**2018 H2 Computing Prelim Exam Paper 2**

| **Qn 1** | **Solution** | **Remarks** |
| --- | --- | --- |
| (a) |  |  |
| (i) | A 🡪 B 🡪 C 🡪 E | 1M |
| (ii) | 33 weeks | 1M |
| (iii) | Concurrent activities are ones which can be carried out simultaneously / at the same time.  Example:  B & D  C & F | 1M – description  1M – any correct example |
| (iv) | Dependent activities are ones where one activity relies on another activity to be completed before it is able to begin.  Example:  B, D depends on A  C depends on B  F depends on B  E depends on C | 1M – description  1M – any correct example |
| (b) | | |
| A  B  C  D  E  L  3  12  13  8  3  5  J 2  K 2 | | |
| 1M – J, K are concurrent activities  1M – L depends on the completion of J and K  1M – J, K points from milestone 3 to milestone 5  1M – Correct re-labeling of milestones and arrows | | |
| (c)  0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 33   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | B |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | C |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | D |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | E |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | F |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   6M – 1M each for the accuracy of each activity | | |
| (d) | |  |  | | --- | --- | | **Maintenance** | **Example** | | **Corrective maintenance**  When a fault or bug is found in the operation of the new system, which were not picked up at formal testing stage. | Example of bug – The updated record of a personnel cannot be viewed by the military unit even though HR has updated the record. | | **Adaptive maintenance**  Done when conditions change from those that existed when the original system was created, for the software to remain functional. This may be because of changes in law or hardware. | Example – the government IT security policy has changed, requiring more stringent checks to ensure that the database of personnel records cannot be accessed by unauthorised parties | | **Perfective maintenance**  ‘Tweaks’ to the system so that it will perform better. This does not change how the system operates as far as the user is concerned but the performance improves. | Example – the user interface is enhanced so that users are able to easily search and generate the updated records faster. | | 6M total:  For each type:  1M – correct name  1M – elaboration with key words  1M – example in context of this system |
| (e) | Only staff allowed to access system:   * allocate username and password to staff * 2-factor authentication   Admin officers are only allowed read access   * military units are to apply for access rights for their admin officers * different user interface for these officers so that data cannot be changed   Only designated computers in MINDEF are able to access the data   * use of firewall to block unauthorised access from the internet * internet separation – devices that can access this system cannot access the internet * prevent malware, viruses * use of anti-virus software / restrict use of exchangeable storage devices * ensure data is unreadable if successful hacking occurs * encryption of data | 2M max per issue:  1M – make clear reference to the issue  1M – example of a way security can be maintained with reference to this issue, with sufficient elaboration. |
| (f) | Security concern:   * this will open the personnel records to intrusion by hackers   Ethical concern:   * direct updating may result in intentional inaccuracy of data entered by the servicemen and women. | 1M max for each type of issue |

| **Qn 2** | **Solution** | **Remarks** |
| --- | --- | --- |
| (a) | Graphic user interface | 1M |
| (b) | Touchscreen  Barcode scanner | 1M each |
| (c) | 3D button   * elicit the mental model * of a physical button | 1M – feature  2M – elaboration, with reference to familiarity of its use |
| (d) | The internet is a means to transfer data while cloud computing refers to the various types of services provided (e.g. IaaS, PaaS, SaaS). | 1M each for the relevant key phrases |
| (e) | Infrastructure as a service (IaaS) is where the O/S and servers are managed by a vendor while the user manages the application and middleware.  Platform as a service (PaaS) is where the user only manages the development of the application. | 1M each for the accurate description of each service |
| (f) | Considerations:   * whether PriceFare has ready expertise in maintenance of the online service * whether there are sufficient funds to pay for the cost of the service * whether there is a need for further customisation of the Platform used in the future | 2M maximum for any two of the considerations, with sufficient context |
| (g) | With the software provided, PriceFare will be unable to customise it to their specific needs. | 1M |

| **Qn 3** | **Solution** | **Remarks** |
| --- | --- | --- |
| (a) | There was a need for more characters for the many languages used in the world as  ASCII could only encode 128 characters. | 1M – specific need  1M – specify the limited number of characters of ASCII |
| (b) | U+03A9 | 1M – must follow exact format as given in the question |
| (c) | 1010 0110 1100 0111 | 1M |
| (d) | Insertion sort | 1M |
| (e) | |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | Array | | | | |  | | | | [1] | [2] | [3] | [4] | [5] | i | j | Key | | Gamma | Delta | Epsilon | Zeta | Eta |  |  |  | |  | Gamma |  |  |  | 2 | 1 | Delta | | Delta |  |  |  |  |  | 0 |  | |  |  | Gamma |  |  | 3 | 2 | Epsilon | |  | Epsilon |  |  |  |  | 1 |  | |  |  |  | Zeta |  | 4 | 3 | Zeta | |  |  |  |  | Zeta | 5 | 4 | Eta | |  |  |  | Eta |  |  | 3 |  | |  |  | Eta | Gamma |  |  | 2 |  | |  |  |  |  |  |  |  |  | | Delta | Epsilon | Eta | Gamma | Zeta |  |  |  |   1M – correct sequence of values for i  1M – correct sequence of values for j  1M – correct sequence of Key  Array Index  3M – correct sequence of changes for all array index  2M – 3 to 4 correct  1M – 1 to 2 correct | |
| (f) | Quadratic / O(n2) | 1M |

| **Qn 4** | **Solution** | **Remarks** |
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| (a) | 1. The sender splits the file into a set of packets. 2. Each packet is numbered and sent over the network. 3. These packets may take different routes, depending on the busy-ness of the route. 4. The packets are reassembled in the correct sequence at the destination. | 1M – Point 1  1M – Point 3  1M – Point 2 and 4 |
| (b)  (I) | 1. Vertical parity 2. adding up the bits of the byte. 3. adds up to odd or even parity, depending on the chosen parity check | 1M for each point  Maximum 2 marks |
| (b)  (II) | 1. Longitudinal parity 2. Using a byte to check that the 3. Bits in each column add up to odd or even parity, depending on the chosen parity check | 1M for each point  Maximum 2 marks |
| (c) | Data validation is about checking the input data to ensure it conforms with the data requirements of the system to avoid data errors.  Data verification is a way of ensuring the user types in what he or she intends, in other words, to make sure the user does not make a mistake when inputting data. | 1M  1M |
| (d) | 1. Format check: Ensure that every packet message begins and ends with a $ character 2. Range check: Ensure that every packet consists of only space characters, $ characters, uppercase letters and a 3-digit number from 100-800. If other characters are detected, the packet is invalid 3. Type check: Ensure that the data type of each packet is in string format (not integer, float, etc) 4. Presence check: Ensure that there are no empty fields, packet should not be empty | 2M for each different validation check. Maximum 6M.  1M – Type of check  1M – description in context of the question |

| **Qn 5** | **Solution** | **Remarks** |
| --- | --- | --- |
| (a) | A peer to peer network does not have a central server, meaning that there is no central storage. Whereas a client-server network has dedicated servers and clients.  Software is installed on each device in a peer-to-peer network whereas the software is only installed on the server in a client-server network.  A server has the control ability while clients don’t in a client-server network. However, in a peer-to-peer network, all computers have equal ability.  Peer-to-peer networks are usually small networks, while client-server networks can be used for both small and large networks.  Security in a peer-to-peer network is poorer as resources are shared, whereas in a client-server network, the security is stronger as it is centralised. | 2M  2M |
| (b) | 1. A front-end workstation could have been left unattended by a staff **OR** a staff opened an attachment sent via the internet 2. It was subsequently infected with malware 3. Hackers used the malware to gain access to the network remotely. 4. This can be done by obtaining the login credentials of staff (ie user name and passwords) 5. Hackers used malicious software to gain access to the database of patients’ data. | 1M each (Maximum 4M) |
| (c) | 1. use strong passwords 2. do not use office email address for unofficial or personal use 3. screen lock when the employee is away from the workstation 4. do not reply to any suspicious email 5. allow time for security patches to be installed 6. notify supervisors if any unusual activities are noticed | 1M each – must be relevant to what employees (end users) can do in the place of work |
| (d) | 1. separate device for internet surfing and intranet use 2. educate staff and update them regularly on IT security matters 3. review the IT security access of staff from time to time 4. perform vulnerability assessment on all network applications regularly | 1M each – must be relevant to what the organisation can do |

| **Qn 6** | **Solution** | **Remarks** |
| --- | --- | --- |
| (a) | A relational database is one which is structured to recognise relationships / links between the stored items of information. | 1M – explaining relational  1M – explaining database |
| (b) | COMPETITION-MEMBER  MEMBER  CLUB  COMPETITION  1M – 1 to many for Competition & Competition-Member  1M – 1 to many for Member & Competition-Member  1M – 1 to many for Club & Member  1M – total 4 tables | |
| (c) | CLUB(ClubID, ClubName, …)  MEMBER(MemberID, MemName, …)  COMPETITION(CompetitionID, CompName, …)  COMPETITION-MEMBER(MemberID, COMPETITIONID, Result, …)  2M for each table:  1M – Underline correct primary key/s  1M – one other relevant field (no two fields with the same name) | |
| (d) | Deletion anomaly:  When the last member of a club is removed from a competition, the details of the club will also be deleted together.  Update anomaly:  When a club’s detail has an error, all rows containing the club’s details must be updated in order not to have inconsistent data.  Insertion anomaly:  When the competition details are not yet available, the member information cannot also be added | Any 2 types given:  1M – name of data anomaly  1M – description of occurrence in context of the question. Answer must also imply the structure of a non 3NF database  Deletion – related data is deleted entirely from the database  Update – when one data is updated, all entries containing that data must be updated  Insertion – when incomplete data prevents data from being entered |