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| **COMMUNICATION SYSTEMS (Course Code TC307)** | | | | | | | | | | | |
| **Contact Hours** | | |  | | | | | **Credit Hours:** | | | |
| Theory | | **48** | Theory | | **03** | |
| Practical | | **48** | Practical | | **01** | |
| **Total** | | **96** | **Total** | | **04** | |
| **SUGGESTED COURSE LEARNING OUTCOMES:**  Upon successful completion of the course, the student will be able to: | | | | | | | | | | | |
| **S. No** | **CLO** | | | | | | **Domain** | **Taxonomy Level** | **PLO** | | |
| 1 | Explain the fundamentals of communication systems, including amplitude and angle modulation, noise effects, and pulse modulation techniques. | | | | | | Cognitive | C2 | 1 | | |
| 2 | Apply the principles of analog-to-digital conversion, design quantizers, and evaluate pulse modulation schemes such as PAM, PWM, PCM, and Delta Modulation. | | | | | | Cognitive | C3 | 2 | | |
| 3 | Analyze amplitude and angle modulation techniques, their advantages and disadvantages, performance metrics, and receiver designs. | | | | | | Cognitive | C4 | 3 | | |
| 4 | Demonstrate and simulate amplitude modulation, frequency modulation, noise impact, and digital modulation techniques using MATLAB and other communication tools. | | | | | | Psychomotor | P4 | 5 | | |
| 5 | Participate effectively in team-based and individual tasks related to communication systems. | | | | | | Affective | A3 | 9 | | |
| **RELEVANT PROGRAM LEARNING OUTCOMES (PLOs):**  The course is designed so that students will achieve the following PLOs: | | | | | | | | | | | |
| **1** | Engineering Knowledge: | | | **√** | **7** | Environment and Sustainability: | | | | |  |
| **2** | Problem Analysis: | | | **√** | **8** | Ethics: | | | | |  |
| **3** | Design/Development of Solutions: | | | **√** | **9** | Individual and Team Work: | | | | |  |
| **4** | Investigation: | | |  | **10** | Communication: | | | | |  |
| **5** | Modern Tool Usage: | | | **√** | **11** | Project Management: | | | | |  |
| **6** | The Engineer and Society: | | |  | **12** | Lifelong Learning: | | | | |  |
| **Course outline:**   |  | | --- | | **1. Amplitude Modulation (AM)** | | Baseband and carrier communications | | Double Sideband (DSB) | | Single Sideband (SSB) | | Vestigial Sideband (VSB) | | Superheterodyne AM Receiver | | Carrier Acquisition | | Television | | **2. Angle Modulation (FM/PM)** | | Instantaneous frequency | | Bandwidth of FM/PM | | Generation of FM/PM | | Demodulation of FM/PM | | **3. Noise in Communication Systems** | | Mathematical representation of noise | | Signal-to-Noise Ratio (SNR) | | Noise in AM systems | | Noise in FM systems | | Noise in PM systems | | **4. Pulse Modulation** | | Sampling and Quantization | | Pulse Amplitude Modulation (PAM) | | Pulse Position Modulation (PPM) | | Pulse Width Modulation (PWM) | | Quantization Noise | | Signal-to-Quantization Noise Ratio | | Pulse Code Modulation (PCM) | | Delta Modulation (DM) | | **5. Digital Modulation Techniques** | | Frequency Shift Keying (FSK) | | Phase Shift Keying (PSK) |   **Note:** Practical work is based on the above theoretical course.  **Recommended Books:**   1. Communication Systems, by Bruce Carlson 2. Modern Digital and Analog Communication Systems, by B.P Lathi 3. Analog and Digital Communication, by Simon Haykin.Simon Haykin, "Communication Systems", John Wiley, Latest Edition. | | | | | | | | | | | |