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**NATIONAL OPEN UNIVERSITY OF NIGERIA**

**14-16 AHMADU BELLO WAY, VICTORIA ISLAND LAGOS**

**SEPTEMBER/OCTOBER 2015 EXAMINATION**

**SCHOOL OF SCIENCE AND TECHNOLOGY**

**COURSE CODE: CIT 341**

**COURSE TITLE: DATA STRUCTURES**

**INST RUCTION: *Answer anyfive questions out of Seven***

**Time: 3HOURS**

1 .

1. Distinguish b etween**linear** and **non‐linear** data structures
2. Write a brief note on each of the foll owing:
	1. **Arra y**
	2. **List**
3. D istinguish between a **queue** and **a stack**. Illustrate your answer.

2 .

a) C onsider the following o perationscarried out on a **queue** Q. Provide the **content** of t he q ueue and th e **returnedvalue,** after each operat on, to comp lete the table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | O peration | Conte nt of Q | Returned Value |  |
|  | I nitialise(Q) |  |  |  |
|  | A dd(A,Q) |  |  |  |
|  | A dd(D,Q) |  |  |  |
|  | A dd(O,Q) |  |  |  |
|  | R emove(Q) |  |  |  |
|  | A dd(T,Q) |  |  |  |
| b) | R emove(Q) |  |  |  |
| U sing a simple example e xplain how a queue is stored in a dynamic data tructure |  |
|  | describing ho w a node ca n be added and removed. |  |  |
| c) | B riefly describe two modes of **stackstorage**. |  |  |

3 .

1. B riefly explain what a hash function is.
2. List the three characteristics of a good hash function.
3. E xplain what a hash table is mentioning an exam ple of its app lication.

|  |  |  |
| --- | --- | --- |
| 4 . |  |  |
| a) | Write down the mathematical definition of a **tree** mentioning | the required properties . |
| b) | B riefly explain **the recursive nature** of the above definition of | a tree. |
| c) | U sing an exampledescrib e the **inverted pictorial representation** of a tree . |
| 5 . |  |  |

1. B riefly describe what a **search tree** is mentioning its salient p roperties.
2. G ive a concise definition of **a perfect binary tree**.
3. U sing the simple tree shown in the fi gure below a s an example, describe the followin g **traversal** methods:
4. Preorder
5. Post order
6. Inorder.



6 .

a) B riefly explain the concept of **garbage** and how it accumulate s in a Java Programme

b) Write short n otes on the following **garbagecolletion**techniques

i. Refeence Counting

ii. Mark ‐and‐Sweep

c) B riefly describe four **Memory Allocation** methods.

7 .

a) E xplain clearly what **greedy algorith** is.

b) D escribefouconstituen t **functions**o f greedy algorithm

c) B riefly describe the three **phases** of the **divide‐and‐conquer** paradigm