

Scilab Manual for
Communication Systems
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List of Experiments

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Experiment: 1

Digital Modulation Schemes- ASK, PSK, FSK

Scilab code Solution 1.1 Digital Modulation Schemes

```
1 //Caption:Waveforms of Different Digital Modulation
   techniques
2 //Digital Modulation Techniques
3 //To Plot the ASK, FSK and PSk Waveforms
4 clear;
5 clc;
6 close;
7 f = input('Enter the Analog Carrier Frequency in Hz'
   );
8 t = 0:1/512:1;
9 x = sin(2*%pi*f*t);
10 I = input('Enter the digital binary data');
11 //Generation of ASK Waveform
12 Xask = [];
13 for n = 1:length(I)
14     if((I(n)==1)&(n==1))
15         Xask = [x,Xask];
16     elseif((I(n)==0)&(n==1))
17         Xask = [zeros(1,length(x)),Xask];
```

```

18     elseif((I(n)==1)&(n~=1))
19         Xask = [Xask,x];
20     elseif((I(n)==0)&(n~=1))
21         Xask = [Xask,zeros(1,length(x))];
22     end
23 end
24 // Generation of FSK Waveform
25 Xfsk = [];
26 x1 = sin(2*%pi*f*t);
27 x2 = sin(2*%pi*(2*f)*t);
28 for n = 1:length(I)
29     if (I(n)==1)
30         Xfsk = [Xfsk,x2];
31     elseif (I(n)~=1)
32         Xfsk = [Xfsk,x1];
33     end
34 end
35 // Generation of PSK Waveform
36 Xpsk = [];
37 x1 = sin(2*%pi*f*t);
38 x2 = -sin(2*%pi*f*t);
39 for n = 1:length(I)
40     if (I(n)==1)
41         Xpsk = [Xpsk,x1];
42     elseif (I(n)~=1)
43         Xpsk = [Xpsk,x2];
44     end
45 end
46 figure
47 plot(t,x)
48 xtitle('Analog Carrier Signal for Digital Modulation
         ')
49 xgrid
50 figure
51 plot(Xask)
52 xtitle('Amplitude Shift Keying')
53 xgrid
54 figure

```

```
55 plot(Xfsk)
56 xtitle('Frequency Shift Keying')
57 xgrid
58 figure
59 plot(Xpsk)
60 xtitle('Phase Shift Keying')
61 xgrid
62 //Example
63 //Enter the Analog Carrier Frequency 2
64 //Enter the digital binary data[0,1,1,0,1,0,0,1]
```

Experiment: 2

Error Control Coding

Scilab code Solution 2.1 Convolutional Coding Technique

```
1 //Caption: Convolutional Code Generation
2 //Time Domain Approach
3 clear;
4 close;
5 clc;
6 g1 = input('Enter the input Top Adder Sequence:=')
7 g2 = input('Enter the input Bottom Adder Sequence:=')
8 m = input('Enter the message sequence:=')
9 x1 = round(convol(g1,m));
10 x2 = round(convol(g2,m));
11 x1 = modulo(x1,2);
12 x2 = modulo(x2,2);
13 N = length(x1);
14 for i =1:length(x1)
15     x(i,:) =[x1(N-i+1),x2(N-i+1)];
16 end
17 x = string(x)
18 disp(x, 'x=')
19 //Result
20 //Enter the input Top Adder Sequence:=[1,1,1]
```

```

21 //Enter the input Bottom Adder Sequence:=[1,0,1]
22 //Enter the message sequence:=[1,1,0,0,1]
23 //x =
24 //!1  1  !
25 //!           !
26 //!1  0  !
27 //!           !
28 //!1  1  !
29 //!           !
30 //!1  1  !
31 //!           !
32 //!0  1  !
33 //!           !
34 //!0  1  !
35 //!           !
36 //!1  1  !

```

check Appendix [AP 1](#) for dependency:

`xor.sce`

Scilab code Solution 2.2 Hamming Error Control Technique

```

1 //Caption:Hamming Encoding
2 //H(7,4)
3 //Code Word Length = 7, Message Word length = 4,
   Parity bits =3
4 //clear;
5 close;
6 clc;
7 //Getting Message Word
8 m3 = input('Enter the 1 bit (MSb) of message word');
9 m2 = input('Enter the 2 bit of message word');
10 m1 = input('Enter the 3 bit of message word');
11 m0 = input('Enter the 4 bit (LSb) of message word');
12 //Generating Parity bits

```

```

13 for i = 1:(2^4)
14     b2(i) = xor(m0(i),xor(m3(i),m1(i)));
15     b1(i) = xor(m1(i),xor(m2(i),m3(i)));
16     b0(i) = xor(m0(i),xor(m1(i),m2(i)));
17     m(i,:) = [m3(i) m2(i) m1(i) m0(i)];
18     b(i,:) = [b2(i) b1(i) b0(i)];
19 end
20 C = [b m];
21 disp('
-----
')
22 for i = 1:2^4
23     disp(i)
24     disp(m(i,:), 'Message Word')
25     disp(b(i,:), 'Parity Bits ')
26     disp(C(i,:), 'CodeWord')
27     disp(" ");
28     disp(" ");
29 end
30 disp('
-----
')
31 //Input
32 //Enter the 1 bit(MSb) of message word
    [0,0,0,0,0,0,0,0,1,1,1,1,1,1,1,1];
33 //Enter the 2 bit of message word
    [0,0,0,0,1,1,1,1,0,0,0,0,1,1,1,1];
34 //Enter the 3 bit of message word
    [0,0,1,1,0,0,1,1,0,0,1,1,0,0,1,1];
35 //Enter the 4 bit(LSb) of message word
    [0,1,0,1,0,1,0,1,0,1,0,1,0,1,0,1];
36 //Output Result
37 //Message Word
38 //     0.     0.     0.     0.
39 // Parity Bits
40 //     0.     0.     0.
41 // CodeWord
42 //     0.     0.     0.     0.     0.     0.     0.

```

```

43 // // 2.
44 // Message Word
45 // 0. 0. 0. 1.
46 // Parity Bits
47 // 1. 0. 1.
48 // CodeWord
49 // 1. 0. 1. 0. 0. 0. 1.
50 // // 3.
51 // Message Word
52 // 0. 0. 1. 0.
53 // Parity Bits
54 // 1. 1. 1.
55 // CodeWord
56 // 1. 1. 1. 0. 0. 1. 0.
57 // // 4.
58 // Message Word
59 // 0. 0. 1. 1.
60 // Parity Bits
61 // 0. 1. 0.
62 // CodeWord
63 // 0. 1. 0. 0. 0. 1. 1.
64 // // 5.
65 // Message Word
66 // 0. 1. 0. 0.
67 // Parity Bits
68 // 0. 1. 1.
69 // CodeWord
70 // 0. 1. 1. 0. 1. 0. 0.
71 // // 6.
72 // Message Word
73 // 0. 1. 0. 1.
74 // Parity Bits
75 // 1. 1. 0.
76 // CodeWord
77 // 1. 1. 0. 0. 1. 0. 1.
78 // // 7.
79 // Message Word
80 // 0. 1. 1. 0.

```

```

81 // Parity Bits
82 // 1. 0. 0.
83 // CodeWord
84 // 1. 0. 0. 0. 1. 1. 0.
85 // // 8.
86 // Message Word
87 // 0. 1. 1. 1.
88 // Parity Bits
89 // 0. 0. 1.
90 // CodeWord
91 // 0. 0. 1. 0. 1. 1. 1.
92 // // 9.
93 // Message Word
94 // 1. 0. 0. 0.
95 // Parity Bits
96 // 1. 1. 0.
97 // CodeWord
98 // 1. 1. 0. 1. 0. 0. 0.
99 // // 10.
100 // Message Word
101 // 1. 0. 0. 1.
102 // Parity Bits
103 // 0. 1. 1.
104 // CodeWord
105 // 0. 1. 1. 1. 0. 0. 1.
106 // // 11.
107 // Message Word
108 // 1. 0. 1. 0.
109 // Parity Bits
110 // 0. 0. 1.
111 // CodeWord
112 // 0. 0. 1. 1. 0. 1. 0.
113 // // 12.
114 // Message Word
115 // 1. 0. 1. 1.
116 // Parity Bits
117 // 1. 0. 0.
118 // CodeWord

```

119	//	1.	0.	0.	1.	0.	1.	1.
120	//	//	13.					
121	//	Message	Word					
122	//	1.	1.	0.	0.			
123	//	Parity	Bits					
124	//	1.	0.	1.				
125	//	CodeWord						
126	//	1.	0.	1.	1.	1.	0.	0.
127	//	//	14.					
128	//	Message	Word					
129	//	1.	1.	0.	1.			
130	//	Parity	Bits					
131	//	0.	0.	0.				
132	//	CodeWord						
133	//	0.	0.	0.	1.	1.	0.	1.
134	//	//	15.					
135	//	Message	Word					
136	//	1.	1.	1.	0.			
137	//	Parity	Bits					
138	//	0.	1.	0.				
139	//	CodeWord						
140	//	0.	1.	0.	1.	1.	1.	0.
141	//	//	16.					
142	//	Message	Word					
143	//	1.	1.	1.	1.			
144	//	Parity	Bits					
145	//	1.	1.	1.				
146	//	CodeWord						
147	//	1.	1.	1.	1.	1.	1.	1.

Appendix

```
Scilab code AP 11 function [value]=xor(A, B)
2   if(A==B)
3       value = 0;
4   else
5       value = 1;
6   end
7 endfunction
```

xor logic function
