M1.

(a)

Current State	S_1	S_1	S_2	S_2	S_3	S_3	S_4	S_4	S_5	S_5
Input Symbol	0	1	0	1	0	1	***0***	***1***	***0***	***1***
Next State	S_2	S_3	S_2	S_4	S_3	S_3	***S_4***	***S_5***	***S_5***	***S_4***

1 mark for all four bolded columns correct
A the two columns for S_4 either way round and similar for S_5

1

(b) Accept/Accepting/Accepted (state) // Input (string) is accepted
A if the FSA finishes in this state output is Yes
R Stop state

1

Input String	**String Accepted? (Yes / No)**
101	***No***
000	***No***
010001101	***No***
0100011011	***Yes***

1 mark for any two correct answers
2 marks for all four answers correct

2

(d) Strings that start with a 0;
A does not start with 1
R starts with 00, 01, any statement of a specific second digit being required

Followed by any sequence containing an odd number of 1s and zero or more 0s;
A String with an odd number of 1s in it.
A Numbers or bit patterns in place of 0s and 1s.

2

[6]

M2.

(a)

Original State	Input	New State	
S0	10	S10	
S0	20	S20	;
S0	50	S50	;
S0	R	S0	;

Note: order of completed rows not important

3

(b) 20, 20, 10;
R, R, 50;
10, 20, 20;
20, 50, 50;
20, R, 50;

Max 4

[7]

M3.

(a)

Current State	S_3	S_3	S_3
Input Symbol	a	b	c
Next State	S_6	S_6	S_4

1 mark for all six correct values in the bold rectangular area
The columns do not have to be in the same order as shown, but the pairings must be correct i.e. (a - S_6, b - S_6, c - S_4).
A 4 for S_4 and 6 for S_6

1

(b) S_3
A 3
I An additional name given to the state eg “State 3”

1

(c) To ensure that a non-valid string is trapped // prevent the accepting state being reached;
A To capture invalid input
A To capture strings that are too long / have extra characters
NE Infinite loop / state cannot be left

1

[3]

Q4.

All marks AO2 (apply)

Event	Label(s)
Correct code keyed	F
Door pulled open	B
Door pushed shut	A
New code keyed	E
Press C	d, g (**I**. order)
Press E	h, c (**I**. order)

1 mark per two correct labels (round down).

I. case

Note: each label must only be used once (if given more than once, reject all occurrences).

[4]