

## Gandhi Institute of Engineering and Technology University, Odisha, Gunupur (GIET University)



B. Tech (Sixth Semester – Regular/Supplementary) Examinations, April 2025  
**21BEEPC36003/22BEEPC36003– Communication Engineering  
(EEE)**

Time: 3 hrs

Maximum: 70 Marks

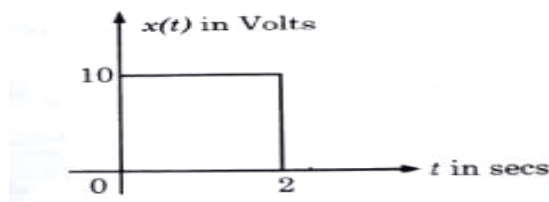
**Answer ALL questions**  
(The figures in the right-hand margin indicate marks)

**PART – A****(2 x 5 = 10 Marks)**Q.1. Answer **ALL** questions

- |   | CO # | Blooms Level |
|---|------|--------------|
| a. State the time shifting property of Fourier Transform.   | CO1  | K1           |
| b. Define Pulse Amplitude Modulation with waveform.   | CO3  | K1           |
| c. What is external noise? How can you classify external noise.   | CO4  | K2           |
| d. Determine the frequency of the modulating signal which is producing an FM signal having a bandwidth of 50 kHz when the frequency deviation of the FM signal is 10 kHz. | CO4  | K3           |
| e. What is Carson's Rule?   | CO2  | K2           |

**PART – B****(15 x 4 = 60 Marks)**Answer **ALL** the questions

2. a. Obtain the Fourier transform of a rectangular pulse of duration 2 seconds and having magnitude of 10 volts as shown in figure.



- |   | Marks | CO # | Blooms Level |
|---|-------|------|--------------|
| b. Describe the time-domain and frequency-domain representations of DSB-SC signals.                                       | 8     | CO1  | K2           |
| (OR)  |       |      |              |
| c. Differentiate between amplitude, frequency, and phase modulation. With neat diagram.                                   | 7     | CO2  | K2           |
| d. Derive the mathematical expression for a single-tone amplitude modulated (AM) wave.                                    | 7     | CO3  | K3           |
| 3.a. Explain the process of coherent detection used to recover the original signal from a DSB-SC modulated wave.          | 8     | CO2  | K3           |
| b. Draw the frequency spectrum of an SSB-SC transmission and provide a clear diagram that explains how it is demodulated. | 7     | CO3  | K3           |
| (OR)  |       |      |              |
| c. Discuss the various types of noise that affect communication systems. How are these noises modelled mathematically?    | 8     | CO4  | K4           |
| d. Compare different pulse modulation techniques: Pulse Amplitude Modulation (PAM) and Pulse Time Modulation (PTM).       | 7     | CO3  | K2           |
| 4.a. Draw the circuit diagram of varactor diode modulator and explain its working.  | 8     | CO4  | K2           |

- b. Describe the working of a Balanced Modulator for generating DSB-SC waves. 7 CO3 K2  
(OR)
- c. A single-tone frequency modulated (FM) signal is given by: 8 CO4 K3  

$$v(t) = 10 \times \sin(16\pi \times 10^6 t + 20 \sin 2\pi \times 10^3 t) \text{ volts}$$
Determine the following parameters:  
i. Carrier frequency ( $f_c$ )  
ii. Modulating frequency ( $f_m$ )  
iii. Modulation index ( $\beta$ )  
iv. Frequency deviation ( $\Delta f$ )
- d. Describe mathematical model for communication channel and their significance. 7 CO4 K2
- 5.a. Explain the operation of a superheterodyne receiver using a clear block diagram. 8 CO5 K2  
How does FM detection use it?
- b. The antenna current of an AM transmitter is 8 A, if only the carrier signal is sent, but it increases to 8.93 A, if the carrier is modulated by a single sinusoidal wave. Determine the percentage modulation. Also find the total current if the percent of modulation changes to 0.8. 7 CO3 K3  
(OR)
- c. Explain the Square law diode modulation method for AM generation. 8 CO3 K2
- d. Write short notes on 7 CO3 K2  
(a) PDM  
(b) Phase Modulation

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