

KABARAK



UNIVERSITY

UNIVERSITY EXAMINATIONS
MAIN CAMPUS

FIRST SEMESTER 2019/2020 ACADEMIC YEAR

EXAMINATION FOR THE DEGREE OF BACHELOR SCIENCE IN COMPUTER
SCIENCE

COMP 214: DATA STRUCTURES

STREAM: Y2S1

TIME: 11:00-1:00PM

EXAMINATION SESSION: DEC

DATE: 5/12/ 2019

VENUE: AUDITORIUM

COPIES: 35

INSTRUCTIONS TO CANDIDATES

- 1. Answer Question 1 and any other two questions in the answer booklet provided.**
- 2. Do not write on your question papers. All rough work should be done in your answer booklet.**
- 3. Clearly indicate which question you are answering.**
- 4. Write neatly and legibly.**
- 5. Edit your work for language and grammar errors.**
- 6. Follow all the instructions in the answer booklet**

*As members of Kabarak University family, we purpose at all times and in all places, to set apart in one's heart,
Jesus as Lord. (1 Peter 3:15)*



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QUESTION ONE (30 marks)

- a) State any two primitive data structures and any two abstract data structures (2mks)
- b) Explain any two applications of stack (2mks)
- c) Demonstrate how you define a queue structure in C (2mks)
- d) What is complexity analysis? Give two forms of complexity analysis with examples. (5mks)
- e) What is the advantage of circular doubly linked lists over other linked lists (2mks)
- f) Write a C function that expresses recursive computation of a factorial of a number n (3mks)
- g) Explain depth first order in binary tree (3mks)
- h) Write a small code to define stack as a structure in C programming language (3mks)
- i) If the index position of the rear and the front of the queue are 0 and -1 respectively, how many elements are there in that queue? (4mks)
- j) Explain the characteristics of good hash function? (2mks)
- k) What are the two parameters specified when pushing an item into the stack (2mks)

QUESTION TWO (20 marks)

- a) Data structures can be classified on the basis of different characteristics. Explain any four characteristics with example in each. (4mks)
- b) Write an algorithm for push operation in stack data structure (3mks)
- c) Explain the syntax of declaration and assignment of values in a two dimensional array. (2mks)
- d) Draw any directed graph of five nodes. Demonstrate how to represent it using adjacency matrix (5mks)
- e) Why is a stack considered as restricted data structure (2mks)
- f) Compute the postfix and prefix of the following expressions; $A+B*(D-F)$ (4mks)

QUESTION THREE (20 marks)

- a) Every Algorithm must satisfy the different properties. Explain five of those properties (5mks)
- b) What is recursion? Write the procedure of executing the minimal number for the tower of Hanoi having any number of disks (5mks)
- c) Show how a sequence of enqueueing and dequeueing represented by a linear array can cause overflow to occur upon an attempt to insert an element into an empty queue (5mks)
- d) Draw a perfect binary search tree with seven nodes and demonstrate how to search for one of the leaf nodes (5mks)

QUESTION FOUR (20 marks)

- a) Give any two scenarios where queue structure can be used in computing (2mks)
- b) Why do we consider an array elements as 'similar' and 'finite' (2mks)
- c) Explain how test stack overflow and stack underflow in C (4mks)
- d) What are the advantages of linked lists over arrays (2mks)
- e) Why is fibonacci series considered a recursive function? (2mks)
- f) A company contains 10 employees each having a unique 5 digit number. Demonstrate how hashing can be used to represent these employees uniquely using two digit numbers (5mks)
- g) What is the value of the postfix expression $6\ 3\ 2\ 4\ +\ -\ *$ (3mks)

QUESTION FIVE (20 marks)

- a) State any three parameters used in measurement of time complexity (3mks)
- b) Explain any three features of a circular queue (3mks)
- c) Explain using an example of any algorithm the best, worst and average case analysis of an algorithm (3mks)
- d) Describe binary tree and the three of its traversal methods. (4mks)
- e) What is the effect of omitting a termination condition in a recursive method (2mks)
- f) Write a code in C to declare the following elements into one dimensional array and show their respective index positions; Abc, Bcd, Cdf, Def, Fgh (5mks)

