

共 8 大題。總分 100 分。

- (1) [15 points] Use a *C-like language* (C/C++/Java) to write the *non-recursive* quick sort procedure.
- (2) [15 points] Use a *C-like language* (C/C++/Java) to write the recursive binary search procedure.
- (3) [10 points] Use a *C-like language* (C/C++/Java) to write the declaration of a data structure which is good for the representation of a sparse matrix.
- (4) [10 points] Input data 4, 2, 3, 1, 7, 5, 6 in sequence. Show the step-by-step results to construct its AVL tree.
- (5) [10 points] Following Question (4), show the step-by-step results to make the post-order traversal of this tree.
- (6) [10 points] Draw the graph G with 6 nodes $\{P_1, P_2, P_3, P_4, P_5, P_6\}$ where there is an edge E_{ij} between P_i and P_j if $i < j + 1$. The cost of edge E_{ij} is $(j + i * 3) \% 17$.
- (7) [15 points] Following Question (6), show the step-by-step results to construct APSP (All Pairs Shortest Paths) of this graph.
- (8) [15 points] Give an in-order expression $(a+b)/(c-(d-e)*f)$. Show the step-by-step results that uses stack to generate its postfix representation.