EDEXCEL AS Level Further Mathematics – DECISION 2 SOW

The number of lessons stated is for teaching the unit. Allow more lessons for topic consolidation, assessment tests and revision informed by the test results.

Aim to finish teaching by the end of the spring term to allow much exam practice.

TRANSPORTATION PROBLEMS (5 Lessons)

Topic	Content	Text	Lessons
Transportation problem	Be familiar with the terminology used in describing and modelling the transportation problem. Find an initial solution to the transportation problem (north-west corner method) Adapt the algorithm to deal with unbalanced transportation problems Understand what is meant by a degenerate solution and know how to manage such solutions	Ex1A p8-10	1
Improved solution	Find shadow costs to find an improved solution and improvement indices, and use these to find entering cells	Ex1B p16-17	1
	Use the stepping stone method to obtain an improved solution, and find an optimal solution	Ex 1C p25-26	1
Using linear programming	Formulate a transportation problem as a linear programming problem	Ex 1D p28	1
	Solve a variety of transportation problems	Mixed Ex 1E p28-30	1
Assessment – Transportation problems			

ALLOCATION PROBLEMS (6 Lessons)

Topic	Content	Text	Lessons
	Interpret allocation problems as minimum-cost matching problems. Be able to reduce cost matrices and use the Hungarian algorithm to find a least cost allocation	Ex 2A p41-42	1
Allocation problems	Adapt the Hungarian algorithm to use a dummy location	Ex 2B p44	1
	Adapt the Hungarian algorithm to manage incomplete data	Ex 2C p47-48	1
	Modify the Hungarian algorithm to deal with a maximum profit allocation	Ex 2D p51	1
	Formulate allocation problems as linear programming problems	Ex 2E p55	1
	Solve mixed exam style questions involving transportation problems	Mixed Ex 2F p56-59	1
Assessment – Allocation problems			

TRAVELLING SALESMAN (5 lessons)

Topic	Content	Text	Lessons
Terminology	Understand the terminology walk, tour, upper bound, lower bound, classical and practical problem in relation to the travelling salesperson		
Least distances	Convert a network into a complete network of least distances	Ex 3A p66	1
Upper bound	Use a minimum spanning tree to find an initial upper bound; use short cuts to reduce the upper bound	Ex 3B p72-73	1
Lower bound	Use a minimum spanning tree to find a lower bound	Ex 3C p77-78	1
Nearest neighbour	Use the nearest neighbour algorithm to find an upper bound	Ex 3D p81-82	1
	Solve a range of problems involving the travelling salesman problem	Mixed Ex 3E p83-86	1
Assessment – Travelling Salesman			

NETWORK FLOWS (6 Lessons)

Topic	Content	Text	Lessons
Terminology	Be familiar with the terminology used in analysing flows through networks	Ex 6A p169-171	1
Network cuts	Understand what is meant by a cut when analysing network flows	Ex 6B p176-178	1
Initial flow	Find an initial flow through a capacitated directed network	Ex 6C p181-182	1
Flow augmenting routes	Use the labelling procedure to find flow-augmenting routes to increase the flow through a network.	Ex 6D p191-192	1
Maximal flow	Be able to confirm that a flow is maximal using the maximum flow – minimum cut theorem	Ex 6E p197	1
Multiple sources / sinks	Adapt the algorithm to deal with networks with multiple sources and / or sinks	Mixed Ex 6F p201-205	1
Assessment – Network flows			

DYNAMIC PROGRAMMING (4-6 lessons)

Topic	Syllabus	Text	Lessons
Dynamic Programming	Understand the terminology and principles of dynamic programming, including Bellman's principle of optimality. Use dynamic programming to solve maximum and minimum problems, presented in network form	Ex 7A p216-217	1-2
	Use dynamic programming to solve maximum and minimum problems, presented in network form where the longest arc is as small as possible or the smallest arc is as long as possible	Ex 7B p220-221	1-2
	Use dynamic programming to solve maximum and minimum problems, presented in table form	Ex 7C p228-229	1-2
	Solve mixed exam style problems involving dynamic programming	Mixed Ex 7D p230-231	1
Assessment – Dynamic Programming			

GAME THEORY (7 lessons)

Topic	Syllabus	Text	Lessons
Game Theory	Know about two-person games and pay off matrices. Understand the idea of a zero-sum game and its representation by means of a pay-off matrix Identify play-safe strategies and stable solutions	Ex 5A p142-144	1
	Reduce a matrix by using a dominance argument Determine an optimal mixed strategy for a game with no stable solution	Ex 5B p148-149	1-2
	Determine the optimal mixed strategy for the player with the choices in a 2 x 3 or 3 x 2 game	Ex 5C p151-152	1
	Determine the optimal mixed strategy for the player with three choices in a 2 x 3 or 3 x 2 game Convert 2 x 3 or 3 x 2 and 3 x 3 games into linear programming problems using simplex	Ex 5D p160-162	1-2
	Solve a variety of mixed exam style questions on Game theory	Mixed Ex 5E p162-163	1
Assessment – Game Theory			

ASSESSMENTS

Students should complete an assessment test at the end of each unit of work. Marks for these assessments should be recorded on G4S as soon as they are complete.

Exam past papers should be used for preparation for the examination in June.