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|  | | | | | | |  |  | **Calculators/Sakrekenaars:** | **No/Nee** |  |
| **Requirements for this paper/Benodigdhede vir hierdie vraestel:** | | | | | | |  |  | **Other resources/Ander hulpmiddels:** | |  |
|  | **Answer scripts/**  **Antwoordskrifte:** |  |  | **Multi-choice cards (A5)/**  **Multikeusekaarte (A5):** |  |  |  |  |  | |  |
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|  | **Attendance slips (Fill-in paper)/**  **Presensiestrokies (Invulvraestel):** | **X** |  | **Multi-choice cards (A4)/**  **Multikeusekaarte (A4):** |  |  |  |  |  | |  |
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|  | **Scrap paper/**  **Rofwerkpapier:** |  |  | **Graph paper/**  **Grafiekpapier:** |  |  |  |  |  | |  |
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| **Type of assessment/**  **Tipe assessering:** | **Semester RESCUE Test** | **Qualification/**  **Kwalifikasie:** | **BSc** |
| **Module code/**  **Modulekode:** | **ITRW222** | **Duration/**  **Tydsduur:** | **1.5 hour**  **1.5 uur** |
| **Module description/**  **Modulebeskrywing:** | **Data Structures and Algorithms** | **Max/**  **Maks:** | **40** |
| **Examiner(s)/**  **Eksaminator(e):** | **R Goede** | **Date/**  **Datum:** | **17/10/2018** |
| **Internal/Interne**  **moderator(s):** |  | **Time/**  **Tyd:** | **11:00** |

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| **Submission of answer scripts/Inhandiging van antwoordskrifte:** | **Ordinary/Gewoon** |

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| **Details of student / Besonderhede van student:** | | | | | | | | |
| Title/ Titel: |  | Initials/ Voorletters: | |  | Surname/ Van: | |  | | |
|  | | |  | | |  | |  | |
| University number/ Universiteitsnommer: | | | |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  |  | | | | Contact number/ Kontaknommer: | | |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  |  |  |  | | |
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|  | | |  | | | Signature/ Handtekening: | |  | |
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| **Examination instructions / Eksamenvoorskrifte** | | |
| 1. Students are allowed into the venue in the first half hour of a session, but no extra time is granted. 2. No student is allowed to leave the venue before half an hour of the examination session has elapsed. 3. Students bring bags to the venue at **own risk**, and must put them in front of the room. 4. Students may not have cell phones/electronic devices with them and/or handle them. 5. No refreshments are allowed in the examination venue. 6. Students may not leave the room for a smoke break. 7. Write on both sides of each page. 8. Write in black or blue ink only. 9. No pages may be removed from the answer scripts. 10. Students may not have unauthorised material with them during a session, e.g. notes and/or objects that contain notes. 11. No items may be borrowed during the session. 12. Students may not attempt to assist another student, or attempt to obtain assistance. 13. Students **must** hand in their answer scrips to invigilators before they leave the venue. 14. The attendance slip on the back cover that also serves as an undertaking, **must** be completed and handed in. |  | 1. Studente mag in die eerste halfuur van 'n sessie tot die lokaal toegelaat word, maar geen ekstra tyd word toegestaan nie. 2. Geen student word toegelaat om die lokaal te verlaat binne die eerste halfuur van 'n eksamensessie nie. 3. Studente bring sakke na lokaal op **eie risiko**, en moet dit voor in die lokaal neersit. 4. Studente mag nie selfone/elektroniese toestelle by hulle hê en/of hanteer nie. 5. Geen verversings word in 'n eksamenlokaal toegelaat nie. 6. Studente mag nie die lokaal verlaat om te gaan rook nie. 7. Skryf op beide kante van die bladsye. 8. Skryf slegs in swart of blou ink. 9. Geen bladsye mag uit die antwoordskrif verwyder word nie. 10. Studente mag nie ontoelaatbare materiaal by hulle hê tydens 'n sessie nie, bv. notas en/of objekte wat notas bevat nie. 11. Geen items mag tydens die sessie geleen word nie. 12. Studente mag nie 'n ander student probeer help of probeer om hulp te kry nie. 13. Studente **moet** hul antwoordskrifte aan toesighouers oorhandig voordat hulle die lokaal verlaat. 14. Die presensiestrokie op die agterblad, wat ook as onderneming geld, **moet** voltooi en ingegee word. |

**IF YOU SUBMIT THIS PAPER IT WILL REPLACE YOUR PART B MARK OF THE SEMESTER TEST, EVEN IF THE MARK FOR THIS TEST IS LOWER!**

**INDIEN JY DIE TOETS INDIEN SAL DIE DEEL B PUNT VAN JOU SEMESTER TOETS VERVANG, SELFS AS DIE PUNT VIR HIERDIE TOETS LAER IS!**

# Question 1 / Vraag 1 (5)

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| Design a method for the class Queue called: *dequeue()*. (5) | Ontwerp ’n metode vir die klas Queue genaamd: *dequeue()*. (5) |
| Assume the following code exists: / Aanvaar die volgende kode bestaan:  public class Queue  {  private Listing[] data;  private int size;  private int numOfNodes;  private int front;  private int rear;  public Queue()  {  size = 100;  numOfNodes = 0;  front = 0;  rear = 0;  data = new Listing[100];  } | |
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# Question 2 / Vraag 2 (35)

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| Study the following class: | Bestudeer die volgende klas: |
| public class SinglyLinkedList<T extends Comparable<? super T>>  {  private Element head; // list header  private Element tail;  public SinglyLinkedList()  {  head = null;  tail = null;  }  public boolean append (T item)  {  // working code: you my use this method without supplying code  }  public boolean prepend (T item)  {  // working code: you my use this method without supplying code  }  public class Element  {  private T data;  private Element next;  public Element(T param)  {  data = param;  }  }// end of inner class Element  }//end SinglyLinkedList outer class | |
| Provide the code for a method *delete(..)* that will delete an item according to value. (5) | Gee die kode vir ‘n metode *delete(…)* wat ‘n item volgens waarde waarde sal uitvee. (5) |
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| Design a method for the generic class SLL named: reverseList() that creates a SLL in reverse order. The user should have TWO options as indicated by the parameter. If the user uses option 1 – by sending a 1 as parameter the original list must still exist and the reversed list should be returned. BUT if the user use option 2 the original list must be stored in reversed order and the old list must be returned.  **Example:**  OPTION 1: (as specified by parameter of 1)  InitialList: {2;4;1;6}  Returned list must be {6;1;4;2}; and  InitialList must remain {2;4;1;6}.  OPTION 2: (as specified by parameter of 2)  InitialList: {2;4;1;6}  Returned list must be {2;4;1;6}; and  InitialList must change to {6;1;4;2}.  **HINT: BE AWARE OF THE DANGERS OF SHALLOW COPY!** | Ontwerp ‘n metode vir die generiese klas SLL genaamd: reverseList() wat ’n SLL skep wat in die omgekeerde volgorde is. Die gebruiker het TWEE opsies soos deur die parameter aangedui word. As die gebruiker opsie 1 gebruik – deur ’n 1 as parameter oor te stuur moet die oorspronklike lys steeds bestaan en die omgekeerde lys moet teruggestuur word. MAAR as die gebruike ’n 2 as parameter oorstuur moet die oorspronklike lys in omgekeerde volgorde gestoor word en die ou lys moet teruggestuur word.  **Voorbeeld:**  OPSIE 1: (soos gespesifiseer deur die parameter  van 1)  Aanvangslys: {2;4;1;6}  Terugstuur lys moet {6;1;4;2} wees; en  Aanvangslys moet {2;4;1;6} bly.  OPSIE 2: (soos gespesifiseer deur die parameter  van 2)  Aanvangslys: {2;4;1;6}  Terugstuur lys moet {2;4;1;6} wees; en  Aanvangslys moet verander na {6;1;4;2}  **WENK: WEES BEWUS VAN DIE GEVARE VAL OPPERVLAKKIGE KOPIEERING!** |
| Draw a diagram to assist your design. (3) | Teken ’n diagram om jou ontwerp te ondersteun. (3) |
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| Write down the general case and describe the steps to be taken. (3) | Skryf die algemene geval neer en beskryf die stappe wat gevolg moet moet word. (3) |
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| Write down the special cases and describe the steps to be taken. (3) | Skryf die spesiale gevalle neer en beskryf die stappe wat gevolg moet moet word. (3) |
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| Give the java code for the method. (10) | Gee die java kode vir die metode. (10) |
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| Complete the test program to test the method thoroughly. (9) | Voltooi die toetsprogram om die metode deeglik te toets. (9) |
| public class Driver  {  public static void main(String [] args)  { | |

TOTAL/TOTAAL: 40