MAASAI MARA UNIVERSITY

REGULAR UNIVERSITY EXAMINATIONS
2017/2018 ACADEMIC YEAR
SECOND YEAR SECOND SEMESTER

SCHOOL OF SCIENCE AND INFORMATION SCIENCES
BACHELOR OF SCIENCE IN COMPUTER SCIENCE

COURSE CODE: COM 2208
COURSE TITLE: DATA STRUCTURES

DATE: 2ND MAY, 2018 **TIME: 1430 – 1630 HRS**

INSTRUCTIONS TO CANDIDATES

i. *Answer question ONE (compulsory) and any other TWO questions.*
ii. *Question one carries 30 marks*
iii. *All other questions carry 20marks*
iv. *Mobile Phone is not allowed in the exam room*

SECTION A (COMPULSORY –30 MARKS)

QUESTION ONE

a. Show the steps of merge sort on the following list of unsorted integers. 87, 36, 22, 15, 56, 85, 48 **(6mks)**

b. Insert the following numbers into a binary search tree in the order that they are given and draw the resulting tree. 45, 37, 78, 15, 40, 52, 89, 114 **(6mks)**

c. Explain the following terms as used in Data Structures **(10mks)**

i. Algorithms

ii. Big-O notations

iii. Planar graph

iv. Data abstraction

v. Queue ADT

d. Differentiate between Priori Analysis and Posterior Analysis of algorithms **(4mks)**

e. Write some short notes on the linked lists **(4mks)**

SECTION B (ANSWER ANY TWO QUESTIONS)

QUESTION TWO

a) Explain THREE types of time complexities **(6marks)**

b) Explain the following terms as used in the queue **(6marks)**

   i. Enqueue
   ii. Dequeue
   iii. IsEmpty

c) Write down an algorithm that does the following:

d) Calculate the sum of two numbers entered by the user **(4marks)**

e) Turns lights on and off at 7:00p.m. and 7:00a.m. respectively **(4marks)**

QUESTION THREE

a. Implement a Queue using either a linked list or a dynamic array, and justify your decision. **(6mks)**

b. Design the interface to your Queue to be complete, consistent, and easy to use. **(6mks)**

c. Outline the three characteristics of data structures **(6mks)**

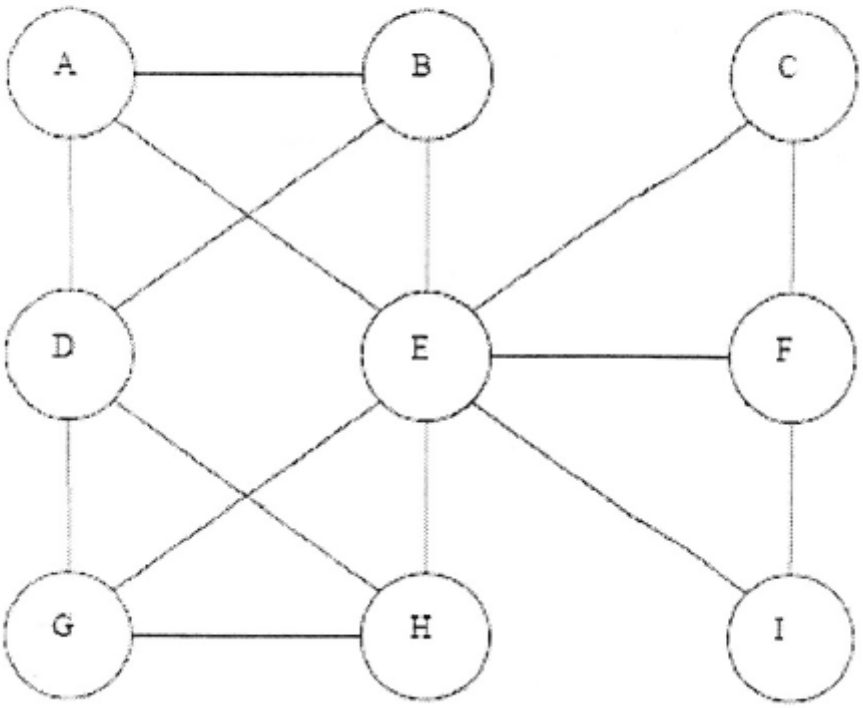
d. Define the term data type **(2mks)**

QUESTION FOUR

a. List five types of algorithms that use the greedy' approach **(5mks)**

b. Use the diagram of the graph below to answer the questions that follow:

Consider the following undirected graph



c. Using Breadth First Search, show how the exploration proceeds if we start at Vertex A. Show the state of the data structure at each step. **(5mks)**

d. Using Depth First Search" show how the exploration proceeds if we start at Vertex A. Show the state of the data structure at each step. **(10mks)**

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