1. The transition table is:

_	***Begin***	M_1	M_2	M_3	M_4	D_1	D_3	D_4	I_0	I_1	I_2	I_4	***End***
Begin	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0
M_1	0.0	0.0	0.67	0.0	0.0	0.0	0.0	0.0	0.0	0.33	0.0	0.0	0.0
M_2	0.0	0.0	0.0	0.5	0.0	0.0	0.125	0.0	0.0	0.375	0.0	0.0	0.0
M_3	0.0	0.0	0.0	0.0	0.857	0.0	0.0	0.143	0.0	0.0	0.0	0.0	0.0
M_4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.571	0.429
D_1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
D_3	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
D_4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0
I_0	0.0	0.429	0.0	0.0	0.0	0.143	0.0	0.0	0.429	0.0	0.0	0.0	0.0
I_1	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I_2	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I_4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.375	0.625
End	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

The emission probabilities at match states:

- M1:

A	1/6 = 0.167
C	5/6 = 0.833

- M2:

T	7/8 = 0.875
G	1/8 = 0.125

- M3:

G	1/7 = 0.143
C	6/7 = 0.857

- M4:

A	5/7 = 0.714
T	2/7 = 0.286

2)

	_	C	T	C	T	G	A
Begin	1.0	0.0	0.0	0.0	0.0	0.0	0.0
I_0	0.0	$2.5x10^{-1}$	$2.68x10^{-2}$	$2.87x10^{-3}$	$3.08x10^{-4}$	$3.3x10^{-5}$	$3.54x10^{-6}$
I_1	0.0	0.0	$8.93x10^{-3}$	$9.58x10^{-4}$	$7.98x10^{-4}$	$1.1x10^{-5}$	$1.18x10^{-6}$
I_2	0.0	0.0	0.0	0.0	0.0	$5.23x10^{-4}$	$9.36x10^{-6}$
I_4	0.0	0.0	0.0	0.0	0.0	0.0	$1.43x10^{-5}$
D_1	0.0	$3.57x10^{-2}$	$3.83x10^{-3}$	$4.1x10^{-4}$	$4.4x10^{-5}$	$4.71x10^{-6}$	$5.06x10^{-7}$
D_3	0.0	0.0	0.0	0.0	$6.98x10^{-4}$	$1.25x10^{-5}$	0.0
D_4	0.0	0.0	0.0	0.0	0.0	$5.7x10^{-5}$	0.0
M_1	0.0	0.0	0.0	$9.57x10^{-3}$	0.0	0.0	$2.36x10^{-6}$
M_2	0.0	0.0	0.0	0.0	$5.58x10^{-3}$	$9.98x10^{-5}$	0.0
M_3	0.0	0.0	0.0	0.0	0.0	$3.99x10^{-4}$	0.0
M_4	0.0	0.0	0.0	0.0	0.0	0.0	$2.44x10^{-4}$
End	0.0	0.0	0.0	0.0	0.0	0.0	$1.05x10^{-4}$

According to Viterbi Algorithm, the most likely sequence is:

Begin -> I_0-> I_0-> M_1-> M_2->M_3-> M_4 -> End

The best path is:

_ C T C _ T _ G A _ _ _

The probability associated with the best path is $1.05x10^{-4}$.