DECISION 1 SCHEME OF WORK

Topic	Objectives	Notes	Resources	ICT	Formal Homework
Linear programming (7 lessons)	Formulation of problems as linear programs. Graphical solution of two variable problems using ruler and vertex methods. Consideration of problems where solutions must have integer values. The Simplex algorithm and tableau for maximising problems. The use and meaning of slack variables.	 Problems will be restricted to those with a maximum of three variables and three constraints, in addition to non-negativity conditions.	6.1 6.2 6.9		Review Ex 2 Qu 11, 14, 17
Algorithms (3 lessons)	**The general ideas of algorithms. (Using Simplex as an example of an algorithm)** Implementation of an algorithm given by a flow chart or text. Candidates should be familiar with: i. bin packing ii. bubble sort iii. quick sort iv. binary search	The order of algorithm is not expected. When using the quick sort algorithm, the pivot should be chosen as the 'number' at the mid-point of the list.	1.1 Bubble Sort Quick Sort 1.2 1.3 1.4 1.5	Bubble Sort spreadsheet	Review Ex 1 Qu 1, 4, 7
Review and Test (2 lessons)					

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Topic	Objectives	Notes	Resources	ICT	Formal Homework
Algorithms on graphs. (4 lessons) **(See chapter 2 for background to graphs)**	The minimum spanning tree (minimum connector) problem. Prim's and Kruskal's (Greedy) algorithm. Dijkstra's algorithm for finding the shortest path. Planar and non-planar graphs. Planarity algorithm for graphs with a Hamiltonian cycle.	Matrix representation of Prim's algorithm is expected. Candidates will be expected to draw a network from a given matrix and also to write down the matrix associated with a network. Candidates should now that K_5 and $K_{3,3}$ are non-planar. Kuratowski's theorem is not required	3.1 3.2 3.3 3.4 3.5 3.6		Review Ex 1 Qu 8, 10, 11
Matchings (3 lessons) **(See chapter 2 for background to graphs)**	Use of bipartite graphs for modelling matchings. Complete matchings and maximal matchings. Algorithm for obtaining a maximum matching	Candidates will be required to use the maximum matching algorithm to improve a matching by finding alternating paths. No consideration of assignment is required.	7.1 7.2 7.3		Review Ex 3 Qu 1, 7
The route inspection problem. (3 lessons)	Algorithm for finding the shortest route around a network, travelling along every edge at least once and ending at the start vertex. The network will have up to four odd nodes.	Also known as the 'Chinese postman' problem. Candidates will be expected to consider all possible pairings of odd nodes. The application of Floyd's algorithm to the odd nodes is not required.	4.1 4.2 4.3		Review Ex 2 Qu 3 Ex 3D Qu 2
Review and Test (2 lessons)					

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Topic	Objectives	Notes	Resources	ICT	Formal Homework
Critical Path Analysis (7 lessons)	Modelling of a project by an activity network, including the use of dummies. Algorithm for finding the critical path. Earliest and latest event times. Earliest and latest start and finish times for activities. Total float. Gantt (cascade) charts. Scheduling	A precedence table will be given. Activity on edge will be used.	5.1 5.2 5.3 5.4 5.5 5.6		Review Ex 2 Qu 6, 9, 10
Flows in networks (7 lessons)	Algorithm for finding a maximum flow. Cuts and their capacity. Use of max flow – min cut theorem to verify that a flow is a maximum flow. Multiple sources and sinks.	Vertex restrictions are not required. Only networks with directed edges will be considered. Only problems with upper capacities will be set.	8.1 8.2 8.3 8.4 8.5		Review Ex 3 Qu 9, 13 Ex 8D Qu 1
Review and Test (2 lessons)					