



Oxford Cambridge and RSA

Thursday 26 May 2022 – Afternoon

AS Level Further Mathematics B (MEI)

Y413/01 Modelling with Algorithms

Printed Answer Booklet

Time allowed: 1 hour 15 minutes



You must have:

- Question Paper Y413/01 (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)

Last name

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 **16** pages.

ADVICE

- Read each question carefully before you start your answer.

1(a)(i)	
1(a)(ii)	
1(b)(i)	<p>A</p> <p>B ●</p> <p>● E</p> <p>● C</p> <p>● D</p>
1(b)(ii)	

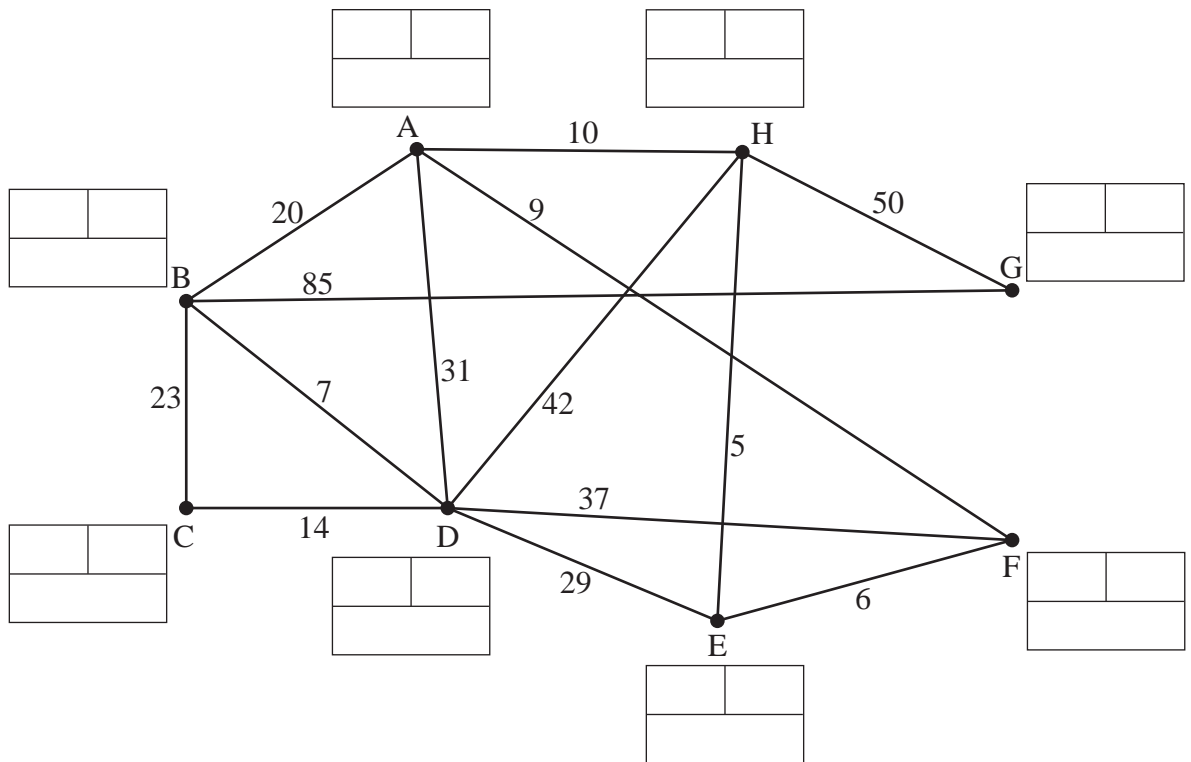
2(a)																																																			
2(b)	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="width: 15%;">N</th> <th style="width: 25%;">A</th> <th style="width: 25%;">B</th> <th style="width: 35%;">Is $-10^{-6} < B - A < 10^{-6}$?</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table>			N	A	B	Is $-10^{-6} < B - A < 10^{-6}$?																																												
	N	A	B	Is $-10^{-6} < B - A < 10^{-6}$?																																															
Final output																																																			
2(c)																																																			
2(d)																																																			

3(a)

3(b)(i)

Key:
 Order of labelling →

 ← Label
 Working values (do not cross out) →

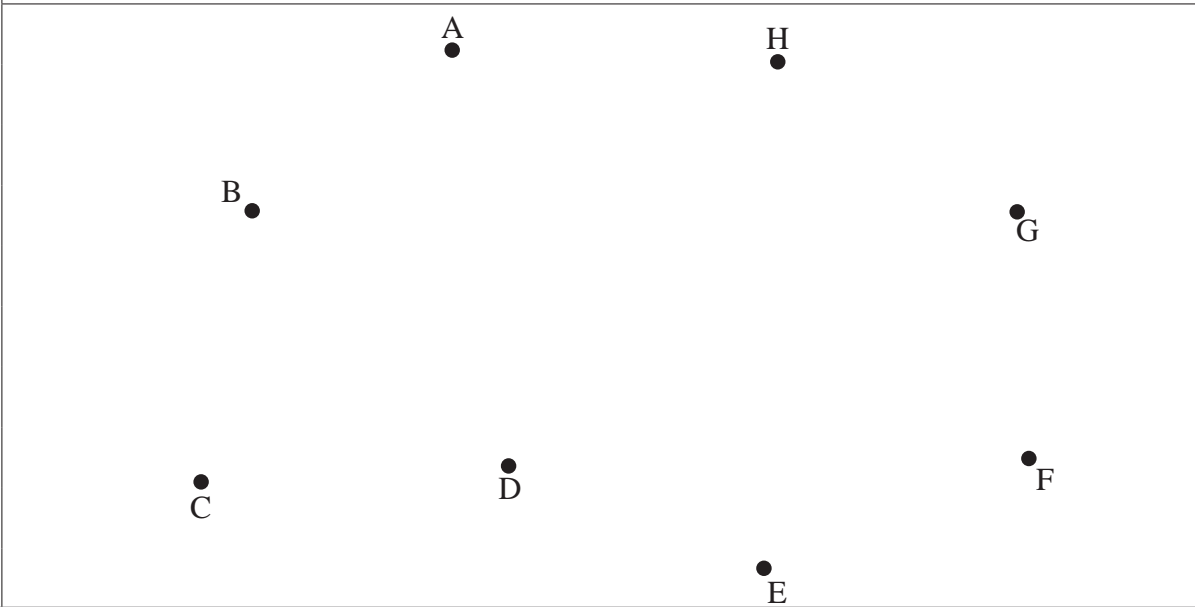


Shortest path from A to C:

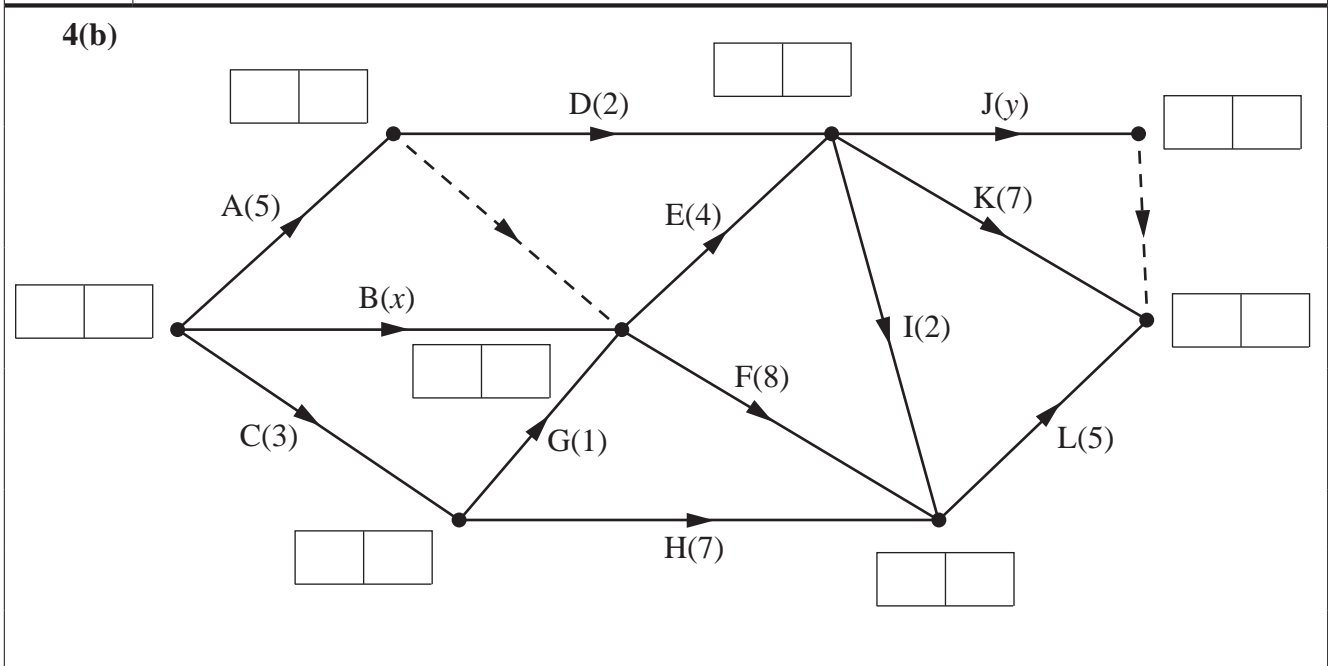
Shortest path from C to G:

3(b)(ii)	

3(c)	



4(a)	Activity	Immediate Predecessor(s)
	A	
	B	
	C	
	D	
	E	
	F	
	G	
	H	
	I	
	J	
	K	
	L	



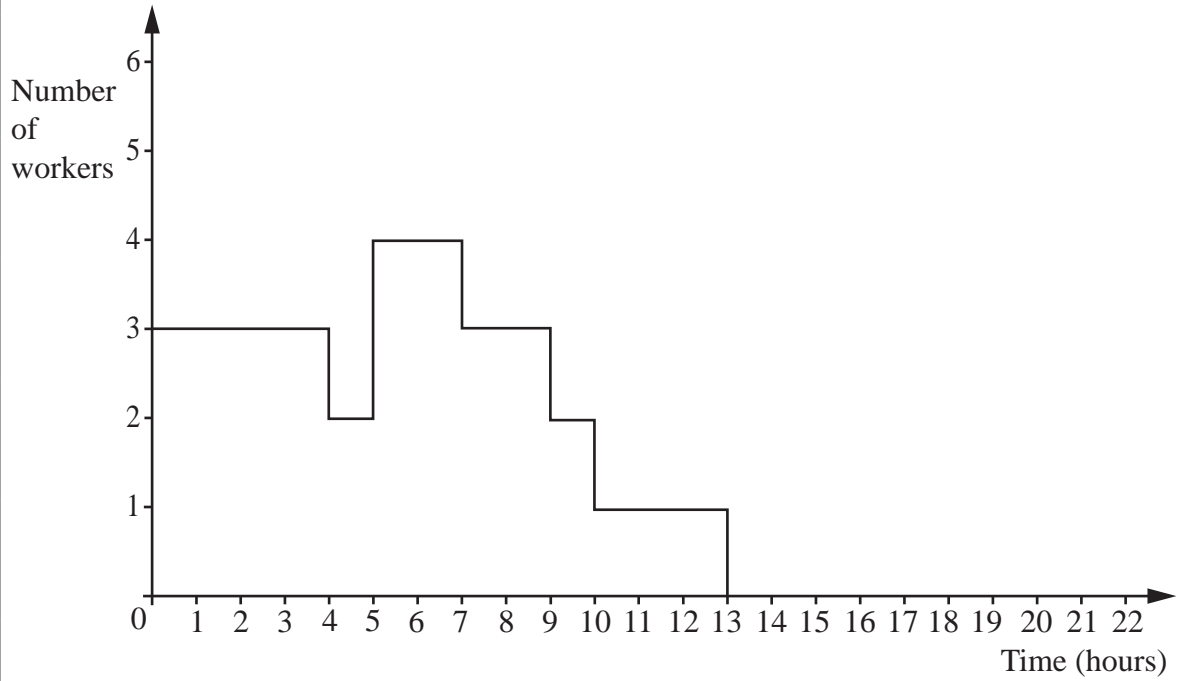
Minimum completion time:

Critical activities:

4(c)	

4(d)	

4(e)



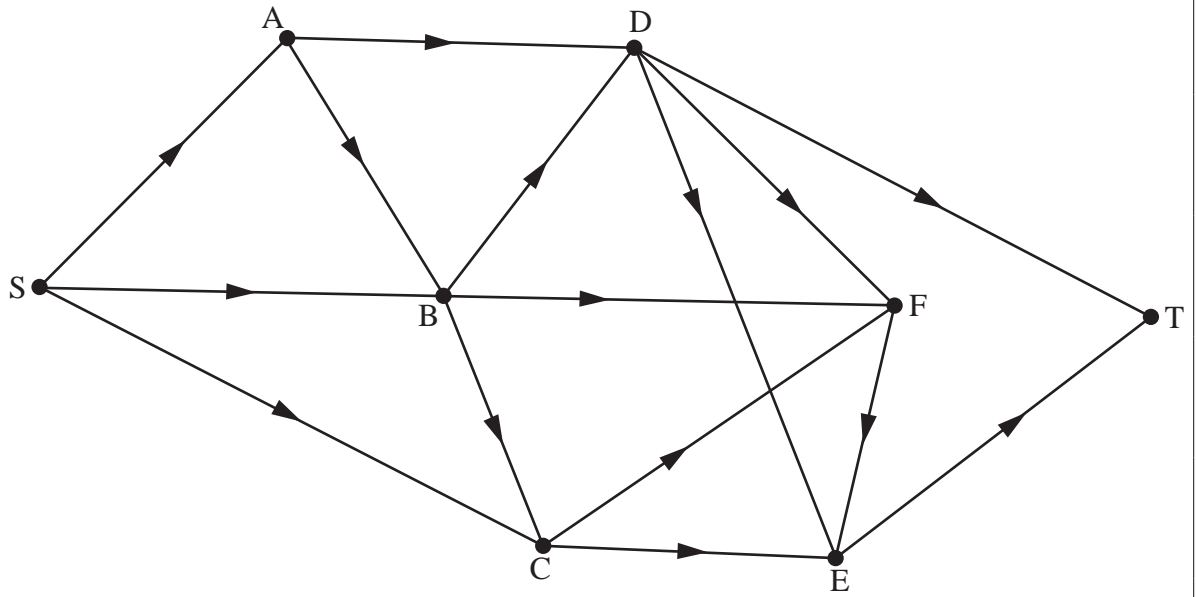
4(f)

	0	1	2	3	4	5	6	7	8	9	10	11
Worker 1												
Worker 2												
Worker 3												

	11	12	13	14	15	16	17	18	19	20	21	22
Worker 1												
Worker 2												
Worker 3												

5(a)(i)	
5(a)(ii)	
5(b)	
5(c)	
5(d)	
5(e)	

5(f)



5(g)

6(a)

P	x	y	z	s_1	s_2	s_3	s_4	RHS

6(b)(i)

P	x	y	z	s_1	s_2	s_3	s_4	RHS
1	0	$-\frac{10}{3}$	0	0	$\frac{10}{3}$	1	0	0
0	0	$\frac{4}{3}$	0	1	$-\frac{1}{3}$	0	0	32
0	0	$-\frac{1}{3}$	1	0	$\frac{1}{3}$	0	0	0
0	1	-2	0	0	3	1	0	0
0	0	$\frac{104}{3}$	0	0	$-\frac{107}{3}$	-11	1	1000

P	x	y	z	s_1	s_2	s_3	s_4	RHS

6(b)(ii)	
6(c)(i)	
6(c)(ii)	

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).

