



**Universiti
Malaysia
PAHANG**

Engineering • Technology • Creativity

**FACULTY OF COMPUTER SYSTEMS & SOFTWARE ENGINEERING
FINAL EXAMINATION**

COURSE	:	DATABASE SYSTEM
COURSE CODE	:	DCI2033
LECTURER	:	NURZETY AQTAR AHMAD AZUAN
DATE	:	3 JANUARY 2012
DURATION	:	3 HOURS
SESSION/SEMESTER	:	SESSION 2011/2012 SEMESTER I
PROGRAMME CODE	:	DCS

INSTRUCTIONS TO CANDIDATE:

1. This question paper consists of **FOUR (4)** questions. Answer **ALL** questions.
2. Write your answers in the answer booklet provided.
3. Answer **EACH** question on a new page.
4. All calculations and assumptions must be clearly shown.

EXAMINATION REQUIREMENTS:

Appendix 1

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO

This examination paper consists of **TEN (10)** printed pages including the front page.

STRUCTURE QUESTION**[100 MARKS]****QUESTION 1****[16 Marks]**

- a) Describe **ONE (1)** difference between database and database system.
[2 Marks]
- b) Describe **TWO (2)** basic components of a database system.
[2 Marks]
- c) Describe **TWO (2)** functions of a Database Management System (DBMS).
[4 Marks]
- d) Explained **TWO (2)** of the limitations of file based system.
[4 Marks]
- e) Based on Figure 1, identify the type of relationship that exist among them (e.g, one-to-one, one-to-many, or many-to-many) and draw its Entity Relationship Diagram (ERD).
[4 Marks]

STAFF and BRANCH (branch is administered by staff)

Figure 1

QUESTION 2**[20 Marks]**

- a) Based on Figure 2, convert the relations into Enhanced Entity Relationship (EER) diagram.

[10 Marks]

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SUPPLIER(SUPP_ID, SUPP_Name, SUPP_Location, SUPP_Phone_Num)
PART(PART_ID, PART_Name, PART_Material, PART_Price, SUPP_ID, PART_Type,.)
MANUFACTURED(MAN PART_ID, MAN_Routing_Num, SUPP_ID)
PURCHASED(PUR PART_ID, PUR_Unit_Price, SUPP_ID)
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Figure 2

- b) A car workshop has technicians who work either under ENGINE team or ACCESORIES team. The TECHNICIANS has general attribute namely EMP_ID, EMP_Name, EMP_Address, EMP_Phone_Num. ENGINE team has additional information such as ENGINE_Type, ENGINE_CC. ACCESSORIES team also have additional information such as ACCESSORIES_Category and CCESSORIES_Name. It is compulsory for every technician to have more than one technical skill before they are hired. Construct an EER diagram for this situation.

[10 Marks]

QUESTION 3**[41 Marks]**

Terus Maju Furniture Sdn. Bhd. records information of their employees from every branch. Relations in Figure 3 represent data that is available in Terus Maju Furniture Sdn. Bhd. database system.

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COUNTRIES (Country_ID, County_Name, Region_ID)

DEPARTMENT (Department_ID, Department_Name, Manager_ID,
Location_ID)

EMPLOYEE (Employee_ID, EMP_FName, EMP_LName, Hire_Date, Salary,
Commission_Pct, Job_ID, Manager_ID, Department_ID)

JOB_HISTORY (Employee_ID, Start_Date, End_Date, Job_ID,
Department_ID)

JOB (Job_ID, Job_Title, Max_Salary, Min_Salary)

LOCATION (Location_ID, Street_Address, Postal_Code, City,
State_Province, Country_ID)

REGIONS (Region_ID, Region_Name)

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Figure 3

Figure 4 to Figure 10 shows the data in each relation available in Figure 3:

<u>COUNTRY_ID</u>	<u>COUNTRY_NAME</u>	<u>REGION_ID</u>
AR	Argentina	2
AU	Australia	3
BE	Belgium	1
BR	Brazil	2
CA	Canada	2
CH	Switzerland	1
CN	China	3
DE	Germany	1
DK	Denmark	1
EG	Egypt	4

Figure 4: Countries

DEPARTMENT_ID	DEPARTMENT_NAME	MANAGER_ID	LOCATION_ID
10	Administration	200	1700
20	Marketing	201	1800
30	Purchasing	114	1700
40	Human Resources	203	2400
50	Shipping	121	1500
60	IT	103	1400
70	Public Relations	204	2700
80	Sales	145	2500
90	Executive	100	1700
100	Finance	108	1700

Figure 5: Department

EMPLOYEE_ID	FIRST_NAME	LAST_NAME	EMAIL	PHONE_NUMBER	HIRE_DATE	JOB_ID	SALARY	COMMISSION_PCT	MANAGER_ID	DEPARTMENT_ID
198	Donald	OConnell	DOCONNEL	650.507.9833	21-JUN-07	SH_CLERK	2600	(null)	124	50
199	Douglas	Grant	DGRANT	650.507.9844	13-JAN-08	SH_CLERK	2600	(null)	124	50
101	Neena	Kochhar	NKOCHHAR	515.123.4568	21-SEP-05	AD_VP	17000	(null)	100	90
102	Lex	De Haan	LDEHAAN	515.123.4569	13-JAN-01	AD_VP	17000	(null)	100	90
103	Alexander	Hunold	AHUNOLD	590.423.4567	03-JAN-06	IT_PROG	9000	(null)	102	60
104	Bruce	Ernst	BERNST	590.423.4568	21-MAY-07	IT_PROG	6000	(null)	103	60
105	David	Austin	DAUSTIN	590.423.4569	25-JUN-05	IT_PROG	4800	(null)	103	60
106	Valli	Pataballa	VPATABAL	590.423.4560	05-FEB-06	IT_PROG	4800	(null)	103	60
107	Diana	Lorentz	DLORENTZ	590.423.5567	07-FEB-07	IT_PROG	4200	(null)	103	60
125	Julia	Nayer	JNAYER	650.124.1214	16-JUL-05	ST_CLERK	3200	(null)	120	50

Figure 6: Employee

EMPLOYEE_ID	START_DATE	END_DATE	JOB_ID	DEPARTMENT_ID
102	13-JAN-01	24-JUL-06	IT_PROG	60
101	21-SEP-97	27-OCT-01	AC_ACCOUNT	110
101	28-OCT-01	15-MAR-05	AC_MGR	110
201	17-FEB-04	19-DEC-07	MK_REP	20
114	24-MAR-06	31-DEC-07	ST_CLERK	50
122	01-JAN-07	31-DEC-07	ST_CLERK	50
200	17-SEP-95	17-JUN-01	AD_ASST	90
176	24-MAR-06	31-DEC-06	SA_REP	80
176	01-JAN-07	31-DEC-07	SA_MAN	80
200	01-JUL-02	31-DEC-06	AC_ACCOUNT	90

Figure 7: Job_History

JOB_ID	JOB_TITLE	MIN_SALARY	MAX_SALARY
AD_VP	Administration Vice President	15000	30000
IT_PROG	Programmer	4000	10000
SH_CLERK	Shipping Clerk	2500	5500
ST_CLERK	Stock Clerk	2008	5000

Figure 8: Job

LOCATION_ID	STREET_ADDRESS	POSTAL_CODE	CITY	STATE_PROVINCE	COUNTRY_ID
1000	1297 Via Cola di Rie	00989	Roma	(null)	IT
1100	93091 Calle della Testa	10934	Venice	(null)	IT
1200	2017 Shinjuku-ku	1689	Tokyo	Tokyo Prefecture	JP
1300	9450 Kamiya-cho	6823	Hiroshima	(null)	JP
1400	2014 Jabberwocky Rd	26192	Southlake	Texas	US
1500	2011 Interiors Blvd	99236	South San Francisco	California	US
1600	2007 Zagora St	50090	South Brunswick	New Jersey	US
1700	2004 Charade Rd	98199	Seattle	Washington	US
1800	147 Spadina Ave	M5V 2L7	Toronto	Ontario	CA
1900	6092 Boxwood St	YSW 9T2	Whitehorse	Yukon	CA

Figure 9: Locations

REGION_ID	REGION_NAME
1	Europe
2	Americas
3	Asia
4	Middle East and Africa

Figure 10: Regions

a) Based on relation in Figure 3, write the following queries in SQL:

- i. Write a report that list out name of all employees having letter 'A' and 'E' in their first name and list in descending order. The report must include last_name and first_name of employee.

[3 Marks]

- ii. HR manager needs a report that list out employees first_name, last_name, job_id, hire_date and salary. Human Resource (HR) manager specifies that he only requires employees information hired in year 2007 with a monthly salary between 3000 and 5000.

[4 Marks]

- iii. Salaries of employees are increased by 7% yearly. Produce a report that show the 'New Salary' and also the difference between new salary (after increments) and old salary (before increment) includes also the first_name and last_name of employee. Named the column for the difference as 'Increment Value'.

[4 Marks]

- iv. Produce a report of employees who work under 'Alexander'. Your report must include employee's first_name, last_name, job_id and manager_id.

[3 Marks]

- v. HR wants to include a new department in their department table. The details of the department are as follow:

Department ID:110

Department Name : Customer Service Support

Manager : Bruce

Location: Washington

Add this new information to the department table accordingly.

[3 Marks]

- vi. Create a report for HR department that displays first_name, last_name and salary of all employee whose salary more than 'Alexander'.

[3 Marks]

- b) Based on the relation in Figure 3 write the following queries in QBE:

- i. List the last name of all 'IT_Prog' and their salary in ascending order.

[3 Marks]

- ii. Employee ID '125' has been promoted as ST_CLERK. Assume that the salary of this employee will increase by 15%. Update all relevant information about for this particular employee.

[3 Marks]

- iii. Calculate the average salary of all employees having 'Alexander' as their manager.

[3 Marks]

- iv. Find number of employees having 'Lex De Haan' as their manager.

[3 Marks]

- v. List employee's name (first_name,last_name) and hire_date of all employees who work in department '60' and sort hire_date in ascending order and name in descending order.

[3 Marks]

- c) Based on the relation in Figure 3, translate the following commands into plain English and **indicate their result** by showing the data

i.

EMPLOYEE_ID	EMP_FName	EMP_LName	Hire_Date	Job_ID	Salary	Commission_Pct	Manager_ID	Department_ID
P.	P.AO			SH_CLERK				

[3 Marks]

ii.

EMPLOYEE_ID	EMP_FName	EMP_LName	Hire_Date	JOB_ID	Salary	Commission_Pct	MANAGER_ID	DEPARTMENT_ID
P.	P.	P.						90

[3 Marks]

QUESTION 4**[23 Marks]**

- a) You are given a relation $R = (C1, C2, C3, C4, C5)$ with the following functional dependencies

Fd1 $C1 \twoheadrightarrow C2$

Fd2 $C1, C3 \rightarrow C2, C4, C5$

Fd3 $C4 \twoheadrightarrow C5$

By using the dependency given, complete the normalization process until Third Normal Form (3NF)

[5 Marks]

- b) Beautiful Furniture Sdn. Bhd. maintains a list of invoice issued to their customer. Figure 11 shows a portion of the invoices for July 2011. (refer to the Appendix for Figure 11)

- i. Transform invoice information into a relation

[2 Marks]

- ii. Draw a Functional Dependency Diagram that shows:

- The primary key
- Partial Dependencies
- Transitive Dependencies

[6 Marks]

- iii. Normalize your relation in (i) to Third Normal Form (3NF). Thoroughly describe and explain each step from 1NF to 3NF. Identify the primary and also the foreign keys in your 3NF

[10 Marks]

END OF QUESTION PAPER

Appendix 1

Figure 11: Invoice Table

Order_ ID	Order_ Date	Customer_ ID	Customer_ Name	Customer_ Address	Product_ ID	Product_ Description	Product_ Finish	Unit_ Price	Ordered_ Quantity
1001	1/7/2011	C001	Ahmad	Ampang, Kuala Lumpur	P001	Chest Drawer	Solid Wood	590	1
					P201	Folding Chair	Stainless steel	98	4
					P104	Bed Frame	Powder-coated steel	550	1
1201	15/7/2011	C003	Mei Ling	Petaling Jaya, Selangor	P201	Bedside Table	Painted Finish	199	2
					P301	Chandelier	Steel,Glass	249	2