ALLAMA IQBAL OPEN UNIVERSITY, ISLAMABAD
(Department of Computer Science)

Course: Database Applications (3426)   Semester: Spring, 2013
Level: MBA-IT   Total Marks: 100
                                                                              Pass Marks:40

ASSIGNMENT No. 1
(UNIT 1–4)

Note: All questions are compulsory. Each question carries equal marks.

Q. 1   a)   What is meant by databases? Define and explain briefly different types of data bases.
        b)   What are the main components of the database environment?

Q. 2   Contrast the following terms:
        a)   Entity; Relationship
        b)   Degree; Cardinality
        c)   Generalization; Categorization
        d)   Subtype; Supertype

Q. 3   a)   What do you mean by primary key, foreign key and candidate key? Explain with the help of suitable examples.
        b)   The entity type Game has the following attributes; Home team, Visiting team, Date, Score, and Attendance. Suggest a primary key, assuming that each team may play more than one home game with each other team, but never more than one on a given date.

Q. 4   a)   What do you mean by an E-R diagram? Why E-R diagram is used in software engineering?
        b)   Draw an E-R diagram for the following situation:
        A company has a number of employees. The attributes of 'Employee' include Name, Address, Phone no., and Date of Birth. The company has also several projects. Attributes of 'Project' include Code, Description and Start date. Each employee may be assigned to one or more projects, or may not be assigned to a project. A project must have at least one employee assigned, and may have several employees assigned.

Q. 5   Figure shows a class list for AIOU, covert this user view to a set of 3NF relations. Assume the following:
        a)   An instructor has a unique location.

b) A student has a unique major.
c) A course has unique title.

Allama Iqbal Open University Class List Autumn 2011			
Course Code: 3408			
Course Title: Data Structures			
Instructor Name: Asif Raza			
Instructor Location: R 204			
Student ID	Student Name	Major	Grade
25219	Ali	SE	A
23727	Faizan	DB	B
27264	Ahsan	SE	A
27368	Omer	DB	C
…….	….	….	….

ASSIGNMENT No. 2
(Unit 5– 8)

Total Marks: 100   **Pass Marks: 40**

Note: All questions are compulsory. Each question carries equal marks.

Q. 1 a) Define logical database model. What are its types? What are the main steps in logical database design?

b) Define physical database design. Name its main components. What are its major objectives?

Q. 2 Question refers to the following tables.

Student ID	Student Name	Major
25316	Ali	CS
27264	Bilal	TE
28729	Ahmad	CS

Course Code	Course Title	Instructor Code
3408	Date Structure	152
920	Electronics	134
3579	Database Applications	127

Student ID	Course Code	Grade
28716	3408	A
27264	920	C
28725	3579	A
25386	3579	B
23729	3408	C
29261	3408	B

Instructor Code	Instructor Name	Instructor Location
127	Ahsan Iqbal	R103
152	Wasim Sheikh	R204
134	Nauman Hamid	R301

Write SQL retrieval commands for each of the following queries:

a) Display the names of students who have Major 'CS'.
b) Display the Student ID, and Course Code of students who got Grade C.
c) Display the total number of students who got Grade 'A'.
d) Display the 'Course Title' and 'Course Code' of the course instructed by 'Ahsan Iqbal'.
e) Display the Instructor Location for instructor 'Waseem Sheikh'.

Q. 3 a) What do you mean by referential integrity? Give the basic rules for insertion and deletion that assure referential integrity.
   b) What are important factors in selecting a file organization? Give a brief discussion on important file organizations.

Q. 4 a) Write down steps to create a simple form application to maintain information of employees of a company.
   b) Explain briefly the four basic components of a report?

Q. 5 a) What do you mean by a report object navigator and object type? Give list of different report object types and their description.
   b) Write down steps to create a tabular report to list information about employees of a company.

3426 Database Applications   Credit Hours: 4(3+1)

Recommended Books:
1.   *Database Systems by Thomas Connolly 3rd Edition*
2.   *Introduction to Oracle: SQL and PL/SQL Student Guide, Vol. 1*

Reference Books:
1.   *Modern Database Management by Fred R. McFadden and Jeffery A Hoffer*
2.   *Database Systems by Catherine Ricardo*
3.   *Fundamentals of Database Systems (5th Edition) by Ramez Elamsri and Shamkant B. Navathe*

Course Outlines:
Unit No. 1 Database Foundation
   Introduction, The Traditional File Processing Approach, Database, The Database Management System (DBMS), Components of the DBMS Environment, Advantages and Disadvantages of Integrated Database Approach, Roles in the Database Environment, Data Administrators, Database Administrators, Database Designers, Application Developers, End Users

Unit No. 2 Database Environment
   The Three-Level ANSI-SPARC Architecture, External Level, Conceptual Level, Internal Level, Schemas and Mappings, Data Independence, Data Models and Conceptual Modeling, Object-Based Data Models, Record-Based Data Models, Physical Data Models, Conceptual Modeling, Functions of OBMS, Components of DBMS, Multi-User DBMS Architecture, Teleprocessing, File-Server, Client-Server, System Catalogues

Unit No. 3 Database Planning and Design
   Database Application Life Cycle, Database Planning, System Definition, User Views, Requirements Collection and Analysis, Database Design, Approaches to Database Design, Data Modeling, Phases of a Database Design (Conceptual, Logical and Physical), DBMS Selection, Prototyping, Implementation, Data Conversion and Loading, Testing, Operational Maintenance

Unit No. 4 Entity-Relationship Modeling

Entity Types, Relationship Types, Degree of Relationship Type, Recursive Relationship, Attributes, Simple and Composite Attributes, Single-Valued and Multi-valued Attributes, Derived Attributes, Keys, Strong and Weak Entity types, Attributes on Relationships, Structural Constraints, 1:1 Relationships, 1:* Relationships, *:* Relationships, Specialization/Generalization, Aggregation, Composition

Unit No. 5 The Relational Model

Brief History and Advantages of the Relational Model, Relation Data Structure, Mathematical Relations, Database Relations, Properties of Relation, Relational Keys, Representing Relational Database Schemas, Relational Integrity, Nulls, Entity Integrity, Referntial Integrity, Enterprise Constraints, Views, Purpose of Views, Mapping an E-R Model to a Relational Model, Codd's Rules for RDBMS. The Relational Algebra, Unary Operations, Set Operations, Join Operations

Unit No. 6 Normalization

The Purpose of Normalization, Data Redundancy and Anomalies, Insert Nomalies, Delete Nomalies, Updata Anomalies, Functional Dependencies and Their Characteristics, Primary Key for a Relation using Functional Dependencies, Inference Rules, INF, Full Functional Dependency, 2NF, Transitive Dependency, 3NF, BCNF

Unit No. 7 Introduction to SQL, Forms and Reports

Importance of SQL, Data Manipulation, Basic Select Statements, Arithmetic Operators, Operators Precedence, Restricting and Storing Data, Single Row Functions, Displaying Data from Multiple Tables, Aggregating Data Using Group Functions, Sub-queries, Multiple Column Sub-queries, Producing Reducible Output, Manipulating Data, Creating and Managing Tables, Other Database Objects, Controlling User Accounts, Form Components, Form Module, blocks, Items, Objects, Object Navigator, Properties Window, Layout Editor, Report Design Considerations, Report Objects, Basic Report Design

Unit No. 8 Database Storage

File Organization, Basic Concepts, Unordered Files, Ordered files, Dynamic Hashing, Indexes, Indexed Sequential Files, Secondary Indexes, Multiple Indexes, B+-Trees

Unit No. 9 Database Issues

Database Security and Authorization, Security Countermeasures, Authorization, Views, Backup and Recovery, Integrity, Encryption, RAID, Transaction management, Concurrency Control, Database Recovery, query Processing, Query Decomposition, query Optimization, Pipelining

Activities/Practical:
Teacher shall assign database case related to real application. Student will perform the following tasks: E-R Diagram, Normalization, Selecting RDBMS and Creating Database, Interface Design, Design report.