RÉPUBLIQUE DU CAMEROUN
Paix-Travail-Patrie
.....
MINISTÈRE DE L'ENSEIGNEMENT SUPÉRIEUR
.....
COMMISSION NATIONALE D'ORGANISATION DE L'EXAMEN
HIGHER NATIONAL DIPLOMA EXAM (HND)
.....

REPUBLIC OF CAMEROON
Peace-Work-Fatherland
.....
MINISTRY OF HIGHER EDUCATION
.....
NATIONAL COMMISSION FOR THE ORGANISATION OF HIGHER NATIONAL DIPLOMA EXAM (HND) EXAM
.....

National Exam of Higher National Diploma 2025 Session

Specialty/option: SOFTWARE ENGINEERING (SWE)
Paper : Case Study
Duration : 6 hours

Credits : 14

GENERAL INSTRUCTIONS.

- ***ANSWER ALL QUESTIONS***
- *You are reminded of the necessity of good English and orderly presentation of your material.*
- *Where calculations are required, clearly show your working and be chronological in your answer.*

SECTION A:ALGORITHM ANDPROGRAMMING (50 MARKS)

I. Algorithms (10 Marks)

1. What is a sorting algorithm ? **1 mark**
2. Draw the flowchart of the nested loop below: **4 marks**

```
1. for(int i=0; i<3; i+1)
2. {
3. Display i+1
4.         for(int j=0; j<2; j+1)
5.         {
6. Display i+1, j+1
7. }
8. }
```

3. Simulate the algorithm in 2) above. **3 marks**
4. State the time complexity of the following algorithms. **2 marks**
   a) Selection sort
   b) Insertion sort
   c) Bubble sort
   d) Merge sort

II. Procedural Programming (15 Marks)

1. Explain the importance of the following in C programming:
   a) Functions in C **1 mark**
   b) Arrays in C **1 mark**
   c) pointers in C **1 mark**

2. Which of the following lines of codes are not valid in C programming. Explain your answer indicating why it is valid or invalid.
   a) int a[2][]= {1,2,3,4}; **1 mark**
   b) int a[]={1,2,3,'a'}; **1 mark**
   c) int a[5]={1,2,3}; **1 mark**
   d) int a[][]={1,2,3,4}; **1.5marks**
   e) int a[][2]= {1,2,3,4}; **1.5 marks**

3. Simulate and give the output of the following code fragments below: **3 marks**

```
1.  #include <stdio.h>
2.  int main()
3.  {
4.      int  a, b;
5.      int  c = 5;
6.      int  *p;
7.      a = 4 * (c + 5);
8.      p = &c;
9.      b = 4 * (*p + 5);
10.     printf ("a=%d b=%d c=%d *p=%d \n", a, b,c,*p);
11. return 0;
12. }
```

4. Write a C program that takes an integer number and displays its last digit. **3 marks**

III. Object Oriented Programming (20 Marks)

1) Provide the definition of the following concepts :
   a) System? **1 mark**
   b) In-house software? **1 mark**
   c) Package software? **1 mark**
   d) Differentiate data and information. **2 marks**

2) A certain University wants to model an Automatic Teller Machine (ATM) system for salary payment. The ATM system is directly connected to the school bank. The main goals and actors of system are as follows:
   - The system is such that the staff can do the following
     - withdraw salary in full or part
     - check balance in their account
   - The system is also such that if there is a technical fault, an engineering student will repair it.
   - When the system runs out of cash, there bursar will fill it with cash
   - Before a staff withdraws their salary, the bank checks if the there is enough money in the system as well as checks if the staff salary is equivalent to what is requested to be withdrawn.

Work required

   a) What is object-oriented modeling strategy ? **4 marks**
   b) Draw a USE CASE diagram for the case study. **3 marks**
   c) Draw a SEQUENCE diagram for the withdrawal USECASE. **4 marks**

3) Contrast object-oriented analysis and object-oriented design **4 marks**

SECTION B: DATABASE DEVELOPMENT AND ADMINISTRATION (20 MARKS)

1) What purpose does the model database serve? **3 marks**
2) How do you trace the traffic hitting a SQL Server? **4 marks**
3) The proprietor of one A&B shop needs a database for his small shop. Below is a table of the database proposed to him.

Tables	Fields	Values
CLIENT	ClientNo	Auto Number
	ClientName	Theron,Thelson
	ClientTown	Molyko,Malingo
BOUGHT	SalesNo	Auto Number
	ArticleNo	1,3
	ClientNo	1,1
	Quantity	1,2
	Date of Purchase	01/01/1997, 15/2/1999
	Paid	Yes,No
ARTICLE	ArticleNo	Auto Number
	ArticleName	Milk, tea
	UnitPrice(CFA)	250,380

Using MySQL, write queries to do the following:

a) create the database called "Business" **1 mark**
b) create the tables (CLIENT, BOUGHT, ARTICLE) indicated abo e and fill the values **5 marks**
c) write a query to display all the information in **CLIENT** table **1 mark**
d) write a query to display information in both the **BOUGHT** and **ARTICLE** tables **2 marks**
e) write a query to display clients who live in Molyko or Muea **3 marks**
f) write a query to display information about people who got articles on credit. **1 mark**

SECTION C : WEB DESIGN 15 MARKS

A certain company wants to conduct an online interview for hnd students. They want useful information from the users with some conditions such as

- Name : The name and surname must be filled (i.e it is required)
- Email: required and must contain @
- Other information : optional

This information is sent to the system which needs to validate before sending it to the server. The figure below shows a sample interface.

HND Student Information

Name:

Surname:

Birth date *formatted as dd/mm/yyyy* jj/mm/aaaa

Place of birth :

E-mail:

Phone Number :

submit

figure: Form Validation using JavaScript

Task :

1) Reproduce the figure for the company using html, css (and JavaScript if neccessary) such that the above conditions are made. **5 marks**
2) Using MySQL querries, create a database called **Online_registration** and a table called **Online** to handle the information on the sample form above. **5 marks**
3) Using php connect the form information to the database using default values. **5 marks**

SECTION D : NETWORKING (15 MARKS)

1)
   a) Name two protocols in the OSI transport layer and their transmission features. **3 marks**
   b) Use table ONLY to compare the OSI, DOD and the Internet models. **3 marks**
2) Write the command to give a router a name. **2 marks**
3) During a practical exercise in one school, a student crimped cross over and straight through cables and created a network between 2 laptops.
   a) What is the main difference between cross over and straight through cables?
   b) How can you check the ip address of a computer in a network?
   c) What is the meaning of **"ping 192.168.1.3?"**
   d) What is the meaning of **ipconfig /all** ? **1 x 4 = 4 marks**
4) Propose a subnet that will allow for a maximum of about 28 host addresses in a Class C IP address 192.168.1.1. State the first two subnets, and their host IP ranges. **3 marks**