Scilab Manual for Communication Systems by Prof R.Senthilkumar, Assistant Professor Electronics Engineering Institute of Road and Transport Technology[1]

Solutions provided by
Mr R.Senthilkumar, Assistant Professor
Electronics Engineering
Institute of Road and Transport Technology

November 20, 2026

[1]Funded by a grant from the National Mission on Education through ICT, 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

Contents

List of Scilab Solutions 3

1 Digital Modulation Scemes- ASK, PSK, FSK 4

2 Error Control Coding 7

List of Experiments

Solution 1.1	Digital Modulation Schemes	4
Solution 2.1	Convolutional Coding Technique	7
Solution 2.2	Hamming Error Control Technique	8
AP 1	xor logic function	13

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,
      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
```

```
for i = 1:(2^4)
  b2(i) = xor(m0(i),xor(m3(i),m1(i)));
  b1(i) = xor(m1(i),xor(m2(i),m3(i)));
  b0(i) = xor(m0(i),xor(m1(i),m2(i)));
  m(i,:) = [m3(i) m2(i) m1(i) m0(i)];
  b(i,:) = [b2(i) b1(i) b0(i)];
end
C = [b m];
disp('
    ------------------------------------------------------------
    ')
for i = 1:2^4
  disp(i)
  disp(m(i,:),'Message Word')
  disp(b(i,:),'Parity Bits')
  disp(C(i,:),'CodeWord')
  disp("   ");
  disp("   ");
end
disp('
    ------------------------------------------------------------
    ')
//Input
//Enter the 1 bit(MSb) of message word
   [0,0,0,0,0,0,0,0,1,1,1,1,1,1,1,1];
//Enter the 2 bit of message word
   [0,0,0,0,1,1,1,1,0,0,0,0,1,1,1,1];
//Enter the 3 bit of message word
   [0,0,1,1,0,0,1,1,0,0,1,1,0,0,1,1];
//Enter the 4 bit(LSb) of message word
   [0,1,0,1,0,1,0,1,0,1,0,1,0,1,0,1];
//Output Result
//Message Word
//      0.     0.     0.     0.
// Parity Bits
//      0.     0.     0.
// CodeWord
//      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 1

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

xor logic function