Part 1 (MCQ) answers

| Question | Answer | Question | Answer | Question | Answer | Question | Answer | Question | Answer |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 11 | 5 | 21 | 3 | 31 | 3 | 41 | 2 |
| 2 | 4 | 12 | 3 | 22 | 1 | 32 | 5 | 42 | 5 |
| 3 | 4 | 13 | 4 | 23 | 1 | 33 | 3 | 43 | 5 |
| 4 | 3 | 14 | 1 | 24 | 2 | 34 | 3 | 44 | 4 |
| 5 | 1 | 15 | 2 | 25 | 1 | 35 | 4 | 45 | 2 |
| 6 | 3 | 16 | 5 | 26 | 5 | 36 | 4 | 46 | 3 |
| 7 | 2 | 17 | 1 | 27 | 2 | 37 | 5 | 47 | 3 |
| 8 | 5 | 18 | 4 | 28 | 4 | 38 | 5 | 48 | 1 |
| 9 | 1 | 19 | 2 | 29 | 3 | 39 | 2 | 49 | 5 |
| 10 | 4 | 20 | 1 | 30 | 2 | 40 | 4 | 50 | 1 |

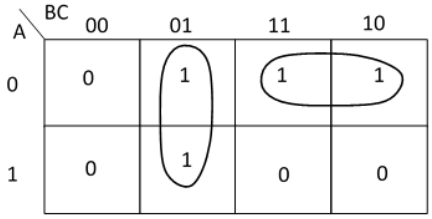
## Part A - Structured Essay Answers

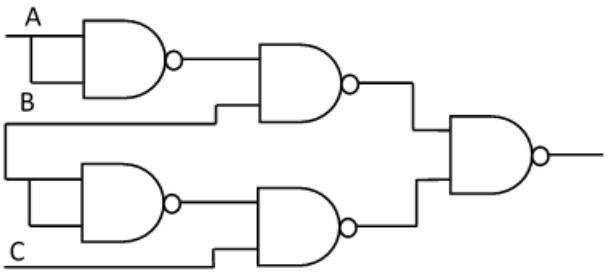
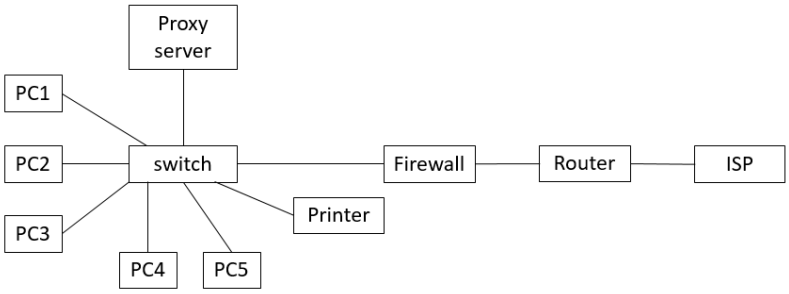
<table>
<tr><th colspan="3">Question Number</th><th>Answer</th><th>Marks</th></tr>
<tr><td rowspan="6">1</td><td>a</td><td></td><td>1. Tea<br>• Black Tea<br>• Green Tea<br>2. Cofee</td><td>1.5 Marks</td></tr>
<tr><td rowspan="2">b</td><td>i</td><td>(A) – POST<br>(B) – stname<br>(C) – pword</td><td>1.5 Marks</td></tr>
<tr><td>ii</td><td>• POST requests are not stored in the browser cache.<br>• POST requests are not stored in the browser history.<br>• POST requests cannot be bookmarked.<br>• Not all data is displayed in the URL.<br>• There is no limit on the data that can be sent.</td><td>1 Mark</td></tr>
<tr><td>c</td><td></td><td>.center {<br>text-align: center;<br>color: red;<br>}<br>center can be replaced by any suitable string of characters.<br>If written within the <Style> tag, no marks will be awarded</td><td>2 Marks</td></tr>
<tr><td>d</td><td></td><td><table><tr><td>(A) : action</td><td>(B) : fieldset</td><td>(C) : legend</td><td>(D) : gender</td></tr><tr><td>(E) : select</td><td>(F) : selected</td><td>(G) : textarea</td><td>(H) : a</td></tr></table></td><td>4 Marks</td></tr>
<tr><td colspan="3">Total Marks for Question 1</td><td>10</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td rowspan="6">2</td><td rowspan="3">a</td><td>i</td><td>B</td><td rowspan="3">0.5x3 = 1.5 Marks</td></tr>
<tr><td>ii</td><td>A</td></tr>
<tr><td>iii</td><td>C</td></tr>
<tr><td rowspan="2">b</td><td>i</td><td>PaaS, or platform as a service<br>SaaS, or software as a service<br>Please ignore minor typographical errors.<br>Please disregard letter case (Capital/Lowercase)</td><td>1 Mark</td></tr>
<tr><td>ii</td><td>B</td><td>2 Marks</td></tr>
<tr><td>c</td><td></td><td>A – B2G<br>B – 4<br>C – 4</td><td>0.5x3 = 1.5 Marks</td></tr>
</table>

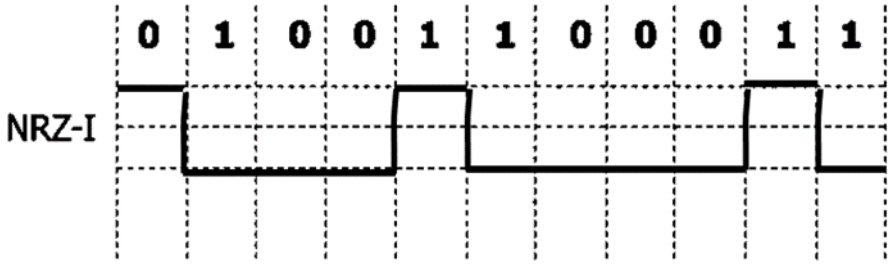
| | | | | |
|---|---|---|---|---|
| | | | **0.5** marks for each. | |
| | **d** | **i** | • Engagement in computing while maintaining **<u>environmental sustainability</u>**.<br>• Utilizing information technology in such a way as to **<u>minimize energy consumption</u>** and reduce energy waste.<br>• Using computer resources in an **<u>environmentally friendly manner.</u>**<br><br>Among the above answers, check each answer by giving more attention to the underlined words, including any suitable answer that contains any of those points or clarifications.<br>For answers like engaging in computing without releasing waste to the environment, provide only 1 mark. | 2 Marks |
| | | **ii** | • Reading the data on a credit or debit card when inserted into an Automatic Teller Machine (ATM) using a magnetic stripe reader.<br>• Reading the barcode of a product using a barcode reader.<br>• Detecting the room temperature using a temperature sensor installed in a room in a house.<br>• Reading checks received at a bank using an MICR machine.<br>• 1 mark for each answer. Choose any two from the four answers above, or any other suitable direct input instances that are not mentioned here. When selecting a direct input instance that is not included, consider situations where devices like Barcode Reader, MICR, Magnetic Stripe Card Reader, Sensor, OMR, or OCR are used for practical data input. | 2 Marks |
| **Total Marks for Question 2** | | | | **10** |
| | | | | |
| **3** | **a** | | Ⓐ yes (0.5 Marks)<br>ⒷNo (0.5 Marks)<br>Ⓒ yes (0.5 Marks)<br>Ⓓ No (0.5 Marks)<br>Ⓔ num>Max (1 Marks) (←-- C)<br>Ⓕ Output num (0.5Marks) (←-- A)<br>ⒼOutput Max (0.5Marks) (←-- B) | 4 Marks |
| | **b** | **i** | [ 5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20]<br>A. (1.5 Marks) Correct list contents<br>B. (0.5 Marks) For [ ] and commas.<br>Ignore spacing errors | 2 Marks |
| | | **ii** | [5,7,9,13,15,17,19] (1 Marks)<br>A. (0.5 Marks) Correct list contents<br>B. (0.5 Marks) For [ ] and commas.<br>Ignore spacing errors | 1 Mark |
| | **c** | | ❶ Num_list (0.5 Marks) (←Correct spelling and proper lowercase letters.)<br>❷ Min_num (0.5 Marks) (← ❶ Correct spelling and proper lowercase letters.)<br>❸ Count (0.5 Marks) (←Correct spelling and proper lowercase letters.)<br>❹ num (0.5 Marks) (←Correct spelling and proper lowercase letters.)<br>❺ c (0.5 Marks) (← ❹)<br>❻ numbers (0.5 Marks) (←Correct spelling and proper lowercase letters.) | 3 Marks |
| **Total Marks for Question 3** | | | | **10** |

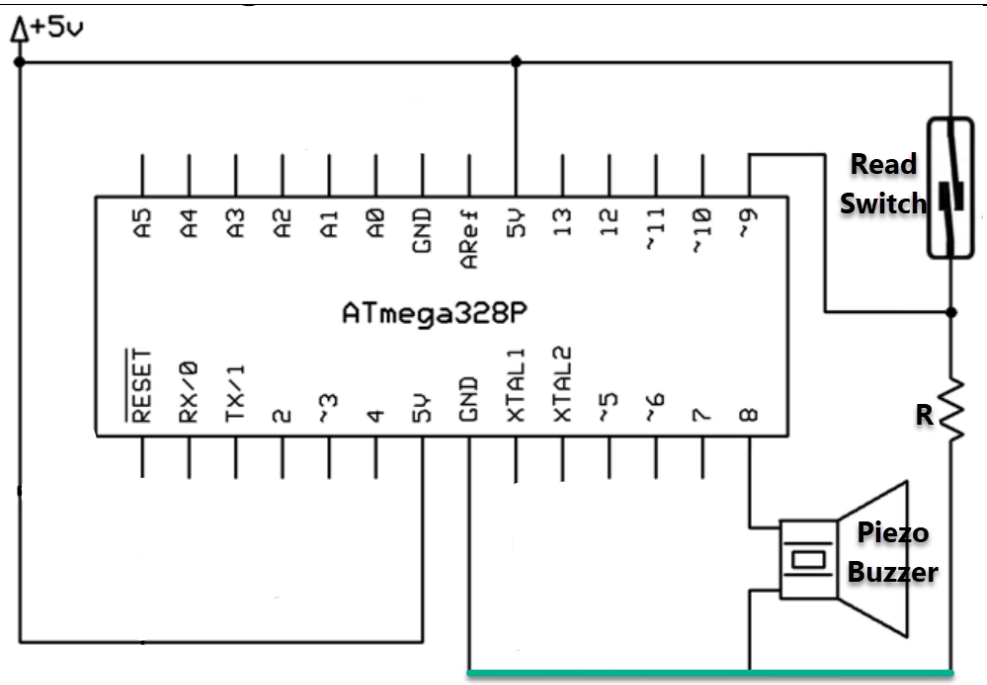
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| **4** | **a** | Ⓐ -5 Ⓑ - 6 Ⓒ -3 Ⓓ - 7<br>Ⓔ - 2 Ⓕ -8 Ⓖ -1 Ⓗ - 4 | 4 Marks |
| | **b** | A minimum of at least 6 patients should be included for any hour. | 1 Mark |
| | **c** | • Facilitating quick transactions by encouraging online bill payments.<br>Quickly counting cash and providing change. | 1 Mark |
| | **d** | • How well does this project integrate with the existing system?<br>• Is there sufficient human resources to implement the project?<br>• Is the knowledge of the employees adequate for implementing the project?<br>• Is there a capacity for training employees to implement the project?<br>• What is the feedback from employees regarding the implementation of the project?<br>• Do employees work flexibly during the implementation of the project?<br>• Can effective communication be established between hospital staff and patients? | 1 Mark |
| | **e** | • Ensuring that the system meets the needs and expectations of hospital staff, doctors, and other stakeholders, thereby confirming readiness to implement the system. | 1 Mark |
| | **f** | • **Developer Team:** Providing facilities for improvements in system iterations based on user feedback and system functionality at each stage.<br>• **Hospital Staff:** Minimizing disruptions to hospital operations by starting implementation from one section and gradually expanding the system to other sections. | 0.5x2 = 1 Mark |
| | **g** | • It may not meet the hospital's needs.<br>• There may be customization limitations.<br>• Unnecessary features may exist.<br>• Modifications may be difficult.<br>• Additional costs may be incurred for upgrading.<br>• Provide marks for a suitable answer. | 1 Mark |
| **Total Marks for Question 4** | | | **10** |

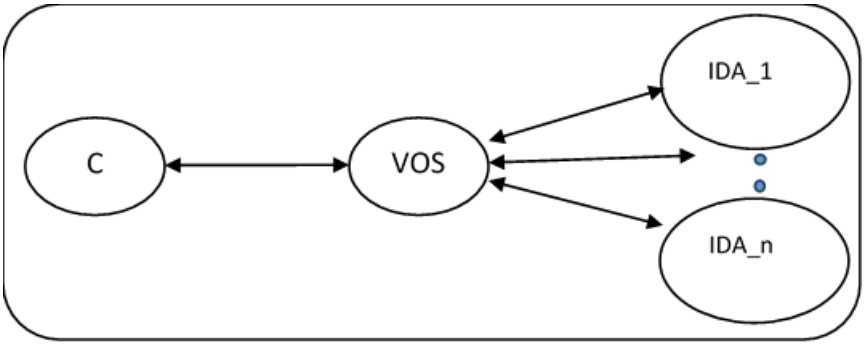
**Part B**

| | | | | |
|---|---|---|---|---|
| **5** | **a** | **i** | <table><tr><th>A</th><th>B</th><th>C</th><th>P</th><th>Q</th><th>R</th></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td><td>1</td></tr><tr><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td><td>1</td></tr><tr><td>0</td><td>1</td><td>1</td><td>1</td><td>0</td><td>1</td></tr><tr><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>1</td><td>0</td><td>1</td><td>0</td><td>1</td><td>1</td></tr><tr><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td></tr></table> • If all 8 lines are correct, 03 marks<br>• If 6 or 7 lines are correct 02 marks<br>• If 4 or 5 lines are correct 01 marks<br>• If 3 lines are correct: 01 mark | 3 Marks |
| | | **ii** | $\bar{A}\,\bar{B}\,C + \bar{A}\,B\,\bar{C} + \bar{A}\,BC + A\bar{B}\,C$ | 2 Marks |
| | | **iii** |  $R = \bar{A}B + \bar{B}C$<br>• Correct Karnaugh map - 1 Mark<br>• Correct marking of two groups - 1 marks<br>• Simplified final answer - 1 Marks | 3 Marks |

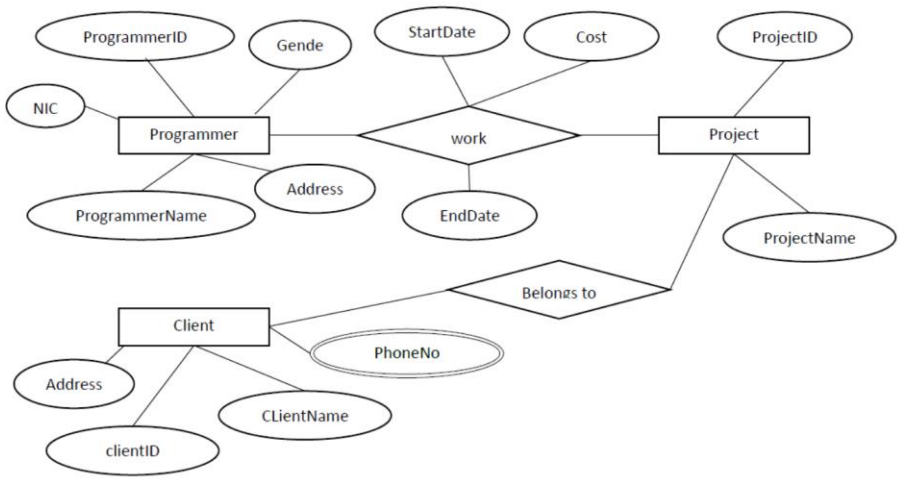
| | | | | |
|---|---|---|---|---|
| | | **iv** | P = $\overline{A}B$ **Q =** $\overline{B}C$<br>• Correct statement P - Marks: 0.5.<br>• Correct statement Q - Marks: 0.5 | 1 Mark |
| | | **v** | <br>For a logically correct but an unoptimized NAND gate arrangement (using many gates) give a total of 2 mark | 2 Marks |
| | **b** | | $AB+A(B+C)+B(B+C)$<br>$= AB+AB+AC+BB+BC$ Distributive Law<br>$=AB+AC+B+BC$ $AA = A$<br>$=AB+AC+B$ $A+AB = A$ (Redundancy law)<br>$= B+ AB +AC$ $A+AB = A$ (Redundancy law)<br>$=\underline{B+AC}$<br>• **Demonstration of step-by-step simplification - Marks: 1** | 1 Mark |
| | **C** | | i. 0<br>ii. 0 or<br>There is no change in the output (← Correct answer for c(i))<br>iii. 1 | 3 Marks |
| **Total Marks for Question 5** | | | | **15 Marks** |
| | | | | |
| | **a** | **i** | • The communication speed is relatively high.<br>• Error troubleshooting is easy.<br>• Network setup and modification are convenient.<br>• The failure of one device does not affect other devices. | 1 Mark |
| | | **ii** | **Network Hub** and **Switch** | 1 Mark |
| | | **iii** | **Device:** Switch<br>**Reason:**<br>• A network hub operates in half-duplex mode, while a switch operates in full-duplex mode. Therefore, a switch is faster than a network hub.<br>• A switch receives data and forwards it to the correct destination, whereas a network hub receives data and sends it to all destinations. | 1 Mark |
| | | **iv** |  | 2 Marks |
| | **b** | **i** | 255.255.255.128 | 1 Mark |
| | | **ii** | 2 | 1 Mark |

| | | | | |
|---|---|---|---|---|
| | | **iii** | <table><tr><th>Subnet</th><th>Network address</th><th>Usable First Host IP address</th><th>Usable Last Host IP address</th><th>Broadcast Address</th></tr><tr><td>Subnet A</td><td>192.168.60.128</td><td>192.168.60.129</td><td>192.168.60.158</td><td>192.168.60.159</td></tr><tr><td>Subnet B</td><td>192.168.60.160</td><td>192.168.60.161</td><td>192.168.60.190</td><td>192.168.60.191</td></tr><tr><td>Subnet C</td><td>192.168.60.192</td><td>192.168.60.193</td><td>192.168.60.222</td><td>192.168.60.223</td></tr><tr><td>Subnet D</td><td>192.168.60.224</td><td>192.168.60.225</td><td>192.168.60.254</td><td>192.168.60.255</td></tr></table> | 4 Marks |
| | **c** | **i** | • A public IP address is required to access the internet.<br>• However, in a private network, a private IP address is used. In that case, none of the computers in the private network can access the internet directly.<br>• The concept of NAT (Network Address Translation) is to allow multiple devices to access the internet through a single public IP address.<br>• For this, it is necessary to translate the private IP address to a public IP address.<br>• Network Address Translation (NAT) is the process of converting one or more private IP addresses into one or more public IP addresses to provide internet access to local hosts. | 2 Marks |
| | | **ii** |  | 2 Marks |
| **Total Marks for Question 6** | | | | **15 Marks** |
| | | | | |
| 7 | a | i | 0.5 marks each for naming the parts and 0.5 marks each for describing the tasks **(0.5 x 2 x 4 = 4 Marks)**<br><br>**A – RX Led/ RX indicator**<br>Indicates that a digital data input is being received in the Arduino board.<br>**B - Microcontroller** (ATMega328 Microcontroller). Consider that the ATMega328 part is not essential.<br>Executing instructions **or**<br>Processing the data received by the board **or**<br>Performing calculations/processing based on the input provided to the board and generating outputs.<br>**C - Power supply jack / Barrel connector/ DC Jack/ 7V to 12V Jack/ 12V input Jack/ External Power Jack**<br>**D – Reset Button**<br>Momentarily interrupting and restoring the power supply in the circuit. Stopping the sequence of instructions operating in the circuit and resetting it to its initial state.<br>Taking actions to re-execute a sequence of instructions within the board from the beginning. | 4 Marks |
| | | ii | Allocate marks of 0.5 each for sections ❶ and ❷<br>❶ - Sensor<br>❷ - Actuator | 1 Mark |

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| | | iii | <br>A: 1 mark for correctly connecting R1 and 5V, GND (ground).<br>B: 1 mark for correctly connecting the Read Switch to the designated input pin.<br>C: 1 mark for correctly connecting the Piezo Buzzer to the designated input/output pin.<br>**Note:**<br>• Complete pin details are not required. However, the connected pins should be displayed.<br>• The term "Piezo Buzzer" can be accepted as "Buzzer" or "Sound output unit." | 3 Marks |
| | **b** | **i** | A and B sections are marked with 1 mark each<br><br>A. autonomous agent - C Agent<br>B. User Agents - Chat Agent or VOS Agent | 2 Marks |
| | | **ii** | C Agent | 1 Mark |
| | | **iii** | In instances where VOS fails to provide self-replies to user issues, it seeks assistance from virtual medical agents residing in different regions via the internet,<br>or<br>For issues that cannot be resolved in this manner, the user is redirected to a human physician through agent C once again.<br>**Note:**<br>It is not essential for the above statements to be written in the exact manner; however, conveying the essence of those statements included in the above details in different words is acceptable. | 1 Mark |
| | | **iv** | • Multicasting behavior refers to multiple agents performing their tasks while maintaining inter-agent cooperative functionality or interaction with each other.<br>• In centralized agent functionality, it is observed that the activities of one agent control the activities of other agents.<br>• In the above system, the behavior of other agents is controlled based on the activities of agent C.<br><br>Please allocate marks as follows: | 0.5 x 3 = 1.5 Marks |

| | | | | |
|---|---|---|---|---|
| | | | Focus on each of the above points separately and assign marks accordingly. Each point should be marked with 0.5 | |
| | | **v** | <br>Note: IDA – Internet Domain Agents<br>Please allocate marks as follows. Focus on the highlighted texts while assigning marks.<br>**A.** The VOS agent should be depicted as a centralized agent in the diagram. - **Marks: 0.5**<br>**B.** A ↔ VOS Agent: If there is **an interaction occurring on both sides** with the roaming virtual agents on the internet, mark one of them. - **Marks: 0.5**<br>**C.** A ↔ VOS Agent: If there is **an interaction occurring on both sides**, mark agent C. - **Marks: 0.5** | 1.5 Marks |
| **Total Marks for Question 7** | | | | **15 Marks** |
| | | | | |

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|---|---|---|---|
| **8** | **a** | 11111 | 3 Marks |
| | **b** | Ⓐ **0.5 marks** count_fruit_likes<br>Ⓑ**0.5 marks** students_fruit_list:<br>Ⓒ**1 marks** fruit<br>Ⓓ**1 marks** fruit_counts[fruit] --> Ⓒ<br>Ⓔ**1 marks** 1<br>Ⓕ**1 marks** fruit_counts --> Ⓐ<br>Ⓖ**1 marks** fruit_counts --> ⒶⒻ<br>Ⓗ**1 marks** students_fruit_list | 7 Marks |
| | **c** | P--- for fruit, count in fruit_counts.items(): ( **2.5 marks** )<br>Q--- file.write(fruit+": "+str(count)+"\n") ( **2.5 marks** ) | 5 Marks |
| **Total Marks for Question 8** | | | **15 Marks** |
| | | | |

| | | | | |
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| **9** | **a** | |  | 6 Marks |
| | **b** | | **Specialization** - Dividing a certain entity into sub-entities through specific attributes.<br>**Generalization** - Combining multiple entities into a single entity through common attributes. | 2 Marks |
| | **C** | **i** | First Normal Form (1NF):<br>There are no repeating groups; all data is atomic.<br>However, partial dependencies exist. | 2 Marks |
| | | **ii** | Exam_Result(studentNO,SubjectId,Grade)<br>Student (StudentNo, NIC,firstName,lastName)<br>Subject(subjectId,subjectName) | 2 Marks |
| | **D** | **i** | ALTER TABLE Customer ADD TelephoneNO char(12); | 2 Marks |
| | | **ii** | CustomerName \| Amount \| date<br>Sunil Anthoney \| 10 \| 2024/05/12<br>Sunil Wijebandara \| 50 \| 2024/05/13 | 2 Marks |
| | | **iii** | SELECT count(CustomerID) FROM purchase WHERE date = "2024/05/12"; | |
| **Total Marks for Question 9** | | | | **15 Marks** |
| | | | | |

| | | | | |
|---|---|---|---|---|
| **10** | **a** | **i** | Device drivers | 1 Mark |
| | | **ii** | Instruction Register (IR) | 1 Mark |
| | | **iii** | B, A,D,C | 1 Mark |
| | **b** | **i** | **Process** **Time t** **Time t+1**<br>exam Running → Ready<br>final Ready → Running | 1 Mark |
| | | **ii** | Storing the state related to the "exam" execution in its Process Control Block.<br>Retrieving the state related to the "final" execution from its Process Control Block | 1 Mark |
| | | **iii** | • Requirement to read a file for the final process.<br>• Requirement to write to a file for the final process.<br>• Engagement in input acquisition for the final process.<br>• Engagement in output delivery for the final process | 1 Mark |
| | **C** | **i** | OS - 0,1 (0.5 mark - if all numbers are present) | 1.5 Marks |

<table>
<tr><td></td><td></td><td></td><td>X - 2, 3, 4, 6,7 (0.5 mark - if all numbers are present)<br>Y - 5, 8, 9, 10 (0.5 mark - if all numbers are present)</td><td></td></tr>
<tr><td></td><td></td><td>ii</td><td>4 Bits</td><td>0.5 Marks</td></tr>
<tr><td></td><td></td><td>iii</td><td>
<table>
<tr><th>Page Number</th><th>Frame Number</th><th>Present/ absent</th></tr>
<tr><td>0</td><td>0000</td><td>0</td></tr>
<tr><td>1</td><td>0110</td><td>1</td></tr>
<tr><td>2</td><td>0000</td><td>0</td></tr>
<tr><td>3</td><td>0010</td><td>1</td></tr>
<tr><td>4</td><td>0111</td><td>1</td></tr>
<tr><td>5</td><td>0100</td><td>1</td></tr>
<tr><td>6</td><td>0011</td><td>1</td></tr>
</table>
<ul>
<li>If all 7 rows are correct - 2 mark</li>
<li>If 5,6 rows are correct - 1.5 mark</li>
<li>If 3,4 rows are correct - 1 mark</li>
<li>If 1,2 rows are correct - 0.5 mark</li>
</ul>
</td><td>2 Marks</td></tr>
<tr><td></td><td></td><td>iv</td><td>0100 0000 0000 1100</td><td></td></tr>
<tr><td></td><td></td><td>v</td><td>64</td><td>1 Mark</td></tr>
<tr><td></td><td>d</td><td>i</td><td>322</td><td>1 Mark</td></tr>
<tr><td></td><td></td><td>ii</td><td>2KB</td><td>1 Mark</td></tr>
<tr><td></td><td></td><td>iii</td><td>
<table>
<tr><td>320</td><td>323</td></tr>
<tr><td>321</td><td></td></tr>
<tr><td>322</td><td>320</td></tr>
<tr><td>323</td><td>-1</td></tr>
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</td><td>1 Mark</td></tr>
<tr><td colspan="4">Total Marks for Question 10</td><td>15 Marks</td></tr>
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