Lesson Plan No. 1	Course Name: Analog and Digital Communication Topic: Essentials of Communication systems	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Articulate the basics of communication systems. b. Introduce to elements of communication system.
Teaching Aids (if any)	a. PPTs
Teaching Development	1. **Introduction** (5 minutes) - Ask questions What do you mean by communication? What is the need of communication? What are the basic elements used in a communication system? Discuss the relevance of the subject as apart of curriculum. 2. **Communication System** (30 minutes) a. Block diagram of communication system. b. Description of each block diagram in detail c. Basic modes of communication. **3. Exercise (5 minutes) –** Ask students to explain each block with the help of examples.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://youtu.be/XoVLa6Dqd5I
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 2	Course Name: Analog and Digital Communication Topic: Noise in Communication System	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Able to understand about noise and its types in communication system. b. Illustrate the impact of noise on communication system.
Teaching Aids (if any)	a. Power point presentation
Teaching Development	1. **Introduction** (5 minutes) - Ask questions What do you mean by noise? What can be the impact of noise on communication system? 2 **Noise** (30 minutes) - Concept of noise - Examples of noise a. External Noise - Atmospheric noise - Industrial noise - Extra-terrestrial noise - Solar noise - Cosmic noise b. Effect of noise on communication system 2. **Exercise (5 minutes) –** Ask students to think of examples of noise in your surroundings.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings

	https://youtu.be/KC8kh5FaIc0 https://youtu.be/WT1Y97riAQQ
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 2	Course Name: Analog and Digital Communication Topic: Noise in Communication System	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Able to understand about noise and its types in communication system. b. Illustrate the impact of noise on communication system.
Teaching Aids (if any)	a. Power point presentation
Teaching Development	1. **Introduction** (5 minutes) - Ask questions What do you mean by noise? What can be the impact of noise on communication system? 2 **Noise** (30 minutes) - Concept of noise - Examples of noise a. Types of noise - Internal Noise - External Noise b. Internal Noise - Shot noise - Partition noise - Flicker noise - Transit time noise - Thermal noise c. External Noise - Atmospheric noise - Industrial noise - Extra-terrestrial noise - Solar noise - Cosmic noise d. Effect of noise on communication system 2. **Exercise (5 minutes) –** Ask students to think of examples of noise in your surroundings.

Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://youtu.be/KC8kh5FaIc0 https://youtu.be/WT1Y97riAQQ
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 2	Course Name: Analog and Digital Communication Topic: Noise in Communication System	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Able to understand about noise and its types in communication system. b. Illustrate the impact of noise on communication system.
Teaching Aids (if any)	a. Power point presentation
Teaching Development	1. **Introduction** (5 minutes) - Ask questions What do you mean by noise? What can be the impact of noise on communication system? 2 **Noise** (30 minutes) - Concept of noise - Examples of noise a. Types of noise - Internal Noise - External Noise b. Internal Noise - Shot noise - Partition noise - Flicker noise - Transit time noise - Thermal noise c. External Noise - Atmospheric noise - Industrial noise - Extra-terrestrial noise - Solar noise - Cosmic noise d. Effect of noise on communication system 2. **Exercise (5 minutes) –** Ask students to think of examples of noise in your surroundings.

Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://youtu.be/KC8kh5FaIc0 https://youtu.be/WT1Y97riAQQ
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 2	Course Name: Analog and Digital Communication Topic: Noise in Communication System	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Able to understand about noise and its types in communication system. b. Illustrate the impact of noise on communication system.
Teaching Aids (if any)	a. Power point presentation
Teaching Development	1. **Introduction** (5 minutes) - Ask questions What do you mean by noise? What can be the impact of noise on communication system? 2 **Noise** (30 minutes) - Concept of noise - Examples of noise a. Types of noise - Internal Noise - External Noise b. Internal Noise - Shot noise - Partition noise - Flicker noise - Transit time noise - Thermal noise c. External Noise - Atmospheric noise - Industrial noise - Extra-terrestrial noise - Solar noise - Cosmic noise d. Effect of noise on communication system 2. **Exercise (5 minutes) –** Ask students to think of examples of noise in your surroundings.

Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://youtu.be/KC8kh5FaIc0 https://youtu.be/WT1Y97riAQQ
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 4	Course Name: Analog and Digital Communication Topi: S/N Ratio & Noise figure	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Able to understand the concept of Signal to noise ratio & Noise figure. b. Illustrate the impact of SNR on communication system.
Teaching Aids (if any)	a. Power point presentation b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions What do you mean by noise? What is the effect of noise on communication system? 2 **Noise** (30 minutes) Signal-to-Noise Ratio (SNR) Noise Figure **2. Exercise (5 minutes) –** Ask students to solve numerical problems based on SNR calculation. Ask them to respond when questioned and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://youtu.be/UOLRP52oOPI
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 5	Course Name: Analog and Digital Communication Topic: Modulation & its need.	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Understand the basis of modulation and its need in communication system. b. Able to identify different types of modulation,
Teaching Aids (if any)	a. Power point presentation
Teaching Development	1. **Introduction** (5 minutes) - Ask questions What do you mean by modulation? Cite an example of modulation? 2 **Modulation** (30 minutes) a - Definition of Modulation - Impact in communication - Advantages b- Types of Modulation - Continous wave modulation - Pulse modulation **2. Exercise (5 minutes) –** Ask students to identify the application areas of amplitude modulation Ask them to draw the input & output signal
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture https://youtu.be/S8Jod9AtpN4 Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 6	Course Name: Analog and Digital Communication Topic: Amplitude Modulation	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Familiarize with the concept amplitude modulation b. Understanding of generation of amplitude modulation techniques
Teaching Aids (if any)	a. Power point presentation b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions What do you mean by amplitude modulation? How is AM different from other types of modulation? What are the application areas of AM? 2 **Amplitude Modulation** (30 minutes) a. Importance of Amplitude Modulation - Application areas - Advantages and Disadvantages of AM b. Types of AM wave generation methods - Square Law Modulator - Switching Modulator c. Square Law Modulator - Components of Square law modulator - Block Diagram - Circuit Diagram - Mathematical analysis - Characteristics of Diode - Frequency response of Band Pass Filter d. Switching Modulator - Circuit diagram of Switching Modulator - Mathematical analysis - Characteristics of Diode **2. Exercise (5 minutes) –** Ask students to identify the application areas of amplitude modulation

	Ask them to draw the input & output signal
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://youtu.be/UznnkHMisIk https://youtu.be/SxSPdjwXDQk https://youtu.be/t81eyPsSHGc https://youtu.be/OE7tWGmIVCk
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 7	Course Name: Analog and Digital Communication Topic:AM Demodulation	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Familiarize with the concept of amplitude demodulation b. Understand the detection methods of AM wave
Teaching Aids (if any)	a. Power point presentation
Teaching Development	1. **Introduction** (5 minutes) - Ask questions What do you mean by amplitude demodulation? How is AM demodulation different from modulation? 2 **Amplitude Demodulation** (30 minutes) - Amplitude detection or amplitude demodulation - Wave form representation a. Types of AM wave detection methods - Square Law Detector - Envelope Detector b. Square Law Detector - Block Diagram - Circuit Diagram - Mathematical analysis of detected signal - SNR calculation c. Envelope Detector - Circuit diagram - Mathematical analysis - Selection of RC time constant - Distortions in envelope detector **2. Exercise (5 minutes) –** Ask students to draw the waveform & circuit diagram
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture

	Spend 5 minutes to wrap up and consolidate the learnings https://youtu.be/t81eyPsSHGc https://youtu.be/OE7tWGmIVCk
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 7	Course Name: Analog and Digital Communication Topic:AM Demodulation	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Familiarize with the concept of amplitude demodulation b. Understand the detection methods of AM wave
Teaching Aids (if any)	a. Power point presentation
Teaching Development	1. **Introduction** (5 minutes) - Ask questions What do you mean by amplitude demodulation? How is AM demodulation different from modulation? 2 **Amplitude Demodulation** (30 minutes) - Amplitude detection or amplitude demodulation - Wave form representation a. Types of AM wave detection methods - Square Law Detector - Envelope Detector b. Square Law Detector - Block Diagram - Circuit Diagram - Mathematical analysis of detected signal - SNR calculation c. Envelope Detector - Circuit diagram - Mathematical analysis - Selection of RC time constant - Distortions in envelope detector **2. Exercise (5 minutes) –** Ask students to draw the waveform & circuit diagram
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture

	Spend 5 minutes to wrap up and consolidate the learnings https://youtu.be/t81eyPsSHGc https://youtu.be/OE7tWGmIVCk
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 9	Course Name: Analog and Digital Communication Topic: DSB-SC	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Understand the need of DSB-SC wave b. Articulate the generation methods of DSB-SC
Teaching Aids (if any)	a. ICT
Teaching Development	1. **Introduction** (5 minutes) - Ask questions How much power is reduced when carrier is suppressed? 2 **DSB-SC Signal** (30 minutes) - - Balanced Modulator using Non-linear Devices - Balanced Modulator using AM Modulator a. Ring Modulator - Circuit Diagram - Modes of operation of ring modulator - Wave form representation **3 Exercise (5 minutes) –** Ask students to explain role of various elements used in modulation Draw the waveform of DSBSC
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://www.youtube.com/watch?v=6028j9VLlXA
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 10	Course Name: Analog and Digital Communication Topic: SSB	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Understand the need for SSB-SC b. Articulate the generation methods of SSB-SC
Teaching Aids (if any)	a. ICT
Teaching Development	1 **Introduction** (5 minutes) Ask questions What are the disadvantages of DSB-SC? Comparison of AM and DSB-SC wave? Comparison of Bandwidth and power consumption in AM, DSB-SC and SSB-SC. 2 **SSB-SC Signal** (30 minutes) Introduction to SSB-SC wave Spectrum analysis Transmission bandwidth of SSB-SC Advantages and Disadvantages a. Generation methods of SSB-SC wave Frequency discrimination method Phase shift method **3 Exercise** (5 minutes) – Ask students to solve numerical problems related to SSB-SC Use poll quiz & collect responses and discuss the answers
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://youtu.be/oRMfN0K9cWU
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2.Quiz Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 11	Course Name: Analog and Digital Communication Topic: SSB	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Understand the need for SSB-SC b. Articulate the generation methods and demodulation of SSB-SC
Teaching Aids (if any)	a. ICT
Teaching Development	1 **Introduction** (5 minutes) Ask questions What is the Bandwidth of SSB signal? Is it power efficient scheme ? . 2 **SSB-SC Signal** (30 minutes) a. Phase Shift Method b. Frequency Description Method - Circuit Diagram - Mathematical Analysis c. Demodulation of SSB-SC - Block Diagram - Mathematical analysis - Spectrum analysis **3 Exercise** (5 minutes) – Ask students to solve numerical problems related to SSB-SC Use poll quiz & collect responses and discuss the answers
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://youtu.be/oRMfN0K9cWU
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2.Quiz Spend 5 minutes to evaluate student assimilation of the lesson contents

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Lesson Plan No. 12	Course Name: Analog and Digital Communication Topic: VSB	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Articulate the concept of VSB b. Understand the generation and detection of VSB
Teaching Aids (if any)	a. ICT
Teaching Development	1 **Introduction** (5 minutes) Ask questions Comparison between AM, DSB-SC, SSB-SC. Difficulty with BPF designing in SSB-SC 2 **VSB Signal** (20 minutes) a. VSB Generation - Block Diagram - Mathematical Analysis - Spectrum Analysis - Application of VSB b. VSB Detection - Block Diagram - Mathematical Analysis **3 Exercise** (5 minutes) – Also ask them to explain the frequency spectrum of VSB scheme. Ask related questions and discuss the answers
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://youtu.be/KC8kh5FaIc0
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 13	Course Name: Analog and Digital Communication Topi: Angle Modulation	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Articulate the concept of Angle modulation b. Demonstrate the difference between PM and FM
Teaching Aids (if any)	a. ICT
Teaching Development	1 **Introduction** (5 minutes) Ask questions What are the different types of CWM? What is the difference between amplitude modulation and angle modulation? What are the different types of angle modulation? 2 **Angle Modulation** (30 minutes) Meaning of angle modulation Principle of angle modulation Introduction to frequency modulation and phase modulation Advantages and disadvantages of angle modulation Applications of angle modulation a. Phase modulation - Mathematical Analysis - Spectrum Analysis **3 Exercise** (5 minutes) – Ask questions to students related to the topic covered. and discuss the answers
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://youtu.be/gsUaHawPy-w https://youtu.be/PmuZnJfheK4 https://youtu.be/jqJpbPseX2c
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 14	Course Name: Analog and Digital Communication Topic: Angle Modulation	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Articulate the concept of Angle modulation b. Demonstrate the difference between PM and FM
Teaching Aids (if any)	a. ICT
Teaching Development	1 **Introduction** (5 minutes) Ask questions What is frequency range of FM? What is modulation of FM? 2 **Angle Modulation** (30 minutes) Frequency modulation - Mathematical Analysis - Waveform Analysis - Modulation index - Deviation ratios Comparison between frequency modulation and phase modulation - Pre-emphasis - De-emphasis - Narrowband and wideband FM - Effect of modulation index on sideband on FM wave **3 Exercise** (5 minutes) – Ask students to enlist features of AM & FM and compare. Ask questions to students related to the topic covered. and discuss the answers
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://youtu.be/gsUaHawPy-w https://youtu.be/PmuZnJfheK4 https://youtu.be/jqJpbPseX2c
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 15	Course Name: Analog and Digital Communication Topic: FM Demodulation	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Understand Frequency modulation detection methods
Teaching Aids (if any)	a. ICT
Teaching Development	1. **Introduction** (5 minutes) Ask questions How many types of FM generation methods are there? 2. **FM Detection** (30 minutes) Introduction to FM detection Requirements of FM detection Direct method Indirect method a. Direct method Frequency discrimination Foster Seeley Method b. Frequency discrimination - Principle of slope detection - Drawback - Simple slope detector - Balanced slope detector c. Balanced slope detector - Detector characteristics - Working principle - Drawback **3. Exercise (5 minutes) –** Revision of concept Ask questions related to Block diagrams & waveforms.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://youtu.be/NjrBfibb7Y0 https://youtu.be/V4ZSywttxAY
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Ask students to Summarize the lecture.

	Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 16	Course Name: Analog and Digital Communication Topic: Receivers	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Articulate the concept of receivers. b. Understand the importance of superheterodyne receiver.
Teaching Aids (if any)	a. ICT
Teaching Development	1. **Introduction** (5 minutes) Ask questions What are receivers? Where are receivers required in a communication system? 2. **Receivers** (30 minutes) - Concept of receivers - Drawback of tradition receivers a. Superheterodyne receiver - Block diagram - Mathematical analysis - Advantages - **3. Exercise (5 minutes) –** Ask students to draw block diagram
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://youtu.be/KC8kh5FaIc0
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Recall the elements of Block diagram with their functions . Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 17	Course Name: Analog and Digital Communication Topic: Receivers	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Articulate the concept of receivers. b. Understand the importance of superheterodyne receiver.
Teaching Aids (if any)	a. ICT
Teaching Development	1. **Introduction** (5 minutes) Ask questions What are receivers? Where are receivers required in a communication system? 2. **Receivers** (30 minutes) - Concept of receivers - Drawback of tradition receivers a. Heterodyne receiver - Block diagram - Mathematical analysis - Advantages - **3. Exercise (5 minutes) –** Ask students to draw block diagram
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://youtu.be/KC8kh5FaIc0
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Recall key points of topic covered. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 18	Course Name: Analog and Digital Communication Topic:Sampling	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Articulate the concept of sampling b. Demonstrate various types of sampling c. Understand the principle of sample and hold circuit
Teaching Aids (if any)	a. ICT
Teaching Development	1. **Introduction** (5 minutes) Ask questions What is the difference between Analog and Digital signal? Can we convert an analog signal into digital signal? 2. **Sampling** (30 minutes) - Concept of sampling - Statement and conditions for sampling - Waveform representations - Aliasing effect **Types of Sampling** (30 minutes) - Ideal sampling - Natural sampling - Flat top sampling - Comparison of 3 types of sampling **3. Exercise (5 minutes) –** Ask students to solve numericals based on Nyquist criteria. Ask students to identify various types of sampling from given examples.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://youtu.be/WUCMavXbJo4 https://youtu.be/G5p0v1BJ0l8 https://youtu.be/WUCMavXbJo4?list=PLF84ABD7D4EBA31C4 https://youtu.be/qQcpnmJNluU?list=PLF84ABD7D4EBA31C4 https://youtu.be/WUCMavXbJo4
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 18	Course Name: Analog and Digital Communication Topic:Sampling	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Articulate the concept of sampling b. Demonstrate various types of sampling c. Understand the principle of sample and hold circuit
Teaching Aids (if any)	a. ICT
Teaching Development	1. **Introduction** (5 minutes) Ask questions What is the difference between Analog and Digital signal? Can we convert an analog signal into digital signal? 2. **Sampling** (30 minutes) - Concept of sampling - Statement and conditions for sampling - Waveform representations - Aliasing effect **Types of Sampling** (30 minutes) - Ideal sampling - Natural sampling - Flat top sampling - Comparison of 3 types of sampling **3. Exercise (5 minutes) –** Ask students to solve numericals based on Nyquist criteria. Ask students to identify various types of sampling from given examples.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://youtu.be/WUCMavXbJo4 https://youtu.be/G5p0v1BJ0l8 https://youtu.be/WUCMavXbJo4?list=PLF84ABD7D4EBA31C4 https://youtu.be/qQcpnmJNluU?list=PLF84ABD7D4EBA31C4 https://youtu.be/WUCMavXbJo4
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 19	Course Name: Analog and Digital Communication Topic: Types of Sampling	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Able to understand different types of sampling. b. Understand the principle of sample and hold circuit
Teaching Aids (if any)	a. ICT
Teaching Development	1. **Introduction** (5 minutes) Ask questions What is Nyquist rate and Nyquist interval? How n we avoid aliasing? 2. **Sampling** (30 minutes) **Types of Sampling** (30 minutes) - Ideal sampling - Natural sampling - Flat top sampling - Comparison of 3 types of sampling - Sample & Hold Circuit **3. Exercise (5 minutes) –** Compare the three types of sampling Ask students to identify various types of sampling from given examples.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://youtu.be/WUCMavXbJo4 https://youtu.be/G5p0v1BJ0l8 https://youtu.be/WUCMavXbJo4?list=PLF84ABD7D4EBA31C4 https://youtu.be/qQcpnmJNluU?list=PLF84ABD7D4EBA31C4 https://youtu.be/WUCMavXbJo4
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 20	Course Name: Analog and Digital Communication Topic: Quantization	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Articulate the concept of quantization. b. Demonstrate the working pf quantization process.
Teaching Aids (if any)	a. ICT
Teaching Development	1. **Introduction** (5 minutes) Ask questions What is sampling? Why is sampling done? a. Quantization process - Concept - Working principle - Quantization terminologies **2. Exercise (5 minutes) –** Ask students to solve numericals based on quantization Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://youtu.be/oFEOryECzug?list=PLF84ABD7D4EBA31C4
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 21	Course Name: Analog and Digital Communication Topic: PAM	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Articulate the concept of quantization. b. Demonstrate the working of quantization process.
Teaching Development	1. **Introduction** (5 minutes) - Ask questions For what kind of signals is amplitude modulation performed? 2. **Pulse Amplitude Modulation (PAM)**(30 minutes) - Basic concept a. Generation of PAM - Block diagram - Waveform representation b. Reconstruction of PAM - Block diagram - Working principle **3. Exercise (5 minutes) –** Ask students to draw PAM signal for given set of input signals.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://youtu.be/WUCMavXbJo4 https://youtu.be/nxuJU3EZ77w
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 21	Course Name: Analog and Digital Communication Topic: PAM	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Articulate the concept of quantization. b. Demonstrate the working of quantization process.
Teaching Development	1. **Introduction** (5 minutes) - Ask questions For what kind of signals is amplitude modulation performed? 2. **Pulse Amplitude Modulation (PAM)**(30 minutes) - Basic concept a. Generation of PAM - Block diagram - Waveform representation b. Reconstruction of PAM - Block diagram - Working principle **3. Exercise (5 minutes) –** Ask students to draw PAM signal for given set of input signals.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://youtu.be/WUCMavXbJo4 https://youtu.be/nxuJU3EZ77w
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 22	Course Name: Analog and Digital Communication Topic: PAM	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Articulate the concept of pulse position modulation
Teaching Aids (if any)	a. Power point presentation b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) Ask questions For what kind of signals is amplitude modulation performed? 2. **Pulse Position Modulation (PPM)**(30 minutes) - Working principle of PPM - Advantages a. Generation of PPMs - Block diagram - Waveform representation b. Reconstruction of PPM - Block diagram - Working principle - **3. Exercise (15 minutes) –** Ask students to solve numericals.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://youtu.be/oFEOryECzug
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 23	Course Name: Analog and Digital Communication Topic: PWM	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Articulate the concept of pulse width modulation
Teaching Aids (if any)	a. Power point presentation
Teaching Development	1. **Introduction** (5 minutes) - Ask questions What do you mean by PPM? What is the difference between PAM & PPM 2. **Pulse Width Modulation (PWM)**(30 minutes) - Working principle of PWM - Advantages a. Generation of PWM - Block diagram - Waveform representation b. Demodulation of PWM - Block diagram - Working principle **3. Exercise (5 minutes) –** Ask students to draw the PWM waveform for a given set of input signals. Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://youtu.be/oFEOryECzug https://youtu.be/OE_05sAxvJ8
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Compare the three types og Pulse Modulation Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 24	Course Name: Analog and Digital Communication Topic: PCM	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Articulate the concept of pulse width modulation
Teaching Aids (if any)	a. ICT
Teaching Development	1. **Introduction** (5 minutes) Ask questions What do you mean by PWM? What is the difference between PAM, PPM & PWM 2. **Pulse Code Modulation (PCM)** (30 minutes) Meaning of PCM Working principle of PCM Standards of PCM Bit rate and bandwidth of PCM Advantages Disadvantages Applications a. Generation and demodulation of PCM - Working principle - Block diagram **3. Exercise (5 minutes) –** Ask students to draw the PCM waveform for a given set of input signals.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://www.youtube.com/watch?v=l_SqkcP6hZ4 https://youtu.be/l_SqkcP6hZ4 https://youtu.be/oFEOryECzug?list=PLF84ABD7D4EBA31C4
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 25	Course Name: Analog and Digital Communication Topic: DM	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Understand the concept of Delta modulation
Teaching Aids (if any)	a. Power point presentation
Teaching Development	1. **Introduction** (5 minutes) - Ask questions What is the drawback of PCM? 2. **Delta Modulation (DM) (**30 minutes) - Meaning of delta modulation - Comparison with PCM a. Generation of DM - Working principle - Block diagram - Waveform b. DM Receivers - Block diagram - Mathematical analysis - Waveform c. Problems with Delta Modulation - Slope overload distortion - Granular noise **3. Exercise (5 minutes) –** Ask students to draw the DM waveform for a given set of input signals.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://www.youtube.com/watch?v=28STyWHDrN4 https://youtu.be/oFEOryECzug?list=PLF84ABD7D4EBA31C4 https://nptel.ac.in/content/storage2/courses/117105083/pdf/ssg_m3l7.pdf
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 26	Course Name: Analog and Digital Communication Topic: DPCM	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Illustrate the aperture effect b. Demonstrate the generation and detection of LPC
Teaching Aids (if any)	a. ICT
Teaching Development	1. **Introduction** (5 minutes) - Ask questions What is the drawback of DPCM? 2. **Linear prediction** (30 minutes) - Aperture effect and its mathematical analysis a. Linear Prediction Transmitter - Block diagram - Working principle b. Linear Prediction Receiver - Block diagram - Working principle **3. Exercise (5 minutes) –** Ask students to solve numerical problems based on aperture effect
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://www.youtube.com/watch?v=4uQsp10rGKU https://www.youtube.com/watch?v=2WNbari_Ktc
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 27	Course Name: Analog and Digital Communication Topic: ADPCM	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Demonstrate the generation and detection of ADPCM
Teaching Aids (if any)	a. ICT
Teaching Development	1. **Introduction** (5 minutes) - Ask questions What is the drawback of DPCM? 2. **Adaptive DPCM (ADPCM) (**30 minutes) - Meaning of ADPCM - Adaptive quantization a. Adaptive quantization - Adaptive quantization with forward estimation - Adaptive quantization with backward estimation b. Adaptive Prediction - Adaptive prediction with forward estimation - Adaptive prediction with backward estimation **3. Exercise (5 minutes) –** Ask students to solve numerical problems based on ADPCM
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://nptel.ac.in/content/storage2/courses/117105083/pdf/ssg_m3l7.pdf https://youtu.be/4rFo0EmcNQk
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Compare DM & ADPCM Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 28	Course Name: Analog and Digital Communication Topic: TDM	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Understand the concept of TDM b. Demonstrate the working of TDM
Teaching Aids (if any)	a. ICT
Teaching Development	**1 Introduction** Ask questions Basic concept of multiplexing Difference between multiplexer and de-multiplexer FDM 2 **Communication System** (30 minutes) TDMs Types of TDM Multiple access techniques and its types Introduction to narrowband system and wideband system **3 Exercise (5 minutes) –** Ask students to explain the difference between synchronous and asynchronous TDM
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://www.youtube.com/watch?v=udU5ykeHg3c https://nptel.ac.in/content/storage2/courses/106105080/pdf/M2L7.pdf
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 29	Course Name: Analog and Digital Communication Topic: Digital Modulation	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Understand Line codes and their types b. Articulate the concept of digital modulation and its types c. Introduce Passband Transmission Model
Teaching Aids (if any)	a. ICT
Teaching Development	1. **Introduction** (5 minutes) - Ask questions - What is modulation Need of modulation process Difference between analog and digital modulation 2. **Modulation** (30 minutes) a. Line codes and its types b. Properties of line codes c. Introduction to digital modulation techniques d. Digital Modulation Techniques Hierarchy e. Basic Elements of Passband Transmission Model **3. Exercise (5 minutes) –** Ask students to differentiate between different types of line codes Also ask to solve problems related to line codes. .
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://youtu.be/YWjTOS28Jrc https://youtu.be/zvN0lio7GbU https://youtu.be/BFL84OQhieQ
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Quiz Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 30	Course Name: Analog and Digital Communication Topic: Digital Modulation-ASK	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Understand the basics of ASK b. Demonstrate the generation and reception of ASK
Teaching Aids (if any)	a. Power point presentation
Teaching Development	1. **Introduction** (5 minutes) Ask questions What is FSK? Features of FSK Drawbacks of FSK 2. **Amplitude Shift Keying** (30 minutes) Introduction to the concept of ASK Signal space representation of ASK Generation of ASK - Working operation - Power spectral density - Bandwidth of ASK Detection of ASK - Working operation - Synchronization requirements Features and drawbacks of ASK **3. Exercise (5 minutes) –** Ask students to draw the waveform of FSK modulated wave
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://youtu.be/YWjTOS28Jrc https://youtu.be/zvN0lio7GbU https://youtu.be/BFL84OQhieQ
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 31	Course Name: Analog and Digital Communication Topic: Digital Modulation-FSK	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Understand the basics of FSK b. Demonstrate the generation and reception of FSK
Teaching Aids (if any)	a. ICT
Teaching Development	1. **Introduction** (5 minutes) Ask questions What are the types of line codes? Why do we use line codes? What is digital modulation? What are the types of digital modulation techniques? 2. **Frequency Shift Keying** (30 minutes) Introduction to the concept of FSK Generation of FSK Spectral of FSK signal Bandwidth of FSK signal Detection of FSK Geometrical representation of Orthogonal FSK Features and drawbacks of ASK **3. Exercise (5 minutes) –** Ask students to draw the waveform of FSK modulated wave
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://youtu.be/r297r3BolwA https://youtu.be/L5nDpNHDyOM https://youtu.be/ZW1glqkIgcw https://youtu.be/gP09GMjZ6q4
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 32	Course Name: Analog and Digital Communication Topic: Digital Modulation-BPSK	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Understand the basics of BPSK b. Demonstrate the generation and reception of BPSK
Teaching Aids (if any)	a. ICT
Teaching Development	1. **Introduction** (5 minutes) Ask questions What is ASK? Features of ASK Drawbacks of ASK 2. **Binary Phase Shift Keying** (30 minutes) Introduction to the concept of BPSK Generation of BPSK Detection of BPSK Features and drawbacks of BPSK **3. Exercise (5 minutes) –** Ask students to draw the waveform of BPSK modulated wave
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://youtu.be/t87ycrOrJd4 https://youtu.be/GK8OYC-YMwM
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Objectives	At the end of the lesson the student shall be able to: c. Understand the basics of FSK d. Demonstrate the generation and reception of FSK
Teaching Aids (if any)	b.
Teaching Development	1. **Introduction** (5 minutes) Ask questions What are the types of line codes? Why do we use line codes? What is digital modulation?

	What are the types of digital modulation techniques? 2. **Frequency Shift Keying** (30 minutes) Introduction to the concept of FSK Generation of FSK Spectral of FSK signal Bandwidth of FSK signal Detection of FSK Geometrical representation of Orthogonal FSK Features and drawbacks of ASK **3. Exercise (5 minutes) –** Ask students to draw the waveform of FSK modulated wave
Closure	3. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 4. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://youtu.be/r297r3BolwA https://youtu.be/L5nDpNHDyOM https://youtu.be/ZW1glqkIgcw https://youtu.be/gP09GMjZ6q4
Evaluation	2. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 33	Course Name: Analog and Digital Communication Topic: Digital Modulation-DPSK	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Understand the basics of DPSK b. Demonstrate the generation and reception of DPSK
Teaching Aids (if any)	a. ICT
Teaching Development	1. **Introduction** (5 minutes) Ask questions What is BPSK? Features of BPSK Drawbacks of BPSK 2. **Differential Phase Shift Keying** (30 minutes) Introduction to the concept of DPSK Generation of DPSK - Encoding technique - Waveform Detection of DPSK Bandwidth of DPSK Advantages and drawbacks of DPSK **3. Exercise (5 minutes) –** Ask students to differentiate between BPSK and DPSK modulated wave Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://youtu.be/gP09GMjZ6q4 https://youtu.be/zWJnGP5o7r4
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 34	Course Name: Analog and Digital Communication Topic: Digital Modulation-QPSK	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Understand the basics of QPSK b. Demonstrate the generation and reception of QPSK
Teaching Aids (if any)	a. ICT
Teaching Development	1. Introduction (5 minutes) Ask questions What is DPSK? Features of DPSK Drawbacks of DPSK 2. Quadrature Phase Shift Keying (30 minutes) Introduction to the concept of QPSK Mathematical representation of QPSK Generation of QPSK Detection of QPSK Error probability of QPSK Advantages and drawbacks of QPSK 3. Exercise (5 minutes) – Ask students to differentiate between PSK and QPSK modulated wave. Ask students to differentiate between BPSK and QPSK modulated wave
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://youtu.be/3ZWs84coJqc https://youtu.be/xD0dFjLEyCM https://youtu.be/4oQBM94-jGs https://youtu.be/kusgZJGbXyM
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 35	Course Name: Analog and Digital Communication Topic: Digital Modulation-DEPSK	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Understand the basics of DEPSK b. Demonstrate the generation and reception of DEPSK
Teaching Aids (if any)	a. ICT b.
Teaching Development	1. **Introduction** (5 minutes) Ask questions What is QPSK? Features of QPSK Drawbacks of QPSK 2. **Differential Encoded Phase Shift Keying** (30 minutes) Introduction to the concept of DEPSK Generation of DEPSK Detection of DEPSK Advantages and drawbacks of QPSK Error in DEPSK system **3. Exercise (5 minutes) –** Ask students to differentiate between DEPSK and DPSK modulated wave.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://youtu.be/gP09GMjZ6q4 https://youtu.be/zWJnGP5o7r4
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 36	Course Name: Analog and Digital Communication Topic: Digital Modulation- Mary	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Understand the basics of M-ary Modulation system b. Articulate the concept of M-ary PSK c. Demonstrate the generation and reception of M-ary PSK
Teaching Aids (if any)	a. Power point presentation
Teaching Development	1. **Introduction** (5 minutes) Ask questions What is DEPSK? Features of DEPSK Drawbacks of DEPSK How is DEPSK different from DPSK 2. **M-ary PSK** (30 minutes) Introduction to the concept of M-ary modulation technique Advantages and disadvantages of M-ary Types of M-ary system M-ary PSK - Signal space representation - Power spectral density - Bandwidth - Generation of M-ary PSK - Detection of M-ary PSK - Advantages and drawbacks of M-ary PSK **3. Exercise (5 minutes) –** Ask students to summarize various types of M-ary modulation system. Ask students Why MSK is called shaped QPSK.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://youtu.be/Rw7VK2__toA https://youtu.be/AOkR5AHp7H0

Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 37	Course Name: Analog and Digital Communication Topic: Digital Modulation types Comparison	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Familiarize with comparison between various modulation techniques
Teaching Aids (if any)	a. Power point presentation b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) Ask questions What is MSK? Difference between ASK, PSK, FSK Difference between DPSK and DEPSK 2. **Comparison of all Modulation techniques** (30 minutes) Comparison of modulation techniques like ASK, FSK, BPSK, DPSK, QPSK, DEPSK, M-ary PSK and MSK **3. Exercise (5 minutes) –** Ask students to find out which of the modulation technique is best among the all. List one application of each type
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://youtu.be/R4Ar9goLwss
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Objectives	At the end of the lesson the student shall be able to: b. Understand the basics difference between types f modulation techniques
Teaching Aids (if any)	c. ICT d.
Teaching Development	1. **Introduction** (5 minutes) Ask questions What is QPSK? Features of QPSK

	Drawbacks of QPSK 2. **Differential Encoded Phase Shift Keying** (30 minutes) Introduction to the concept of DEPSK Generation of DEPSK Detection of DEPSK Advantages and drawbacks of QPSK Error in DEPSK system **3. Exercise (5 minutes) –** Ask students to differentiate between DEPSK and DPSK modulated wave.
Closure	3. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 4. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://youtu.be/gP09GMjZ6q4 https://youtu.be/zWJnGP5o7r4
Evaluation	2. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 38	Course Name: Analog and Digital Communication Topic: Shannon coding	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Articulate the concept of Shannon Fanno Coding b. Understand the algorithm of Shannon Fanno Coding
Teaching Aids (if any)	a. ICT
Teaching Development	- **Introduction** (5 minutes) - Ask questions What is source coding? What are the various terminologies involved in source coding? - **Shannon Fanno coding** (30 minutes) - Introduction to Shannon Fanno Coding - Algorithm - Numerical problems related to Shannon Fanno Coding - - **Exercise (5 minutes) –** - Ask, students to solve numerical problems. .
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://youtu.be/U2cAJjXAuhw
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 39	Course Name: Analog and Digital Communication Topic: Huffman coding	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Articulate the concept of Huffman Coding b. Understand the algorithm and types of Huffman Coding
Teaching Aids (if any)	a. ICT
Teaching Development	**1. Introduction** (5 minutes) - Ask questions - What is Shannon Fanno Coding? - What are the various terminologies involved in Shannon Fanno Coding? **2. Huffman Coding** (30 minutes) - Introduction to Huffman Coding - Algorithm of Huffman Coding - Numerical problems based on types of Huffman Coding **3. Exercise (5 minutes) –** - Ask, students to solve numerical problems.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://nptel.ac.in/courses/108/108/108108168/ https://youtu.be/U2cAJjXAuhw https://youtu.be/hUIlYm4uIwc
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Numerical on Huffman coding 3. Spend 5 minutes to evaluate student assimilation of the lesson contents

Objectives	At the end of the lesson the student shall be able to: c. Articulate the concept of Shannon Fanno Coding d. Understand the algorithm of Shannon Fanno Coding

Teaching Aids (if any)	b. ICT
Teaching Development	- **Introduction** (5 minutes) - Ask questions What is source coding? What are the various terminologies involved in source coding? - **Shannon Fanno coding** (30 minutes) - Introduction to Shannon Fanno Coding - Algorithm - Numerical problems related to Shannon Fanno Coding - - **Exercise (5 minutes) –** - Ask, students to solve numerical problems. .
Closure	3. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 4. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://youtu.be/U2cAJjXAuhw
Evaluation	4. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 40	Course Name: Analog and Digital Communication Topic: Channel capacity	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Articulate the concept of Channel capacity theorem b. Illustrate the Shannon Hartley Theorem
Teaching Aids (if any)	a. ICT
Teaching Development	**1. Introduction** (5 minutes) - Ask questions - What is Huffman Coding? - Name the types of Huffman Coding? **2. Channel capacity theorem** (30 minutes) - Introduction to Shannon theorem - Introduction to the concept of Channel coding theorem (Shannon-Hartley theorem) - Numerical based on Channel coding theorem **3. Exercise (5 minutes) –** - Ask, students to solve numerical problems.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://nptel.ac.in/courses/108/108/108108168/ https://youtu.be/FxtIZO7a5ps
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 41	Course Name: Analog and Digital Communication Topic: Convolution coding	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Articulate the concept of convolutional coding b. Demonstrate code tree with the help of examples
Teaching Aids (if any)	a. ICT
Teaching Development	**1. Introduction** (5 minutes) - Ask questions - What do you mean by product coding? - What is repetitive encoding? **2. Convolution coding and decoding** (30 minutes) - Introduction to convolutional codes - Constant length - Code rate - Convolutional codes encoding and decoding its types - Code tree **3. Exercise (5 minutes) –** - Ask, students to solve numerical problems based on code tree. .
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://youtu.be/AnyVu5eDhAQ https://www.bing.com/videos/search?q=convolutinal+encoding+nptel+video&docid=608051482461560517&mid=4BCE77C3DE5EAB5408034BCE77C3DE5EAB540803&view=detail&FORM=VIRE
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 42	Course Name: Analog and Digital Communication Topic: Trellis Diagram	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Articulate the concept of state and trellis diagram b. Demonstrate state and trellis diagram with the help of examples
Teaching Aids (if any)	a. ICT
Teaching Development	**1. Introduction** (5 minutes) - Ask questions - What is convolution coding? - What is the need of convolutional coding? - Name different types of convolutional coding **2. State and Trellis diagram** (30 minutes) - Introduction to State and Trellis diagram - Numerical problems on State diagram and code trellis **3. Exercise (5 minutes) –** - Ask, students to solve numerical problem. -
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://youtu.be/6j9dcKhsYYU https://youtu.be/u9SAwbzQJ3o https://www.youtube.com/watch?v=6j9dcKhsYYU http://www.digimat.in/nptel/courses/video/117104120/L05.html
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 43	Course Name: Analog and Digital Communication a. Topic: Viterbi Decoding	Course No.: ECE-402

Objectives	At the end of the lesson the student shall be able to: a. Articulate the concept of Viterbi algorithm b. Demonstrate Viterbi decoding with the help of examples
Teaching Aids (if any)	a. ICT
Teaching Development	**1. Introduction** (5 minutes) - Ask questions - What do you mean by convolutional codes? - What is state diagram? - What is trellis diagram **2. Viterbi Algorithm** (30 minutes) - Introduction to Viterbi decoding - Viterbi algorithm - Examples of Viterbi decoding **3. Exercise (5 minutes) –** - Ask, students to solve numerical problems.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Video Lecture Spend 5 minutes to wrap up and consolidate the learnings https://youtu.be/z1MdvYu2ZHk https://youtu.be/JwWBfhfHq_M https://www.youtube.com/watch?v=JwWBfhfHq_M https://www.youtube.com/watch?v=z1MdvYu2ZHk
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents