BSc(Hons) in Computing
Programming, Data Structures and Algorithms | NIB210CT
Examination Paper

Academic Year 2017-2019-September Intake

Date : 12th May, 2017, 9am-11am
Time allowed : Two Hours

INSTRUCTIONS TO CANDIDATES

- This paper contains 4 questions on one page (Page 2).
- The total marks obtainable for this examination is 100.
- Marks of each question is indicated
- This is a closed book examination.
- All calculators are not allowed.
- Answer ALL questions.

ADDITIONAL MATERIALS

- None

Faculty of Engineering, Environment and Computing

School of Computing, Electronics and Mathematics

Coventry University

School of Computing

National Institute of Business Management

1.

a) What is an abstract data type? Explain with suitable examples. (05 Marks)
b) What are the main characteristics of an Algorithm? (05 Marks)
c) Explain the basic operations supported by an Array. Write a java program code to implement array operations. (15 Marks)

2. Write a Menu Driven Java program for following:

a) Input data to two ArrayLists U and V of length N. (05 Marks)
b) Sort the data in ArrayLists U and V into ascending order using 'Direct Insertion Sort'. (08 Marks)
c) Merge the data in U and V using 'Merge Sort'. (08 Marks)
d) Print the results of each of the above. (04 Marks)

3.

a) Briefly explain the difference between ArrayList and LinkedList. (05 Marks)
b) Why Binary Tree data structure is considered as special when compared to other data structures? Briefly explain with a suitable diagram. (06 Marks)
c) Explain the basic operations supported by a Binary Tree. (06 Marks)
d) Briefly explain how Linear search and Binary work with suitable pseudo codes. (08 Marks)

4.

i. Create a class Employee with following attributes: *employee number, name, address, date of birth and hire date*. The class must have following constructors & methods also.
   - A constructor that accepts nothing and initializes all numeric attributes with 0 and string with null.
   - A constructor that accepts all attribute values
   - An abstract method display that will display all attributes
   - A method that changes the address of an employee. (08 Marks)

ii. Create two sub classes of employee naming waged and salaried. The waged should have additional attributes as days worked and salary per day and following additional methods.
   - Default Constructor
   - Parameterized that accepts all attribute values
   - A method that calculates and displays monthly salary (days worked * salary per day) (06 Marks)

iii. The salaried should have additional attributes as basic salary, employee provident fund(EPF) and income tax and following additional methods.
   - Default Constructor
   - Parameterized that accepts all attribute values
   - A method that calculates & displays the net salary after deducting the EPF and *Income Tax*. (06 Marks)

iv. Both classes should override the display method appropriately to display the all employee details including type of employee. Create another class with a main method to test the classes. Include your own sample data where necessary. (05 Marks)