

Sixth Semester Examination – 2007

COMMUNICATION ENGINEERING

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.

*All symbols carry their usual meaning. Make
suitable assumptions where ever necessary.*

1. Answer the following questions : 2×10

Marks will be awarded only for citing valid reasons wherever necessary.

- (a) What is toll-quality speech bit rate? Justify how do you obtain this value ?
- (b) An ideal low-pass filter is a non causal system. Justify with the help of a suitable sketch.

P.T.O.

- (c) What is quantization error ? What is the basis of associating it with a PDF ?
- (d) What is a typical model for base band channels ? If the bandwidth of a channel is narrow, what is its effect on a digital data stream ?
- (e) What type of modulation technique does your cell phone use ? Why ?
- (f) Give the signal space representation of BPSK and BFSK.
- (g) What is the principle of a receiving antenna ? The antenna operates at base band or pass band ?
- (h) Sketch the output of an ideal low-pass filter when white noise passes through it. Justify the diagram.
- (i) Can you demodulate a BPSK signal using an envelope detector ? Justify.
- (j) Is a satellite communication receiver subject to fading ? Justify.

2. (a) Give the F.T. of a channel having the impulse response 8

$$h(t) = a_0 + a_1 \delta(t - T) + a_2 \delta(t - 2T)$$

Plot the magnitude and phase spectrum. Can you model the channel as a filter looking at its F.T. you have obtained now ? What type of filter is this ?

- (b) Why flat-top sampling is carried out ? 2

3. What is the nice feature about FM ? Explain how it is obtained. Do the necessary derivations ? Is it always realized ? 10

4. (a) Explain how can you realize a low cost receiver for binary FSK ? Draw suitable diagrams. What is the basis of this receiver ? 6

- (b) What is the disadvantage of BPSK modulation ? Explain. 4

5. (a) Compute the response of a rectangular low-pass filter with a bandwidth f_c to the impulse function $\delta\left(t - \frac{k}{2f_c}\right)$. 6

- (b) Compute the noise bandwidth of an RC filter. What is the meaning of noise bandwidth ? 4

6. (a) Compute P_M when 6

$$H_p(f) = K \left(1 + j \frac{f}{f_1} \right) \text{ and } G_m(f) = \begin{cases} G_0 & |f| \leq f_m \\ 0 & \text{elsewhere} \end{cases}$$

- (b) Explain how does a dipole antenna radiate ? 4

7. Derive the output SNR in PCM. State the assumptions you have made in deriving this expression. 10
8. Write short notes on any *three* : 10
- (a) Matched Filter
 - (b) Inter Symbol Interference
 - (c) Fiber Optic Communication System
 - (d) Antennas in Satellite Communication System
 - (e) Multiple Access
 - (f) Fading in mobile communication.

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