**SRM Institute of Science and Technology**

**Batch1**

**Set B**

**College of Engineering and Technology**

**DEPARTMENT OF ECE**

SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamilnadu

**Academic Year: 2024-2025 (Even)**

**Test: FT- III** **Date: 18.02.2025**

**Course Code / Title: 21ECC302T/ Analog and Digital Communication Duration:** **08.00 – 9.40 AM Year & Sem:** **III & VI** **Max. Marks:** **50**

**Course Articulation Matrix:**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **21ECC302T/ Analog and Digital Communication** | **PROGRAM OUTCOMES (PO)** | | | | | | | | | | | | **PROGRAM SPECIFIC OUTCOMES** | | | |
| **S.NO** | **COURSE OUTCOMES** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **1** | **2** | **3** |
| 1 | Explain the Various Analog Modulation Techniques | 3 | - | - | - | - | - | - | - | - | - | - | 2 | 2 | - | - |
| 2 | Analyze the Noise performance of Radio transmitters and Receivers | 3 | 3 | - | - | - | - | - | - | - | - | - | 2 | - | 3 | - |
| 3 | Demonstrate the demodulation and detection of received digital data | 3 | 2 | - | - | - | - | - | - | - | - | - | - | - | - | 3 |
| 4 | Apply the suitable passband techniques for real time applications | 3 | - | - | - | 3 | - | - | - | - | - | - | - | - | - | 2 |
| 5 | Exposed to the concepts of information theory and channel capacity | 3 | - | 3 | - | - | - | - | - | - | - | - | - | 3 | - | - |

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| **Part – A (10x1 = 10 Marks)**  **Answer all the questions** | | | | | |
| **Q. No** | **Question** | **Marks** | **BL** | **CO** | **PO** |
|  | Which digital modulation scheme is the most resistant to noise?  A) Amplitude Shift Keying (ASK) B) **Frequency Shift Keying (FSK)** C) Phase Shift Keying (PSK) D) Pulse Code Modulation (PCM) | **1** | **1** | **3** | **1** |
|  | Nyquist theorem states that the sampling frequency must be at least: A) Half the signal bandwidth B) **Twice the highest signal frequency** C) Equal to the signal frequency D) Four times the signal frequency | **1** | **2** | **3** | **1** |
|  | What is the primary advantage of DPCM over standard PCM?  A) Reduced quantization noise  B) Less power consumption  C) No requirement for synchronization  **D) Reduced bit rate** | **1** | **1** | **3** | **1** |
|  | The output of a matched filter depends on: A) **The shape of the input signal** B) The power of the noise C) The sampling frequency D) The modulation index | **1** | **2** | **3** | **2** |
|  | What does an open eye pattern indicate in digital communication?  A) High noise  B) High inter-symbol interference  **C) Low error probability**  D) Low signal-to-noise ratio | **1** | **1** | **3** | **2** |
|  | What is the main advantage of **passband transmission** over baseband transmission? A) Reduced bandwidth usage B) **Better noise immunity and signal integrity** C) Less complexity in implementation D) Requires fewer components | **1** | **1** | **4** | **1** |
|  | **The phase difference between adjacent symbols in QPSK is:**  **A) 90°** B) 45° C) 180° D) 60° | **1** | **2** | **4** | **1** |
|  | Increasing the value of M in **M-ary PSK**: A) Increases the bit error rate (BER) B) Decreases bandwidth efficiency C**) Increases spectral efficiency** D) Makes demodulation easier | **1** | **1** | **4** | **1** |
|  | The probability of error for BPSK in an AWGN channel depends on \_\_\_\_\_  A) Phase error  **B) SNR (Signal-to-Noise Ratio)**  C) Frequency offset  D) Signal bandwidth | **1** | **1** | **4** | **1** |
|  | A QAM-64 constellation can be used to send:   1. 4 bits per symbol 2. 5 bits per symbol 3. **6 bits per symbol** 4. 7 bits per symbol | **1** | **2** | **4** | **5** |
| **Part – B (5 x 4 = 20 Marks)** | | | | | |
| **Instructions: Answer any FIVE Questions** | | | | | |
| **11.** | Compare PAM, PPM and PWM. | **4** | **2** | **3** | **1** |
| **12.** | Discuss the working principles behind PWM signal generation and detection. | **4** | **3** | **3** | **2** |
| **13.** | Provide a brief overview of Inter-Symbol Interference (ISI) and its effects. | **4** | **3** | **3** | **2** |
| **14.** | Mention the drawbacks of delta modulation and how it can be overcome. Explain with waveform. | **4** | **4** | **3** | **1** |
| **15** | Explain the generation and detection method of PSK waveform. | **4** | **3** | **4** | **5** |
| **16** | In a digital continuous-time communication system, the bit rate of NRZ data stream is 1Mbps and carrier frequency of transmission is 100 MHz Find the symbol rate of transmission and bandwidth requirement of the channel for the BPSK system. | **4** | **4** | **4** | **5** |
| **17.** | Discuss the concept of QAM system. | **4** | **2** | **4** | **1** |
| **Part - C (2 x 10 = 20 Marks)**  **Instructions: Answer ANY One Question** | | | | | |
| **18. A**  **18. B** | With neat illustrations, discuss the working principle of PCM along with its advantages and disadvantages.  **(OR)**  Describe the probability of symbol error in a digital communication system using a matched filter. | **10**  **10** | **3**  **4** | **3**  **3** | **2**  **2** |
| **19. A**  **19. B** | Draw and explain the block diagram of the QPSK transmitter & receiver along with its waveform and signal space representation with probability of error.  **(OR)**  Illustrate the BFSK modulation and demodulation process with appropriate diagrams, waveforms, and probability of error analysis. | **10**  **10** | **3**  **4** | **4**  **4** | **5**  **5** |

**Course Outcome (CO) and Bloom’s level (BL) Coverage in Questions**

**Evaluation Sheet**

**Name of the Student: Register No.:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Part- A (10x 1= 10 Marks)** | | | | | |
| **Q. No** | **CO** | **PO** | **Maximum Marks** | **Marks Obtained** | **Total** |
| 1 | 3 | 1 | 1 |  |  |
| 2 | 3 | 1 | 1 |  |
| 3 | 3 | 1 | 1 |  |
| 4 | 3 | 2 | 1 |  |
| 5 | 3 | 2 | 1 |  |
| 6 | 4 | 1 | 1 |  |
| 7 | 4 | 1 | 1 |  |
| 8 | 4 | 1 | 1 |  |
| 9 | 4 | 1 | 1 |  |
| 10 | 4 | 5 | 1 |  |
| **Part - B (5 x 4 = 20 Marks)** | | | | | |
| 11 | 1 | 1 | 4 |  |  |
| 12 | 1 | 2 | 4 |  |
| 13 | 1 | 2 | 4 |  |
| 14 | 1 | 1 | 4 |  |
| 15 | 2 | 5 | 4 |  |
| 16 | 2 | 5 | 4 |  |
| 17 | 2 | 1 | 4 |  |
| **Part - C (2 x 10 = 20 Marks)** | | | | | |
| 18 | 1 | 2 | 10 |  |  |
| 19 | 2 | 5 | 10 |  |  |

**Consolidated Marks:**

|  |  |  |
| --- | --- | --- |
| **CO** | **Maximum Marks** | **Marks Obtained** |
| **3** |  |  |
| **4** |  |  |
| **Total** |  |  |

|  |  |  |
| --- | --- | --- |
| **PO** | **Maximum Marks** | **Marks Obtained** |
| **1** | **19** |  |
| **2** | **20** |  |
| **5** | **19** |  |
| **Total** |  |  |

**Signature of Course Teacher**

**Signature of the Course Coordinator Signature of the Academic Advisor**