


LAGOS STATE UNIVERSITY, OJO
DIRECTORATE OF SCHOOL OF PART TIME STUDIES
FACULTY OF SCIENCE
DEPARTMENT OF COMPUTER SCIENCE
FIRST SEMESTER EXAMINATION 2023/2024 ACADEMIC SESSION

COURSE CODE: CSC 223
COURSE TITLE: INTRODUCTION TO INFORMATION PROCESSING METHOD
TIME ALLOWED: 2 HOURS
INSTRUCTION: ANSWER QUESTION 1 AND ANY TWO QUESTIONS

WARNING: Note that you are not allowed to bring mobile phone(s) into examination hall.
Non-compliance will amount to examination misconduct and attract stiff penalty.

1. a. i. Define MIS? (3 Marks)
ii. Explain the scope of MIS in terms of management, information and system. (6 Marks)
b. i. Highlight five roles of MIS in an organization. (5 Marks)
ii. Does MIS have a positive or negative impact on an organization? (Support your answer with reasons). (4 Marks)
iii. Highlight six characteristics of a valuable knowledge. (6 Marks)
c. i. With the aid of diagram explain information system. (3 Marks)
ii. Explain the relationship between Information system and management information system. (3 Marks)

2. a. i. Define file index. (2 Marks)
ii. Explain disc allocation strategies. (4 Marks)
b. i. Highlight the methods of keeping track of available blocks and disks. (2 Marks)
ii. Explain the tracking methods listed above. (3 Marks)
iii. Indicate the strengths and weaknesses of these methods. (3 Marks)
c. Given a disk with 5 tracks and 12 sectors each, the following specifies the allocated blocks in the memory:

Track	Sectors	values
0	2,7,8	4,3,5
1	0,5,6,9	2,7,14,1
2	4,5,10	11,3,5
3	0,1,2,7	4,5,1,7
4	4,5	3,5

- i. Represent the above diagrammatically, using the appropriate allocation strategy. (3 Marks)

- ii. Using any disk tracking method of your choice, keep track of the data represented above based on blocks of memory. (2 Marks)
3. a.i. Explain the term sorting. (3 Marks)
ii. Explain the distinguishing features of internal and external sorting. (3 Marks)
b. Indicate if sorting is useful for the following processes or not:
i. report generation
ii. Minimizing the storage needed
iii. making searching easier and efficient
iv. responding to queries easily (4 Marks)
- c. i. The way a card game player arranges his card as he picks them up one by one is an example of which sorting technique. (2 Marks)
ii. State the steps involved in the sorting technique picked above. (6 Marks)
iii. When is such a sorting technique most suitable. (2 Marks)
4. Define the following:
a. Vertex (2 Marks)
b. Parent (2 Marks)
c. Child (2 Marks)
d. Edge (2 Marks)
e. Degree (2 Marks)
f. Binary tree (2 Marks)
g. Full binary tree (2 Marks)
h. Complete binary tree (2 Marks)
- i. Draw the tree with the string notation:
(A(B(C(E),F,D), G(H,(I(J))))) (2 Marks)
- What type of tree is the tree above? (1 Mark)
- Traverse the tree above using preorder traversals (1 Mark)
5. a. i. Define a decision table? (2 Marks)
ii. Highlight and explain the steps involved in constructing a decision table. (10 Marks)
- b. A customer intends to withdraw some amount of money, the following are the conditions of withdrawal of cash:
- Withdrawal is granted if the customer has sufficient fund in their account
 - Withdrawal is granted if customer does not have sufficient fund in their account, but has credit granted.
- i. Using the steps involved in constructing a decision table listed above, construct a decision table for customer withdrawal. (5 Marks)
- ii. Write test cases for each rule in the customer withdrawal decision table. (3 Marks)

~~21/11/2020~~

LAGOS STATE UNIVERSITY, OJO, LAGOS
FACULTY OF SCIENCE
SCHOOL OF PART TIME STUDIES
DEPARTMENT OF COMPUTER SCIENCE
FIRST SEMESTER EXAMINATION 2020/2021 SESSION

CSC 327: Database Management System II 3 Units Duration: 2 hrs

INSTRUCTION: Answer question ONE and any THREE questions

WARNING: Please note that you are not allowed to bring mobile phone(s) into the examination hall. Non-compliance will amount to examination misconduct and attract stiff penalty.

- ! Consider the following relational database that represents books, publishers, and books published by publishers.

books

	Title	Author	Publishing Year	Page Count	ISBN
231	The Soul of a New Machine	Tracy Kidder	1981	1	1000
77	Programming Pearls	Jon Bentley	2000	2	1500
23	Programming Pearls	Jon Bentley	1981	1	1200
2	Tess of the d'Urbervilles	Thomas Hardy	1850	1	800

publishers

	Name	Address	Web Site	Count	Books	Count	Publ. Year
1	Back Bay Books	Boston	backbay.com	1	231	293	1981
2	Addison Wesley	New York	addisonwesley.com	2	77	235	2001
3	Modern Library	London	randomhouse.com	2	23	200	1980
4	Penguin	New York	penguin.com	3	2	565	2001
				4	2	540	1990

a. (i) List three super keys of the *books* relation. (3mks)

(ii) What two meanings best describe a null web site value in the publishers table? (2mks)

(iii) Outline the best strategy to handle publishers that have more than one web site. (2mks)

(iv) What is the relational schema for this database? (3mks)

b. (i) Write an SQL expression that lists all titles by Jon Bentley (3½ mks)

(ii) Write an SQL statement that lists all books that have the same title but different authors. (4mks)

2a. Write short notes on the following DBMS commands: (5mks)

(i) DROP (ii) DELETE

(i) Explain the concept of ACID properties in DBMS? (8mks)

b. (i) Explain the concept of ACID properties in DBMS? (8mks)

(ii) What are the benefits of database partitioning? (4½ mks)

2b. (i) With good example in each, enlist the various relationships of DBMS? (6mks)

(ii) Define Join and state its types. (7½ mks)

(i) Define the terms database partitioning (2 mks)

b. (i) Define the terms database management system (2mks)

(ii) State the major components of database management system

- (i) List the different advantages of Relational model (5½ mks)
(ii) What are the different levels of abstraction in the DBMS? (6mks)
Briefly describe the following terms as used in ER Model:
(i) Entity (ii) Attributes (iii) Relationship (6mks)

- 5a A typical DBMS has users with different rights and permissions who use it for different purposes.
Briefly describe the following categories of DBMS users:
(i) Administrators (ii) Designers (iii) End Users (7½ mks)
Explain the following types of attributes as applicable in ER Model:
(i) Simple attribute (ii) Composite attribute (iii) Derived attribute (6mks)
5c State the set of commands SQL contains in its DML section(4mks)
- 6a Write short notes on the following database 3-tier architecture:
(i) Database (Data) Tier
(ii) Application (Middle) Tier
(iii) User (Presentation) Tier (9mks)
- b (i) Differentiate between Physical Database Schema and Logical Database Schema (4½ mks)
(ii) State the set of commands SQL uses to define database schema


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FIRST SEMESTER EXAMINATION 2023/2024 ACADEMIC SESSION

COURSE CODE: CSC 323

COURSE TITLE: EVOLUTIONARY COMPUTING

TIME ALLOWED: 2 HOURS

WARNING: Note that you are not allowed to bring mobile phone(s) into examination hall.
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SECTION A: Answer all questions [20marks]

1. Evolutionary computation uses the in the theory of evolution.
2. The two opposing forces that drive evolution are and
3. builds up genetic diversity.
4. Evolutionary computation operates on populations of
5. The method of assigning a heuristic numerical estimate of quality to members of the evolving population is called
6. A/an is a sequence of DNA bases such as the eye color or ability to metabolize alcohol.
7. A/Aa is a value of trait.
8. Natural is responsible for the variation of allele frequencies in populations over time.
9. The first step in defining an evolutionary algorithm is to link the "real world" to the "EA world".
is called
10. Variation operations in evolutionary computing are divided into and
11. merges information from two parent genotypes into one or two offspring.
12. The operator which merges information from two parent genotypes into one or two offspring is called
13. The concept of survival of the fittest relates directly to which theory.....
14. Which selection tends to behave more like greedy algorithm and also exploits the nearest areas with promising solutions?

14. The selection scheme that is more exploratory and tends to have greater selection pressure is called
15. The simplest selection operator where each individual has the same probability to be selected is called
16. refers to the process of ensuring that only the best individuals of the current population survive to the next generation.
17. The theory of evolution was developed by
18. The commonly used algorithms to generate high-quality solutions for optimization problems and search problems are called
19. The condition that refers to an evolutionary algorithm should end is called
20. In a typical evolutional algorithm cycle, the first step is

SECTION B : Answer question 1 and other two questions

- 1a. List and briefly describe six components of evolutionary algorithm design [12mks]
- b. Briefly describe each of the following operators: (i) One Point Crossover (ii) Two Point Crossover (iii) Uniform Crossover (iv) Blend Crossover [8 mks]
- 2a. State the theory of evolution. [5mks]
- b. There are two opposing forces that drive evolution. Discuss [5mks]
- c. Differentiate between Pre-selection and Post-selection procedure [5mks]
- 3a. Given the following two parents with permutation representation.
 $p_1 = (475318692)$ [5mks]
 $p_2 = (524836971)$, [5mks]
 Compute the first offspring with Cycle Crossover. [4mks]
- b. List four selection schemes in Evolutionary algorithm [6mks]
- c. Differentiate between Parent Selection and Survivor Selection operators [6mks]
4. Briefly describe each of the following: (i) Evolution Strategy (ii) Genetic Programming (iii) Differential Evolution (iv) Genetic Algorithm [15mks]
5. Discuss how evolutionary techniques can be used in
 (i) Optimization (ii) Learning (iii) Design

CODE: CSC 333

TITLE: RESEARCH METHODOLOGY

QUESTION ONE

- a. Explain 5 reasons why it is good to conduct research.
- b. List 4 types of BSc projects in computer science and write short notes on them.
- c. Explain 4 different methods of identifying a project topic.

QUESTION TWO

- a. With examples differentiate between qualitative and quantitative research.
- b. Differentiate between the discussion and conclusion section of a research.
- c. List the steps to take in order to conduct scientific research.

QUESTION THREE

- a. Explain 4 methods of adding records to an endnote library.
- b. Differentiate between citations and references.
- c. Explain 4 benefits of using endnote.

QUESTION FOUR

- a. List the chapter titles of a typical BSc project in computer science and write short notes on them.
- b. List 5 ingredients of a productive research.
- c. With examples, differentiate between a research question and a hypothesis.

QUESTION FIVE

- a. Explain the words plagiarism and intellectual property.
- b. List 4 reasons why citation should be done when writing up a project.
- c. Write short notes on each of the following types of research.
 - i. Empirical ii. Fundamental iii. Descriptive iv. Conceptual



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COURSE CODE:

CSC 217

COURSE TITLE:

FUNDAMENTAL OF DIGITAL ELECTRONICS

TIME ALLOWED:

2 HOURS

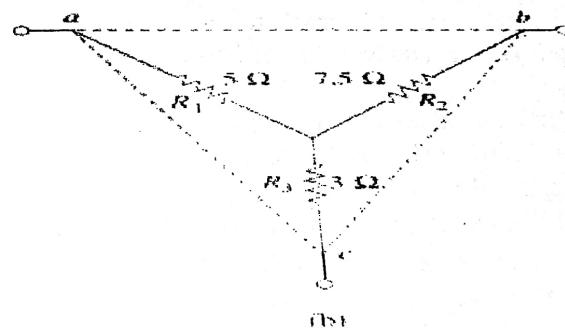
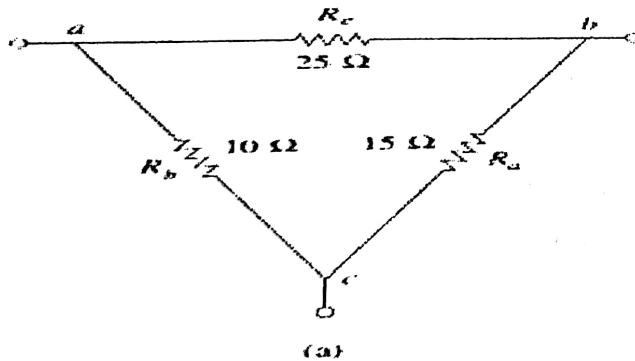
INSTRUCTION:

ANSWER QUESTION ONE AND ANY OTHER TWO QUESTIONS

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- | | | |
|----|--|--------------|
| 1a | (i) Define the terms register transfer and register transfer notation | <i>2mks</i> |
| b | (ii) What are the commonly used registers in digital computer? | <i>3mks</i> |
| | (i) Outline the rules used in 1's Complemental Subtraction method | <i>5mks</i> |
| | (ii) What power is dissipated by a $100\ \Omega$ resistor when a 6 V drop is measured across it? | <i>5mks</i> |
| | (iii) Outline any five uses of Resistors | <i>2½mks</i> |
| 2a | (i) A flashlight bulb dissipates 6 W at 2 A. What is the supplied voltage? | <i>3mks</i> |
| | (ii) Briefly describe the terms Electric circuit | <i>2½mks</i> |
| | (iii) How do logic gate (NAND and NOR) works using two input variables to explain the truth table. | <i>5mks</i> |
| b | Convert the Delta network in figure 1(a) to an equivalent star network | <i>7mks</i> |



- | | | |
|----|---|--------------|
| 3a | Briefly describe the terms Kirchhoff's Voltage Law (KVL) using relevant loops and equations to illustrate how the law could achieve acceptable results | <i>7½mks</i> |
| b | Write the KVL equation for the circuit shown in:
(i) figure 1 (ii) figure 2 | <i>10mks</i> |

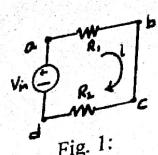


Fig. 1:

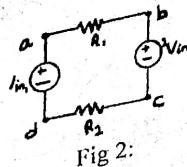


Fig 2:

5mks

4a Find current i in the circuit shown in figure 3

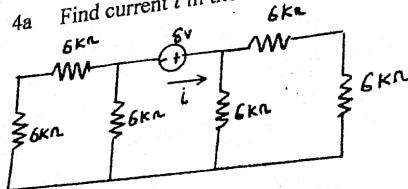


Fig. 3

w^t

b Find the Req for the circuit shown in figure 4

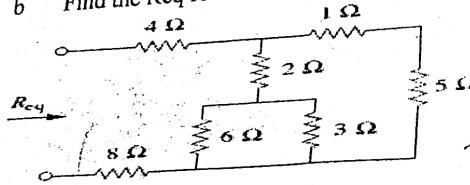


Fig. 4

12½mks

5a (i) State the application of Kirchhoff's Current Law (KCL) using relevant circuit diagram for analysis

7½mks

b Write short notes on the following types of an electric circuit elements:

10mks

- (i) Active elements (ii) Passive elements
- (iii) Bilateral and Unilateral Elements
- (iv) Lumped and Distributed Elements

6a Evaluate the following number systems:

12mks

(i) 110011 in binary to decimal

(ii) 234 denary to octal

(iii) 765 in decimal to hexadecimal

b Draw the logic circuit for the following expression:

5½mks

(i) $x' + (y \cdot x)$

(ii) $(a \cdot b)' + (c \cdot d)'$



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FIRST SEMESTER EXAMINATION 2023/2024 ACADEMIC SESSION

COURSE CODE:

CSC 325

COURSE TITLE:

OPERATING SYSTEM II

TIME ALLOWED:

2 HOURS

INSTRUCTION:

ANSWER QUESTION ONE AND ANY OTHER THREE

WARNING: Note that you are not allowed to bring mobile phone(s) into examination hall. Non-compliance will amount to examination misconduct and attract stiff penalty.

- 1a. What do you understand by Operating System? (3mks)
- (b). Enumerate four functions of Operating System. (8mks)
- (c). State three disadvantages of OS. (3mks)
- (d). Explain the term Kernel in OS. (3mks)
- (e). State three features of OS Kernel. (3mks)
- (f). Describe the following: (2.5mks)
- (i.) Monolithic (2.5mks)
- (ii) Microkernel (2mks)
- (6mks)
- 2a. Define OS process. (2mks)
- b. Define (i) Scheduling (ii) Virtual Memory (iii) Buffering (5mks)
- c (i). What is deadlock? (2mks)
- (ii). Explain conditions that can lead to deadlock (5mks)
- 3a(i). What do you understand by OS Security? (3mks)
- (ii). List four ways of providing OS Security for a system. (4mks)
- b. Explain in detail any two mentioned in (aii) above. (4mks)
- c. Highlight and explain the two major design objectives of I/O devices. (4mks)
- 4a (i). Differentiate between sequential and concurrent programs (5mks)
- (ii). Why is concurrency necessary in computing. (2mks)
- b. A computer engineer intends incorporating concurrency into the design of his operating system, state four operating system concerns that must be taken into consideration about the existence of concurrency by the engineer. (8mks)



LAGOS STATE
DIRECTORATE OF
EDUCATION

FIRST SEMESTER

COURSE CODE:
COURSE TITLE:
TIME ALLOWED:
INSTRUCTIONS:

1 2 3 5

- 5.a. Explain how process is been swapped in and out in an operating system. (5mks)
b. Enumerate two (2) benefits of swapping techniques and two (2) drawbacks of swapping (4mks)
c. Draw a schematic view of the swapping process in an operating system (6mks)
- 6.a. Name and explain the three structures of the page table (6mks)
b. Differentiate between paging and segmentation (4mks)
c. List and explain 4 partition selection policies associated to contiguous memory allocation (5mks)

(a) OS security (operating system security) is the science that helps keep a safe life in an operating system for the end user without any alteration.

- (i) Encryption (ii) Firewall (iii) fire wall
(iv) Good Network Security planning

(b) Relationships & Communication protocols in the computer system of an operating system
as well as the updated the cultural, social and material part of the living system

(c) The Inputting of data in an OS

Activity: Recording of data in an OS



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FIRST SEMESTER EXAMINATION 2023/2024 ACADEMIC SESSION

QUESTION CODE: CSC 303
COURSE TITLE: OBJECT ORIENTED PROGRAMMING
TIME ALLOWED: 2 HOURS
INSTRUCTION: ANSWER QUESTION ONE (1) AND ANY OTHER TWO (2) QUESTIONS

WARNING: Please note that you are not allowed to bring mobile phone(s) into the examination hall. Non-compliance will amount to examination misconduct and attract stiff penalty

QUESTION 1

- a. State 4 features of Java programming language (2 Marks)
- b. What is? (1) Java applet (2) Java application (2 Marks)
- c. Describe the following types of comments in Java stating how they are implemented (3 marks)
i. Line comments, ii. Block comments and iii. Javadoc comments
- d. Give two differences between primitive and reference data types in Java (2 Marks)
- e. What are the components of a variable declaration statement? (2 Marks)
- f. What is a Named Constant? (2Marks)
- g. State which of the following java statements / expressions is valid or invalid. If invalid then state why it is invalid and make correction: (9 marks)
i. int loopcounter, sumofinteger ii. loopcounter = 1; iii. 2q = (a/b) + 14;
iv. double[] myList = {24.5 10.0 30.4 20.9}; v. System.out.println("Total is " ++ total)
vi. if (myList[i] ≤ max) max = myList[i] vii. double int total1 = 0;xiii. final int char lastvalue =
10 ix. if (loopcounter = lastvalue)
{sumofinteger = sumofinteger + loopcounter;
loopcounter = loopcounter + 1 }
h. What is the output of this java program? (4 marks)
- ```
public class Test_fix { public static void main(String[] args)
{Test_fix p = new Test_fix();
p.start(); }
void start()
{ long [] a1 = {6,4,5};
long [] a2 = fix(a1);
System.out.print(a1[0] + a1[1] + a1[2] + " ");
System.out.println(a2[0] + a2[1] + a2[2]);
}
long [] fix(long [] a3)
{ a3[1] = 8;
return a3; }
}
```

- i. Define the following - i. Polymorphism ii. Abstract class iii. overloading iv. Arithmetic Exception (4 marks)

**Question 2**

- a. Briefly describe the following OOP concepts – i. Objects ii. Classes iii. Inheritance (4.5marks)
- b. What is a package and list any FIVE different packages in Java API. (3.5 Marks)
- c. Write short note on each of the following variable types i. local ii. Instance iii. Class variable (4.5 Marks)
- d. Write a Java program that read an integer value and prints the sum of all even integers between 2 and the input value inclusive. (7.5 Marks)

**Question 3**

a. Write the syntax in java, for each of the following statement structures (10 marks)

- i. If ..... else statement structure
- ii. While structure iii. do ..... while structure iv. For loop structure (1 Mark)

b. Define an array

- c. Given the vector  $A = \{1.9, 2.9, 3.4, 3.5\}$ . Write a java program to (1) print the element of the vector, (2) sum the elements and output the sum and (3) find the largest element of the vector and output it. (9 Marks)

**Question 4**

- a. Explain the following terms i. Input Stream ii. Output stream [6 marks]

- b. List 4 subclasses inherited from the Input Stream class [2 marks]

- c. b. Write a java program to print the square of the even numbers and cube of odd numbers between 1 and 10, all on the same line. Your program must use both selection and iteration control structures. Your program must produce an output that looks like the following. Note the multiple addition signs [12 marks]

```
+++++++
1 4 27 16 125 36 343 64 729 100
++++++
```

**Question 5**

- a. i. Explain the switch statement (4 marks)

- ii. Differentiate between while loop and do-while loop (4 marks)

- b. Calculate the value of P if  $x=2, y=5, t=7, P = -x + y * t - t / x \% y$  (3 marks)

- c. Write a java program to determine the smallest of three numbers supplied by the user using conditional operator (9 marks)



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FIRST SEMESTER EXAMINATION 2023/2024 ACADEMIC SESSION

**COURSE CODE:** CSC 319  
**COURSE TITLE:** COMPILER CONSTRUCTION  
**TIME ALLOWED:** 2 HOURS  
**INSTRUCTION:** ATTEMPT ANY FOUR QUESTIONS

**WARNING:** Please note that you are not allowed to bring mobile phone(s) into the examination hall. Non-compliance will amount to examination misconduct and attract stiff penalty.

**Question 1:**

- (a) (i) Briefly describe the term parse tree as used in compiler design (2 marks)  
(ii) Using relevant diagram, explain activities between the lexical and syntax stages in compilation process (6 ½ marks)

(b) Consider the following grammar:

$$\begin{aligned} S &\rightarrow aB / bA \\ S &\rightarrow aS / bAA / a \\ B &\rightarrow bS / aBB \end{aligned}$$

Derive the string  $w = aaabbabbba$  using: (5 marks)

(i) leftmost derivation      (ii) rightmost derivation

c. Outline the major drawbacks of Syntax analyzers in compilation process (4marks)

**Question 2:**

- (a) What is difference between the following pairs? (4marks)  
(i) parse tree and syntax tree? (ii) top down parsing and bottom up parsing?
- b. (i) What is the major role of parser in compiler? (2marks)  
(ii) With the aid of a good diagram, describe two phases of compiler based on the way they compile. (4marks)
- c. Write short notes on the following types of compilers using relevant diagrams:(i) Single Pass Compilers(ii) Two Pass Compilers  
(iii) Multipass Compilers (7½ marks)

**Question 3:**

- (a) If  $r$  and  $s$  are regular expressions denoting the languages  $L(r)$  and  $L(s)$ , state the expression for the following notations: (4marks)  
(i) Union      (ii) Concatenation      (iii) Kleene closure
- (b) If  $x$  is a regular expression in a programming language, state the following valid tokens representation: (4½marks)  
(i)  $x^*$       (ii)  $x^+$       (iii)  $x^?$
- (c) (i) Define compiler and state its types (3marks)

(ii) What is YACC in compiler design?  
(iii) Distinguish between SLR(1) and LR(0) as used in compiler design

(2marks)  
(4marks)

- Question 4:**
- (a) (i) Enumerate the properties of parse tree  
(ii) Briefly describe the term token as used in yacc?
  - (b) Outline any three applications of compilers  
(c) (i) Enumerate four differences between compiler and interpreter  
(ii) State any six features of a compiler

(4marks)  
(3½marks)  
(3marks)  
(4marks)  
(3marks)

**Question 5:**  
(a) (i) Outline five standard compiler construction tools

(5marks)

- (ii) LR parser uses a wide class of context-free grammar which makes it the most efficient syntax analysis technique. Highlight the three widely used algorithms available for constructing an LR parser
- (b) (i) Differentiate between Linker and Loader in compiler design  
(ii) State the types of LR parser

(7½marks)  
(3marks)  
(2marks)

**Question 6:**

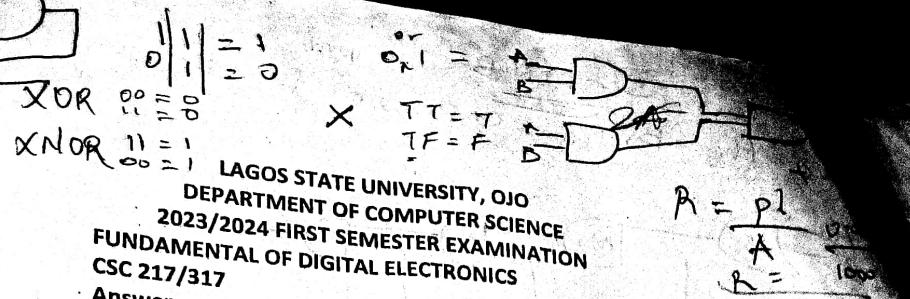
- (a) In tabular form, explain Noam Chomsky classification of four classes of languages using

(2 marks)  
(2 marks)  
(2 marks)  
(4marks)  
(3½marks)

- (i) Type of Grammar
- (ii) Restriction on  $G = (N, T, P, S)$
- (iii) Advantages and Disadvantages

- (b) (i) What are the four components of a context-free grammar  
(ii) Design a FA with  $\Sigma = \{0, 1\}$  accepts the only input 101  
(iii) Consider the production rules:  $E \rightarrow E + E \mid E - E \mid id$   
Generates the available parse trees for the string  $id + id - id$ , for the grammar in 6b (iii) above

(4marks)



COURSE TITLE:  
COURSE CODE:  
INSTRUCTION:

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TIME: 1 hour 30 minutes

- Q1(a) Design a logic circuit that has three inputs A, B, and C, and whose output will be HIGH only when a majority of the inputs are HIGH [17 marks]  
 (b) State Kirchhoff's current and voltage laws [5 marks]  
 (c) What do you understand by a truth table? [2 marks]  
 (d) Prepare a truth table for each of the following logic gates: [6 marks]  
 (i) AND (ii) NAND (iii) OR (iv) XOR

$$P = \frac{R}{V}$$

$$I = \frac{V}{R}$$

$$4a$$

$$R^2$$

Q2(a) A coil consists of 1000 turns of copper wire having a cross-sectional area of  $0.8\text{mm}^2$ . The mean length per turn is 80cm and the resistivity of copper is  $0.02\mu\Omega\text{m}$ . Find the resistance of the coil and power absorbed by the coil when connected across 110V DC supply.

- (b) A piece of silver wire has a resistance of  $1\Omega$ . What will be the resistance of mangamite wire of one-third the length and one-third the diameter, if the specific resistance of mangamite is 30 times that of silver? [10 marks]

[10 marks]

- Q3(a) What are extrinsic semiconductors? [2 marks]  
 (b) Mention and briefly describe the two classes of extrinsic semiconductors [6 marks]  
 (c) Briefly describe a bipolar transistor [2 marks]  
 (d) State the functions of emitter and collector in a bipolar [4 marks]  
 (e) Briefly describe three types of multivibrators [6 marks]

[2 marks]

[6 marks]

[2 marks]

[4 marks]

[6 marks]

$$P = IV$$

$$R^2$$

- Q4(a) State De Morgan's theorems [2 marks]  
 (b) Simplify the following expressions and show the minimum gate implementation [4 marks]  
 (i)  $Y = \overline{ABC} + \overline{ABC} + \overline{ABC} + \overline{BC}$   
 (ii)  $Y = B(A+C) + C(\overline{A} + B) + AC$  [4 marks]  
 (c) Perform the following operations: [6 marks]  
 (i)  $BAD_{16} + 3AC_{16}$  (ii) convert  $127.24_8$  to decimal  
 (d) If a logic function has three inputs, how many rows must the truth table have to contain all possible states? Justify your answer. [4 marks]

[2 marks]

[4 marks]

[4 marks]

[6 marks]

$$AND$$

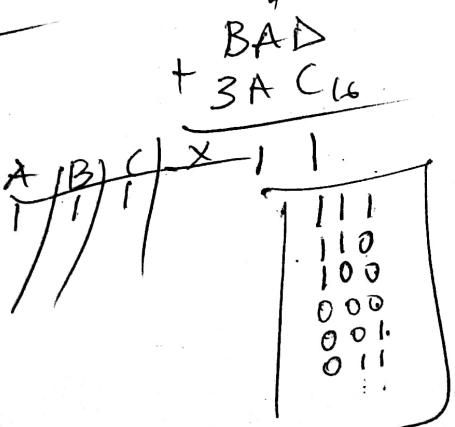
$$NOT$$

- Q5 (a) Define each of the following integrated circuit terminologies: [6 marks]  
 (i) chip (ii) circuit probing (iii) diffusion (iv) epitaxy (v) etching (vi) metallization  
 (b) List three classes of integrated circuits based on structure and briefly describe each [9marks]  
 (c) Simplify  $(\overline{A} + C)(B + D)$  to one having only single variables inverted [5 marks]

[6 marks]

[9marks]

[5 marks]



$$\begin{array}{r} 101 \\ + 101_2 \\ \hline 111 \end{array} \quad \begin{array}{r} 25 \\ 101 \\ - 111_2 \\ \hline 110 \end{array}$$

$$\begin{array}{l} A = 10 \\ B = 11 \\ C = 12 \\ D = 13 \\ E = 14 \\ F = 15 \end{array} \quad \begin{array}{l} \hline \hline \\ \hline \hline \end{array}$$

$P = \frac{PL}{A}$

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