna. [2]

Q. 2 (a) Explain with the help of diagram GSM TDMA frame and the types of handover in GSM system. [6]

(b) What are the different components of DECT system architecture reference model. Draw the diagram for the same. [4]

(c) Name basic applications for satellite communication and elaborate different handover scenarios in satellite systems. [2]

Q. 3 (a) Discuss classes of handover in UMTS and localization & routing with respect to satellite systems. [6]

(b) What are infrastructure and adhoc networks. Explain them with architectural

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diagram of IEEE 802.11. [4]

(c) What are different inter frame spacing in medium access control layer. [2]

Q. 4(a) Discuss beacon transmission in a busy 802.11 infrastructure and adhoc network. [6]

(b) Elaborate the reasons that has led to the development of WATM system. [4]

(c) Define formation of Bluetooth piconet and scatternet. [2]

Q. 5 (a) Explain the registration process of a mobile node through the foreign agent and directly with the home agent. Also discuss IP-in-IP encapsulation process. [6]

(b) What do you understand by mobile adhoc networks and mobile TCP. [4]

(c) Problems with HTTP and HTML have led to different proprietary and standardized solutions. Discuss any one approache that supports wireless access. [2]

Section II

Q6. (a) State the disadvantages of simulation. (5)

(b) A bank's ATM centre has only one ATM machine operating. Customers arrive at this centre at random from 1 to 10 minutes. The probabilities of arrival distribution and service distribution are listed as below. Develop the simulation table for 10 customers. (8)

Time Between Arrivals	1	2	3	4	5	6	7	8	9	10
Probability	0.10	0.05	0.12	0.10	0.13	0.12	0.16	0.10	0.10	0.02

Service Time	1	2	3	4	5	6
Probability	0.05	0.10	0.20	0.30	0.25	0.10

Determine the average waiting time for a customer as well as the probability of a customer to wait in the queue.

Use the following random numbers

Random numbers for arrivals: 25, 31, 15, 88, 64, 12, 73, 36, 45

Random numbers for service: 10, 22, 34, 16, 59, 74, 48, 37, 51, 18

Q7. (a) A production process manufactures computer chips on the average at 2% non-conforming. Every day a random sample of size 25 is taken from the process. If the sample contains more than two nonconforming chips, the process will be stopped. Determine the probability that the process is stopped by the sampling scheme. (5)

(b) Write down the pdf, mean, mode and cdf of Triangular distribution. (8)

Q8. (a) The inter arrival times and service times of a single window driving license issuing office are exponentially distributed. The value of λ and μ are 2 per hour and 3 per hour respectively. Find (5)

(i) The server utilization

(ii) The probability of only one customer in the queue.

(b) Explain the following terms with respect to Queueing Systems: (4)

(i) System Capacity (ii) Arrival Process

(c) Write down the steps to perform Gap test for random numbers. (4)

Q9. (a) Write an algorithm to generate random sample of size n from exponential distribution using inverse transform technique. (5)

(b) Consider the following sequence of random numbers:- (8)

0.12	0.01	0.23	0.28	0.89	0.31	0.64	0.28	0.83	0.93
0.99	0.15	0.33	0.35	0.91	0.41	0.60	0.27	0.75	0.88
0.68	0.49	0.05	0.43	0.95	0.58	0.19	0.36	0.69	0.87

Test whether 3rd, 8th, 13th etc. numbers in the sequence are auto correlated

[Given: the area below the Standard Normal Curve between + 1.96 is 0.95]

Q10. (a) Explain with the help of a diagram the three steps in model building. (5)

(b) Briefly explain the following terms with respect to simulation models: (4)

(i) Verification (ii) Validation

(c) Explain acceptance rejection technique. (4)

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Con. 4027–13. **PB–5785**

(3 Hours) **[Total Marks : 75**

N.B. **(1)** Attempt any **three** questions from each **section.**
(2) Answer to the two sections must be written in separate **answer books.**
(3) Figures to the right indicate full marks.
(4) Use of simple calculator and statistical tables are allowed.

SECTION I

1. **(a)** Write a short note on OLAP and relational OLAP. **5.**

(b) Explain how data warehouse architecture is different from design. Support your answer by giving suitable example. **5.**

(c) Define Data warehouse by giving suitable application. **2.**

2. **(a)** Define dimensional modeling. What are the strengths of dimensional modeling? **5.**

(b) What is the significance of the ETL process? What are different basic data transformations task performed in ETL process? **5.**

(c) Define surrogate key. Why there is a need of this key? Explain with an example. **2.**

3 **(a)** Explain following terms used in measuring performance in classification of data: (i) True positive, (ii) True negative, (iii) False positive and (iv) False negative. **5.**

(b) Define entropy and gain of an attribute in information theory. Consider the following information about buying computer where one of the attribute is "age". Compute entropy and gain for an age. **5.**

age	Buy Computer = yes	Buy Computer = no	Total
<= 35	2	3	5
36 to 45	4	0	4
> 45	3	2	5
Total	**9**	**5**	**14**

(c) Explain how to construct a classification model for a training set and verify using test set by considering a classifier rule. **2.**

4. **(a)** Consider the following set of frequent item sets: **5.**
{1,2,3}, {1,2,4}, {1,2,5}, {1,3,4}, {2,3,4}, {2,3,5}, {3,4,6}.
Assume that there are only six items in the datasets. List all candidate 4-item sets obtained by candidate generation procedure using Apriori algorithm by taking minimum support as 30%.

(b) Represent the following distance matrix by dendogram after clustering using complete linkage criteria of agglomerative method. **5.**

	M_1	M_2	M_3	M_4	M_5
M_1	0.00	1.00	5.10	8.94	4.00
M_2	1.00	0.00	5.39	9.43	3.00
M_3	5.10	5.39	0.00	4.24	7.07
M_4	8.94	9.43	4.24	0.00	11.31
M_5	4.00	3.00	7.07	11.31	0.00

(c) What is cluster Analysis? What do you mean by outliers in cluster analysis? Is it true that "Clusters are formed using un-supervised learning"? Justify your answer. **2.**

5. (a) Explain different types of crawlers in web content mining. 5.

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

TID	Items bought
101	{y, x, z, p, q, r, s, e}
102	{x , f, z, y, g, s, h}
103	{f, y, m, n, h}
104	{f, z, o, a, b}
105	{x, y, z, t, g, b, s, u}

(c) What do you mean by frequent item set? State Apriori algorithm. If {a, f} is not frequent then can you say that {a, d, f} is frequent? Explain. 2.

SECTION II

6. (a) Define the term distributed data independence and distributed transaction atomicity. What is the difference between homogeneous and heterogeneous distributed databases? 5.

(b) Write a short note on (i) Location transparency, (ii) Fragmentation transparency in distributed DBMS. 5.

(c) Briefly describe and compare synchronous and asynchronous distributed database. 3.

7. (a) Describe and differentiate with example pipelined parallelism and data partitioned parallelism. Discuss round robin and hash techniques for partitioning the data. 5.

(b) Why *ack* messages are required in 2PC? What are the differences between traditional 2PC and 2PC with Presumed Abort? 5.

(c) What are the different types of fragmentation to divide the database? Explain. 3.

8. (a) Differentiate between object identity and primary key. 5.

(b) Writ a short note on referential integrity in OODBMS. 5.

(c) Define any two classes or types in OODBMS and explain 1:M relationships between them. 3.

9. (a) Consider the following rules: 5.

```
reachable(X, Y) :- flight(X,Y)
reachable(X, Y) :- flight(X,Z), Reachable(Z, Y)
```

Where `reachable(X, Y)` means that city Y can be reached from city X, and `flight(X,Y)` means that there is a flight to city Y from city X.

a. Construct fact predicates that describes the following:
   (i) Mumbai, Delhi, New York, Los Angeles, Chicago, Paris, Frankfurt, Singapore are cities.
   (ii) The following flights exist:
   Mumbai to New York, New York to Delhi, Delhi to Frankfurt, Frankfurt to Delhi, Frankfurt to Singapore and Singapore to Paris.

b. Is the given data cyclic? If so, in what sense?

c. Consider the query

```
reachable(Delhi,Paris)?
```

How will this query be executed using naïve evaluation?

(b) Why do we have XML DTDs? What is a well formed XML document? What is the valid XML document? Give an example of an XML document that is valid but not well formed and vice versa. **5.**

(c) Explain with suitable example Event-Condition-Action rules for reactive behavior in an active database. **3.**

10. (a) Consider the relational schema **5.**

Garden (Gard_No, Gard_Name).

Suppose user wants to know the dimensions of a garden, then which additional attribute is required in the above schema? Which type of data base you get after adding new attribute? How is it different from traditional database?

(b) What is the difference between temporal and ordinary database? What are the advantages of temporal database? **5.**

(c) Write a short note on GIS. **3.**
