30% 1. Identify the letter of the choice that best completes the statement or answers the question.
   (1) The data model and the schema of a DBMS are often defined in the _____ level.
       a. external                       c. internal
       b. conceptual                    d. physical
   (2) In an abstract data type, ______.
       a. the ADT implementation is known.  c. the ADT functions are hidden.
       b. the ADT implementation is hidden.  d. none of the above.
   (3) Defining the users, needs, requirements, and methods is part of the _____ phase.
       a. analysis                       c. implementation
       b. design                        d. testing
   (4) To prevent ______, an operating system can put resource restrictions on processes.
       a. starvation                    c. paging
       b. synchronization               d. deadlock
   (5) The transport layer protocol of TCP/IP is called
       a. TCP                            c. IP
       b. UDP                           d. a and b
   (6) Which of the following is not an image format?
       a. JPEG                          c. GIF
       b. TIFF                          d. all of the above are image formats
   (7) Which of the following protocol can be used to transfer E-mail?
       a. ICMP                          c. SMTP
       b. HTTP                          d. SNMP
   (8) The "I" in EDI stands for ______.
       a. Information                  c. Integration
       b. Interchange                  d. Interaction
   (9) What is the data structure that stores data with FIFO (first-in-first-out).
       a. Queue                        c. Tree
       b. Stack                        d. Array
   (10) A kilobyte (KB) is used to express which one of the following approximate measures?
        a. 1,000 bytes of storage       c. 1,000,000,000 bytes of storage
        b. 1,000,000 bytes of storage  d. 1,000,000,000,000 bytes of storage

10% 2. Terminology Explanation
(1) Register
(2) ASCII
(3) Plug & Play
(4) RISC / CISC
(5) Cookies

10% 3. Please explain the difference between physical address and virtual address, and how a virtual address is translated to a physical address.
10% 4. Give the binary tree representation of the following tree:

```
    A
   /|
  B  C
 /|
E FG
```

10% 5. Please explain the difference between physical address and virtual address, and how a virtual address is translated to a physical address.

10% 6. What is the main task of the following program?
```cpp
def tolower(char c):
    if c >= 'A' && c <= 'Z')
        return c - 'A' + 'a'; //ASCII 'A' = 65, a = 97
    else
        return c;
```

10% 7. You have the two tables as shown in follows.

<table>
<thead>
<tr>
<th>ID</th>
<th>Name</th>
<th>Dept.</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Chen</td>
<td>Cs</td>
</tr>
<tr>
<td>13</td>
<td>Wang</td>
<td>Ch</td>
</tr>
<tr>
<td>14</td>
<td>Lin</td>
<td>Cs</td>
</tr>
<tr>
<td>15</td>
<td>Liu</td>
<td>Ee</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dept.</th>
<th>Name</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cs</td>
<td>Computer Science</td>
<td>EECS430</td>
</tr>
<tr>
<td>Ch</td>
<td>Chinese</td>
<td>EECS434</td>
</tr>
<tr>
<td>Ee</td>
<td>Electrical Engineering</td>
<td>EECS401</td>
</tr>
</tbody>
</table>

Write a SQL statement to find out the names of employees and their working locations.

10% 8. Represent the bit pattern 1011010010011111 in hexadecimal notation.