

1. Compute the following X1 and X2 :
 - (1) $(10010)_2 = (X1)_{10}$ (3%)
 - (2) $010101.011_2 = (X2)_8$ (3%)
2. What is the final value of X after executing the following program segment?
(4%)

```
x = 0;
for i = 1 to N do
  for j = 1 to i do
    x = x + 1;
```
3. Explain the following terminologies: (30%)
 - open network
 - router
 - gateway
 - VAN (Value Added Network)
 - virtual memory
 - distributed system.
4. (a) Draw a binary tree that you could use to store A, B, C, D, E, F, G, H, and I for future searching. (3%)
(b) Indicate the path traversed in the binary tree you drew by the binary search when searching for the entry G. (2%)
(c) Draw the binary tree after deleting the node with key H from the binary tree you drew in (a). (5%)
5. (a) When a queue is implemented in a circular fashion, what is the relationship between the head and tail pointers when the queue is empty? (5%)
(b) Design a procedure for inserting an entry in a circular queue. (10%)
6. Use an example for (or explain) *Hierarchical*, *Network*, *Relational*, and *Object* data models. (20%)
7. Explain the characteristics of object-oriented programming language. (7%)
8. Explain "class" and "object" and give an example for a class and its objects. (8%)