

EDEXCEL

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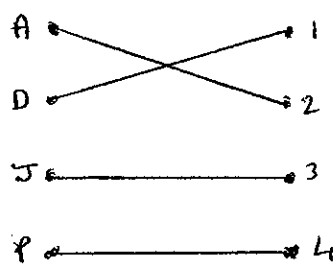
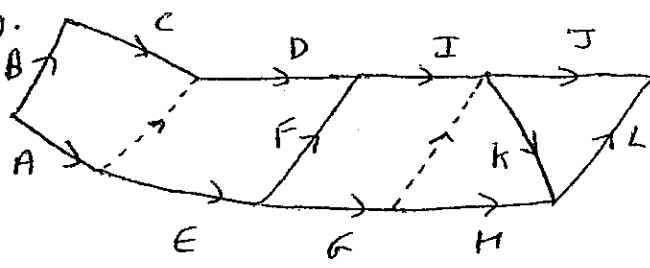
January 2005

Advanced Subsidiary/Advanced Level

General Certificate of Education

Subject: **Decision Maths**

Paper: **D1**

Question Number	Scheme	Marks
<p>1)(a)</p>  <p>(b) e.g. $S-3 = J-4 = P-6$ c.s. $S = 3 - J = 4 - P = 6$ and $T-2 = A-1 = D-5$ c.s. $T = 2 - A = 1 - D = 5$ $A=1$ $D=5$ $J=4$ $P=6$ $S=3$ $T=2$</p>		<p>B1 (1)</p> <p>m1 A1 (2)</p> <p>⊥ (m1) A1</p> <p>A1 (3)</p> <p>6</p>
<p>2 (a)</p> <p>(b) eg.</p> 	<p>D depends on A and C, but E depends on A only H depends on G only, but J and K depend on G and I</p>	<p>B1 (2)</p> <p>B1 (2)</p> <p>m1 A1 A1 A1 A1 (5)</p> <p>7</p>
<p>3) (a)</p> <p>(b)</p>	<p>(i) FH, AD, DE, CE, (not DC), {BC}, {EG}, (not AC), CF, HI, (not FI), IJ stop</p> <p>(ii) AD, DE, EC, {BC}, {EG}, CF, FH, HI, IJ stop.</p> <p>Start off the tree with AB and FI, then apply Kruskal</p>	<p>m1 A1 A1 (3)</p> <p>m1 A1 A1 (3)</p> <p>B2, 1, 0 (2)</p> <p>8</p>

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<p>4) (a)</p>	<p>E.g.</p> <table style="border-collapse: collapse; margin-left: 20px;"> <tr> <td style="border: 1px solid black; padding: 2px;">650</td> <td style="border: 1px solid black; padding: 2px;">431</td> <td style="border: 1px solid black; padding: 2px;">245</td> <td style="border: 1px solid black; padding: 2px;">643</td> <td style="border: 1px solid black; padding: 2px;">455</td> <td style="border: 1px solid black; padding: 2px;">710</td> <td style="border: 1px solid black; padding: 2px;">234</td> <td style="border: 1px solid black; padding: 2px;">162</td> <td style="border: 1px solid black; padding: 2px;">452</td> <td style="border: 1px solid black; padding: 2px;">134</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px;">650</td> <td style="border: 1px solid black; padding: 2px;">643</td> <td style="border: 1px solid black; padding: 2px;">710</td> <td style="border: 1px solid black; padding: 2px;">455</td> <td style="border: 1px solid black; padding: 2px;">431</td> <td style="border: 1px solid black; padding: 2px;">245</td> <td style="border: 1px solid black; padding: 2px;">234</td> <td style="border: 1px solid black; padding: 2px;">162</td> <td style="border: 1px solid black; padding: 2px;">452</td> <td style="border: 1px solid black; padding: 2px;">134</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px;">650</td> <td style="border: 1px solid black; padding: 2px;">710</td> <td style="border: 1px solid black; padding: 2px;">643</td> <td style="border: 1px solid black; padding: 2px;">455</td> <td style="border: 1px solid black; padding: 2px;">431</td> <td style="border: 1px solid black; padding: 2px;">245</td> <td style="border: 1px solid black; padding: 2px;">452</td> <td style="border: 1px solid black; padding: 2px;">234</td> <td style="border: 1px solid black; padding: 2px;">162</td> <td style="border: 1px solid black; padding: 2px;">134</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px;">710</td> <td style="border: 1px solid black; padding: 2px;">650</td> <td style="border: 1px solid black; padding: 2px;">643</td> <td style="border: 1px solid black; padding: 2px;">455</td> <td style="border: 1px solid black; padding: 2px;">431</td> <td style="border: 1px solid black; padding: 2px;">452</td> <td style="border: 1px solid black; padding: 2px;">245</td> <td style="border: 1px solid black; padding: 2px;">234</td> <td style="border: 1px solid black; padding: 2px;">162</td> <td style="border: 1px solid black; padding: 2px;">134</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px;">710</td> <td style="border: 1px solid black; padding: 2px;">650</td> <td style="border: 1px solid black; padding: 2px;">643</td> <td style="border: 1px solid black; padding: 2px;">455</td> <td style="border: 1px solid black; padding: 2px;">452</td> <td style="border: 1px solid black; padding: 2px;">431</td> <td style="border: 1px solid black; padding: 2px;">245</td> <td style="border: 1px solid black; padding: 2px;">234</td> <td style="border: 1px solid black; padding: 2px;">162</td> <td style="border: 1px solid black; padding: 2px;">134</td> </tr> </table> <p style="text-align: right; margin-right: 50px;">stop.</p>	650	431	245	643	455	710	234	162	452	134	650	643	710	455	431	245	234	162	452	134	650	710	643	455	431	245	452	234	162	134	710	650	643	455	431	452	245	234	162	134	710	650	643	455	452	431	245	234	162	134	<p>M1 A1 A1✓ A1✓ A1 (5)</p>
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<p>(b)</p>	<p>Bin 1 710 + 245 Bin 3 643 + 162 + 134 Bin 5 431 Bin 2 650 + 234 Bin 4 455 + 452</p>	<p>M1 A1 A1✓ A1 (4)</p>																																																		
<p>(c)</p>	<p>$\frac{4116}{1020} = 4.116 \therefore 5 \text{ bins needed } \therefore \text{optimal}$</p>	<p>M1 A1✓ (2) 11</p>																																																		

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5) (i)	<p style="text-align: center;">shortest distance is 385m</p>	<p>MI A1 A1 ✓ A1 ✓</p> <p>A1 (5)</p> <p>MI A1 A1 A1 (4)</p> <p>B1 B1 (2)</p> <p style="text-align: right;">□</p>
(ii)	<p>Odd vertices B, C, D, G</p> $BC + DG = 95 + 145 = 240 *$ $BD + CG = 169 + 179 = 348$ $BG + CD = 249 + 74 = 323$ <p>Repeat BC, DE and EG</p> <p>eg. $A \underline{B} \underline{C} \underline{B} \underline{F} \underline{H} \underline{G} \underline{F} \underline{E} \underline{G} \underline{E} \underline{C} \underline{D} \underline{E} \underline{D} \underline{A}$</p> <p>length $1241 + 240 = 1481m$</p>	

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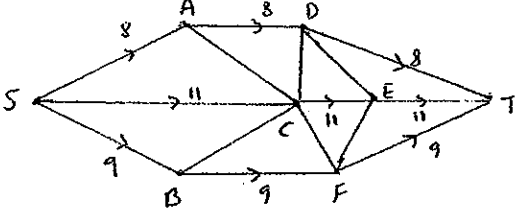
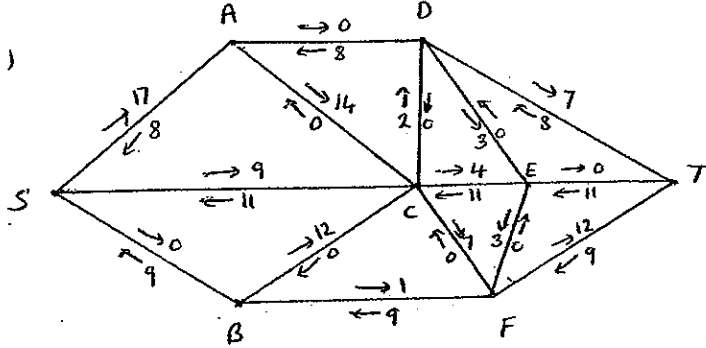
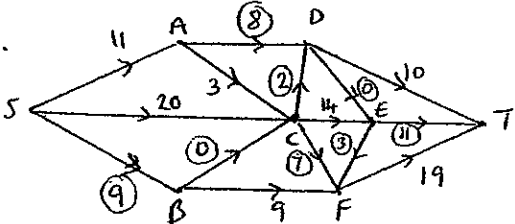
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6)(a)	SADT - 8 SCET - 11 SBFT - 9	B 2, 1, 0
(b)		B 1 (3)
(c) (i)	 <p>e.g. SACDT - 2 SCFT - 6 SACEFT - 3 SACFT - 1 <u>max flow 40</u></p>	<p>m 1 A 1 (2) A 1 A 1 (3)</p>
(ii) eg.		<p>m 1 A 1 (2)</p>
(iii)	<p>Max flow - min cut theorem cut AD, CD, DE, ET, EF, CF, BC, SB is {SACE} {BDFT}</p>	<p>m 1 A 2, 0 (3)</p>
(d)	<p>Idea of a <u>directed</u> flow through a <u>system</u> of arcs from <u>S</u> to <u>T</u> <u>practical</u></p>	<p>B 1 (1)</p>
		<div style="border: 1px solid black; padding: 2px; display: inline-block;">14</div>

