2012-2013
B.TECH (WINTER SEMESTER) EXAMINATION
COMPUTER ENGINEERING
DATABASE MANAGEMENT SYSTEM
CO-304

Maximum Marks: 60
Credits-05
Duration: 3 hrs.

— Attempt all questions.
— Symbols & notations used have their standard meanings.
— Assume suitable data if required.

Q.No. 

Questions M.M.

1. (a) What are the advantages of a DBMS over the conventional file-system? [4]
   (b) Explain data abstraction methodology in DBMS. [4]
   (c) Differentiate between Database Schema and Database Instance. Why is data dictionary used in DBMS? [2+2]

OR

1’. (a) Briefly describe about the architecture of a DBMS. [4]
   (b) Explain different types of mapping cardinality using suitable example. [4]
   (c) What is a foreign key? Differentiate between relational algebra and relational calculus in DBMS. [2+2]

2. (a) What is a fat relation? How will you handle an unknown value in a relation? [1+3]
   (b) What is the need of different levels of normalisation? Explain. [4]
   (c) Write the role of a DBA. [4]

OR

2’. (a) What is 3NF? Why is BCNF stronger than 3NF? [1+3]
   (b) What are the ACID properties in transaction management? [4]
   (c) What is the use of VIEW operation? Provide its syntax in SQL. [2+2]

3. (a) Briefly describe about the different types of failures in DBMS. [4]
   (b) What is a conflict serializable schedule? Explain with example. [1+3]
   (c) Write a short note on RAID technology. [4]

Contd…….2
4. (a) What is query optimization? Write the syntax of GRANT operation in SQL. \[ 2+2 \]
(b) What is a data warehouse? Write six differences between operational database and data warehouse? \[ 1+3 \]
(c) What do you mean by parallel database? What are the techniques used to implement a parallel database? \[ 1+3 \]

5. Consider a banking database that consists of the following relations:
CUSTOMER (Name, Id, A/C_no, Address, DOB)
ACCOUNT (A/C_no, Br_code, Balance)
LOAN (Loan_no, A/C_no, Br_Code, Amount)
BRANCH (Br_code, Br_name, City)
EMPLOYEE (Emp_id, Emp_name, Br_code, Salary, Desig)

a) Write the expressions using relational algebra for following operations: \[ 2\times 2 \]
   i. Find the branch names of those branches where the average account balance is more than Rs.25000/-.
   ii. Increment the balance of all accounts of “Delhi” city by 6% and the accounts of other cities by 5%.

b) Write the SQL statements for following operations: \[ 4\times 2 \]
   i. Calculate the number of customers born on 1st January.
   ii. Find the branch name that has the highest average account balance.
   iii. Display the name of all customers who do not have any loan from the bank.
   iv. Delete the records of all accounts at every branch located in “Ghaziabad” city.
2012-13
B.TECH. (VI SEMESTER) EXAMINATION
COMPUTER ENGINEERING
THEORY OF COMPUTATION
CO305

Maximum Marks: 60  Credits: 05  Duration: Three Hours

Answer all the questions.
Assume suitably if required.
Abbreviations and symbols have their usual meanings.

Q.No.  Question  M.M.
1(a)  Give formal definitions of
     (i) the extended transition function \( \hat{\delta}(q, w) \) and the language of a DFA.
     (ii) the extended transition function \( \hat{\delta}(q, w) \) and the language of an \( \varepsilon \)-NFA.  [06]
1(b)  Design a DFA that accepts the set of binary strings whose second last symbol is a 1.  [06]
2(a)  Find the regular expression for the language of the following DFA using state elimination technique:

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<th>0</th>
<th>1</th>
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<tbody>
<tr>
<td>0</td>
<td>q0</td>
<td>q3</td>
</tr>
<tr>
<td>1</td>
<td>q1</td>
<td>q2</td>
</tr>
<tr>
<td>2</td>
<td>q0</td>
<td>q3</td>
</tr>
<tr>
<td>3</td>
<td>q1</td>
<td>q2</td>
</tr>
</tbody>
</table>

2(b)  Write the algebraic laws for regular expressions  [06]

OR

2'(a)  Design a DFA for accepting strings that represent binary numbers divisible by 3.  [06]
2'(b)  Write a regular expression for the set of strings of 0's and 1's with at most one pair of consecutive 0's. Convert the regular expression to an automaton.  [06]

3.  Consider the grammar given below:

\[
S \rightarrow 0A0 \mid 1B1 \mid BB \\
A \rightarrow C \\
B \rightarrow S \mid A
\]

Contd. . . . . 2
C → S | ε

(a) Eliminate unit productions from the grammar.  [06]
(b) Convert the grammar into Chomsky Normal Form.  [06]

OR

3'(a) Write the pumping lemma for CFL's and use it to prove that the language \( \{0^n1^n2^n \mid n \geq 1 \} \) is not a CFL.  [06]
3'(b) Write a CFG for accepting palindromes of odd length (i.e. \( w0w^R \) and \( w1w^R \)) over the alphabet \( \{0, 1\} \), and design a push down automaton for this language.  [06]

4(a) Design a TM that accepts \( ww \) where \( w \) is a string in \( \{0, 1\}^* \).  [08]
4(b) Write a technical note on time complexity of TM.  [04]

5(a) Discuss the binary coding for a TM with input alphabet \( \{0, 1\} \). Explain what are recursive and recursively enumerable languages.  [06]
5(b) Explain the concepts of undecidability and intractability, and give some examples of undecidable and some of intractable problems.  [06]

OR

5'(a) Explain the P-class, NP-class, and NP-complete problems, giving examples of each.  [06]
5'(b) Explain the diagonalization language \( L_d \) and discuss why there is no TM that accepts \( L_d \).
# B.TECH. (WINTER SEMESTER) EXAMINATION

**COMPUTER ENGINEERING**

**SYSTEMS PROGRAMMING**

**CO-306**

**Maximum Marks:** 60  
**Credits:** 04  
**Duration:** Three Hours

**Answer all the questions.**  
**Assume suitable data if missing.**  
**Notations used have their usual meaning.**

<table>
<thead>
<tr>
<th>Q.No.</th>
<th>Question</th>
<th>M.M.</th>
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<tbody>
<tr>
<td>1(a)</td>
<td>Give definition only of the following:</td>
<td>[05]</td>
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<tr>
<td></td>
<td>(i) Systems Programming</td>
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<td>(ii) Language Processor</td>
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<td>(iii) Translator</td>
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<td>(iv) Linker</td>
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<td>(v) Loader</td>
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<td>1(b)</td>
<td>Write the benefits of assembly languages over machine and high level languages?</td>
<td>[05]</td>
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<td>1(c)</td>
<td>How does assembler handle backward and forward references? Explain by example.</td>
<td>[05]</td>
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<td><strong>OR</strong></td>
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<td>1(c')</td>
<td>How do two variants of intermediate representation of an assembler differ? Explain.</td>
<td>[05]</td>
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<tr>
<td>2(a)</td>
<td>Using an example elaborate the concept of expansion time control flow during macro expansion.</td>
<td>[05]</td>
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<td>2(b)</td>
<td>Write an efficient Macro in assembly language to find the largest and smallest of three elements.</td>
<td>[05]</td>
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<td>2(c)</td>
<td>What are the merits and demerits of macro-assembler over macro preprocessor?</td>
<td>[05]</td>
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<td><strong>OR</strong></td>
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<td>2'(a)</td>
<td>Discuss the syntax of AIF, AGO, ANOP, REPT and IRP statements.</td>
<td>[05]</td>
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<td>2'(b)</td>
<td>List all data structures of the macro preprocessor and write their use.</td>
<td>[05]</td>
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<tr>
<td>2'(c)</td>
<td>How macro expansion is performed in nested macro calls? Explain by example.</td>
<td>[05]</td>
</tr>
<tr>
<td>3(a)</td>
<td>What are the functions performed by the Linkers and Loaders?</td>
<td>[05]</td>
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Contd......
3(a') Discuss the concept of 'linking' and 'program relocation'. Write the expressions for performing program relocation.

3(b) Discuss the procedures of designing a Linker.

3(c) Write the benefits and limitations of direct linking loader scheme over absolute loader scheme.

4(a) What is a device driver? How does the operating system access device drivers.

4(b) Write short note on any ONE of the following:

(i) Software Utility and its categories

(ii) Unix Shell and its types

4(c) Write a shell script to find the real roots of a quadratic equation.
Maximum Marks: 60  
Credits: 05  
Duration: Three Hours

Answer all the questions.
Assume suitable data if missing.
Notations used have their usual meaning.

Q.No.  
Question  
M.M.

1(a) What are the different network topologies? Explain in detail.  [08]

OR

1(a') What are the various types of connectors available for optical fibre cable, co-axial cable, UTP and STP? Draw suitable diagrams. [08]

1(b) Discuss the original ARPANET design. [07]

2(a) What are the different multiple access protocols. Explain the CSMA/CD protocol in detail. [08]

OR

2(a') Discuss in detail the Point-to-Point (PPP) protocol. Explain with the help of suitable network diagrams and examples. What are PPPoE and PPPoATM, and where are they used? [08]

2(b) Explain in detail the Selective Repeat ARQ. Draw the timing diagrams under normal operation and lost frame. What is the size of the sender window and receiver window and why? [07]

3(a) Explain the Token Bucket Algorithm for traffic shaping. Support your answer with suitable diagrams. [8]

OR

3(a') Differentiate between TCP and UDP. What is connectionless and connection-oriented transport? Give examples for each. [8]
3(b) Explain the OSPF routing protocol in detail. What is the difference between distance vector routing, link-state routing and path vector routing protocols? Give examples for each.

4(a) Write a note on GSM and CDMA.

(OR)

4(a') What do you understand by Mobility Management? Explain horizontal handover and vertical handover in context to wireless data networks and wireless mobile networks. Support your answer with suitable diagrams.

4(b) Explain in detail the functioning of Hyper Text Transfer Protocol. How is a document retrieved from the internet and displayed on your system. What is a URL?