**19EC2204 – ANALOG COMMUNICATION**

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| **Course category:** | Program core | **Credits:** | 3 |
| **Course Type:** | Theory | **Lecture - Tutorial - Practical:** | 3 - 0 - 0 |
| **Prerequisite:** | Knowledge in Fourier series and Fourier transforms. | **Sessional Evaluation :****External Evaluation:****Total Marks:** | 4060100 |
| **Course****Objectives** | Students undergoing this course are expected to understand: |
| 1. The Generation and Detection of A.M waves.
2. DSB & SSB modulation and demodulation.
3. The difference between SSB-SC, DSB-SC and VSB modulation schemes.
4. The discriminate between Frequency Modulation and Phase Modulation generation and detection methods.
5. The effect of noise on different modulation schemes and to design some circuits like pre - emphasis and de - emphasis networks.
6. The concepts to realize or implement the circuits required for modulation and demodulation of AM and FM Schemes such as Transmitters and receivers.
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| **Course Outcomes** | Upon successful completion of the course, the students will be able to: |
| CO1 |  Understand the need for modulation, Generation and detection of AM waves. |
| CO2 | Know the SSB-SC modulation and demodulation techniques |
| CO3 | Demonstrate FM signal generation and detection. |
| CO4 | Get familiarized with the different types of noises present in the Analog Communication. |
| CO5 | State and prove Sampling theorem. |
| CO6 | Analyze the Characteristics of AM and F.M radio Transmitter and receiver. |
| **Course****Content****Course****Content** |  **UNIT –I****AMPLITUDE MODULATION:** Introduction to communication system, need for modulation and its types. Amplitude Modulation: Definition, Time domain and frequency domain description, Single tone and multi tone modulations, Power relations in AM waves. Generation of AM waves: Square law Modulator, Switching Modulator. Detection of AM Waves: Square Law Detector, Envelop Detector.  **UNIT –II****DSB MODULATION AND DEMODULATION:** Introduction toDouble Side Band Suppressed Carrier modulation, Generation of DSB-SC Modulated waves: COSTAS Loop, Frequency discrimination. **SSB MODULATION AND DEMODULATION:** Introduction to SSB-SC, Frequency discrimination, Phase discrimination methods for generating SSB-SC, Demodulation of SSB Waves, VSB generation, detection and its applications. Comparison of AM schemes, Applications of different AM Systems.**UNIT –III****ANGLE MODULATION:** Frequency Modulation, Phase modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave, Narrow band FM, Wide band FM, Transmission bandwidth of FM Wave, Generation of FM Waves, Direct and Indirect methods of FM, Detection of FM Waves: Discriminators and its types, Phase Locked Loop.  **UNIT –IV****NOISE IN ANALOG COMMUNICATION:**  Noise in AM, DSB-SC and SSB-SC Systems, Noise in Angle Modulation Systems, Threshold Effect. Pre-Emphasis and De-Emphasis.**UNIT –V****SAMPLING THEOREM**: Definition, Nyquist rate, Types of Sampling, Aliasing Effect, Sampling of Band Pass Signals.**PULSE ANALOG MODULATION:** Types of Pulse Analog Modulations, Generation and Detection methods of PAM, PWM, PPM, Comparison of Pulse Analog Modulation schemes. **UNIT-VI****RADIO TRANSMITERS:** Block diagram of AM transmitter, Frequency Scintillation, Radio Broadcast Transmitter, Armstrong FM Transmitter, Simple FM Transmitter using Reactance Modulator. **RADIO RECEIVERS:** TRF Receiver, Super Heterodyne Receiver, Intermediate Frequency, Image Frequency, AGC, AFC. |
| **Text Books and Reference Books** | **TEXT BOOKS:**1. “Communication Systems” Simon Haykin, Wiley, 2nd Ed., 2007
2. “Electronic Communication Systems” John Kennedy, TMH, 5th Ed., 2011.
3. “Analog Communication Systems” Sanjay Sharma, Katson Books, 2013.

**REFERENCE BOOKS:**1. “Communication Systems Engineering” John Proakis, MasoudSaleb, Pearson, 2nd Ed, 2002.
2. “Principles of Communication Systems” Taub and Schilling, McGraw-Hill ISE, 4th Ed, 2017.
3. “Analog Communication Systems” P. Chakrabarthi, Dhanapat Rai & Sons, 2018.
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| **E-Resources** | 1. <http://nptel.ac.in/cources>
2. https:// iete-elan.ac.in
3. [https://freevideolectures.com/university/iit](https://freevideolectures.com/university/iitm)
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| Contribution of Course Outcomes towards achievement of Program Outcomes  |
|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
| CO1 |  3 | 2 | 2 | 2 | 1 | - | - | - | - | 1 | - | 2 | 3 | 2 |
| CO2 | 3 | 3 | 2 | 2 | 1 | - | - | - | - | 1 | - | 1 | 3 | 3 |
| CO3 | 3 | 3 | 1 |  1 |  1 |  - |  - |  - |  - |  1 |  - |  - |  3 |  3 |
| CO4 | 3 | 3 | 2 | 2 | 1 | - | - | - | - | 1 | - | - | 3 | 3 |
| CO5 | 3 | 3 | 1 | 2 | 1 | - | - | - | - | 1 | - | 2 | 3 | 3 |
| CO6 | 3 | 3 | 2 | 2 | 1 | - | - | - | - | 1 | - | 2 | 3 | 3 |