FOUNTAIN UNIVERSITY OSOGBO, NIGERIA

P.M.B.4491, OSOGBO, OSUN STATE.

COLLEGE OF NATURAL AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICAL AND COMPUTER SCIENCES

2022/2023 FIRST SEMESTER EXAMINATIONS

CPS319: Operation Research **Credit Unit/Status: 2 (E)**

Time Allowed: 1.5hrs

INSTRUCTION(s): **Answer ANY 3 QUESTIONS** **DATE: 13/02/2023**

QUESTION ONE

(a) What is Linear Programming? **(4Marks)**

(b) List four steps involved in the formulation of Linear Programming problem. **(4Marks)**

(c) What are the objectives of optimization theory? **(4Marks)**

(d) List the two types of optimization problem. **(4Marks)**

(e) Define the feasible and basic feasible solution. **(4Marks)**

QUESTION TWO

(a) List and Explain the phases of Operation Research **(4Marks)**

(b) What are the components of a Linear Programming Problem in Operation Research. **(4Marks)**

(c) A Lagos based company makes two types of ornaments (type A and B) using brass and copper. Type A contains 100g of copper and 600g of brass and it sold for N100 per unit. Type B contains 500g of copper and 200g of brass and it sold for N140 per unit. The company has 18kg of copper and 12kg of brass in stock. Formulate the above problem as linear programming model in order to maximize the total profit. **(6Marks)**

(d) Use the graphical method to obtain the solution of the linear programming problem in (b) above. **(6Marks)**

QUESTION THREE

(a) State and prove the weak duality theorem in Linear Programming. **(6Marks)**

(b) Construct the dual of the primal problem below;

Minimize $Z = 3X_1 - 2X_2 + 4X_3$

Subject to

$$3X_1 + 5X_2 + 4X_3 \geq 7$$

$$6X_1 + X_2 + 3X_3 \geq 4$$

$$7X_1 - 2X_2 - X_3 \leq 10$$

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$$X_1 - 2X_2 + 5X_3 \geq 3$$

$$4X_1 + 7X_2 - 2X_3 \geq 2$$

$$X_1, X_2, X_3, \geq 0$$ **(4Marks)**

(c) Use the simplex method to solve the Linear Programming Problem below;

Minimize $Z = -2Y_1 - Y_2 - 2Y_3$

Subject to:

$$2Y_1 + Y_2 + Y_3 \leq 2$$

$$Y_1 + 2Y_2 + 3Y_3 \leq 5$$

$$Y_i \geq 0; \; i = 1,2,3$$ **(10Marks)**

QUESTION FOUR

(a) Clearly differentiate between a Linear Programming Problem and Mathematical Problem. **(5Marks)**

(b) Explain the steps involved in the formulation of a Linear Programming Problem. **(5Marks)**

(c) Consider the balanced transportation problem with three ports and three markets. The entries are cost in naira of shipping from each port to corresponding market as given in the table below.

	M1	M2	M3	M4	
P1	4	7	11	3	5
P2	7	5	6	4	7
P3	1	3	4	8	8
	2	9	4	5	

Use the Vogel approximation to find the initial basic feasible solution **(10Marks)**

QUESTION FIVE

(a) Explain briefly what you understand by the following;

(i) Transportation problem **(3Marks)**

(ii) Non-standard Transportation problem **(3Marks)**

(b) Consider the transportation problem given below

					A_i
	10	0	20	11	15
	12	7	9	20	25
	0	14	16	18	5

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B_j	5	15	15	10	

The entries are cost in naira of shipping one unit from source i to destination j.

(i) Find, by North/West corner rule the initial basic solution. **(4Marks)**

(ii) Using the transportation algorithm, find the allocation which minimizes transportation cost. **(10Mark)**

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B_j	5	15	15	10	

The entries are cost in naira of shipping one unit from source i to destination j.

(i) Find, by North/West corner rule the initial basic solution. **(4Marks)**

(ii) Using the transportation algorithm, find the allocation which minimizes transportation cost. **(10Mark)**

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FOUNTAIN UNIVERSITY, OSOGBO

GENERAL STUDIES UNIT

FIRST SEMESTER EXAMINATION 2022\2023 ACADEMIC SESSION
COURSE CODE: GNS 203

COURSE TITLE: ISLAMIC ETHICS AND CULTURE

Time: 1 HOUR

Name:_____ **Department:**_____

Level: _____ **Matric. No:**_____ **College:**_____

INSTRUCTION: ***Carefully choose correct options, any alteration in choosing will be cancelled.***

1. The religion of Islam was named after a person or a group of people. It was decided by a later generation of man, as in the case of Christianity which was named after Jesus Christ.
   a. Not true
   b. Not false
2. If Budhism is to Gautama Buddha, Confucianism after Confucius, Hinduism is after Hindus.
   a. Not true
   b. Not false
3. Prophet Muhammad is nothing to the Muslim except a mortal messenger of the immortal creator.
   a. True
   b. False
4. The right word that describe the life of the prophet, his actions, deeds and tacit approvals is _____
5. If any man or woman engages in a belief or action which clearly in conformity with the Quran or Sunnah, then that belief or action cannot be thought to be 'Islamic'.
   a. Not true
   b. Not false
6. The biography of prophet Muhammad is known in Arabic as _____
   a. Salafiyyah
   b. Sunnah
   c. Seerah
   d. Tazkirah
7. Suratul hujuraat is quran chapter _____
   a. 43
   b. 49
   c. 65
   d. 13
8. As contained in suratu luqman, he advised his children not to be proud, rather walk on the earth boastfully.
   a. Not true
   b. Not false
9. One of the teachings of suratul hujraat is to spread information without confirmation
   a. True
   b. False
10. Salat prohibits evil not obscenity
    a. Not true
    b. Not false
11. Zakat is not merely a tax that is collected from the pockets of the people, It is also a way of sowing the seeds of kindness.
    a. Not false
    b. Not true
12. One of the wisdoms behind the payment of zakat is to raised the standards of the society to the height of decency and purity
    a. Not true
    b. Not false
13. To remove dangerous items from the roads is zakat l fitr and not charity.
    a. False
    b. True
14. To command to do good and prohibit others from doing evil is not charity
    a. True
    b. False
15. While going for hajj, according to quran 2 verse 197 the best provision for it is righteousness.
    a. Not true
    b. Not false
16. The prophet, in one of his hadeeth repeated "I swear by Allah, he is not a believer". In this hadeetl he meant _____
    a. A person who neglects zakat
    b. A person whose hands are not well washec during ablution

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c. A person from whose misdeeds his neighbor is not safe
d. A person who marries his cousin sister

17. It was reported by the prophet that a person who believes in Allah and last day should speak about good things or_____
    a. Recite the Quran
    b. Chant adhkaar
    c. Keep quiet
    d. Keep checking his heart
18. According to the prophet, 'a poor man among my Ummah is he whose good deeds are relegated because he had offended this person and his good deeds were collected and given to the victim.
    a. True
    b. False
19. According to the prophet in one of his hadeeth, the followings are the qualities of the hypocrites except _____
    a. When he speaks he lies
    b. When he fights he does not settle
    c. When he promises, he fails
    d. When you entrust him, he cheats
20. Morality is the name of the principles of life which the religion must adopt and must care for the respect of its standard-bearers.
    a. Not false
    b. Not true
21. According to the prophet, a man who will be dearest to him and will be closest to him on the day of judgment is he who does not possess the best moral character.
    a. Not true
    b. Not false
22. Allah's messenger said: "A slave achieves great position and high honour in the hereafter, though he may be weak in matters of worship but not on account of his wickedness of character he is thrown in the lowest recesses of the hell"
    a. True
    b. False
23. According to quran 31:19, Allah says "show no insolence in your walking, and lower your voice. Verily, the harshest of all voices is the voice of the ass."
    a. Not true
    b. Not false
24. A Muslim is not horrified by being depicted as one who gossips as being like one eats the flesh of his dead brother
    a. Not false
    b. Not true
25. One of the main factors that aid the success th much-sought by believers is the misuse of ton
    a. True
    b. False
26. According to the prophet, a tale carrier would enter paradise
    a. True
    b. False
27. With the tongue, a person can indulge in more with any other parts of the body.
    a. Not true
    b. Not false
28. One of the Sunnah of seeking permission to er another man's house is to state one's name.
    a. True
    b. False
29. Allah has promised, specially, great rewards to fathers who have been given daughters and nc sons, who accepts them, takes care of them ar give them good upbringing.
    a. Not true
    b. Not false
30. Every new baby is born in the natural state of r known as _____

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COLLEGE OF NATURAL AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICAL AND COMPUTER SCIENCES

FIRST SEMESTER EXAMINATION 2021/2022 SESSION

CPS309: DATABASE SYSTEMS 1 **Credit Unit/Status:2(C)**

Time Allowed: 1 ½ HOURS **Date: 26/03/2022**

INSTTRUCTIONS: Answer question 1 and any other 2 questions

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1. Assuming that you work in an ICT company that specializes in designing Database solutions for organization. A newly established community bank wishes to computerize her operations. After an initial fruitful discussion with the representatives of the bank, your technical team has identified the following set of information as being essential in creating the database solution for the bank:
   i. Branch-scheme = (bname, bcity, assets)
   ii. Customer-scheme = (cname, street, ccity)
   iii. Depositor-scheme = (cname, account_num)
   iv. Account-scheme = (bname, account_num, balance).

   Using the above information
   a) Prepare database schema for the tables. **[4 marks]**
   b) From the schema, create a comprehensive database for the Community bank **[5 marks]**
   c) Using a DDL, populate at least 4 tables with relevant data **[3 marks]**
   d) Using Data Manipulation Language write an SQL command that can be used to extract all customers whose balance is above N5M **[3 marks]**
   e) Assuming you are the team leader for this project, which database architecture will you recommend? Give three justifications for this **[5 marks]**
   f) List at least five potential risk factors which may likely plague this database system. **[5 marks]**

2. a(i). What is a Database?
   a(ii) Establish the relationship between a Database system and a Database Management System (DBMS)
   a(iii) List 3 common Database Management Software **[5 marks]**

   b. What is a database Model? **[1 mark]**
   Describe in details using diagrammatic illustrations.with Relevant examples the following Database Models
   (i) Relational Database Model **[4 marks]**
   (ii) Compare and Contrast Hierarchical and Relational database Models **[4 marks]**

   c. Mention 3 reasons why relational Database is the most popular database engines in the market **[3 marks]**

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3. Explain what each of these concepts mean in Database systems

(i) Database Schema **[3 marks]**

(ii) Client -Server Database **[3 ½ marks]**

(iii) Physical view of a database **[4 marks]**

(iv) 2-tier Database Architecture **[4 marks]**

(v) One to many relationship **[3 marks]**

4. a) Draw clearly the Architecture of the organization of a Database System **[5 marks]**

b) Explain fully the functions of at least 5 components of a Database System and how they interrelate **[7 marks]**

c) List the major functions of a Database manager as an important module within a Database Management System **[5 marks]**

5. a) (i) Explain what you understand by Database Normalization

(ii) Give 4 reasons why a good Database Administrator must normalize a database? **[7 marks]**

b) In a typical Database Environment, the following Specialists are identified as very key to the successful and effective operation of the unit.

i. Database Administrator **[6marks]**

ii. Application Programmer **[4 marks]**

In an outline form, list the major roles and responsibilities of each identified stakeholder to the successful operation of a good Database System.

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DEPARTMENT OF MATHEMATICALAND COMPUTER SCIENCES

FIRST SEMESTER EXAMINATION 2021/2022 SESSION

CPS323: Algorithm and Complexity **Credit Unit/Status: 2 (C)**

Time Allowed: 1½hrs 29/03/2022

INSTRUCTION(s): **Attempt any three questions**

1a i) Explain Merging and mention types of merging 4 marks

ii) Use any merge method to sort the Array A 6 marks

A

9	3	7	5	6	4	8	2
1	2	3	4	5	6	7	8

b i) Explain ways to reduce time complexity of Quicksort 3 marks

ii) Given 10 has pivot, Quick sort Array A 7 marks

B

6	5	8	9	3	10	15	12	12	16	∞
1	2	3	4	5	6	7	8	9	10	11

2a. i) Describe a complete binary tree with two (2) good examples. 6 marks

ii) Given Array T below, produce its equivalent binary tree. 7 marks

T

A	B	C	D	E	F	G

b. With Binary Tree (BT) examples show the difference between max and min heaps 7 marks

3. i) Draw the equivalent BT for the Array H 6 marks

H

50	30	20	15	10	8	16

ii) Insert 60 to the array H and draw the BTs with equivalent Array 6 marks

iii) Perform delete operation on the Array H 6 marks

iv) Explain the Greedy Method. 2 marks

4. i) Explain Knapsack problem 2 marks

Table 1

Objects: O	1	2	3	4	5	6	7
Profits: P	10	5	15	7	6	18	3
Weights in Kg: W	2	3	5	7	1	4	1

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Given M = 15Kg, is the maximum capacity of the Knapsack

ii) From Table 1 calculatex (profit/weight) for the Objects — 6 marks

iii) Calculate the total weight (that can profit Knapsack owner) — 6 marks

iv) Calculate the total profit for the selected objects — 6 marks

Hint: the weight can be fractionalized

5a. i) Explain the application areas of Huffman Coding — 4 marks

ii) Given this message: **BCCABBDDAECCBBAEDDCC**

Complete table 2 below using the message for the HUFFMAN coding approach

Table 2

Characters	Count/Frequency

4 marks

b. i) Draw appropriate Binary Tree from the table — 6 marks

ii) Complete the Table 3 below using b (i) — 6marks

Table 3

Characters	Count/Frequency	Code	Message bits

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DEPARTMENT OF MATHEMATICAL AND COMPUTER SCIENCES

FIRST SEMESTER EXAMINATIONS 2021/2022 SESSION

CPS305: Operating System II **Credit Unit/Status: 2 (C)**

Time Allowed: 1½hrs **23/03/2022**

INSTRUCTION(s): ATTEMPT ANY TWO (2) QUESTIONS FROM BOTH PARTS

SECTION A:

1a. Discuss the scheduling algorithms [5 marks]

b.

Processes	Burst Time
P1	53
P2	17
P3	68
P4	24

Time Quantum = 20

Using table in 1b calculate:

i) Calculate the limit burst time for each process [10 marks]

ii) Calculate the average waiting of the processes [5 marks]

2a. Explain Dinning Philosopher conditions [5 marks]

b. i) Describe how interrupt works and how its being taken are off [4 marks]

ii) Explain Maskable and Non-Maskable Interrupts [3 marks]

iii) Mention and explain types of Software Interrupts [3 marks]

3a. Explain various methods that can be used to handle Deadlock [5 marks]

b i) Using suitable Algorithm explain sleeping barber solution [5 marks]

ii) Discuss bounded –buffer problem [5 marks]

SECTION B:

1. a) Briefly explain the term File management and itemize its functions. [5 Marks]

b) Write five (5) objectives of a File Management System [5 Marks]

c) List four (4) examples of a common file format. [2 Marks]

d) Enumerate six (6) operations that an be performed on a file. [3 Marks]

2. a) In practice, why is it preferred that the number of frames in memory is a power of two? [5 Marks]

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b) Write brief answers to the following questions (on memory allocation):

i. What is the difference between Fixed Partitioning and Dynamic Partitioning?

ii. Mention the deficiencies of Fixed Memory Partitioning and Dynamic Memory Partitioning respectively?

iii. What does Paging allow to do that was not possible with Partitioning?

iv. Cite important differences between Virtual Paging and Simple Paging.

[2.5 Marks each]

3. Write short note the following terminologies:

a. Paging
b. Segmentation
c. Fragmentation
d. Defragmentation
e. Compaction

[3 Marks each]

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COLLEGE OF NATURAL AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICAL AND COMPUTER SCIENCES

FIRST SEMESTER EXAMINATION 2022/2023 SESSION

CPS 307: FUNDAMENTALS OF DATA STRUCTURES **CREDIT UNIT/STATUS: 2 (C)**

Duration: 2hrs 08/02/2023

INSTRUCTION(s): ANSWER QUESTION ONE (1) AND ANY OTHER TWO (2) QUESTIONS

Question 1

(a) Briefly explain what Data Structure means and give real life illustrations to buttress your points. **[4marks]**

(b) Differentiate between Linear and Non Linear Data Structures, providing relevant examples of each data structure. **[4marks]**

(c) Explain the concept of Queue data structure using any 4 analogies of your own **[2marks]**

(d) Data structures are normally classified into two types, namely primitive and non-primitive data structures. Explain with examples. **[5marks]**

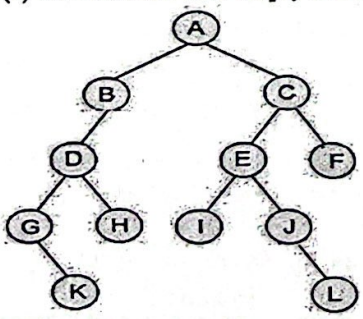
(e). Applying the FIFO principle, complete the table below:

Action	Contents of queue Q after operation	Return value
Initialize (Q)		
Add (X,Q)		
Add (Y,Q)		
Add(Z,Q)		
Remove (Q)		
Add (A,Q)		
Remove (Q)		
Remove (Q)		
Remove (Q)		

[5 marks]

Question 2

(a) Traverse the non-empty Binary tree below and give the node order: **[7 marks]**



(i) Pre-Order Algorithm (ii) Post-order Algorithm (iii) In-Order Algorithm

(b) Discuss the following terminologies in Tree Data Structure **[5 marks]**

(i) Binary tree (ii) Root node (iii) Leaf node (iv) Degree of a node (v) Similar Binary tree

(c) Perform the following operations: **[8 marks]**

(i) 10's complement of 9856_{10} (ii) 9's complement of 9856_{10} (iii) 2's complement of 1101_2

(iv)1's complement of 1101_2

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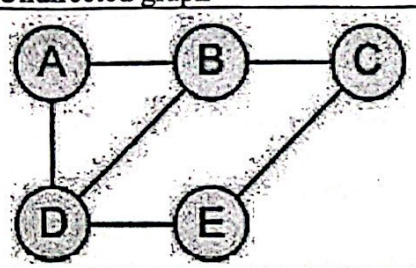
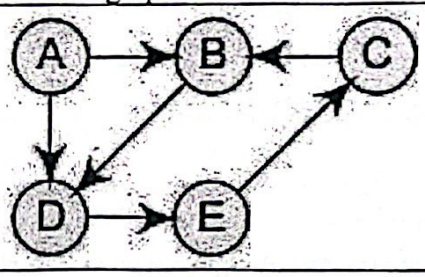
Question 3

(a) Given an expression, Exp = ((x+ y) - (a * b)) % ((e ^f) / (u-v)), construct the corresponding binary tree **[3 marks]**

(b) Provide the corresponding adjacency matrix of the below graph: **[3 marks each]**

Undirected graph	Directed graph
	

(c) Continuously perform the operation below using the List, L=

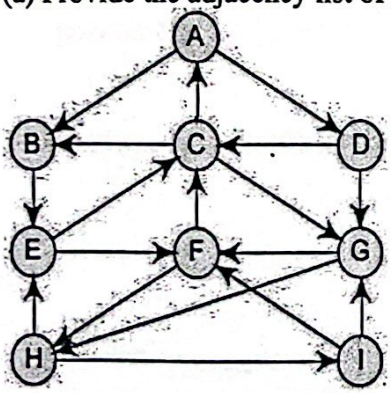
A	B	C

(i) Add (1,X,L) (ii) Set (2,Z,L) (iii) Remove (Z,L) (iv) Get (2,L) (v) IndexOf (X,L)
[6 marks]

(d) Enumerate any 5 operations performed on Stack data structure. **[5 marks]**

Question 4

(a) Provide the adjacency list of the graph below **[8 marks]**



(b) Create a binary search tree using the following data elements: 45, 39, 56, 12, 34, 78, 32, 10, 89, 54, 67, and 81. **[5 marks]**

(c) Convert the following infix expressions into postfix expressions. **[5 marks]**
Solution:
(i) (X+Y) * (A+B) (ii) (A + B) / (C + D) *(D - E) (iii) (I + J)^Z

(d) Why is adjacency matrix called bit matrix? **[2 marks]**

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FOUNTAIN UNIVERSITY, OSOGBO

GENERAL STUDIES UNIT

FIRST SEMESTER EXAMINATION 2022\2023 ACADEMIC SESSION
COURSE CODE: FUC 301

COURSE TITLE: FOUNTAIN UNIVERSITY FIQH CLASS

Time: 1 HOUR

Name:_____ **Department:**_____

Level: _____ **Matric. No:**_____ **College:**_____

INSTRUCTION: ***Carefully choose correct options, any alteration in choosing will be cancelled.***

1- The grave is the first stage of heaven according to..
A- Allah B- Believers C- Muhammad D- Suffi

2- "Give us good in this world and good in the....."
A- Heaven B- Believers C- Akhirah D- Suffi

3- ..... were advised to embrace Islam wholeheartedly
A- Jihadists B- Believers C- Muslims D- Kafir

4- ".....surely we are Allah's, and to Him we return
A- Return B- believe C- Depend D- Complain

5- "Whoever does an atom's weight of evil will ....."
A- feel it B- Get it C- Reap it D- See it

6- No mother should be ..... through her child
A- Shunned B- Chased C- Harmed D- Neglected

7- Parents are entitled to ..... in life and death
A- Prayers B- Care C- Finance D- Shelter

8- ".....is a mark of faith,"
A- Kindness B- Humbleness C- Love D- obedient

9- It is not appropriate to refer to Islam as .....
A- Muhmin B- Tablig C- Abrahamonic D- Muhammedan

10- A lunatic transaction is regarded .....
A- Filthy B- Void C- Clean D- Tidy

11- Qubuul means .....
A- Profit B- Acceptance C- Finance D- Allowance

12- Al-Gharar means .....
A- Abnormal B- Tricky C- Normal D- Scary

13- Hinduism is a religion named after a .....
A- Personality B- Race C- Tribe D- Place

14- Children must recognize the ..... of the parent.
A- Impact B- Status C- Right D- Honour

15- All the battles fought by Prophet Muhammad are
A- Strategic B- Proactive C- Defensive D- Conclusiv

16- "God hardens the heart of whomever He....."
A- Guides **B-** Wills **C-** Anoints **D-** Dislikes

17- Shortening of Rakats in Salat is known as .....
A- Jam'u **B-** Iqamah **C-** Fathat **D-** Qasri

18- The gay practice is known as ..... In Islam
A- Liwat **B-** Ruqyah **C-** Sadaaqi **D-** Dislikes

19- The inferno that lead to the compilation of Qur'an
..... **A-** Injustice **B-** Death **C-** Killing **D- Draught**

20- Yamammah is an event name which was tagged to
A- Battle **B-** Rancour **C-** Jihad **D-** Frustration

21- Salat offered at the dawn period is called .....
A- Maghrib **B-** Ishai **C-** Fajri **D-** Dhuur

23- A situation where 2 Salats are being combined
A- Battle **B-** Rancour **C-** Jihad **D-** Frustration

24- It is ..... to prevent imminent attack in Islam
A- Nullified **B-** Allowed **C-** Encouraged **D-** Discouraged

25- It is ..... clear that Islam was spread by sword.
A- Vigorously **B-**Affirmatively **C-**Obviously **D-** Convincingly

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26- These are Khalifah(s) that took part in compilation of Quran except .....

A-Umar B- Alli C- Abubakar D- Uthman

27- Muhammad's integrity assisted in authentication of

A- Battle B- Hadith C- Qur'an D- Sunah

28- There are .....between Qur'an and Bible

A-Criminalities B-Frivolities C-Similarities D- Spiritualties

29- The first verses revealed from Qur'an are .....

A- 9 B- 12 C- 7 D- 5

30- The spherical shape of the earth is a ..... fact in Qur'an

A- Botanical B- Theological C- Biblical D- Scientific

31- All these are categorized as Bay'u except .....

A- Selling B- Consumption C- Buying D- Services

32-Textual evidences in Quran & Sunnah regarded Bay'u

A- Battle B- Rancour C- Jihad D- Frustration.

33- "One who lacks kindness of heart lacks ....."

A- All devotions B- All Sincerity C- All favour D- All good

34- The Qur'an writing materials were kept with .....

A- Thabit B- Hafsat bin Umar C- Umar D- Abubakar

35- "And take ..... when you buy and sell"

A- Stock B- Witness C- Measurement D- Caution

36- Transaction is bassed on ..... agreement

A- Communal B- Natural C- Mutual D- Internal

37- ..... is part of transaction conditions.

A- Immunity B- Civility C- Accountability D- Sensibility

38- Sale of Al-Gharar involves these except .....

A Risks, B- Jittery C- Speculation D- Uncertainty

39- Contact between the .....necessitates Ghuslu

A- Contacts B- Parts C- Genitals D- Hearts

40- Prayer ..... against Evils

A- Illuminates B- Protects C- Works D- Radiate

41- Ghusl is ..... with presence of semen fluid

A- Battle B- Timely C- Satisfactory D- Obligaory.

42- The difference between Guslu Janabah & Dead is

A- Interest B- Personality C- Devotion D- Frustrat

43- Ghuslu is ..... if a single hair is left dry.

A- Compromising B- Untidy C- Invalid D- Intact

44- Rinsing the mouth with water is .....

A- Mubaahu B- Sunnah C- Mustahab D- Faraic

45- A daily ritual that is performed in a specified intervals is .....

A- Qur'an B- Salat C- Shukru D- Sujuud

46- "Seek ..... through patience and Salat"

A- God B- Help C- Justice D- Good

47- Salat is the sign of a .....

A- Leadership B- Mujahid C- Believer D- Righteous

48- Jam'u means ..... of Salat

A- Dedication B- Combination C- Shortening D- Valu

49- Shaf'i signifies units of .....

A- Salat B- Nafl C- Fard D- Ruku'

50- 'Asri is observed in the .....

A- Sunset B- Afternoon C- Pre-down D- Noon

51- Qasri & Jam'u can be established only while .....

A- In convoy B- In panic C- In distress D- On journe

52- Establishing ..... leads to Allah's eternal Blessin

A- Tahajud B- Fasting C- Jihad D- Salat

53- "Make ... as the last prayer of your night prayer"

A- Kurisiyu B- Nafilat C- Tahajud D- Witri

54- Dhuur is observed in the .....

A- Sunset B- Afternoon C- Pre-down D- Noon

55- Punctuality and ..... makes Salat more rewardi

A- Recitation B- Constancy C- Congregation D- Qunu

56- Nafl and Fard are ..... of prayer.

A- Conditions B- Rakats C- Components D- Types

57- There are two Naflats prescribed ..... Maghrib

A- Between B- After C- During D- Before

58- Fajr is observed in the .....

A- Sunset B- Afternoon C- Pre-down D- Noon

59- Maghrib is observed in the .....

A- Sunset B- Afternoon C- Pre-down D- Noon

60- The aggregate units for daily salat is routine are

A- 5 B- 17 C- 33 D- 66

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COLLEGE OF NATURAL AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICAL AND COMPUTER SCIENCES

FIRST SEMESTER EXAMINATION 2022/2023 SESSION

CPS 305: OPERATING SYSTEM II **Credit Unit/Status: 2 (C)**

Time Allowed: 2.00Hrs 10/02/2023

INSTRUCTION(s): ATTEMPT QUESTION 1 AND ANY OTHER TWO (2) QUESTIONS.

Question 1

a) Explain the following terms in relation to Asynchronous Concurrent Programming: **[3marks each]**

(i) Race Condition (ii) Mutual Exclusion (iii) Indefinite Blocking (iv) Deadlock

b) Suppose a system allows for starvation of certain entities. As a prospective System designer, how would you provide a means for preventing this? **[4marks]**

c) Given the workload shown in Table 1 below. All five processes arrive at time 0, in the order given, with the length of the CPU-burst time given in milliseconds. Consider the FCFS, SJF, and RR (quantum = 10milliseconds) scheduling algorithms for these set of processes. Which algorithm would give the minimum average waiting time? **[6marks]**

Table 1: Process's Burst time

Process	*Burst Time*
P1	*10*
P2	*29*
P3	*3*
P4	*7*
P5	*12*

d) In the context of Dijkstra's Banker's algorithm, discuss whether the State described in Table 2 below is safe or unsafe. If the State is safe, show how it is possible for all processes to complete. If the state is unsafe, show how it is possible for deadlock to occur. **[8marks]**

Table 2: System State

Process	*Allocation*	*Max Need*	*Available*
	A B C D	A B C D	A B C D
P0	0 0 1 2	0 0 1 2	1 5 2 0
P1	1 0 0 0	1 7 5 0	
P2	1 3 5 4	2 3 5 6	
P3	0 6 3 2	0 6 5 2	
P4	0 0 1 4	0 6 5 6	

If a request from process *P1* arrives for (0,4,2,0), can the request be granted immediately?

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Question 2

a) A process repeatedly requests and releases resources of type R1 and R2, one at a time and in that order. There is exactly one resource of each type. A second process also requests and releases these resources one at a time repeatedly.

i. With the aid of R-A graph, under what circumstances could these processes deadlock?

ii. What could be done to prevent deadlock? **[6marks]**

b) Enumerate the requirements that must be satisfied by a solution to the critical section problem. **[3marks]**

c) Developments in OS have generally occurred in an evolutionary trend. For each of the following transitions, describe the primary motivations that led OS designers to produce the new type of system from the old: **[6marks]**

i. Single-user system to multiprogramming.

ii. Fixed-partition multiprogramming to variable-partition multiprogramming.

iii. Contiguous memory allocation systems to noncontiguous memory allocation systems.

Question 3

a) Consider a system consisting of four resources of the same type that are shared by three processes, each of which needs at most two resources. Show that the system is deadlock-free. **[4marks]**

b) Show that the four necessary conditions for deadlock hold in a traffic deadlock and state a simple rule that will avoid deadlock in the system. **[6marks]**

c) Given the memory partitions of 100 KB, 500 KB, 200 KB, 300 KB and 600 KB (in that order), how would each of the first-fit, best-fit, and worst-fit algorithms place processes of 212 KB, 417 KB, 112 KB, and 426 KB (in that order)? For this particular case, which algorithm makes the most efficient use of memory? **[5marks]**

Question 4

a) Why is it inefficient to allow only one process to be in memory at a time? **[2marks]**

b) Dekker's algorithm prevented a process from being indefinitely postponed from entering a critical section.

i. Describe how indefinite postponement was prevented. **[3marks]**

ii. How is this related to aging? **[2marks]**

c) Using a tabular form, differentiate between the following terms: **[8marks]**

i. Deadlock prevention and Deadlock avoidance

ii. Internal and External fragmentation

iii. Fixed and Variable Partition Multiprogramming

iv. Paging and Segmentation

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COLLEGE OF NATURAL AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICAL AND COMPUTER SCIENCES

2021/2022 FIRST SEMESTER EXAMINATIONS

CPS 303: PROGRAMMING WITH VISUAL BASIC.NET **Credit Unit/Status: 3 [C]**

Time Allowed: 2hrs 29/03/2022

INSTRUCTION[s]: ATTEMPT ALL QUESTIONS IN SECTION A AND ANY OTHER TWO (2) IN SECTION B

SECTION A

1. State whether each of the following is true or false. If false, state why.
   a) The title bar of the IDE displays the IDE's mode.
   b) Both Form and Labels have a title bar.
   c) The toolbar contains icons that represent controls that can be drag and drop onto a Form.
   d) VB.Net is backward compatible with VB 6.
   e) The Variable of type Char cannot be converted to type Integer.
   f) Control property can be modified only by writing code.
   g) Visual Basic file use the extension .vxls. [1 Mark each]
2. Fill the following blank in each of the following statements. [1 Mark each for the space]
   a. Method can be declared in _____ and _____.
   b. The _____window allows you to browse solution file.
   c. Visual Basic Console Application begins execution at _____ method.
   d. Class _____ contains methods for displaying dialogs.
   e. A Method is invoked with a (n) _____.
   f. The technique of _____ allows you to create GUIs without writing code.
   g. _____ and _____ are two type of methods in VB.Net.
   h. A variable known only within the method in which it is declared is cleared is called a (n) _____.
   i. The _____ of a variable is the portion of the program in which the variable can be referenced without qualification.
   j. Keywords Public and Private are _____.
   k. A[n] _____appears when the mouse pointer hover an icon.
   l. Keyword _____indicates that a method will perform a task but will not return any value.
   m. In a For.....Next statement, incremental occurs _____ the body of the statement is performed.
   n. In a Do.....Loop while repetition statement, the body of the loop is executed _____.
   o. The expression following the keyword Select Case is called _____.
   p. The properties in the properties window can be sorted _____ or_____.

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3. Dot (.)Net Programs are compiled into machine specific instruction in two steps. Describe the steps. [2 Marks]
4. Using Do Until .....Loop repetition statement, write a program that calculate the first power of three larger than 100. [2 Marks]

SECTION B

1. [a] Briefly describe each of the following terms:

   [i.] Menu bar [ii.] Toolbar [iii.] Solution Explorer [iv.] Property Window [8 Marks]

   [b] Differentiate between the Do While..... Loop and Do.....Loop While statement. [3marks]

   [c] Write a VB.Net program that counts integers from 1 to 100, using any repetition statement and counter variable x. Assume the variable x has been declared but not initialized. Print only five integers per line. [Hint: use the calculation x mod 5. When the value of this is 0, print a carriag return; otherwise, print a tab character. Call Console.WriteLine to output the carriage return and call Console.Write(vbTab) to output the tab character] [4 marks]

2. [a] In a tabular form, list 5 controls use in Visual Basic programming with their prefix and uses. [5 marks]

   [b] Write a console application in Visual Basic that print elements in two dimensional array whose elements are {(1, 2, 3) , (7, 8, 9)} by row. [5 marks]

   [c] List the six (5) string manipulating methods in VB.Net and their syntax. [5 Marks]

3. [a] Explain term exception in VB. [5 Marks]

   [b] Write a window application in VB that sum element of an array whose elements are[1,2,3,4,5,6,7,8,9,10]. [5 Marks]

   [c] Explain five [5] features that make .NET a wonderful platform for developing modern applications. [5 Marks]

4. (a) Briefly discuss four (4) characteristics of an Object-Oriented Programming Languages. [6 marks]

   (b) Write a Visual Basic statement to accomplish each of the following:

   I. Sum the odd integers between 1 and 99 using a while statement. Assume that the variables sum and count have been declared as an integer.

   II. Sum the squares of even integer between 1 and 15 using a Do While.....loop repetition statement. Assume that the integer variables sum and count have been declared and initialized to 0 and 2, respectively.

   III. Print the numbers from 20 to 1 to the MessageBox using a Do until.....loop and Integer counter Variable counterIndex. Assume that the variable counter index is initialized to 20. [3 Marks each]

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FOUNTAIN UNIVERSITY, OSOGBO

GENERAL STUDIES UNIT

FIRST SEMESTER EXAMINATION 2022\2023 ACADEMIC SESSION

COURSE CODE: GNS 203

COURSE TITLE: ISLAMIC ETHICS AND CULTURE

Time: 1 HOUR

Name:_____ **Department:**_____

Level: _____ **Matric. No:**_____ **College:**_____

INSTRUCTION: ***Carefully choose correct options, any alteration in choosing will be cancelled.***

1. The religion of Islam was named after a person or a group of people. It was decided by a later generation of man, as in the case of Christianity which was named after Jesus Christ.
   a. Not true
   b. Not false
2. If Budhism is to Gautama Buddha, Confucianism after Confucius, Hinduism is after Hindus.
   a. Not true
   b. Not false
3. Prophet Muhammad is nothing to the Muslim except a mortal messenger of the immortal creator.
   a. True
   b. False
4. The right word that describe the life of the prophet, his actions, deeds and tacit approvals is _____
5. If any man or woman engages in a belief or action which clearly in conformity with the Quran or Sunnah, then that belief or action cannot be thought to be 'Islamic'.
   a. Not true
   b. Not false
6. The biography of prophet Muhammad is known in Arabic as _____
   a. Salafiyyah
   b. Sunnah
   c. Seerah
   d. Tazkirah
7. Suratul hujuraat is quran chapter _____
   a. 43
   b. 49
   c. 65
   d. 13
8. As contained in suratu luqman, he advised his children not to be proud, rather walk on the earth boastfully.
   a. Not true
   b. Not false
9. One of the teachings of suratul hujraat is to spread information without confirmation
   a. True
   b. False
10. Salat prohibits evil not obscenity
    a. Not true
    b. Not false
11. Zakat is not merely a tax that is collected from the pockets of the people, It is also a way of sowing the seeds of kindness.
    a. Not false
    b. Not true
12. One of the wisdoms behind the payment of zakat is to raised the standards of the society to the height of decency and purity
    a. Not true
    b. Not false
13. To remove dangerous items from the roads is zakat I fitr and not charity.
    a. False
    b. True
14. To command to do good and prohibit others from doing evil is not charity
    a. True
    b. False
15. While going for hajj, according to quran 2 verse 197 the best provision for it is righteousness.
    a. Not true
    b. Not false
16. The prophet, in one of his hadeeth repeated "I swear by Allah, he is not a believer". In this hadeeth he meant _____
    a. A person who neglects zakat
    b. A person whose hands are not well washed during ablution

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c. A person from whose misdeeds his neighbor is not safe
d. A person who marries his cousin sister

17. It was reported by the prophet that a person who believes in Allah and last day should speak about good things or_____
    a. Recite the Quran
    b. Chant adhkaar
    c. Keep quiet
    d. Keep checking his heart
18. According to the prophet, 'a poor man among my Ummah is he whose good deeds are relegated because he had offended this person and his good deeds were collected and given to the victim.
    a. True
    b. False
19. According to the prophet in one of his hadeeth, the followings are the qualities of the hypocrites except _____
    a. When he speaks he lies
    b. When he fights he does not settle
    c. When he promises, he fails
    d. When you entrust him, he cheats
20. Morality is the name of the principles of life which the religion must adopt and must care for the respect of its standard-bearers.
    a. Not false
    b. Not true
21. According to the prophet, a man who will be dearest to him and will be closest to him on the day of judgment is he who does not possess the best moral character.
    a. Not true
    b. Not false
22. Allah's messenger said: "A slave achieves great position and high honour in the hereafter, though he may be weak in matters of worship but not on account of his wickedness of character he is thrown in the lowest recesses of the hell"
    a. True
    b. False
23. According to quran 31:19, Allah says "show no insolence in your walking, and lower your voice. Verily, the harshest of all voices is the voice of the ass."
    a. Not true
    b. Not false
24. A Muslim is not horrified by being depicted as one who gossips as being like one eats the flesh of his dead brother
    a. Not false
    b. Not true
25. One of the main factors that aid the success that is much-sought by believers is the misuse of tongue.
    a. True
    b. False
26. According to the prophet, a tale carrier would not enter paradise
    a. True
    b. False
27. With the tongue, a person can indulge in more than with any other parts of the body.
    a. Not true
    b. Not false
28. One of the Sunnah of seeking permission to enter another man's house is to state one's name.
    a. True
    b. False
29. Allah has promised, specially, great rewards to fathers who have been given daughters and not sons, who accepts them, takes care of them and give them good upbringing.
    a. Not true
    b. Not false
30. Every new baby is born in the natural state of man, known as _____

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DEPARTMENT OF MATHEMATICAL AND COMPUTER SCIENCES

FIRST SEMESTER EXAMINATION 2021/2022 SESSION

CPS307: Foundation of Data Structure **Credit Unit/Status:2 (C)**

Time Allowed: 02hrs 21/03/202022

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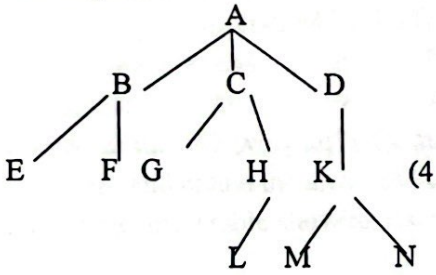
1. (a) Briefly explain what Abstract Data type means. (5 marks)
   (b Convert the infix expression (K*G)*(P - Q) into postfix expression (12 marks)
   (c) Explain concisely what the following terms means (i) Peek operation (ii) Algorithm (iii) Data (iv) Dequeue (8 marks)

2. (a) Discuss extensively on the memory implementations of the following data structure types (i) Stack (ii) Graph (iii) Queue (15 marks)
   (b) Draw the tree representation of this mathematical expression (i) $-b+(n^2 -4ac)^{1/2}$ (ii) (k+1)/(j*3) (10 marks)

3. (a) Explain in details what the following terms means (i) Complete binary tree (ii) String (iii) Set (12 marks)
   (b) Perform these operations (i) 23.55_{10} to base 2 (ii) $AF916_{16}$ to base 8 (iii) $26_{10}+79_{10}$ using BCD (9 marks)
   (c) State the inorder and preorder traverse of Tree T.



(4 marks)

4. (a) Briefly explain each of the following (i) Heap (ii) Hash technique (iii) Memory management (iv) Fragmentation (10 marks)

   (b) Using 10's and 9's complements, perform the following subtraction $2816_{10} - 8569_{10}$ (5 marks)

   (c) Enumerate the advantages and disadvantages of (i) Buddy system (ii) Adjacency matrix (10 marks)

5. (a) Briefly discuss each of the following (i) Garph (ii) Edge (iii) Path (iv) cycle (6 marks)

   (b) State whether each of the following is a path, cycle or walk

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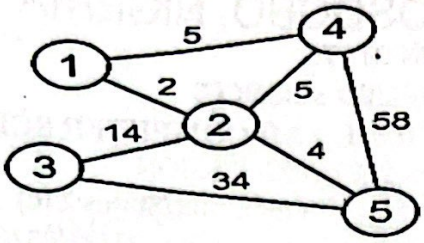

Nodes	Path/ cycle/ walk	Yes / No
1-4-5-3	Path Cycle walk	
1-2-5		
1-2-3		
1-4-2		
1-4-2-1		
3-2-5		

(6 marks)

(c) Draw any seven subgraphs of the graph in 5(b). (7 marks)

(d) Define any five operations that can be performed on a graph. (5 marks)

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COLLEGE OF NATURAL AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICAL AND COMPUTER SCIENCES

FIRST SEMESTER EXAMINATION 2021/2022 SESSION

CPS 301: STRUCTURED PROGRAMMING **Credit Unit (Status): 3 (C)**

Time Allowed: 2.00 Hr. 22/03/2022

Instructions: Attempt ALL Questions in Section A and any other Two (2) in Section B.

Section A

Question 1

a) Discuss the fundamental idea in Structured programming? **[5marks]**

b) Explain the following concepts with reference to Java Programming language:

i. Modularity ii. public static void main (String args[])

iii. Classes iv. Constructor v. Array **[10marks]**

c) Write a Java program to implement a simple calculator. **[5marks]**

Question 2

a) Java referred to as the 'Platform Independent Programming Language. What advantage does this have to the programmer? **[2 ½ marks]**

b) What do you understand by the following terms? **[7 ½ marks]**

i. Variable casting ii. Parameter iii. Java Libraries

iv. Encapsulation v. Access modifiers

c) Perform the following tasks for an array table:

i. Declare and create the array that contains 5 elements **[1mark]**

ii. Print the array table showing the index and the value at each index of the array. **[2marks]**

iii. Sum up the elements in the array and print the sum. **[2marks]**

Section B

Question 1

a) Discuss the two Structured programming paradigm that you know, and expatiate on the significant and the drawbacks of both differences. **[6marks]**

b) Assuming you are among the team working on a project called Result Computation System, and you are given the task to fix the error in the code snippet given to you below.

```
int score = new [10];
total = 0;
for (i = 0; i< 10; i++){
        if (score[] % 2 == 0)
        total += score[];
}
```


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i. Correct the errors and write out the corrected code snippets **[2 ½ marks]**

ii. Summarize what the program is doing. **[2marks]**

iii. Suppose the following data were supplied to the program 65, 67, 68, 52, 64, 70, 63, 76, 52, 44, what will be the final output from the program? **[2marks]**

Question 2

a) "To see it right, set it right". Discuss this assertion with reference to good programming style. **[5marks]**

b) A Fountain University staff bought a good worth N30000 from FUOCICS with a profit of 5% of the goods he bought. He pays N2000 at the end of each month. The amount he owes at the end of each month is calculated thus:

AM = P+ (5 / 100 * P)2000

where P = Principal amount left to be paid.

i. Write a program that will print the amount he owes each month and the number of months it will take him to pay all the debt. **[5marks]**

ii. Give the analysis of your program. **[2½ marks]**

Question 3

a) Differentiate between the following: **[8marks]**

i. Local variables and Instance variables

ii. Java and FORTRAN programming language

iii. Constructor and Method

iv. No argument constructor and parameterized constructor

b) Write a program to create a class Student with data 'name, matric number and email address' along with method printData to display the data. Create the two objects s1, s2 to declare and access the values. **[4 ½ marks]**

Question 4

a) Give an example of a Java statement to illustrate any three (3) of the control structure that you know. **[6marks]**

b) At NITDA, each Staff member is given a monthly basic salary that commensurate with his/her salary grade level. In addition, each Staff is given 10% and 15 % of basic salary as transport and housing allowance respectively, and N500 as meal subsidy. Also, if a Staff has spent over 10 years in the organization, he/she is given 2% of his basic salary. Write a java programme to implement the above payroll policy assuming the total number of Staff is 50. **[6½marks]**

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COLLEGE OF NATURAL AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICAL AND COMPUTER SCIENCES

2021/2022 FIRST SEMESTER EXAMINATIONS

CPS317: Statistical Computing **Credit Unit/Status: 2 (E)**

Time Allowed: 1.5hrs **Thursday 24/03/2020**

INSTRUCTION(s): **Answer ANY THREE QUESTIONS**

QUESTION ONE

(a) Computational Statistics involves intensive programming in solving problems thereby making inference a lot easier. Many soft\ware exists today but R has grown so much that more than 5000 packages are contributed from institutions worldwide. It has therefore taken the position of a statistical lingua franca. State the advantages of using R for statistical computing. **(5Marks)**

(b) Explain four levels of measurement / scale and give one example **each.** **(5Marks)**

(c) List and discuss any five statistical packages that you know with their areas of application in Computational Statistics. **(5Marks)**

(d) Discuss the strength and ease of the use of the statistical packages in (a) above for the different types of analysis. **(5Marks)**

QUESTION TWO

(a) In a tabular form, differentiate between Data View and Variable View in SPSS **(5Marks)**

(b) A research is to be conducted to evaluate the performance of newly developed software for result computation by a well known software developing company in Nigeria. The results of the finding are required by an international organization to be published in one of their publications.Draw a **well detailed questionnaire** to investigate this issue. **(10Marks)**

(c) Explain the process of coding the details in the questionnaire designed in (a) above into SPSS for analysis. **(5Marks)**

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QUESTION THREE

(a) Explain each line of codes below as it will be executed in R Statistical package

```
> rm(list=ls())
> getwd()
> setwd(dir="C:/Users/Sholadehindel/Desktop)
> n=1:100
> y=lgamma(n+1)
> x=0.5*log(2*pi)+(n+0.5)*log(n)-n
> plot(x,y)
> var(y)
> sqrt(var(y))
> q();
```

(10 Marks)

(b) The following are sample observations on incoming solar radiation at a greenhouse:

11.1 10.6 6.3 8.8 10.7 11.2 8.9 12.2

Write the R codes to;

(i) assign the data to an object called soalr.radiation. **(2Marks)**

(ii) to call the object into R console for analysis **(2Marks)**

(iii)find the mean, standard deviation, and skewness of the radiation observations. **(4Marks)**

(iv)Plot a histogram of the solar.radiation. **(2Marks)**

QUESTION FOUR

Coefficients [a]

Model		Unstandardized		Standardized	t	Sig.
		B	Std. Error	Beta		
1	Constant	2.758	1.912		1.443	0.187
	X_1	-0.480	0.281	-0.130	-1.707	0.126
	X_2	3.591	0.297	0.916	12.076	0.000
	Gender	0.477	0.144	0.252	3.308	0.017

a.Dependent Variable: Y

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(a) Considering the output of regression Analysis above;

(i) Is the regression model a good fit at 5% level and Why? **(3 Marks)**

(ii) Write out the full regression model. **(3 Marks)**

(iii) What do you notice in values of estimated parameters as compared with the corresponding standard errors? **(4 Marks)**

(b) What is data processing and Explain the steps involve in data processing **(10 Marks)**

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COLLEGE OF NATURAL AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICAL AND COMPUTER SCIENCES

FIRST SEMESTER EXAMINATION 2022/2023 SESSION

MAT 203: LINEAR ALGEBRA I **Credit Unit/Status: 3 (C)** **Time Allowed: 2 hours 15 Minutes**

INSTRUCTION: ANSWER ANY FOUR (4) QUESTIONS **10/02/2023**

Question 1

(a) Define the following:

(i) Power set, P(S), of a non-empty set S [2 Marks]

(ii) Cartesian product of sets X and Y [2 Marks]

(b) If A = {1, 2, 3, 4, 5}, find P(A) [5 Marks]

(c) Let A and B be a pair of non-empty sets. Prove that $(A \times B) \cap (B \times A) = (A \cap B) \times (B \cap A)$ [6 Marks]

Question 2

(a) Fountain University Factory has a machine that produces three different commodities, x, y and z. On the first day of operation, the machine produces 3 units of commodity x, 4 units of commodity y and 2 units of commodity z at a cost of \$53. On the second day, it produces a unit of commodity x, 2 units of commodity y and 5 units of commodity z at a cost of \$52 and on the third day it produces 4 units of commodity x, a unit of commodity y and 3 units of commodity z at a cost of \$47. Using any suitable method, assist the factory to determine the cost of producing a unit each of commodity's x, y and z. (Hint: set up a system of linear equations) [10 Marks]

(b) When do we say vectors $u_1, u_2, u_3, \dots, u_n$ in V form a spanning set of V? [2 Marks]

(c) Given that $V = \mathbb{R}^3$, list out the vectors that form a spanning set in $\mathbb{R}^3$ [3 Marks]

Question 3

(a) Given that $f(x) = 2x^2 - 3$, $g(x) = x^2$ and $h(x) = x + 5$, compute:

(i) $g \circ f$ [1½ Marks]

(ii) $f \circ h$ [1½ Marks]

(iii) $(f \circ h) \circ (h \circ g)$ [3 Marks]

(iv) show that $f \circ (h \circ g) = (f \circ h) \circ g$ [4 Marks]

(b) Find the solution set for the congruent relations below:

(i) $x + 4 \equiv 20 \ (mod\ 5)$ [2½ Marks]

(ii) $y - 6 \equiv 2 \ (mod\ 3)$ [2½ Marks]

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Question 4

(a) Explain with an example each, the following types of matrices:

(i) Square Matrix [1 Mark]
(ii) Zero (Null) Matrix [1 Mark]
(iii) Diagonal Matrix [1 Mark]
(iv) Identity Matrix [1 Mark]
(v) Transpose of a Matrix [1 Mark]

(b) Given the following matrices:

$$A = \begin{pmatrix} 3 & 1 & 2 \\ 4 & 1 & 1 \\ 2 & 6 & 2 \end{pmatrix} \qquad B = \begin{pmatrix} 1 & 1 & 1 \\ 0 & 5 & -3 \\ -1 & 8 & -5 \end{pmatrix} \qquad C = \begin{pmatrix} 1 & 1 & 2 \\ 1 & -1 & 6 \\ 2 & 6 & 2 \end{pmatrix}$$

Compute the following:

(i) AB [2½ Marks]
(ii) 5B + 3C [1½ Marks]
(iii) C^{-1}; the inverse of matrix C [6 Marks]

Question 5

(a) What do you understand by the word "Vector Space"? [3 Marks]

(b) Give three (3) examples of Vector Space [3 Marks]

(c) Let V be a vector space of polynomial of degree ≤ 3 over $\mathbb{R}$. Determine whether $\boldsymbol{u}$, $\boldsymbol{v}$ and $\boldsymbol{w}$ taken from V are linearly dependent or independent: [7 Marks]

$\boldsymbol{u} = t^3 - 3t^2 + 5t + 7 \qquad \boldsymbol{v} = t^3 - t^2 + 8t + 2 \qquad \boldsymbol{w} = 2t^3 - 4t^2 + 9t + 5$

(d) State the two conditions for a set $S = \{u_1, u_2, u_3, \dots, u_n\}$ to form a basis for a vector space V. [2 Marks]

Question 6

(a) Express matrix M as a linear combination of the matrices A, B, C, where

$M = \begin{bmatrix} 4 & 7 \\ 7 & 9 \end{bmatrix} \qquad A = \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix} \qquad B = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \qquad C = \begin{bmatrix} 1 & 1 \\ 4 & 5 \end{bmatrix}$ [6 Marks]

(b) State the order (dimension) of the following matrices: [5 marks]

$P = \begin{bmatrix} 1 & 3 \\ 0 & -3 \\ 6 & 9 \end{bmatrix} \quad Q = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \quad R = \begin{bmatrix} 2 & 6 & 4 \\ -2 & 1 & 0 \end{bmatrix} \quad S = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} \quad T = \begin{bmatrix} 10 & 12 \end{bmatrix}$

(c) Given that $f(x) = \frac{3x+2}{x-3}$, where $x \neq 3$, find:

(i) $f^{-1}(x)$ [2 Marks]
(ii) $f^{-1}(1)$ [1 Mark]
(iii) $f^{-1}(-3)$ [1 Mark]

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COLLEGE OF NATURAL AND APPLIED SCIENCES
DEPARTMENT OF CHEMICAL SCIENCES
2022/2023 FIRST SEMESTER EXAMINATION

CHM 315: Glass Blowing Techniques | **Credit Unit (Status): 1 (C)**
Time Allowed: 1:30 Hrs. | **Date: 09/02/2023**
Instruction: Answer three questions

1a. Glass blowing workshops need some tools. List in a tabular form, any ten (10) of these tools with their uses. **7½mks**

b. Our forefathers were scientists. Justify this by using examples from glass blowing techniques. **5mks.**

c. What are the safety measures to be taken in a glass blowing laboratory? **7½mks**

2a. Explain in details i. Procedure for rotating a glass tubing **5mks**

ii Procedure for cutting glass tubing. **5mks**

b. Explain vividly how a round bottom flask can be made from a glass tubing. **7½mks.**

3 a. Explain the following terms: (i) Sealing ii. Polishing iii. Bending **3mks each**

b. Complete this table **7½mks**

S/N	Chemical compositions	Pyrex glass	Lead glass	Soda glass
1	?	80.6	?	69-70
2	?	2.2	0.8	2.6
3	Calcium oxide(CaO)	0.1		?
4	?	?		2.9
5	?	4.15	?	15-20
6	Potassium oxide	?	7.2.	?
7	Boric oxide(B_2O_3)	12.6	0.2	0.5
8	?	0.2		?
9	Iron (II) oxide (FeO)	?		
10	Chlorine	0.1		
11	?		30.2	

4 a. List and explain the physical and chemical methods of identifying glass. **7½mks**

b. Explain Oven and Flame annealing. Why are they important in glass blowing technique? **10mks**

5a. What are the properties of a glass? **5mks**

b. Draw five (5) named manufacturers' signs **7½mks.**

c. Mention five (5) gases used in glass blowing workshop. **5mks**

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