

MID/FINAL SEMESTER EXAMINATION
Academic year 2022-2023/ODD Semester (20221)

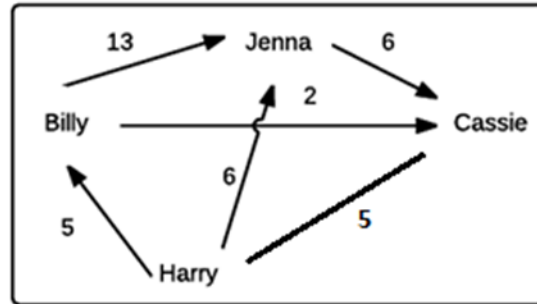
Subject : Data Structures and Algoritma
Lecturer : R. B. Wahyu
Study Program : Information Technology

Instructions to candidate:

1. This examination paper consists of 2 pages and 4 questions.
 2. Time allowed for this examination is 2.5 (hours).
 3. Marking/maximum score for each section/number is written (in brackets). Marks will be deducted for not following the examination rules (instruction written in the answer sheet, exam paper, and instruction from invigilator).
 4. All answers are to be written in the answer book provided.
 5. Students are to use proper language and required to write neatly and clearly.
 6. This test is **A CLOSED-BOOK** test.
 7. Students **are not allowed** to bring any communication devices;
 8. Students **are not allowed** to borrow any equipments/books etc from other fellow student nor communicate to other students.
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Questions:

1. Please describe several data structures that you know and the for each data structure that you chose describe several applications for the structures you think that they are applicable to! (30 marks).
2. Please choose **2 out of 8** lectures' name from Faculty of Computing and please develop the AVL tree the names you chose. The names are: 1. **Rila Mandala**, 2. **Nur Hadisukmana**, 3. **Rikip Ginanjar**, 4. **Tjong Wan Sen**, 5. **Roesdiyanti Roestam**, 6. **Rosalina Sahuri**, 7. **Prof. Wiranto**, 8. **Fransica Rachael**! (30 marks)
3. The following is a graphs locations of several people in a community with their respective distance in kms. Every location is connected through a road and the distances are represented in every edges as shown by the following picture.



Please calculate the Minimum Spanning Tree using Prim and Kruskal Algorithms and show your steps in constructing the MST. (30 marks)

4. Consider the following Unique Elements algorithm.

ALGORITHM *UniqueElements*($A[0..n - 1]$)

//Determines whether all the elements in a given array are distinct

//Input: An array $A[0..n - 1]$

//Output: Returns “true” if all the elements in A are distinct

// and “false” otherwise

for $i \leftarrow 0$ **to** $n - 2$ **do**

for $j \leftarrow i + 1$ **to** $n - 1$ **do**

if $A[i] = A[j]$ **return false**

return true

The input data are: [4,3,5,12,7,18,13,20,15,17]. Then using the above algorithm please do the checking by showing the tracking of the processes (30 marks).

Good luck