**National**

**Qualifications**

**Computing Science**

**N5**

**Prelim exam – Broxburn Academy**

**Database design and development** - entire topic

**Web design and development** – entire topic

**Software design and development** – analysis, data types, standard algorithms, expressions and constructs

**Total marks – 106**

**SECTION A – 25 marks**

Attempt ALL questions in this section.

**SECTION B – 81 marks**

Attempt ALL questions in this section.

Please write your name and subject. All answers must be written on the lined paper provided.

Read all questions carefully before attempting.

Duration – 2 hours

|  |  |  |  |
| --- | --- | --- | --- |
| **SECTION A – 25 marks**  **Attempt ALL questions** | | | **MARKS** |
| **1** | A web page can use both internal and external hyperlinks.  Explain the difference between an internal and an external hyperlink. | | **2** |
| **2** | An online retailer stores the details of a customer’s e-mail in a secure database to contact them about promotional offers. | |  |
| **(a)** | State the type of validation that would be used for this attribute. | | **1** |
| **(b)** | Explain why this validation would be suitable. | | **1** |
| **3** | The code below monitors the temperate of a room:  . . .  **Line 7** RECEIVE temp FROM <sensor>  **Line 8** REPEAT WHILE temp >= 20  **Line 9** RECEIVE temp FROM <sensor>  **Line 10** END WHILE  **Line 11** SET heater TO On  Describe what happens in lines 8 to 10 above if the sensor detects a value of 15 at line 7. | | **3** |
| **4** | Gillian would like to create a website promoting her Fabulous Homemade Cakes. Customers should be able to browse the range of cakes, write reviews and submit recipes of their own. Gillian would also like to ensure that customers are able to customise the look of the website by choosing between different colour schemes. | |  |
| **(a)** | State **two** functional requirements for the website. | | **2** |
| **(b)** | State **one** end-user requirement for the website. | | **1** |
| **5** | CurlNWhirl uses a database to store details of its members and affiliated curling teams. The database contains personal information. | |  |
| **(a)** | State the Act which governs personal data of individuals and businesses. | | **1** |
| **(b)** | Describe one implication that CurlNWhirl must ensure it complies with when storing this information. | | **1** |
| **6** | A link with the following address is contained within a web page.  http://www.coolmath-games.com/ | |  |
| **(a)** | State if this is an example or absolute or relative addressing. | | **1** |
| **(b)** | Explain what would happen to the link if the current web page was moved to a different location. | | **1** |
| **7** |  | An example of a database record is shown below.   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **EmployeeNo** | **Firstname** | **Surname** | **Date of Birth** | **Location** | | 02545 | Jon | Snow | 26/11/1986 | Falkirk | |  |
|  |  | |  |
| **(a)** | Explain why the EmployeeNo attribute requires a presence check. | | **1** |
| **(b)** | Suggest a data type for the EmployeeNo attribute. Explain why your choice would be suitable. | | **2** |
| **8** | Evaluate the following program and answer the questions.  **Line 7** SET hero1 TO “Batman”  **Line 8** SET hero2 TO “Robin”  **Line 9** SET mainhero TO hero1  **Line 10** SET batcalls TO 0  **Line 11** REPEAT UNTIL batcalls = 3  **Line 12** IF batcalls > 2 THEN  **Line 13** SEND mainhero+“and”+hero2+“are on the way!” TO DISPLAY  **Line 14** END IF  **Line 15** batcalls = batcalls + 1  **Line 16** END REPEAT | |  |
| **(a)** | State a suitable data type for hero1. | | **1** |
| **(b)** | State a suitable data type for batcalls. | | **1** |
| **(c)** | Name the construct used on line 11. | | **1** |
| **(d)** | Explain the purpose of line 15. | | **1** |
| **(e)** | Write down the exact output of the program. | | **2** |
| **9** | Nazmi would like to share a new video of her magic trick routine with her friends on FaceBase. It has been recorded using a smartphone.  Suggest a suitable standard file format for this to be uploaded to a social media platform. Explain your answer. | | **2** |

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| **SECTION B – 85 marks**  **Attempt ALL questions** | | | | **MARKS** |
| **10** | Below is the design for part of a program that finds the total score in a clay pigeon shooting game. Players are given a set number of shots and points are awarded for every target that is hit. | | |  |
|  | **Line 1** | | SET score TO 0 |  |
| **Line 2** | | REPEAT 10 TIMES |  |
| **Line 3** | | RECEIVE targethit FROM KEYBOARD |  |
| **Line 4** | | IF targethit = True THEN |
| **Line 5** | | score = score +10 |
| **Line 6** | | END IF |
| **Line 7** | | END REPEAT |
| **Line 8** | | SEND “You achieved” + score + “points” TO DISPLAY |
|  | |  |
|  | **(a)** | Suggest a suitable data type for targethit. | | **1** |
|  | **(b)** | State the line of code that requests input from the user. | | **1** |
|  |  |  | |  |
|  | **(c)** | Name the construct that used on line 4. | | **1** |
|  |  |  | |  |
|  | **(d)** | Using pseudocode or a language of your choice write a solution that will generate a message displaying “Well done, great score” when the player scores between 50 and 100 points. | | **3** |

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|  | **11** | ReelyJiggard are a folk band that have decided to promote their newest album on the band website.  The band would like a design for the web page that contains the following:   * information about the new album and tour dates * a photograph of the band performing * a video interview hosted by on social media website | | |  |
|  | **(a)** | Using this information, draw a wireframe design for the new page. | | | **3** |
|  |  |  | | |  |
|  | **(b)** | A cascading style sheet (CSS) rule shown below is used to style the paragraph descriptions on the band website.  p { font-size: 10px;  font-family: “Arial”;  text-align: left;  The heading text in this website should be displayed in the centre, using a Tahoma font that is three times the size of the text used in the paragraphs.  Write a CSS rule that would style the headings accordingly. | | | **4** |
|  | **(c)** | The fans test the band website. Three members report  that the links between some pages do not work.  Describe **two** additional tests that can be performed on the website. | | | **2** |
|  | **12** | A mobile development company called GameOnTheGo uses a flat file database to store details of its games and publishers. | | |  |
|  | |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **GameID** | **Name** | **Genre** | **Release date** | **Publisher** | **Country** | | 56173 | Chess 2000 | Strategy | 06/02/2004 | Station Games | USA | | 12456 | Amusement Park | Simulation | 06/02/2016 | TB Games | USA | | 13375 | Fighter King | Fighting | 01/05/2016 | TB Games | USA | | 32648 | Disco Diva | Dance | 20/07/2006 | Eaglehead | UK | | 78852 | LunarBase | Action | 25/05/2007 | Elite | UK | | 25649 | Gedi Wars – I | Action | 04/06/2009 | Eaglehead | UK | | 21569 | DynoWarrior | Fighting | 27/12/2010 | Elite | UK | | 79445 | UltraMan – The Wally Wars | Platformer | 01/08/1996 | Capital  Com | Japan | | 65584 | Sentinel | Action | 09/09/2015 | Victory | France | | |  |
|  |  | |  |
|  | **(a)** | State the field type used to store each Release date. | | | **1** |
|  | **(b)** | Describe **two** advantages of using a relational database rather than a flat file. | | | **2** |
|  | **(c)** | Identify an attribute that should be used as a primary key. Explain why your choice would be suitable. | | | **2** |
|  | **(d)** | When adding a game the following error message is displayed:  GameID 1564 is invalid, please re-enter  State the validation that has been applied to the GameID field. | | | **1** |
|  |  |  | | |  |
|  | **(e)** | The table has been sorted on two fields. Describe how the table has been sorted. | | | **2** |

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| **13** |  | Hamish writes a program for a cinema booking system that will check if the customer has a VIP membership. If this is true then they can continue and then book the premium seats. The user is given 3 attempts to provide a valid membership otherwise they will be locked out of the system. | **MARKS** |
|  |  | **Line 3** SET attempts to 0  **Line 4** REPEAT  **Line 5** RECEIVE vipmember FROM KEYBOARD  **Line 6** SET attempts TO attempts + 1  **Line 7**…….UNTIL \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  |
|  | **(a)** | Identify the line that is used as an input for the program. | **1** |
|  | **(b)** | Complete line 7 of the code above. | **1** |
|  | **(c)** | State the variable type of the variable vipmember. | **1** |
|  | **(d)** | Hamish decided to improve the program by making it display a message that will inform the user when they only have one attempt remaining.  Using a programming or reference language of your choice, write code that would check for and display this before the third attempt is reached. | **3** |

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| **14** | Below is a basic design for a new audio company’s website. The site will include the home page and a further three main pages. Both microphones and speakers be contained within the gear page. | |  |
|  | Contact Us  Get in touch to find out more information about our products or to book a repair  Home  Gear  - Microphones  - Speakers  Contact  NEWMAAN 87  Home  Gear  - Microphones  - Speakers  Contact | |  |
|  | **(a)** | Draw a structure diagram for the website above. | **3** |
|  | **(b)** | Describe **two** features to be considered when designing the user interface of the website. | **2** |

|  |  |  |  |
| --- | --- | --- | --- |
|  | **(c)** | State the type of language which could be used to create an interactive registration form for a customer account. | **1** |
|  | **(d)** | A video review of a product is added to the website but during testing it keeps pausing during playback.  Describe one change which could be made to help the video play smoothly. | **1** |
|  | **(e)** | Suggest a suitable standard file format for storing audio recordings when storage capacity may be limited. Explain your choice. | **2** |
| **15** |  | Jim is a web developer for the IndieScoop website. Two school students from a games development company made the headlines with their new FundDriver campaign. |  |
|  | **(a)** | Jim wishes to add a new web page which will include:  • information about the new game that has been developed  • photographs of the students  • a video interview with the students  Using this information, draw a wireframe design for the new page. | **3** |
|  |  |  |  |
|  | **(b)** | Jim would also like to show the games that influenced the students as a bullet point list on the web page. The list of games will be implemented using <ol> and <li> tags.  Add HTML <ol> and <li> opening and closing tags to the list items below so that it will display correctly in the browser.  Unknown Undergrounds  Dash Brandycott  Go Home Knuckles | **3** |
|  | **(c)** | Jim decides to use a scripting language to add some interactivity to an image on the web page. The code used is given below.  <img id=”game” src=”promo1.jpg” alt=”Promo photos”  onmouseover=”document.getElementById(‘game’).src=’promo2.jpg’”/>  The graphic changes when the mouse pointer is placed over it.  Identify the event in the code that causes the graphic to change. | **1** |

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|  |  |  | **MARKS** |
|  | **(d)** | Jim has decided to style text in the webpage using internal style rules. |  |
|  |  | **(i)** State the type of CSS selector shown by the . (full stop) symbol at the beginning of the CSS rule below.  .important{font-size:12px;font-weight:bold;color:Blue;} | **1** |
|  |  | **(ii)** The CSS rules below contain three styles each.  p {font-size:8px; color:Red; text-align:center;}  .important {font-size:12px; font-weight:bold; color:Blue;}  Both of these rules have been applied to the text below the  graphic.  <p class=”important”>Influential Games</p>  Describe how the text will look when it is viewed in a browser. | **3** |
|  | **(e)** | Jim is advised to use an external cascading style sheet. Describe what is meant by an external cascading style sheet and explain one of the benefits of using one. | **2** |
|  | **(f)** | Jim uses a search engine to find a suitable graphics of recent games that are being developed to be included in the article.  State one way Jim could ensure he does not breach the Copyright, Designs and Patents Act 1988. | **1** |

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| **16** | A robot gripper is controlled using a programming language which includes the following pre-defined functions: | | | | |  | |
|  |  | | |  |  | | |
|  | **Grab ()** | | | Picks up the object which is directly below |  | | |
|  | **Drop ()** | | | Puts the gripped object into the position directly below |  | | |
|  | **Left (n)** | | | Moves left *n* positions |  | | |
|  | **Right (n)** | | | Moves right *n* positions |  | | |
|  |  |  | robot question | | | |  | |
|  |  |  |  | | | |  | |
|  | E.g. To move two smartphones from position A to position E, the code would be: | | | | |  | |
|  |  |  | REPEAT 2 TIMES | | | |  | |
|  |  |  | Grab () | | | |  | |
|  |  |  | Right (4) | | | |  | |
|  |  |  | Drop () | | | |  | |
|  |  |  | Left (4) | | | |  | |
|  |  |  | END REPEAT | | | |  | |
|  | **(a)** | State the type of loop shown in the example above. Justify your answer. | | | | | **2** | |
|  | **(b)** | Describe what would be at position D after the following code is executed: | | | | | **2** | |
|  |  |  | Grab () | | | |  | |
|  |  |  | Right (3) | | | |  | |
|  |  |  | Drop () | | | |  | |
|  |  |  | Left (1) | | | |  | |
|  |  |  | Grab () | | | |  | |
|  |  |  | Right (1) | | | |  | |
|  |  |  | Drop () | | | |  | |
|  | **(c)** | Write the code that would move the two processors from position C to position B, starting from position A. | | | | | **3** | |

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|  |  |  | **MARKS** |
| **17** |  | Sven works in a Segway shop. He decides to create a database to store information on staff and Segways for leasing. This would make it easier to record which staff member is responsible for preparing each Segway for a customer.  Sven begins by analysing the problem. He looks at the information that the store currently holds on paper and makes notes as follows:   |  |  | | --- | --- | | **Staff**  employeeID  name  address  teleNo  role (for example: sales, service, management) | **Segway**  serialNo  model  colour  speed  maxWeight | |  |
|  | **(a)** | Copy and complete the entity-relationship diagram below. | **4** |
|  | **(b)**  **(c)** | Staff  Segway  1:M  leases/prepares    Sven’s relational database contains primary and foreign keys.  State the purpose of a foreign key in a relational database.  Following implementation of the database, the ‘Segway’ table below contains 10 records. |  |
|  |  | |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **serialNo** | **model** | **colour** | **speed** | **maxWeight** | **employeeID** | | X1256 | Active | White | 2.5 | 120 | 5468 | | M5422 | Cruise | Silver | 2.0 | 110 | 1475 | | F2554 | Eco | Green | 1.5 | 95 | 7669 | | P1126 | Eco | Green | 1.7 | 95 | 8214 | | L4452 | Active | Black | 2.2 | 110 | 9795 | | B4356 | Cruise | Black | 1.9 | 100 | 8415 | | A4877 | Cruise | White | 1.8 | 100 | 1121 | | S8916 | Active | Red | 2.3 | 100 | 5972 | | P5241 | Eco | Blue | 1.8 | 90 | 3321 | | B8779 | Active | Green | 2.5 | 105 | 6574 | |  |
|  |  |  |  |
|  |  | Sven notices there are some data entry errors. All the Eco models only come in a Green colour. He writes the following SQL statement to correct the errors.  UPDATE Segway  SET colour = “Green”  WHERE model = “Active” |  |
|  |  | (i) Explain why Sven’s SQL statement would not correct these errors. | **1** |
|  |  | (ii) Explain why Sven’s SQL statement would create additional errors. | **1** |
|  | **(d)** | Sven wishes to remove the following Segway from the database as it has been in an accident and cannot be repaired.  serialNo: X1256  model: Active  colour: White  speed:2.5 |  |
|  |  | (i) Evaluate the effect of running the SQL statement below:  DELETE FROM Segway  WHERE model = “Active” AND speed = 2.5; | **2** |
|  |  | (ii) Describe a better solution Sven could use to remove the Segway from the database. | **1** |
|  |  |  |  |

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|  |  |  | **MARKS** |
| **18** |  | Skeeter Hardie (a second-hand car company) has dealers located in five different Scottish towns and cities. They maintain a database of all cars they have for sale. Some of the records from the relational database are shown below. |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Table name: Dealer** | | | | |
| **dealerNumber** | **Street** | **Town** | **Postcode** | **dateFounded** |
| 8795542 | 10 George Street | Edinburgh | EH1 7AB | 21/02/1972 |
| 2221364 | 23 Hamilton Road | Glasgow | G11 2FN | 08/08/1969 |
| 4852167 | 14 Highland Way | Inverness | IV5 9BE | 18/11/1993 |
| 7889715 | 52 Windmill Road | Motherwell | ML1 5QR | 05/05/1984 |
| 8997415 | 71 Rowie Road | Aberdeen | AB10 1SY | 09/07/1999 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Table name: Cars** | | | | |  |  |
| **Make** | **Model** | **Colour** | **regiNum** | **mileage** | **alloys** | **dealerNumber** |
| Renault | Kangoo | White | SL11 GTD | 44521 | No | 4852167 |
| Vauxhall | Corsa | Black | RD15 BXZ | 22121 | Yes | 8795542 |
| Lexus | LS 430 | Blue | LM03 YRT | 147856 | Yes | 7889715 |
| Toyota | Avensis | Silver | DM16 ERD | 20865 | Yes | 8997415 |
| Vauxhall | Corsa | Green | X563 PPD | 101256 | No | 8795542 |
| Honda | Civic | Blue | SG55 CRV | 88212 | Yes | 2221364 |
| Seat | Ibiza | Yellow | YN14 TRE | 36597 | No | 4852167 |

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|  | **(a)** | (i) Copy and complete the table below to identify the key fields that were created when this relational database was implemented.   |  |  |  | | --- | --- | --- | |  | Table | Field | | Primary key |  |  | | Primary key |  |  | | Foreign key |  |  | | **3** |  |
|  |  |  |  |  |
|  |  | (ii) State the relationship that exists between the two implemented tables. | **1** |  |
|  | **(b)** | State the output from the following SQL statement  SELECT make, model, mileage  FROM Cars  WHERE colour = “Blue”  ORDER BY make DESC; | **3** |  |
|  | **(c)** | Customers often visit Skeeter Hardie looking for a particular make and model of car.  Design a search query that would provide customers with the ordered list of cars, as shown below.   |  |  |  |  | | --- | --- | --- | --- | | **Model** | **Colour** | **Town** | **Mileage** | | Civic | Green | Aberdeen | 112567 | | Civic | Red | Edinburgh | 9567 | | Civic | White | Edinburgh | 103452 | | Civic | Black | Glasgow | 62147 | | Civic | Green | Glasgow | 70254 | | Civic | Silver | Inverness | 32547 | | Civic | Black | Motherwell | 12548 | | **4** |  |
|  |  | |  |  | | --- | --- | | Field(s) |  | | Table(s) |  | | Search criteria |  | | Sort order |  | |  |  |

**[END OF QUESTION PAPER]**