1. (a) Explain the relationships between time-sharing and multi-tasking from the perspective of how Web server operates. (4%) 
(b) Use an example to illustrate an object class and an object instance. --- (3%) 
(c) Explain the advantages and disadvantages of a programming language which provides dynamic memory allocation. (4%) 

2. Suppose that you are shopping around on the Internet. 
(a) Design a linked-list data structure to store all the product-items you have purchased. Each node in the linked list should store the information of a purchased item, including the item's name, unit_price and no_of_units. (4%) 
(b) Write a recursive algorithm to compute the total money you spent. --(7%) 

3. (a) Explain the concept of foreign key in database systems. (4%) 
(b) How does foreign key play a role in the join operation? (3%) 

4. Explain the following terms. (4%) 
(a) interleaved concurrency 
(b) critical region 

5. Explanation: (25%) 
(a) Garbage collection. 
(b) B-tree 
(c) Topological order 
(d) Linear probing 
(e) Stack and Queue 

6. Write the prefix and postfix for A/B**C +D*E-A+C (infix). (8%) 

7. Explain the following terms. (20%) 
(a) Shareware 
(b) RISC 
(c) Client/server model 
(d) CD-RW drives 
(e) GUI 

8. Write a binary search program in any programming language. (8%) 
Analyze its computational complexity of average case and worst case. (6%)