

**This assignment covers Modules 3–5. It is due on Tue, 15 Feb 2005 at 18:00 PST — please slide under Holger’s door (ICICS/CS X541) or ask receptionist in the main office to put into his mailbox..**

**Problem 1 (Knowledge test; 6 marks)** The various SLS methods that we discussed in Modules 2–4 can be classified according to different criteria including

- (1) the use of a population of solutions,
- (2) the explicit use of memory (other than just for storing control parameters),
- (3) the number of neighbourhood relations used in the search,
- (4) the modification of the evaluation function during the search, and
- (5) the inspiring source of an algorithm (*e.g.*, by natural phenomena).

Classify the following SLS methods according to these criteria: ACO, DLS, MAs, RII, SA and VND.

**Problem 2 (Problem solving; 5 marks)** Design (on paper) a population-based extension of ILS and describe its application to the TSP.

**Problem 3 (Problem solving; 4 marks)** Give a good GLSM representation for the following hybrid SLS algorithm for TSP:

1. Start from a nearest neighbour tour for the given TSP instance.
2. Perform 10 000 iterations of Simulated Annealing, using a 3-exchange neighbourhood and a geometric annealing schedule with a starting temperature of 10 and a temperature reduction by a factor of 0.8 every 500 search steps.
3. Perform best improvement steps in the 3-exchange neighbourhood until a local minimum is found.
4. If given target solution quality has not been reached, perform a single, random 4-exchange step and go to Step 3.

It is sufficient to specify the semantics for each state type and transition action in the form of a precise and concise natural language description.