

Scilab Manual for  
Communication Systems  
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<http://spoken-tutorial.org/NMEICT-Intro>. This Scilab Manual and Scilab codes  
written in it can be downloaded from the "Migrated Labs" section at the website  
<http://scilab.in>



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# Experiment: 1

## Digital Modulation Scemes- 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,
4 //Parity bits =3
5 //clear;
6 close;
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(:, :) = [m3(i) m2(i) m1(i) m0(i)];
18     b(:, :) = [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(:, :), 'Message Word')
25     disp(b(:, :), 'Parity Bits')
26     disp(C(:, :), 'CodeWord')
27     disp("    ");
28     disp("    ");
29 end
30 disp('
-----')
31 //Input
32 //Enter the 1 bit(MSb) of message word
33 //          [0,0,0,0,0,0,0,1,1,1,1,1,1,1];
34 //Enter the 2 bit of message word
35 //          [0,0,0,0,1,1,1,0,0,0,0,1,1,1];
36 //Enter the 3 bit of message word
37 //          [0,0,1,1,0,0,1,1,0,0,1,0,0,1];
38 //Enter the 4 bit(LSb) of message word
39 //          [0,1,0,1,0,1,0,1,0,1,0,1,0,1];
40 //Output Result
41 //Message Word
42 //          0.      0.      0.      0.
43 // Parity Bits
44 //          0.      0.      0.
45 // CodeWord
46 //          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. 1.
50 // //
51 // 3.
52 // Message Word
53 // 0. 0. 1. 0.
54 // Parity Bits
55 // 1. 1. 1.
56 // CodeWord
57 // 1. 1. 1. 0. 1. 0.
58 // //
59 // 4.
60 // Message Word
61 // 0. 0. 1. 1.
62 // Parity Bits
63 // 0. 1. 0. 0. 0. 1. 1.
64 // //
65 // 5.
66 // Message Word
67 // 0. 1. 0. 0.
68 // Parity Bits
69 // 0. 1. 1.
70 // CodeWord
71 // 0. 1. 1. 0. 1. 0. 0.
72 // //
73 // 6.
74 // Message Word
75 // 0. 1. 0. 1.
76 // Parity Bits
77 // 1. 1. 0. 0. 1. 0. 1.
78 // //
79 // 7.
80 // Message Word
81 // 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.

```

---

# 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