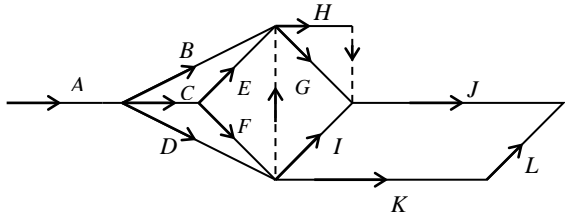


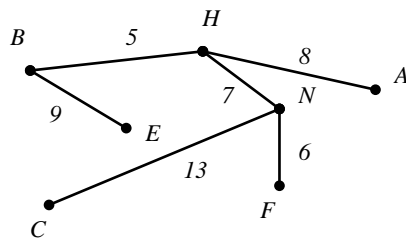
EDEXCEL DECISION MATHEMATICS D1 (6689)
 PROVISIONAL MARK SCHEME NOVEMBER 2003

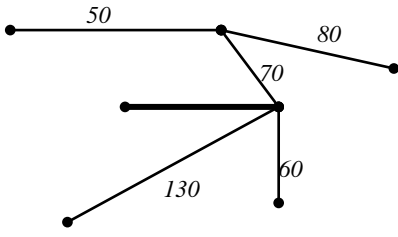
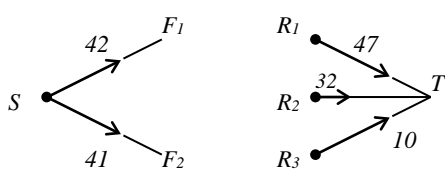
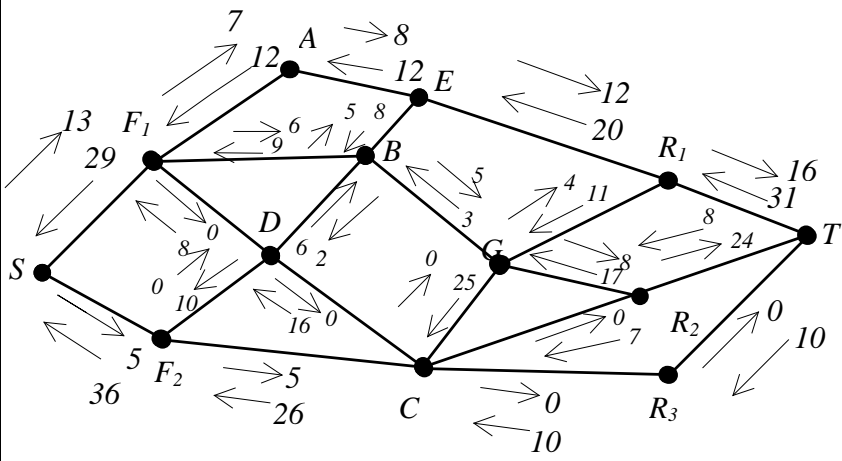
Question Number	Scheme	Marks
1.	<p>(a) All arcs must be traversed twice. (So no arc needs repeating more than twice.) All valencies therefore even.</p> <p>(b) e.g. <i>CECAEFEAFAFBACDBDGF</i> $\text{length} = 2 \times 6$ $= \underline{12km}$</p>	<p>B1 (1)</p> <p>M1 A1</p> <p>A1 (3)</p> <p>4</p>
2.	<p>(a)</p> <p>(b)</p> <p>\therefore planar, so product can be built</p>	<p>B1 (1)</p> <p>M1</p> <p>A1</p> <p>A1</p> <p>A1 (4)</p> <p>5</p>

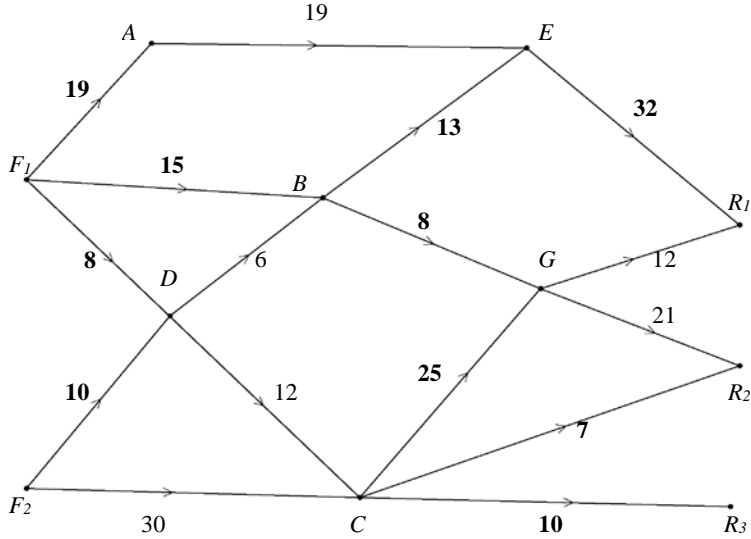
EDEXCEL DECISION MATHEMATICS D1 (6689)
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Question Number	Scheme	Marks
3.	<p>(a) Add A to 3, B to 4, C to 1 and F to 5 in a distinctive way</p> <p>(b) <u>e.g.</u> $D - 3 = A - 1 = C - 4 = B - 2$</p> <p>C.S. $D = 3 - A = 1 - C = 4 - B = 2$</p> <p>$E - 5 = F - 6$</p> <p>C.S. $E = 5 - F = 6$</p> <p>$A = 1 \quad B = 2 \quad C = 4 \quad D = 3 \quad E = 5 \quad F = 6$</p>	<p>B1 (1)</p> <p>M1</p> <p>A1 (2)</p> <p>M1</p> <p>A1</p> <p>A1 (3)</p> <p>6</p>
4.	<p>(a) <u>e.g.</u></p>  <p>(b) D will only be critical if it lies on a longest route.</p> <p>ABEG – 14</p> <p>ACFG – 15</p> <p>ACDEG – 13 + x</p> <p>So D critical if $x \geq 2$ (must be \geq not $>$)</p>	<p>M1</p> <p>A1</p> <p>A1</p> <p>A1</p> <p>A1</p> <p>A1 (6)</p> <p>M1</p> <p>A1 (2)</p> <p>8</p>
5.	<p>(a) Bin 1 – 75+20</p> <p>Bin 2 – 70 +20</p> <p>Bin 3 – 60+40</p> <p>Bin 4 – 50+35</p> <p>Bin 5 – 20</p> <p>5 Planks needed: cost £15</p> <p>Wastage = 5+10+0+15+80 = 110cm</p>	<p>M1</p> <p>A1</p> <p>A1</p> <p>A1</p> <p>A1</p> <p>A1 (5)</p>

Question Number	Scheme	Marks
<p>5. (cont)</p>	<p>(b) Bin 1 (1.5m) – 75+70 Bin 1 (1m) –75+20 Bin 2 (1.5m) – 60+50+40 or Bin 2 (1.5m) –70+60+20 Bin 3 (1m) – 35+20+20+20 Bin 3 (1.5m) –50+40+35+20</p> <p>Cost £11 1.5m lengths better value than 1m lengths to use as many as possible</p>	<p>M1 A1 A1</p> <p>A1 (4)</p> <p style="text-align: right;">9</p>
<p>6.</p>	<p>(a) i A connected graph with no cycles, loops or multiple edges</p> <p>ii A tree that includes all vertices</p> <p>iii A spanning tree of minimum total length</p> <p>(b) E.g.</p> <ul style="list-style-type: none"> • In Kruskal the shortest <u>arc</u> is added (unless it completes a cycle), in Prim the nearest unattached <u>vertex</u> is added • There is no need to check for cycles when using Prim, but there is when using Kruskal • In Prim the tree always “grows” in a connected fashion • Kruskal starts with the shortest edge, Prim with any vertex <p>(c) BH, NF, HN, HA, BE, NC; length = 48</p>	<p>B1</p> <p>B1</p> <p>B1 (3)</p> <p>B1 (1)</p> <p>M1 A1; A1</p> <p>A1 (4)</p>



Question Number	Scheme	Marks
6. (cont)	<p>(d)</p>  <p><u>New cable – 390m</u></p>	<p>B1</p> <p>M1 A1 (3)</p> <p>11</p>
7.	<p>(a) $x = 3$, $y = 26$</p> <p>(b)</p>  <p>(c)</p> 	<p>B1, B1 (2)</p> <p>M1 A1 A1 (3)</p> <p>M1 A1 A1 (3)</p>

Question Number	Scheme	Marks
<p>7. (cont)</p>	<p>(c) (cont.) <u>e.g.</u> S F₁ A E R₁ T - 7 S F₁ B E R₁ T - 5 S F₁ B G R₁ T - 1 S F₂ C D B G R₂ T - 4</p> <p>(d) <u>e.g.</u></p>  <p><u>Max Flow 82</u></p>	<p>DM1 A1 A1 A1 (4)</p> <p>B1 B1 (2)</p> <p>M1 A1 (2)</p> <p>16</p>
	<p>(e) <u>e.g.</u></p> <p>F₁ A, BE, BG, CG, CR₂, CR₃ (=82) Or ER₁, BG, CG, CR₂, CR₃ (=82)</p>	

