

VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY (VSSUT), ODISHA
Odd Mid Semester Examination for Academic Session 2024-25

COURSE NAME: B.Tech.

SEMESTER: 3rd

BRANCH NAME: Electronics and Telecommunication Engineering

SUBJECT NAME: Basic Communication Engineering

FULL MARKS: 30

TIME: 90 Minutes

Answer All Questions.

The figures in the right hand margin indicate Marks. Symbols carry usual meaning.

- Q1. Answer all Questions. [2 × 3]
- a) Explain the time differentiation property of Fourier Transform. - CO1
 - b) Why choice of time constant is crucial in envelope detection method? - CO2
 - c) How frequency sensitivity and frequency deviation parameters are used in deciding the bandwidth of FM? - CO3

- Q2. [8]
- Verify Parseval's theorem for the signal $g(t) = e^{-at}u(t)$ ($a > 0$) by calculating energy. - CO1

OR

Find the Fourier Transform of Signum function as combination of positive and negative step function. Draw both time and frequency domain waveforms. - CO1

- Q3. [8]
- ✓ A sinusoidal carrier $c(t) = 80 \cos(2\pi 10^4 t)$ is amplitude modulated by a sinusoidal voltage $m(t) = 10 \cos(2\pi 10^2 t)$ up to a modulation depth of 30%. - CO2

- i. Write down the expression for the modulated waveform.
- ii. Calculate amplitude and frequency of each sideband.
- iii. Find out the carrier power, sideband power and total power.

OR

"AM and NBFM consume same bandwidth". Justify the statement with proper explanation using phasor diagram and spectrum. - CO2

- Q4. [8]
- ✓ The maximum deviation allowed in FM broadcast system is 75 KHz. If the modulating signal is a single tone sinusoid of 10 KHz, find the bandwidth of the FM signal. What will be the change in bandwidth, if modulating signal frequency is doubled? Also calculate the bandwidth if modulating signal amplitude is doubled. - CO3

OR

Differentiate between direct and indirect method of FM generation using proper diagram. - CO3