Registration No.: | | | | | | | | | | |

Total Number of Pages: 02

Course: B.Tech
Sub_Code: ETPE3003

5th Semester Regular Examination: 2025-26
SUBJECT: ANALOG COMMUNICATION TECHNIQUES
BRANCH(S): EEE
Time: 3 Hours
Max Marks: 100
Q.Code: U349

Answer Question No.1 (Part-I) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right-hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** **(2 x 10)**

a) What are the basic differences between Fourier series & Fourier transform?
b) What is Frequency translation?
c) In FM, if the modulating signal amplitude is doubled then what will be the frequency deviation? .
d) An AM broadcast radio transmitter radiates 12 KW of power with depth of modulation 40 %. Calculate how much power is wasted in transmitting the carrier signal.
e) Why AM is an in-efficient modulation technique?
f) Compare AM with FM.
g) What is the basic difference between FDM & TDM?
h) What are merits of digital communication?
i) What is sampling rate & Nyquist rate?
j) What is white noise? Why it is called so?

Part-II

Q2 **Only Focused-Short Answer Type Questions - (Answer Any Eight out of Twelve)** **(6 x 8)**

a) Find out the Fourier coefficients for a unipolar square wave which doesn't pass through origin having width $T_0/2$ & Amplitude A/2.
b) Determine the Fourier Transform of $x(t) = \text{Sin}(10\omega_0 t)$ & plot its spectrum.
c) Derive total power of FM. Also draw spectrum of FM.
d) Discuss the generation methods for SSB-SC & write the merits of SSB-SC.
e) What is synchronous demodulation technique? Justify why it is called so.
f) Explain PCM with required block diagram.
g) Discuss Armstrong method for WBFM with appropriate equations.
h) Define mean & variance and establish a relation between them.
i) Explain square law demodulation with proper analysis for recovery of modulating signal from AM.

j) What are noise sources in analog communication system, explain briefly. Define AWGN and draw its power spectrum.

k) A signal is s(t) = 10 Cos (20πt). Cos (200πt) sampled at rate of 250 samples/sec. Find the Nyquist rate & sampling interval for the signal s(t).

l) Write down specialty and uses of pre-emphasis & de-emphasis filter in FM.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 **a)** Derive AM & FM equations. **(8)**

b) Find Fourier transform of a gate function having unit width. Also plot its spectrum. **(8)**

Q4 **a)** Describe superheterodyne principle in AM receiver system with suitable blocks. **(8)**

b) Explain FDM with suitable examples. **(8)**

Q5 **a)** A received SSB-SC signal of strength 1 mW has a power spectrum, which extends over the frequency range 1 MHz to 1.001 MHz. The accompanied noise (white noise) has uniform power spectral density 10-9 W/Hz and it is followed by coherent detection, where the baseband filter of cut-off frequency f_m is used to get the message signal. Calculate **(6)**

I. Message bandwidth
II. Output SNR in dB

b) Discuss the noise effects in FM. Derive SNR of FM, where the channel is AWGN. **(10)**

Q6 **a)** Explain delta modulation with proper diagram & waveform. **(8)**

b) Explain Sampling process. Also explain PAM generation process. **(8)**