Name : ....

Roll No. : ....

Invigilator's Signature : ....

CS/B.TECH (EE-NEW/OLD)/SEM-8/EE-802A/EC-802C (O)/2011

2011
COMMUNICATION ENGINEERING

Time Allotted : 3 Hours   *Full Marks* : 70

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

GROUP – A
(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following :

    $10 \times 1 = 10$

    i)   A signal $g(t)$ delayed by T second is represented by

         a) $g(t - T)$ b) $g(t + T)$

         c) $g(T - t)$ d) $g(-T - t)$.

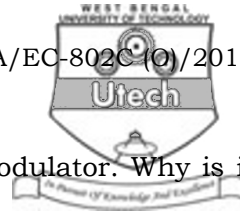   ii) Which modulation scheme is used in television
         broadcasting ?

         a)   AM   b)   DSB-SC

         c)   SSB   d)   VSB.

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iii) The ideal value of bandwidth of a WBFM is

a)   0

b)   infinity

c)   1

d)   twice the message signal bandwidth.

iv) If the modulation index of an AM wave is changed from 0 to 1, the transmitted power is

a)   unchanged   b)   halved

c)   doubled   d)   increased by 50%.

v) In order to reduce quantizing noise one must

a)   increase the no. of shandard amplitudes

b)   send pulses whose sides are more nearly vertical

c)   use an RF amplifier in the receiver

d)   increase the no. of samples per second.

vi) The biggest disadvantage of PCM is

a)   its inability to handle analog signals

b)   the high error rate which its quantizing noise introduces

c)   its incompatibility with TDM

d)   the large bandwidth that is required for it.

vii) Time division multiplexing requires

    a) constant data transmission

    b) transmission of data samples

    c) transmission of data at random

    d) transmission of data of only one measurand.

viii) Population inversion is a property found in

    a) LASER   b) photodiode

    c) FET   d) LED.

ix) Which of the following statements is true in case of satellite communication ?

    a) Uplink frequency is equal to downlink frequency

    b) Uplink frequency is greater than downlink frequency

    c) Uplink frequency is less than downlink frequency

    d) None of these.

x) Principle of propagation through optical fibre is

    a) Total internal reflection

    b) Total internal refraction

    c) Total internal dispersion

    d) Total internal polarization.

xi) Thermal noise power in a resistor R is proportional to

    a)   T   b) T^2

    c) $1/T$ d) T^3.

xii) The channel capacity of a white channel is given by

    a) $C = B \log_2 (1 + C/n)$ b/s

    b) $C = B \log_2 (1 + N/S)$ b/s

    c) $N \log_2 (1 + N^2/S^2)$ b/s

    d) $C = n B \log_2 (1 + S/N)$ b/s.

GROUP – B

(Short Answer Type Questions)

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

2. Draw the corresponding PAM, PWM, PPM signal waveform with reference to an arbitrary message signal waveform.

                                           2 + 1 + 2

3. How does PLL work as an FM demodulator ?   5

4. Define and explain the term "Channel Capacity". Calculate the capacity of a channel with bandwidth 2900 Hz and signal to noise ratio of 316.2.   2 + 3

5. Explain the working principle of a ring modulator. Why is it called double balanced modulator ? 4 + 1

6. Define the following terms : 5 × 1

 i) Code word (ii) code rate (iii) code vectors (iv) Hamming distance (v) Minimum distance in context to error in communication system.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) Explain how a non-linear device can be used for generation of AM signal. 5

 b) Discuss how an SSB-SC wave can be generated using phase shift method. 5

 c) An AM broadcast transmitter radiates 10 kW of power if modulation percentage is 60. Calculate how much of this is carrier power, depth of modulation and side band power. 5

8. a) With the help of Block diagram, explain the Armstrong indirect FM transmitter. 6

b) How can you produce FM using PM modulator and PM using FM modulator ? 4

c) How PLL is used to demodulate FM ? 5

9. a) Draw the block diagram of a simple superheterodyne receiver and explain its principle. 7

b) A single-tone AM wave has a modulation index of 80%. What is the saving in power if a carrier and one of the sidebands are suppressed ? 4

c) Define the Carson's rule for FM bandwidth. An FM wave modulated to a depth of 8, generates a signal of BW of 180 kHz. Find the frequency deviation. 4

10. a) Explain the working principle of a QPSK system (both transmitter and receiver). 8

b) Compare ASK, FSK and PSK. 5

c) What is the advantage of QPSK over BPSK ? 2

11. Write short notes on any three of the following : 3×5

    a) Adaptive Delta Modulation.

    b) PSK

    c) Synchronization in TDM.

    d) MEO and LEO satellites.

    e) Pulse Modulation (PAM, PWM & PPM).

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