Con. 1990-11. **LR-7289**

(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 **separate** answer-books.
(3) **Figures** to the **right** indicate **full** marks.
(4) Use of **simple** calculator is **allowed**.

Section I

1. (a) Explain structure of Complier. 5
   (b) Explain parameter passing with call by reference, call by name, call by value. 5
   (c) What is Associativity ? Explain with example. 2

2. (a) What is ε-closure ? Explain algorithm for subset construction and calculate ε-closure. 5
   (b) Consturct transition diagram for following regular expression (a|b)*abb 5
   (c) Define Regular expression. Also state regular expression construction rules. 2

3. (a) What is Ambiguous grammar ? 5
   Find where the following grammar is ambiguous
   G=({E, U}, (+,*,(,),0,....9),P,E)
   Where P consists of
   E->E+E
   E->E*E
   E->(E)
   E->U
   U->0|1|···|9
   (b) What are precedence functions ? Generate the precedence function for the following precedence matrix. 5

	id	+	*	$
id		.>	.>	.>
+	<.	.>	<.	.>
*	<.	.>	.>	.>
$	<.	<.	<.	

   (c) What is top down parsing ? Construct parse tree for input string cad for the following grammar. 2
   S->cAd
   A->ab|a

4. (a) Compute FIRST & FOLLOW sets for each NT 5
   E->TE'
   E'->+TE'|ε
   T->FT'
   T'->*FT'|ε
   F->(E) | id
   (b) Explain with reason which languages are context free 5
   (i) $L1=\{wcw^R | w$ is in $(a|b)^*\}$ w^R stands w reverse
   (ii) $L2=\{a^n b^m c^n d^m | n>=|$ and $m>=1\}$
   (c) Explain the terms handle & handle pruning with example. 3

5. (a) Check whether the following grammar is LL(1) ? Construct predictive parsing table for the grammar. 5
   S->iCtSS' | a
   S'->eS|ε
   C->b
   (b) Compute LR(0) items for the following grammar 5
   E->E+T
   E->T
   T->T*F
   T->F
   F->(E)
   F->id
   (c) Write an algorithm for constructing LALR table. 3

[TURN OVER

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 -> |
|-> |digit
| -> digit

Write the semantic actions for above productions. Give the parse tree and translation for the expression 287+44.

(c) Write quadruples, triples and indirect triples for the expression 5
–(a+b)*(c+d)–(a+b+c)

7. (a) How symbol table can be effectively designed ? 2
(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 A>B>C or B<C 2
(b) Explain implementation of simple Stack-Allocation scheme. 5
(c) Consider the following code :— 5

```
begin
        sum:=0
        for i:=1 to n do
            sum:=sum+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 the matrix addition program. Partition the program into basic blocks.

9. (a) Define live variables. 2
(b) Give importance of code optimization phase, state different methods of code optimization and discuss any two. 5
(c) What is static allocation scheme ? Explain different strategy required for languages like FORTRAN, ALGOL, PL/1. 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) Assume a target machine is a byte addressable machine with 216 bytes of memory and have eight general purpose registers R0,R1,R2,...,R7; each capable of holding 16 bit quantity. Generate code for expression W := (A–B)+(A–C)+A 5
Assume suitable instructions for the target machine. Explain your assumed instructions.

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V-1st-Hf-Ex-11-C-30

Con. 1991-11.

LR-7292

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

N.B. : (1) Attempt any **three** questions from **each** section.
(2) Answers to **two** sections must be written on **separate** answer sheet.
(3) **Figures** to the **right** indicates **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 **simple calculators** and **statistical tables** is **allowed**.

Section I

1. (a) Define system function. 3
   (b) Find the convolution of the following using z-transform. 5
   X(n)=[1,2,1] and h(n)=[1,1,1]
   (c) What is the speed improvement factor in calculating 64-point DFT of a sequence using direct computation and FFT algorithms ? 5

2. (a) Define circular convolution. 2
   (b) Find the output y(n) of a filter whose impulse response is h(n)=[1 ,1,1] and input signal x(n) = [3,–1,0,1,3,2,0,1,2,1] using overlap add method. 5
   (c) Prove the following properties of DFT when X(k) is the DFT of an N-point sequence x(n). 5
   (i) X(k) is real and even when x(n) is real and even.
   (ii) X(k) is imaginary and odd when x(n) is real and odd.

3. (a) What are advantages and disadvantages of bilinear transformations ? 2
   (b) With neat figure explain direct-form I realization structure of a 3rd order system. 5
   (c) Explain the process of analog-to-digital conversion. 5

4. (a) State advantages and disadvantages of FIR filters. 2
   (b) Distinguish between FIR and IIR filter. 5
   (c) Explain the characteristics and working of inverse Chebyshev filters. 5

5. (a) Draw 4-point DIT FFT butterfly diagram in detail. With the help of diagram calculate DFT of signal x(n)=[2,1 ,0,2] . 3
   (b) Explain the bit shuffling algorithm used for implementing FFT. What is output of algorithm ? 5
   (c) State and explain different properties of Butterworth lowpass filters. Design a Buterworth filter with at least 66-db attenuation at $\Omega = 2000 \prod$ rad/sec and 3-db attenuation at $\Omega = 1000 \prod$ rad/sec. 5

Section II

6. (a) Explain how the two dimensional DFT be evaluated using one dimensional FFT program. 5
   (b) Explain how windowing is carried out for two dimensional signals. 5
   (c) Why different logic families are required in DSP hardware ? 2

7. (a) How can multiplexing be used to realize three separate FIR filters with a single computational element ? 5
   (b) Explain the working of Transistor-Transistor logic with a simplified circuit diagram and compare TTL and ECL circuits. 5
   (c) Differentiate between ac fan out and dc fan out. 2

8. (a) Explain different techniques of parallel processing to speed up calculating FFT. 5
   (b) Explain the role of a general purpose computer in Digital signal processing. 5
   (c) What are disadvantages of FDP structure ? 3

9. (a) Explain the use of high speed scratch memory. 5
   (b) Write a note on Lincoln Signal Processor 2(LSP2). 5
   (c) Explain the block diagram of the radix 4 pipeline FFT. 3

10. (a) Illustrate Simple techniques for analyzing speech based on short time spectrum analysis. 5
    (b) Describe the components of Radar system and important Radar parameters. 5
    (c) Explain the following terms : (i) Pitch period (ii)Pitch frequency. 2

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Con. 1993-11.

LR–7295

(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) Draw **diagram** where ever applicable.
(5) **Abbreviations** have their usual meaning unless stated otherwise.

SECTION I

1. **(a)** Explain amplitude , frequency, and phase shift keying method with the help of diagram and write where these methods are used. **5**
   (b) Why collision detection is difficult in wireless scenario. Explain near and far terminal problem. **5**
   (c) Define Reservation TDMA access scheme. **3**

2. **(a)** Differentiate among Mobile, Bearer, Tele and Supplementary services of a GSM system. **5**
   (b) Discuss the functionality of Mobile terminated call and Mobile originated call. What is the importance of SS7. **5**
   (c) Write note on UMTS system architecture. **3**

3. **(a)** Differentiate among four different types of orbits of a satellite system and discuss their advantages and disadvantages. **5**
   (b) Explain Digital Audio Broadcasting with respect to its frame structure and the MOT structure. **5**
   (c) Draw the diagram for the architecture of an infrastructure based IEEE 802.11 network and explain its functionality. **2**

4. **(a)** How many types of Inter Frame Spacing can be used in a medium access layer. Explain the phenomenon of DFWMAC-PCF with polling. **5**
   (b) Write the different functional groups of MAC management . Explain any of them in detail. **5**
   (c) Write note on Bluetooth piconet and scatternet. **2**

5. **(a)** How do IEEE 802.11, Hiperlan2 and Bluetooth respectively solve the hidden terminal problem. **6**
   (b) Write note on: **6**
   (i) Packet delivery to and from the mobile node.
   (ii) Approaches that help wireless access.

Section II

Q6. (a) Explain where you feel simulation is an appropriate tool. (4)

(b) Able has a kneecap injury and cannot move as fast. Consequently two things happen. Able's service distribution changes and baker gets the first shot of the customer if both the carhops are idle. Able's service time distribution is as follows (Table 2) also bakers service time distribution is as follows (Table 3) The arrivals follow a distribution as shown in the table below(Table 1). Develop a simulation and subsequent analysis for 20 iterations. Calculate the following statistics. (8)

1. Average busy time of Able.
2. Average busy time of Baker.
3. Average wait time.

Table 1		Table 2		Table 3	
Arrival Time	Probability	Service Time	Probability	Service Time	Probability
1	0.25	1	0.30	1	0.35
2	0.40	2	0.30	2	0.25
3	0.20	3	0.25	3	0.20
4	0.15	4	0.15	4	0.20

Use the following random numbers:

Random nos for arrival:

94, 77, 49, 45, 43, 32, 49, 00, 16, 24, 31, 14, 41, 61, 85, 08, 15, 97, 52

Random nos for service:

80, 20, 15, 88, 98, 65, 86, 73, 24, 60, 78, 29, 01, 90, 93, 73, 21, 45, 76, 96

Q7. (a) Write down the pdf, mean, mode and cdf of Triangular distribution. (7)

(b) Explain Uniform distribution and solve the following: (5)

A bus arrives every 20 minutes at a specified stop beginning at 6.40 am and continuing until 8.40 am. A certain passenger does not know the schedule, but arrives randomly (uniformly distributed) between 7 am and 7.30 am every morning. What is the probability that the passenger waits more than 5 minutes for a bus?

Q8. (a) Explain the following terms with respect to Queueing Systems: (4)

(i) System Capacity (ii) Arrival Process

(b) 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 (4)

(i) The server utilization

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

(c) Briefly explain the autocorrelation test for random numbers. (4)

Q9. (a) Write an algorithm to generate a sequence of 2-digit random numbers using Linear Congruential method. Also generate there random numbers between 0 and 1 with $X_0 = 63$, $a = 19$, $c = 0$ and $m = 100$. (5)

(b) Consider the following sequence of 40 random numbers. Use runs above and below the mean test to determine whether the hypothesis of independence (8)

can be accepted for the following numbers where $\alpha = 0.05$

0.41	0.68	0.89	0.94	0.74	0.91	0.55	0.62	0.36	0.27
0.19	0.72	0.75	0.08	0.54	0.02	0.01	0.36	0.16	0.28
0.18	0.01	0.95	0.69	0.18	0.47	0.23	0.32	0.82	0.53
0.31	0.42	0.73	0.04	0.83	0.45	0.13	0.57	0.63	0.29

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

Q10. (a) Describe the inverse transform method for the generation of random variates satisfying the uniform distribution and weibull distribution. (6)

(b) Explain the acceptance-rejection technique. (4)

(c) Discuss EAR(1) time series model. (3)

M.SC. **PART – I** (APRIL – 2011) : **PAPER – IV**

Con. 2003-11.

LR–7298

(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)** Differentiate by giving suitable examples operational system and information system in processing large data sets. **5.**

(b) Explain the steps involved in building a data warehouse. **5.**

(c) Explain the architecture frame work of a data warehouse. **3.**

2. **(a)** Differentiate between star and snow flake schema used in data design. Give an example to support your answer. **5.**

(b) Explain data extraction strategy and ~~varies~~ various steps involved in source identification process in extraction of data in ETL process. **5.**

(c) Write a short note on a technical architecture plan of a data warehouse. **3.**

3 **(a)** 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 rules. 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

(b) Consider the following table, where class L: low and H: high risk. Use ID3 algorithm to create a decision tree for classifying data. **5.**

Age	Car type	Class
> 21	Maruti	L
> 21	Hyundai	H
< 21	Maruti	H
< 21	Indica	H
> 21	Maruti	L
> 21	Hyundai	H

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

4. **(a)** What is a cluster? How to make cluster using similarity measures? Give an example. **5.**

(b) Explain k-mean clustering method using the set {4, 6, 12, 14, 5, 22, 32, 13, 27} by dividing a set into three clusters. Initially begin with three clusters with elements 5, 6 and 13. **5.**

[TURN OVER

(c) Explain CLARA algorithm. 2.

5. (a) Define support and confidence to measure the strength of association rule. Calculate support and confidence for the rules jam => (butter, bread) and butter => bread, from the following: 5.

Basket 1: bread, butter, jam
Basket 2: bread, butter
Basket 3: bread, butter, milk
Basket 4: beer, bread
Basket 5: beer, milk

(b) What do you mean by frequent it m set? Use Apriori algorithm to generate frequent item sets for the following by taking support threshold as 60%: 5.

TID	Items
1	{ Egg , Milk}
2	{ Egg, Chips, Butter, Beer}
3	{ Milk, Chips, Butter, popcorn}
4	{ Egg, Milk, Chips, Butter}
5	{Egg, Milk, Chips, popcorn}

(c) Write a short note on Web usage mining. 2.

SECTION II

6. (a) Write a short note on pipelined parallelism and data-partitioned parallelism. Supply an appropriate application to explain both. 5.

(b) Explain homogeneous and heterogeneous distributed database. 5.

(c) What are the advantages of distributed DBMS over centralized DBMS? 2.

7. (a) Illustrate with an example :(i) Remote request, (ii) Distributed transaction. 5.

(b) What is a commit protocol and why is it required in a distributed database? Explain how the system recovers from failure and deals with a particular transaction T in each of the following cases using 2-phase commit protocol: 5.
(i) A subordinate site for T fails before receiving a prepare message.
(ii) A subordinate site for T fails after receiving a prepare message but before making a decision.

(c) Define a nested transaction in distributed database. 2.

8. (a) What are the different problems faced by traditional database and explain how they are resolved using object oriented database. 5.

(b) How is an object identifier (OID) different from a record id in a relational DBMS? Compare OID with primary key. Give advantages of OID. 5.

(c) Using relational schema **Toy** (Tno,Tname,price), and explain the difference between message and method. 2.

9. (a) What are the differences between structured, semi-structured and un- structured data in XML database? 5.

(b) What is a safe program in Datalog? Why this property important? What is range restrictions and how does it ensures safety? 5.

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

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

```
Garden( gardenName, address)
```

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? Write two instances of the new database.

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

(c) What is the difference between GIS data and traditional data used in RDBMS? **3.**