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# PRESIDENCY UNIVERSITY

BENGALURU

## Make Up Examinations – December 2025

Date: 27-12-2025

Time: 09:30am – 12:30pm

|                      |                                   |               |  |
|----------------------|-----------------------------------|---------------|--|
| School: SOE          | Program: B.Tech                   |               |  |
| Course Code: ECE3005 | Course Name :Analog Communication |               |  |
| Semester: MK         | Max Marks:100                     | Weightage:50% |  |

| CO - Levels | C01 | C02 | C03 | C04 | C05 |
|-------------|-----|-----|-----|-----|-----|
| Marks       | 15  | 6   | 25  | 27  | 27  |

### Instructions:

- (i) Read all questions carefully and answer accordingly.
- (ii) Do not write anything on the question paper other than roll number.

### Part A

Answer ALL the Questions. Each question carries 2marks.

10Q x 2M=20M

|   |                                                                                                                                                                                                                                                                                                                                                            |         |    |     |
|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----|-----|
| 1 | Pulse Width Modulation (PWM) is an analog modulating scheme in which the amplitude and position of the pulses are kept constant, while the width of each pulse varies according to the instantaneous sampled value of the message signal. What are the advantages and disadvantages of PWM?                                                                | 2 Marks | L1 | C03 |
| 2 | Frequency Modulation is the process of varying the frequency of the carrier signal linearly with the message signal. Hence, in frequency modulation, the amplitude and the phase of the carrier signal remains constant. Give two practical application of Frequency Modulation.                                                                           | 2 Marks | L1 | C02 |
| 3 | Pre-emphasis and de-emphasis are signal processing techniques commonly used in communication systems, particularly in audio transmission and broadcasting. They help improve the quality of transmitted signals and reduce the effects of noise and distortion. Explain how the combination of pre-emphasis and de-emphasis reduces noise in an FM system. | 2 Marks | L1 | C02 |

|    |                                                                                                                                                                                                                                                                         |         |    |     |
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| 4  | Multiplexing is used in cases where the signals of lower bandwidth and the transmitting media is having higher bandwidth. Explain the role of a guard band in FDM                                                                                                       | 2 Marks | L1 | C03 |
| 5  | The modulation of the amplitude of the individual pulses with reference to the amplitude of an analog signal to encode the information analog signal into the digital signal is known as PAM. What is the key advantage of PAM in communication systems?                | 2 Marks | L1 | C03 |
| 6  | Pulse modulation forms an optimal way to transmit analog data through digital information channels, so it is popularly applied in the data transmission technology, signal processing, and communications fields. Explain the concept of sampling in the context of PAM | 2 Marks | L1 | C03 |
| 7  | In FDM, number of signals are sent simultaneously at the same time allocating separate frequency bands or channels to each signal. How does FDM prevent interference between signals from different channels?                                                           | 2 Marks | L1 | C04 |
| 8  | How does DSB-SC help in reducing the transmitted power compared to AM?                                                                                                                                                                                                  | 2 Marks | L1 | C02 |
| 9  | During Communication, noise is unavoidable. What is the noise figure of a system, and how is it calculated?                                                                                                                                                             | 2 Marks | L1 | C05 |
| 10 | What is the main difference between FDM and TDM?                                                                                                                                                                                                                        | 2 Marks | L1 | C03 |

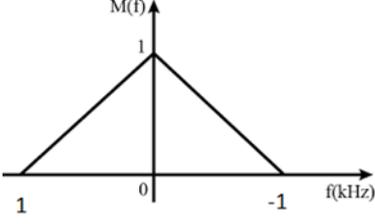
## Part B

Answer the Questions.

Total Marks 80

|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |          |    |     |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----|-----|
| 11. | <p>a. What are the main components of an FM transmitter? Briefly explain their roles in the transmission process.</p> <p>a. Draw the block diagram of FM transmitter.</p> <p>b. Explain each block in detail with help of neat waveforms.</p>                                                                                                                                                                                                                      | 15 Marks | L2 | C04 |
|     | <p>b. In an analog communication laboratory, student is provided with a signal generator set to produce an analog signal of 1kHz. He fed it as input to a modulator of carrier frequency 5kHz. The following observations are made by the student:</p> <p>i. The frequency is swinging between 3.5kHz and 5.5kHz.</p> <p>ii. At every instant the frequency is different</p> <p>a. Identify the type of modulation</p> <p>b. Calculate the depth of modulation</p> | 10 Marks | L3 | Co4 |

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| <p><b>12.</b></p> <p><b>a.</b></p> | <p>A message signal <math>m(t)</math> with spectrum shown in the below figure is applied to a product modulator with a carrier wave <math>\text{Accos}(2\pi f_c t)</math> producing the DSB-SC modulated wave <math>S(t)</math>. This modulated wave is then applied to a coherent detector. Assuming a perfect coherence between the transmitter and receiver, determine the spectrum of the detector output when</p> <div style="text-align: center;"></div> <p>i. <math>f_c=1.25\text{kHz}</math>.</p> <p>ii. <math>f_c=0.75\text{kHz}</math> and sketch the same</p> <p>iii. The lowest <math>f_c</math> so the <math>m(t)</math> is uniquely determined from <math>S(t)</math>.</p> | <p><b>15</b><br/><b>Marks</b></p> | <p><b>L3</b></p> | <p><b>C04</b></p> |
| <p><b>b.</b></p>                   | <p>An angle modulated FM wave is given by the equation <math>S(t)=10\cos[5.7*10^8t+5\sin(12*10^3t)]</math>. Determine</p> <p>i. Carrier frequency</p> <p>ii. Modulating frequency</p> <p>iii. Modulation index</p> <p>iv. Frequency deviation</p> <p>v. Power dissipated in a <math>100\Omega</math> load resistor.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <p><b>10</b><br/><b>Marks</b></p> | <p><b>L3</b></p> | <p><b>C04</b></p> |

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| <p><b>13.</b></p> <p><b>a.</b></p> | <p>What is Time Division Multiplexing (TDM)? Explain its working principle and describe the different types of TDM, highlighting their key features and applications.</p>            | <p><b>15</b><br/><b>Marks</b></p> | <p><b>L2</b></p> | <p><b>C05</b></p> |
| <p><b>b.</b></p>                   | <p>A TDM system combines 20 voice signals, each sampled at a rate of 6 kHz. Each sample is encoded with 8 bits. What is the minimum pulse frequency required for the TDM system?</p> | <p><b>10</b><br/><b>Marks</b></p> | <p><b>L3</b></p> | <p><b>C05</b></p> |

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| <p><b>14.</b></p> <p><b>a.</b></p> | <p>Explain the different types of noise encountered in communication channels, their sources, and their impact on signal transmission. How can noise be minimized or mitigated?</p> | <p><b>15</b><br/><b>Marks</b></p> | <p><b>L2</b></p> | <p><b>C05</b></p> |
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|  | <b>b</b> | <p>A non-ideal amplifier with:</p> <p>Input signal power (<math>S_i</math>) = <math>2 \times 10^{-10}</math>W,</p> <p>Input noise power (<math>N_i</math>) = <math>2 \times 10^{-18}</math> W,</p> <p>Output signal power (<math>S_o</math>) = <math>2 \times 10^{-4}</math> W</p> <p>Output noise power (<math>N_o</math>) = <math>8 \times 10^{-12}</math> W.</p> <p>Determine the Noise Factor and Noise Figure of the amplifier</p> | <b>10<br/>Marks</b> | <b>L3</b> | <b>C05</b> |
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| <b>15.</b> | <b>a.</b> | <p>Compare DSBFC, DSBSC SSBSC and VSBSC methods of modulation with respect to their definition, transmission power and bandwidth requirement and Derive the power calculations of carrier wave and the sidebands of AM wave.</p> | <b>15<br/>Marks</b> | <b>L2</b> | <b>C01</b> |
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| <b>16.</b> | <b>a.</b> | <p>Explain the process of detecting an amplitude-modulated (AM) wave with key components and neat diagram with the help of Envelope detector and square law detector.</p> | <b>15<br/>Marks</b> | <b>L2</b> | <b>C01</b> |
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| <b>17.</b> | <b>a.</b> | <p>What is a Phase-Locked Loop (PLL)? Explain its role and working principle in Frequency Modulation (FM) systems, along with its advantages and applications.</p> | <b>15<br/>Marks</b> | <b>L2</b> | <b>C03</b> |
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| <b>18.</b> | <b>a.</b> | <p>Pulse modulation can be considered as a transition from analog to digital communication. The various types of pulse modulations are PAM, PWM and PPM.</p> <p>Explain the generation and detection of Flat Top PAM<br/>And Natural PAM</p> | <b>15<br/>Marks</b> | <b>L3</b> | <b>C03</b> |
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**\*\*\*\*\* BEST WISHES \*\*\*\*\***