QUESTION FIVE

a) What is sorting? Hence, differentiate between internal sorting algorithm and external sorting algorithm. 4 marks

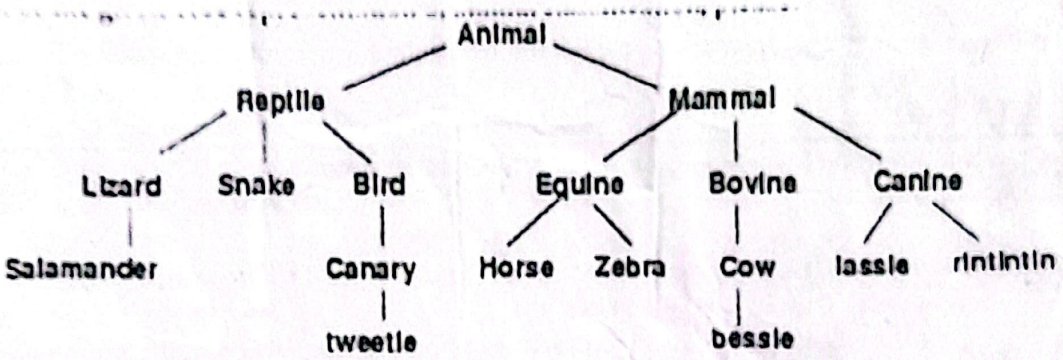
b) Describe the following foundation terms of a data structure; 4 marks

i. Interface ii. Implementation

c) Traverse the Tree below in;

i. NLR Recursive scan/Pre order

ii. LRN Recursive scan/Post order 4 marks



QUESTION SIX

a) Outline four (4) factors that determine choice of data structure for solving a particular problem. 4 marks

b) Another name for Stack and Queue respectively are _____ and _____. 2 marks

c) Given an array A of n dimensions, $A(L_1:U_1, L_2:U_2, L_3:U_3, \ldots\ldots L_n:U_n)$.

i. State the general formular to calculate the number of elements in A

ii. Find the number of elements in array A (2:4, 3:5, 4:7)

iii. List out the elements in A in Lexicographic ordering 6 marks

QUESTION SEVEN

a) Define the following data structure operations

i. Insertion ii. Searching iii. Traversing iv. Merging 4 marks

b) Study the queue of characters below, where QUEUE is a circular array that is allocated six memorycells. Describe the QUEUE as the following operations take place;

FRONT = 2, REAR = 4 QUEUE: _, A, C, D, _, _

i. F is added to the queue

ii. Two letters are deleted

iii. K, L and M are added to the queue

iv. Two letters are deleted

v. R is added to the queue

vi. Two letters are deleted

vii. S is added to the queue

viii. Two letters are deleted

ix. One letter is deleted

x. One letter is deleted 5 marks

c) State the difference between linear and non-linear data structures based on the following parameters;

i. Arrangement of the data elements ii. Traversal

THE POLYTECHNIC, IBADAN
DEPARTMENT OF COMPUTER STUDIES
SECOND SEMESTER EXAMINATION 2022/2023 SESSION

COURSE CODE: COM 124
COURSE TITLE: DATA STRUCTURE & ALGORITHM
CLASS: ND I COMPUTER SCIENCE (FT& DPP)
TIME ALLOWED: 2 ½ HOURS
INSTRUCTION: ANSWER ANY FIVE(5) QUESTIONS. ALL QUESTIONS CARRY EQUAL MARKS.

QUESTION ONE

a) What is data structure? 2 marks

b) Explain any three (3) common problems faced by applications that necessitate good data structures. 6 marks

c) Describeany two (2) approaches used in determining the efficiency of an algorithm. 4 marks

QUESTION TWO

a) What Classify the followings into linear and non linear data structures
   i. Tree ii. Queue iii. Array iv. Linked list
   v. Graph vi. Stack 3 marks

b) Given an array Q (1:4, 1:7) and given that the base address is 140, find the location of elements
   i. Q (2,4) ii. Q (3,7) 5 marks

c) Describe the following execution time cases use,compare various data structures, cite suitable examples;
   i. Worst case ii. Best case 4 marks

QUESTION THREE

a) Describe any four (4) distinctive properties of algorithms 4 marks

b) State four (4) uses of stacks 4 marks

c) Write down a procedure to
   i. push an element into a stack
   ii. pop out the top element of a stack 4 marks

QUESTION FOUR

a) What are the benefits of data structures? 4 marks

b) Study the STACK below as the following operations takes place
   STACK: A, C, D, F, K, _, _, _. The stack is allocated 8 memory cells 4 marks

   i. POP(STACK, ITEM)
   ii. POP(STACK, ITEM)
   iii. PUSH(STACK, L)
   iv. PUSH(STACK, P)
   v. POP(STACK, ITEM)
   vi. PUSH(STACK, R)
   vii. PUSH(STACK, S)
   viii. POP(STACK, ITEM)

c) Considering 2c above, State 4 marks
   i. When overflow will occur
   ii. When C will be deleted before D