

Total No. of Questions : 8]

SEAT No. :

PE-4252

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[6582]-23

**S.E. (Electronics/E & TC/Electronics & Computer)
(Electronics VLSI Design & Technology)
PRINCIPLES OF COMMUNICATION SYSTEMS
(2019 Pattern) (Semester - IV) (204193)**

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Assume suitable data, if necessary.
- 4) Use of Non-programmable scientific calculators is allowed.

- Q1)** a) Define modulation index and frequency deviation in frequency modulation. Calculate modulation index and frequency deviation if a sinusoidal modulating signal of 15 V, 10 KHz is applied to a FM system. Assume frequency deviation constant is 5 KHz/V. [6]
- b) Draw and explain wideband FM generation using Armstrong's indirect method. [6]
- c) Compare phase modulation with frequency modulation. [6]

OR

- Q2)** a) Distinguish between narrowband and wideband FM. [6]
- b) Describe the role of limiter and de-emphasis circuits in FM super heterodyne receiver. [6]
- c) For the FM wave represented by the following equation, [6]
 $V=15 \sin [3 \times 10^8 t + 50 \sin (2500)t]$
Calculate i) Carrier and modulating frequencies, ii) Modulation index, iii) Maximum frequency deviation, and iv) Power delivered to 75 Ω resistor.

- Q3)** a) Explain different types of sampling techniques clearly stating advantages and disadvantages of each technique. [6]
- b) Compare Pulse Amplitude Modulation (PAM), Pulse Width Modulation (PWM) and Pulse Position Modulation (PPM) techniques. [6]
- c) Describe Pulse Position Modulation (PPM) generation with the help of neat diagram. [5]

OR

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- Q4)** a) Draw the spectrum showing aliasing in sampling. Elaborate the significance of nyquist criteria to avoid aliasing in sampling. [6]
b) Describe PWM generation with help of neat diagram. [6]
c) Explain Time Division Multiplexing (TDM) scheme with the help of neat diagram. [5]

- Q5)** a) With the help of neat block diagram explain the working of Adaptive Delta modulator. [6]
b) What is need of non-uniform quantization? Explain μ law compander in PCM. [6]
c) A 1 KHz signal of voice channel is sampled at 4 KHz sampling frequency and transmitted using 12-bit PCM, Calculate i) Signaling rate and ii) Bandwidth required for the PCM system. Now if the same signal with the same sampling frequency is transmitted using DM, Calculate i) Signaling rate and ii) Bandwidth required for the DM system. [6]

OR

- Q6)** a) With the help of neat block diagram explain the working of Pulse Code Modulation transmitter. [6]
b) Compare Delta Modulation and Adaptive Delta Modulation. [6]
c) Define quantization. Draw and explain the characteristics of midtread type of uniform quantizer. [6]

- Q7)** a) Draw any six data formats for representation of digital bit pattern 10110011. [6]
b) Draw and explain AT & T hierarchy digital multiplexing system. [6]
c) Write a note on scrambling and unscrambling techniques. [5]

OR

- Q8)** a) Define Inter Symbol Interference (ISI). Explain the use of equalizers to remove the effect of ISI. [6]
b) Describe working of closed loop bit synchronizer in a digital communication system with the help of block diagram and waveforms. [6]
c) Compare unipolar NRZ and split phase manchester data formats with respect to following parameters i) transmission of DC component, ii) Noise immunity, iii) Synchronization capability, iv) Bandwidth and v) Crosstalk. [5]

