Registration No. : | | | | | | | | | | |

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B. Tech

PCEE 4304

Sixth Semester Regular Examination – 2015

COMMUNICATION ENGINEERING

BRANCH : EEE

QUESTION CODE : J 206

Full Marks – 70

Time : 3 Hours

*Answer Question No. **1** which is compulsory and any **five** from the rest.*
The figures in the right-hand margin indicate marks.

1. Answer the following questions : 2×10

(a) Give the frequency range of standard AM and FM broadcast transmission.

(b) Suggest a suitable circuit to generate high level modulation.

(c) Suggest a suitable circuit to act as a slope detector. Explain in two/three sentences how does it detect.

(d) What is a line spectrum ? Will a TV signal show such a spectrum ? Justify.

(e) Explain two roles of the RF amplifier found in a superheterodyne receiver. .

(f) Is a zero crossing detector suitable for demodulating an AM signal ? Explain.

(g) What are the advantages of PWM, PPM modulations ?

(h) The frequency of a local oscillator is usually higher than that of the incoming signal. Why ? Give examples.

(i) Derive Poisson's formula.

(j) Which sampling is used in practice ? Justify.

2. (a) Discuss the chopper type of modulators with the help of neat sketches. Derive suitable expressions for the output of such a circuit. 5

(b) Discuss the use of a chopper modulator as a demodulator. Derive the necessary expressions for the output of such a circuit. 5

3. A 100Hz pulse train forms the input to the RC filter. The output of the filter is sampled at 700 samples per second. Find the aliasing error. 10

4. A message signal $m(t) = 10 \sin c(400t)$ phase modulates a carrier $100 \cos 2\pi f_c t$. The modulation index is 6. Write down

(i) an expression for the modulated signal,

(ii) the maximum frequency deviation of the modulated signal,

(iii) the power content and

(iv) the bandwidth of the modulated signal. 10

5. (a) Is SSB suitable for modulating data type of signals ? Justify by deriving appropriate expressions and drawing proper diagrams. 6

(b) Prove that AM is a kind of linear system. 4

6. (a) Discuss an FM radio receiver with a neat block diagram. Where do you use a low pass filter in this receiver ? 5

(b) Discuss the principle and working of a ratio detector circuit with the help of appropriate sketches. 5

7. (a) A TDM system is used to multiplex four signals $m_1(t) = \cos\omega_0 t$, $m_2(t) = 0.5 \cos\omega_0 t$, $m_3(t) = 2 \cos 2\omega_0 t$ and $m_1(t) = \cos 4\omega_0 t$.

(i) Calculate the minimum sampling rate if each signal is sampled at the minimum sampling rate,

(ii) What is the commutator speed in RPS ? 4

(b) Design a suitable commutator that allows each of the four signals to be sampled at a faster rate to satisfy the Nyquist criterion for the individual signal. 6

8. Write short notes on any **two** of the following : 5×2

(a) Low level modulators

(b) Fourier transform of a unit step function

(c) PWM/PPM generators

(d) Line codes.