EDITH COWAN UNIVERSITY PERTH WESTERN AUSTRALIA		**INTERNAL/EXTERNAL** SAMPLE
Unit Code and Title	**CSG1207 Systems and Database Design**	**SAMPLE PAPER**
Student Number	SURNAME/FAMILY NAME	OTHER OR GIVEN NAME/S
Please print clearly		

Duration	Reading time **5** minutes. Working time **3** hours. Total time **3** hours **5** minutes.
Attempt	Attempt **ALL** questions.
Marks	**50** marks available, representing 50% of the unit mark. Questions in Section 1 are worth 1 mark each. Questions in Section 2 are worth 3 marks each. Questions in Section 3 are worth 7 marks each.
Type of Exam	**Closed Book** exam – unit guide, textbooks, reference books, notes and calculators are not permitted.
Equipment or attachments required during examination	15 page answer booklet
Special Instructions	• **This exam paper MUST be handed in with your exam answer booklet(s).** • Your answers must be written on the answer booklet(s) provided, NOT on the examination paper. • Assume SQL Server 2008 R2's Transact-SQL (T-SQL) when answering all SQL questions

Students are not permitted to write on the examination paper or any other paper during reading time.

Do not commence the examination until you are told to do so.

Record your name and student number on ALL papers and hand them in at the completion of the exam.

Section 1 – Multiple Choice

Attempt **ALL** of the questions in this section. Each question is worth **1** mark.
All answers must be written on the answer booklet(s) provided.
Clearly indicate the question number of each of your answers.

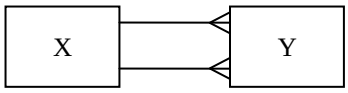
Q1) A transitive dependency is...

(A) A foreign key which does not relate to a primary key
(B) One or more attributes that only depend on part of the primary key
(C) A dependency between non-key attributes in a relation
(D) A dependency between attributes that only exists for certain values

Q2) Many-to-Many (M:M) relationships are resolved in logical ER diagrams...

(A) Only if the intermediary entity contains meaningful attributes
(B) All the time
(C) None of the time
(D) Only if a meaningful name exists for the intermediary entity

Q3) Which foreign key attributes would be needed to implement the relationships between entities X and Y?



(A) Y needs a foreign key referencing the primary key of X
(B) X needs two foreign keys referencing the primary key of Y
(C) Y needs two foreign keys referencing the primary key of X
(D) X needs a foreign key referencing the primary key of Y

Q4) Concatenation can be performed on which data types in an SQL query?

(A) Numeric data types
(B) Date-based data types
(C) All data types
(D) Text/String-based data types

Q5) Which of the following queries would select all rows and columns from a table named "staff"?

(A) SELECT ALL FROM staff;
(B) SELECT * FROM staff;
(C) SELECT DISTINCT FROM staff;
(D) SELECT + FROM staff;

Q6) If a column was given a data type of NUMERIC(4,2), the largest number it could hold would be...

(A) 9.999
(B) 99.99
(C) 9999
(D) 9999.99

Q7) Which of the following names would match a LIKE search pattern of '_a%[aeiou][^a-m]'?

(A) Sarah
(B) Barney
(C) Jamie
(D) Martie

Q8) Which of the following WHERE clauses would return all rows where the "birthday" column is not NULL?

(A) WHERE birthday = NOT NULL
(B) WHERE birthday != NULL
(C) WHERE NOT NULL(birthday)
(D) WHERE birthday IS NOT NULL

Q9) A table alias allows you to...

(A) Automatically create aliases for all columns in a table
(B) Specify another name that can be used to refer to the table in all subsequent queries
(C) Specify another name that can be used to refer to the table in that query
(D) Create a duplicate table with a different name

Q10) Which of the following statements is false during a transaction (i.e. before reaching a COMMIT or ROLLBACK statement)?

(A) The user performing the transaction can view the results of the transaction in progress
(B) Other users can view the results of the transaction in progress, but not edit the data
(C) The state of the data prior to the transaction can be recovered
(D) The affected rows are locked, preventing changes from other users

Q11) How do most aggregate functions treat NULLs?

(A) They are counted as 0
(B) They are ignored
(C) They prevent a query from executing
(D) They cause the result of the query to be NULL

Section 2 – Short Answer

Attempt **ALL** of the questions in this section. Each question is worth **3** marks.
All answers must be written on the answer booklet(s) provided.
Clearly indicate the question number of each of your answers.

Q12) Briefly describe the concepts of Insertion Anomalies, Update Anomalies and Deletion Anomalies.

Q13) Describe the differences between PRIMARY KEY and UNIQUE constraints.

Q14) Explain what an "index" is in a database, and why it is not a good idea to create indexes for columns in tables where they are not needed.

Q15) Name and describe the usage/purpose of any three of the aggregate functions available in MS SQL Server 2008.

Q16) When creating a FOREIGN KEY constraint on a column, you can specify how the database should respond to changes or deletions of data in the column that the foreign key references. Describe what behaviour "ON UPDATE CASCADE" and "ON DELETE SET DEFAULT" would result in.

Q17) Describe the differences between a LEFT OUTER JOIN, a RIGHT OUTER JOIN and a FULL OUTER JOIN.

Section 3 – Normalisation, ER Modelling and SQL

Attempt **ALL** of the questions in this section. Each question is worth **7** marks.
All answers must be written on the answer booklet(s) provided.
Clearly indicate the question number of each of your answers.

Q18) Normalise the following form to the third normal form (3NF), clearly showing the stages of 0NF, 1NF, 2NF and 3NF. Clearly state any assumptions you make about the data shown (e.g. derived fields), and name your final set of relations.

Use underlining to depict primary keys, and dotted underlining to depict foreign keys. Use both types of underlining on a single attribute if necessary.

Tax Invoice

DOOM CO. LTD

"#1 in Supervillain Supply!"

Tax Invoice

Supervillain Details:	
Villain ID:	134
Code Name:	"Dr. Dastardly"

Invoice Details:	
Invoice #:	21574
Order Date:	25-05-11

Item Details				
Item Code	**Description**	**Qty**	**Price**	**Sub Total**
A-143	NOBOND-Z3000 Island Defence System	1	$65000	$65000
C-211	Shiny black henchman outfit	5000	$10	$50000
A-232	Sharks with lasers on their heads	20	$850	$17000
E-093	Freeze-ray MKII	2	$6000	$12000
E-093	Basic laser pistol	5000	$130	$650000
D-126	Taking Over The World for Dummies	1	$30	$30
			Grand Total:	$794030

Delivery Details:	
Location ID:	364
Location Code Name:	"Normal Island (not a secret base)"
Location Coordinates:	-46 25.995, 51 45.484

Q19) You have been asked to create a database to keep track of the stock of a small bookstore. The business wants to record details of books, their authors and publishers, the categories of books, and book bundles they offer.

You have the following details:

- Details of books that need to be stored are the ISBN, title, edition number and the price.

- Details of book authors (their names and date of birth) must be stored. Each author can write multiple books, and each book can have multiple authors.

- The bookstore only wishes to store details of authors who have written books they sell.

- The name, contact phone number and address of book publishers must be stored. Each publisher can publish multiple books.

- The bookstore wishes to store details of all major publishers, even if the store does not currently sell any of their books.

- A list of book categories/topics must be stored. Each book can have multiple categories, and each category can apply to multiple books.

- Sometimes the bookstore offers book bundles, where they sell multiple books together for a discounted price. The database must store a name, description and price for each bundle.

- The database must record which books are in which bundles. A book can be in multiple bundles, and each bundle contains multiple books.

Create a suitable **physical Entity-Relationship diagram** based on this scenario. Ensure that you show all attributes mentioned, as well as the cardinality of all relationships. Clearly state any assumptions.

It is recommended that you use auto-incrementing integers for primary keys, unless a suitable primary key attribute exists in the specified scenario.

Use underlining to depict primary keys, and dotted underlining to depict foreign keys. Use both types of underlining on a single attribute if necessary.

Q20) Write the SQL statements to achieve the objectives described below, based on the following data dictionary. You do NOT need to write a creation script. All SQL must be compatible with SQL Server 2008 R2's version of T-SQL.

Table Name: **staff_member**

Column Name	Data Type	Null	Key Constraints / Other
staff_id	int	Not Null	Primary Key (auto incrementing)
first_name	varchar(20)	Not Null	
surname	varchar(20)	Not Null	
hire_date	smalldatetime		
pay	decimal(5,2)		
supervisor_id	int		Foreign Key (staff_member.staff_id)
shop_id	int		Foreign Key (shop.shop_id)
job_id	int	Not Null	Foreign Key (job.job_id)

Table Name: **shop**

Column Name	Data Type	Null	Key Constraints / Other
shop_id	int	Not Null	Primary Key (auto incrementing)
shop_name	varchar(50)	Not Null	
address	text	Not Null	
manager_id	int	Not Null	Foreign Key (staff_member.staff_id)

Table Name: **job**

Column Name	Data Type	Null	Key Constraints / Other
job_id	int	Not Null	Primary Key (auto incrementing)
title	varchar(20)	Not Null	
min_pay	decimal(5,2)		
max_pay	decimal(5,2)		

(A) Write a query which shows the full name (e.g. "Joe Bloggs"), job title and pay of all staff members who have a job title that starts with "sales". Order the results by pay, descending. (**3** marks)

(B) Write a query which selects the surname, hire_date and pay with 10% added (give the column an alias of "bonus_pay") of all staff members who were hired on or after the 1st of January 2000 and have a supervisor (i.e. they have a value in the supervisor_id column). (**2** marks)

(C) Create a view named "shop_details" which displays the name and address of all shops, as well as the full name (e.g. "Joe Bloggs") and pay of each shop's manager. (**2** marks)

END OF EXAMINATION PAPER