ENGINEERING & MANAGEMENT EXAMINATIONS, JUNE – 2008

PRINCIPLES OF COMMUNICATION ENGINEERING

SEMESTER – 4

Time : 3 Hours] [Full Marks : 70

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$

i) A broadcast radio transmitter radiates 20 kW when the modulation percentage is 60. The carrier power will be

a) 1.2 kW b) 1.45 kW

c) 16.94 kW d) 20 kW. ☐

ii) In TV system, picture and sound respectively use

a) AM, FM b) FM, FM

c) FM, AM d) AM, AM. ☐

iii) In a narrow band FM the highest modulating frequency is fm. The bandwidth of the system will be

a) 6fm b) fm

c) 2fm d) 10fm. ☐

iv) Recovering information from a carrier is known as

a) demultiplexing b) modulation

c) detection d) carrier recovery. ☐

v) In an envelope detector for AM signal

a) only diode is used

b) only capacitor is used

c) only diode and capacitor are used

d) only inductor and capacitor are used. ☐

vi) Indicate which of the following modulation is analog

a) PCM b) Differential PCM
c) PAM d) Delta Modulation. ☐

vii) The bandwidth required for transmitting a 4 kHz signal using PCM with 128 quantization levels is

a) 8 kHz b) 16 kHz
c) 28 kHz d) 32 kHz. ☐

viii) The sampling frequency f_s, must be (B = bandwidth)

a) equal to B b) greater than B
c) greater than $2B$ d) must lie between B and $2B$. ☐

ix) PWM signal can be generated by

a) a monostable multi-vibrator
b) a astable multi-vibrator
c) integrating the PPM signal
d) differentiating the PPM signal. ☐

x) Quantization noise occurs in

a) TDM b) FDM
c) PCM d) PWM. ☐

xi) For global communication, the number of satellites needed is

a) 1 b) 3
c) 5 d) 7. ☐

xii) Entropy is basically a measure of

a) rate of information b) average information
c) probability of information d) disorder of information. ☐

xiii) The IF used for a superhet, receiver is

a) 455 kHz
b) 455 MHz
c) 910 kHz
d) f_c + 455 kHz
where f_c = carrier frequency. ☐

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. a) Explain briefly, why modulation is needed in communication system. 2

   b) Draw the spectrum of (i) DSB – SC (AM), (ii) SSB signal (iii) VSB signal. 3

3. Briefly explain FM demodulation scheme using PLL.

4. a) Explain what you understand by the term 'Aliasing'. 1

   b) To avoid aliasing, find the Nyquist rate of the signal $x(t) = 8 \cos 200 \pi t$. 2

   c) Encode the bit sequence 1011011 in the NRZ-polar and RZ-bipolar format. 2

5. Distinguish between ASK, FSK and PSK in terms of their performances. 5

6. Draw a diagram of A/D converter and explain its working principle. 5

7. Draw the block diagram of a satellite transponder and briefly explain the role of each block. 5

GROUP – C

(Long Answer Type Questions)

Answer any *three* questions. $3 \times 15 = 45$

8. a) 'FM and PM are basically same' — comment on the statement and justify. 3

   b) Give a block diagram of WBFM modulation for practical use (Armstrong method). Explain the principle of working. 6

   c) Define 'selectivity' and 'sensitivity' of a receiver. A superheterodyne receiver is tuned to a signal frequency of 655 kHz. The LO frequency is 1110 kHz. Find the image frequency. 3 + 3

9. a) Discuss the relative advantages and disadvantages of 'digital communication' over 'analog communication'. 3

   b) Explain briefly with block diagrams the generation and detection processes of PCM. 5

   c) A telephone signal has a maximum frequency of 4 kHz. It is limited in voltage between ± 1V. It is transmitted by using PCM. The required signal-to-quantization noise ratio is 40 dB. What is the minimum bandwidth required for transmission ? 7

10. a) Explain the principle of detection of FM signal using balanced slope detector circuit with proper sketch. 6

b) What is Carson's rule ? 2

c) Derive an expression for the signal to noise ratio of DSB-SC systems. 7

11. a) Discuss the generation of time division multiplexed PAM signal. 4

b) Write the advantages and disadvantages of TDM over FDM. 3

c) With the help of block diagram, explain the working principles of coherent FSK generation and detection. 5

d) What is DPSK ? Write down the DPSK format for bit pattern 1011011 considering initial bit to be 1. 3

12. a) Derive Hartley-Shanon Law. 4

b) Explain how a single bit error differs from burst error. 3

c) Discuss the purpose of Huffman encoding. 2

d) Represent the block code in Matrix form. 6

13. Write short notes on any *three* of the following : 15

a) Reactance Modulator

b) Foster-Seeley Discriminator

c) Pre-emphasis and De-emphasis

d) MODEM

e) Ring Modulator.

END