BCS Level 4 Module in Software Developer

Sample Paper A

Record your surname / last / family name and initials on the answer sheet.

Sample paper only consisting of 20 questions in total across:

- 10 knowledge questions that include a range of question types such as multiple choice, multiple response and fill in the blanks – 1 mark awarded for each question.
- 2 scenario-driven situational judgement assessments each with 5 questions designed to test knowledge, skills and behaviours that include a range of question types such as multiple choice, multiple response, fill in the blanks and ordering question types – 1 mark awarded for each question.

A number of possible answers are given for each multiple choice or multiple response question, indicated by either A B C or D (up to E in the skills scenarios). A number of other questions will require you to re-order a list or fill in the blanks. Your answers should be clearly indicated on your answer sheet.

Pass mark is 13/20
Time allowed: 45 minutes

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This professional certification is not regulated by the following United Kingdom Regulators - Ofqual, Qualifications in Wales, CCEA or SQA
1 Which of the following is the PRIMARY role of the SDLC?

A SDLC is a method for outsourcing software development.
B SDLC provides a structured approach to software development.
C SDLC prevents the development of large, complex software systems.
D SDLC enables software development to take place in isolation.

2 At which stage in the SDLC would research be conducted to determine whether a software project SHOULD be undertaken?

A Design.
B Implementation.
C Development.
D Feasibility.

3 Which of the following will NOT be assessed when conducting a feasibility study?

A Business constraints.
B Technical constraints.
C Financial constraints.
D Maintenance constraints.

4 Which of the following WOULD be a reason for a Technical Support department to liaise with software developers before a new system goes live?

A To be made aware of workarounds for known issues.
B To be granted access to a documentation repository.
C To provide details of the user’s security credentials.
D To arrange for the system deployment to production.

5 Which of the following document(s) does the software tester create?

A GANTT chart.
B Software validation plans and scripts.
C Use case diagrams.
D Change management plan.

6 Which of the following describes the function of design patterns?
A  They encourage testing early in development.
B  They enable rapid requirements engineering.
C  They represent the best software processes.
D  They reuse successful software approaches.

7  In software development, what is TYPICALLY meant by authentication?
A  The ability for users to identify themselves to a system.
B  Making code more obscure to protect it from being stolen.
C  A way by which individual users are given permissions.
D  A standard process used to check the skills of developers.

8  Which of the following would TYPICALLY occur in a penetration test?
Select all that apply.
A  A measurement of the average loading time for a web page.
B  A test of the password policy.
C  An attempt at an SQL injection attack.
D  A social engineering attack against the service desk.
E  An interview with the senior management team, exploring their understanding of security.
F  A test of the network speeds.

9  Software is the deliverable from which stage of the SDLC?
A  Testing.
B  Development.
C  Planning.
D  Maintenance.

10 In the context of a software development project, which of the following BEST describes the MAIN responsibility of a Product Owner??
A  Maximise the value of the delivered product.
B  Manage the development team.
C  Manage application infrastructure.
D  Market the product to investors.
Scenario 1: Using Algorithms

Your team are involved in the development of an encryption algorithm, which will make use of prime factors. A prime number is a positive integer greater than 1 that cannot be formed by multiplying two smaller positive integers (e.g., 3, 7, 17). Twin primes are pairs of prime numbers of the form (p, p+2) for example: (3, 5), (5, 7), (11, 13), (17, 19). The function isPrime(x) returns true if x is a prime number and false if it is not.

Two algorithms have been proposed to display all the twin primes where both prime numbers are less than 40:

Algorithm 1
for i = 2 to 40 Step 1
if (isPrime(i) AND isPrime(i + 2))
    Display i and i+2 as a twin prime pair

Algorithm 2
for i = 3 to 37 Step 2
if (isPrime(i) AND isPrime(i + 2))
    Display i and i+2 as a twin prime pair

11 You have been asked to review the algorithms suggested by the Junior Software Developer and provide feedback on their effectiveness. Which of the following statements would you include in your feedback?

A Only algorithm 1 will produce correct output.
B Only algorithm 2 will produce correct output.
C Both algorithms will produce incorrect output.
D Both algorithms will produce correct output.
E Only algorithm 1 will produce correct output.

12 Following on from the feedback you provided, you have been asked to assess the efficiency of the algorithms. Which of the following statements is true?

A Algorithm 1 is more efficient than algorithm 2.
B Algorithm 2 is more efficient than algorithm 1.
C Both algorithms are equally efficient.
D It is impossible to say which algorithm is the most efficient.
E Neither algorithm is fit for purpose.
The team manager has changed their requirements, so that all the twin primes less than 30 are to be printed. Select the amendment you should you make to algorithm 1 to produce the CORRECT output to meet the manager’s requirements?

A  for i = 2 to 30 Step 1
B  for i = 2 to 31 Step 1
C  for i = 2 to 29 Step 1
D  for i = 2 to 28 Step 1
E  for i = 2 to 27 Step 1

The team leader has chosen to work with algorithm 2. Considering the requirements have changed so that all the twin primes less than 30 are to be printed, which of these amendments to algorithm 2 would you make produce the correct output?

A  for i = 3 to 28 Step 2
B  for i = 3 to 29 Step 2
C  for i = 3 to 30 Step 2
D  for i = 3 to 31 Step 2
E  for i = 3 to 27 Step 2

You have been asked to edit the algorithm to allow it to be applicable to any given number. Algorithm 1 is incorporated into a function printTwinPrimes which accept an argument n. A call to printTwinPrimes(n) will print all twin primes where both prime numbers are less than n. Which of the following amendments to algorithm 1 is correct?

A  for i = 1 to (n - 3) Step 1
B  for i = 1 to (n - 2) Step 1
C  for i = 1 to (n - 1) Step 1
D  for i = 1 to n Step 1
E  for i = 1 to (n + 1) Step 1
Scenario 2 - Testing

You have been asked to test a code routine, which is described by following pseudocode:

```c
function y (int m, int n, int o, int p)
{
    If (m > n AND m != 0) print “Condition 1”
    If (o > p OR p != 20) print “Condition 2”
    If (NOT (m > n AND m != p) print “Not Condition 3”
}
```

16 Which type of testing is this?
A System testing.
B Unit testing.
C Integration testing.
D Acceptance testing.

17 Your team leader has provided you with a set of data to run against the function, as follows.
m = 40
n = 20
o = 20
p = 30

Complete the blanks to show your expected output.

Condition 1 (A)____________be printed.
Condition 2 (B)____________be printed.
Not Condition 3 (C)____________be printed.

(A) Will.
    Will not.
(B) Will.
    Will not.
(C) Will.
    Will not.
You have decided to call the function with a set of randomly selected values, as part of your testing approach. You are using the following values.

\[ m = 40 \]
\[ n = 20 \]
\[ o = 10 \]
\[ p = 40 \]

What would your predicted printed output be?

A. Condition 1 only.
B. Condition 2 only.
C. Not Condition 3 only.
D. No output.
E. Condition 1, Condition 2 and Not Condition 3.

You have been asked to demonstrate to the team that the programme is capable of producing all of the possible outputs.

Which of these function calls would you expect to output the single string “Condition 1”? 

A. \( y(20, 25, 15, 25) \)
B. \( y(25, 20, 20, 20) \)
C. \( y(30, 20, 10, 10) \)
D. \( y(20, 15, 20, 20) \)
E. \( y(0, 0, 20, 0) \)

You are demonstrating that the programme is capable of producing outputs, condition 2, not condition 3.

Which of these function calls would you expect to output the strings “Condition 2”, “Not Condition 3”?

Select all that apply.

A. \( y(20, 25, 15, 25) \)
B. \( y(25, 20, 20, 20) \)
C. \( y(30, 20, 10, 10) \)
D. \( y(20, 15, 20, 20) \)
E. \( y(0, 0, 20, 0) \)
<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
<th>Explanation / Rationale</th>
<th>Syllabus Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>B</td>
<td>Software Development Life Cycle adds structure and a consistent approach to the development of software solutions.</td>
<td>1.1</td>
</tr>
<tr>
<td>2</td>
<td>D</td>
<td>The feasibility stage helps one to understand whether a project is technically, financially and operationally possible.</td>
<td>1.2</td>
</tr>
<tr>
<td>3</td>
<td>D</td>
<td>Maintenance is not considered as part of this study.</td>
<td>1.3</td>
</tr>
<tr>
<td>4</td>
<td>A</td>
<td>Technical support should be made aware of common/likely issues and how to resolve them prior to launch.</td>
<td>2.1</td>
</tr>
<tr>
<td>5</td>
<td>B</td>
<td>The creation of A, C and D should be the responsibility of other roles in the project team.</td>
<td>2.2</td>
</tr>
<tr>
<td>6</td>
<td>D</td>
<td>Design patterns can improve the speed of development, by repurposing designs which have proven to be successful in similar projects.</td>
<td>5.3</td>
</tr>
<tr>
<td>7</td>
<td>A</td>
<td>Authentication ensures the identity of the user is known.</td>
<td>6.3</td>
</tr>
<tr>
<td>8</td>
<td>C and D</td>
<td>The other activities would not be classed as penetration testing, although they may be undertaken at other times.</td>
<td>10.2</td>
</tr>
<tr>
<td>9</td>
<td>B</td>
<td>Software is classed as a deliverable at this stage, with maintenance etc coming thereafter.</td>
<td>1.4</td>
</tr>
<tr>
<td>10</td>
<td>A</td>
<td>The Product Owner is responsible for the value – real and perceived – of the product.</td>
<td>2.2</td>
</tr>
<tr>
<td>11</td>
<td>D</td>
<td>Both algorithms will produce the correct output for the value 40. Algorithm 1 is in general incorrect but in this case, it will produce the expected output.</td>
<td>7.1,7.2</td>
</tr>
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<tr>
<td>12</td>
<td>B</td>
<td>Algorithm 2 is more efficient than algorithm 1, it only tests half the numbers. Prime numbers greater than 2 are always odd therefore even numbers can be ignored.</td>
<td>7.1,7.2</td>
</tr>
<tr>
<td>13</td>
<td>D and E</td>
<td>a), b) and c) will yield the pair 29, 31 and 31 is greater than 30 and therefore beyond the parameters of the request.</td>
<td>7.1,7.2, 7.4</td>
</tr>
<tr>
<td>14</td>
<td>A and E</td>
<td>a) will not reach the pair 29,31 because the count will go 25, 27, 29 and therefore terminate at 27.</td>
<td>7.1,7.2, 7.4</td>
</tr>
<tr>
<td>15</td>
<td>A</td>
<td>The largest number considered will be (n-3)+2 which is the largest integer smaller than n.</td>
<td>9.1</td>
</tr>
<tr>
<td>16</td>
<td>B</td>
<td>This is unit testing – testing a small portion of code to ensure it is fit for use and delivers expected output.</td>
<td>10.2</td>
</tr>
<tr>
<td>17</td>
<td>A – Will. B – Will. C – Will not.</td>
<td>m &gt; n and m != 0 so condition 1 is true. p != 20 so condition 2 is true. m &gt; n and m != p so NOT (m &gt; n AND m != p) is false;</td>
<td>7.2,9.2</td>
</tr>
<tr>
<td>18</td>
<td>E</td>
<td>m &gt; n and m != 0 so condition 1 is true, p != 20 so condition 2 is true. m = p making the condition in brackets false and Not condition 3 true. All of the functions are valid but only summary will return more than one average as well as the quartiles.</td>
<td>7.2,9.2</td>
</tr>
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<td>19</td>
<td>B</td>
<td>m &gt; n and m != 0 so condition 1 is true. p = 20 and o !&gt; p so condition 2 is false. m != p and m &gt; n so NOT of condition 3 is false.</td>
<td>7.2,9.2</td>
</tr>
<tr>
<td>20</td>
<td>A and E</td>
<td>For A), m &lt; n so condition 1 is false, p != 20 so condition 2 is true, m &lt; n so NOT condition 3 is true. For E) m !&gt; n so condition 1 is false, o &gt; p so condition 2 is true, m !&gt; n so NOT condition 3 is true. In the other three cases m &gt; n and m != 0 so condition 1 is true.</td>
<td>7.2,9.2</td>
</tr>
</tbody>
</table>