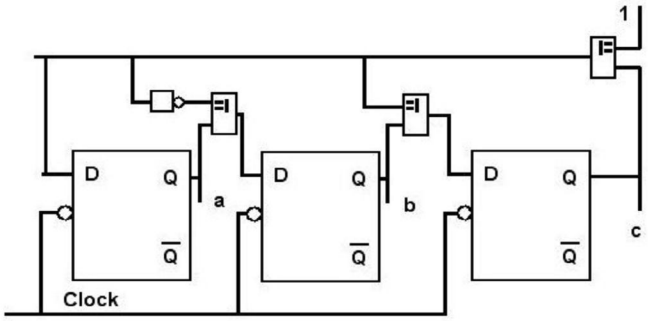
Digital Communication Test 3 – 24 October 2014

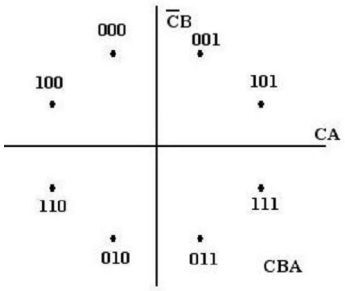
1 Find all outputs of the following PN generator (8)



2 The following code must be transmitted: 0 1 1
The PN code to be used is as follows 111 110 010 100 101 011 001 (cba)
A 3:1 ratio (PN:Data) and output value b is used. The resulting output is applied to a frequency hopping system with maximum frequency of 120 kHz and incremental steps of 2,5 kHz

(a) Show the waveform of the scrambler output.
(b) Give the table for the frequency hopping system.
(c) Draw the graph of the transmitted signal showing the frequency levels as well as the data at each level. (8)

3 Use the following table and constellation to find the results of the data transmitted by an 8PSK differential transmitter.
Data: (011) 011, 110, 111, 000 (6)



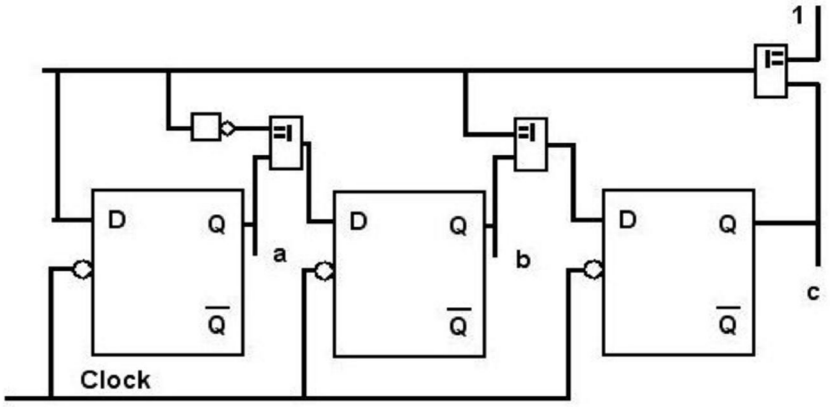
B/b	A/a	Phase
0	0	+90°
0	1	-90°
1	0	0°
1	1	180°

4 Data was received from a transmission system using standard RS232 principles. The data contains 2 start bits, 8 data bits, a parity bit and 2 stop bits.
The data is: F 8 A F E D 7 F 6 B 9 3 1
Determine the values of the start and stop bits, the type of parity used and the original word.
Show all calculations. Marks will not be given for answers not supported by calculations (6)

Paper total 30

Digital Communication Test 3 – 24 October 2014
Memorandum

1 Find all outputs of the following PN generator (8)



	1+c		/d	a+e		d+b						
Clock	d	a	e	f	b	g	c		c	b	a	
0	1	0	0	0	0	1	0		0	0	0	0
1	0	1	1	0	0	0	1		1	0	1	5
2	0	0	1	1	0	1	0		0	0	0	0

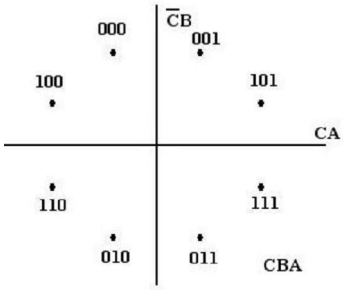
2 The following code must be transmitted: 0 1 1
The PN code to be used is as follows 111 110 010 100 101 011 001 (cba)
A 3:1 ratio (PN:Data) and output value b is used. The resulting output is applied to a frequency hopping system with maximum frequency of 120 kHz and incremental steps of 2,5 kHz

(a) Show the waveform of the scrambler output.
(b) Give the table for the frequency hopping system.
(c) Draw the graph of the transmitted signal showing the frequency levels as well as the data at each level. (8)

Digital Communication Test 3 – 24 October 2014

Data	0			1			1			
PN(b)	1	1	1	0	0	1	0	1	1	
out	1	1	1	1	1	0	1	0	0	
	π	π	π	π	π	0	π	0	0	
120,0										000
117,5				π						001
115,0			π							010
112,5		π							0	011
110,0							π			100
107,5					π					101
105,0						0				110
102,5	π							0		111
	111	110	010	100	101	011	001	111	110	
	111	011	010	001	101	110	100	111	011	

3 Use the following table and constellation to find the results of the data transmitted by an 8PSK differential transmitter.
Data: (011) 011, 110, 111, 000 (6)



B/b	A/a	Phase
0	0	+90°
0	1	-90°
1	0	0°
1	1	180°

PRESENT	NEXT	PHASE	OUTPUT
011 √ (4)	011 (4)	**0°**	**010** √
010 (3)	110 (3)	**0°**	**110** √
110 (3)	111 (4)	**-90°**	**101** √
101 (1)	000 (2)	**+90°**	**000** √

Digital Communication Test 3 – 24 October 2014

4 Data was received from a transmission system using standard RS232 principles. The data contains 2 start bits, 8 data bits, a parity bit and 2 stop bits.
The data is: F 8 A F E D 7 F 6 B 9 3 1
Determine the values of the start and stop bits, the type of parity used and the original word.
Show all calculations. Marks will not be given for answers not supported by calculations **(6)**

F				8				A				F				E				D			
1	**1**	1	1	1	0	0	0	1	0	1	0	1	**1**	**1**	1	1	1	1	0	1	1	0	1
strt		Data 1						P	stp			**strt**				Data 2				P			

7				F				6				B				9				3			
0	1	**1**	**1**	1	1	1	1	0	1	1	0	1	0	1	**1**	**1**	0	0	1	0	0	1	1
stp		**strt**		Data 3				P	stp			**strt**				Data 4							

1			
0	0	0	1
	P	stp	

Start bits = 11 √ Correct Hex to Binary √ Stop bits = 01 √
Correct separation of data √ Parity type = ODD √
Character 1 = 0100 0111 = G
Character 2 = 0110 1111 = o
Character 3 = 0110 1111 = o
Character 4 = 0110 0100 = d
Word is **Good** √

Paper total 30