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MINISTÈRE DE L'ENSEIGNEMENT SUPÉRIEUR
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COMMISSION NATIONALE D'ORGANISATION DE L'EXAMEN HIGHER NATIONAL DIPLOMA EXAM (HND)
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REPUBLIC OF CAMEROON
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NATIONAL COMMISSION FOR THE ORGANISATION OF HIGHER NATIONAL DIPLOMA EXAM (HND) EXAM
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National Exam of Higher National Diploma-New program – 2020 Session

Spécialty/option : All Specialties
Paper : Enterprise creation and entrepreneurship
Duration : 2 hours

Credit : 1/2

Instructions: Answer All Questions

SECTION A: ENTREPRENEURSHIP (34marks)

Question 1

Define the following terms as used in entrepreneurship **(4 marks)**

a) Franchise
b) Family business
c) Risk
d) Business idea

Question 2

Identify and explain the stages involved in the entrepreneurial process **(10 marks)**

Question 3

What are some of the challenges to entrepreneurship in Cameroon and how do you think you can overcome them as an entrepreneur? **(10 marks)**

Question 4

a) Identify any five (05) components of a business plan. **(5 marks)**
b) Why is a business plan important for an entrepreneur? **(5 marks)**

SECTION B: GENERAL ECONOMICS (33marks)

Question 1

Briefly distinguish a market economy from a planned economy. **(4 marks)**

Question 2

State and explain any three (03) factors that affect price elasticity of demand. **(6 marks)**

Question 3

In modern days, commercial banking occupies an important place in every economy. It is an important constituent of a country's financial system.

a. Define a commercial bank citing two examples in Cameroon. **(3 marks)**
b. What are the main functions of a commercial bank? **(10 marks)**

Question 4

Identify and explain any five (05) functions of money **(10 marks)**

SECTION C: COMPANY LAW (33marks)

Question 1

After explaining what you understand by company law, explain four reasons why it is important. **(10 marks)**

Question 2

Briefly describe four (04) types of companies provided by the OHADA law. **(12 marks)**

Question 3

A company is distinct from its members when it acquires the status of a legal personality. State and explain three (03) reasons under which this rule can be violated. **(6 marks)**

Question 4

Identify and define any five (05) required documents for the successful registration of a company. **(10 marks)**

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National Exam of Higher National Diploma-New program – 2020 Session

Spécialty/option : All Specialties
Paper : French
Duration : 2 hours

Credit : 1

I- Questions à choix multiples /40 points

La phrase de ponctuation correcte est :

1)

a- Me voici à Douala !
b- Me voici à Douala ?
c- Me voici à Douala…

2)

a- elle riait, elle sautait, tapait des pieds et des mains.
b- elle riait elle sautait, tapait des pieds et des mains.
c- elle riait, elle sautait, tapait, des pieds et des mains.

3)

a- Il faisait très chaud ; la terre était desséchée.
b- il faisait très chaud, la terre était desséchée.
c- il faisait très chaud. La terre était desséchée.

4)

a- Viens immédiatement !
b- Viens immédiatement ?
c- Viens immédiatement.

5)

a- Si monsieur veut bien prendre la peine…
b- Si monsieur veut bien prendre la peine,
c- Si monsieur veut bien prendre la peine !

A quels temps et modes sont conjugués les verbes dans les phrases :

6) Tchourouma fut (d'abord) frappé de stupeur.

a- futur antérieur
b- passé simple
c- passé antérieur

7) A travers mes larmes, je vis mon agresseur.

a- présent de l'indicatif
b- passé simple
c- imparfait

8) Nous accourions à lui et l'envahissions comme une bande de criquets…
   a- imparfait de l'indicatif
   b- futur simple
   c- conditionnel

9) Le lendemain, le marché grouillait de monde.
   a- plus-que-parfait
   b- imparfait de l'indicatif
   c- passé simple

10) J'ai signé moi aussi.
   a- passé composé
   b- impératif présent
   c- futur antérieur

11) Fais-le cuir doucement, lentement, longuement !
   a- Impératif présent
   b- Présent de l'indicatif
   c- Présent simple

12) La phrase correctement accordée est :
   a- La voiture a été heurtée par le camion.
   b- La voiture a été heurté par le camion.
   c- La voiture a été heurter par le camion.

13)
   a- La voiture et le camion sont entrés en collision.
   b- La voiture et le camion sont entrées en collision.
   c- La voiture et le camion sont entré en collision.

14)
   a- La montre que Paul a perdue n'était pas la sienne.
   b- La montre que Paul a perdu n'était pas la sienne.
   c- La montre que Paul a perdus n'était pas la sienne.

15)
   a- Quelle bonne nouvelle j'ai apprise !
   b- Quelle bonne nouvelle j'ai appris !
   c- Quelle bonne nouvelle j'ai appri !

16)
   a- Elles se sont comprises à demi-mots.
   b- Elles se sont compris à demi-mots.
   c- Elles se sont comprit à demi-mots.

17)
   a- Ils se sont aperçus de la ruse à temps.
   b- Ils se sont aperçu de la ruse à temps.
   c- Ils se sont aperçue de la ruse à temps.

18)

a- Elle s'est confectionné la plus belle robe.
b- Elle s'est confectionnée la plus belle robe.
c- Elle s'est confectionner la plus belle robe.

19)

a- Cette nuit, tous les chiens du quartier ont hurlé.
b- Cette nuit, tous les chiens du quartier ont hurlés.
c- Cette nuit, tous les chiens du quartier ont hurler.

20)

a- Les fleurs que nous avons plantées ont bien poussé.
b- Les fleurs que nous avons plantés ont bien poussé.
c- Les fleurs que nous avons planté ont bien poussé.

21)

a- Les deux meilleurs élèves seront retenus pour le concours.
b- Les deux meilleurs élèves seront retenues pour le concours.
c- Les deux meilleurs élèves seront retenu pour le concours.

Les accords grammaticaux

22)

a- Nos haillons sales dégageaient une odeur putride.
b- Nos haillons sal dégageaient une odeur putride.
c- Nos haillons sale dégageaient une odeur putride.

23)

a- La vie se moque bien d'être aigre-douce.
b- la vie se moque bien d'être aigre-doux.
c- La vie se moque bien d'être aigre-douse.

24)

a- Monsieur Laporte a acheté une berline marron clair.
b- Monsieur Laporte a acheté une berline marronne clair.
c- Monsieur Laporte a acheté une berline marron claire.

25) Quelle est la bonne orthographe des mots soulignés :

a- Les garçons jouent au ballon dans la cours de récréation.
b- Les garssons jouent au ballon dans la cours de récréation.
c- Les garsons jouent au ballon dans la cours de récréation.

26) quel est le sens correct ?

a- l'oiseau fait son nid dans l'arbre.
b- l'oiseau fait son nid sur l'arbre.
c- l'oiseau fait son nid sous l'arbre.

27)

a- Après le repas, les filles reprennent leur jeu de saut à la corde.
b- Après le repas, les filles reprennent leur jeu de saut de la corde
c- Après le repas, les filles reprennent leur jeu de saut de corde.

Compréhension écrite / 30 points

Texte

C'était il y a deux ans, à l'université de Ouagadougou. Face à un amphithéâtre bondé d'étudiants burkinabé, Emmanuel Macron, arrivé six mois plus tôt à l'Élysée, y délivrait sa vision de la « nouvelle » relation qu'il entendait tisser avec l'Afrique. En formulant une promesse martelée par ses prédécesseurs depuis le général De Gaule : celle d'en finir avec la françafrique, ses liens malsains et ses réseaux obscurs.

Rien de très neuf, donc, si ce n'est un changement en terme d'image et de méthode. Un président français pas encore quarantenaire qui se plie à une séance de questions-réponses musclée avec son jeune auditoire, en direct et sans filet de rattrapage.

Emmanuel macron a eu beau assurer qu'il n'y avait « plus de politique africaine de la France », son désormais célèbre discours de Ouagadougou décline une à une les grandes mesures qu'il entend prendre sous son quinquennat. « C'est une feuille de route, affirme-t-on à l'Élysée. A part sur l'Europe, il n'y a aucun autre domaine où le président a clairement affiché ses intentions de la sorte ».

Conçu avec les membres de son Conseil présidentiel pour l'Afrique, composé d'une douzaine de personnalités françaises et africaines issues de la société civile, ce discours-programme entend marquer une rupture et le début d'une nouvelle ère. Objectif affiché : bâtir une relation normalisée passant uniquement par des canaux officiels.

Parmi la batterie de mesures annoncées à Ouagadougou, certaines, considérés par son entourage comme des « marqueurs symboliques », ont été rapidement prises. Les archives françaises sur l'assassinat de Thomas Sankara ont été ainsi transmises à la justice burkinabé, et le processus de restitution du patrimoine culturel africain a été enclenché, en particulier avec le Benin.

Benjamin Roger : « Politique africaine de la France : Emmanuel Macron, du discours à la méthode ? » in **Jeune Afrique**, 4 novembre 2019, sur www.jeuneafrique.com

Questions à choix multiples

1) La françafrique est : a- la relation entre la France et l'Afrique
   b- la politique africaine de la France
   c- les relations commerciales France et Afrique

2) Un quarantenaire est âgé de : a- 4 ans
   b- 40 ans
   c- 400 ans

3) L'Élysée est : a- le palais présidentiel allamand
   b- un prophète
   c- le nom du palais présidentiel français

4) Ouagadougou est : a- une banlieue parisienne
b- la capitale du Burkina Faso
c- une région en Afrique

5) Un des prédécesseurs de Macron cité dans le texte est :
a- Alain Juppé
b- le général De Gaulle
c- Ernest Ouandié

6) Emmanuel Macron est :
a- Sénateur
b- Journaliste
c- Président de la République française

7) Les habitants du Burkina Faso sont :
a- Les burkinafasiens
b- Les burkina
c- Les burkinabé

8) Un quinquennat est :
a- un nouveau mandat
b- un mandat de 5 ans
c- une quinte

9) Un amphithéâtre est :
a- une salle de cours avec gradins
b- une salle de classe
c- une salle de sport

10) Emmanuel Macron est président de la République française depuis :
a- le 14 mai 2017
b- 2019
c- 2015

11) Que signifie CPA
a- Conseil de paix africaine
b- Conseil présidentiel pour l'Afrique
c- Cours pénale africaine

12) Les membres du CPA sont :
a- Les africains
b- Les français
c- Les français et africains

13) Qui a conçu et composé le discours de Macron à Ouagadougou ?

a- Les membres du conseil présidentiel pour l'Afrique
b- Le conseil des ministres français
c- Le protocole du Burkina Faso

14) Combien d'unités vaut une douzaine ?

a- 10 unités
b- 20 unités
c- 12 unités

15) Certaines mesures annoncées à Ouagadougou sont considérées comme :

a- Des marqueurs symboliques
b- Une feuille de route
c- Des liens malsains

16) l'une de ces mesures est :

a- La transmission des archives françaises sur l'assassinat de Thomas Sankara à la justice burkinabé
b- Une relation normalisée
c- Le début d'une ère nouvelle

17) Quels sont les pays concernés par ces mesures ?

a- le Burkina Faso et le Benin
b- le Cambodge
c- l'Afrique

18) Qui est Thomas Sankara ?

a- le père du panafricanisme
b- un ancien président du Burina Faso
c- conseiller du président macron

19) En année fut-il été assassiné ?

a- 1960
b- 1940
c- 1984

20) Le pluriel de « un burkinabé » est :

a- Les burkinabés
b- Des burkinabés
c- Des burkinabé

21) Le pluriel du mot composé un discours-programme est :

a- des discours-programmes
b- les discours-programmes
c- des discours-programme

22) Certaines mesures ont été rapidement prises. Cette phrase est à :
   a- la voie normale
   b- la voix active
   c- la voix passive

23) Le singulier du nom composé des questions-réponses est :
   a- une question-réponse
   b- la question-réponse
   c- une questions-réponse

24) La phrase : « C'était il y a deux ans à l'université de Ouagadougou. » est à la modalité :
   a- Affirmative
   b- Emphatique
   c- Injonctive

25) Ouagadougou est un
   a- nom propre de lieu
   b- nom commun de chose
   c- nom de composé

26) Quel est le pluriel de cette expression : son désormais célèbre discours
   a- ses désormais célèbres discours
   b- ses désormais célèbre discours
   c- leurs désormais célèbre discours

27) Le singulier de : ses liens malsains est :
   a- son lien malsain
   b- son lien malsaint
   c- son lien malesain

28) Ses réseaux obscurs au singulier est :
   a- son réseau obscur
   b- son résal obscur
   c- son réseau obscurs

29) « Il n'y avait plus de politique africaine de la France ». Cette phrase est à la forme :
   a- négative
   b- affirmative
   c- interro-négative

30) Une feuille de route est :
   a- un nom composé
   b- un verbe
   c- un adverbe

II- Expression libre / 30 points

Que pensez-vous des relations d'amitié entre la France et le Cameroun ?

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National Exam of Higher National Diploma-New program – 2020 Session

Spécialty/option : Software Engineeering
Paper : System Analysis and Design
Duration : 4 hours

Credit : 7

SECTION A:
INFORMATION SYSTEMS AND DATABASE (50 marks).
I: OBJECT MODELING (25 marks).

Exercise I

MCQ'S each question carries 1 mark (10 marks)

1. The detailed specification of how all the parts of a system will be implemented and coordinated is called.

A) programming B) paraphrasing C) system design D) structuring

2.The primary purpose of a good modeling techniques is to _____

A) to promote communication B) increase functional cohesion
C) reduce the need for structure D) reduce dependency between modules

3. The UML provides standard ways to do all of the following to business systems except them.

A) construct B) document C) describe D) destroy

4. The UML is commonly used to model all of the following except.

A) computer programs B) business activities
C) organizational processes D) software systems

5. The UML was intentionally designed to be_____

A) low-level, detail-oriented B) used with Visual Basic
C) nontechnical D) inexpensive

6. The UML diagrams that show how a business works from the perspective of those who actually interact with the business, such as employees or customers, are diagrams.

A) communication B) use case C) state machine D) class

7. Which of the following would be portrayed as an extend relationship in a use case diagram for a hospital?

A) the relationship between the head nurse and the floor nurses
B) admitting a patient who has never been admitted before.
C) serving a meal.
D) scheduling the monitoring of patients' vital signs

8. The people shown in use case diagrams are called _____

A) workers B) clowns C) actors D) relatives

9. One aspect of use case diagrams that makes them difficult to learn is that_____

A) they require programming experience to understand

B) they use a technical vocabulary
C) there is no single right answer for any case.
D) all of the above

10. The arithmetic association relationship between a college student and college courses would be expressed as _____

A) 1 0 B) 1 1 C) 1 0...* D) 0...* 0

Exercise 2 (15 MARKS)

1. a) What is object? **(2 marks)**
   b) Discuss the main characteristics of the object with example from the real world. **(4marks)**
2. What is: **(4 marks)**
   a) UML?
   b) Modeling
3. Explain two types of system development process of your choice. **(3marks)**
4. Differentiate between aggregation and composition. **(2marks)**

DATABASE ADMINISTRATION WITH MYSQL (25 marks).

Draw an entity-relationship diagram for the following information system. The Aeroporter Transport Services Company runs a limousine service that carries passengers to and from the Toronto airport to their homes or places of business. They maintain a database of customers on a PC in order to schedule pickups and also to keep their customers from having to repeat address information each time they call the limousine service. The database for the customers is accessed by customer telephone number. If a customer is picked up sometimes at their home and sometimes at their office, both home and office telephone numbers and addresses are stored in the database. The customer may also schedule a pickup from the airport when his or her flight arrives or may call from the airport and reserve a limousine which will come in approximately five minutes. When a request for a pickup comes in, the dispatcher checks for available drivers, calls one and assigns them to a customer. Typically cars are assigned to the driver each workday and often a driver will take a car home for an early morning pickup if needed.

The relevant customer and driver attributes kept in the database for managing the customer pickup and delivery is as follows:

Customer Name
Customer Home Telephone Number
Customer Home Address
Customer Home Region
Customer Work Telephone Number
Customer Work Address
Customer Work City Region Date of Pickup

1. Time of Pickup Driver assigned to Pickup Special Pickup Information Flight Number Air Carrier Arrival Time Customer Drop-off City Region Driver ID Driver Name Driver Address Driver City Region Driver Phone Number Car ID Car Make Car License Number

QUESTION 1. WEB PROGRAMING (25MARKS)

1. Give the full meaning of the following Acronyms **(8mks)**
   a. HTML _____
   b. W3C _____
   c. CSS _____
   d. HTTP _____
   e. IP _____
   f. URL _____
   g. DNS _____
   h. FTP _____

2. Match the technology or practice on the left with the problem it best addresses: **(5 Marks)**

Technology	Problem
1.____Progressive enhancement	a. Assistive reading and input devices
2.____Server-side detection	b. Slow connection speeds
3.____Responsive design	c. All levels of browser capabilities
4.____WAI-ARIA	d. Determining which device is being used
5.____Site performance optimization	e. A variety of screen sizes

3. Give the function of each of the following programming languages: HTML, CSS, JavaScript,
   PHP. **(5marks)**
4. List two software you can use to type a HTML program **(2 marks)**
5. What type of storage engine MySQL support **(5 marks)**

QUESTION 2. MOBILE PROGRAMING (25MARKS)

1. What is mobile programming? **(2marks)**
2. What is an android software? **(2marks)**
3. What is a mobile terminals? **(2marks)**
4. State the different types of mobile terminals that you know **(3marks)**
5. What is an android operating system? **(2marks)**
6. State two examples of android operating system **(2marks)**
7. What is a web application? **(2marks)**

8. Protecting the Security and Privacy of Mobile Devices **(10 marks)**

As the number of smartphone and tablet devices increases, so does the risk that hackers and computer criminals will target these devices. Since they were first introduced, certain

mobile devices have been vulnerable to eavesdropping and fraudulent charges. In addition, many of them automatically track a user's location.

The major security risks associated with mobile devices include: *Malware*—Android apps, in particular, are vulnerable to malware because of the platform's openness. To guard against malware threats, users have to upload the most recent versions of the operating system and use mobile security tools. *Premium SMS billing*—With their devices' vulnerability to malware, smartphone users face an added risk of subscribing to premium text-messaging services that charge every time users interact with them. Most cell phone carriers allow subscribers to block premium SMS messaging, however. *E-mail and SMS phishing*—Because it is more difficult to establish a link's legitimacy on a mobile device, mobile users are more likely to click on them, which is a phisher's dream come true. Mobile users should therefore use a lot of caution when using e-mail on these devices. *Spyware*—Commercially available software can be used by intruders to track and control the user's mobile activities.

Malicious Web sites—These could pose a threat in the future, given that many smartphone browsers are based on a browser engine with vulnerabilities. Never leave your mobile device unlocked. Never leave it unattended. Always protect it with a password.

Answer the following questions:

a) What are some examples of security risks associated with a mobile device?

b) How can these devices automatically track a user's location?

c) What are a couple of recommendations for protecting your mobile device against these threats?

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National Exam of Higher National Diploma-New program – 2020 Session

Spécialty/option : Software Engineeering
Paper : Computer Technology
Duration : 4 hours

Credit : 6

SECTION A: MCQ: 40 MARKS

Each question carries 1 mark

1. **A computer Network is _____**
   A) Collection of hardware components and computers
   B) Interconnected by communication channels
   C) Sharing of resources and information
   D) All of the Above
2. **A protocol is a(n) _____**
   A) Agreement on how communication components and DTE's are to communicate
   B) Logical communication channels for transferring data
   C) Physical communication channels used for transferring data
   D) None of above
3. **Two devices are in network if _____**
   A) a process in one device is able to exchange information with a process in another device
   B) a process is running on both devices
   C) PIDs of the processes running of different devices are same
   D) none of the mentioned
4. **What is a Firewall in a Computer Network?**
   A) The physical boundary of Network
   B) An operating System of Computer Network
   C) A system designed to prevent unauthorized access
   D) A web browsing Software
5. **Which data communication method is used to transmit the data over a serial communication link?**
   A) Simplex
   B) Half-duplex
   C) Full duplex
   D) All of above
6. **Each IP packet must contain _____**
   A) Only Source address
   B) Only Destination address
   C) Source and Destination address
   D) Source or Destination address
7. **Software that defines a database, stores the data, supports a query language, produces reports and creates data entry screens is a _____**
   A) data dictionary
   B) database management system (DBMS)
   C) decision support system
   D) relational database

8. **The database design that consists of multiple tables that are linked together through matching data stored in each table is called a _____**
   A) Hierarchical database B) Network database
   C) Object oriented database D) Relational database
9. **Which of the following items is not the advantage of a DBMS?**
   A) Improved ability to enforce standards B) Improved data consistency
   C) Local control over the data D) Minimal data redundancy
10. **Two different terms are used to describe the characteristics of interest for an entity. They are attributes and _____**
   A) classes B) entities C) properties D) traits
11. **Which of the below given sorting techniques has highest best-case runtime complexity.**
   A) quick sort B) selection sort C) insertion sort D) bubble sort
12. **Which of the following declaration is illegal?**
   A) char *str = "Best C programming classes by Joe Digital Academy";
   B) char str[] = "Best C programming classes by Joe Digital Academy";
   C) char str[20] = "Best C programming classes by Joe Digital Academy";
   D) char[] str = "Best C programming classes by Joe Digital Academy";
13. **Can a linear search recursive algorithm and binary search recursive algorithm be performed on an unordered list?**
   A) Binary search can't be used B) Linear search can't be used
   C) Both cannot be used D) Both can be used
14. **The array is as follows: 1,2,3,6,8,10. Given that the number 17 is to be searched. At which call it tells that there's no such element? (By using linear search(recursive) algorithm).**
   A) 7th call B) 9th call
   C) 17th call D) The function calls itself infinite number of times
15. **What is the header file for the string class?**
   A) #include<ios> B) #include<str>
   C) #include<string> C) #include<stio>
16. **Which of the following displays the unique values of a column?**
   SELECT _____ dept_name
   FROM instructor;
   A) All B) From C) Distinct D) Name
17. **Which of the following is a correct way to declare a multidimensional array in Java?**
   A) int [ ][ ]arr; B) int arr[[]]; C) int arr [ ][ ]; D) int[[]] arr;
18. **The UML class diagram also referred to as_____.**
   A) dynamic modeling. B) static modeling.
   C) object modeling. D) test modeling.
19. **An/A _____ is a user playing a role with respect to the system.**
   A) developer. B) enduser. C) customer. D) actor.
20. **_____software is expected to provide a solution to a problem.**
   A) System. B) Application. C) Engineering. D) Design.
21. **_____are an important mechanism for classifying objects.**
   A) Methods. B) Objects. C) Classes. D) Code.
22. **_____ diagrams are used to illustrate data structures, and the static snapshots instances of the things found in the class diagrams.**

A) use case B) Object C) Collaboration D) Sequence

23. A function in JavaScript with no return value is called

A) Procedures B) Method C) Static function D) Dynamic function

24. The <a> and tags in HTML are use for _____

A) Adding images B) Adding Text C) Adding links D) Adding headings

25. Which of the following HTML tag is use to make text italic?

A) <i> B) <italic> C) <ii> D) <it>

26. What tag is used to display a picture in a HTML page?

A) <picture> B) <image> C) <img> D) <src>

27. Devices on one network can communicate with devices on another network via a _____

A) File Server B) Utility Server C) Printer Server D) Gateway

28. What is the output of this program in C?

```
int main(void)
{
int i = 3;
for (;i++=0;) printf(—%dl,i);
}
```

A) A character B) A set of character C) 4 D) Compiler Error

29. What is the most restrictive access modifier?

A) Private B) Public C) Protected D) Restricted

30. Which of the following loops will execute at least once?

A) For B) Do-while C) If D) While

31. PHP File have a default file extension of _____

A) .html B) .xml C) .php D).pdf

32. In a Hierarchical model records are organized as _____

A) Graph. B) List. C) Links. D) Tree.

33. In an E-R diagram attributes are represented by _____

A) rectangle. B) square. C) ellipse. D) triangle.

34. The language used in application programs to request data from the DBMS is referred to as the _____

A) DML B) DDL C) VDL D) SDL

35. In the _____ traversal we process all of a vertex's descendants before we move to an adjacent vertex.

A) Depth First B) Breadth First C) With First D) Depth Limited

36. Inserting an item into the stack when stack is not full is called _____Operation and deletion of item form the stack, when stack is not empty is called _____ operation.

A) push, pop B) pop, push C) insert, delete D) delete, insert

37. _____ is a pile in which items are added at one end and removed from the other.

A) Stack B) Queue C) List D) None of the above

38. The ____ multithreading model multiplexes many user-level threads to a smaller or equal number of kernel threads.

A) many-to-one model B) one-to-one model

C) many-to-many model D) many-to-some model

39. _____ is the number of processes that are completed per time unit.

A) CPU utilization B) Response time

C) Turnaround time D)Throughput

40. Which of the following devices forwards data packets to all connected ports?

A) Router B) Switch C) Bridge D) Hub

SECTION B : 60 MARKS

Question I Programming (20 marks)

1. Give the full mean and the function of the following:
   - PHP
   - JAVASCIPT
   - SQL
   - HTML **(1 x 4 marks)**

   (Note: For questions 2 and 3 below, you may use any one of the following programming languages: C, C++, JAVA, PHP, or Visual Basic)
2. a) What is a recursive function? **(1 mark)**
   b) Define a function called *factorial* that accepts one parameter and returns the computed value. **(3 marks)**
   c) Write a program that does the following:
      - prompts a user for a non-negative,
      - calls the factorial function, and
      - prints the factorial of the number entered by the user. **(7 marks)**
3. Write a C Program that read an integer number in Decimal and converts it into Binary Number System. **(5 marks)**

Question II: Databases (15 marks)

1. Write down the SQL statement to create a database called **myexamdb. (1 mark)**
2. Write the SQL statement to drop a database called **myexamdb. (1 mark)**
3. Can we have two tables with the same name in mysql? **(2marks)**
4. Give 3 examples of Database Management System. **(2marks)**

Consider the following from question 5 to 6

Customer(CustID: int(10), CustName: varchar(50), Address: varchar(50), CustPhone: varchar(50), town: varchar(50), age int(10), gender: (character)

5. Write the sql statement to create the table customer. **(2 marks)**
6. Provide the SQL statement to delete all male customers between 20 and 40. **(2marks)**
7. SQL statement to list all the customer living in "Douala" who have a name which starts with "sh". **(3 marks)**
8. Write the SQL statement to display the number of customers per town. **(2marks)**

Question III: NETWORKING (15 Marks)

As far as the client/server networking model is concerned, answer the following questions:

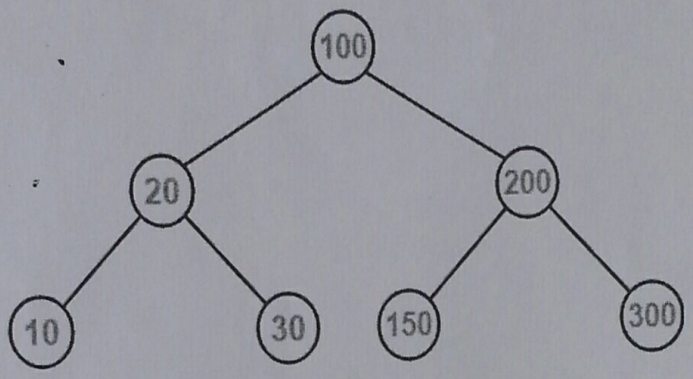
1. What is a server? What is a client? Give one example of each. **(4marks)**
2. Name three protocols regulating the communication between clients and servers. **(3marks)**
3. Name three services that can be provided by network servers. **(3marks)**
4. Is there a direct connection between clients in this model? If not, how does a client proceed to get connected to another client? **(4marks)**
5. Where did TCP/IP get its name from? **(1marks)**

Question IV: DATA STRUCTURE AND ALGORITHM (10marks)

Traversal is a process to visit all the nodes of a tree and may print their values too. Because, all nodes are connected via edge links we always start from the root head node. That is, we cannot random access a node in tree. There are three ways which we use to traverse a tree –

- In-order Traversal
- Pre-order Traversal
- Post-order Traversal

1. State the algorithms of the tree traversals mentioned above. **(2 x 3 marks)**
2. Consider the following binary search tree-



Now, write the traversal sequences for this binary search tree in;

a) In-order Traversal

b) Pre-order Traversal

c) Post-order Traversal. **(1 x 3 marks)**

3. What is a data structure? Name an example of a linear data structure. **(1 mark)**

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National Exam of Higher National Diploma-New program – 2020 Session

Spécialty/option : SWE-DBM
Paper : Information System
Duration : 3 hours **Credit : 6**

Instructions: *Follow the instructions below carefully*

- *This paper contains three sections; Section A (40%), Section B (40%) and Section C (20%). Answer all questions in each section.*
- *The respective mark(s) of each question is indicated.*
- *It is a closed book exam and pre-prepared material is not authorized.*
- *Should any student encounter any difficulty, only the examiner(s) in the examination hall should be contacted*

SECTION A: SYSTEM ARCHITECTURE. (40marks)

1. What is an Object server in client server environment? **(4mks)**
2. What are the two broad classes of middleware in client server environment? **(4mks)**
3. What are the five major technologies that can be used to create Client/Server applications in client server environment? **(4mks)**
4. What is public cloud and private cloud? **(4mks)**
5. What are the essential characteristics of cloud computing? **(4mks)**
6. How many types of deployment models cloud? **(4mks)**
7. Describe about the different Guided Medias. **(4mks)**
8. What do you mean by wireless communication? **(4mks)**
9. List two (02) advantages and two (02) disadvantages of fiber optics cable. **(4mks)**
10. List three (03) factors on which data rate depends. **(4mks)**

SECTION B: OPERATING SYSTEMS. (40marks)

1. Explain the main purpose of an operating system? **(5mks)**
2. What are the advantages of a multiprocessor system? **(5mks)**
3. Describe the objective of multiprogramming. **(5mks)**
4. Give some benefits of multithreaded programming. **(5mks)**
5. i) What is a file ? **(1mk)**
   ii) What are the Operations performed on files or directories **(4mks)**
6. What Is the Google Android SDK? **(5mks)**
7. List the four (04) key components of Android Architecture. **(5mks)**
8. What is the importance of having an emulator within the Android environment? **(5mks)**

SECTION C: PROJECT MANAGEMENT AND LEGAL REGULATIONS. (20marks)

1. What is the difference between agile project management and agile software development? **(5mks)**
2. How important is "Project Methodology" as a parameter for software cost estimation? **(5mks)**
3. Can agile development be applicated in traditional product development? **(5mks)**
4. Explain what is Copyright. **(5mks)**

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National Exam of Higher National Diploma-New program – 2020 Session

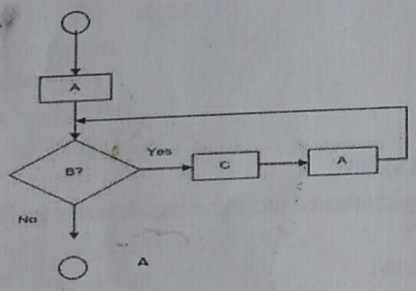
Spécialty/option : Software Engineeering
Paper : Case Study
Duration : 6 hours

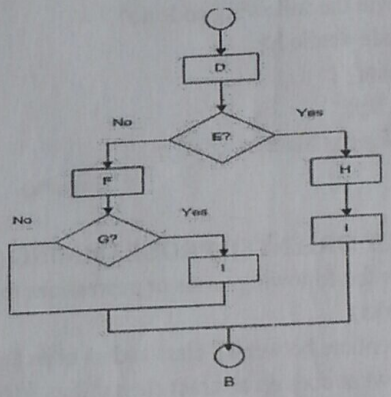
Credit : 14

SECTION A: ALGORITHM AND PROGRAMMING. (50marks)

I- DATA STRUCTURE AND ALGORITHMS (10 marks)

1. Consider the flowcharts below. Write pseudocode for each example (A and B) making sure your pseudocode is structured but accomplishes the same tasks as the flowchart segment. **(2+3 marks)**





2. The statements below show some features of "Big-Oh" notation for the functions f ≡ f(n) and g ≡ g(n). Determine whether each statement is TRUE or FALSE and correct the formula in the latter case. **(5 marks)**

Statement	Is it TRUE or FALSE?	If it is FALSE then write the correct formula
Rule of sums: $O(f+g) = O(f) + O(g)$		
Rule of products: $O(f \cdot g) = O(f) \cdot O(g)$		
Transitivity: if $g = O(f)$ and $h = O(f)$ then $g = O(h)$		

II. STRUCTURED PROGRAMMING (15 MARKS)

1. Variables are very important for almost all mathematical programs in c programming. What are the rules to follow in when declaring variables in c programming? **(3 marks)**
2. List the four ways in which a function can be declared in c programming giving their respective examples. **(5marks)**

3. What is the size in byte of the array **int arr[10],** for both a 32bit and 64bit system? **(2marks)**

4. Consider the code snippet below. Calculate the size of the structure named ***employee*** given that int is 4byte, char is 1byte, and float is 4byte. **(2 marks)**

```
struct employee
{  int id;
   char name[20];
   float salary;
};
```

5. What be the output of the following program?

```
#include <stdio.h>
int main()
{
   int a = 1, b = 1, c;
   c = a++ + b;
   printf("%d, %d", a, b);
}.
```

(2 marks)

6. What will the following code do?

```
#include <stdio.h>
int main() {
FILE *fp;
fp  = fopen ("data.txt", "w");
}
```

(1 mark)

III. OBJECT ORIENTED PROGRAMMING (15 MARKS)

1. Define the following terms or expressions related to object oriented programming : Inheritance, Modularity **(2marks)**
2. Differentiate between a class and an object. **(2marks)**
3. From what does an abstract class differs from a concrete class? **(2marks)**
4. Name the various existing types of inheritance. **(2marks)**
5. What is a dot (.) operator in C++? **(1 mark)**
6. Considering the following C++ program:

```
1.  #include <iostream>
2.  using namespace std;
3.
4.  class Person
5.  {
6.     public:
7.        string profession;
8.        int age;
9.
10.       Person(): profession("unemployed"), age(16) { }
11.       void display()
12.       {
13.          cout << "My profession is: " << profession << endl;
14.          cout << "My age is: " << age << endl;
15.          walk();
16.          talk();
17.       }
```

```
18.         void walk() { cout << "I can walk." << endl; }
19.         void talk() { cout << "I can talk." << endl; }
20. };
21.
22. // MathsTeacher class is derived from base class Person.
23. class MathsTeacher : public Person
24. {
25.     public:
26.         void teachMaths() { cout << "I can teach Maths." << endl; }
27. };
28.
29. // Footballer class is derived from base class Person.
30. class Footballer : public Person
31. {
32.     public:
33.         void playFootball() { cout << "I can play Football." << endl; }
34. };
35.
36. int main()
37. {
38.     MathsTeacher teacher;
39.     teacher.profession = "Teacher";
40.     teacher.age = 23;
41.     teacher.display();
42.     teacher.teachMaths();
43.
44.     Footballer footballer;
45.     footballer.profession = "Footballer";
46.     footballer.age = 19;
47.     footballer.display();
48.     footballer.playFootball();
49.
50.     return 0;
51. }
```

a. Which Object Oriented Concepts are implemented in this program ? **(2 marks)**

b. Analyse line by line and give the output of the program above. **(4 marks)**

IV. OOM-UML (10MARKS)

We want to model a system for management of flights and pilots.

An airline operates flights. Each airline has an ID. Each flight has an ID a departure airport and an arrival airport: an airport as a unique identifier. Each flight has a pilot and a co-pilot, and it uses an aircraft of a certain type; a flight has also a departure time and an arrival time.

An airline owns a set of aircrafts of different types. An aircraft can be in a working state or it can be under repair. In a particular moment an aircraft can be landed or airborne. A company has a set of pilots: each pilot has an experience level: 1 is minimum, 3 is maximum.

A type of aero plane may need a particular number of pilots, with a different role (e.g.: captain, co-pilot, navigator): there must be at least one captain and one co-pilot, and a captain must have a level 3.

a. Differentiate between static and dynamic UML diagrams with two examples in each case. (4marks)

b. Identify all the classes and the relationship between them. **(3marks)**

c. Produce the Class diagram of the system. **(3marks)**

SECTION B: DATABASE DEVELOPMENT AND ADMINISTRATION (20 MARKS)

EXERCISE IV (20 marks)

1. Think of an organizational database in which some of the fields in the CUSTOMER table must have the given data types. Explain what they mean and how they are used:
   - i) Customer ID (auto numeric field)
   - ii) Customer Name (text field)
   - iii) Fee Paid (decimal field)
   - iv) Pay Date (date field).

   (2 x 4 = 8 marks)
2. Table 1 contains sample data for vehicles and for operators who ply these vehicles. In discussing these data with users, we find that vehicle ID (but not descriptions) uniquely identify vehicles and that operator names uniquely identify operators.
   - a) Convert this table to a relation (named VEHICLE OPERATOR) in first normal form. Illustrate the relation with the sample data in the table. **(2 marks)**
   - b) List the functional dependencies in VEHICLE OPERATOR and identify a candidate key. **(3 marks)**
   - c) For the relation VEHICLE OPERATOR, identify each of the following: an insert anomaly, a delete anomaly, and a modification anomaly. **(3 marks)**
   - d) Draw a relational schema for VEHICLE OPERATOR and show the functional dependencies. **(3 marks)**
   - e) In what normal form is this relation? **(1 mark)**

Table 1: Sample Data for Vehicles and Operations

VehicleID	Description	Operator	Route	Tarrif Per Mile
V1	Luxury	Polax	Grand Trail	100
		Ubet	East Route	150
V2	Comfort	Polax	Grand Trail	45
		Ubet	East Route	60
		Minim	South Trunk	35

SECTION C : WEB DESIGN

Exercise 6:HTML, JS, CSS, PHP(15 marks)

1. What is JavaScript used for? **(1 mark)**
2. Is it possible to implement a web project without using JavaScript? **(1 mark)**
3. The purpose of building a web application is to make it accessible to the whole world, explain the process of deploying a web application built locally. **(2 marks)**
4. Define PHP, what are the various tools needed to develop PHP project? **(1,2 marks)**
5. Create a form (HTML+ CSS) to authenticate users (Login, Password) ***see figure 1*** **(4marks)**
6. Creates a php file (process.php) to get the parameters from the form and display them. **(4 marks)**

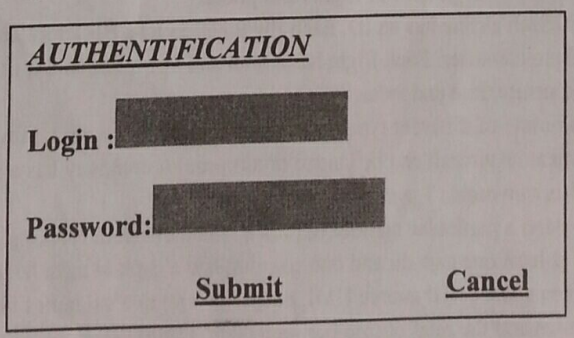


Figure 1: login form

SECTION D: NETWORKING (15 MARKS)

EXERCISE VI (15 marks)

You are required to setup a LAN in your school secretariat to serve both wired and wireless users, and to connect to the Internet.

The network will consist of 10 PCs, one printer accessible by all the PCs, 7 laptops.

a) Name the other network devices you would need in order to setup the LAN. **(3 marks)**

b) Name the media type required, and connectors required. **(2 marks)**

c) What would you need to install in order to protect your network from external attack? **(1 mark)**

d) Upon successfully setting up the LAN, you still don't have internet connection. Who should you contact for internet connection? **(1 mark)**

e) List two different connection options that can provided to you by d) above. **(1 mark)**

f) Given the network address 192.168.1.0,

   i) How many usable host addresses does it provide? **(1 mark)**

   ii) Which address would most likely be assigned to the device interface that connects the LAN to the Internet? **(1 mark)**

   iii) State the address that a remote host will use to communicate with all hosts in this LAN. **(1 mark)**

g) Sketch a physical topology of your network specifying the different cable types used in connecting the different devices. **(4 marks)**

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National Exam of Higher National Diploma-New program – 2020 Session

Spécialty/option : SWE-HWM-CWD
Paper : Digital Literacy
Duration : 2 hours **Credit : 1**

Instruction to candidates: *You are required to answer all the questions in this paper*

SECTION A: GENERAL COMPUTER KNOWLEDGE (50 MARKS)

Question I: MCQ (20 Marks) Each question carries 1 mark.

1. **Which of the following is not a type of application software?**
   A) Word processor B) Database C) Device driver D) Browser
2. **Which button do we click to shut down the PC?**
   A) Windows shut button B) Windows lock off
   C) Windows start button D) Windows close button
3. **Which of these application programs is used for data base or information management?**
   A) MS word B) MS Excel C) MS PowerPoint D) MS Access
4. **Which device keeps a desktop computer functioning when power goes off?**
   A) USB B) USP C) BUS D) UPS
5. **Which of these devices is NOT a secondary memory?**
   A) Floppy disk B) ROM C) Hard disk D) USB
6. **SRAM stands for _____**
   A) Standard Random Access Memory B) Static Read Access Memory
   C) Static Random Access Memory D) Standard Read Access Memory
7. **The process of getting information from the internet into the computer is known as**
   A) Browsing B) Downloading C) Uploading D) Recording
8. **Which categories of computers predict weather conditions?**
   A) Super computers B) Mainframe computers
   C) Microcomputers D) Nano Computers
9. **A software program which controls, analyses and configures the computer is called ___**
   A) Control program B) Utility software C) Compiler D) Debugger
10. **The language used by a computer is called _____**
    A) English language B) French language
    C) Binary language D) Computer language
11. **Which program can help you detect and prevent malicious activities on your computer?**
    A) Ethernet protector B) Trojan horse warriors
    C) Worm killer D) Spyware fighting software

12. **Which action can you describe as a copyright violation?**
    A) Reading material from a publicly available website
    B) Distributing someone else original work as yours
    C) Quoting a paragraph and referencing the source
    D) Sharing a website address on social media
13. **You create a document by using Microsoft Word 2010. You want to place a title in the center of the page. Which feature can you use to do this?**
    A) Spacing B) Font size C) Alignment D) Font style
14. **Which device can you use to record a video?**
    A) Scanner B) MP3 recorder C) Camcorder D) Player
15. **Which type of online community can you use to create an online journal?**
    A) Blog B) News group C) Chat group D) Bulletin board
16. **Stephan creates a business presentation by using Microsoft Office PowerPoint 2010. He saves it with the name Presentation.ppt. Stephan opens the file to make some changes, and he wants to save it with a different name. Which of the following commands on the File menu will Stephan use to save the file with a different name?**
    A) Save B) Save As C) Send To D) Page Setup
17. **Which of the following is not a magnetic storage device?**
    A) Floppy Disk B) Hard Disk Drive C) Magnetic Tape D) RAM
18. **Barbara wants to create a newsletter. She needs a program that provides several newsletter templates. Which of the following programs will meet her needs?**
    A) Desktop publishing program B) Presentation program
    C) E-mail program D) Spreadsheet program
19. **You create a presentation by using PowerPoint. Which of the following toolbars will you use to add geometric shapes to the presentation?**
    A) Drawing B) Formatting C) Reviewing D) Illustrations
20. **A security hole in a system that can be exploited as a weakness of the system is called?**
    A) Virus B) Vulnerability C) Thread D) Risk

<u>Question I</u> Structural Questions (30 marks)

1. How many generations of computers are there, name and explain? **(5 marks)**
2. What contributions has computer science given to our World? **(2 marks)**
3. What does download mean? **(2mks)**
4. What does a graphics card do? **(2mks)**
5. How does the ECC RAM differ from a normal RAM? **(2mks)**
6. What is the brain of the computer system? **(1mks)**
7. What is a Microsoft windows? State two examples. **(2mks)**
8. List two operating system Capabilities. **(2mks)**
9. List two Operating System Limitations. **(2mks**
10. What is Bios? State three main functions of the Bios. **(2mks)**
11. Classify the following under volatile and Non-Volatile Memory. **(2mks)**
    A) RAM B) PROM C) EPROM D) Flash Prom
12. State two characteristics of Hard Disk Drive. **(2mks)**

13. Differentiate between a Main folder and a Briefcase folder. **(2mks)**
14. Differentiate between local area network and cloud computing. **(2mks)**

SECTION B (50 marks)

Question I Web Knowledge (20 mark)

a) Give the difference between
   i. Internet browser and search engine **(2 marks)**
   ii. Intranet and extranet **(2 marks)**
   iii. Internet and the web. **(2 marks)**

b) (i) What is green computing. **(2 marks)**
   (ii) Name two ways by which it can be enhanced. **(2 marks)**

c) (i) What is Computer Generation. **(2 marks)**
   (ii) State the technology that characterizes the 5^{th} Generation Computers. **(2 marks)**

d) (i) give2 advantages and 2 disadvantages of using social media in school. **(2 marks)**
   (ii) State any four social media platforms. **(4 marks)**

Question II Digital Society (30 marks)

1. Briefly explain the following in relation to the digital society
   a. Juvenile delinquency
   b. Cyber bullying
   c. scamming
   d. propaganda
   e. Software piracy. **(5x2marks =10 marks)**
2. a) Explain software privacy. **(5marks)**
   b) Explain the concept of living online. **(5marks)**
3. What is a fake news? List two consequences of propagating fake news. **(2, 2 marks)**
4. Differentiate between e-learning and e-commerce. **(4 marks)**
5. What are your tips for protecting yourself against identity theft? **(2 marks)**

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National Exam of Higher National Diploma-New program – 2020 Session

Spécialty/option : SWE-CSN-DBM
Paper : Digital Electronics
Duration : 4 hours **Credit : 7**

***Instructions**: Answer all questions. You are authorized to use only non-programmable calculator.*

SECTION A: NUMBER SYSTEM AND CODES. Each question carries 20 marks.

1. In the decimal numbering system, what is the MSD?

A. The middle digit of a stream of numbers
B. The digit to the right of the decimal point
C. The last digit on the right
D. The digit with the most weight

2. The output of an AND gate with three inputs, A, B, and C, is HIGH when _____.

A. A = 1, B = 1, C = 0
B. A = 0, B = 0, C = 0
C. A = 1, B = 1, C = 1
D. A = 1, B = 0, C = 1

3. The BCD number for decimal 16 is _____.

A. 00010110
B. 00010000
C. 00010010
D. 11100000

4. What are the symbols used to represent digits in the binary number system?

A. 1,2
B. 0 through 8
C. 0,1,2
D. 0,1

5. Convert the fractional binary number 0001.0010 to decimal.

A. 1.40
B. 1.125
C. 1.20
D. 1.80

6. The number of digits used to store a BCD number is:

A. 1
B. 8
C. 4
D. 2

7. **Convert 11001001_2 (binary) to decimal.**
   A. 201
   B. 2001
   C. 210
   D. 20
8. **17010 is equivalent to**
   A. FD_{16}
   B. DF_{16}
   C. AA_{16}
   D. AF_{16}
9. **The operation 111000 + 110110 in binary is equal to**
   A. 111111
   B. 1101110
   C. 1111110
   D. 1011110
10. **The operation 111000 – 101111 in binary is equal to**
   A. 11_{10}
   B. 10_{10}
   C. 9_{10}
   D. 8_{10}
11. **The two's complement of binary number 0101 is**
   A. 1111
   B. 1101
   C. 1110
   D. 1011
12. **Which of the following logical operations is represented by the + sign in Boolean algebra?**
   A. inversion
   B. AND
   C. OR
   D. complementation
13. **The output of an AND gate is LOW _____.**
   A. all the time
   B. when any input is LOW
   C. when any input is HIGH
   D. when all inputs are HIGH
14. **Excess-3 code is known as :**
   A. Weighted code
   B. Cyclic redundancy code
   C. Self-complementing code
   D. Algebraic code
15. **A full adder logic circuit will have**
   A. Two inputs and one output.
   B. Three inputs and three outputs.
   C. Two inputs and two outputs.
   D. Three inputs and two outputs.

16. How many AND gates are required to realize the circuit of the function Y = AD +AB + BC

A. 4
B. 5
C. 3
D. 2

17. The 1's complement can be easily obtained by using _____

A) Comparator B) Inverter C) Adder D) Subtractor

18. Any signed negative binary number is recognized by its _____

A. MSB
B. LSB
C. Byte
D. Nibble

19. If the decimal number is a fraction then its binary equivalent is obtained by _____ the number continuously by 2.

A. Dividing
B. Multiplying
C. Adding
D. Subtracting

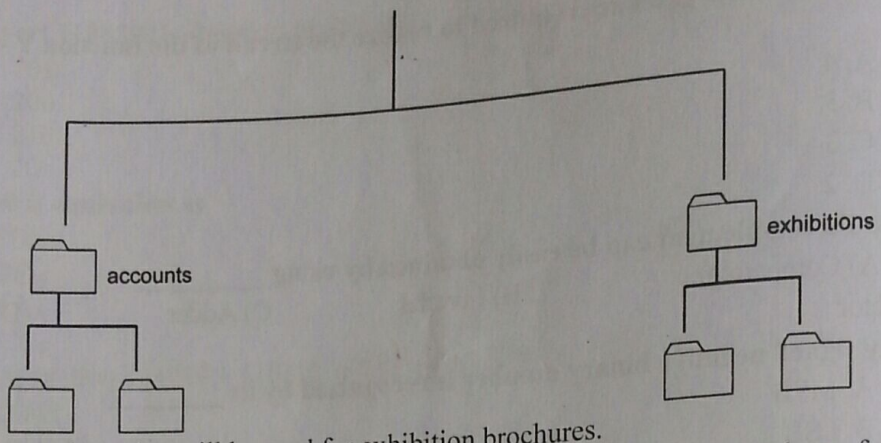
20. The format used to present the logic output for the various combinations of logic inputs to a gate is called a(n):

A. Boolean algebra
B. Boolean variable
C. Truth table
D. Logic function

SECTION B: COMPUTER FUNDAMENTAL (80%)

I- HARDWARE (20MARKS)

1. Compare a hardware and a software **(2marks)**
2. Give 3 examples of computer input devices and 3 examples of output devices. For each state the use. **(3marks)**
3. Using a diagram explain the computer memory hierarchy **(2marks)**
4. What is a bus? **(1marks)**
5. List the different types of ROM. Which type is used in Flash technology? **(2marks)**
6. Explain serial and parallel transmission of data **(2marks)**
7. What is the motherboard? Give 5 devices attached to the motherboard **(3marks)**
8. Trendy Artists gallery has a directory structure with the C drive as its root directory.



Kim creates templates that will be used for exhibition brochures.

a. Redraw the above diagram and indicate where the brochure templates for the brochures should be saved. **(1marks)**
b. What is the absolute directory path for the brochure templates? **(1marks)**
c. How can she protect the brochure templates from being modified? **(1marks)**
d. Kim wants to have all file names with directory location shown automatically on the bottom of each page. A macro has been suggested.
e. Should this be a local or global macro? Justify your answer. **(2marks)**

II- NETWORK AND MOBILE DEVICES (40MARKS)

1. What are the types of mobile applications? **(3mks)**
2. What does WAP mean? **(2mks)**
3. What is GPRS and how does it work? **(3mks)**
4. What is the role of the following in the internet communication? **(10mks)**
   a) Modem
   b) Network Server
   c) DNS Server
   d) E-mail
   e) Videoconference
5. Through which means can a wireless communication take place?**(3mks)**
6. With the aid of diagrams state and explain the different types of computer network topology and which topology do you consider the best **(6marks)**
7. What is the function of the following networking devices **(10marks)**
   A. Distributor
   B. Router
   C. Switch
   D. NIC
   E. Network cable
8. What is a mobile device? **(1mark)**
9. List the different types of mobile devices you know **(2marks)**

B) Trojan horse warriors

III- MICROSOFT WORD, EXCEL AND POWERPOINT (20MARKS)

1. What is the suitable Office software to perform the following actions? **(4mks)**
   a) Write a letter
   b) Write a financial report
   c) Design a calendar
   d) Prepare a presentation for a seminar
2. What is the use of the following Microsoft Excel functions? **(3mks)**
   a) MAX
   b) AVERAGE
   c) SUM
3. From the figure below:

	A	B	C	D	E
1		Bill			
2	Name	Unit	Number	Total	
3	Iron (8)	2875	450		
4	Iron (10)	4590	25		
5	Cement	5900	350		
6	Corrugated Iron	6300	600		
7			Total		

   a) From which application software is this figure? **(1 mark)**
   b) Give the formula to be used to fill the cells D3, D4, D5, D6 and D7 **(5 marks)**
   c) How can you from D3, automatically fill D4-D6? **(1 marks)**

4. What is the importance of applying breaks in a document? Give the procedures **(2marks)**
5. What is the file extension for a word, excel and PowerPoint document. **(2marks)**
6. What is the procedure for creating animations and transition in PowerPoint **(2marks)**

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
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MINISTRY OF HIGHER EDUCATION
.....
NATIONAL COMMISSION FOR THE ORGANISATION OF HIGHER NATIONAL DIPLOMA EXAM (HND) EXAM
.....

National Exam of Higher National Diploma-New program – 2020 Session

Spécialty/option : NWS-SWE-EDM
Paper : Discrete Mathematics
Duration : 4 hours **Credit : 4**

Instructions: Answer all questions. You are authorized to use only non-programmable calculator.

SECTION A: MCQS (20 MARKS)

1) **Suppose that the mean of the sampling distribution for the difference in two sample proportions is 0.** This tells us that:
   A. The two population proportions are both 0.
   B. The two population proportions are equal to each other.
   C. The two sample proportions are both 0.
   D. The two sample proportions are equal to each other.
2) **If A and B are independent events (both with probability greater than 0) then which of the following statements must be true?**
   A. $P(A) + P(B) = 1$
   B. $P(A \text{ and } B) = P(A)P(B)$
   C. $P(A \text{ and } B) = 0$
   D. $P(A \text{ and } B) = P(A) + P(B)$
3) **A sales person makes "cold calls" trying to sell a product by phone and is successful on each call with probability 1/50. Whether or not he is successful is independent from one call to the next. If he calls 50 people, the number of successful calls is:**
   A. exactly 1, since he called 50 people and the probability of success is 1/50 each time.
   B. at most 1, because once he has been successful he can't be successful again in the 50 calls.
   C. a binomial random variable.
   D. equally likely to be 0, 1 or 2.
4) **The expected value of a random variable is**
   A. always computed as np.
   B. the value that has the highest probability of occurring.
   C. always one of the possible values for the random variable.
   D. the mean value over an infinite number of observations of the variable.
5) **Suppose that a 95% confidence interval for the proportion of men over 60 who have high blood pressure is .30 to .40. Which of the following is the best interpretation of this information?**
   A. 95% of the men in the sample have blood pressure that is between 30% and 40% too high.
   B. 95% of the men in the population have blood pressure that is between 30% and 40% too high.

C. We can be fairly confident (about 95%) that the proportion of men in the sample who have high blood pressure is between .30 and .40.
D. We can be fairly confident (about 95%) that the proportion of men in the population who have high blood pressure is between .30 and .40.

6) All of the following are ways to show that A and B are mutually exclusive events except one of them. Which one does not show that A and B are mutually exclusive?

A. $P(A|B) = 0$
B. $P(A \text{ and } B) = P(A)P(B)$
C. $P(A \cap B) = 0$
D. $P(A \text{ or } B) = P(A) + P(B)$

7) You buy coffee at a kiosk at random times. The following table gives the probability distribution for X = number of customers in line when you show up (not including you):

K	0	1	2	3	4
P(X = k)	0.15	0.20	0.40	0.20	0.05

The probability that there will be at least two people in line when you show up is
A. 0.25 B. 0.40 C. 0.65 D. 0.75

Use this information to answer problems 8 and 9. x lies in the first quadrant and y lies in the second quadrant. $\sin x = \frac{4}{5}$, and $\cos y = -\frac{8}{17}$.

8) The exact value of $\cos(x+y)$ is

A. $\frac{13}{85}$ B. $-\frac{36}{85}$ C. $\frac{36}{85}$ D. $\frac{84}{85}$

9) The exact value of $\sin 2x$ is

A. $\frac{8}{5}$ B. $\frac{24}{25}$ C. $\frac{9}{25}$ D. $\frac{3}{5}$

10) Which of the following is *not* a solution to $\sin 2x + \cos x = 0$ over the interval $[0, 2\pi)$?

A. $\frac{\pi}{2}$ B. $\frac{5\pi}{6}$ C. $\frac{7\pi}{6}$ D. $\frac{3\pi}{2}$

11) A class contains 8 boys and 7 girls. The teacher selects 3 of the children at random and without replacement. The probability that the number of boys selected exceeds the number of girls selected is

A. $\frac{512}{3375}$ B. $\frac{28}{65}$ C. $\frac{8}{15}$ D. $\frac{1856}{3375}$

12) What are all values of k for which $\int_{-3}^{k} x^2 dx = 0$

A. –3 B. 3 C. –3 and 3 D. –3, 0, and 3

13) Find the value(s) of $\frac{dy}{dx}$ of $x^2y+y^2=5$ at $y=1$.

A. $-\frac{2}{3}$ only B. $\frac{2}{3}$ only C. $\pm\frac{2}{3}$ D. $\pm\frac{3}{2}$

14) Find the average rate of change of the function f(x) on [0, 2] if $f(x)=2x^2-2$

A. –4 B. 0 C. 1 D. 4

15) The domain of the function $f(x)=\sqrt{1-x}\ln x$ is

A. $(0,+\infty)$ B. (0, 1] C. $(-\infty, 1)$ D. [0, 1]

16) The exact value of $\lim_{x\to 0}\frac{\sqrt{3+x}-\sqrt{3}}{x}$ is

A. $\sqrt{3}$ B. 0 C. $\frac{1}{2\sqrt{3}}$ D. the limit does not exist

17) Which of the following is an equation of the tangent to the curve $y = 2x\sin x$ at the point $(\frac{\pi}{2},\pi)$?

A. $y = 2x + 2\pi$ B. $y = 2x$ C. $y = -2x$ D. $y = -2x + 2\pi$

18) The exact value of $\lim_{x\to\infty}\frac{x+2}{9x^2+1}$ is

A. 0 B. $\frac{1}{9}$ C. $\frac{2}{9}$ D. ∞

19) Which of the following is an even function of t.?

A. $3t^2$ B. t^2-4t C. $\sin 2t + 3t$ D. t^3+6

20) "A periodic function" is given by a function which

A. has a period $T = 2\pi$ B. has a period $T = \pi$

C. satisfies $f(t + T) = -f(t)$ D. satisfies $f(t + T) = f(t)$

21) For $y=\sin^2 x+\cos^2 x$, $y'=$

A. $2\sin x-2\cos x$ B. $2\sin x\cos x$ C. $4\sin x\cos x$ D. 0

22) If $y^3=x^2$, then $\frac{dy}{dx}=$

A. $\frac{2x}{y^3}$ B. $\frac{2x}{3y^2}$ C. $\frac{x^2}{3y^2}$ D. $\frac{x^2}{3y}$

23) $\operatorname{cosec}(-\frac{4}{3}\pi)=$

A. 2 B. $\frac{\sqrt{3}}{2}$ C. $\frac{2\sqrt{3}}{3}$ D. $-\frac{2\sqrt{3}}{3}$

24) Find a positive value c, for x, that satisfies the conclusion of the Mean Value Theorem for Derivatives for $f(x)=3x^2-5x+1$ on the interval [2, 5].

A. 1 B. $\frac{7}{2}$ C. 3 D. $\frac{23}{6}$

25) At what value of x does the function $f(x)=\frac{(x+1)^2}{x^2-1}$ have a removable discontinuity?

A. 1 B. 3 C. 2 D. –1

26) Suppose g is a function defined on the interval [0, 5] such that $\lim_{x\to 2} g(x) = -1$, the $\lim_{x\to 2}[g(x)]^3$ is

A. 8 B. $\frac{1}{8}$ C. –1 D. $\frac{1}{3}$

27) If $f(a) = f(b) = 0$ and $f(x)$ is continuous on [a, b], then

A. $f(x)$ must be identically zero,
B. $f'(x)$ may be different from zero for all x on (a, b),
C. There exists at least one number c, $a < c < b$, such that $f'(c) = 0$,
D. $f'(x)$ must exist for every x on (a, b).

28) A medical treatment has a success rate of 0.8. Two patients will be treated with this

treatment. Assuming the results are independent for the two patients, what is the probability

that neither one of them will be successfully cured?

A. 0.5 B. 0.36 C. 0.2 D. 0.04

29) Suppose that the probability of event A is 0.2 and the probability of event B is 0.4. Also, suppose that the two events are independent. Then P(A|B) is:

A. P(A) = 0.2
B. P(A)/P(B) = 0.2/0.4 = ½
C. P(A) × P(B) = (0.2)(0.4) = 0.08
D. None of the above.

30) A specific range of numbers within which a population mean should lie is

A. the range.
B. the confidence coefficient.
C. the confidence interval.
D. the confidence level.

31) The sample standard deviation using the data

X:_ 4 5 2 6 4 3 4 is

A. 10 B. 1.66 C. 1.20 D. 1

32) A sample of 40 cows is drawn to estimate the mean weight of a large herd of cattle. If the standard deviation of the sample is 96 kg, what is the maximum error in a 90% confidence interval estimate?

A. 25 kg B. 158 kg C. 58 kg D. 30 kg

33) Find the Laplace transform of f(t) = 3.

A. $\frac{3}{s}$ B. $\frac{1}{s}$ C. 3 D. 3s

34) Find the $L^{-1}(\frac{1}{(s+2)^4})$.

A) $e^{-2t}\times 3$ B) $e^{-2t}\times\frac{t^3}{3}$ C) $e^{-2t}\times\frac{t^3}{6}$ D) $e^{-2t}\times\frac{t^2}{6}$

35) The coefficient of the term in x^2 in the Maclaurin expansion of $In(1-2x)$ is

A) $\frac{1}{2}$ B) 1 C) -2 D) 2

36) State the interval of convergence the function

$f(x)=x^2\ln(1-2x)$

A. I = (1, 2) B. I = $[-\frac{1}{2}, \frac{1}{2})$ C. I = [1, 2] D. I = $[-\frac{1}{2}, \frac{1}{2}]$

37) $f(x)=\sqrt{4+x}$ **as a Maclaurin series, State it's radius of convergence.**

A. R = 2 B. R = 0 C. R = 3 D. R = 1

38) $\sec^2 x - \tan^2 x$ **is identical to which of the following:**

A. 1 B. $\sin^2 x - \cos^2 x$. $\cos^2 x - \sin^2 x$ D. $1 - \tan^2 x$

39) What is the magnitude of the vector $\langle 6, 15\rangle$**?**

A. $\sqrt{21}$ B. 261 C. 21 D. $\sqrt{261}$

40) What are the first five terms of the sequence defined as

$a(1) = 3$

$a(n+1) = a(n) - 4$, for $n \geq 1$?

A. –3, –2, –1, 0, 1 B. –1, –5, –9, –13, –17

C. 3, –1, –5, –9, –13 D. 3, –1, 0, 1, 2

SECTION B: STRUCTURAL (80 MARKS)

1. Analysis (30 Marks)

1.1. Evaluate $f_x(x,y)$ *and* $f_y(x,y)$ for the following functions.

(i) $f(x,y) = x^3 + 5xy + 2y - 2$

(ii) $f(x,y) = 8 + cos2x - xy^2$. **(2+ 2 marks)**

1.2. Evaluate $\int_0^1\int_0^2\int_0^2 x^2yz\, dz\, dy\, dx$. **(4 marks)**

1.3. a) Evaluate the Laplace transforms of $3t^2 + \cos 2t$.

b) Solve the following initial value problem by using the Laplace transform

$y' + 2y = 3$ $y(0) = 0$ **(3+ 5 marks)**

1.4. Sketch the triangular wave

$$f(t) = \begin{cases} t, & 0 < t < \pi \\ -t, & -\pi < t < 0 \end{cases}$$

$f(t) = f(t + 2\pi)$, for $-5\pi < t < 5\pi$

Is the function odd or even? Show that the corresponding Fourier series is

$f(t)$ = **Erreur !– Erreur !** **(6 marks)**

1.5. a) Solve the differential equation

$$(y^2 - xy)dx + x^2 dy = 0.$$

b) Find the particular solution of the differential equation $2y''-3y'+2y=0$ which satisfies the boundary condition $y=0$ and $y'=2$ when $x=0$. **(4+4 marks)**

2. Statistics (30 Marks)

2.1 A national examination in Mathematics was taken by 8479 candidates and the result is summarized in the grouped frequency distribution below.

Marks	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
No of candidates	46	216	822	1057	1492	1683	1522	1011	522	108

It is decided that 62.2% of the candidates should pass.

a) Calculate the necessary pass mark, regarding the marks as a continuous variable.

b) Draw a cumulative frequency graph and hence estimate the range of marks obtained by the central 80% of candidates.

c) If the pass mark has been fixed for 55%, how many candidates would pass? **(3+ 7+ 2 marks)**

2.2 The probability density function for a continuous random variable X is

$$f(x) = \begin{cases} a + bx^2, & 0 \le x \le 1 \\ 0, & otherwise \end{cases}$$

where a, b are some constants. Find

a) a, b if $E(X) = \frac{3}{5}$

b) $Var(X)$. **(4+ 4 marks)**

2.3 The number of customers arriving at a Bank is Poisson distributed with a mean, 4 customers/per minute.

a) Within 2 minutes, what is the probability that there are 3 customers?

b) What is the probability density function for the time between the arrival of the next customer? **(5+5 marks)**

3. Probability (20 Marks)

3.1. a) State Baye's Theorem

b) Suppose a certain disease has an incidence rate of 0.1% (that is, it afflicts 0.1% of the population). A test has been devised to detect this disease. The test does not produce false negatives (that is, anyone who has the disease will test positive for it), but the false positive rate is 5% (that is, about 5% of people who take the test will test positive, even though they do not have the disease). Suppose a randomly selected person takes the test and tests positive. Using Baye's Theorem find the probability that this person actually has the disease? **(2+ 4 marks)**

3.2. In a random sample of HND students 50% indicated they are business majors, 40% engineering majors, and 10% other majors. Of the business majors, 60% were

female; whereas, 30% of engineering majors were females. Finally, 20% of the other majors were female. Given that a person is female, what is the probability that she is an engineering major? **(5 marks)**

3.3. Given that $P(A \cup B) = 0.7$ *and* $P(A \cup B') = 0.9$, find P(A). **(4 marks)**

3.4. A bloods test indicates the presence of a particular disease 95% of the time when the disease is actually present. The same test indicates the presence of the disease 0.5% of the time when the disease is not present. One percent of the population actually has the disease. Calculate the probability that the person has the disease given that the test indicates the presence of the disease. **(5 marks)**