Roll No. | | | | | | | | | | | | |

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech (ECE) (Sem.–6)

DIGITAL COMMUNICATION

Subject Code : EC-304

Paper ID : [A0318]

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS 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

1. **Answer briefly :**

a) What is non-uniform quantization and companding?

b) Explain RZ, NRZ and differential Manchester line coding schemes.

c) What are the drawbacks of delta modulation system?

d) Explain PCM digital hierarchy system of North America.

e) Compare QPSK and MSK modulation techniques.

f) What is the merit and de-merit of DPSK over PSK?

g) Define Granular noise and slope over load error in delta modulation system.

h) State baseband sampling theorem and define aperture effect.

i) Explain HDB and B8ZS signaling.

j) State Shannon-Hartley theorem of channel capacity.

SECTION-B

2. Explain the generation and detection of coherent M-QAM signal. Draw the constellation diagram of 16-QAM signal.

3. Explain each blocks of PCM system in detail. Compare PCM with delta modulation system in terms of bandwidth efficiency and quality of signal transmission.

4. Explain how Nyquist criterion eliminates ISI in the absence of noise for distortion less baseband binary transmission.

5. Explain how phase-locked loop (PLL) is used for phase estimation in carrier recovery at receiver? Draw block diagram of PLL based phase estimator and write its transfer function also.

6. Derive an expression of mean quantization error and signal to quantization noise ratio for a delta modulation system.

SECTION-C

7. With the help of proper mathematical expression, explain the generation of MSK signals. Explain phase continuity in a MSK signal with the help of suitable waveforms. Why CPFSK is known as MSK? What is the difference between MSK and GMSK?

8. Explain the generation and detection of coherent FSK signal. Derive an expression of power spectral density of FSK signal. Compare FSK and QAM modulation techniques.

9. Consider a signal having spectral component from 300 Hz to 3300 Hz. A PCM signal is generated with a sampling rate of 8500 samples/sec. The required output signal to quantization noise ratio is 36 dB.

   a) What is minimum no of uniform quantization level, and minimum no of bits per sample needed? Calculate the minimum system bandwidth required.

   b) Repeat part i, when μ-law compander is used with μ = 255.