Roll No. ☐☐☐☐☐☐☐☐☐☐☐   **Total No. of Pages : 02**

Total No. of Questions : 09

B.Tech.(EE)/(Electrical & Electronics) (2011 Onwards E-I)
(Sem.–6)
PRINCIPLES OF COMMUNICATION SYSTEMS
Subject Code : BTEE-605E
Paper ID : [A2343]

Time : 3 Hrs.   **Max. Marks : 60**

INSTRUCTION TO CANDIDATES :
1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

Q1. Answer briefly :

a) Explain the need of modulation.

b) What is a band limited signal?

c) What is angle modulation?

d) Explain the difference between wideband and narrow band FM.

e) Given an angle-modulated signal $x(t) = 10\cos[10^8\pi t + 5\sin 2\pi \times 10^3 t]$. Determine the maximum phase deviation.

f) State Carson's rule of FM modulation.

g) Define Nyquist rate.

h) What is quantization error?

i) Why local oscillator frequency is always higher than the signal frequency?

j) Sketch the FM and PM wave of the given modulating wave m(t). The constant k_f and k_p are 2×10^5 and $\pi/2$, respectively and $f_c = 100$MHz.

$$m(t)$$

1

−1

99.9 MHz   100.1 MHz

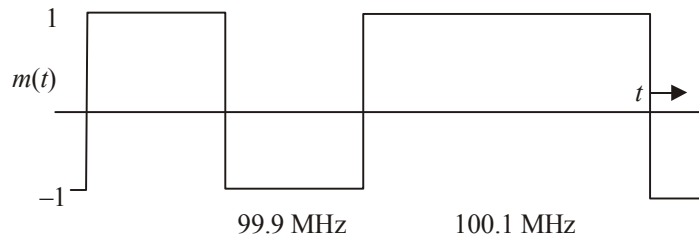## SECTION-B

Q2. Explain with help of circuit diagram how delayed AGC can be realized. What are its merits over simple AGC?

Q3. Explain the working of balanced slope detector. Discuss its characteristics. What are its limitations?

Q4. What are the drawbacks in delta modulation and how they are overcome in adaptive delta modulation? Explain with the help of neat diagram.

O5. Explain the working of a PCM system with neat block diagram.

Q6. An amplitude modulated signal is given by :

$\varphi_{AM} = 10\cos(2\pi \times 10^6 t) + 5\cos(2\pi \times 10^6 t)\cos(2\pi \times 10^3 t) + 2\cos(2\pi \times 10^6 t)\cos(2\pi \times 10^3 t)$ volts. Find the various frequency components present and corresponding modulation indices. Draw the line spectrum and find the bandwidth.

SECTION-C

Q7. Explain the working of phase discriminator circuit with the help of block diagram and phasor diagrams. Prove that the phase discriminator is an FM demodulator.

Q8. A television signal (video and audio) has a bandwidth of 4.5MHz. This signal is sampled, quantized, and binary coded to obtain a PCM signal.

a) Determine the sampling rate if the signal is sampled at a rate 20% above the Nyquist rate.

b) If the samples are quantized into 1024 levels, determine the number of binary pulses required to encode each sample.

c) Determine the binary pulse rate (bits per seconds) of the binary-coded signal, and the minimum bandwidth required to transmit the signal.

Q9. Write a short note on :

a) Frequency division multiplexing (FDM).

b) Quadrature null effect.