**Course Handout**

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| **Course No. : 19ECT51** | **Dept.: Electronics and Communication**  **Engineering.** |
| **Course Title : Analog Communication** | **Semester: Vth** |
| **Instructor-in-charge : Dr.H.Venkatesh Kumar**  **Venkateshkumarh@ncetmail.com** | **Academic Year: 2020-21** |
| **Lab. Instructor : Dr.H.Venkatesh Kumar** | **3/8/2020** |

**Subject Description:**

Communication systems are at the heart of today’s information driven economy and support our modern-day lifestyles. The course starts with a brief historical background, types of communication, communication process, generic model, and block diagram. The focus will be on the fundamental working principles of these systems. Specifically, it covers the generation of Amplitude modulation and demodulation process with the help of mathematical concepts, using Hilbert Transform it is highlighted how the sidebands are suppressed. The application of Amplitude modulation is elaborated with the help of a practical superheterodyne receiver.

This course also introduces the Frequency modulation its generation and demodulation technique by using phase locked loop method. Later part of the course highlighted the importance of analysis on the Continuous Wave Modulation schemes in the presence of noise. This course serves as a bridge the gap between theoretical concepts and practical concepts used in advanced communication systems. The course has a lab component as well it includes experiments on filters using active components, Amplitude modulation, Frequency modulation, pulse amplitude modulation, and demodulation techniques using discrete components.

**Text Books:**

1. Simon Haykins: “Communication Systems”, John Willey India Pvt. Ltd., 5th Edition, 2009, ISBN: 9971-51-170-3.

2. B. P. Lathi: “Modern digital and analog Communication systems”, 4th Edition, Oxford University Press, 2010, ISBN: 0-195-68622-5.

**Reference Books:**

1. Simon Haykins: “An Introduction to Analog and Digital Communication”, John Wiley India Pvt.

Ltd., 2008, ISBN: 987-81-265-0932-4.

2. Singh, Sapre: “Communication Systems Analog and digital”, 2nd Edition, TMH, 2007, ISBN: 100-07-063454-8.

**PREREQUISITES:**

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| 1. Analog Electronics circuits  2. Signals and Systems | Self-study | Remarks:  Students have undergone this Course in lower semesters of BE. |

**LECTURE PLAN**

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| **Topic** | **Topic Details** | **Number**  **of**  **Lectures** | **Unit/ Chapter**  **Reference** |
| **Module I**  **Amplitude Modulation(AM)** | Introduction to Analog Communication, Need for modulation, AM. | 1 | T1.page no  36-107  R1.page no  100-120 |
| Generation of AM wave. | 2 |
| Detection of AM waves. | 3 |
| Square law detector. | 4 |
| Problems on AM wave generation and detection. | 5 |
| Envelop detector. | 6 |
| DSBSC- Time-Domain description. | 7 |
| Frequency-Domain representation of DSBSC. | 8 |
| Generation of DSBSC waves using Balanced modulator. | 9 |
| Ring modulator. | 10 |
| Problems on above Topics. | 11 |
| **Module-II**  **Single Side-Band Modulation (SSB) and Hilbert Transform.** | Introduction to Hilbert transform. | 12 | T1.page no  88-90  R1.page no  121-130 |
| Properties of Hilbert transform. | 13 |
| Pre-envelope. | 14 |
| Problems on above topics. | 15 |
| SSB- Frequency Domain description. | 16 |
| Time Domain description of SSB. | 17 |
| SSB-Generation - Phase discrimination method. | 18 |
| SSB-Demodulation. | 19 |
| Frequency Translation-Up conversion. | 20 |
| Frequency Translation. Down conversion. | 21 |
| AM Radio. | 22 |
| **Revision** |  |  |  |
| **AAT-1** |  |  |  |
| **Module-III**  **Angle Modulation** | Introduction to Angle modulation. | 23 | T1.page no  102-120  R1.page no  152-174 |
| Frequency Modulation. | 24 |
| Narrow Band FM. | 25 |
| Wide Band FM. | 26 |
| Transmission-BW-of FM waves. | 27 |
| Generation of FM waves. | 28 |
| Indirect FM- Generation. | 29 |
| Direct FM-Generation. | 30 |
| Problems on above Topics. | 31 |
| Frequency stabilization in FM receivers. | 32 |
| **Module-IV**  **FM Demodulation** | Introduction to FM demodulation. | 33 | T1.page no  127-133  R1.page no  175-183 |
| Slope Detector. | 34 |
| Limitations on slope detector. | 35 |
| Balanced Discriminator method-detector. | 36 |
| FM demodulation using PLL. | 37 |
| PLL-Nonlinear equivalent model. | 38 |
| PLL-Linear Model. | 39 |
| Zero crossing detector. | 40 |
| Nonlinear effects in FM systems. | 41 |
| Applications of FM. | 42 |  |
| **Revision** |  |  |  |
| **AAT-2** |  |  |  |
| **Module-V**  **Noise In Continuous Wave Modulation Systems** | Introduction to noise in CW communication. | 43 | T1.page no  207-226  R1.page no  365-390 |
| Receiver model. | 44 |
| Noise in DSB-SC receivers. | 45 |
| Noise in SSB receivers. | 46 |
| Noise in AM receivers. | 47 |
| Threshold effect. | 48 |
| Noise in FM receivers. | 49 |
| FM threshold effect. | 50 |
| Problems on above topics. | 51 |
| Pre-emphasis and De-emphasis in FM. | 52 |

**Evaluation Scheme:**

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| **Component** | **Duration** | **Weightage** | **Date** |
| **CIE 1** | **90 min** | **20%** | **28-09-2020** |
| **CIE 2** | **90 min** | **20%** | **06-11-2020** |
| **AIT 1** | **2 days** | **5%** | **21-09-2020** |
| **AIT 2** | **2 days** | **5%** | **02-11-2020** |
| **Make up CIE** | **90 min** |  | **25-11-2020** |
| **SEE** | **180 min** | **50%** | **11-12-2020 onwards** |
| **Make up SEE** | **180 min** |  | **08-01-2021 onwards** |
| **Total** |  | **100%** |  |

**Notices:** All notices will be displayed on NCET and in Department website.

**Chamber Consultation Hour:** Thursday 2:00Pm to 4:00 Pm

**Makeup Policy:** To be granted only in case of serious illness or emergency.

**Email Policy:** Communication through email. If you want to discuss anything, you are most welcome to meet me during chamber consultation hours or immediately after the class. Academic queries/doubts can be posted in Moodle.

**NC Policy:**

Dr. H. Venkatesh Kumar

**Course-in-charge**