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Sardar Patel University

24th October, 2018

M.Sc. (Electronics) 3rd Semester Examination-2018

PS03CELE22: Digital and Microwave Communication Systems

Total Marks 70

Time: **2.30 to 05.30 PM**

Q.1 Give the correct/nearest answer (statement) for the following Multiple Choice Questions (Statements)

8 X 1 = 8 Marks

A. Which code is used in Baudot system?
1. Five unit
2. Seven unit
3. Morse
4. ASCII

B. Which of the following is common between earth and a geostationary satellite
1. Same acceleration
2. Same velocity
3. Same angular velocity
4, Same gravitational force

C. Phase Shift Keying refers to
1. Keying of phase values to the carrier
2. Shifting phase of digital message according to carrier
3. Shifting phase of carrier between two levels according to digital message
4. Phase modulation of digital carrier

D. The Shanon- Hartley law
1. refers to distortion
2. defines bandwidth
3. describes signaling rate
4. refers to noise

E. Noise figure is used as figure of merit of
1. Isolator
2. amplifier
3. modulator
.4 oscillator

F. The sampling frequency should be
1. less than or equal to maximum frequency of message signal
2. more than or equal to maximum frequency of message signal
3. equal to average frequency of message signal
4. more than or equal to twice the maximum frequency of message signal

G. The signal to quantization noise ratio in an n-bit PCM system
1. depends upon the sampling frequency employed
2. is independent of the value of 'n'
3. increases with the increasing value of 'n'
4. decreases with the increasing value of 'n'

(1)

(P T o)

H. A balanced modulator is used mainly
1.   to limit noise picked by a receiver
2.   to suppress carrier signal in order to create a single-sideband or double side band
3.   to produce balance modulation of a carrier wave
4.   to produce 100 percent modulation

Q.2 **Short Questions (Any Seven)**   7 X 2 = 14 Marks

1.   Explain M-ary.
2.   Define coherent demodulator.
3.   What is the purpose of clock recovery circuit? When is it used?
4.   Explain the difference between two-wire and four-wire operation.
5.   Explain quantizing.
6.   What is the role of parity in data communication code?
7.   What does the parameter μ determine.
8.   Define receiver threshold.
9.   Define look angles, angle of elevation and azimuth.

Long Questions: 12 X 4 = 48 Marks

Q.3 (a)) Explain the principle and operation of Eight Quadrature Amplitude   (6)
     Modulator (8QAM) using a block diagram and phasor diagram .
     (b) Discuss the importance of QAM over QPSK technique.   (6)
                              OR
     (b) Explain quantization of analog signals for Pulse Code Modulation   (6)
     (PCM) system. Discuss the Signal-to- Noise ratio or Signal to-quantization noise
     ratio (SQR) for linear PCM codes.

Q.4 (a). What is the need of multiplexing? Explain what do you mean by Companding? (6)
     Discuss how 12-bit PCM code is compressed before transmission and expanded at
     the receiver in a digitally companded PCM system.

     (b) A PCM/TDM system multiples 24 voice band channels. Each sample is encoded (6)
     into 7-bits and a framing bit is added to each frame. The sampling rate is 9000
     samples/second. Determine the line speed in bits per second.
                              OR
     (b)) Determine Block Check Sequence(BCS) for the following data and   (6)
     CRC- generating polynomial.

$$G(X) = x^7 + x^4 + x^2 + x^0 = 10010101$$
$$\text{and } P(X) = x^5 + x^4 + x^1 + x^0 = 110011$$

Q.5 (a)Describe the baseband signal for a microwave system. Contrast baseband and IF (6)
     repeater. Explain why changing down to an intermediate frequency takes place in
     a microwave repeater.

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(b)　Explain with respect to a microwave communication　　(6)
        (i)　System Gain
        (ii)　Fade Margin
        (iii)　Free Space Path Loss.

OR

(b) If the noise figure of a device [in microwave communication system] is　　(6)
NF show that its equivalent noise temperature T_e is given by

$T_e = T(NF-1)$

where T is the equivalent temperature in K.

Q.6　(a) Briefly explain the characteristics of low-, medium- and high – altitude satellite　　(6)
orbits.　Contrast the advantages and disadvantages of geosynchronous satellites.
Explain what is meant by saying that a satellite is " Stationary"?

(b)　Briefly describe the functional characteristics of an up-link, a transponder and　　(6)
a down-link model for a satellite system.

OR

(b)　What do you mean by mobile communication?　What indicates　　(6)
SIM?　Explain the concept of frequency reuse and cell splitting in
mobile communication system.

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