M.Sc (Comp. Science) (Part-I)

Principles of Complier Design I & Principles of Complier Design II

(OCT-16)

QP Code : 75495

[3 hours] [75 marks]

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.
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	What is a compiler? Explain the various phases of compiler in detail, with a neat sketch.	6
	B	Draw a NFA for a*|b*	6
2	A	Write a note on input buffering.	6
	B	Explain the role of DFA in lexical analysis. Give the difference between DFA and NFA.	6
3	A	Explain different error recovery strategies used in Syntax analysis.	6
	B	Explain about context free grammars? What is an ambiguous grammar? Explain with example.	6
4	A	Construct Predictive parsing table for the following grammar $E \rightarrow E+T \mid T$ $T \rightarrow T*F \mid F$ $F \rightarrow (E) \mid id$.	6
	B	What is a shift reduce parser? Explain in detail the conflicts that may occur during shift reduce parsing.	6
5	A	For the grammar given below, calculate the operator precedence relation and the precedence functions. $E \rightarrow E+E \mid E-E \mid E*E \mid E/E \mid E\hat{}E \mid (E) \mid E \mid id$	6

	B	Consider the grammar given below. $S \rightarrow E$ $E \rightarrow 1\ E$ $E \rightarrow 1$ Construct an LR Parsing table for the above grammar.	6

Section II

6	A	Explain the terms with example: i) Synthesized Attributes. ii) Inherited Attributes	6
	B	Describe in detail the syntax directed translation of case statements.	7
7	A	Describe in detail about the stack allocation in memory management.	6
	B	Write about Data flow analysis of structural programs.	7
8	A	Construct the DAG for the following basic block: d: = b * c e: = a +b b: = b * c a: = e d	6
	B	Explain in detail Runtime Storage Administration.	7
9	A	Explain the principle sources of optimization in detail.	6
	B	What are the different issues in design of code generator?	7
10	A	Write a note on Three Address Codes.	6
	B	Explain the term: Peephole optimization.	7

M.Sc (Comp. Science) (Part-I)

Digital Signal Processing I & Digital Signal Processing II

(OCT-16)

QP Code : 75550

[3 hours] [75 marks]

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Section I

1	A	Consider the LTI system: $y(n) = x(n) + x(n-1) - 2x(n-2) - 4x(n-4)$ Determine direct form-II realization for the given system.	6
	B	Explain the term Twiddle Factor. Find the IDFT of the sequence with DFT. [2, -1, 0, 3]	6
2	A	Determine the impulse response and frequency response of the filter defined by $y(n) = x(n) - ax(n-1) - by(n-1)$	6
	B	Consider second order LTI system. Discuss cascade from realization of FIR systems.	6
3	A	Explain 'in-place' in DIT and DIF algorithms with the help of suitable figures.	6
	B	Explain fixed point arithmetic and floating point arithmetic.	6
4	A	Describe mapping of S-plane to Z-plane in the design of IIR filters.	6
	B	What is impulse invariant transformation technique for digitizing an analog filter?	6
5	A	Explain the reason why Chip Z Transform (CZT) is considered as an efficient algorithm. What are the operations in CZT?	6
	B	How many four-point DFTs are required if we want to construct a sixteen-point DFT from it? Explain.	6

Section II

6	A	Explain the terms fan-in and fan-out. Assuming that the number system deals with only positive numbers, design a system that determines the smallest of two 3-bit numbers.	6
	B	Explain two dimensional digital filter design considerations using System Transfer function.	7
7	A	Calculate DFT of [1, 2; 2, 1] using any method.	6

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	B	Design an 8-bit parity tree by generating a logical 1 for even parity and a logical 0 for odd parity.	7
8	A	Explain various ways of incorporating a cache memory into a computer.	6
	B	Explain any two hardware considerations for Radix 2 Algorithms.	7
9	A	Explain overall FDP structure.	6
	B	Explain block diagram of a modern RADAR system.	7
10	A	Explain congruential method for generating pseudo-random numbers.	6
	B	Discuss digital realization of a running sum.	7

M.Sc (Comp. Science) (Part-I)

Mobile Computing & Computer Simulation Modeling

(OCT-16)

QP Code : 75604

(3 Hours) [75 marks]

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Section I

1	A	Explain in brief Space Division Multiplexing and Time Division Multiplexing in brief.	6
	B	Write advantages and disadvantages of cellular systems	6
2	A	Explain the concept of Multiple Access with Collision Avoidance.	6
	B	Explain the system architecture of GSM.	6
3	A	Explain in brief the process of Mobile Terminated call [MTC] and Mobile Originated Call [MOC].	6
	B	What are different types of satellite orbits? Explain any one in brief.	6
4	A	Elaborate the concept of DFWMAC-DCF using CSMA/CA with several computing senders.	6
	B	What are the various entities and terminology required to understand mobile IP.	6
5	A	Explain ad-hoc networks with reference to routing.	6
	B	Explain the concept of snooping with its advantages.	6

Section II

6	A	What are the Advantages and Disadvantages of Simulation?	6
	B	Able has knee cap injury and cannot move as fast as baker. 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 baker's 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: 1. Average busy time of able 2. Average busy time of baker 3. Average wait time	7

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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 numbers for arrival:
94,77,49,45,43,32,49,00,16,24,31,14,41,61,85,08,15,97,52
Random numbers for service:
80,20,15,88,98,65,86,73,24,60,78,29,01,90,93,73,21,45,76,96.

7	A	Explain in brief Auto correlation test for random numbers.	6
	B	A component of a system whose time to failure is exponentially distributed with failure rate $\lambda = 1/6$. If 6 such components are installed in the systems, what is the probability that at least 2 are still working at the end of 9 years.	7
8	A	What are the characteristics of Queuing system?	6
	B	Use combine linear congruential method to combine three multiplicative generators with $m_1 = 32363$, $a_1 = 157$, $m_2 = 31727$, $a_2 = 146$, $m_3 = 31657$ and $a_3 = 142$. Generate random numbers with the combined generator using initial seed $X_{i,0} = 100, 300, 500$ for individual generator $i = 1,2,3$.	7
9	A	Explain EAR (1) time series.	6
	B	Explain steps to perform gap test for random numbers.	7
10	A	Explain Covariance and correlation in brief.	6
	B	Write a short note on Validation and Verification with respect to simulation model	7

M.Sc (Comp. Science) (Part-I)

Data Warehousing and Mining & Advanced Database Systems

(OCT-16)

QP Code : 75658

(3 Hours) [75 marks]

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Section I

1 A Define a data warehouse. How does it differ from a database? What are the characteristics of a data warehouse? 6

B Explain the steps involved in building a data warehouse. 6

2 A Differentiate between star and snow flake schema used in data design. Give an example to support your answer. 6

B What is OLAP? Differentiate between MOLAP and ROLAP. 6

3 A Explain in detail extraction, transformation and loading process in ETL. 6

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. 6

4 A What is data Mining? Explain any one of the application of data mining. 6

B Explain different stages involved in KDD process 6

5 A Define support and confidence to measure the strength of association rule. Calculate support and confidence for the association rule {Mike, Diapers} →{Beer} 6

TID	Items
1	{Bread, Milk}
2	{Bread, Diapers, Beer, Egg}
3	{Milk, Diaper, Beer, Cola}
4	{Bread, Milk, Diaper, Beer }
5	{Bread, Milk, Diaper, Cola }
6	{Milk, Diaper}
7	{Cola, Beer}

B Write short note on web mining. 6

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Section II

6	A	Explain ECA rule in active database with example.	6
	B	What is serailizability in distributed systems? Explain different techniques to distribute across different sites in concurrency control.	7
7	A	Compare OODBMS and RDBMS. What are the challenges faced by OODBMS?	6
	B	Explain characteristics of generalization and specialization in ER model with appropriate examples.	7
8	A	Write short note on i) Location Transparency ii) Fragmentation Transparency.	6
	B	Describe and explain any two architectures supported by distributed DBMS.	7
9	A	Explain single and multiple dimensional attribute in temporal database. Differentiate between valid and transaction time by suitable example.	6
	B	What is difference between structured, semi structured and unstructured data in XML database?	7
10	A	What is Geographical Information Systems? Explain different format used to represent geographic data.	6
	B	What are the characteristics of spatial data? Explain concept of indexing on spatial database.	7