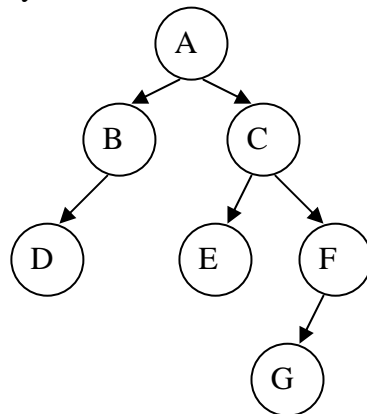


01. Use examples to explain the difference between “call by value” and “call by reference”. (5%)
Use an object-oriented programming language (C++ or Java) to give two examples of “overloading” and “encapsulation”. (6%) Why we use “interface” frequently in java language but not in C++? Explain it. (4%)

02. Is TCP protocol a reliable and connection-oriented protocol? Explain it. (4%) Is UDP protocol reliable and connection oriented? Explain it. (4%) Which layer (OSI) do TCP and UDP protocol belong to? (2%) What are bridge, switch and router respectively? (6%)

03. What is the threaded binary tree? What are the advantages of the threaded binary tree? (5%)
For the following binary tree, show its “inorder” threaded representation. (5%)



04. Why we use AVL-binary-tree to substitute for binary-tree to improve the searching performance? (4%) Please determine the time complexity of merge sort for sorted-ordered input, reverse-ordered input and random-ordered input. (6%)

05. Explain the following terms.

- a. PIXEL (3%)
- b. VPN (network) (4%)
- c. NP Complete (3%)
- d. NTSC / PAL (TV system) (3%)
- e. RGB / CMYK (color system) (3%)
- f. Two’s complement of $(37)_{10}$ (Show your answer both in binary and hexadecimal notation) (3%)
- g. FAT (Disk system) (3%)
- h. Associate memory (computer organization) (3%)

06. Describe the difference between blocking I/O and nonblocking I/O? (4%) What is software

interrupt (trap)? (4%) What is the similarity between deadlock and starvation? (2%) What is the difference between deadlock and starvation? (2%) What is the major difference between a computer process and thread? (4%)

07. Write a recursive function to calculate the GCD of two integers. And then write a function to calculate LCM of two integers. You can use C, C++, BASIC or java language. (8%)