Total number of printed pages – 3

B. Tech

PCEE 4304

Sixth Semester Regular Examination – 2014

COMMUNICATION ENGINEERING

BRANCH(S) : CSE, IT

QUESTION CODE : F 323

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) Bring out four essential features of an analog communication system.

    (b) Give standard radio broadcast frequency band. Why is this band used for broadcast ?

    (c) Sketch the power spectrum of $\text{rect}(t/T)\cos 4\pi\times10^{6}t$.

    (d) Give the Fourier spectrum of $2x\left(\dfrac{t}{2}-5\right)$ if $x(t) \leftrightarrow X(f)$.

    (e) How is an SSB-SC signal demodulated ? What is its advantage ?

    (f) Write down two important advantages of a superheterodyne receiver.

    (g) Can you ever realize a noiseless channel ? Justify.

    (h) The signal $x(t) = \sin c(f_{0}t)$ is limited in which domain ? Justify.

P.T.O.

(i) What is a line code ? Give two examples.

(j) Why is the logarithmic measure adopted for companding ?

2. (a) Find the Fourier transform of $x(t) = \begin{cases} \cos \pi t; & -\dfrac{1}{2} \le t \le \dfrac{1}{2} \\ 0 & \text{elsewhere} \end{cases}$ 5

(b) Find x(t) if the corresponding $X(f) = \dfrac{j2\pi f}{\left(1+j2\pi f\right)^2}$ 5

3. (a) A sinusoidal carrier of signal 5 V peak amplitude and 100 Hz frequency is amplitude modulated by a 5 KHz signal of peak amplitude 3V. What is the modulation index ? Sketch the two-sided spectrum of the modulated signal. Give also the expression for the modulated signal.   1+3+1

(b) Determine the power contained in the above modulated signal by deriving the necessary expression for it.   2+3

4. (a) What are the eigen values of a frequency modulated signal ? Discuss with the help of necessary expressions and diagrams.   1+5

(b) Discuss Armstrong's method of FM generation.   4

5. (a) Discuss frequency-to-amplitude conversion. Give the transfer function of a circuit capable of doing this.   4+1

(b) Discuss a Foster-Seely discriminator with the help of appropriate diagrams. Explain the function of each component clearly.   5

6. (a) Derive the transfer function of the reconstruction filter used to recover the message signal from its samples. Sketch the same.   4+1

(b) Give the spectrum of a 100 Hz sinusoid when it is sampled at 120 Hz. What are your observations ?   4+1

7. Compare the AM and FM superheterodyne receiver.   10

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

    (a)   SNR in DSB with carrier type of systems

    (b)   Time division multiplexing

    (c)   TV transmitter

    (d)   PAM Systems.

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