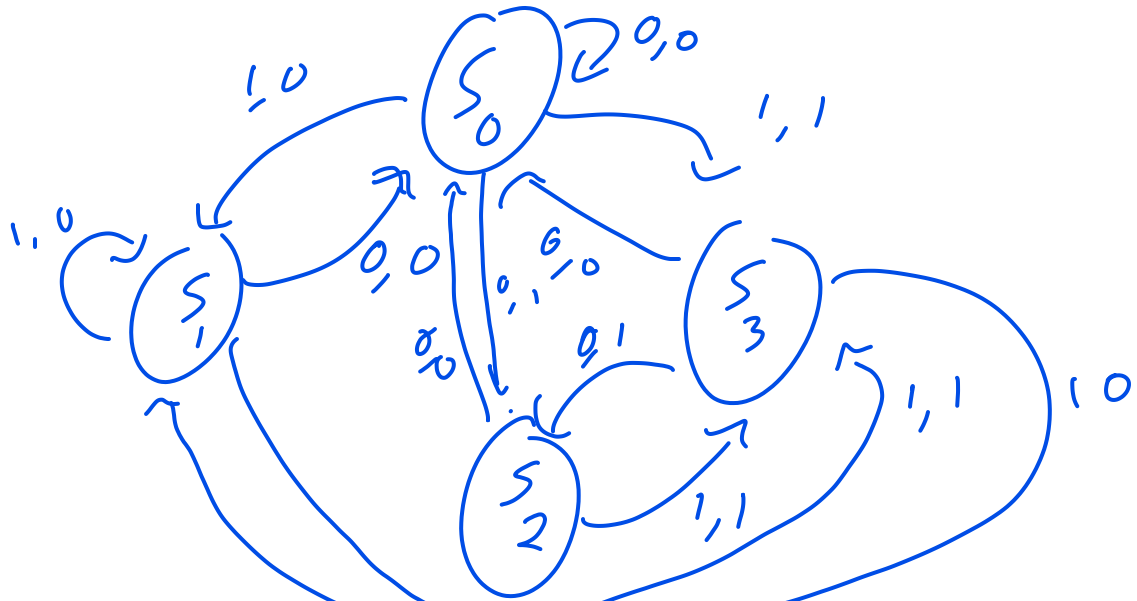


1 a) Draw the state diagram for a FSM to represent the given specifications.



1 b) Write an encoded state table (transition table) corresponding to the state diagram above.

Present State		Next State			
F	S	DT = 00	DT = 01	DT = 10	DT = 11
0	0	00	10	01	11
0	1	00	xx	01	11
1	0	00	10	1x	11
1	1	00	10	01	11

1 c) Fill in the Karnaugh maps for F+ and S+ and write minimal sum-of-products equations for F+, S+ (show your work).

FS\DT	00	01	11	10
00	0	1	1	0
01	0	x	1	0
11	0	1	1	0
10	0	1	1	x

F+

FS\DT	00	01	11	10
00	0	0	1	1
01	0	x	1	1
11	0	0	1	1
10	0	0	1	x

S+

1 d) Create the Karnaugh maps for J_F and K_F , J_S and K_S write minimal sum-of-products equations for each

FS\DT	00	01	11	10
00	x	1	1	0
01	x	x	1	0
11	x	x	x	x
10	x	x	x	x

J_F

FS\DT	00	01	11	10
00	x	x	x	x
01	x	x	x	x
11	1	0	0	1
10	1	0	0	1

K_F

$$J_F = 1$$

$$K_F = \overline{1}$$

FS\DT	00	01	11	10
00	0	0	1	1
01	x	x	x	x
11	x	x	x	x
10	0	0	1	x

J_S

FS\DT	00	01	11	10
00	x	x	x	x
01	1	x	0	0
11	1	1	0	0
10	x	x	x	x

K_S

$$J_S = 0$$

$$K_S = \overline{0}$$

2 a) Complete a state table corresponding to the state diagram.

present state	condition				next state
	A	B	C	D	
S_1	1	x	x	x	S_2
S_1	x	1	x	x	S_2
S_1	0	0	x	x	S_1
S_2	x	0	0	x	S_3
S_2	x	1	1	x	S_2
S_2	x	0	1	x	S_4

s_2	X	1	0	X	s_4
s_3	0	X	1	X	s_3
s_3	0	X	0	X	s_2
s_3	1	X	1	X	s_2
s_3	1	X	1	X	s_4
s_4	X	X	0	0	s_3
s_4	X	X	1	X	s_1
s_4	X	X	X	1	s_1

2 b) Complete the encoded state table (transition table).

present state	condition				next state
XY	A	B	C	D	X^+Y^+
10	1	x	x	x	11
10	x	1	x	x	11
10	0	0	x	x	10
11	x	0	0	x	00
11	X	1	1	X	11
11	X	0	1	X	01
11	X	1	0	X	01
00	0	X	1	X	00
00	0	X	0	X	11
00	1	X	1	X	11
00	1	X	0	X	01
01	X	X	0	0	00
01	X	X	1	X	10
01	X	X	X	1	10

2 c) Fill in the Karnaugh maps for the next states X^+ , Y^+ .

AB\CD	00	01	11	10
00	1	1	0	0
01	1	1	0	0
11	0	0	1	1
10	0	0	1	1

XY=00

AB\CD	00	01	11	10
00	0	1	1	1
01	0	1	1	1
11	0	1	1	1
10	0	1	1	1

XY=01

Maps for X^+

AB\CD	00	01	11	10
00	1	1	1	1
01	1	1	1	1
11	1	1	1	1
10	1	1	1	1

XY=10

AB\CD	00	01	11	10
00	0	0	0	0
01	0	0	1	1
11	0	0	1	1
10	0	0	0	0

XY=11

AB\CD	00	01	11	10
00	1	1	0	0
01	1	1	0	0
11	1	1	1	1
10	1	1	1	1

XY=00

AB\CD	00	01	11	10
00	0	0	0	0
01	0	0	0	0
11	0	0	0	0
10	0	0	0	0

XY=01

$\bar{C} + A$

Maps for Y^+

0

AB\CD	00	01	11	10
00	0	0	0	0
01	1	1	1	1
11	1	1	1	1
10	1	1	1	1

XY=10

$D + A$

AB\CD	00	01	11	10
00			1	1
01	1	1	1	1
11	1	1	1	1
10			1	1

XY=11

2 d) *If you need*, fill in the maps for each of D_X and D_Y .

AB\CD	00	01	11	10
00	1	1	0	0
01	1	1	0	0
11	0	0	1	1
10	0	0	1	1

XY=00

AB\CD	00	01	11	10
00	0	1	1	1
01	0	1	1	1
11	0	1	1	1
10	0	1	1	1

XY=01

Map for D_X

AB\CD	00	01	11	10
00	1	1	1	1
01	1	1	1	1
11	1	1	1	1
10	1	1	1	1

XY=10

AB\CD	00	01	11	10
00	0	0	0	0
01	0	0	1	1
11	0	0	1	1
10	0	0	0	0

XY=11

AB\CD	00	01	11	10
00	1	1	0	0
01	1	1	0	0
11	1	1	1	1
10	1	1	1	1

XY=00

AB\CD	00	01	11	10
00	0	0	0	0
01	0	0	0	0
11	0	0	0	0
10	0	0	0	0

XY=01

AB\CD	00	01	11	10
00	1	1	0	0
01	1	1	0	0
11	1	1	1	1
10	1	1	1	1

XY=10

AB\CD	00	01	11	10
00			1	1
01			1	1
11	1	1	1	1
10			1	1

XY=11

Map for D_Y

2 e) Determine the minimal sum-of-products equations for each of D_X and D_Y .

$$D_X = X\bar{Y} + YBC + \bar{X}Y\bar{C} + \bar{X}YC + \bar{Y}\bar{A}Z + \bar{Y}AC$$

$$D_Y = \bar{X}\bar{Y}\bar{C} + \bar{Y}A + X\bar{B} + XYC$$

2 f) Draw the circuit

