

EDEXCEL FOUNDATION

Stewart House 32 Russell Square London WC1B 5DN

January 2002

Advanced Supplementary/Advanced Level

General Certificate of Education

Subject **DECISION MATHEMATICS 6689**

Paper No. **D1**

Question number	Scheme	Marks												
1) (a)		B1 B1 (2)												
(b)	<p><u>Possible paths</u></p> <p style="margin-left: 40px;">1 = A - 2 = D - 4</p> <p style="margin-left: 40px;">N - 2 = D - 4</p> <p style="margin-left: 40px;">N = 1 - A = 2 - D = 4 or N = 2 - D = 4</p> <table style="margin-left: 40px; border: none;"> <tr> <td style="padding-right: 20px;">A - 2</td> <td>D - 4</td> <td style="padding-right: 20px;">A - 1</td> <td>D - 4</td> </tr> <tr> <td>B - 3</td> <td>G - 5</td> <td>B - 3</td> <td>G - 5</td> </tr> <tr> <td></td> <td>N - 1</td> <td></td> <td>N - 2</td> </tr> </table>	A - 2	D - 4	A - 1	D - 4	B - 3	G - 5	B - 3	G - 5		N - 1		N - 2	M1 A1 A1
A - 2	D - 4	A - 1	D - 4											
B - 3	G - 5	B - 3	G - 5											
	N - 1		N - 2											
(c)	<p>Gives second alternating path</p>	A1 (4) 6												
(i)	<p>10 names so middle is $[\frac{1}{2}(10+1)] = 6$ <u>FEW</u></p> <p>SABINE must occur after FEW so list reduces to</p> <ul style="list-style-type: none"> 7. Osborne 8. Paul 9. Swift 10. Turner <p>middle location is $[\frac{1}{2}(10+7)] = 9$ <u>SWIFT</u></p> <p>SABINE must occur before SWIFT, so list reduces to</p> <ul style="list-style-type: none"> 7. Osborne 8. Paul <p>middle location is $[\frac{1}{2}(7+8)] = 8$ <u>PAUL</u></p> <p>SABINE must occur after PAUL, but there is no entry in list after PAUL \therefore SABINE not in list</p>	M1 A1 A1 ✓ A1 ✓ A1 (5) CSO												
(ii)	<p>Iterations reduce list to maximum lengths as follows</p> <p style="margin-left: 40px;">1000, 500, 250, 125, 62, 31, 15, 7, 3, 1</p> <p>(Final iteration to check if list of 1 is the correct name) \therefore 10 iterations (accept 11)</p>	M1 A1 (2) CSO 17												

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<p>3)(i)(a)</p> <p>b)</p> <p>(c)</p> <p>(ii)(a)</p> <p>(b)</p>	<p>method: choose vertex nearest to A and add to tree choose vertex nearest to any vertex on tree repeat last step until all vertices included</p> <p>or an account of the specific solution to this problem</p> <p>Order of arc selection: AF, FC, $\begin{matrix} FB \\ \text{or} \\ BC \end{matrix}$, FD, EB</p> <p>weight = 38</p> <p>Not unique - gives other one, or convincing explanation</p> <p>number of edges = $7 - 1 = 6$</p> <p>number of vertices = $n + 1$</p>	<p>M1 A1</p> <p>M1 A1 (4)</p> <p>B1 ✓ B1 ✓ B1 (3)</p> <p>B1 B1 (2)</p>
<p>4)</p> <p>(a)</p> <p>(b)</p>	<p>Traceback. Include arc xy if y is already on the path and length of arc xy = final label of y - final label of x or a detailed account for this question</p> <p>path is {A E F G H L} (of length 13) {A E I J K L}</p> <p>states other path</p>	<p>m1 (Dijkstra)</p> <p>A1</p> <p>A1 ✓</p> <p>A1</p> <p>(4)</p> <p>B2, 1, 0</p> <p>A1</p> <p>B1 (4)</p>

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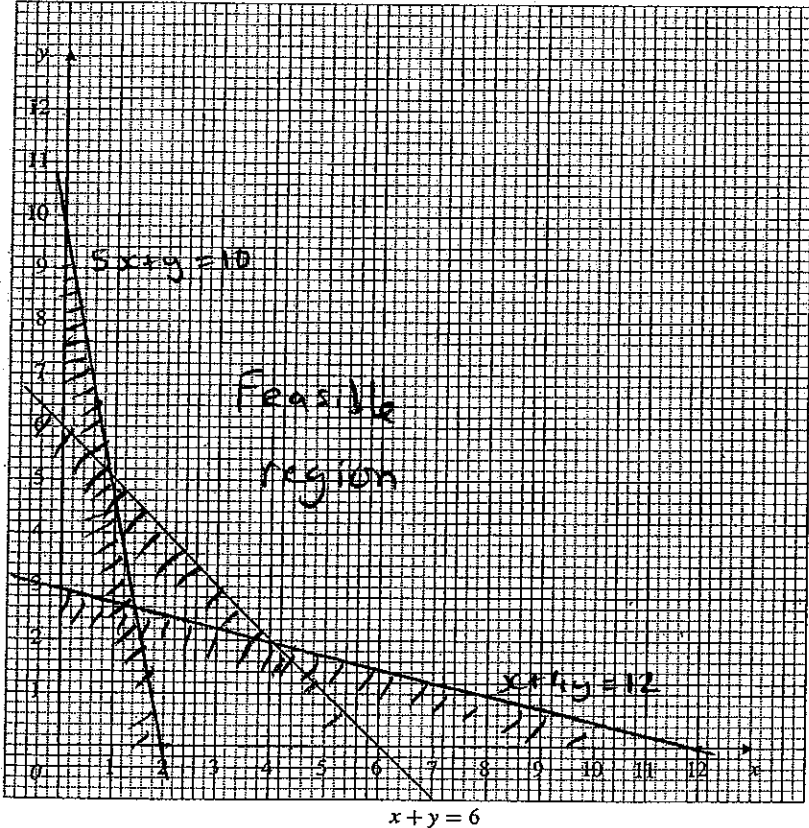
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5) (a)	<p>Chemical A $5x + y \geq 10$ *</p> <p>chemical B $2x + 2y \geq 12 \rightarrow x + y \geq 6$ *</p> <p>chemical C $\frac{1}{2}x + 2y \geq 6 \rightarrow x + 4y \geq 12$ *</p> <p>$x \geq 0$ $y \geq 0$ - from context</p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>B1 (4)</p>
(b)		<p>B1 ✓</p> <p>B1 ✓</p> <p>B1</p> <p>(3)</p>
(c)	<p>$T = 2x + 3y$</p>	<p>B1 (1)</p>
(d)	<p>Profit line or point testing (≥ 3)</p> <p>$x = 4$ $y = 2$, $T = 14$.</p>	<p>M1 A1</p> <p>A1 A1 ✓</p> <p>(4)</p>
(e)	<p>Three (or more) variables e.g.</p> <p>A blend of three fertilizers x, y and z</p>	<p>M1</p> <p>A1 (2)</p> <p><u>14</u></p>

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6) (a)		<p>M1 A1 A1 (3)</p>
(b)	<p>(i) $WW_1AR_1R = 6$ (ii) $WW_3CR_2R = 11$</p>	<p>B1 B1 (2)</p>
(c)	<p>e.g. $WW_1BAR_2R = 6$ $WW_1AR_2R = 2$ $WW_2BCR_2R = 5$ $WW_2BAR_2R = 1$</p> <p>max flow 31</p>	<p>M1 A1 A1 A1 (5)</p>
(d)	<p>correct for <u>their</u> network</p>	<p>B1 (1)</p>
(e)	<p><u>All</u> candidates to receive 3 marks.</p>	<p>(3)</p>

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<p>7) (a)</p> <p>(b) activities A, C, F and H, length 21</p> <p>(c) Float for B is 1 ($= 10 - 5 - 4$) D is 1 ($= 12 - 9 - 2$) E is 2 ($= 21 - 12 - 7$) G is 4 ($= 21 - 9 - 8$)</p> <p>(d)</p> <p>(e)</p>	<p>e.g.</p> <p>24 days</p>	<p>Forward pass M1 A1</p> <p>Backward pass M1 A1</p> <p>(4)</p> <p>B1, B1✓ (2)</p> <p>M1 A1 A1 (3)</p> <p>M1 A1 A1✓ A1 (4)</p> <p>M1 A1 A1 A1 (4)</p> <p>17</p>