



Paper ID : 261675

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Subject Code: BEC401

Roll No:

BTECH
(SEM. IV) THEORY EXAMINATION 2025-26
COMMUNICATION ENGINEERING

TIME: 3 HRS**M.MARKS: 70**

Note: Attempt all Sections. In case of any missing data; choose suitably.

SECTION A

1. Attempt all questions in brief.

02 x 7 = 14

Q no.	Question	CO	Level
a.	State the need of modulation in communication system.	1	K2
b.	Calculate the transmission efficiency of an AM signal with 100% modulation.	1	K3
c.	State Carson's rule for the bandwidth of an FM signal.	2	K1
d.	Define white noise and its power spectral density.	3	K1
e.	What do you mean by time division multiplexing?	4	K2
f.	Explain the term granular noise in delta modulation.	4	K2
g.	Briefly explain the concept of quadrature amplitude modulation.	5	K2

SECTION B

2. Attempt any three of the following:

07 x 3 = 21

Q no.	Question	CO	Level
a.	What do you mean by amplitude modulation (AM)? Derive the mathematical expression AM-DSB/FC. Also provide the graphical representation for modulation index less than one.	1	K2
b.	Explain the Armstrong method of FM generation with a detailed block diagram and discuss the spectral characteristics of FM signals using Bessel functions.	2	K3
c.	Explain the concepts of pre-emphasis and de-emphasis in FM and derive how they improve SNR.	3	K4
d.	Explain the concept of companding in PCM systems and its importance.	4	K2
e.	Draw and explain the block diagram for a binary frequency shift keying transmitter and receiver.	5	K2

SECTION C

3. Attempt any one part of the following:

07 x 1 = 07

Q no.	Question	CO	Level
a.	The antenna current of an AM broadcast transmitter, modulated to a depth of 30% by an audio sine wave is 10A. It increases to 12A as a result of sinusoidal modulation by another audio sine wave. What is the modulation index due to second wave?	1	K3
b.	Draw the block diagram of a complete communication system and explain the function of each block.	1	K2



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4. Attempt any one part of the following: 07 x 1 = 07

Q no.	Question	CO	Level
a.	Demonstrate the generation of FM with the help of PM and vice-versa.	2	K2
b.	Explain the demodulation of an FM wave using a phase locked loop with a functional block diagram.	2	K3

5. Attempt any one part of the following: 07 x 1 = 07

Q no.	Question	CO	Level
a.	State the various types of noises encountered in a communication system.	3	K2
b.	Derive the expression for the signal to noise ratio and figure of merit for a double side band suppressed carrier system.	3	K3

6. Attempt any one part of the following: 07 x 1 = 07

Q no.	Question	CO	Level
a.	Discuss the process of quantization in PCM. Prove that for a PCM signal, the signal to quantization noise ratio in dB is $1.8 + 6n$ approximately, where n is the number of bits per sample.	4	K4
b.	Explain Delta Modulation. Discuss the causes of slope overload distortion and how to minimize it. Derive mathematical expression of S_{min} .	4	K3

7. Attempt any one part of the following: 07 x 1 = 07

Q no.	Question	CO	Level
a.	Explain amplitude shift keying using waveforms. Draw the block diagram for its generation and coherent detection.	5	K2
b.	Describe the minimum shift keying scheme. Prove that the phase of a minimum shift keying signal remains continuous at bit transitions.	5	K4