Appendices
# LIST OF APPENDICES

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</tr>
</thead>
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</table>
QUESTIONNAIRE for Students of MCA

AIM: To identify an appropriate ability for Development of a Diagnostic Test in “Problem Solving and Programming” for students of MCA Programme

1. Name of the Institution:

2. Discipline of your Bachelor’s Degree:

3. The course on “Problem Solving and Programming” is ........(Tick the appropriate box)
   
   Very easy

   Easy

   Difficult

   Very difficult

4. Arrange the following programming abilities in the decreasing order of difficulty of learning (Assign Rank No.5 to the most difficult ability and Rank No.1 to the least difficult ability)

<table>
<thead>
<tr>
<th>Programming Ability</th>
<th>Rank Order of difficulty of learning</th>
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<tbody>
<tr>
<td>1. Solving problems using “for” loop</td>
<td></td>
</tr>
<tr>
<td>2. Accessing the content of the arrays</td>
<td></td>
</tr>
<tr>
<td>3. Manipulating Strings using arrays</td>
<td></td>
</tr>
<tr>
<td>4. Performing arithmetic operations on Pointers</td>
<td></td>
</tr>
<tr>
<td>5. Accessing Members of a Structure using Pointers</td>
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</table>

5. Free Comments:

*** Thank you ***
### Operational Characteristics of the Items as Determined in the Pilot Study and the Steps taken to Revise the Diagnostic Test for Main Study

<table>
<thead>
<tr>
<th>Sl. No. of the Item</th>
<th>Facility Value of Item (%)</th>
<th>Index of Discrimination of Item</th>
<th>Effectiveness of Distractors</th>
<th>Steps taken to revise the Diagnostic Test for the Main Study</th>
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<tbody>
<tr>
<td><strong>1.1 to 1.3 Multiple Choice Type Item</strong></td>
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<tr>
<td>1.1</td>
<td>57.6</td>
<td>0.24</td>
<td>Distractors are effective</td>
<td>Item retained as such</td>
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<tr>
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<td>31.8</td>
<td>0.33</td>
<td>Distractors are effective</td>
<td>Item retained as such</td>
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<tr>
<td>1.3</td>
<td>54.5</td>
<td>0.12</td>
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<td>1.4</td>
<td>77.3</td>
<td>0.21</td>
<td>The FV of ‘A’, ‘C’, &amp; ‘F’ is less than 10%</td>
<td>Distractor A, C and F Were modified</td>
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<tr>
<td>1.5</td>
<td>69.7</td>
<td>0.18</td>
<td></td>
<td></td>
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<tr>
<td>1.6</td>
<td>6.1</td>
<td>0.06</td>
<td>---</td>
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<td><strong>1.7 to 1.15 Multiple Choice Type Item</strong></td>
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<td>1.8</td>
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<td>‘C’ has a FV of 6%</td>
<td>Distractor C was modified</td>
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<td>1.9</td>
<td>81.8</td>
<td>0.18</td>
<td>‘A’ has a positive ID (0.03)</td>
<td>Distractor A was modified</td>
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<tr>
<td>1.10</td>
<td>65.2</td>
<td>0.21</td>
<td>The FV of ‘D’ is less than 4.5%</td>
<td>Distractor D was modified</td>
</tr>
<tr>
<td>1.11</td>
<td>43.9</td>
<td>0.21</td>
<td>The FV of ‘B’ is less than 4.5%</td>
<td>Distractor B was modified</td>
</tr>
<tr>
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<td>71.2</td>
<td>0.33</td>
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<td>Item retained as such</td>
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<tr>
<td>1.13</td>
<td>74.2</td>
<td>0.27</td>
<td>‘D’ has a positive ID (0.03)</td>
<td>Distractor D was modified</td>
</tr>
<tr>
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<td>0.27</td>
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<td>Item retained as such</td>
</tr>
<tr>
<td>1.15</td>
<td>57.6</td>
<td>0.24</td>
<td>‘B’ has a FV of 7.6%</td>
<td>Distractor B was modified</td>
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<tr>
<td>2.1</td>
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<td>0.27</td>
<td>The FV of ‘D’ is less than 1.5%</td>
<td>Distractor D was modified</td>
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<tr>
<td>2.2</td>
<td>87.9</td>
<td>0.12</td>
<td>‘D’ has a positive ID (0.06)</td>
<td>Distractor D was modified</td>
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<tr>
<td>2.3</td>
<td>48.5</td>
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<td>‘C’ has a FV of 9.1%</td>
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<tr>
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<td>50.0</td>
<td>0.39</td>
<td>‘A’ has a positive ID (0.06)</td>
<td>Distractor A were modified</td>
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<tr>
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<td>72.7</td>
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<td>‘B’ has a FV of 3%</td>
<td>Distractor B were modified</td>
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<tr>
<td>2.6</td>
<td>69.7</td>
<td>0.30</td>
<td>‘C’ has a FV of 3%</td>
<td>Distractor C were modified</td>
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<tr>
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<td>21.2</td>
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<td>2.8</td>
<td>21.2</td>
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### Operational Characteristics of the Items as Determined in the Pilot Study and the Steps taken to Revise the Diagnostic Test for Main Study

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<th>3.1 to 3.4 Matching Type Item</th>
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<tr>
<td>3.1</td>
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<td>87.9</td>
<td>0.18</td>
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<td>3.3</td>
<td>22.7</td>
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</tr>
<tr>
<td>3.4</td>
<td>28.8</td>
<td>0.15</td>
</tr>
</tbody>
</table>

- ‘E’ has a positive ID (0.03) & the FV of ‘G’ is less than 1.5%
  - Distractors E & G were modified

<table>
<thead>
<tr>
<th>3.5 to 3.7 Matching Type Item</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>3.5</td>
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<td>0.15</td>
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<tr>
<td>3.6</td>
<td>72.7</td>
<td>0.12</td>
</tr>
<tr>
<td>3.7</td>
<td>75.8</td>
<td>0.12</td>
</tr>
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</table>

- ‘E’ has a positive ID (0.03), the FV of C(3%) and F (4.5%) less than 10%
  - Distractor A, C & F were modified

<table>
<thead>
<tr>
<th>3.8 to 3.9 Multiple Choice Type Item</th>
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<th></th>
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</thead>
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<tr>
<td>3.9</td>
<td>71.2</td>
<td>0.27</td>
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</table>

- Distractors are effective
  - Item retained as such

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<th>3.10 to 3.17 True or False Type Item</th>
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<td>71.2</td>
<td>0.15</td>
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<td>3.12</td>
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<td>3.13</td>
<td>84.8</td>
<td>0.18</td>
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<td>0.33</td>
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<td>3.15</td>
<td>78.8</td>
<td>0.30</td>
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<td>3.17</td>
<td>62.1</td>
<td>0.39</td>
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</table>

- Item has no distractors
  - Item retained as such
- do-
  - Item retained as such

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<thead>
<tr>
<th>4.1 to 4.6 Multiple Choice Type Item</th>
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<td>0.12</td>
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<tr>
<td>4.2</td>
<td>78.8</td>
<td>-0.18</td>
</tr>
<tr>
<td>4.3</td>
<td>45.5</td>
<td>0.36</td>
</tr>
<tr>
<td>4.4</td>
<td>74.2</td>
<td>0.15</td>
</tr>
<tr>
<td>4.5</td>
<td>51.5</td>
<td>0.24</td>
</tr>
<tr>
<td>4.6</td>
<td>48.5</td>
<td>0.30</td>
</tr>
</tbody>
</table>

- The FV of ‘A’ is less than 10%
  - Distractor A was modified
-Rejected
- The FV of ‘B’ & ‘D’ is less than 10%
  - Distractor B & D were modified
- ‘A’ has a positive ID (0.06)
  - Distractor A was modified
- Distractors are effective
  - Item retained as such
- Distractors are effective
  - Item retained as such

<table>
<thead>
<tr>
<th>4.7 to 4.9 True or False Type Item</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4.7</td>
<td>62.1</td>
<td>-0.39</td>
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<tr>
<td>4.8</td>
<td>54.5</td>
<td>0.30</td>
</tr>
<tr>
<td>4.9</td>
<td>25.8</td>
<td>0.39</td>
</tr>
</tbody>
</table>

- Item has no distractors
  - Item retained as such
- do-
  - Item retained as such
-Rejected
- Item has no distractors
  - Item retained as such
- do-
  - Item retained as such

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### Operational Characteristics of the Items as Determined in the Pilot Study and the Steps taken to Revise the Diagnostic Test for Main Study

#### 5.1 to 5.7 Multiple Choice Type Item

<p>| | | | | |</p>
<table>
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<tbody>
<tr>
<td>5.1</td>
<td>77.3</td>
<td>-0.21</td>
<td>‘A’ has a positive ID (0.03) &amp; the FV of ‘B’ is 6.1%</td>
<td>Rejected</td>
</tr>
<tr>
<td>5.2</td>
<td>87.9</td>
<td>0.12</td>
<td>Distractor A &amp; B were modified</td>
<td></td>
</tr>
<tr>
<td>5.3</td>
<td>40.9</td>
<td>0.15</td>
<td>Distractors are effective</td>
<td>Item retained as such</td>
</tr>
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<td>86.4</td>
<td>0.21</td>
<td>‘B’ has a FV of 3%</td>
<td>Distractor B was modified</td>
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<td>42.4</td>
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<td>5.6</td>
<td>24.2</td>
<td>0.12</td>
<td>Distractors are effective</td>
<td>Item retained as such</td>
</tr>
<tr>
<td>5.7</td>
<td>74.2</td>
<td>0.15</td>
<td>‘C’ has a positive ID (0.03)</td>
<td>Distractor C was modified</td>
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#### 5.8 to 5.11 Matching Type Item

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<td>‘B’ has a positive ID (0.09) &amp; the FV of ‘C’ is 4.5%</td>
<td>Distractors B &amp; C were modified</td>
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#### 6.1 to 6.9 Matching Type Item

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<tr>
<td>6.1</td>
<td>81.8</td>
<td>0.12</td>
<td>The FV of ‘B’ &amp; ‘G’ is less than 10% and ‘E’ has a positive ID (0.06)</td>
<td>Distractors B, E, &amp; G were modified</td>
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<td>75.8</td>
<td>0.12</td>
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#### 6.10 to 6.14 Multiple Choice Type Item

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<tbody>
<tr>
<td>6.10</td>
<td>53.0</td>
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<td>Distractor D was modified</td>
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<td>Distractors are effective</td>
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<tr>
<td>6.13</td>
<td>34.8</td>
<td>0.15</td>
<td>Distractors are effective</td>
<td>Item retained as such</td>
</tr>
<tr>
<td>6.14</td>
<td>25.8</td>
<td>0.21</td>
<td>FV of ‘A’ is 6.1%</td>
<td>Distractor A was modified</td>
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#### 6.15 to 6.16 True or False Type Item

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<tr>
<td>6.16</td>
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### Operational Characteristics of the Items as Determined in the Pilot Study and the Steps taken to Revise the Diagnostic Test for Main Study

#### 7.1 to 7.10 Multiple Choice Type Item

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<th>Incorrect %</th>
<th>Decision</th>
<th>Action</th>
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<td>78.8</td>
<td>0.18</td>
<td>Distractors are effective</td>
<td>Item retained as such</td>
</tr>
<tr>
<td>7.3</td>
<td>28.8</td>
<td>0.15</td>
<td>Distractors are effective</td>
<td>Item retained as such</td>
</tr>
<tr>
<td>7.4</td>
<td>87.9</td>
<td>0.18</td>
<td>‘B’ has a positive ID (0.03)</td>
<td>Distractor B were modified</td>
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<tr>
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<td>22.7</td>
<td>0.15</td>
<td>Distractors are effective</td>
<td>Item retained as such</td>
</tr>
<tr>
<td>7.6</td>
<td>48.5</td>
<td>0.30</td>
<td>FV of ‘A’ is 3%</td>
<td>Distractor D were modified</td>
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<tr>
<td>7.7</td>
<td>27.3</td>
<td>0.18</td>
<td>Distractors are effective</td>
<td>Item retained as such</td>
</tr>
<tr>
<td>7.8</td>
<td>43.9</td>
<td>0.15</td>
<td>Distractors are effective</td>
<td>Item retained as such</td>
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<td>7.9</td>
<td>24.2</td>
<td>0.24</td>
<td>Distractors are effective</td>
<td>Item retained as such</td>
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<tr>
<td>7.10</td>
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#### 8.1 to 8.10 Multiple Choice Type Item

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<th>Incorrect %</th>
<th>Decision</th>
<th>Action</th>
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<td>0.12</td>
<td>FV of ‘A’ is 3%</td>
<td>Distractor B was modified</td>
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<tr>
<td>8.2</td>
<td>36.4</td>
<td>0.24</td>
<td>Distractors are effective</td>
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<tr>
<td>8.3</td>
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<td>0.30</td>
<td>Distractors are effective</td>
<td>Item retained as such</td>
</tr>
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#### 9.1 to 9.14 Multiple Choice Type Item

<table>
<thead>
<tr>
<th>Item</th>
<th>Correct %</th>
<th>Incorrect %</th>
<th>Decision</th>
<th>Action</th>
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</thead>
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<tr>
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<tr>
<td>9.2</td>
<td>71.2</td>
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</tr>
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Operational Characteristics of the Items as Determined in the Pilot Study and the Steps taken to Revise the Diagnostic Test for Main Study

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<td>56.1</td>
<td>0.15</td>
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</tr>
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<td>9.14</td>
<td>21.2</td>
<td>0.12</td>
<td>Distractors are effective</td>
</tr>
<tr>
<td>10.1</td>
<td>56.1</td>
<td>0.33</td>
<td>Distractors are effective</td>
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<td>Distractors are effective</td>
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<td>Distractors are effective</td>
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<tr>
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<td>1.5</td>
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<td>---</td>
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<td>FV of ‘A’ is 6.1%</td>
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<td>‘D’ has a positive ID (0.06)</td>
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<td>0.18</td>
<td>Distractors are effective</td>
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<td>45.5</td>
<td>0.42</td>
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<td>21.2</td>
<td>0.18</td>
<td>Distractors are effective</td>
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<tr>
<td>10.13</td>
<td>22.7</td>
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<td>Distractors are effective</td>
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<tr>
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</tr>
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<td>‘C’ has a positive ID (0.03)</td>
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</tr>
<tr>
<td>11.7</td>
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<td>The FV of ‘B’ is less than 10% and ‘E’ has a positive ID (0.18)</td>
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<tr>
<td>11.8</td>
<td>51.5</td>
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<tr>
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<td>12.1</td>
<td>83.3</td>
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<td>FV of ‘B’ is 3%</td>
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<tr>
<td>12.2</td>
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<td>FV of ‘C’ is 4.5%</td>
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Operational Characteristics of the Items as Determined in the Pilot Study and the Steps taken to Revise the Diagnostic Test for Main Study

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<th>ID (%)</th>
<th>Description</th>
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<td>Distractors B &amp; C were modified</td>
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<td>0.18</td>
<td>Distractors are effective</td>
<td>Item retained as such</td>
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<td>12.6</td>
<td>48.5</td>
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<td>Distractors are effective</td>
<td>Item retained as such</td>
</tr>
<tr>
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<td>13.1 to 13.13 Multiple Choice Type Item</td>
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<td></td>
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<td>Distractors are effective</td>
<td>Item retained as such</td>
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<td>0.27</td>
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<td>Item retained as such</td>
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<td>FV of ‘A’ is 7.6%</td>
<td>Distractor A was modified</td>
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<td>28.8</td>
<td>0.15</td>
<td>Distractors are effective</td>
<td>Item retained as such</td>
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<tr>
<td>13.8</td>
<td>30.3</td>
<td>0.12</td>
<td>Distractors are effective</td>
<td>Item retained as such</td>
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<tr>
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<td>71.2</td>
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<td>The FV of ‘C’ is 4.5%, ‘A’ (0.09) &amp; ‘F’ (0.03) has a positive ID</td>
<td>Distractor A, C, &amp; F were modified</td>
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<td>Item retained as such</td>
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<tr>
<td>14.8</td>
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<td>0.21</td>
<td>Distractors are effective</td>
<td>Item retained as such</td>
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### Operational Characteristics of the Items as Determined in the Pilot Study and the Steps taken to Revise the Diagnostic Test for Main Study

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<td>15.5</td>
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</tr>
<tr>
<td>15.10</td>
<td>0.21</td>
<td>Distractors are effective</td>
</tr>
</tbody>
</table>
Questionnaire for Demographic Survey

Note: The Questionnaire is designed to collect information about student’s profile. The information collected will be used for research purpose only. The ‘confidentiality’ of the data will be strictly maintained.

Instructions:

i. Please fill out all the fields of the following form.
ii. Wherever box are provided tick (√) in the appropriate box

1. Name of the College : 
2. Name of the Student : 
3. Gender : Male [ ] Female [ ]
   (Please √ in the appropriate box)
4. Particulars of Degree Programme completed by you at the Undergraduate Level
   (i) Degree : 
   (ii) Major : 
   (iii) Medium of Instruction : 

Appendix - III
Diagnostic Test on “ACCESSING MEMBERS OF A STRUCTURE USING POINTERS IN C PROGRAMMING LANGUAGE”

Component Ability: 1. Knowledge of variables (data types)

1.1 to 1.3 Choose the correct answer:

1.1. Value of char or signed char ranges from
   A. -128 to 127
   B. 0 to 255
   C. 1 to 256
   D. -128 to +128

1.2. Value of unsigned int ranges from
   A. -128 to 127
   B. 0 to 255
   C. -32,768 to 32,767
   D. 0 to 65535

1.3. The size of the long int is _____ bytes.
   A. 2
   B. 4
   C. 6
   D. 8

1.4 to 1.6 Match the following:

List A consists of data types. List B consists of their size in bytes. Match each data type with its correct size by writing the corresponding letter (A or B or C or D etc.) in the Matching Panel.

<table>
<thead>
<tr>
<th>List A</th>
<th>List B</th>
<th>Matching Panel</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.4. float</td>
<td>-</td>
<td>1.4</td>
</tr>
<tr>
<td>1.5. double</td>
<td>-</td>
<td>1.5</td>
</tr>
<tr>
<td>1.6. long double</td>
<td>-</td>
<td>1.6</td>
</tr>
</tbody>
</table>

1.7 to 1.15 Choose the correct answer:

1.7. Which one of the following is used to store a data value?
   A. Data type
   B. Variable
   C. Operator
   D. Keyword

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1.8. First character of a variable must be a
   A. Letter or underscore
   B. Letter or keyword
   C. Number or underscore
   D. Number or keyword

1.9. Variable can not have a/an
   A. Number
   B. Underscore
   C. White space
   D. Letter

1.10. Which one of the following is a valid variable?
      A. Rs18
      B. Rs.18
      C. 18$
      D. 1.8Rs

1.11. Variables in C are
      A. Lower case
      B. Upper case
      C. Case sensitive
      D. No case sensitive

1.12. Which of the following declarations is invalid?
      A. int a;
      B. int a; int b;
      C. int a%b;
      D. double a__b;

1.13. Which of the following declarations is valid?
      A. int a, int b;
      B. char a, int b;
      C. int a; char b;
      D. int a b;

1.14. Which of the following declarations is invalid?
      A. float a; int b;
      B. float a, float b;
      C. float ab;
      D. float a,b;

1.15. Which of the following declarations is invalid?
      A. long float t;
      B. double n1, n2;
      C. long int c1;
      D. double int c2;
Component Ability: 2. Knowledge of arithmetic operations

2.1 to 2.8 Choose the correct answer:

2.1. Integer division results in
   A. Rounding the fractional part
   B. Floating value
   C. Truncating the fractional part
   D. Generating an error

2.2. Which is the valid C language expression of $\frac{x + y}{z}$?
   A. $x + y / z$
   B. $(x + y) \% z$
   C. $(x + y) / z$
   D. $x + (y / z)$

2.3. Expression $((x - (y / 5) + z) \% 8) + 25$ is equivalent to
   A. $x - (y/5) + z \% 8 + 25$
   B. $(x - y/5 + z) \% 8 + 25$
   C. $(x - y/5) + z \% 8 + 25$
   D. $(x - (y/5) + z \% 8) + 25$

2.4. Given, $a=5, b=7, c=2$; then the value of the expression
     $a+b/c-a%c+2*a$ is
     A. 18
     B. 17
     C. 16
     D. 15

2.5. Given, int $a=10$; int $b = 3$; int $c = a/b$; What is the value of c?
     A. 3
     B. 3.3
     C. 3.33
     D. 3.333...

2.6. Given $a = 2, b = 4, c = 5$ and $d = 6$. What is the value of $(a+b-c*d)/d$?
     A. 1
     B. 4
     C. -1
     D. -4

2.7. What is the value of $-5 \% -3$?
     A. -2
     B. -1
     C. 2
     D. 1

2.8. What is the value of $5 \% -10$?
     A. -0.5
     B. 0
     C. -5
     D. 5
Component Ability: 3. Knowledge of relational and logical operations

3.1 to 3.4 Match the following:
List A consists of certain expressions. List B consists of their operators. Match each correct expression with its correct operator by writing the corresponding letter (A or B or C or D etc.) in the Matching Panel.

<table>
<thead>
<tr>
<th>List A</th>
<th>List B</th>
<th>Matching Panel:</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1. not equal to</td>
<td>A. &lt;=</td>
<td>3.1</td>
</tr>
<tr>
<td>3.2. equal to</td>
<td>B. !&gt;</td>
<td></td>
</tr>
<tr>
<td>3.3. not less than</td>
<td>C. ==</td>
<td>3.2</td>
</tr>
<tr>
<td>3.4. not greater than</td>
<td>D. !=</td>
<td>3.3</td>
</tr>
<tr>
<td></td>
<td>E. &lt;&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>F. &gt;=</td>
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</tr>
<tr>
<td></td>
<td>G. !&lt;</td>
<td>3.4</td>
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</table>

3.5 to 3.7 Match the following:
List A consists of certain expressions. List B consists of their operators. Match each expression with its correct operator by writing the corresponding letter (A or B or C or D etc.) in the Matching Panel.

<table>
<thead>
<tr>
<th>List A</th>
<th>List B</th>
<th>Matching Panel:</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.5. (x == 25) and (y &lt; 10)</td>
<td>A. &lt;&gt;</td>
<td>3.5</td>
</tr>
<tr>
<td>3.6. (x not= 25) II (y &lt; 10)</td>
<td>B.</td>
<td></td>
</tr>
<tr>
<td>3.7. ! ((x &gt; 5) or (x &lt; 0))</td>
<td>C. &amp;</td>
<td>3.6</td>
</tr>
<tr>
<td></td>
<td>D. &amp;&amp;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>E. ^</td>
<td>3.7</td>
</tr>
<tr>
<td></td>
<td>G. !</td>
<td></td>
</tr>
</tbody>
</table>

3.8 to 3.9 Choose the Correct Answer:

3.8. Which operators are used for comparison of two expressions?
A. Assignment
B. Relational
C. Logical
D. Arithmetic

3.9. The operator to be used when we want to test more than one condition and make decisions is called _________ operator.
A. Assignment
B. Relational
C. Logical
D. Arithmetic

3.10 to 3.12 Given a=4, b=3, c=2 specify whether each of the following expression's value is 1 or 0 by writing the corresponding number in the box.

<table>
<thead>
<tr>
<th>Expression</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.10. b * b &gt; 4 * a * c</td>
<td></td>
</tr>
<tr>
<td>3.11. b + a / 2 == a – c + b</td>
<td></td>
</tr>
<tr>
<td>3.12. a != (b + c) * (b – c)</td>
<td></td>
</tr>
</tbody>
</table>
3.13 to 3.17 Given a=5, b=10, c=-6 specify whether each of the following expression's value is 1 or 0 by writing the corresponding number in box.

3.13. (a > b) && (a < c) :  
3.14. (a < b) && (a > c) :  
3.15. (a == c) || (b > a) :  
3.16 b > 15 && c < 0 || a > 0 :  
3.17 (a/2 == 0 && b/2 !=0) || c < 0 :  

Component Ability: 4. Knowledge of increment and decrement operations

4.1 to 4.6 Choose the correct answer:

4.1. Which operator is used to reduce the value of a variable by 1?
   A. Post or Pre Diminish
   B. Post or Pre Reduce
   C. Post or Pre Decrease
   D. Post or Pre Decrement  

4.2. The statement i++ can be rewritten as
   A. i = + + ;  
   B. +i+ ;  
   C. i = i + 1 ;  
   D. i =+ 1 ;  

4.3. Given, m = 15; k = 13; k = m++; What is the value of k?
   A. 15
   B. 14
   C. 16
   D. 13

4.4. Given, a = 20; b = 17; b = ++a; What is the value of b?
   A. 18
   B. 19
   C. 20
   D. 21

4.5. Given, x = 15; k = 13; k = x--; What is the value of k and x?
   A. 13  15
   B. 15  14
   C. 14  14
   D. 13  14
4.6. Given, \( x = 20; \ y = 17; \ y = --x; \)
What is the value of \( x \) and \( y \)?
A. 20 17
B. 20 19
C. 19 19
D. 19 17

4.7 to 4.9 State whether each of the following statements is true or false by writing T or F in the box.

4.7. ++a++; :  
4.8. a = b++ - c * 2; :  
4.9. ++m = ++n; :  

Component Ability: 5. Knowledge of Input Functions

5.1 to 5.7 Choose the correct answer

5.1. Which header file includes Input and Output functions?
A. <inputoutput.h>  
B. <stdio.h>  
C. <iostd.h>  
D. <ios.h>  

5.2. Which function is used to input values of the variables using the keyboard?
A. readf()  
B. inputf()  
C. getf()  
D. scanf()  

5.3. Which of the following is a valid syntax of scanf() function?
A. scanf("format specification", &variable1,&variable2,...,&variableN);  
B. scanf("format specification1", “format specification2”, ...“format specificationn”, &variable1,&variable2,..., &variableN);  
C. scanf(&variable1,&variable2,..., &variableN,"format specification");  
D. scanf(&variable1,&variable2,..., &variableN, “format specification1”, “format specification2”, ...“format specificationN”);  

5.4. If ‘a’ is an integer and ‘b’ is a real number, which is a valid C statement?
A. scanf("%d%f", &a, &b);  
B. scanf("%d,%f", a, b);  
C. scanf("%d",%f", &a, &b);  
D. scanf("%d%f", &a, &b);  

5.5. Which function is used to read one character at a time from the keyboard and will wait for a key to be pressed?
A. getchr()  
B. getch()  
C. getchar()  
D. getc()
5.6. Which function is used to read one character from the keyboard and it must not expect the enter key?
   A. getchr()
   B. getch()
   C. getchar()
   D. getc()  

5.7 Which format specification is used to read or write more than one character?
   A. %s
   B. %c
   C. %mc
   D. %ns  

5.8 to 5.11 Match the following:
List A consists of data types. List B consists of their format specification. Match each data type with its correct format specification by writing the corresponding letter (A or B or C or D etc.) in the Matching Panel.

<table>
<thead>
<tr>
<th>List A</th>
<th>List B</th>
<th>Matching Panel</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.8 double</td>
<td>A. %u</td>
<td>5.8</td>
</tr>
<tr>
<td>5.9. long double</td>
<td>B. %d</td>
<td>5.9</td>
</tr>
<tr>
<td>5.10. unsigned int</td>
<td>C. %s</td>
<td>5.10</td>
</tr>
<tr>
<td>5.11. long int</td>
<td>D. %ud</td>
<td>5.11</td>
</tr>
<tr>
<td></td>
<td>E. %f</td>
<td></td>
</tr>
<tr>
<td></td>
<td>F. %ld</td>
<td></td>
</tr>
<tr>
<td></td>
<td>G. %lf</td>
<td></td>
</tr>
</tbody>
</table>

Component Ability: 6. Knowledge of Output functions

6.1 to 6.9 Match the following:
List A consists of certain escape sequences. List B consists of their meaning. Match each escape sequence with its correct meaning by writing the corresponding letter (A or B or C or D etc.) in the Matching Panel.

<table>
<thead>
<tr>
<th>List A</th>
<th>List B</th>
<th>Matching Panel</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.1. \b</td>
<td>horizontal tab</td>
<td>6.1.</td>
</tr>
<tr>
<td>6.2. \f</td>
<td>vertical tab</td>
<td>6.2.</td>
</tr>
<tr>
<td>6.3. \r</td>
<td>double quote</td>
<td>6.3.</td>
</tr>
<tr>
<td>6.4. \t</td>
<td>back space</td>
<td>6.4.</td>
</tr>
<tr>
<td>6.5. &quot; &quot;</td>
<td>ternary operator</td>
<td>6.5.</td>
</tr>
<tr>
<td>6.6. '</td>
<td>form feed</td>
<td>6.6.</td>
</tr>
<tr>
<td>6.7. \n</td>
<td>new line</td>
<td>6.7.</td>
</tr>
<tr>
<td>6.9. ?</td>
<td>single quote</td>
<td>6.9.</td>
</tr>
<tr>
<td></td>
<td>J. backslash</td>
<td></td>
</tr>
<tr>
<td></td>
<td>K. question mark</td>
<td></td>
</tr>
<tr>
<td></td>
<td>L. carriage return</td>
<td></td>
</tr>
</tbody>
</table>
6.10 to 6.14 Choose the correct answer:

6.10. Which escape character can be used to sound a beep in C language?
A. \a
B. \b
C. \m
D. \n
6.11. Which escape character can be used to begin a new line in C language?
A. \a
B. \b
C. \t
D. \n
6.12. Given, int a = 9876; printf("%06d",a); then the output is
A. 987600
B. 9876
C. 009876
D. 9876

6.13. What is the output after executing the following statements?
float a = 98.7654;
printf("%-7.2f",a);
A. 98.76
B. 98.54
C. 98.77
D. 0098.77

6.14. What is the output after executing the following statements?
long n = 987654;
printf("%10ld",n);
A. 987654
B. 987654
C. 9876540000
D. 0000987654

6.15 to 6.16 State whether each of the following statement is true or false for the following declaration, by writing T or F in the box.

int code;
char city[10];
float price;

6.15. printf("%c, %u", &city, code); : 
6.16. printf(%f, %d, %s", price, code, city); : 

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Component Ability: 7. Ability to assign and display the values of the variables and expressions

7.1 to 7.10  Choose the correct answer:

7.1. Which is a valid statement to read float value of x and int value of n?
   A. scanf("%d%d",&x,&n);
   B. scanf("%d%f",&xn);
   C. scanf("%f%d",&x,&n);
   D. scanf("%f%d,&x,&n");

7.2. Which is a valid statement to read char value for variable ch?
   A. scanf("%c",ch);
   B. scanf("%c",&ch);
   C. scanf("%c","ch");
   D. scanf("%ch",&c);

7.3. What is the value of 'a' and 'b' in the following Program?
   scanf("%2d %5d",&a,&b);
   input data is as follows:
   31142681  50
   A. a = 31, b = 50
   B. a = 3114268, b = 50
   C. a = 31, b = 14268
   D. a = 31, b = 142681

7.4. “a += 4”
   The operator += in the above statement means
   A. a + 4 = a
   B. a = 4
   C. a = a + 4
   D. a = 4 + 4

7.5. What would be the output of the program given below?
   main()
   {
      int x = 10;
      printf("%d %d", ++x, ++x);
   }
   A. 11 11
   B. 12 11
   C. 10 10
   D. 11 12
7.6. What is the output of the following program?

```c
main()
{
    int a = -3, b = 2, c = 0, d;
    d = ++a && ++b || ++c;
    printf("a = %d, b = %d, c = %d, d = %d", a, b, c, d);
}
```

A. a = -2, b = 3, c = 0, d = 1
B. a = -2, b = 3, c = 1, d = 1
C. a = -2, b = 3, c = 1, d = 0
D. a = -2, b = 3, c = 0, d = 0

7.7. What is result of the following code?

```c
main()
{
    int x=20,y=35;
    x=y++ + x++; 
    y= ++y + ++x;
    printf("%d\t%d",x,y);
}
```

A. 55 59
B. 55 93
C. 56 94
D. 57 94

7.8. What is the output of the following code?

```c
main()
{
    int i=10;
    i = (!i > 14);
    printf("i=%d",i);
}
```

A. i=10
B. i=14
C. i=0
D. i=1

7.9. What is the output of the following code?

```c
main()
{
    printf("\nabi");
    printf("\bsi");
    printf("\rha");
}
```

A. abisiha
B. absiha
C. hasi
D. hasiabi
7.10. What is the output of the following code?

```c
main()
{
    int i=400,j=300;
    printf("%d..%d");
}
```

A. 400..300  
B. 0..0  
C. 300..400  
D. Garbage values  

Component Ability: 8. Knowledge of “if” statement” (Decision Making Statement)

8.1 to 8.10 Choose the correct answer:

8.1. Condition tests using more than one if construct is called ________.
   A. loop if  
   B. simple if  
   C. nested if  
   D. compound if  

8.2. If x is not less than or equal to 2000 then y = x /100. Which is the correct C code for the above statement?
   A. if (x > 2000) then  
      {  
         y = x/100;  
      }
   B. if (x > 2000)  
      {  
         y = x/100;  
      }
   C. if x >2000  
      {  
         y = x/100;  
      }
   D. if (x >= 2000)  
      {  
         y = x/100;  
      }
8.3. If value of x is less than 15 then assign 80 to y. Which is the correct C code for the above statement?

A. if x < 15 then y = 80;
B. if (x < 15) then
   
   y = 80;

C. if x < 15
   
   y = 80;

D. if (x < 15)
   
   y = 80;

8.4. When x is not equal to 33, assign 33 to y. Which is the correct C code for the above statement?

A. if(x not= 33)
   
   y = 33;

B. if(x!=33) ;
   
   y ==33;

C. if(x!=33)
   
   y = 33;

D. if x !=33
   
   y = 33;

8.5. What is the value of 'a' for executing “else block” in the following program?

if (a)
   
   b = 100;
else
   
   b = -100;

A. -1
B. 1
C. 100
D. 0
8.6 If x is greater than Y set p = 5; otherwise, p is 10. Which if statement is equivalent for the above?

A. if (X > Y)
   p = 5;
   else
   p = 10;

B. if (x > Y)
   p = 5;
   else
   p = 10;

C. if (x > y)
   p = 5;
   else
   p = 10;

D. if x > Y
   p = 5;
   else
   p = 10;

8.7 If x = 5, y = 0, and z = 1, what will be the values of x, y and z after executing the following ‘if’ statement?

if (x || y || z)
   y = 10;
else
   z = 0;

A. x = 5, y = 0, z =0
B. x = 5, y = 10, z =1
C. x = 5, y = 10, z =0
D. x = 0, y = 10, z = 1

8.8 If x = 5, y = 0, and z = 1, what will be values of x, y and z after executing the following program?

if (x)
   if(y)
      z = 10;
   else
      z = 0;

A. x = 5, y = 0, z =10
B. x = 5, y = 0, z =0
C. x = 5, y = 0, z =1
D. x =5, y = 0, z = 5
8.9. If x = 5, y = 0, z = 1, what will be the values of x, y and z after executing the following program?

if (x == 0 || x && y)
    if (!y)
        z = 0;
    else
        y = 1;

A. x = 5, y = 0, z = 1
B. x = 5, y = 1, z = 1
C. x = 5, y = 1, z = 0
D. x = 5, y = 0, z = 0

8.10. What is the output of the following program?

main()
{
    int m,n;
    int i = 1;
    printf(" enter the values of m & n");
    scanf("%d%d", &m, &n); // input data: m = 5 and n = 5
    if (m == n)
    {
        i = m + n;
        m = i + n;
        n = i + m;
    }
    else
    {
        i = m - n;
        m = m + n;
        n = n + m;
    }
    printf("%d,%d,%d", i, m, n);
}

A. 0,10,15
B. 10,6,6
C. 10,15,25
D. 10,15,15
Component Ability: 9. Knowledge of “for” loop statement (Looping Statement)

9.1 to 9.14 Choose the correct answer:

9.1. How many loop control statements are available in C Language?
   A. 4
   B. 3
   C. 5
   D. 2

9.2. for loop is a/an __________ controlled loop.
   A. exit
   B. quit
   C. entry
   D. start

9.3. Nested for loop consists of
   A. more than one for statement
   B. one for statement after another for statement
   C. one for statement before another for statement
   D. one for statement within another for statement

9.4. What is the value of ‘s’ and ‘i’ after execution of following program?
   ```
   s = 0;
   for(i=1; i <= 10 ; i++)
   {
       s = s + 1;
   }
   ```
   A. s = 1, i = 1
   B. s = 10, i = 10
   C. s = 10, i = 11
   D. s = 11, i = 11

9.5. How many times the body of the loop will execute for the following program?
   ```
   x = 5;
   y = 25;
   for(i = x; i <= y; x++)
   {
       y = y – i;
   }
   ```
   A. 20
   B. 1
   C. 5
   D. 6
9.6. How many times the body of the loop will execute for the following program?

\[
\begin{align*}
m & = 1; \\
x & = 0; \\
\text{for}(m = 1; m \leq 10; m = m + 2) & \quad x = x + 1;
\end{align*}
\]

A. 6  
B. 5  
C. 4  
D. 3  

9.7. What is the value of \( p \) after the execution of the following program?

\[
\begin{align*}
\text{for}(p=10; p >0;) & \\
& \quad p = p - 1;
\end{align*}
\]

A. 10  
B. 9  
C. 1  
D. 0  

9.8. How many times the loop will execute for the following program?

\[
\begin{align*}
m & = 9; \\
n & = 5; \\
\text{for}(i=0; (m \% n > 0); i++) & \\
& \quad \{ \\
& \quad \quad m = m + 1; \\
& \quad \quad n = n + 2;
& \quad \}
\end{align*}
\]

A. 3  
B. 4  
C. 5  
D. 6  

9.9. What is the output of the following program?

```c
main()
{
    int i=0;
    for(;i++;printf("%d",i));
    printf("%d",i);
}
```

A. 01  
B. 11  
C. 0  
D. 1
9.10. What is the output of the following program?

```c
s = 0;
for(i=1; i<=3; i++)
{
    s += i;
    printf("%d,%d\t",i,s);
}
```

A. 1,1 1,2 1,3
B. 1,1 2,3 3,5
C. 1,1 2,3 3,6
D. 1,1 2,4, 3,6

9.11. What is the output after executing the following program?

```c
a = 1;
for(i = 1; i <= 2; i++)
    for(j = 2; j >= 1; j--)
    {
        a = a + i – j;
        printf("%d",a);
    }
```

A. 1012
B. 0001
C. 0012
D. 1001

9.12. What is the output after executing the following program?

```c
for(i = 1; i <= 2; i++)
    for(j = i; j <= 5; j=j+2)
        printf("%d",i);
```

A. 1234567
B. 13524
C. 12345
D. 11122
9.13. What is the output after executing the following program?

```c
main()
{
    long s=1;
    long p = 1;
    int n , m;
    printf(" enter the value of m ");
    scanf("%d",&m);  // let us input the value of m is 5
    for(n=1;n<=5;n++)
    {
        p = p * 10;
        s = s + p;
        printf("%ld\n",s);
    }
}
```

A.  1  
    11  
    111  
    1111  
    11111  

B.  11  
    111  
    1111  
    11111  
    111111  

C.  10  
    101  
    1001  
    10001  
    100001  

D.  11  
    121  
    1221  
    12221  
    122221  

```
9.14. What is the output after executing the following program?

d = 1;
for(i=1; i <= 3; d += i)
{
    for(j=1; j <= 2*i ; j ++)
        printf("%d ",d);
    printf("\n");
    i = i + 1;
}

A.  1
    3 3
    6 6 6

B.  1 1
    3 3 3
    6 6 6 6

C.  11
    3333
    666666

D.  1 1
    3 3 3 3
    6 6 6 6 6 6
10.1 to 10.14 Choose the correct answer:

10.1. The maximum number of elements that can be stored in the following array is
   \begin{verbatim}
   float a[30][10][1];
   \end{verbatim}
   A. 300
   B. 301
   C. 310
   D. 41

10.2. The output of an array: \texttt{a[5] = \{0,2,3\}} is, 2 3 0. Which of the following is an equivalent output statement for the above?
   A. \texttt{printf("\%d\n\%d\n\%d",a[2],a[3],a[1]);}
   B. \texttt{printf("\%d\\lt\%d\\lt\%d",a[2],a[3],a[1]);}
   C. \texttt{printf("\%d\\lt\%d\\lt\%d",a[1],a[2],a[3]);}
   D. \texttt{printf("\%d\\lt\%d\\lt\%d",a[0],a[1],a[2]);}

10.3. Which of the following C code is equivalent to the two statements given below?
   1. Declare the size of the array ‘a’ as 10.
   2. Assign a value of 5 to the array ‘a’ of index 3.
   A. \texttt{int a[10], j;}
      \texttt{a[5] = 3;}
   B. \texttt{int a = 10;}
      \texttt{a[3] = 5;}
   C. \texttt{int a[10];}
      \texttt{a = 5;}
   D. \texttt{int a[10];}
      \texttt{a[3] = 5;}

10.4. An array starts at address 4500 in memory. Which of the following is the correct output for the following program?
   \begin{verbatim}
   #include<stdio.h>
   main()
   {
      int a[] = \{10,320,3,-1,0\};
      printf("%u\lt\%u\lt\%u", a, &a[0],&a);
   }
   \end{verbatim}
   A. 4500 4500 4500
   B. 4500 4502 4504
   C. 4500 4701 4902
   D. 4498 10 4500
10.5. Which of the following is the correct output for the program given below?

```c
#include<stdio.h>
main()
{
    int x[5] = {5,3,2,3,5};
    int a,b,c;
    a = --x[4];
    b = x[1]++;
    c = x[--a]--;
    printf("%d\t%d\t%d",a,c,b);
}
```

A. 4 3 3  
B. 3 3 3   
C. 3 2 3   
D. 2 5 6

10.6. Which of the following is the correct output for the program given below?

```c
#include<stdio.h>
main()
{
    char arr[10] = "Pointer";
    arr[4] = ' ';  
    printf("%s",arr);
}
```

A. Poi nter  
B. Poin ter  
C. Poin er  
D. Poi ter

10.7. If 's' is declared as character array of 10,
char s[10];

Which of the following is the valid assignment statement?

A. s[10]= "abcdefghij"  
B. s[10] = "a";  
C. s[10] = "";  
D. s[10] = "";

10.8. If the value of s[3] is 'p', what will be the declaration of 's'?

A. char s[10] = "unexpected";  
B. char s[10] = "alphabet";  
C. char s[10] = "anyplace";  
D. char s[10] = "april";
10.9. For the program given below which is the equivalent print statement for the output 'm'.

```c
char c = 'm';
char s[] = “Computer Programming”;
c = s[3];
```

A. `printf(“%c”,c);`
B. `printf(“%c”,s[2]);`
C. `printf(“%c”,s[17]);`
D. `printf(“%c”,s[17]--);`

10.10. What will be the array values after executing the following program?

```c
#include<stdio.h>
main()
{
    int a[5], i = 0;
    for(;i<5;) /* first for loop */
        a[i] = ++i;
    for(i=0; i<5 ; i++) /* second for loop */
        printf(“%d	”,a[i]);
}
```

A. 1 2 3 4
B. 0 1 2 3
C. garbage value 1 2 3 4
D. syntax error in first for loop

10.11. What will be the output of the following program?

```c
int a[3][3] = {1,0,0,1,1,0};
int i,j;
for(i = 0; i < 3; i++)
{
    for(j = 0; j < 3; j++)
        printf(“%d”,a[i][j]);
    printf("\n");
}
```

A. 1 0
   0 1
   1 0
B. 1 0 0
   0 1 0
   0 0 1
C. 1 0 0
   1 1 0
   1 1 1
D. 1 0 0
   1 1 0
   0 0 0
10.12. What will be the output of the following program?

```c
int a[6], i=1, j;
for(j=1;j<=6;j++)
a[j] = 3 * j;
printf("%d\t%d\t%d\t",a[i],a[i++],a[i+3]);
```

A. 3 6 9
B. 6 3 12
C. 3 6 12
D. 6 9 12

10.13. Which of the following is the correct output for the program given below?

```c
int i, j, k, a[3][3];
for(i=0;i<3;i++)
for(j=0;j<3;j++)
a[j][i] = (i+1) % (j+1);
for(k=0;k<3;k++)
printf("%d\t",a[j-1][k]);
```

A. 0 1 2
B. 1 0 2
C. 1 2 0
D. 2 1 0

10.14. Which of the following is the correct output for the program given below?

```c
int a[2][3] = {{1,5,-1}, {2,8,4}};
int i = 1;
printf("%d\t%d\t%d\t%d",a[--i][1],a[1][++i],a[i][i++],a[i][--i]);
```

A. 8 4 1 2
B. 5 4 1 2
C. 2 1 5 8
D. 1 2 5 8
Component Ability: 11. Knowledge of Pointers

11.1 to 11.6 Choose the correct answer:

11.1. Which of the following is used to hold the address of the variable?

A. local variable
B. global variable
C. auto variable
D. pointer variable

11.2. Which operator is known as indirection or dereferencing operator?

A. &
B. *
C. %
D. #

11.3. P is a pointer. Which one of the following is an invalid statement?

A. &p = 10;
B. p++;
C. --p;
D. *p = 25;

11.4. Which operator is used to compare the pointers?

A. Arithmetic
B. Logical
C. Relational
D. Indirection

11.5. Which is the equivalent C statement for declaring a string pointer and assign a constant string “Computer” to the pointer?

A. char ptr;
   ptr = “Computer”;
B. char ptr;
   *ptr = “Computer”;
C. char *ptr;
   &ptr = “Computer”;
D. char *ptr;
   ptr = “Computer”;

11.6. If p1 and p2 are two pointers of data type int, which of the following is the correct output statement?

A. printf(“%u”, p1 – p2);
B. printf(“%u”, p1 + p2);
C. printf(“%u”, p1 * p2);
D. printf(“%u”, p1 / p2);
### 11.7 to 11.10  Match the following:

List A consists of certain statements. List B consists of their C programs. Match each statement with its correct program by writing the corresponding letter (A or B or C or D etc.) in the Matching Panel.

<table>
<thead>
<tr>
<th>List A</th>
<th>List B</th>
<th>Matching Panel:</th>
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<tr>
<td>11.7. A pointer variable can be assigned the address of the variable</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>11.8. Pointer to a pointer</td>
<td>-</td>
<td>B. int *x, y = 0; &amp;x = &amp;y;</td>
</tr>
<tr>
<td>11.9. A pointer variable can be assigned the value of another pointer variable</td>
<td>-</td>
<td>C. int **x;</td>
</tr>
<tr>
<td>11.10. A pointer variable can be initializing with the base address</td>
<td>-</td>
<td>D. int *x, y = 10; x = &amp;y;</td>
</tr>
</tbody>
</table>

E. int *x;
   int base[5] = {1,2,3,4,5};
   *x = base;

F. int *x;
   int y[5] = {1,2,3,4,5};
   x = y;

G. int *x = 10, *y = 10;
   *x = *y;
Component Ability: 12. Knowledge of Dynamic Memory Allocation

12.1 to 12.7 Choose the correct answer:

12.1. The process of allocating memory at runtime is known as _____ memory allocation.
   A. Contiguous
   B. Distributed
   C. Static
   D. Dynamic

12.2. Which of the following function is used to release the allocated block of memory?
   A. unalloc()
   B. free()
   C. release()
   D. drop()

12.3. Which function should be used to allocate a single block of memory to store values of specific data type?
   A. memalloc()
   B. malloc()
   C. allocmem()
   D. alloc()

12.4. Which function is used to increase or decrease the memory space that is previously allotted?
   A. realloc()
   B. incralloc()
   C. decralloc()
   D. incdecalloc()

12.5. If p is a pointer of float data type, which one of the following is a valid calloc() statement?
   A. p = (float *) calloc(50,sizeof(float));
   B. *p = (float *) calloc(50, sizeof(float));
   C. p = (float) calloc(sizeof(float),50);
   D. *p = (float) calloc(sizeof(float),50);

12.6. Which function does **not** belong to dynamic memory allocation?
   A. free()
   B. calloc()
   C. malloc()
   D. alloc()

12.7. Which header file includes dynamic memory allocation functions?
   A. <dynamic.h>
   B. <memory.h>
   C. <alloc.h>
   D. <stdmem.h>
Component Ability: 13. Ability to access the pointer variables

13.1 to 13.13 Choose the correct answer:

13.1. Which is a valid pointer expression?
   A. `sum=sum+3/*x;`
   B. `*x=*x+y/*x;`
   C. `*z=(y+3)/ *x+3;`
   D. All the above

13.2. What is the correct output of the following program?
   ```c
   main()
   {
       int a=5, b = 16;
       int *x, *y;
       x = &a;
       y = &b;
       *x = *x – 1;
       *y = 10 - *y / *x - 6;
       printf("%d\t%d",a,b);
   }
   ```
   A. 4 -46
   B. 4 0
   C. 5 -5
   D. 5 1

13.3. What is the correct output of the following program?
   ```c
   main()
   {
       int *ptr;
       int a[]={40,70,50,60,90};
       ptr = a;
       if (2* - *ptr > *(ptr+3))
           printf("%d", 2* - *ptr);
       else
           if( -2* - *ptr > *(ptr+3))
               printf("%d", -2* - *ptr);
           else
               printf("%d", *(ptr+3));
   }
   ```
   A. 80
   B. -80
   C. 60
   D. 43
13.4. Which is the correct output of the program given below?

```c
main()
{
    int x[3][2] = {{5,3},{2,3},{5,4}};
    int *ptr;
    ptr = &x[2][0];
    ptr++;
    printf("%d", --ptr);
}
```

A. 2
B. 3
C. 4
D. 5

13.5. Which is the correct output of the following program?

```c
main()
{
    int i = 1, n = 3;
    int *m;
    m = &i;
    for(;i<n;i++);
    printf("%d", m);
}
```

A. Garbage value
B. 1
C. 2
D. 3

13.6. Which is the correct output of the following program?

```c
main()
{
    char str1[] = "jack";
    char str2[] = "jill";
    char *s1 = str1;
    char *s2 = str2;
    printf("%s%s", ++s1 + 3, s2++);
}
```

A. ckj
B. cill
C. kill
D. jill
13.7. Which is the correct output of the following program?

```c
main()
{
    char str[] = "women";
    char *s = str;
    int i;
    for(i=0; *s++ != \0; i++);
    for(s--; i>2 ; i--)
        printf("%c", *--s);
}
```

A. men  
B. nem  
C. women  
D. nemow

13.8. Which is the correct output of the following program?

```c
main()
{
    int a[] = {10,2,20,3};
    int *p = a;
    int **ptr = &p;
    printf("%d\t%d\t%d\t%d", *(ptr+1), *ptr, *ptr++, *++ptr);
}
```

A. 20 2 10 10  
B. 20 3 0 0  
C. 20 3 garbage-value  
D. 2 2 2 20

13.9. Which is the equivalent declaration of int a[5][10];?

A. int *a;  
B. int *a[5];  
C. int *a[10];  
D. int (*a[5]+10);

13.10. What is the maximum number of int bytes that can be allotted for the following statement?

```c
int *p = (int *) malloc(40);
```

A. 20  
B. 40  
C. 80  
D. 160
13.11. Which group of statements will print the data in reverse order for the following program which is meant for storing ‘n’ data using dynamic memory allocation?

```c
int i, n;
int *p;
printf(“ enter the value of n”);
scanf(“%d”, &n);
p = (int *) malloc(n*sizeof(int));
printf(“ Enter all the values “);
for(i=0; i<n; i++)
    scanf(“%d”, (p+i));
```

A. for(i=0; i<n ; i++)
   printf(“%d”, *(p+i));
B. for(i=1; i<n ; i++)
   printf(“%d”, *(p+n-i));
C. for(i=0; i<=n ; i++)
   printf(“%d”, *(p+n-i));
D. for(i=1; i<=n ; i++)
   printf(“%d”, *(p+n-i));

13.12. What is the value of ‘s’ for the following program?

```c
int s = 0, i;
int *a[5];
for(i=0; i < 5; i++)
a[i] = (int *) calloc(5, sizeof(int));
for(i=0; i < 5; i++)
s += *(*(a+i)+i);
```

A. 0
B. 10
C. 20
D. garbage-value

13.13. Which is the valid statement to store the data of two dimensional array using scanf() function for the declaration, int *a[100];?

A. for(i=0; i<100 ; i++)
   for(j=0; j <100; j++)
       scanf(“%d”, *(a+i+i)));
B. for(i=0; i<100 ; i++)
   for(j=0; j <100; j++)
       scanf(“%d”, *(*(*(a+i)+j)));
C. for(i=0; i<100 ; i++)
   for(j=0; j <100; j++)
       scanf(“%d”,&(*((a+i)+j)));
D. for(i=0; i<100 ; i++)
   for(j=0; j <100; j++)
       scanf(“%d”,&((&(a+i)+j)));
### Component Ability: 14. Knowledge of Structures

#### 14.1 to 14.4 Match the following:

List A consists of certain statements. List B consists of their operators. Match each statement with its correct operator by writing the corresponding letter (A or B or C or D etc.) in the Matching Panel.

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<tr>
<td>14.1. Copy the two variables of the same structure type</td>
<td>-</td>
<td>A. &amp;</td>
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<tr>
<td>14.2. Terminate the structure</td>
<td>-</td>
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<tr>
<td>14.3. Access the members of a structure through a structure variable</td>
<td>-</td>
<td>C. *</td>
</tr>
<tr>
<td>14.4. Access the members of a structure using pointers through a structure variable</td>
<td>-</td>
<td>D. =</td>
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<td>E. .</td>
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<td>F. ,</td>
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<td></td>
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<td>G. ;</td>
</tr>
</tbody>
</table>

#### 14.5 to 14.12 Choose the correct answer:

14.5. Structure is a basic ______ data type in C.

- A. integer
- B. string
- C. pointer
- D. user-defined

14.6. Which function gives the total number of bytes occupied by various data members in the structure?

- A. totalbyte()
- B. numbyte()
- C. sizeof()
- D. strctlen()
Direction: Study the following structure declaration before answering the questions having the serial number 14.7 and 14.8.

Given,

```c
struct lib
{
    int studno;
    char studname[20];
    struct cdate
    {
        int dd;
        int mm;
        int yyyy;
    } trans_date;
} s;
```

14.7. The size of the 'lib' and 'cdate' are _____ and _____ for the above structure declaration.

A. 28 6
B. 28 8
C. 22 6
D. 30 8

14.8. Which is a valid C statement to access the 'yyyy' member variable and assign a value 10?

A. s.trans_date.yyyy = 10;
B. cdate.yyyy = 10;
C. lib.cdate.trans_date.yyyy = 10;
D. s.cdate.yyyy = 10;

14.9. Which is a valid C statement for the following structure declaration?

```c
struct class
{
    int rollno;
} s[5];
```

A. s[5] = {1,2,3,4,5};
B. s[5].rollno[5] = 1;
C. s[5].rollno = 1;
D. s[5].rollno = {1};
14.10. Which is an appropriate example for self referential structure?

A. struct node
   {
       int first;
       int next;
       struct node p[10];
   };

B. struct node
   {
       int first;
       int next;
       struct node *p;
   };

C. struct node
   {
       int first;
       int *next;
       struct node p;
   };

D. struct node
   {
       int first;
       int *next;
   } *p;

14.11. Which is an invalid example for array within structure?

A. struct node {
       int first[10];
       int next[10];
       struct node p[10];
   };

B. struct node{
       int first[10];
       int next;
       struct node *p;
   };

C. struct node{
       int first[10];
       int next;
   } *p;

D. struct node{
       int first[10][10];
       int next;
   } p;
14.12. Which is a valid example for array within structure?

A. struct time[100]
   {
      int hours[24];
      int minutes[60];
      int seconds[60];
   };

B. struct date
   {
      int dd;
      int mm;
      int yy;
   } day[31];

C. struct book
   {
      int first_page;
      int last_page;
      int *prev_page[10];
      int *next_page[10];
   };

D. struct emp_sales_detail
   {
      int empid = 11023;
      char name[10];
      int month_sales[12] = {100,2,45,34,2,6,1,10,20,12,2,3};
      float sal = 15000;
   } s[10];
Component Ability: 15. Ability to access members of a structure using pointers

15.1 to 15.9 Choose the correct answer:

15.1. Which group of statements is valid for assigning member variable of the structure given below?

```c
struct employee
{
    int empid;
    char name[20];
    float sal;
}
emp;
```

A. `emp->empid = 10;
strcpy(emp->name, 'ram');
emp->sal = 21000;`

B. `emp->empid = 10;
strcpy(emp->name, "ram");
emp->sal = 21000;`

C. `emp.empid = 10;
strcpy(emp.name, "ram");
emp.sal = 21000;`

D. `empid = 10;
strcpy(emp.name, "ram");
sal = 21000;`

15.2. Which is the correct statement pertaining to the following program?

```c
struct stud
{
    int rollno = 5;
    char name[] = "ram";
} *s;
main()
{
    printf("%d\t%s",s->rollno,s->name);
}
```

A. The program has a compilation error
B. The program will result in runtime error
C. The output of the program is `5 ram`
D. The output of the program is Garbage-value
15.3. Which is the correct output of the following program?

```c
main()
{
    struct stud
    {
        char name[20];
        int age;
    };
    struct stud s1 = {"ravi",43};
    struct stud s2 = {"raj",34};
    if ((s1.age == s2.age)
        printf(" ravi and raj are same age");
    else
        if(s1.age != s2.age)
            printf("ravi and raj are not of same age");
        else
            if (s1.age > s2. age)
                printf(" raj is younger than ravi");
            else
                printf(" ravi is younger than raj");
}
```

A. ravi and raj are same age  
B. ravi is younger than raj  
C. raj is younger than ravi  
D. ravi and raj are not of same age  

15.4. Which is the correct output of the following program?

```c
int i;
struct g
{
    int x;
    char name[10];
    int m[3];
    char c;
} s = {100,"struct",{18,63,72},'y'};
struct g *p;
p = &s;
for(i=0; i<3; i++)
    if(p->m[i] < p->x)
        p->x = p->m[i];
printf("%d",s.x);
```

A. 100  
B. 18  
C. 63  
D. 72
15.5. Which is the correct output of the following program?

```c
int i, j, r;
struct mat
{
    int ab;
    int *a;
    int *b;
};
struct mat x;
x.ab = 0;
x.a = (int *) calloc(5, sizeof(int));
x.b = (int *) calloc(5, sizeof(int));
printf(" enter the value of an array a \n");
for(i=0; i<5; i++)
    scanf("%d", (x.a+i)); /* let us input the data {63, 56,23,3,14} */
printf(" enter the value of an array b \n");
for(i=0; i<5; i++)
    scanf("%d", (x.b+i)); /* let us input the data {53,9,,25,33,4} */
for(i=0; i<5; i++)
{
    r = x.a[i];
    for(j=0; j<5; j++)
        if(x.b[j] > r)
            r = x.b[j];
    if (x.ab < r)
        x.ab = r;
}
printf("%d", x.ab);
```

A. 3
B. 4
C. 53
D. 63

15.6. Which is an equivalent expression of p->c for the following program?

```c
struct cal
{
    int c;
};
struct cal *p;
```

A. (*p).c
B. (*p)->c
C. &p>>&c
D. *(&p.c)
15.7. Which is the correct statement to be used for accessing the member variable ‘h’ and ‘b’ using structure variables ‘triangle’ in the following program?

```c
struct height
{
    int h;
} obj1 = {10};
struct breath
{
    int b;
} obj2 = {20};
struct area
{
    struct height *th;
    struct breath *tb;
} triangle;
triangle.th = &obj1;
triangle.tb = &obj2;
```

A. triangle.th->obj1.h
   triangle.tb->obj2.b
B. triangle.th->h
   triangle.tb->b
C. triangle.th.h
   triangle.tb.b
D. triangle.th->obj1->h
   triangle.tb->obj2->b

15.8. Which of the statement is correct for the following program?

```c
struct xval
{
    int x;
} *p;
struct subxval
{
    int s;
    struct xval sx;
} np;
p = &np.sx.x;
np.sx.x = 500;
np.s = np.sx.x /2;
if (np.sx.x == p->x)
    printf("%d",p->x);
else
    printf("%d",np.s);
```

A. The output of the program is 0
B. The output of the program is 250
C. The output of the program is 500
D. The output of the program is garbage value
15.9. Which is the correct output of the following program?

```c
int i;
struct linear
{
    int v;
    struct linear *n;
} *p[3];
for(i=0; i<3; i++)
    p[i] = (struct linear *) malloc(sizeof(struct linear));
for(i=0; i<3; i++)
    {
        p[i]->v = i+1;
        p[i]->n = p[(i+1)%3];
    }
for(i=0; i<3; i++)
    printf("%d\n",*(p[i]->n));
```

A. 1
   2
   3

B. 2
   3
   1

C. 3
   2
   1

D. Garbage-value
   Garbage-value
   Garbage-value

15.10. Which is the valid statement to access the variable 'x' in the following program?

```c
struct nestone
{
    struct nesttwo
    {
        struct nestthree
        {
            int x;
            float y;
        } t;
    } *r;
} *q;
*p;
```

A. p->q->r.t->x
B. p->q.r->t.x
C. p.q.r->t->x
D. p.q->r->t.x

Thank You!
### SCORING KEY OF THE DIAGNOSTIC TEST
### USED IN MAIN STUDY

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