Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 80443

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2021.

Fourth Semester

Electronics and Communication Engineering

EC 2252/EC 1252/EC 42/080290020 — COMMUNICATION THEORY

(Regulations 2008)

(Common to PTEC 2252 for B.E. (Part-Time) for Third Semester – Regulations 2009)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the advantages of converting the low frequency signal into high frequency signal?

2. Compare Bandwidth and power requirement in terms of carrier power P_C, for AM, DSB-SC and SSB?

3. How is the Narrow band FM converted into wideband FM?

4. A carrier is frequency modulated by a sinusoidal modulating frequency 2 kHz, resulting in a frequency deviation of 5 kHz. What is the bandwidth occupied by the modulated waveform?

5. Define white noise.

6. Define noise figure.

7. What are the methods to improve FM threshold reduction?

8. What is capture effect?

9. The average information rate is zero for both extremely likely and extremely unlikely message. Is the statement correct? Why?

10. What is lossy source coding?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Define Amplitude modulation. How an amplitude modulated signal can be generated using a non-linear modulator circuit? (8)

(ii) What is a DSB-SC signal? Write the working of a synchronous detector used to detect a DSB-SC signal with the output amplitude spectrum of each block. (8)

Or

(b) (i) Discuss in detail about frequency translation and frequency division multiplexing technique with diagrams. (10)

(ii) Compare Amplitude Modulation and frequency Modulation. (6)

12. (a) (i) Explain the principle of indirect method of generating a wideband FM signal. (8)

(ii) Discuss the effects of non linearities in FM systems. (8)

Or

(b) (i) Draw the circuit diagram of Foster-Seeley discriminator and explain its working. (8)

(ii) What are the applications of PLL? (8)

13. (a) (i) Suppose an amplifier is designed with three identical stages, each of which has a gain 5 and a noise figure of 6, determine the overall noise figure of the cascade of the three stages. (3)

(ii) A radio antenna pointed in the direction of the sky has a noise temperature of 50° K. The antenna feeds the received signal to the pre-amplifier, which has a gain of 35 dB over a bandwidth of 10 MHz and a noise figure of 2 dB. Determine the effective noise temperature at the input to the pre-amplifier. Also determine the noise power at the output of the pre-amplifier. (4)

(iii) Discuss in detail about Gaussian process. (9)

Or

(b) (i) Explain how shot noise and white noise are generated. (10)

(ii) Describe the mathematical definition of a random process in brief. (6)

14. (a) (i) Draw the super heterodyne receiver and explain the operation of each block. (10)

(ii) Derive the figure of merit for AM system for non coherent system, with suitable assumptions. (6)

Or

(b) (i) Derive the figure of merit of a FM system. (10)

(ii) Explain FM threshold effect. (6)

15. (a) (i) Consider a discrete memory less source with seven possible symbols X_i = {1, 2, 3, 4, 5, 6, 7} with associated probability Pr = {0.37, 0.33, 0.16, 0.07, 0.04, 0.02, 0.01}. Construct the Huffman's code and determine the coding efficiency and redundancy. (10)

(ii) A Discrete memory less source emits 5 symbols whose associated probabilities are as given below. Construct Shannon Fano code and determine the efficiency. (6)

Symbols :	X0	X1	X2	X3	X4
Probabilities:	0.4	0.19	0.16	0.15	0.1

Or

(b) (i) Derive the channel capacity of a continuous band limited white Gaussian noise channel. (10)

(ii) Discuss about rate distortion theory. (6)

———————