

#### D. Syllabus Detailing and Learning objectives

| Module | Chapter                                                       | Detailed Content                                                                                                                                                                                                        | Syllabus Detailing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Learning Objectives                                                                                                                                                                                                                                                                                                                                                                                            |
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| 1      | <b>CH 1</b><br>Introduction<br>(3hrs)                         | Basics of analog communication systems (Block diagram), Sources of information, Baseband and band pass signals, Types of communication channels, Frequency / Spectrum allocations, Need for modulation and demodulation | <b>Purpose:</b><br>To make students able to outline block diagram of Basics of analog communication systems concepts, Describe various sourced of information & communication channel<br>Illustrate Need for modulation. And also Interpret Fourier transform ,its properties<br><br><b>Scope –</b><br><b>1. Academic Aspects-</b> to draw & explain each block and related theory of communication system<br><b>2. Technology Aspect-</b> demonstrate the working of transmitter & receiver<br><b>3. Application Aspect-</b> to apply concept of communication systems for various analog system, And find the Fourier transform of given function | <b>1. To describe blocks of analog communication system(R)</b><br><br><b>2.To classify various types of source of (U)</b><br><br><b>3. To Choose the application of respective frequency(A)</b><br><br><b>4. To Differentiates various type of channel the (AN)</b><br><br><b>5. To Evaluate ,fouries transform of given function (E)</b><br><br><b>6. To Differentiates Baseband and bandpass signal (AN)</b> |
|        | <b>Chapter 2</b><br>Fourier Transform and Noise<br>(Hours -3) | Introduction to Fourier Transform, Its properties (time and frequency shifting and convolution property),                                                                                                               | <b>Students Evaluation –</b><br>1. Theory Questions to be asked on Block diagram of analog communication systems , Sources of information, Baseband and band                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                |

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|                 |                                                                         | Fourier transform of unit step, delta and gate function.                                                                                                                                                              | pass signals, Types of communication channels,<br>Need for modulation and Fourier transform of unit step, delta and gate function<br>.2. Tutorial on Communication system .                                                                                                                                        |                                                                                                                                                                                                                                                                                                                         |
| <b>Module 2</b> | <b>Chapter 2</b><br>Fourier Transform and Noise (Hours -2)              | Correlated and uncorrelated sources of noise in communication system,<br>Noise parameters –Signal to noise ratio, Noise factor, Noise figure, Friis formula and Equivalent noise temperature                          | <b>Purpose-</b><br>This chapter is focused on various Correlated and uncorrelated sources of noise in communication system, Calculate the noise parameters And Describe calculate spectrum, waveforms, bandwidth, Power calculations of DSBFC AM, DSBSC-AM, SSB SC AM, describe AM receivers & its characteristics | 1. <b>List</b> different properties of fourier transform( <b>R</b> )<br><br>2. To predict the noise parameter for given system ( <b>U</b> )<br><br>3. <b>Solve</b> the given data using various dictionary based compression algorithms. ( <b>A</b> )<br><br>4. <b>Distinguish</b> different types of AM .( <b>AN</b> ) |
|                 | <b>Chapter 3-</b><br>Modulation and Demodulation (AM and FM) (Hours -4) | <b>AM: Amplitude modulation techniques and its types-</b><br>DSBFC AM, DSBSC-AM, SSB SC AM (spectrum, waveforms, bandwidth, Power calculations.)<br><b>AM Receivers</b><br>– Block diagram of TRF receivers and Super | Scope –<br>1. Academic Aspects-<br>Explain the different types of AM techniques with its merit & Demerits, Describe AM Receiver & Its Characteristics<br><br>2. Technology Aspect- Demonstration of AM Transmitter & Receiver                                                                                      | 5. <b>Evaluate</b> performance of different AM system .( <b>E</b> )<br>6. <b>Explain</b> the AM Receiver ( <b>U</b> )                                                                                                                                                                                                   |

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|                 |                                                    | <p>heterodyne receiver.</p> <p><b>Receiver characteristics</b> - Sensitivity, Selectivity, Fidelity, Image frequency and its rejection and double spotting</p> | <p>3. Application Aspect- Students should Know working and appropriate application Different types of AM transmitter &amp; Receiver</p>                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                 |
|                 |                                                    |                                                                                                                                                                | <p><b>Students Evaluation –</b><br/> Theory and tutorial question are asked on following topics<br/> 1. DSBFC AM, DSBSC-AM, SSB SC AM (spectrum, waveforms, bandwidth, Power calculations.)<br/> <b>2.AM Receivers</b><br/> – Block diagram of TRF receivers and Super heterodyne receiver.<br/> <b>3.Receiver characteristics</b> - Sensitivity, Selectivity, Fidelity, Image frequency and its rejection and double spotting</p> |                                                                                                                                                                                                                                                                 |
| <b>Module 3</b> | Modulation and Demodulation (AM and FM) (Hours -6) | <p><b>FM :Principle of FM-</b> waveforms, spectrum, bandwidth. <b>Preemphasis and de-emphasis in FM, FM noise triangle, Comparison of AM and FM</b></p>        | <p><b>Purpose –</b><br/> To describe concept of Principle of FM . Preemphasis and de-emphasis in FM, FM noise triangle,&amp; to Compare of AM and FM systems</p>                                                                                                                                                                                                                                                                   | <p>1. Outline the principle of FM various compression techniques.<b>(R)</b><br/> 2. <b>Explain</b> generation of FM .<b>(U )</b><br/> 3. Compare AM &amp; FM <b>(A)</b><br/> 4. <b>Explain</b> direct &amp; Indirect method of generation of FM.<b>(AN)</b></p> |

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|  |  | <p>systems,<br/> <b>FM generation:</b> Direct method –Varactor diode Modulator,<br/> Indirect method (Armstrong method) block diagram and waveforms.</p> | <p><b>Scope –</b><br/> <b>1. Academic Aspects-</b><br/> <b>Principle of FM-</b><br/> <b>Preemphasis and de-emphasis in FM,</b><br/> <b>FM noise triangle,</b><br/> Comparison of AM and FM systems,<br/> <b>FM generation:</b><br/> Varactor diode Modulator,<br/> Indirect method (Armstrong method)<br/> <b>2. Technology Aspect-</b><br/> Demonstrate the generation of FM<br/> <b>3. Application Aspect-</b><br/> <b>Need of Preemphasis&amp;Deemphasis</b></p> <hr/> <p><b>Student Evaluation –</b><br/> Theory and tutorial question are asked on following topics<br/> 1. Principle of FM<br/> 2.Preemphasis and de-emphasis<br/> 3.FM noise triangle,<br/> 4.Comparison of AM and FM systems,<br/> 5.FM generation:</p> | <p>5. <b>Describe</b> Varactor diode modulator <b>(R)</b><br/> 6. <b>Explain</b> the concept of Preemphasis&amp;De emphasis<b>(A)</b></p> |
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| <b>Module 4</b> | <b>Chapter 3-</b><br>Modulation and Demodulation (AM and FM) (Hours -2) | FM demodulator: Foster Seely discriminator, Ratio detector.                                                                          | <b>Purpose –</b><br>To study the concept of FM demodulator: Foster Seely discriminator, Ratio detector.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1. <b>Outline</b> the Demodulation principles <b>(R)</b><br>2. <b>Explain</b> the : Foster Seely discriminator, <b>(U)</b><br>3. Derive Sampling Theorem <b>(E)</b><br>4. <b>Describe</b> the need of Anti aliasing filter <b>(U)</b><br>5. Compare PAM ,PWM ,PPM <b>(E)</b><br>6. list Advantages and disadvantages of PAM,PWM,PPM. <b>(R)</b> |
|                 | <b>Chapter 4</b><br>Pulse Analog Modulation <b>(Hours -5)</b>           | Sampling theorem for low pass and band pass signals with proof, Anti- aliasing filter, PAM, PWM and PPM generation and Degeneration. | <b>Scope –</b><br><b>1. Academic Aspects-</b><br>To study concept Sampling theorem for low pass and band pass signals with proof,Anti- aliasing filter, PAM, PWM and PPM generation and Degeneration<br><b>2. Technology Aspect-</b><br>Comparison of PAM ,PWM,PPM<br><b>3. Application Aspect-</b><br>Explain the need of sampling theorem in communication<br><b>Student Evaluation -</b><br>Theory and tutorial question are asked on following topics<br>1. FM demodulator: Foster Seely discriminator, Ratio detector.<br>2.Sampling theorem for low pass and band pass signals with proof, Anti- aliasing filter, |                                                                                                                                                                                                                                                                                                                                                 |

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|                 |                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                | 3.PAM, PWM and PPM generation and Degeneration                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                |
| <b>Module 5</b> | <b>Chapter 5</b><br>Digital Modulation Techniques and Transmission<br><b>(Hours -6)</b> | Introduction to digital communication (Block diagram), Quantization process, Pulse code modulation, Delta modulation, Adaptive delta modulation, Principle of time division multiplexing, Frequency division multiplexing and its applications.<br>Introduction to Line codes, Inter symbol interference, Binary phase shift keying, Differentially encoded phase shift keying, Quadrature phase shift keying, | <b>Purpose –</b><br>To explain the concept of Quantization process, PCM DM ADM, Multiplexing & Line codes                                                                                                                                                                                        | 1. <b>Define</b> digital communication system <b>(R)</b>                                                                                                                                                                       |
|                 |                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                | <b>Scope –</b><br><b>1. Academic Aspects-</b><br>Theoretical concept of digital communication system, PCM, DM, ADM, TDM, FDM Line coding<br><b>2. Technology Aspect- multiplexing Line coding &amp; ISI</b><br><b>3. Application Aspect-</b><br>Application of BPSK, DEPSK, QPSK                 | 2. Explain Quantization process <b>(R)</b><br><br>3. <b>Summarize</b> the working of PCM, DM, ADM <b>(A)</b><br><br>4. Compare different multiplexing techniques <b>(A)</b><br><br>5. Define the various line codes <b>(U)</b> |
|                 |                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                | <b>Student Evaluation –</b><br>. Theory and tutorial question are asked on following topics<br>1. Introduction to digital communication<br>Quantization process, PCM, DM, ADM Principle TDM & FDM and its applications.<br>Introduction to Line codes<br>Inter symbol interference, Binary phase | 6. <b>Describe</b> concept of BPSK, DEPSK, QPSK <b>(R)</b>                                                                                                                                                                     |

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|                 |                                                                                  |                                                                                                                                                | shift keying, BPSK,DEPSK,QPSK                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                     |
| <b>Module 6</b> | <b>Chapter 5</b><br>Digital Modulation Techniques and Transmission<br>(Hours -2) | M-ary phase shift keying, Quadrature amplitude shift keying                                                                                    | <b>Purpose –</b><br>To Describe M-ary Shift Keying ,QPSK<br>Fundamental of Electromagnetic radiation, types of propagation<br>.                                                                                                                                                                | 1. Explain The QPSK Transmitter and receiver <b>(R)</b><br>2. <b>Explain</b> fundamentals of electromagnetic radiatin (R)<br>3. Compare different propagation . <b>(A)</b><br>4. <b>Outline</b> Mary Phase shift Keying <b>(E)</b><br>5. <b>Explain</b> the various types of propogation <b>(U)</b> |
|                 | <b>Chapter 5</b><br>Radiation and Propagation of Waves<br>(Hours -4)             | Electromagnetic radiation, fundamentals, types of propagation, ground wave propagation, sky wave propagation, tropospheric scatter propagation | <b>Scope –</b><br><b>1. Academic Aspects-</b><br>QPSK Elecromagneticpropogation types of propagation<br><b>2. Technology Aspect-</b><br>Effect of electromagnetic radiation of comunication system.<br><b>3. Application Aspect-</b><br>sky wave propagation, tropospheric scatter propagation |                                                                                                                                                                                                                                                                                                     |
|                 |                                                                                  |                                                                                                                                                | <b>Student Evaluation –</b><br>. Theory and tutorial question are asked                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                     |



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|  |  |  | on following topics<br>M-ary phase shift keying,<br>Quadrature amplitude shift keying<br>Electromagnetic radiation,<br>fundamentals,<br>types of propagation,<br>ground wave propagation,<br>sky wave propagation,<br>tropospheric scatter propagation |  |
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