Grade 13 A/L ICT · Lesson 8

Lesson 8 A/L Exam Practice: Questions and Answers

This practice paper assesses **Lesson 8: Database** (syllabus competency 8). Paper I has 30 five-option MCQs. Paper II Part A has four structured questions; Part B has three essays. Marking points are shown in brackets. Every SQL answer was checked by running it in sqlite3.

Paper I – Multiple choice questions (30)

1. Processed data that has meaning is

A. a domain
B. information
C. a field
D. raw data
E. a tuple

2. Which is unstructured data?

A. a marks table
B. a bank ledger table
C. a voice note
D. an invoice row
E. a timetable grid

3. A tree model where each child has one parent is

A. flat file
B. network
C. object relational
D. hierarchical
E. relational

4. A model allowing many parents per record is

A. flat file
B. network
C. hierarchical
D. sequential file
E. tree

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5. The same data stored many times is

A. encryption
B. a domain
C. normalisation
D. integrity
E. redundancy

6. A row of a relation is a

A. attribute
B. tuple
C. domain
D. schema
E. degree

7. A table with 3 columns and 5 rows has degree

A. 5
B. 2
C. 8
D. 3
E. 15

8. Inserting mark 105 is rejected by

A. a UNIQUE constraint
B. a view
C. a foreign key
D. a NOT NULL constraint
E. a CHECK constraint

9. Inserting a student in class C13Z (no such class) breaks

A. the UNIQUE constraint on Name
B. the foreign key constraint
C. the CHECK constraint
D. first normal form
E. the domain of Mark

10. ALTER TABLE belongs to

A. TCL
B. DCL
C. HTML
D. DDL
E. DML

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11. GRANT and REVOKE belong to

A. DML
B. ERD
C. DCL
D. CSS
E. DDL

12. SELECT AVG(Mark) FROM Marks WHERE SubjectCode = 'ICT' returns

A. 64.5
B. 78.0
C. 60.0
D. 62.0
E. 62.4

13. Students per class (GROUP BY ClassID) gives

A. C12A, 3; C12B, 3
B. C12B, 2
C. C12A, 2; C12B, 3
D. C12A, 3; C12B, 2
E. C12A, 5

14. UPDATE Marks SET Mark = Mark + 5 WHERE SubjectCode = 'ICT' AND Mark < 50 changes

A. 2 rows
B. 3 rows
C. 0 rows
D. 5 rows
E. 1 row

15. The inner join for class 12B returns

A. Sunil Perera
B. no rows
C. Amali Silva; Sunil Silva
D. all 5 students
E. Nimal Perera; Kamala Perera

16. To combine rows of two tables on matching keys use

A. DROP TABLE
B. CREATE DATABASE
C. GRANT
D. ALTER TABLE
E. INNER JOIN

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17. In an ER diagram a relationship is drawn as a

A. diamond
B. rectangle
C. ellipse
D. double rectangle
E. arrow only

18. Students and subjects have cardinality

A. 0:1
B. 1:N
C. N:1
D. 1:1
E. M:N

19. Age calculated from date of birth is

A. a derived attribute
B. a composite attribute
C. a multi-valued attribute
D. an entity
E. an identifier

20. Supertypes and subtypes are shown in

A. EER diagrams
B. Gantt charts
C. flat files
D. DFD level 0
E. context diagrams

21. Candidate keys of the Employee instance are

A. Dept only
B. EmpID, NIC, Email
C. EmpID, Name
D. Name only
E. Name, Dept

22. A candidate key not chosen as primary is

A. a domain
B. a derived key
C. a tuple
D. an alternate key
E. a foreign key

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23. The rows of a table at one moment are its

A. model
B. domain
C. degree
D. schema
E. instance

24. For Class 1:N Student the foreign key goes in

A. Student
B. Class
C. neither
D. both tables
E. a new linking table

25. An M:N relationship is transformed into

A. a derived attribute
B. a linking table with both keys
C. a CHECK rule
D. a view only
E. one extra column

26. The school ER (3 entities, one 1:N, one M:N) gives

A. 3 tables
B. 6 tables
C. 4 tables
D. 2 tables
E. 5 tables

27. ItemCode → ItemName with key (OrderNo, ItemCode) is

A. a partial dependency
B. a full dependency
C. a candidate key
D. a transitive dependency
E. an anomaly

28. CustID → CustName where CustID is not a key is

A. a partial dependency
B. a domain
C. a primary key
D. a transitive dependency
E. a full dependency

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29. The order data in 1NF has

A. 8 rows
B. 4 rows
C. 5 rows
D. 10 rows
E. 3 rows

30. A table in 2NF with no transitive dependency is in

A. 1NF
B. unnormalised form
C. 3NF
D. 2NF only
E. 0NF

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Paper II Part A – Structured questions

1. Database concepts and the relational model *(8 marks)*

(i) Distinguish data and information and give one example of each. *(2 marks)*
(ii) Compare the hierarchical, network and relational models. *(3 marks)*
(iii) Name three constraints and give an insert each would reject. *(3 marks)*

2. SQL DDL and DML *(8 marks)*

(i) Write SQL to create Marks with a composite primary key, a foreign key and a CHECK on Mark. *(3 marks)*
(ii) Write SQL to add a Phone column to Student and then delete it. *(2 marks)*
(iii) Write a query listing names and ICT marks of 60 or more, highest first, and give the output. *(3 marks)*

3. ER diagrams and keys *(8 marks)*

(i) Draw an ER diagram: Class has Students; Students take Subjects. *(3 marks)*
(ii) Explain composite, multi-valued and derived attributes. *(2 marks)*
(iii) From the Employee instance identify candidate, primary and alternate keys. *(3 marks)*

4. Transformation and normalisation *(8 marks)*

(i) Transform the school ER diagram into a logical schema. *(3 marks)*
(ii) Explain insert, update and delete anomalies with the order table. *(2 marks)*
(iii) Normalise the order table to 3NF. *(3 marks)*

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Paper II Part B – Essay questions

1. Databases and database systems *(10 marks)*

(i) Explain the need for databases compared with separate files. *(3 marks)*
(ii) Describe the five database models with one advantage of each. *(3 marks)*
(iii) Describe the components of a database system and the role of the DBA. *(4 marks)*

2. Designing a school database *(10 marks)*

(i) Draw an ER diagram for classes, students and subjects with cardinality. *(4 marks)*
(ii) Transform it into a relational schema showing all keys. *(3 marks)*
(iii) Write SQL to create Student with a foreign key and insert one row. *(3 marks)*

3. Normalisation and queries *(11 marks)*

(i) Explain functional dependencies: full, partial and transitive. *(3 marks)*
(ii) Normalise the order data from 0NF to 3NF and show that the design is lossless. *(5 marks)*
(iii) Write a query that gives the total value of order 1001 from the 3NF tables and state the result. *(3 marks)*

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Exam tips

- Data = raw facts; information = processed with meaning.
- Hierarchical one parent; network many parents; relational tables and keys.
- Degree = columns; cardinality = rows.
- Primary key = UNIQUE + NOT NULL.
- DDL: CREATE, ALTER, DROP. DML: INSERT, SELECT, UPDATE, DELETE.
- Write ON in every INNER JOIN.
- UPDATE and DELETE without WHERE change every row.
- ER: rectangle, ellipse, diamond; underline identifiers.
- 1:N → FK in the many side; M:N → linking table.
- Candidate keys are minimal; one becomes primary, the rest alternate.
- 1NF atomic; 2NF no partial; 3NF no transitive.
- Beyond boxes (NoSQL, AI text-to-SQL) are interest only.

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Answers and explanations

Paper I

1. **B** – Information.
2. **C** – No fixed fields.
3. **D** – Hierarchical.
4. **B** – Network.
5. **E** – Redundancy.
6. **B** – Tuple.
7. **D** – Columns.
8. **E** – CHECK 0–100.
9. **B** – Referential integrity.
10. **D** – DDL.
11. **C** – DCL.
12. **E** – 312 ÷ 5.
13. **D** – 3 and 2.
14. **A** – S002, S005.
15. **C** – Matching ClassID.
16. **E** – Join.
17. **A** – Diamond.
18. **E** – Many to many.
19. **A** – Derived.
20. **A** – EER.
21. **B** – Unique minimal sets.
22. **D** – Alternate.
23. **E** – Instance.
24. **A** – Many side.
25. **B** – Linking table.
26. **C** – 3 + 1.
27. **A** – Part of key.
28. **D** – Non-key to non-key.
29. **C** – One row per item line.
30. **C** – 3NF.

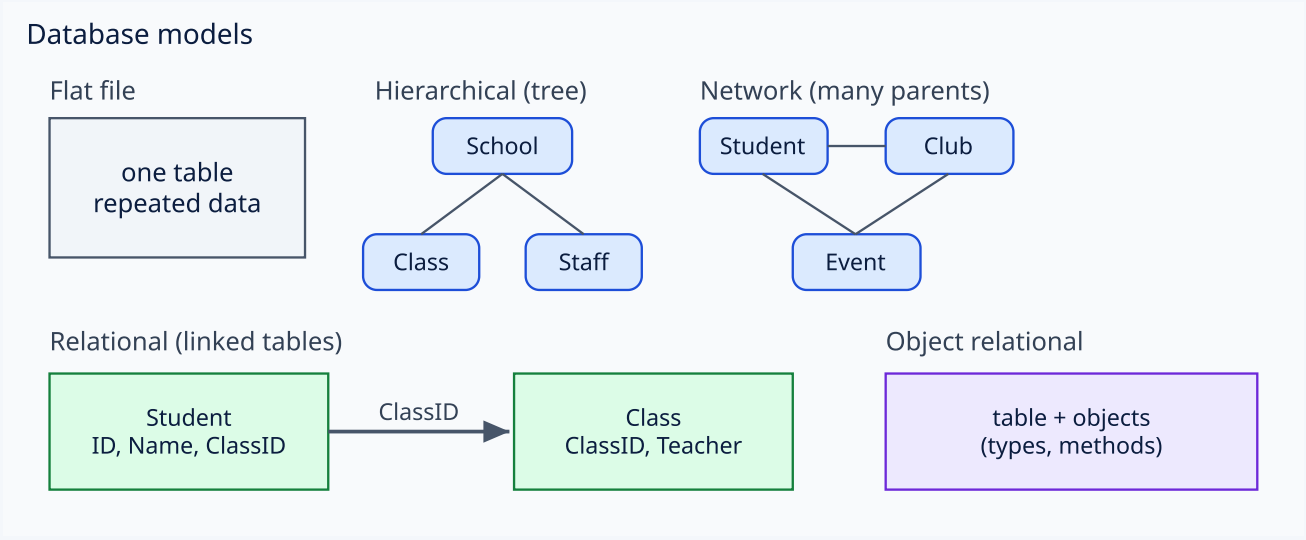
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Paper II Part A – model answers and marking points

1. *(8 marks)*

(i) (2 marks)
Raw facts vs processed meaning (1); examples 78 / average report (1).

(ii) (3 marks)
Tree one parent (1); graph many parents (1); tables and keys with SQL (1).



Database models.

(iii) (3 marks)
PRIMARY KEY duplicate S001 (1); FOREIGN KEY class C13Z (1); CHECK mark 105 (1).

🎯 Examiner tip: name the constraint and give the exact bad value.

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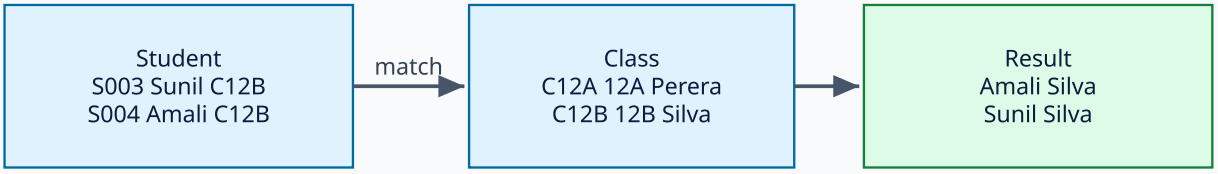
2. *(8 marks)*

(i) (3 marks)
CREATE TABLE with types (1); REFERENCES Student (1); CHECK 0–100 and PRIMARY KEY (StudentID, SubjectCode) (1).

(ii) (2 marks)
ALTER TABLE Student ADD Phone VARCHAR(10) (1); ALTER TABLE Student DROP COLUMN Phone (1).

(iii) (3 marks)
SELECT … INNER JOIN … ON StudentID (1); WHERE SubjectCode and Mark >= 60, ORDER BY Mark DESC (1); Sunil, 88; Nimal, 78; Amali, 62 (1).

INNER JOIN Student and Class ON ClassID



Only rows whose ClassID values match appear in the result.

WHERE ClassName = 12B keeps class C12B only.

Inner join.

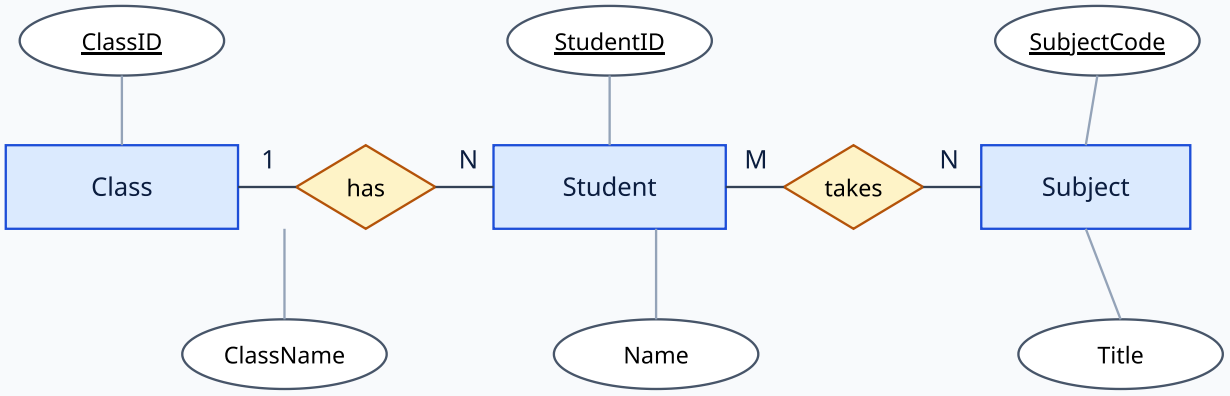
🎯 Examiner tip: always include the ON condition in a join.

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3. *(8 marks)*

(i) (3 marks)
Three entities with identifiers (1); has 1:N (1); takes M:N (1).

ER diagram (Chen notation)



Rectangle = entity · ellipse = attribute (underlined = identifier) · diamond = relationship

School ER.

(ii) (2 marks)
Two correct (1); all three with examples (1).

(iii) (3 marks)
Candidate EmpID, NIC, Email (1); primary EmpID (1); alternate NIC, Email (1).

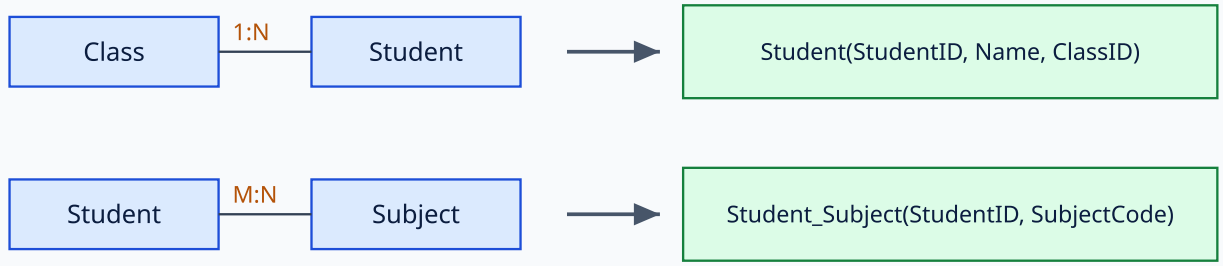
🎯 Examiner tip: underline identifiers in ER diagrams.

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4. *(8 marks)*

(i) (3 marks)
Class and Subject tables (1); Student with ClassID FK (1); Student_Subject composite key (1).

ER → tables: 1:N adds a foreign key, M:N adds a new table



Entity → table · attribute → column · identifier → primary key

Transformation.

(ii) (2 marks)
Any two correct (1); all three with examples (1).

(iii) (3 marks)
1NF 5 rows key (OrderNo, ItemCode) (1); 2NF Order, Item, OrderLine (1); 3NF Customer split, 4 tables (1).

🎯 Examiner tip: list the dependency removed at each step.

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Paper II Part B – model answers and marking points

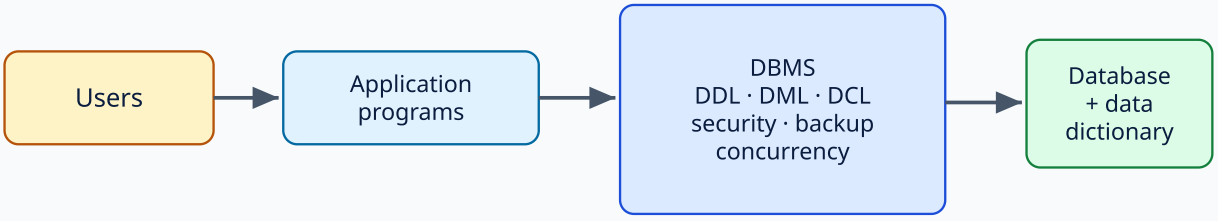
1. *(10 marks)*

(i) (3 marks)
Redundancy (1); inconsistency (1); sharing, security, backup (1).

(ii) (3 marks)
Five models (2); advantages (1).

(iii) (4 marks)
Hardware, software, data, users, procedures (3); DBA role (1).

Database system: users → applications → DBMS → database



DDL: CREATE, ALTER, DROP – define structure

DML: INSERT, SELECT, UPDATE, DELETE – work with data

DBA controls the DBMS; SQL is the language for both

Database system.

🎯 Examiner tip: give a Sri Lankan school or bank example.

2. *(10 marks)*

(i) (4 marks)
Entities and identifiers (2); relationships with 1:N and M:N (2).

(ii) (3 marks)
4 tables (1); PKs (1); FKs and composite key (1).

(iii) (3 marks)
CREATE TABLE with PK (1); REFERENCES Class (1); INSERT INTO … VALUES (1).

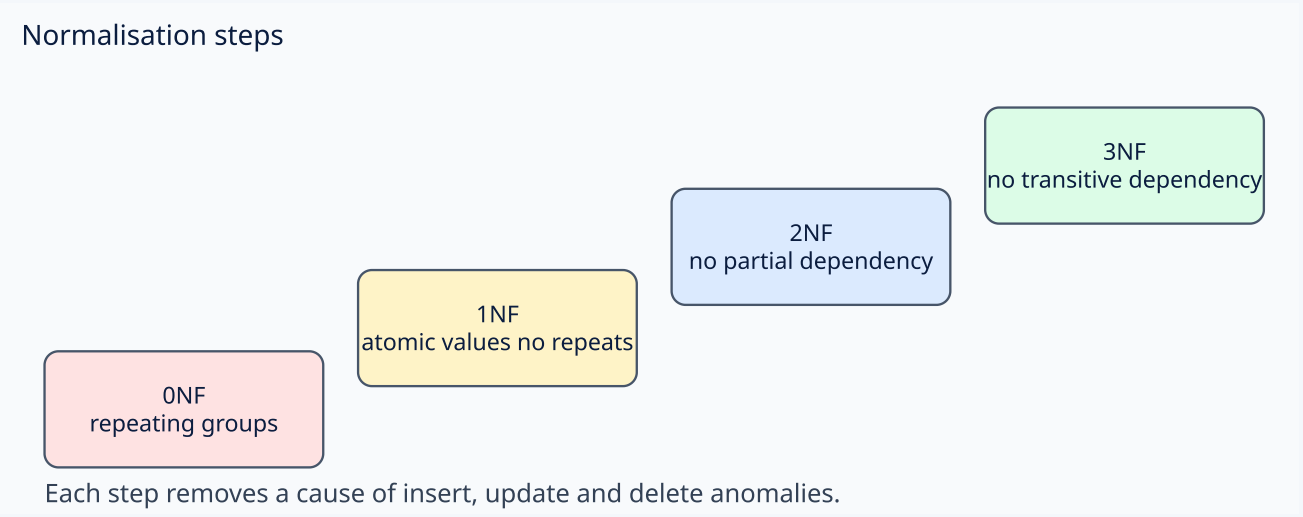
🎯 Examiner tip: make the SQL match your schema.

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3. *(11 marks)*

(i) (3 marks)
Each with an example (3).

(ii) (5 marks)
0NF repeating groups (1); 1NF 5 rows (1); 2NF (1); 3NF 4 tables (1); join rebuilds the data (1).



Normalisation.

(iii) (3 marks)
SELECT SUM(Qty * Price) (1); FROM OrderLine JOIN Item ON ItemCode WHERE OrderNo = 1001 (1); Rs. 550 (1).

🎯 Examiner tip: name the anomaly each step removes.

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