

1. (a) Outline **two** uses of a *data model* in a database. (2 marks)

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- (b) Distinguish between *data redundancy* and *data inconsistency* as used in databases. (4 marks)

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- (c) Describe **three** components of a *three tiered architecture* in a client server database system. (6 marks)

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- (d) An organisation uses a time card system to track hours worked by employees to be used when computing payments. A time card should have hours worked, date submitted, a unique id and status. Each time card is associated with exactly one employee and each employee has a unique id, name, address and payment type. An employee submits a time card every pay period. Each employee is associated with exactly one manager and each manager has a unique id and a name. Each manager is in charge of multiple employees and each manager approves time cards for multiple employees.  
Draw an ER diagram to represent the information. (8 marks)





3. (a) Andrew a manager, would like to purchase a Database Management System for his company. Outline **four** factors he should consider during the selection. (4 marks)

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- (b) The following are SQL statements. Use them to answer the question that follows.

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Create Table (Staffno varchar(5),lname(varchar(15),salary
decimal ((7,2);
INSERT TO STAFF ('ST678','Lenny' "15700");
SELECT staffno,lastname,salary
From staff
Where salary >10000;
```

- Identify and correct the errors found in the statements.. (4 marks)

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- (c) Mary developed a system with the following modules; *sales, invoicing* and *payroll* all maintaining their own data files. Explain **three** disadvantages she would experience from this approach. (6 marks)

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- (d) Describe **three** database security measures that can be applied on data within a network. (6 marks)

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4. (a) Describe a *normal form* as used in normalization (2 marks)

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(b) (i) Outline four factors to consider when to setting a Database Management System. (4 marks)

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(ii) Describe the following during database designs. (2 marks)

I. Logical;

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II. Physical. (2 marks)

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(c) Explain **three** objectives a *Query builder* in a database system. (6 marks)

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(d) Eric would like to de-normalise a table. Explain **two** problems that he may encounter from this approach. (4 marks)

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5. (a) Distinguish between *COUNT DISTINCT* and *COUNT \** as used in structured query language. (4 marks)

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(b) Explain **three** advantages of the contemporary *database architecture*. (6 marks)

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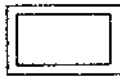
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(ii)



(1 mark)

(c) State **three** differences between a *join operator* and a *union operator* as used in relational algebra. (6 marks)

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(d) The following tables show relationships between the student score and grades. Use them to answer the questions that follow.

Names	Score	Grade
ALI	10	B
ALI	20	A
BEATRICE	10	B

**Table R**

Names	Score	Grade
ALI	20	A
ALI	30	A

**Table K**

State the output when each of the following operations are applied between the tables.

(i)  $R \cup K$  (2 marks)

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(ii)  $\Pi_{\text{names, grade}}(R)$  (2 marks)

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(iii)  $R - K$  (2 marks)

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(iv)  $R \cap K$

(2 marks)

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7. (a) The following tables shows lectures information and the courses assigned to each of them respectively. Use them to answer the questions that follow.

LECTURES ID	NAME	DEPATMENT	SALARY
T01010	BENERD	COMPUTER	30,000
T01011	RICHARD	BUSINESS	40,000
T01012	LIONE	MECHANICAL	35,000
T02011	MAURICE	MECHANICAL	45,000

Lectures table

LECTURES ID	COURSE ID
T01010	CS-001
T01012	BU-001
T01014	MC-001

Course table

- (i) State the output when the following operations are applied on the tables.

I. Lecturers  $\bowtie$  Course

(2 marks)

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II. Lectures  $\bowtie$  Course

(2 marks)

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- (ii) display the fields, salesman, age, dailysales for those salesman whose age is more than 30 and daily sales is in the range of 20,000 and 40,000; (2 marks)

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- (iii) add a column named department that would store data of at most five characters; (2 marks)

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- (iv) sort the records in ascending order by Salesman and dailysales; (2 marks)

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- (v) create a view from *products* table with the fields salesman and age. (2 marks)

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8. (a) Outline the function of each of the following SQL statements.

- (i) FROM; (1 mark)

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- (ii) HAVING; (1 mark)

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(iii) ORDER BY;

(1 mark)

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(iv) WITH.

(1 mark)

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(b) Distinguish between *relational algebra* and *structured query language* as used in databases. (4 marks)

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(c) The following are tables named *customer* and *order* respectively. Use them to answer the questions that follow.

CUSTOMER ID	NAME	ADDRESS	AGE	SALARY
C/001	ALI	788 NRB	45	40,000
C/002	ANNE	2000 KSM	75	30,000
C/003	MATHEW	3412 NRB	25	33,000
C/004	DEBORAH	4222 NR	33	22,000
C/005	ANTONY	7243 MA	22	10,000

**Customer**

ORDER ID	DATE	CUSTOMER ID	AMOUNT
0/0001	24/12/2012	C/003	20,000
0/0002	23/05/2014	C/003	30,000
0/0003	20/07/2014	C/002	40,000
0/0004	20/02/2014	C/004	5,000

**Order**

