



Oxford Cambridge and RSA

**Wednesday 20 October 2021 – Afternoon**

**A Level Further Mathematics B (MEI)**

**Y433/01 Modelling with Algorithms**

**Printed Answer Booklet**

**Time allowed: 1 hour 15 minutes**



**You must have:**

- Question Paper Y433/01 (inside this document)
- the Formulae Booklet for Further Mathematics B (MEI)
- a scientific or graphical calculator



Please write clearly in black ink. **Do not write in the barcodes.**

Centre number

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Candidate number

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First name(s)

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Last name

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**INSTRUCTIONS**

- Use black ink. You can use an HB pencil, but only for graphs and diagrams.
- Write your answer to each question in the space provided in the **Printed Answer Booklet**. If you need extra space use the lined pages at the end of the Printed Answer Booklet. The question numbers must be clearly shown.
- Answer **all** the questions.
- Where appropriate, your answer should be supported with working. Marks might be given for using a correct method, even if your answer is wrong.
- Give your final answers to a degree of accuracy that is appropriate to the context.

**INFORMATION**

- This document has **12** pages.

**ADVICE**

- Read each question carefully before you start your answer.

<b>1(a)</b>	
<b>1(b)</b>	
<b>The answer space for Q2(a) and Q2(b) is on page 3</b>	
<b>2(c)</b>	
<b>2(d)</b>	

<b>2(a)(b)</b>	
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<b>2(e)</b>	

**3(a)(i)**

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**3(a)(ii)**

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**3(b)**

Key:  
 Order of labelling → 

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 ← Label  
 Working values (do not cross out) → 

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Shortest path from A to F:

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**3(c)** STEP 1:

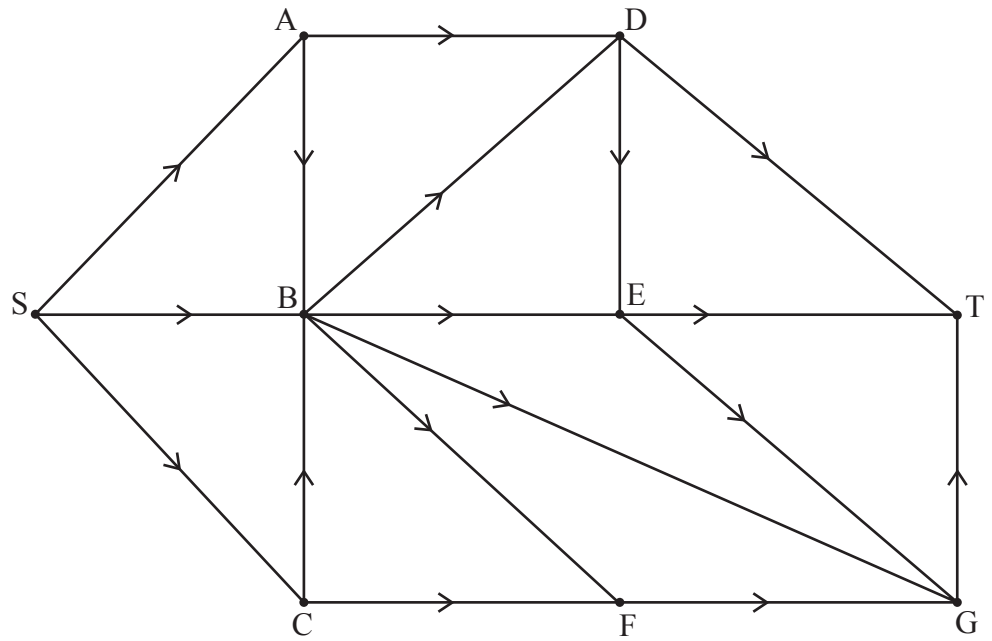
Possible pairings of odd nodes	Corresponding shortest path	Length of shortest path


**3(d)** STEP 2:


STEP 3:


<b>4(a)(i)</b>	Cut $\alpha =$
<b>4(a)(ii)</b>	Cut $\beta =$
<b>4(b)</b>	The maximum possible flow is
<b>4(c)</b>	
<b>4(d)</b>	
	Subject to
	$SA - AB - AD = 0$
	$SC - CB - CF = 0$
	$AD + BD - DE - DT = 0$
	$BF + CF - FG = 0$
	$BG + EG + FG - GT = 0$
$SA \leq 62, SB \leq 71, SC \leq 47, AB \leq 43, AD \leq 22, BD \leq 39, BE \leq 32, BF \leq 43,$ $BG \leq 47, CB \leq 25, CF \leq 39, DE \leq 33, EG \leq 43, FG \leq 42$	

4(e)



4(f)

4(g)

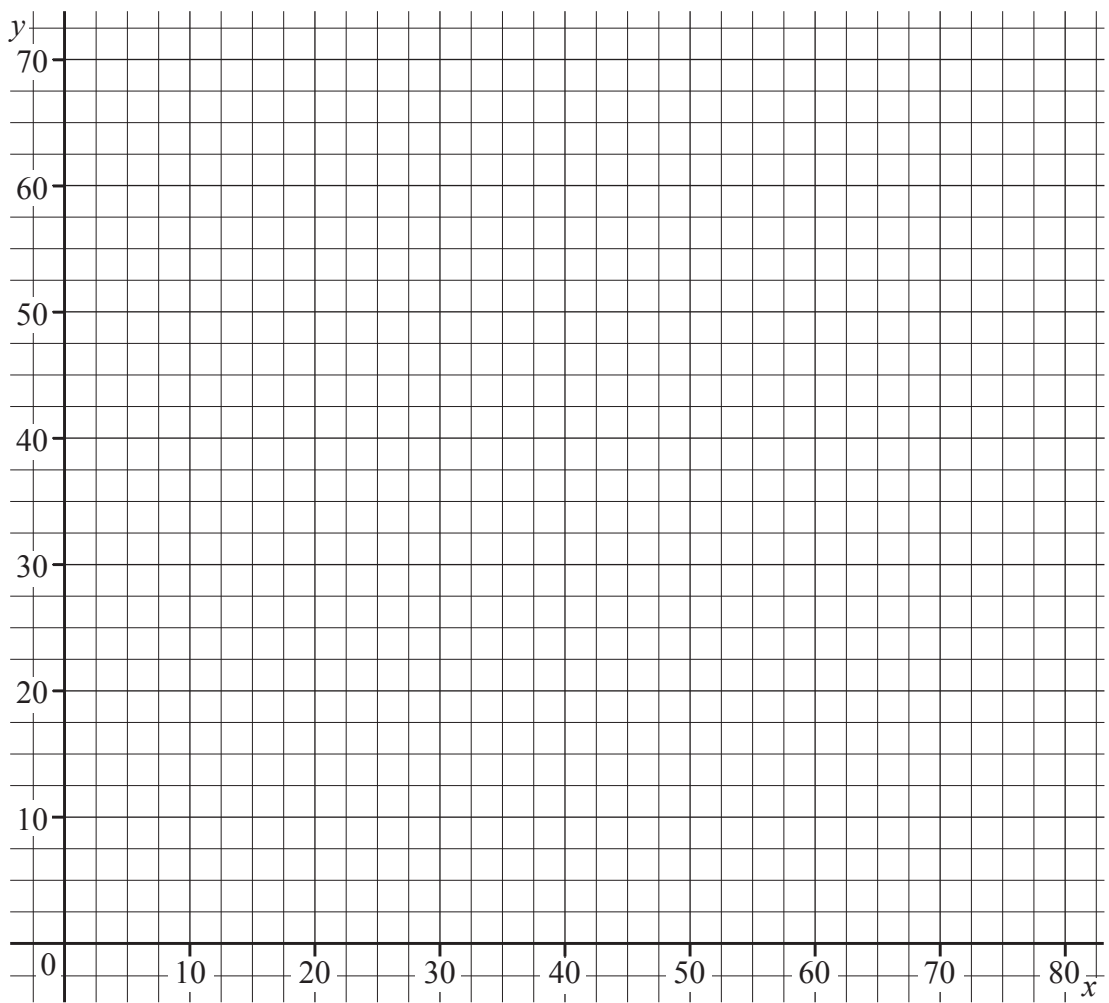
5(a)


<i>Q</i>	<i>P</i>	<i>x</i>	<i>y</i>	<i>z</i>	<i>s</i> <sub>1</sub>	<i>s</i> <sub>2</sub>	<i>s</i> <sub>3</sub>	<i>s</i> <sub>4</sub>	<i>s</i> <sub>5</sub>	<i>a</i> <sub>1</sub>	RHS

There is a spare copy of this tableau on page 11



5(b)

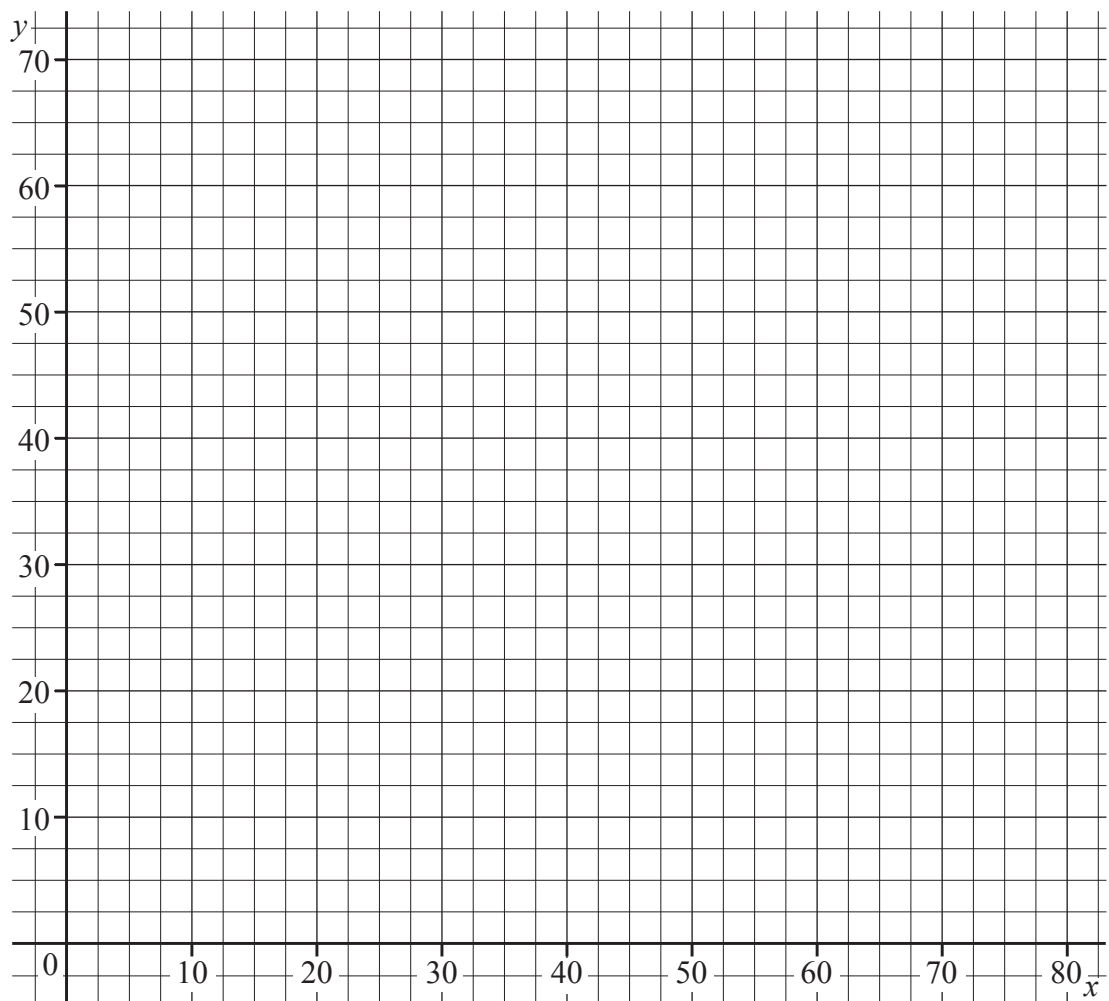
There is a spare copy of this graph on page 11

<b>5(c)</b>	
<b>5(d)(i)</b>	
<b>5(d)(ii)</b>	
<b>5(e)</b>	

**5(a)** Spare copy of tableau for Q5(a)

$Q$	$P$	$x$	$y$	$z$	$s_1$	$s_2$	$s_3$	$s_4$	$s_5$	$a_1$	RHS

**5(b)** Spare copy of graph for Q5(b)



**ADDITIONAL ANSWER SPACE**

If additional space is required, you should use the following lined page(s). The question number(s) must be clearly shown in the margin(s).




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