

Reg. No. :

Question Paper Code : 20473

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2022.

Third/Fourth Semester

Electronics and Communication Engineering

EC 8491 — COMMUNICATION THEORY

(Common to : Computer and Communication Engineering, Geoinformatics Engineering)

(Regulations 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Draw the AM modulated wave for over, under and 100% modulation.
2. Mention the advantages of VSB-AM.
3. List the advantages and application of FM.
4. What are capture range and lock range in PLL?
5. Write down the two main features of Gaussian process.
6. What is ergodic process?
7. Differentiate and give examples for external noise and internal noise.
8. Draw the pre-emphasis and de-emphasis circuits.
9. What is aliasing effect? How the effect can be avoided?
10. Compare PPM and PCM.

PART B — (5 × 13 = 65 marks)

11. (a) With neat block diagram briefly explain the generation and detection of DSB-SC. plot the modulating signal and DSB-SC waveform. Also draw the frequency spectrum of the same and discuss on optimum modulation index.

Or

- (b) Explain the operation of each block of a super heterodyne receiver with a simple block diagram and state how channel selection can be done using heterodyning.

12. (a) Name the two basic methods of generating frequency modulated signals. Explain the principle of varactor diode modulator with necessary diagrams.

Or

- (b) What is the function of FM detector? Name any four FM demodulation techniques. Briefly explain, how the PLL is used as FM demodulator with neat diagram.

13. (a) Define correlation. Explain in detail about auto correlation and cross correlation with its properties.

Or

- (b) Discuss about power Spectral Density and prove the properties of PSD.

14. (a) Brief about the noise figure and equivalent noise temperature in cascaded amplifiers.

Or

- (b) Consider AM receivers using envelope detection. Analyze the system and deduce the expressions for output SNR and channel SNR.

15. (a) What is the need for quantizer? Classify it. Brief about the midtread and midrise quantizer with suitable sketches.

Or

- (b) Discuss the concept TDM and FDM. Compare and contrast TDM and FDM with its advantages and applications.

PART C — (1 × 15 = 15 marks)

16. (a) A modulating signal, $20 \sin(2\pi \times 10^3 t)$ is used to modulate a carrier signal $40 \sin(2\pi \times 10^4 t)$. Find out,

- (i) Modulation index
- (ii) Percentage of modulation
- (iii) Frequencies of the sideband components and their amplitudes
- (iv) Bandwidth of the modulating signal
- (v) Draw the spectrum of the AM wave. (5 × 3 = 15)

Or

- (b) A receiver has a noise figure of 12 dB and it is fed by a low noise amplifier that has a gain of 50 dB and a noise temperature of 90 K. Calculate the noise temperature of the receiver and the overall noise temperature of the receiving system. Assume room temperature as 200 K.