**River Valley High School**

**JC2 H2 Computing 2019**

**Prelim suggested solution 100 marks**

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| --- | --- | --- |
| Qn | Solution | mark |
| 1a | Entity: [1/2,1/2]   * User * Seller   Data Store:[1/2,1/2]   * Drinks * Bank   Process: [2]   * Calculate cash input & Return change / process payment (0.5) * Check stock (0.5) * Dispense drink (0.5) * Top up drinks/Collect Cash (0.5)   Arrow: [1]   * Must be labelled * Correct direction | 5 |
| 1b | Flow chart  Input $ amount  Input drink choice  Is chosen drink in stock?   Input amount > cost of chosen drink?  Dispense drink   Input amount == cost of chosen drink?  Return Change  Return Change  Are there $ input for next 5 seconds?  START  END  No  Yes  Yes  Yes  No  No  Yes  No  Flow chart includes  Input of [1/2,1/2]   * Cash * Drink name   Conditions of [2]   * Drink in stock? [1] * Cash >= price of drink? [1] enough cash [1/2]   Process [1/2,1/2]   * Dispense drink * Return change   Correct use of Flow chart symbol. [1] | 5 |
| 2a | Driverless car Ethical issue:   * Privacy: the more information taken into consideration for the decision making, the more it might interfere with data and privacy protection. Should we use more sensors in driverless car? * Safety: Should we use “testing of driverless car to certify car software” as an assurance to safety? * Should a self-driving car be allowed to drive, when it does not have the latest software version running? * In an extreme scenario self-driving car might even avoid or reject to drive to a certain region or position. Would that be an interference with the freedom of choice, will passengers be informed about the reasons for such decisions? It is important to determine how much control the human should have, that will be taken into account when making design choices for a self-driving car.   Driverless car Social issue:   * Loss of job of drivers * Reducing accidents affects other car industries e.g. car insurance company | 2 |
| 2b | |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Conditions | C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | | Pedestrian sensed 10 m ahead | Y | Y | Y | Y | N | N | N | N | | Speed of car > 20 km / hour | Y | Y | N | N | Y | Y | N | N | | Red light 20 m ahead | Y | N | Y | N | Y | N | Y | N | | Outcomes |  | | | | | | | | | Emergency break | X | X |  |  |  |  |  |  | | Slow down gently |  |  | X | X | X |  | X |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | | Conditions | C1/2 | C3/4 | C5/7 | C6/8 | | Pedestrian sensed 10 m ahead | Y | Y | N | N | | Speed of car > 20 km / hour | Y | N | - | - | | Red light 20 m ahead | - | - | Y | N | | Outcomes | | Emergency break | X |  |  |  | | Slow down gently |  | X | X |  |   Correctly identify condition/outcome – 1  Correct outcome – 2  Correctly reduced – 2 (4 possible reductions) | 5 |
| 3a | To illustrate dependencies between activities, for example in this case, Activity E can only proceed when B and D are completed. | 1 |
| 3b |  | 3 |
| 3c | Critical path is ABFG which is 20 weeks. When F is cut by 3 to 6 weeks. The critical path changed to ACDEG which is 19 week. So the whole project will end 1 week earlier. | 2 |
| 3d | The purpose of a proposal is to **persuade the prospective customer to adopt the solution** to <a problem> or <the fulfilment of a need> put forward in the proposal.  Get funding/As a guide | 1 |
| 3e | Any 2 of the following   * Project justification * The proposed approach * The implementing organisation * Project aims * Project implementation | 1 |
| 4 | pos\_lst = split(llst, pos-1)  pos\_1\_lst = split(pos\_lst, 1)  remaining = split(pos\_1\_lst, 1)  join(pos\_lst, remaining)  join(pos\_1\_lst, pos\_lst)  join(llst, pos\_1\_lst) | 3  2 |
| 5a | The switch extracts the destination **MAC address** of incoming packets and uses it to look up the **switch table**. From the switch table, the **destinated port** is found and the packet is forwarded to the port. | 1 |
| 5b | To forward IP packets to different computer networks based on their source and destination IP addresses | 1 |
| 5c | A client server network is a network that partitions resources/services/tasks between server and clients. For example, a file server keeps computer files and allows other computer nodes (clients) to access the content of the files. | 1 |
| 5d | Infrastructure as a service (IaaS) is where the O/S and servers are managed by a vendor (3rd party) while the user manages the application and middleware.  Platform as a service (PaaS) is where the user only manages the development of the application. | 1 |
| 5e | Any 2:   * 1D/2D Party checks * Echo Back * Double entry | 1 |
| 5f | * Messages are broken into small blocks called packets or datagrams, * which are routed individually along different routes through the network. * At the receiver, the packets are assembled to construct the complete message. | 1 |
| 5g | half duplex | 1 |
| 5h | Asynchronous communication: sender inserts special start and stop bit patterns between each byte of data  Synchronous communication, a byte is sent after a standardized time interval. | 1 |
| 5i | Use encrypted connection like SSL/TLS which provide authentication and data encryption between servers, machines and applications operating over a network | 1 |
| 5j | Perform data encryption with strong encryption method like RSA. | 1 |
| 6a | insertion | 1 |
| 6b | [] [9, 1, 8, 2, 3, 7, 5]  [9] [1, 8, 2, 3, 7, 5]  [9, 1] [8, 2, 3, 7, 5]  [9, 8, 1] [2, 3, 7, 5]  [9, 8, 2, 1] [3, 7, 5]  [9, 8, 3, 2, 1] [7, 5]  [9, 8, 7, 3, 2, 1] [5]  [9, 8, 7, 5, 3, 2, 1] []  [9, 8, 7, 5, 3, 2, 1] | 3 |
| 6c | O(n^2) | 1 |
| 6d | It will always return True  binSearch(3, [1,2,4,5,6,7,8]) would return True which is wrong.  This is because of line 04, it is the base case for all test cases. | 1 |
| 6e | Line 05 changed to  return True if inc\_sort\_lst[0]==target else False | 2 |
| 6f | It is inefficient because the binary search does not check if the pivot value is the target before it recursively searches in the smaller segment. This results in its time complexity to be O(lg n) all the time. If the target value is check with the pivot value before it recursively searches the smaller segment, then the best case can occur in O(1). | 2 |
| 7a | Semantic error  it is due to wrong interpretation of the program statement.  STRING(count) | 3 |
| 7b | Logic error  it is one which allows a program to run successfully, but produces an unintended or undesired result  add i+1 after line 15 | 3 |
| 7c | American Standard Code for Information Interchange  ASCII code is the numerical representation of characters, including English alphabets, numbers and some special characters such as @ or space.  ASCII code was originally defined as a 7-bit sequence: 0 to 127, a total of 128 characters are represented. Subsequently, it is extended to 8-bit. | 2 |
| 7d | 01000001 -> 10115051 | 1 |
| 7e | Not effective if no long repetition found.  OR  Hard to decode if more than 10 consecutive chars found. | 2 |
| 8a | Data inconsistency exists when different and conflicting versions of the same data appear in different places.  When a wrong name of student is entered, there will be different records about the same person with different names | 2 |
| 8b | Data privacy refers to data only accessible by authorized users.  File may contain personal particulars of the student, which should not be accessible by normal users. | 2 |
| 8c | An attribute or a combination of attributes for which there is a value in each tuple and that value is unique | 2 |
| 8d | Student 1:n LoaningRecord 1:n BookLoaningRecord n:1 Book | 4 |
| 8e | Student (StudenID, Name, Class, Gender, …)  LoaningRecord (LoaningFormID, StudentID\*, LoanDate, DueDate, ActualReturnDate, …)  BookingRecord (LoaningFormID\*, BookID\*)  Book(BookID, BookName, Author, Publisher, …)  Legend: primary key underscore, foreign key \*.  Table with meaningful attributes, 4  Primary key, 1  Foreign key, 1  Legend, 1 | 7 |
| 8f | LoaningFormID, BookID, Author, LoanDate, DueDate | 4 |
| 8g | Neat drawing  2 features, such as Date selector, or List of books | 4 |
| 8h | Copy right definitions  Suggest get creative common, etc. | 3 |
| 9a | 1 mark for 3 classes  1 mark for correct use of public and private  1 mark for correct distribution of attributes  1 mark for identification of appropriate methods  1 mark for correct inheritance shown (upward pointing arrows) | 5 |
| 9b | Polymorphism refers to the ability of different classes respond to the same methods in different ways.  For example, display() method in diff classes may function differently to meet different requirements. | 2 |
| 9c | Encapsulation is combining methods and attributes into a single object type. It is used to hide the values or state of a structured data object inside a class, preventing unauthorized parties' direct access to them.  For example, Item class stores the title, description information, and as private attributes, users should not be able to modify the private values if no mutator methods are provided. | 2 |
| 9d | 1 subclass under item  Properties: year, subject, paper number  Methods: related set/get methods. | 2 |