

- (f) What is the relation between bit rate and baud rate for FSK system ?
- (g) Differentiate between coherent and non-coherent digital modulation methods.
- (h) Sketch the waveform of PSK for binary sequence 1100101.
- (i) Why is quantization necessary ?
- (j) Is it possible to use the repeaters in a PCM System ? **10×1½=15**

Roll No.

Total Pages : 04

J-21-0044

B. Tech. EXAMINATION, 2021

Semester V (CBCS)

DIGITAL COMMUNICATION

EC-501

Time : 2 Hours

Maximum Marks : 60

The candidates shall limit their answers precisely within 20 pages only (A4 size sheets/assignment sheets), no extra sheet allowed. The candidates should write only on one side of the page and the back side of the page should remain blank. Only blue ball pen is admissible.

Note : Attempt *Four* questions in all, selecting *one* question from any of the Sections A, B, C and D. Q. No. **9** is compulsory.

Section A

1. (a) State and prove the sampling theorem for the reconstruction of original signal.
- (b) An audio signal $s(t) = 3 \cos(100\pi t)$ is quantized using 10-bit PCM. Determine the signal to quantization noise ratio. **15**

2. (a) Describe A-law and μ -law companding.
 (b) Prove that output signal to quantization ratio

$$\text{for DM is } \frac{3}{80} \left(\frac{f_b}{f_m} \right)^3. \quad 15$$

Section B

3. Explain matched filter. How does it differ from optimum filters ? Derive an expression for impulse response of matched filter. 15
4. Discuss the following :
- (a) Eye patterns
 (b) Geometric representation of signals
 (c) Maximum likelihood decoding. 15

Section C

5. (a) Draw the modulator and demodulator circuits of QPSK. Also explain the components used in them.
 (b) Represent 100111010 using the following digital data format :
- (i) Bipolar NRZ
 (ii) Split-phase Manchester. 15

6. Draw and explain the transmitter and receiver circuit of QASK. Also draw the constellation diagram of 4-QAM and 8-QAM systems. 15

Section D

7. Draw and explain the block diagram of M-ary PSK transmitter and receiver. Also discuss the advantages and disadvantages of M-ary PSK. 15
8. Discuss the following :
- (a) Optimum detection of binary PAM in noise.
 (b) Performance comparison of QPSK and QASK. 15

(Compulsory Question)

9. Answer the following :
- (a) What is Aliasing ? How to avoid its effect ?
 (b) What is the interpretation obtained from eye pattern ?
 (c) What are the advantages of digital transmission ?
 (d) Determine the Nyquist sample rate for a maximum analog input frequency of :
- (i) 4 kHz
 (ii) 10 kHz.
 (e) Distinguish between DM and ADM.