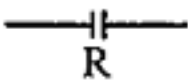
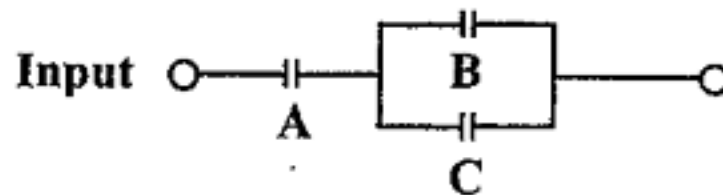


1. A variable switch contact (or relay) can be expressed as  R, write the Boolean expression for the given circuit and its truth table. (10%)



2. (a) How would you implement a queue with three primitive operations?(9%)  
 (b) Explain the primitive operations for a stack. (6%)
3. (a) Describe the action of calling a function, how a main program returns from the called function? (5%)  
 (b) How to use a stack to operate the recursive algorithm during the process of computing  $4!$  ( $\text{fact}(4)$ )? (5%)
4. (a) Suppose a two-dimensional array is declared (in C language) by  $a[m][n]$ , the address of  $a[0][0]$  is located at  $\text{base}(a)$ , each element of the array requires a single unit of storage length "esize", how to represent the address of  $a[i][j]$  with row-major order? (5%)  
 (b) What is the maximum number of nonzero element in the above mentioned array  $a[m][n]$ ? Suppose  $m=n$  and it is applied for a lower triangular array. (5%)  
 (c) How can these nonzero elements be stored sequentially in an one-dimensional array  $b[k]$  with column-major order? (5%)
5. Please describe in detail the difference between function calling methods "call by value" and "call by reference". Please also describe their advantages and disadvantages. (10%)
6. Please explain the following terminology: (each 4% total 20%)  
 (a) HTTP (b) URL (c) Public Key and Private Key (d) TCP/IP (e) HTML
7. Please describe in detail the three local area network topologies. (Draw diagrams if you prefer) (10%)
8. Please describe in detail the three basic program structures in a general purpose programming language such as C, Pascal, and Java. (5%)
9. Describe in detail the difference among "Multi-programming", "Time-sharing", and "Multi-processing". (5%)