



**K. K. Wagh Institute of Engineering Education & Research, Nashik**  
(An Autonomous Institute From A.Y. 2022-23)

SUMMER-2024	
Exam Seat No.:	
Academic Year:2023-2024	Semester:IV
Class:SY	Program:B.Tech
Branch Code:ETC	Pattern:2022
Name of Course:Communication Engineering	Course Code:ETC222012
Max. Marks:60	Duration:2.30 Hrs.

**Instructions:** Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains 02 pages.
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. Draw the neat labelled diagrams, wherever necessary.
5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.

**Question No. 1 Attempt following Question**

- 1a) Explain DSB-SC generation using Balanced modulator in details (6) CO1

**Question No. 2 Attempt following Question**

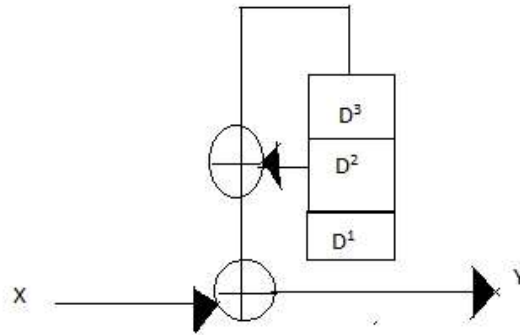
- 2a) In AM receiver the loaded Q of the antenna circuit at the input to mixer is 100. Calculate image frequency and its rejection at 1MHz (6) CO2

**Question No. 3 Attempt following Question**

- 3a) Encode the bit stream 10011110 into (8) CO3  
I) Unipolar NRZ, II) Unipolar RZ, III) Polar NRZ, IV) AMI,  
V) Manchester, VI) Polar RZ codes, VII) Polar Quaternary code

**OR**

- 3b) Explain the PCM technique in details. (8) CO3
- 3c) The data stream 10101010001 is an input to a scrambler shown in the figure . obtain scrambled output assuming initial content of all the registers to be zero. (8) CO3



OR

- 3d) Compare PAM, PWM and PPM (8) CO3

**Question No. 4 Attempt following Question**

- 4a) Explain BFSK signal transmission and BFSK reception with suitable diagrams (8) CO4

OR

- 4b) A band pass data transmission scheme uses PSK with bit interval 0.2 msec. The carrier amplitude at the receiver input is 1 mV and PSD of AWGN is  $10^{-11}$  watt/Hz. Calculate the probability of error of the receiver.  $\text{Erfc}(2.24)=0.00041$  (8) CO4

- 4c) Explain BPSK signal transmission and coherent BPSK reception with suitable diagrams (8) CO4

OR

- 4d) With necessary equations and signal space diagram, obtain the Euclidean Distance coherent binary FSK systems. (8) CO4

**Question No. 5 Attempt following Question**

- 5a) Let  $V(t) = X + 3t$  Where  $X$  is a random variable with  $\bar{x}$  and  $\bar{x}^2$ . Show that  $\bar{v}(t) = 3t$  and  $R_v(t_1, t_2) = 5 + 9t_1 t_2$  where  $R_v(t_1, t_2)$  is autocorrelation function and  $\bar{v}(t)$  is mean value of  $V(t)$  (8) CO5

OR

- 5b) Define the terms: Noise Figure, Noise temperature, Noise Bandwidth, SNR (8) CO5

- 5c) Three resistors have values  $R_1=10\text{K}\Omega$ ,  $R_2=14\text{K}\Omega$  and  $R_3=24\text{K}\Omega$ . It is known that the thermal noise voltage generated by  $R_1$  is  $0.3\mu\text{V}$ . Calculate the thermal noise voltage generated by:

- The three resistors connected in series.
- The three resistors connected in parallel.

OR

- 5d) Draw and explain performance of Baseband system in presence of noise. (8) CO5

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