

**PRACTICE PAPER**  
**INFORMATION AND COMMUNICATION TECHNOLOGY**  
**PAPER 2A**  
**Databases**  
**Question-Answer Book**

(1 hour 30 minutes)

This paper must be answered in English

**INSTRUCTIONS**

- (1) After the announcement of the start of the examination, you should first write your Candidate Number in the space provided on Page 1 and stick barcode labels in the spaces provided on Pages 1, 3 and 5.
- (2) **ANSWER ALL QUESTIONS.** Write your answers in the spaces provided in this Question-Answer book. Do not write in the margins. Answers written in the margins will not be marked.
- (3) Supplementary answer sheets will be supplied on request. Write your candidate number, mark the question number box and stick a barcode label on each sheet, and fasten them with string **INSIDE** this book.
- (4) No extra time will be given to candidates for sticking on the barcode labels or filling in the question number boxes after the 'Time is up' announcement.

Please stick the barcode label here.

Candidate Number

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Answer all questions.

1. An examination agent designs the following database tables to store the information on candidates who register for examination.

CAND

Field name	Type	Width	Description
CNUM	Character	8	Unique candidate number of the candidate where the first three characters are the unique school code of the candidate's school
CNAME	Character	30	Name of the candidate
DOB	Date		Date of birth of the candidate

REGISTER

Field name	Type	Width	Description
CNUM	Character	8	Candidate number of the candidate who sits the examination of the subject
SCODE	Character	2	Unique subject code

SUBJECT

Field name	Type	Width	Description
SCODE	Character	2	Unique subject code
SNAME	Character	30	Name of the subject

- (a) (i) Write a SQL command to create CAND.

- (ii) Which of the following can be a candidate key of CAND? Explain briefly.

(1) CNUM                      (2) CNAME + DOB

Answers written in the margins will not be marked.

Please stick the barcode label here.

(iii) Write a SQL command to create an index file, CIND, for CAND on CNUM. What is the advantage of using this index file?

SQL command: \_\_\_\_\_

Advantage: \_\_\_\_\_

(7 marks)

(b) Identify the primary key(s) and foreign key(s) of REGISTER.

Primary key: \_\_\_\_\_

Foreign key: \_\_\_\_\_

(3 marks)

(c) (i) Write a SQL command to increase the width of CNUM in CAND to 12. Make sure that CNUM would never be empty.

(ii) Write a SQL command to list all the candidate names and their corresponding school codes.

(iii) The subject code and subject name of a new subject are 09 and LAW respectively. Write a SQL command to insert this record into SUBJECT.

(6 marks)

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2. A database table, **CLINIC**, stores the information on patients who visit a clinic for treatment. The design of **CLINIC** is based on the following assumptions:

- There may be some illnesses that no patient ever visits for.
- A doctor can prescribe medicine by zero or more injections for an illness and prescribe medicine by one injection for a number of illnesses.

The fields in **CLINIC** are shown below:

Field name	Description
PNUM	Unique patient number
PNAME	Name of patient
VDATE	Date of the clinic visit
ICODE	Unique illness code
INAME	Name of illness
MCODE	Unique injection code
MNAME	Name of the injection

- (a) Explain briefly how the design of **CLINIC** leads to data redundancy.

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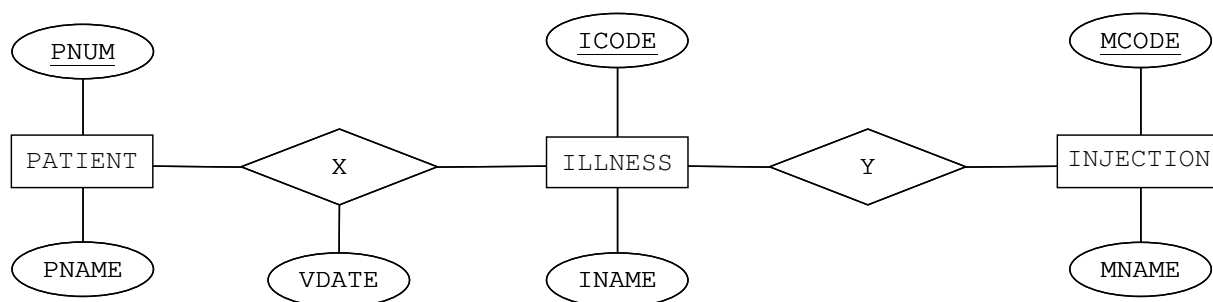
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(2 marks)

The incomplete E-R diagram below represents an alternative design for the clinic to fulfill the assumptions.



- (b) (i) Give the appropriate words for the relationships in **X** and **Y**.

**X**: \_\_\_\_\_ **Y**: \_\_\_\_\_

- (ii) Complete the E-R diagram above.

(5 marks)

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Please stick the barcode label here.

(c) Transform the E-R diagram into the database schemas below.

X ( )  
Y ( )

(4 marks)

(d) Can the alternative design handle an illness without the need for an injection? Explain briefly.

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(2 marks)

(e) One day, one type of medicine is prohibited by the government.

(i) Give one problem which will occur when the record of the prohibited medicine is removed from INJECTION in the alternative design.

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(ii) Suggest a method of handling prohibited medicines in the alternative design.

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(2 marks)

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3. A web site uses the following database tables to store information on restaurants.

RES

Field name	Type	Width	Description	Example of data
RESID	Character	5	Identification code of the restaurant	02173
RESNAME	Character	30	Name of the restaurant	EAA Cafe mini
RATING	Numeric	1	Rating of the restaurant	3
DISTRICT	Character	2	District code of the restaurant	04
CUISINE	Character	2	Cuisine code of the restaurant	07
SPENDING	Numeric	3	Spending per person	80

DIST

Field name	Type	Width	Description	Example of data
DISTRICT	Character	2	District code	04
DISTNAME	Character	30	Name of the district	Wanchai

CUI

Field name	Type	Width	Description	Example of data
CUISINE	Character	2	Cuisine code	07
CUINAME	Character	30	Type of cuisine	Italian

Write SQL commands to complete the tasks in (a) to (e).

- (a) List the names and ratings of restaurants with a rating equal to or greater than 3, in descending order of the rating.

(3 marks)

- (b) Calculate the average spending per person of those restaurants with 'Cafe' in their names.

(2 marks)

- (c) List the names of restaurants in the district 'Mongkok'.

(2 marks)

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(d) List the number of restaurants offering Thai cuisine (i.e. `CUINAME = 'Thai'`) in each district.

(4 marks)

(e) List the district name which has the largest number of restaurants with a rating greater than 3.

(4 marks)

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4. A catering service company provides lunches to primary school students. Before the beginning of each month, students fill in a form, as below:

Meal Order Form							
Year/Month: 20 /							
Student name:				HKID number:			
Class:				Class number:			
Fill in meal type (A, B or C) for each day							
1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>	7 <input type="checkbox"/>	8 <input type="checkbox"/>
9 <input type="checkbox"/>	10 <input type="checkbox"/>	11 <input type="checkbox"/>	12 <input type="checkbox"/>	13 <input type="checkbox"/>	14 <input type="checkbox"/>	15 <input type="checkbox"/>	16 <input type="checkbox"/>
17 <input type="checkbox"/>	18 <input type="checkbox"/>	19 <input type="checkbox"/>	20 <input type="checkbox"/>	21 <input type="checkbox"/>	22 <input type="checkbox"/>	23 <input type="checkbox"/>	24 <input type="checkbox"/>
25 <input type="checkbox"/>	26 <input type="checkbox"/>	27 <input type="checkbox"/>	28 <input type="checkbox"/>	29 <input type="checkbox"/>	30 <input type="checkbox"/>	31 <input type="checkbox"/>	
Meal sub-total (Number of meals ordered x \$18):							
Meal with juice: Yes / No      If yes, add \$150.							
TOTAL:							
Payment method (Blacken the square)							
<input type="checkbox"/> Convenience shop <input type="checkbox"/> Cheque <input type="checkbox"/> Phone payment							
Transaction / Cheque / Payment number: _____							

- (a) The following is *part* of a data dictionary that represents the meal order form for one of the schools.

Field name	Data type	Width	Description
SCHNAME	Character	50	School name
STNAME	Character	50	Student name
HKIDNO	Character	11	Student's HKID number
CLASS	Character	2	Class
CLASSNO	<i>x</i>		Class number
JUICE	<i>y</i>		Meal with juice (Yes / No)
TOTAL	Real		Total amount
PAYMETHOD	Character	1	Payment method: C: convenience shop Q: cheque P: phone payment
PAYMENTNO	Character	10	Transaction / Cheque / Payment number

- (i) TOTAL seems to be unnecessary in the data dictionary. Why?

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- (ii) Other than Character, suggest suitable data types for *x* and *y*.

*x* : \_\_\_\_\_ *y* : \_\_\_\_\_



(iii) Illustrate the domain integrity in the above design.

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(5 marks)

- (b) Parents complain about the need to provide HKID numbers and student names. What should the following people do in order to prevent this kind of complaint?

Database designer: \_\_\_\_\_

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Data entry operator: \_\_\_\_\_

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(2 marks)

- (c) The company serves many schools and wants to store all meal orders. It designs a Third Normal Form (3NF) database table, MEALPLAN3, with the following field names.

<u>Field name</u>	<u>Description</u>
STNO	Unique student number
MEALDATE	Date for the meal
MEALTYPE	Meal type

- (i) Explain why MEALPLAN3 is in 3NF.

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(ii) The company defines the database table

MEALPLAN1 (STNO, Y, M, MEALTYPE01, MEALTYPE02, ... , MEALTYPE31)

where the 31 fields, MEALTYPE01, MEALTYPE02, ... , MEALTYPE31, store the meal types for the days of the month M and year Y.

Is MEALPLAN3 better than MEALPLAN1? Explain briefly.

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(5 marks)

(d) The records of all meal orders will be analysed using data mining. Suggest an example of data to be mined and explain how it can be used by the company to improve its service.

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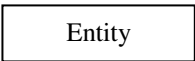

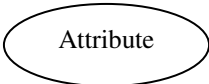
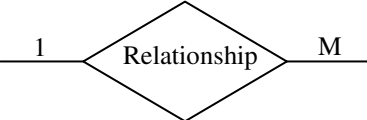
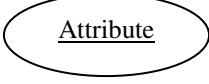
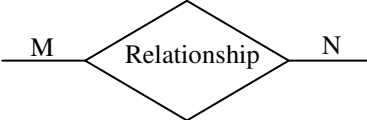


(2 marks)

**END OF PAPER**

### Database (SQL commands - based on SQL-92 Standard)

Constants	FALSE, TRUE
Operators	+, -, *, /, >, <, =, >=, <=, <>, %, _ , ' , AND, NOT, OR
SQL	ABSOLUTE (ABS), AVG, INT, MAX, MIN, SUM, COUNT ASC, AT, CHAR (CHR), CHAR_LENGTH (LEN), LOWER, TRIM, SPACE, SUBSTRING (SUBSTR/MID), UPPER, VALUE (VAL) DATE, DAY, MONTH, YEAR ADD, ALL, ALTER, ANY, AS, ASC, BETWEEN, BY, CREATE, DELETE, DESC, DISTINCT, DROP, EXISTS, FROM, GROUP, HAVING, IN, INDEX, INNER JOIN, INSERT, INTEGER, INTERSECT, INTO, LEFT [OUTER] JOIN, LIKE, MINUS, NULL, RIGHT [OUTER] JOIN, FULL [OUTER] JOIN, ON, ORDER, SELECT, SET, TABLE, TO, UNION, UNIQUE, UPDATE, VALUES, VIEW, WHERE

### Symbols Used in Entity-Relationship Diagrams

Meaning	Symbol	Meaning	Symbol
Entity		One-to-one Relationship	
Attribute		One-to-Many Relationship	
Key Attribute		Many-to-Many Relationship	
Relationship		Participation constraints: Use   on Mandatory side Use ○ on Optional side	

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**Answers written on this page will not be marked.**