



Kot Bhalwal, Jammu



Model Institute of Engineering
& Technology (Autonomous)
Dr. Arun K. Gupta Teaching-Learning Centre

Department of Computer Applications Details of Lesson Plan

S.No.	Particulars	Details
1.	Course Name	Computer Networks
2.	Course Code	MCA-203
3.	Academic Year	2024-25
4.	Semester	MCA – 2nd
5.	Number of Lesson plans	40
6.	Faculty Assigned	Ms. Deepanshi

Faculty Signature



Lesson Plan No. 1	Course Name: Computer Network Topic: Fundamentals of Communication	Course No.: MCA-203
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Objectives	At the end of the lesson the student shall be able to: a. Articulate the concept of fundamentals of communication. b. To study the basic taxonomy and terminology of the computer networking model and architecture
Teaching Aids (if any)	a. Power point presentation b. Use of Near pod tool for online quiz
Teaching Development	<p>1. Introduction (5 minutes)</p> <ul style="list-style-type: none">- Initiate discussion by asking thought-provoking questions:<ul style="list-style-type: none">- What are the fundamentals of communication?- How is data represented in communication systems?- Encourage students to share their understanding before introducing key concepts. <p>Development (30 minutes)</p> <ul style="list-style-type: none">• Overview of Fundamentals of Communication• Overview of Fundamental Characteristics• About Components<ul style="list-style-type: none">▪ Message▪ Sender▪ Receiver▪ Transmission medium▪ Protocol• About Data Representation• Components of Communication System• Explain each component with real-world examples:<ul style="list-style-type: none">▪ Message – The actual information being transmitted.▪ Sender – The device or user that initiates communication.▪ Receiver – The device or user that receives the message.▪ Transmission Medium – The channel through which data travels (wired/wireless).▪ Protocol – The set of rules governing communication (e.g., TCP/IP). <p>3. Exercise (5 minutes) – Use Google forms and the Near pod tool for quizzes based on the above topic Ask questions like:</p> <ol style="list-style-type: none">1. Differentiate between analog and digital communication.2. Discuss various types of transmission media used in



	communication. Use Nearpod to collect responses and discuss the answer.
Closure	<ol style="list-style-type: none">1. Summarize the Lesson Learning Outcomes and get affirmation from students on these.2. Suggested NPTEL Video lecture https://nptel.ac.in/courses/1061051833. Homework<ol style="list-style-type: none">a) Explain the fundamental components of data communication?b) Write the characteristics of communication <p>Spend 5 minutes to wrap up and consolidate the learnings</p>
Evaluation	<ol style="list-style-type: none">1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss.<ul style="list-style-type: none">• Define the term communication and explain its importance in networking.• Explain the key components of a communication system.• What are the major types of data representation in computer networks?2. Nearpod Quiz on Fundamentals of Communication. <p>Spend 5 minutes to evaluate student assimilation of the lesson contents</p>



Lesson Plan No. 2	Course Name: Computer Network Topic: Modulation	Course No.: MCA-203
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Objectives	At the end of the lesson the student shall be able to: a. Articulate the concept of data flow. b. Understand the concept of modularity. c. Appreciate the advantages of data flow and its associated challenges. d. Explain the significance of modulation in communication systems. e. Differentiate between various modulation techniques with practical applications
Teaching Aids (if any)	a. Power point presentation b. Use of Near pod tool for online quiz
Teaching Development	<p>1. Introduction (5 minutes)</p> <ul style="list-style-type: none">- Initiate discussion by asking thought-provoking questions:<ul style="list-style-type: none">- What are the characteristics of data flow?- What is modularity, and how is it applied in networks?- Why is modulation essential in communication?- Encourage students to share their understanding before introducing key concepts. <p>Development (30 minutes)</p> <ul style="list-style-type: none">• Overview of Data Flow<ul style="list-style-type: none">• Simplex• Half-Duplex• Full-Duplex• Overview of Modulation<ul style="list-style-type: none">• Amplitude modulation (AM)• Frequency modulation (FM)• Phase modulation (PM)• Types of Modulation<ul style="list-style-type: none">• Explain different types of modulation with waveform illustrations:• Amplitude Modulation (AM) – Varying amplitude of the carrier signal. Used in AM radio broadcasting.• Frequency Modulation (FM) – Varying frequency of the carrier signal. Used in FM radio and audio transmission.• Phase Modulation (PM) – Varying phase of the carrier signal. Used in digital communication and satellite systems.• Quadrature Amplitude Modulation (QAM) – Combination of AM and PM, used in digital TV and wireless networks. <p>2. Exercise (5 minutes) –</p>



	<p>Use Google forms and the Near pod tool for quizzes based on the above topic Use Nearpod to collect responses and discuss the answers</p>
Closure	<ol style="list-style-type: none">1. Summarize the Lesson Learning Outcomes and get affirmation from students on these.2. Suggested NPTEL Video lecture https://www.youtube.com/watch?v=S8Jod9AtpN4 https://archive.nptel.ac.in/courses/108/104/108104091/3. Homework<ol style="list-style-type: none">a. Define modulation and its role in communication systems.b. Explain why modulation is needed for efficient data transmission.c. Discuss real-world applications (e.g., radio, TV, mobile communication). <p>Spend 5 minutes to wrap up and consolidate the learnings</p>
Evaluation	<ol style="list-style-type: none">1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss.<ul style="list-style-type: none">- Define modulation and explain its significance in data communication.- Differentiate between AM, FM, and PM.- What are the advantages of full-duplex communication?- How does QAM enhance data transmission efficiency?2. Nearpod Quiz on Data Flow and Modularity <p>Spend 5 minutes to evaluate student assimilation of the lesson contents</p>



Lesson Plan No. 3	Course Name: Computer Network Topic: OSI Reference Model	Course No.: MCA-203
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Objectives	At the end of the lesson the student shall be able to: a. Articulate the concept of the OSI reference model. b. Understand the functions and responsibilities of each OSI layer. c. Appreciate the advantages and challenges associated with the OSI model. d. Compare the OSI model with the TCP/IP model.
Teaching Aids (if any)	a. Power point presentation b. Use of Near pod tool for online quiz c. Real-world examples of protocol usage at different OSI layers
Teaching Development	<p>1. Introduction (5 minutes)</p> <ul style="list-style-type: none"> - Initiate discussion by asking thought-provoking questions: - How do devices send and receive data or communicate? - What protocols are followed between two devices? - How does breaking down communication into layers help network engineers? - Encourage students to share their thoughts before introducing the OSI model. <p>Development (30 minutes) Overview of OSI Reference Model Characteristics of OSI Model Functions of the OSI Layers</p> <ul style="list-style-type: none"> ▪ Physical layer ▪ Data-Link Layer ▪ Network Layer ▪ Transport Layer ▪ Session Layer ▪ Presentation Layer ▪ Application Layer <p>Its Function and Advantages and Disadvantages</p> <p>3. Exercise (5 minutes) – Use Google forms and the Near pod tool for quizzes based on the above topic</p> <p>Use Nearpod to collect responses and discuss the answers.</p>
Closure	<p>1. Summarize the Lesson Learning Outcomes and get affirmation from students on these.</p> <p>2. Suggested NPTEL Video lecture https://www.youtube.com/watch?v=8BK70UDgyrc&list=PLbRMhDVUMngf-peFloB7kyiA40EptH1up&index=5</p> <p>3. Homework</p> <ul style="list-style-type: none"> • Explain briefly the responsibilities of each layer in the OSI model. • Describe the function of each layer in the OSI model with real-world examples.



	<ul style="list-style-type: none">• Compare and contrast the OSI model with the TCP/IP model. <p>Spend 5 minutes to wrap up and consolidate the learnings</p>
Evaluation	<ol style="list-style-type: none">1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss.<ul style="list-style-type: none">- Define the OSI reference model and its significance in network communication.- How does each layer contribute to end-to-end data transmission?- What are the practical differences between OSI and TCP/IP models?- Why is the transport layer crucial for reliable communication?2. Nearpod Quiz on OSI Reference Model <p>Spend 5 minutes to evaluate student assimilation of the lesson contents</p>



Lesson Plan No. 4	Course Name: Computer Network Topic: TCP/IP model	Course No.: MCA-203
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Objectives	At the end of the lesson the student shall be able to: a. Explain the concept and structure of the TCP/IP Model. b. Identify and describe the functions of each layer in the TCP/IP Model. c. Compare the advantages and challenges of the TCP/IP Model. d. Differentiate TCP/IP from the OSI Model.
Teaching Aids (if any)	a. Power point presentation b. Use of Near pod tool for online quiz
Teaching Development	<p>1. Introduction (5 minutes)</p> <ul style="list-style-type: none">- Begin with a brief recap of the OSI Model.- Ask guiding questions:<ul style="list-style-type: none">- What do you know about network models?- How many layers does the OSI Model have?- How do different layers interact with each other?- Introduce the TCP/IP Model as the backbone of modern networking. <p>Development (30 minutes)</p> <ul style="list-style-type: none">• Overview of TCP/IP Model Define the TCP/IP Model and its significance. Discuss its historical background and why it is widely used.• Characteristics of TCP/IP• Model Functions of the TCP/IP Layers<ul style="list-style-type: none">○ Physical layer○ Data-Link Layer○ Network Layer○ User Datagram Protocol○ Transmission control protocol○ Transport Layer○ IP Protocol○ ARP Protocol○ ICMP Protocol○ Application Layer○ Its Function and Advantages and Disadvantages <p>3. Exercise (5 minutes) – Engage students by asking:<ul style="list-style-type: none">- Can you summarize the key functions of the Transport Layer?- How does TCP differ from UDP?</p> <p>Use Nearpod to ask questions and discuss the answers.</p>



Closure	<ol style="list-style-type: none">1. Summarize the Lesson Learning Outcomes and get affirmation from students on these.<ul style="list-style-type: none">- The role and significance of TCP/IP layers.- Core protocols at each layer.- Comparison with OSI Model.2. Suggested NPTEL Video lecture https://www.youtube.com/watch?v=zzXs0EnCin03. Homework Describe the function of each layer in the TCP/IP model. <p>Spend 5 minutes to wrap up and consolidate the learnings</p>
Evaluation	<ol style="list-style-type: none">1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss.<ul style="list-style-type: none">- Can you summarize the key functions of the Transport Layer?- How does TCP differ from UDP?2. Nearpod Quiz: Assess understanding of OSI and TCP/IP Models.3. Discussion: Address misconceptions and clarify doubts. <p>Spend 5 minutes to evaluate student assimilation of the lesson contents</p>



Lesson Plan No. 5	Course Name: Computer Network Topic: Transmission Impairment	Course No.: MCA-203
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Objectives	At the end of the lesson the student shall be able to: a. Articulate the concept of Transmission Impairment b. Analyze the various reasons of degradation in the signal
Teaching Aids (if any)	a. Power point presentation b. Use of Near pod tool for online quiz
Teaching Development	<ul style="list-style-type: none">• Introduction (5 minutes)<ul style="list-style-type: none">- Ask guiding questions:- What are the various reasons for degradation in a signal?- Introduce Transmission Impairment and its significance in networking.1. Development (30 minutes)<ul style="list-style-type: none">a. Overview of Transmission Impairment (10 minutes)<ul style="list-style-type: none">- Define Transmission Impairment and its impact on network communication.b. Types of Transmission Impairment (20 minutes)<ul style="list-style-type: none">- Attenuation- Explain signal weakening over distance.- Discuss amplification techniques to counteract attenuation.- Distortion- Define distortion and its effect on signals.- Discuss solutions to minimize distortion in transmission.c. Noise<ul style="list-style-type: none">- Define different types of noise (thermal noise, intermodulation, impulse noise, etc.).- Discuss noise reduction techniques (shielding, filtering, and error detection mechanisms).2. Exercise (5 minutes) –<ul style="list-style-type: none">- Use Google forms and the Near pod tool for quizzes based on the above topic- Quick assessment on transmission impairment types and solutions. <p>Use Nearpod to collect responses and discuss the answers.</p>
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. <ul style="list-style-type: none">- Definition and impact of Transmission Impairment.- Types of impairment: Attenuation, Distortion, and Noise.- Methods to counteract signal degradation.



	<p>2. Suggested NPTEL Video lecture https://www.youtube.com/watch?v=WRgJKeGIz6A&t=2099s</p> <p>3. Homework</p> <ul style="list-style-type: none">- Explain various types of transmission Impairment.- Explain various types of Transmission Impairment with real-world examples.- Discuss strategies to minimize signal degradation. <p>Spend 5 minutes to wrap up and consolidate the learnings</p>
Evaluation	<p>1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss.</p> <ul style="list-style-type: none">- What is the impact of distortion on a transmitted signal?- Why is amplification important in reducing attenuation? <p>2. Nearpod Quiz on transmission Impairment</p> <p>Spend 5 minutes to evaluate student assimilation of the lesson contents</p>



Lesson Plan No. 6	Course Name: Computer Network Topic: Guided Transmission Media	Course No.: MCA-203
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Objectives	At the end of the lesson the student shall be able to: a. Articulate the concept of Guided Transmission Media b. Analyze the advantages of various Guided Transmission media and its associated challenges.
Teaching Aids (if any)	a. Power point presentation b. Use of Near pod tool for online quiz
Teaching Development	Introduction (5 minutes) <ul style="list-style-type: none">- Ask guiding questions:- What is Guided Transmission?- How many types of media are required to transmit data?- Introduce Guided Transmission Media and its role in networking. Development (30 minutes) <ul style="list-style-type: none">a. Overview of Guided Transmission Media (10 minutes)<ul style="list-style-type: none">- Define Guided Transmission Media and its significance.- Discuss how it differs from Unguided Transmission Media.b. Types of Guided Transmission Media (10 minutes)<ul style="list-style-type: none">- Twisted Pair Cable<ul style="list-style-type: none">o Function and characteristics.o Advantages: Cost-effectiveness, easy installation.o Disadvantages: Susceptible to interference, limited bandwidth.- Coaxial Cable<ul style="list-style-type: none">o Structure and working mechanism.o Advantages: Better shielding, higher bandwidth than twisted pair.o Disadvantages: Expensive, difficult to install over long distances.- Fiber Optics<ul style="list-style-type: none">o Principles of light transmission.o Advantages: High speed, low attenuation, immunity to interference.o Disadvantages: Expensive, complex installation and maintenance.c. Comparative Analysis (10 minutes)<ul style="list-style-type: none">o Compare Twisted Pair, Coaxial Cable, and Fiber Optics in terms of cost, speed, reliability, and applications.o Discuss real-world applications (e.g., LAN, WAN, Broadband, Enterprise Networks).



	<p>1. Exercise (5 minutes) –</p> <ul style="list-style-type: none">- Use Google forms or the Near pod tool for quizzes based on the above topic.- Quick assessment on transmission media types and their applications. <p>Use Nearpod to collect responses and discuss the answers.</p>
Closure	<p>1. Summarize the Lesson Learning Outcomes and get affirmation from students on these.</p> <ul style="list-style-type: none">- Definition and importance of Guided Transmission Media.- Types of guided media: Twisted Pair, Coaxial Cable, Fiber Optics.- Advantages and disadvantages of each type. <p>2. Suggested NPTEL Video lecture https://www.youtube.com/watch?v=hjVNKeVdKcs</p> <p>3. Homework</p> <ul style="list-style-type: none">- What type of cabling out of twisted pair, coaxial cable and fiber optics is suitable for LAN in the department? Justify your answer- What type of cabling (Twisted Pair, Coaxial Cable, Fiber Optics) is most suitable for a LAN setup in your department? Justify your answer. <p>Spend 5 minutes to wrap up and consolidate the learnings</p>
Evaluation	<p>1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss.</p> <ul style="list-style-type: none">- Which type of transmission media is most suitable for high-speed data transfer?- How does fiber optics compare with twisted pair cables in terms of performance?- Why is shielding important in coaxial cables?- What factors influence the choice of transmission media? <p>2. Nearpod Quiz: Assess understanding of Guided Transmission Media.</p> <p>3. Discussion: Address misconceptions and clarify doubts.</p> <p>Spend 5 minutes to evaluate student assimilation of the lesson contents</p>



Lesson Plan No. 7	Course Name: Computer Network Topic: Unguided Transmission Media	Course No.: MCA-203
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Objectives	At the end of the lesson the student shall be able to: a. Articulate the concept of Unguided Transmission Media b. Analyze the advantages of various Unguided Transmission media and its associated challenges.
Teaching Aids (if any)	a. Power point presentation b. Use of Near pod tool for online quiz
Teaching Development	<ul style="list-style-type: none">• Introduction (5 minutes) Ask guiding questions:<ul style="list-style-type: none">- What is Unguided Transmission?- How many types of media are required to transmit data?- Introduce Unguided Transmission Media and its role in wireless communication.• Development (30 minutes)<ul style="list-style-type: none">a. Overview of Unguided Transmission Media (10 minutes)<ul style="list-style-type: none">- Define Unguided Transmission Media and its significance.- Discuss how it differs from Guided Transmission Media.b. Types of Unguided Transmission Media (20 minutes)<ul style="list-style-type: none">• Radio Waves<ul style="list-style-type: none">- Function and characteristics.- Advantages: Long-distance communication, good penetration.- Disadvantages: Susceptible to interference, limited bandwidth.• Infrared Waves (5 minutes)<ul style="list-style-type: none">- Principles of infrared transmission.- Advantages: Secure communication, free from electromagnetic interference.- Disadvantages: Requires line-of-sight, short-range.• Microwaves (5 minutes)<ul style="list-style-type: none">- Structure and working mechanism.- Advantages: High-speed data transmission, suitable for satellite links.- Disadvantages: Affected by weather conditions, requires direct line-of-sight.• Satellite Communication (5 minutes)<ul style="list-style-type: none">- Principles of satellite-based communication.- Advantages: Global coverage, reliable for long-distance communication.- Disadvantages: High latency, expensive infrastructure.c. Comparative Analysis (5 minutes)<ul style="list-style-type: none">- Compare Radio Waves, Infrared, Microwaves, and Satellites in terms of cost, speed, reliability, and



	<p>applications.</p> <ul style="list-style-type: none">- Discuss real-world applications (e.g., mobile networks, Wi-Fi, remote sensing, GPS). <p>2. Exercise (5 minutes) –</p> <ul style="list-style-type: none">- Use Google forms or the Near pod tool for quizzes based on the above topic.- Quick assessment on transmission media types and their applications. <p>Use Nearpod to collect responses and discuss the answers.</p>
Closure	<ol style="list-style-type: none">1. Summarize the Lesson Learning Outcomes and get affirmation from students on these.<ul style="list-style-type: none">- Definition and importance of Unguided Transmission Media.- Types of Unguided Media: Radio Waves, Infrared, Microwaves, Satellites.- Advantages and disadvantages of each type.2. Suggested NPTEL Video lecture https://www.youtube.com/watch?v=Gk9jpUNBYXg3. Homework Discuss various types of Unguided Transmission Media Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	<ol style="list-style-type: none">1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss.<ul style="list-style-type: none">- Which type of transmission media is most suitable for satellite communication?- Why is line-of-sight crucial for infrared and microwave transmission?- What factors influence the choice of wireless transmission media?- How does microwave transmission compare with radio waves in terms of performance?2. Nearpod Quiz on Unguided Transmission Media <p>Spend 5 minutes to evaluate student assimilation of the lesson contents</p>



Lesson Plan No. 8	Course Name: Computer Network Topic: Switching Technique	Course No.: MCA-203
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Objectives	At the end of the lesson the student shall be able to: a. Articulate the concept of the Switching technique b. Analyze the advantages of the Switching technique and its associated challenges.
Teaching Aids (if any)	a. Power point presentation b. Use of Near pod tool for online quiz
Teaching Development	<p>1. Introduction (5 minutes)</p> <ul style="list-style-type: none"> - Ask guiding questions: <ul style="list-style-type: none"> o What is Switching in Networking? o Why do we need Switching Techniques in data communication? - Introduce Switching Techniques and their importance in network communication. <p>Development (30 minutes)</p> <p>a. Overview of Switching Techniques (5 minutes)</p> <ul style="list-style-type: none"> - Define Switching and its role in data transmission. - Discuss why Switching is essential in network communications. <p>b. Types of Switching Techniques (20 minutes)</p> <ul style="list-style-type: none"> • Circuit Switching <ul style="list-style-type: none"> - How Circuit Switching works. - Advantages: Dedicated path, minimal delay during transmission. - Disadvantages: Inefficient for bursty traffic, high setup time. • Packet Switching <ul style="list-style-type: none"> - Working mechanism of Packet Switching (Datagram & Virtual Circuit). - Advantages: Efficient bandwidth utilization, dynamic routing. - Disadvantages: Possible delays due to congestion. • Message Switching <ul style="list-style-type: none"> - How Message Switching differs from Circuit and Packet Switching. - Advantages: No need for dedicated path, good for non-time-sensitive communication. - Disadvantages: High latency, requires large storage. <p>c. Comparative Analysis</p> <ul style="list-style-type: none"> - Compare Circuit, Packet, and Message Switching based on speed, cost, efficiency, and applications. - Discuss real-world applications (e.g., VoIP, video conferencing, cloud networking). <p>3. Exercise (5 minutes) –</p> <ul style="list-style-type: none"> - Use Google forms or the Near pod tool for quizzes based on



	<p>the above topic</p> <ul style="list-style-type: none">- Quick assessment on Switching Techniques and their applications. <p>Use Nearpod to collect responses and discuss the answers.</p>
Closure	<ol style="list-style-type: none">1. Summarize the Lesson Learning Outcomes and get affirmation from students on these.<ul style="list-style-type: none">- Definition and importance of Switching Techniques.- Types: Circuit Switching, Packet Switching, and Message Switching.- Advantages and disadvantages of each technique.2. Suggested NPTEL Video lecture https://www.youtube.com/watch?v=yZV3y-usK_g https://www.youtube.com/watch?v=SaQ3RhRVT6c3. Homework<ul style="list-style-type: none">• What are the two approaches to packet switching?• Describe the need for switching and define a switch? <p>Spend 5 minutes to wrap up and consolidate the learnings</p>
Evaluation	<ol style="list-style-type: none">1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss.<ul style="list-style-type: none">- Which Switching technique is best suited for real-time communication?- Why is Packet Switching widely used in the Internet?- What are the major drawbacks of Circuit Switching?- How does Packet Switching improve network efficiency?2. Nearpod Quiz: Assess understanding of Switching Techniques.3. Discussion: Address misconceptions and clarify doubts. <p>Spend 5 minutes to evaluate student assimilation of the lesson contents.</p>



Lesson Plan No. 9	Course Name: Computer Network Topic: Data Encoding	Course No.: MCA-203
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Objectives	At the end of the lesson the student shall be able to: <ol style="list-style-type: none"> Articulate the concept of various Data Encoding techniques. Analyze the process of using various patterns of voltage in encoding. Compare different encoding techniques based on efficiency and application.
Teaching Aids (if any)	<ol style="list-style-type: none"> Power point presentation Use of Near pod tool for online quiz
Teaching Development	<p>1. Introduction (5 minutes)</p> <ul style="list-style-type: none"> - Engage students with thought-provoking questions: - What is encoding? - Define decoding. - Why is data encoding important in networking? <p>Development (30 minutes)</p> <ol style="list-style-type: none"> Overview of Data Encoding (10 minutes) <ul style="list-style-type: none"> - Define data encoding and its role in digital communication. - Explain the need for different encoding schemes. Types of Line Encoding Techniques (10 minutes) <ul style="list-style-type: none"> • Unipolar Encoding <ul style="list-style-type: none"> - Concept and working principle. - Advantages and disadvantages. - Real-world applications. • Polar Encoding <ul style="list-style-type: none"> - Explanation of NRZ-L and NRZ-I encoding. - Benefits and drawbacks. - Examples of usage. • Bipolar Encoding <ul style="list-style-type: none"> - Alternate Mark Inversion (AMI) encoding. - How it reduces DC component in transmission. - Where it is used. Manchester Encoding (5 minutes) <ul style="list-style-type: none"> - Self-clocking nature of Manchester encoding. - Comparison with other techniques. - Its role in Ethernet communication. Comparative Analysis (10 minutes) <ul style="list-style-type: none"> - Compare Unipolar, Polar, Bipolar, and Manchester encoding in terms of efficiency, power consumption, and synchronization. - Discuss real-world applications of each technique. <p>Exercise (5 minutes) –</p> <ul style="list-style-type: none"> - Use Google forms and the Near pod tool for quizzes based on the above topic.



	<ul style="list-style-type: none">- Quick assessment on encoding techniques. <p>Use Nearpod to collect responses and discuss the answers.</p>
Closure	<ol style="list-style-type: none">1. Summarize the Lesson Learning Outcomes and get affirmation from students on these.<ul style="list-style-type: none">- Definition and importance of Data Encoding.- Types: Unipolar, Polar, Bipolar, and Manchester encoding.- Comparative analysis and real-world applications.2. Suggested NPTEL Video lecture https://www.youtube.com/watch?v=ifgs0uypC78&list=PL8BF3052396E05930&index=93. Homework<ul style="list-style-type: none">- Draw line encoding patterns for Unipolar, Polar, Bipolar, and Manchester.- Which encoding technique is the most efficient and why?- Where is Manchester encoding commonly used? <p>Spend 5 minutes to wrap up and consolidate the learnings</p>
Evaluation	<ol style="list-style-type: none">1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss.<ul style="list-style-type: none">- Why do some encoding techniques require synchronization?- What is the advantage of Bipolar encoding over Unipolar encoding?2. Nearpod Quiz: Interactive quiz on encoding techniques with pattern identification. <p>Spend 5 minutes to evaluate student assimilation of the lesson contents</p>



Lesson Plan No. 10	Course Name: Computer Network Topic: Error detection & Correction	Course No.: MCA-203
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Objectives	At the end of the lesson the student shall be able to: a. Explain the concept of error detection in networking. b. Analyze different error detection techniques used in communication systems. c. Compare the effectiveness and limitations of various error detection methods.
Teaching Aids (if any)	a. Power point presentation b. Use of Near pod tool for online quiz
Teaching Development	1. Introduction (5 minutes) Ask questions. Role of Datalink Layer What is an Error? 2. Development (30 minutes) • Overview of Data Link Layer ▪ Services • Overview of Error Detection • Single parity check • Two-dimensional parity check • Checksum • Cyclic redundancy check • Advantages and Disadvantages • Overview of Error Correction ▪ Hamming Code 3. Exercise (5 minutes) – - Use Google forms and the Near pod tool for quizzes based on the above topic - Quick assessment on error detection techniques. Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. - Importance of error detection in networking. - Various error detection techniques and their working principles. - Comparative analysis of different methods. 2. Suggested NPTEL Video lecture https://nptel.ac.in/courses/106105183 3. Homework - Discuss the concept of redundancy in error detection and correction? - Which error detection technique is most reliable and why? - How does Hamming Code help in both error detection and correction?



	Spend 5 minutes to wrap up and consolidate the learnings.
Evaluation	<ol style="list-style-type: none">1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss.<ul style="list-style-type: none">- Explain how CRC is used for error detection in Ethernet networks.- Solve a Hamming Code problem for a given binary data.- Why is CRC preferred over a simple checksum?- How does a parity bit help in error detection?2. Nearpod Quiz: Interactive quiz on error detection techniques with problem-solving scenarios. <p>Spend 5 minutes to evaluate student assimilation of the lesson contents</p>



Lesson Plan No. 11	Course Name: Computer Network Topic: Elementary Data link protocols	Course No.: MCA-203
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Objectives	At the end of the lesson the student shall be able to: <ul style="list-style-type: none"> a. Articulate the concept of the Flow Control b. To study the fundamentals of data link protocols c. Understand the various types of Data link protocols
Teaching Aids (if any)	<ul style="list-style-type: none"> a. Power point presentation b. Use of Near pod tool for online quiz
Teaching Development	<p>1. Introduction (5 minutes)</p> <ul style="list-style-type: none"> - Engage students with thought-provoking questions: - What is the role of the Data Link Layer in networking? - Why do we need protocols for data transmission? - Can data be transmitted without protocols? <p>Development (30 minutes)</p> <ul style="list-style-type: none"> • Overview of Data Link protocols <ul style="list-style-type: none"> ▪ Various types <ul style="list-style-type: none"> Noiseless channels <ul style="list-style-type: none"> • Simplest • Stop & wait Noisy channels <ul style="list-style-type: none"> • Stop & wait ARQ • Go Back N ARQ • Selective Repeat ARQ • Advantages and Disadvantages • Explain the function of elementary data link protocols. • Discuss the challenges in data transmission (framing, error control, flow control). <p>2. Exercise (5 minutes) –</p> <ul style="list-style-type: none"> - Use Google forms or the Near pod tool for quizzes based on the above topic - Quick assessment on elementary data link protocols. <p>Use Nearpod to collect responses and discuss the answers.</p>
Closure	<ol style="list-style-type: none"> 1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. <ul style="list-style-type: none"> - Role of Data Link Protocols in networking. - Types: Simplex, Stop-and-Wait, and Sliding Window protocols. - Strengths and weaknesses of each technique. 2. Suggested NPTEL Video lecture https://nptel.ac.in/courses/106105183 3. Homework <ul style="list-style-type: none"> • Discuss noiseless protocol? • Explain what is stop and wait ARQ?



	<ul style="list-style-type: none">• Which protocol is most efficient for real-time video streaming?• How does Stop-and-Wait differ from Go-Back-N? <p>Spend 5 minutes to wrap up and consolidate the learnings</p>
Evaluation	<ol style="list-style-type: none">1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss.<ul style="list-style-type: none">- Why is Selective Repeat more efficient than Go-Back-N in certain scenarios?- Can Stop-and-Wait be used for high-speed networks? Why or why not?2. Nearpod Quiz: Interactive quiz on elementary data link protocols. <p>Spend 5 minutes to evaluate student assimilation of the lesson contents.</p>



Lesson Plan No. 12	Course Name: Computer Network Topic: Channel allocation methods	Course No.: MCA-203
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Objectives	At the end of the lesson the student shall be able to: a. Articulate the concept of the Channel allocation methods b. To study the various types of Channel allocation methods
Teaching Aids (if any)	a. Power point presentation b. Use of Near pod tool for online quiz
Teaching Development	1. Introduction (5 minutes) Ask questions. Flow Control Techniques 2. Development (30 minutes) • Channel Allocation Problem ▪ Static Channel Allocation ▪ Dynamic Channel Allocation • Advantages and Disadvantages 3. Exercise (5 minutes) – Use Google forms and the Near pod tool for quizzes based on the above topic Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. These methods aim to optimize the use of communication channels, with each having specific benefits and limitations depending on network size, user behavior, and traffic demand. 2. Suggested NPTEL Video lecture https://nptel.ac.in/courses/106105183 3. Homework - Compare n contrast between the two types of channel allocation methods. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Channel allocation methods Spend 5 minutes to evaluate student assimilation of the lesson contents



Lesson Plan No. 13	Course Name: Computer Network Topic: Random Access Protocol	Course No.: MCA-203
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Objectives	At the end of the lesson the student shall be able to: a. Articulate the concept of the multiple access protocol b. To study the fundamentals of data communication and protocols c. Appreciate the advantages of multiple access protocols and its associated challenges.
Teaching Aids (if any)	a. Power point presentation b. Use of Near pod tool for online quiz
Teaching Development	1. Introduction (5 minutes) Ask questions. Flow Control Techniques 2. Development (30 minutes) <ul style="list-style-type: none">• Overview of Multiple Access Protocol• About Random Access Protocol<ul style="list-style-type: none">• ALOHA• CSMA• CSMA/CA• CSMA/CD▪ About Controlled Access Protocol<ul style="list-style-type: none">▪ Reservation▪ Polling▪ Token Passing▪ About Channelization Protocol<ul style="list-style-type: none">▪ TDMA,FDMA,CDMA• Advantages and Disadvantages 3. Exercise (5 minutes) – Use Google forms and the Near pod tool for quizzes based on the above topic 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 NPTEL Video lecture https://nptel.ac.in/courses/106105183 3. Homework <ul style="list-style-type: none">• Define controlled access and list three protocols in this category?• Define random access and list three protocols in this category? Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Nearpod Quiz on Random Access Protocol Spend 5 minutes to evaluate student assimilation of the lesson contents



Lesson Plan No. 14	Course Name: Computer Network Topic: IEEE standard 802 for LANS	Course No.: MCA-203
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Objectives	At the end of the lesson the student shall be able to: a. To study the various IEEE standard 802 for LANS b. Articulate the concept of ethernet
Teaching Aids (if any)	a. Power point presentation b. Use of Near pod tool for online quiz
Teaching Development	1. Introduction (5 minutes) Ask questions. What is LAN? 2. Development (30 minutes) <ul style="list-style-type: none">• Various IEEE standard 802 for LANS• Introduction on Ethernet• IEEE 802.3 Popular Versions• Frame format of Ethernet 3. Exercise (5 minutes) – Use Google forms and the Near pod tool for quizzes based on the above topic 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 NPTEL Video lecture https://nptel.ac.in/courses/106105183 3. Homework <ul style="list-style-type: none">a. Discuss IEEE standard 802 for LANSb. What is the Frame format of 802.3? Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Ethernet Spend 5 minutes to evaluate student assimilation of the lesson contents



Lesson Plan No. 15	Course Name: Computer Network Topic: IEEE standard 802 for LANS	Course No.: MCA-203
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Objectives	At the end of the lesson the student shall be able to: a. To study the concept of Token Ring b. Understand the concept of Token Bus
Teaching Aids (if any)	a. Power point presentation b. Use of Near pod tool for online quiz
Teaching Development	1. Introduction (5 minutes) Ask questions. What is Ethernet? IEEE standard 802 for LANs? 2. Development (30 minutes) Token Bus <ul style="list-style-type: none"> • Introduction on Token Bus • Organisation of Token Bus Token Ring <ul style="list-style-type: none"> • Introduction on Token Ring • Various types of Token Ring 3. Exercise (5 minutes) – Use Google forms and the Near pod tool for quizzes based on the above topic 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 NPTEL Video lecture https://nptel.ac.in/courses/106105183 3. Homework <ul style="list-style-type: none"> a. Discuss organization of Token Bus b. What are types of Token Ring? Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Token Bus & Token Ring Spend 5 minutes to evaluate student assimilation of the lesson contents



Lesson Plan No. 16	Course Name: Computer Network Topic: Network Establishment Concepts	Course No.: MCA-203
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Objectives	At the end of the lesson the student shall be able to: a. To study the role of Network Layer b. Articulate the concept of Connection less and connection-oriented Services.
Teaching Aids (if any)	a. Power point presentation b. Use of Near pod tool for online quiz
Teaching Development	1. Introduction (5 minutes) Ask questions. What is the role of Network layer ? Services offered by Network layer? 2. Development (30 minutes) <ul style="list-style-type: none">• Overview of Network layer• Explain Connection less Services• Explain Connection-oriented Services 3. Exercise (5 minutes) – Use Google forms and the Near pod tool for quizzes based on the above topic 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 NPTEL Video lecture https://nptel.ac.in/courses/106105183 3. Homework a. Differentiate between connectionless and connection-oriented services? b. Differentiate between Adaptative and Non-Adaptative services? Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Network layer Spend 5 minutes to evaluate student assimilation of the lesson contents



Lesson Plan No. 17	Course Name: Computer Network Topic: Switching Techniques	Course No.: MCA-203
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Objectives	At the end of the lesson the student shall be able to: a. To study the role of Switching techniques b. Articulate the various types switching techniques
Teaching Aids (if any)	a. Power point presentation b. Use of Near pod tool for online quiz
Teaching Development	1. Introduction (5 minutes) Ask questions. What is the role of switch? 2. Development (30 minutes) <ul style="list-style-type: none">• Introduction of Switching Techniques• Explain types of switching techniques:<ul style="list-style-type: none">• Circuit switching• Message switching• Packet switching• Advantages & disadvantages:<ul style="list-style-type: none">• Circuit switching• Message switching• Packet switching 3. Exercise (5 minutes) – Use Google forms and the Near pod tool for quizzes based on the above topic 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 NPTEL Video lecture https://nptel.ac.in/courses/106105183 3. Homework <ul style="list-style-type: none">a. Explain types of Switching Techniquesb. Discuss the advantage & disadvantage of each of the switching technique Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Switching Techniques Spend 5 minutes to evaluate student assimilation of the lesson contents



Lesson Plan No. 18	Course Name: Computer Network Topic: Flooding	Course No.: MCA-203
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Objectives	At the end of the lesson the student shall be able to: a. To study the role of Routing Protocol b. Articulate the various types Flooding
Teaching Aids (if any)	a. Power point presentation b. Use of Near pod tool for online quiz
Teaching Development	1. Introduction (5 minutes) Ask questions. What is the role of Router? 2. Development (30 minutes) Introduction of Flooding Explain types of Flooding: <ul style="list-style-type: none">▪ Uncontrolled flooding▪ Controlled flooding▪ Selective flooding Advantages & disadvantages Example for explanation 3. Exercise (5 minutes) – <ul style="list-style-type: none">- Use Google forms or the Near pod tool for quizzes based on the above topic- Ask questions related to the flooding- 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 NPTEL Video lecture https://nptel.ac.in/courses/106105183 3. Homework Explain types of Flooding Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Flooding Spend 5 minutes to evaluate student assimilation of the lesson contents



Lesson Plan No. 19	Course Name: Computer Network Topic: Link State Routing	Course No.: MCA-203
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Objectives	At the end of the lesson the student shall be able to: a. To study the concept of Link State Routing b. Articulate the various phases of Link State Routing
Teaching Aids (if any)	a. Power point presentation b. Use of Near pod tool for online quiz
Teaching Development	1. Introduction (5 minutes) Ask questions. What is the role of Routing algorithm? 2. Development (30 minutes) <ul style="list-style-type: none">• Introduction of Link State Routing• Explain various phases of Link State Routing:<ul style="list-style-type: none">• Phase 1: reliable flooding• Phase 2 : Route calculation• Advantages & disadvantages• Example/numerical 3. Exercise (5 minutes) – Use Google forms and the Near pod tool for quizzes based on the above topic. 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 NPTEL Video lecture https://nptel.ac.in/courses/106105183 3. Homework <ul style="list-style-type: none">a. Explain Phases of Link State Routingb. Discuss the advantage & disadvantage for Link State Routing Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Link State Routing Spend 5 minutes to evaluate student assimilation of the lesson contents



Lesson Plan No. 20	Course Name: Computer Network Topic: Shortest path Routing	Course No.: MCA-203
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Objectives	At the end of the lesson the student shall be able to: a. To study the concept of Shortest Path Routing b. Understand the Dijkstra's method finding shortest route
Teaching Aids (if any)	a. Power point presentation b. Use of Near pod tool for online quiz
Teaching Development	1. Introduction (5 minutes) Ask questions. What is the role of Routing algorithm? 2. Development (30 minutes) <ul style="list-style-type: none">• Introduction of Shortest Path Routing• Explain the method of finding shortest route<ul style="list-style-type: none">• Dijkstra's algorithm• Advantages & disadvantages• Example/numerical 3. Exercise (5 minutes) – Use Google forms and the Near pod tool for quizzes based on the above topic 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 NPTEL Video lecture https://nptel.ac.in/courses/106105183 3. Homework Explain Dijkstra's algorithm Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Shortest Path Routing Spend 5 minutes to evaluate student assimilation of the lesson contents



Lesson Plan No. 21	Course Name: Computer Network Topic: Distance Vector Routing	Course No.: MCA-203
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Objectives	At the end of the lesson the student shall be able to: a. To study the concept of Distance Vector Routing b. Understand the method of finding least cost path
Teaching Aids (if any)	a. Power point presentation b. Use of Near pod tool for online quiz
Teaching Development	1. Introduction (5 minutes) Ask questions. What is the role of Routing algorithm? 2. Development (30 minutes) <ul style="list-style-type: none">• Introduction of Distance Vector Routing• Explain the method of finding least cost path• Advantages & disadvantages• Example/numerical 3. Exercise (5 minutes) – Use Google forms and the Near pod tool for quizzes based on the above topic 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 NPTEL Video lecture https://nptel.ac.in/courses/106105183 3. Homework <ul style="list-style-type: none">• Explain Distance Vector Routing Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Distance Vector Routing Spend 5 minutes to evaluate student assimilation of the lesson contents



Lesson Plan No. 22	Course Name: Computer Network Topic: Hierarchical Routing	Course No.: MCA-203
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Objectives	At the end of the lesson the student shall be able to: a. To study the concept of Distance Vector Routing b. Understand the method of finding least cost path
Teaching Aids (if any)	a. Power point presentation b. Use of Near pod tool for online quiz
Teaching Development	1. Introduction (5 minutes) Ask questions. What is the role of Routing algorithm? 2. Development (30 minutes) <ul style="list-style-type: none">• Introduction of Distance Vector Routing• Explain the method of finding least cost path• Advantages & disadvantages• Example/numerical 3. Exercise (5 minutes) – Use Google forms and the Near pod tool for quizzes based on the above topic 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 NPTEL Video lecture https://nptel.ac.in/courses/106105183 3. Homework <ul style="list-style-type: none">• Explain Distance Vector Routing Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Distance Vector Routing Spend 5 minutes to evaluate student assimilation of the lesson contents



Lesson Plan No. 23	Course Name: Computer Network Topic: Multicast & Broadcast Routing	Course No.: MCA-203
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Objectives	At the end of the lesson the student shall be able to: a. To study the concept of Multicast Routing b. Understand the method of Broadcast Routing
Teaching Aids (if any)	a. Power point presentation b. Use of Near pod tool for online quiz
Teaching Development	1. Introduction (5 minutes) Ask questions. What is the role of Routing algorithm? 2. Development (30 minutes) <ul style="list-style-type: none">• Introduction of Broadcast Routing• Discussion on several methods in Broadcast Routing:<ol style="list-style-type: none">a. Multi destinationb. Floodingc. Reverse Path flooding• Explanation on the concept of Multicast Routing• One Example each• Comparison on Multicast & Broadcast Routing 3. Exercise (5 minutes) – Use Google forms and the Near pod tool for quizzes based on the above topic 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 NPTEL Video lecture https://nptel.ac.in/courses/106105183 3. Homework Comparison on Multicast & Broadcast Routing Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Multicast & Broadcast Routing Spend 5 minutes to evaluate student assimilation of the lesson contents



Lesson Plan No. 24	Course Name: Computer Network Topic: OSPF Routing Protocol	Course No.: MCA-203
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Objectives	At the end of the lesson the student shall be able to: a. To study the concept of OSPF Routing Protocol b. Understand the working of OSPF c. Articulate the various types of OSPF and frame format
Teaching Aids (if any)	a. Power point presentation b. Use of Near pod tool for online quiz
Teaching Development	1. Introduction (5 minutes) Ask questions. <ul style="list-style-type: none">• Define protocol.• What is the role of Routing protocols? 2. Development (30 minutes) <ul style="list-style-type: none">• Introduction of OSPF Routing Protocol• Discussion on working of OSPF• Explain the various types of OSPF<ul style="list-style-type: none">○ Point to Point○ Transient link○ Stub link○ Virtual Link• Explanation on various packets in OSPF• Description of the frame format in OSPF 3. Exercise (5 minutes) – Use Google forms and the Near pod tool for quizzes based on the above topic 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 NPTEL Video lecture https://nptel.ac.in/courses/106105183 3. Homework <ul style="list-style-type: none">• Explain the various types of OSPF• Discuss various packets in OSPF Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Nearpod Quiz on OSPF Spend 5 minutes to evaluate student assimilation of the lesson contents



Lesson Plan No. 25	Course Name: Computer Network Topic: BGP	Course No.: MCA- 203
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Objectives	At the end of the lesson the student shall be able to: a. To study the concept of BGP b. Understand the working of BGP c. Articulate the various types BGP sessions, Packets & frame format
Teaching Aids (if any)	a. Power point presentation b. Use of Near pod tool for online quiz
Teaching Development	1. Introduction (5 minutes) Ask questions. <ul style="list-style-type: none">• Define OSPF Routing Protocol• What is the role of OSPF Routing Protocol 2. Development (30 minutes) <ul style="list-style-type: none">• Introduction of BGP Routing Protocol• Discussion on working of BGP Routing Protocol• Explain the various types of Autonomous Systems<ul style="list-style-type: none">○ Stub AS○ Multihomed AS○ Transient AS• Explanation on various packets in BGP• Discuss two BGP sessions:<ul style="list-style-type: none">○ Internal Session○ External Session• Description of the frame format in BGP 3. Exercise (5 minutes) – Use Google forms and the Near pod tool for quizzes based on the above topic 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 NPTEL Video lecture https://nptel.ac.in/courses/106105183 3. Homework <ul style="list-style-type: none">• Explain the various types of BGP sessions• Discuss various packets in BGP Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on BGP Spend 5 minutes to evaluate student assimilation of the lesson contents



Lesson Plan No. 26	Course Name: Computer Network Topic: BGP	Course No.: MCA-203
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Objectives	At the end of the lesson the student shall be able to: <ol style="list-style-type: none"> To study the concept of BGP Understand the working of BGP Articulate the various types BGP sessions, Packets & frame format
Teaching Aids (if any)	<ol style="list-style-type: none"> Power point presentation Use of Near pod tool for online quiz
Teaching Development	<ol style="list-style-type: none"> Introduction (5 minutes) Ask questions. <ul style="list-style-type: none"> Define OSPF Routing Protocol What is the role of OSPF Routing Protocol Development (30 minutes) <ul style="list-style-type: none"> Introduction of BGP Routing Protocol Discussion on working of BGP Routing Protocol Explain the various types of Autonomous Systems <ul style="list-style-type: none"> Stub AS Multihomed AS Transient AS Explanation on various packets in BGP Discuss two BGP sessions: <ul style="list-style-type: none"> Internal Session External Session Description of the frame format in BGP Exercise (5 minutes) – Use Google forms and the Near pod tool for quizzes based on the above topic Use Nearpod to collect responses and discuss the answers.
Closure	<ol style="list-style-type: none"> Summarize the Lesson Learning Outcomes and get affirmation from students on these. Suggested NPTEL Video lecture https://nptel.ac.in/courses/106105183 Homework <ul style="list-style-type: none"> Explain the various types of BGP sessions Discuss various packets in BGP <p>Spend 5 minutes to wrap up and consolidate the learnings</p>
Evaluation	<ol style="list-style-type: none"> Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Nearpod Quiz on BGP <p>Spend 5 minutes to evaluate student assimilation of the lesson contents</p>



Lesson Plan No. 27	Course Name: Computer Network Topic: Congestion Control	Course No.: MCA-203
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Objectives	At the end of the lesson the student shall be able to: a. To study the concept of Congestion control b. Understand the two mechanisms of Congestion control
Teaching Aids (if any)	a. Power point presentation b. Use of Near pod tool for online quiz
Teaching Development	<ol style="list-style-type: none">Introduction (5 minutes) Ask questions.<ul style="list-style-type: none">Define trafficWhat is congestion?Development (30 minutes)<ul style="list-style-type: none">Introduction of congestion controlDiscussion on mechanisms of congestion control<ul style="list-style-type: none">Open loop<ul style="list-style-type: none">Retransmission PolicyWindow PolicyAcknowledgement PolicyAdmission PolicyClosed loop<ul style="list-style-type: none">Back PressureChoke PressureImplicit SignalingExplicit SignalingExercise (5 minutes) – Use Google forms and the Near pod tool for quizzes based on the above topic Use Nearpod to collect responses and discuss the answers.
Closure	<ol style="list-style-type: none">Summarize the Lesson Learning Outcomes and get affirmation from students on these.Suggested NPTEL Video lecture https://nptel.ac.in/courses/106105183Homework<ul style="list-style-type: none">Explain the various types of controlling congestionDiscuss Open loop conceptExplain closed loop congestion control <p>Spend 5 minutes to wrap up and consolidate the learnings</p>
Evaluation	<ol style="list-style-type: none">Reflective Questions (What, Why, Who?). Allow students to answer and discuss.Nearpod Quiz on congestion control <p>Spend 5 minutes to evaluate student assimilation of the lesson contents</p>



Lesson Plan No. 28	Course Name: Computer Network Topic: Congestion Control algorithm	Course No.: MCA-203
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Objectives	At the end of the lesson the student shall be able to: a. Articulate the concept of Congestion b. Understand the advantages of Congestion and its associated challenges. c. Analyze the two algorithms used in congestion control
Teaching Aids (if any)	a. Power point presentation b. Use of Near pod tool for online quiz
Teaching Development	1. Introduction (5 minutes) Ask questions. <ul style="list-style-type: none">• Define traffic• What is congestion? 2. Development (30 minutes) <ul style="list-style-type: none">• Introduction• Discussion on congestion control algorithms:<ul style="list-style-type: none">○ Leaky Bucket Algorithm○ Token Bucket Algorithm 3. Exercise (5 minutes) – Use Google forms and the Near pod tool for quizzes based on the above topic 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 NPTEL Video lecture https://nptel.ac.in/courses/106105183 3. Homework <ul style="list-style-type: none">• Discuss congestion control algorithms• Compare Leaky Bucket & Token Bucket Algorithm Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on congestion control Algorithms. Spend 5 minutes to evaluate student assimilation of the lesson contents



Lesson Plan No. 29	Course Name: Computer Network Topic: IP Addresses, classes of IP addresses	Course No.: MCA-203
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Objectives	At the end of the lesson the student shall be able to: a. Articulate the concept of TCP/IP b. Articulate the concept of IP Addresses, classes of IP addresses c. To study network design and performance issues
Teaching Aids (if any)	a. Power point presentation b. Use of Near pod tool for online quiz
Teaching Development	<ol style="list-style-type: none">Introduction (5 minutes) Ask questions.<ul style="list-style-type: none">Recall role of TCP/IPDevelopment (30 minutes)<ul style="list-style-type: none">Overview of IP addressTypes of IP address<ul style="list-style-type: none">Public,Private,StaticDynamic.Version of IP address<ul style="list-style-type: none">IPV4IPV6Overview of NetworkClassful Addressing<ul style="list-style-type: none">Class AClass BClass CClass DClass EExamplesExercise (5 minutes) – Use Google forms and the Near pod tool for quizzes based on the above topic Use Nearpod to collect responses and discuss the answers.
Closure	<ol style="list-style-type: none">Summarize the Lesson Learning Outcomes and get affirmation from students on these.Suggested NPTEL Video lecture https://nptel.ac.in/courses/106105183Homework<ul style="list-style-type: none">What is an IP address? Briefly explain classes of IP addresses.Differentiate between IPv4 and IPv6? <p>Spend 5 minutes to wrap up and consolidate the learnings</p>



Evaluation	<ol style="list-style-type: none">1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss.2. Nearpod Quiz on IP addresses <p>Spend 5 minutes to evaluate student assimilation of the lesson contents</p>
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Lesson Plan No. 30	Course Name: Computer Network Topic: IPv6	Course No.: MCA-203
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Objectives	At the end of the lesson the student shall be able to: <ol style="list-style-type: none"> Understand the need for IPv6 and how it differs from IPv4. Learn the structure and addressing scheme of IPv6. Understand how IPv6 improves upon IPv4 in terms of address space and network management. Gain insights into the deployment and security considerations of IPv6.
Teaching Aids (if any)	<ol style="list-style-type: none"> Power point presentation Use of Near pod tool for online quiz
Teaching Development	<p>1. Introduction (5 minutes)</p> <ul style="list-style-type: none"> Briefly discuss what students know about IPv4 and its limitations, focusing on the exhaustion of IPv4 address space. Ask students if they are aware of IPv6 and its role in the modern internet infrastructure. Introduction to IPv6 (5 minutes): Define IPv6 as the sixth version of the Internet Protocol, designed to address the limitations of IPv4. Highlight the major driving factor behind IPv6 adoption: the limited address space of IPv4 and the need for more unique IP addresses as the internet grows. <p>Development (30 minutes)</p> <ul style="list-style-type: none"> The Need for IPv6 (5 minutes) IPv4 Limitations: <ul style="list-style-type: none"> Explain how IPv4 addresses are 32-bit and can only provide approximately 4.3 billion unique addresses. Discuss the exhaustion of IPv4 addresses due to the increasing number of connected devices (IoT, smartphones, etc.). Solution Offered by IPv6: <ul style="list-style-type: none"> IPv6 uses 128-bit addresses, offering a significantly larger address space (about 340 undecillion addresses). Discuss how IPv6 ensures that there will be enough unique IP addresses for the foreseeable future. Structure of IPv6 (10 minutes) <ul style="list-style-type: none"> Address Format: <ul style="list-style-type: none"> Show the 128-bit structure of IPv6 addresses Zero Compression: <ul style="list-style-type: none"> Discuss the rule that only one zero compression is allowed in an address to prevent ambiguity. Hexadecimal Notation: <ul style="list-style-type: none"> Explain how IPv6 uses hexadecimal (base 16) representation for each 16-bit block, which is more compact and readable compared to the binary format of IPv4. Comparison between IPv4 & IPv6



	<p>2. Exercise (5 minutes) –</p> <ul style="list-style-type: none">- Use Google forms and the Near pod tool for quizzes based on the above topic- Ask students to work in pairs or small groups to discuss the advantages of IPv6 over IPv4 in terms of scalability and security.- Alternatively, ask students to look up a real-world example where IPv6 has been deployed, and summarize the benefits and challenges faced in the deployment. <p>Use Nearpod to collect responses and discuss the answers.</p>
Closure	<ol style="list-style-type: none">1. Summarize the Lesson Learning Outcomes and get affirmation from students on these.<ul style="list-style-type: none">- Summarize the need for IPv6, its addressing scheme, the features it offers, and how it resolves many limitations of IPv4.2. Suggested NPTEL Video lecture https://nptel.ac.in/courses/1061051833. Homework<ol style="list-style-type: none">a. What is IPV6? Explain IPv6 in detail?b. Draw the comparison between IPv4 & IPv6 <p>Spend 5 minutes to wrap up and consolidate the learnings</p>
Evaluation	<ol style="list-style-type: none">1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss.2. Nearpod Quiz on IPv6. <p>Spend 5 minutes to evaluate student assimilation of the lesson contents</p>



Lesson Plan No. 31	Course Name: Computer Network Topic: ARP, RARP	Course No.: MCA-203
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Objectives	At the end of the lesson the student shall be able to: a. Articulate the concept of ARP b. Understand the working of RARP c. Analyze the comparison between ARP and RARP
Teaching Aids (if any)	a. Power point presentation b. Use of Near pod tool for online quiz
Teaching Development	1. Introduction (5 minutes) Ask questions. <ul style="list-style-type: none">Recall role of IP addressWhat is Physical address? 2. Development (30 minutes) <ul style="list-style-type: none">Introduction of ARPExplanation on how ARP worksSteps taken by ARP protocolIntroduction of RARPExplanation on how RARP works 3. Exercise (5 minutes) – Use Google forms and the Near pod tool for quizzes based on the above topic 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 NPTEL Video lecture https://nptel.ac.in/courses/106105183 3. Homework <ul style="list-style-type: none">What is ARP? Explain working of ARP in detailDraw the comparison between ARP & RARP Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on ARP & RARP. Spend 5 minutes to evaluate student assimilation of the lesson contents



Lesson Plan No. 32	Course Name: Computer Network Topic: BOOTP, DHCP	Course No.: MCA-203
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Objectives	At the end of the lesson the student shall be able to: a. Articulate the concept of BOOTP b. Understand the working of DHCP c. Analyze the comparison between BOOTP and DHCP
Teaching Aids (if any)	a. Power point presentation b. Use of Near pod tool for online quiz
Teaching Development	1. Introduction (5 minutes) Ask questions. <ul style="list-style-type: none">Recall role of ARPWhat is RARP? 2. Development (30 minutes) <ul style="list-style-type: none">Introduction of BOOTPExplanation on how BOOTP worksLimitations of BOOTPIntroduction of DHCPExplanation on how DHCP worksComparison of BOOTP & DHCP 3. Exercise (5 minutes) – Use Google forms and the Near pod tool for quizzes based on the above topic 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 NPTEL Video lecture https://nptel.ac.in/courses/106105183 3. Homework <ul style="list-style-type: none">What is BOOTP? Explain working of BOOTP in detailDraw the comparison between BOOTP & DHCP Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on BOOTP & DHCP Spend 5 minutes to evaluate student assimilation of the lesson contents



Lesson Plan No. 33	Course Name: Computer Network Topic: TCP, UDP	Course No.: MCA-203
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Objectives	At the end of the lesson the student shall be able to: a. Articulate the Segment format of TCP b. Understand the datagram format of UDP c. Analyze the comparison between TCP & UDP
Teaching Aids (if any)	a. Power point presentation b. Use of Near pod tool for online quiz
Teaching Development	1. Introduction (5 minutes) Ask questions. <ul style="list-style-type: none">• Applications of transport layer 2. Development (30 minutes) <ul style="list-style-type: none">▪ Introduction of TCP▪ Explanation on TCP segment format▪ Introduction of UDP▪ Explanation on UDP datagram format▪ Comparison of TCP & UDP 3. Exercise (5 minutes) – Use Google forms and the Near pod tool for quizzes based on the above topic 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 NPTEL Video lecture https://nptel.ac.in/courses/106105183 3. Homework <ul style="list-style-type: none">a. What is TCP? Explain TCP segment formatb. Draw the comparison between TCP & UDP Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on TCP & UDP Spend 5 minutes to evaluate student assimilation of the lesson contents



Lesson Plan No. 34	Course Name: Computer Network Topic: Socket Programming	Course No.: MCA-203
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Objectives	At the end of the lesson the student shall be able to: a. Articulate the concept of socket b. Understand the importance of Socket programming
Teaching Aids (if any)	a. Power point presentation b. Use of Near pod tool for online quiz
Teaching Development	1. Introduction (5 minutes) Ask questions. <ul style="list-style-type: none">• Applications of transport layer 2. Development (30 minutes) <ul style="list-style-type: none">▪ Introduction of socket programming▪ Stages for server▪ Stages for client 3. Exercise (5 minutes) – Use Google forms and the Near pod tool for quizzes based on the above topic 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 NPTEL Video lecture https://nptel.ac.in/courses/106105183 3. Homework <ul style="list-style-type: none">a. What is socket? Explain socket programming with block diagramb. Discuss various stages of socket programming Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on socket programming Spend 5 minutes to evaluate student assimilation of the lesson contents



Lesson Plan No. 35	Course Name: Computer Network Topic: Telnet, FTP, SMTP, MIME, WWW, HTTP	Course No.: MCA-203
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Objectives	At the end of the lesson the student shall be able to: <ul style="list-style-type: none"> a. Understand the basic functions and uses of Telnet, FTP, SMTP, MIME, WWW, and HTTP. b. Differentiate between these protocols and their role in networking and internet communication. c. Learn how each protocol contributes to modern web applications and communication systems. d. Understand the security implications of these protocols and how they are secured in modern systems.
Teaching Aids (if any)	<ul style="list-style-type: none"> a. Power point presentation b. Use of Near pod tool for online quiz
Teaching Development	<ol style="list-style-type: none"> 1. Introduction (5 minutes) <ul style="list-style-type: none"> - Briefly introduce the six protocols that will be discussed: - Telnet: Used for remote login to networked devices. - FTP (File Transfer Protocol): Used for transferring files between computers over a network. - SMTP (Simple Mail Transfer Protocol): Used for sending email messages. - MIME (Multipurpose Internet Mail Extensions): Extends the format of email to allow attachments, multimedia, etc. - WWW (World Wide Web): A collection of interlinked documents and resources accessible via the internet. - HTTP (HyperText Transfer Protocol): The protocol used to transfer web pages over the internet. Development (30 minutes) <ol style="list-style-type: none"> a. Telnet (10 minutes) <ul style="list-style-type: none"> - Purpose: - Explain that Telnet allows users to interact with a remote device as if they were directly connected to it (command-line interface). - Limitations: - Mention the security concerns with Telnet, as it transmits data, including passwords, in plaintext (vulnerable to interception). b. FTP (File Transfer Protocol) (10 minutes) <ul style="list-style-type: none"> - Purpose: - Differentiate between active and passive modes in FTP. - Command and GUI Clients: - Show examples of FTP commands (e.g., ftp [hostname]), as well as GUI clients like FileZilla. c. SMTP (Simple Mail Transfer Protocol) (10 minutes) <ul style="list-style-type: none"> Purpose:



	<p>Define SMTP as the protocol used for sending email messages between servers. Explain that SMTP is used for outgoing mail, while protocols like IMAP and POP3 are used for retrieving mail. Workflow: Discuss how SMTP works: email is sent from the client to the server, and from the server to the recipient's server. Security Concerns:</p> <p>2. Exercise (5 minutes) –</p> <ul style="list-style-type: none">- Ask students to break into pairs or small groups and research one of the following:- How does FTP differ from SFTP in terms of security?- What are the advantages of HTTPS over HTTP?- Discuss an example of how SMTP is used in real-life applications (e.g., sending an email). <p>Use Nearpod to collect responses and discuss the answers.</p>
Closure	<p>1. Summarize the Lesson Learning Outcomes and get affirmation from students on these.</p> <ul style="list-style-type: none">- Summarize the key protocols discussed: Telnet, FTP, SMTP, MIME, WWW, and HTTP.- Reinforce their roles in networking and communication, especially the importance of HTTPS for securing web traffic. <p>2. Suggested NPTEL Video lecture https://nptel.ac.in/courses/106105183</p> <p>3. Homework</p> <ol style="list-style-type: none">a. Explain the importance of Telnet, FTP, SMTP, MIME, WWW, HTTP <p>Spend 5 minutes to wrap up and consolidate the learnings</p>
Evaluation	<p>1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss.</p> <p>2. Nearpod Quiz on Telnet, FTP, SMTP, MIME, WWW, HTTP</p> <p>Spend 5 minutes to evaluate student assimilation of the lesson contents</p>



Lesson Plan No. 36	Course Name: Computer Network Topic: Cryptography	Course No.: MCA-203
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Objectives	At the end of the lesson the student shall be able to: a. Understand the basic principles of cryptography. b. Differentiate between symmetric and asymmetric cryptography. c. Learn the key cryptographic techniques used for secure communication. d. Understand the importance of cryptographic algorithms in securing data.
Teaching Aids (if any)	a. Power point presentation b. Use of Near pod tool for online quiz
Teaching Development	1. Introduction (5 minutes) - Ask students what they know about cryptography. - Discuss the concept of encryption and decryption in the context of securing communication. - Introduce the importance of cryptography in securing information over the internet, such as in emails, banking, and online communication. - Introduction to Cryptography (5 minutes): - Define cryptography: the practice and study of techniques for securing communication and data from third parties. - Explain that cryptography involves encoding information in a way that only authorized parties can read or use it. Development (30 minutes) <ul style="list-style-type: none">• Basic Concepts in Cryptography (10 minutes)<ul style="list-style-type: none">- Plaintext and Ciphertext:<ul style="list-style-type: none">- Explain the terms plaintext (original data) and ciphertext (encrypted data).- Encryption and Decryption:<ul style="list-style-type: none">- Define encryption as the process of converting plaintext into ciphertext.- Define decryption as the process of converting ciphertext back into plaintext.- Cryptographic Keys:<ul style="list-style-type: none">- Explain the role of keys in cryptography: they are used to encrypt and decrypt data.- Introduce the concept of symmetric and asymmetric keys.• Symmetric vs. Asymmetric Cryptography (10 minutes)<ul style="list-style-type: none">- Symmetric Cryptography:<ul style="list-style-type: none">- Define symmetric cryptography: the same key is used for both encryption and decryption.- Discuss examples: Data Encryption Standard (DES), Advanced Encryption Standard (AES).• Asymmetric Cryptography:<ul style="list-style-type: none">- Define asymmetric cryptography: uses two different keys—a public key for encryption and a private key



	<p>for decryption.</p> <ul style="list-style-type: none"> - Discuss examples: RSA, Elliptic Curve Cryptography (ECC). - Explain the advantages of asymmetric cryptography: no need for secure key distribution, as the public key can be shared openly, while the private key remains confidential. <ul style="list-style-type: none"> • Comparison: <ul style="list-style-type: none"> - Summarize the differences between symmetric and asymmetric encryption: - Symmetric: Faster but has key distribution challenges. - Asymmetric: More secure for key exchange but slower than symmetric encryption. • Cryptographic Techniques and Algorithms (10 minutes) <ul style="list-style-type: none"> - Substitution and Transposition Ciphers: - Substitution Cipher: Replaces elements of the plaintext with other symbols (e.g., Caesar cipher). - Transposition Cipher: Rearranges the elements of the plaintext (e.g., rail fence cipher). • Modern Cryptographic Algorithms: <p>2. Exercise (5 minutes) –</p> <ul style="list-style-type: none"> - Give students a short quiz with the following questions: - What is the difference between symmetric and asymmetric cryptography? - What is a digital signature and how does it ensure data integrity? - Name one example of a modern cryptographic algorithm used in practice. - Alternatively, have students discuss in pairs how cryptography is used in everyday applications like online banking or secure messaging. <p>Use Nearpod to collect responses and discuss the answers.</p>
Closure	<ol style="list-style-type: none"> 1. Summarize the basic concepts of cryptography, including encryption, decryption, symmetric and asymmetric encryption, and the role of cryptographic algorithms in securing data. 2. Suggested NPTEL Video lecture https://nptel.ac.in/courses/106105183 3. Homework <ol style="list-style-type: none"> a. Define cryptography. Discuss its components and its types <p>Spend 5 minutes to wrap up and consolidate the learnings</p>
Evaluation	<ol style="list-style-type: none"> 1. Reflective Questions (What, why, Who?). Allow students to answer and discuss. <ul style="list-style-type: none"> - Assign students to research a modern cryptographic algorithm, such as AES or RSA, and write a brief report on how it works and its applications. 2. Nearpod Quiz on Cryptography



Model Institute of Engineering & Technology (Autonomous) Lesson Plan

Kot Bhalwal, Jammu

Spend 5 minutes to evaluate student assimilation of the lesson contents





Lesson Plan No. 37	Course Name: Computer Network Topic: Data Encryption Standard	Course No.: MCA-203
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Objectives	At the end of the lesson the student shall be able to: <ol style="list-style-type: none"> Understand the basics of the Data Encryption Standard (DES). Learn the process of DES encryption and decryption. Understand the strengths and weaknesses of DES. Discuss the relevance of DES in modern cryptography and its evolution into AES.
Teaching Aids (if any)	<ol style="list-style-type: none"> Power point presentation Use of Near pod tool for online quiz
Teaching Development	<ol style="list-style-type: none"> Introduction (5 minutes) <ul style="list-style-type: none"> Briefly discuss previous encryption algorithms, focusing on symmetric encryption methods. Introduce DES as a symmetric key algorithm used for encrypting data. Explain that DES was developed by IBM in the 1970s and became a federal standard for data encryption in the U.S. Discuss the significance of DES as one of the first widely accepted encryption algorithms and its subsequent replacement by more secure algorithms like AES. Development (30 minutes) <ol style="list-style-type: none"> DES Overview (10 minutes) <ul style="list-style-type: none"> Structure and Functionality: <ul style="list-style-type: none"> Explain that DES is a block cipher that encrypts 64-bit blocks of data with a 56-bit key. Discuss the key components of DES: <ul style="list-style-type: none"> Initial Permutation (IP): The data block is initially permuted before the main rounds. Rounds (16 rounds): The data is processed in 16 rounds of transformation, each involving substitution and permutation operations. Final Permutation (FP): The result after the 16 rounds is permuted again to produce the final ciphertext. Key Schedule: <ul style="list-style-type: none"> Discuss how the 56-bit key is expanded into 16 subkeys (one for each round) through a key schedule. Explain how these subkeys are used during the rounds of encryption. DES Algorithm (15 minutes) <p>Feistel Structure: Introduce the Feistel structure, which DES uses in its rounds, where half of the data block is processed and XORed with the subkey. Walk through the steps involved in a single round of DES encryption: Splitting the Data: The 64-bit input block is divided into two</p>



	<p>32-bit halves. Expansion: The right half is expanded to 48 bits using a predefined expansion function.</p> <p>1. Exercise (5 minutes) –</p> <ul style="list-style-type: none">- Use Google forms and the Near pod tool for quizzes based on the above topic- Explain that DES was once widely used for securing sensitive data, but due to its vulnerabilities, it was replaced by more secure algorithms such as AES.- Mention the DES variants like Triple DES (3DES), which applies DES three times with different keys to improve security. <p>Use Nearpod to collect responses and discuss the answers.</p>
Closure	<p>1. Summarize the Lesson Learning Outcomes and get affirmation from students on these.</p> <ul style="list-style-type: none">- Ask students to work in pairs or small groups and discuss the potential weaknesses of DES, especially focusing on key size and cryptanalysis.- Each group will share one strength and one weakness of DES with the class. <p>2. Suggested NPTEL Video lecture https://nptel.ac.in/courses/106105183</p> <p>3. Homework</p> <p>a. Discuss DES and its operation</p> <p>Spend 5 minutes to wrap up and consolidate the learnings</p>
Evaluation	<p>1. Reflective Questions (What, why, Who?). Allow students to answer and discuss.</p> <ul style="list-style-type: none">- Summarize the DES algorithm, its key components (Feistel structure, rounds, S-boxes, key schedule), and its significance in cryptography.- Emphasize the security concerns regarding DES, particularly the short key length. <p>2. Nearpod Quiz on Data Encryption Standard</p> <p>Spend 5 minutes to evaluate student assimilation of the lesson contents</p>



Lesson Plan No. 38	Course Name: Computer Network Topic: Advanced Encryption Standard	Course No.: MCA-203
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Objectives	At the end of the lesson the student shall be able to: <ol style="list-style-type: none"> Understand the basics of the Advanced Encryption Standard (AES). Learn about AES encryption modes and their applications. Understand how AES operates in terms of rounds, key sizes, and block sizes. Appreciate the strengths and weaknesses of AES in securing data.
Teaching Aids (if any)	<ol style="list-style-type: none"> Power point presentation Use of Near pod tool for online quiz
Teaching Development	<p>1. Introduction (5 minutes)</p> <ul style="list-style-type: none"> - Briefly discuss previous encryption algorithms, including symmetric encryption methods. - Recap the difference between block ciphers and stream ciphers, introducing AES as a block cipher. - Introduction to AES (5 minutes): - Explain that AES is a symmetric key encryption algorithm used worldwide for securing data. - Discuss AES as the successor to the Data Encryption Standard (DES), and explain why it is preferred due to its strength and efficiency. <p>Development (30 minutes)</p> <ol style="list-style-type: none"> AES Overview (10 minutes) <ul style="list-style-type: none"> - AES Structure: - Explain that AES operates on fixed-size blocks of 128 bits and supports key sizes of 128, 192, and 256 bits. - Discuss the AES algorithm's use of a substitution-permutation network (SPN). - Key Features: - Discuss why AES is considered secure: it is resistant to various attacks (brute force, differential, linear cryptanalysis). - Mention that AES is used in many protocols, such as SSL/TLS, VPNs, and disk encryption. AES Algorithm (15 minutes) <ul style="list-style-type: none"> - AES Rounds: - Explain that AES uses multiple rounds of encryption, with the number of rounds depending on the key size: <ul style="list-style-type: none"> - 10 rounds for 128-bit keys - 12 rounds for 192-bit keys - 14 rounds for 256-bit keys - Walk through the key operations in each round: - Discuss the final round (without the MixColumns step) and how the ciphertext is generated. - AES Key Expansion: - Explain how the original AES key is expanded into a set of



	<p>round keys using a key schedule.</p> <ul style="list-style-type: none"> - Describe how the expanded keys are used in each round of AES. <p>c. AES Modes of Operation (10 minutes)</p> <ul style="list-style-type: none"> - Modes of AES Encryption: - Introduce the concept of modes of operation, which determine how AES encrypts data larger than a single block (128 bits). - Discuss the most common modes: - Security Considerations: - Explain how different modes impact the security of AES. - Highlight why ECB is generally considered insecure, while CBC and CTR modes are widely used in practice. <p>1. Exercise (5 minutes) –</p> <ul style="list-style-type: none"> - Give students a short quiz with the following questions: - What are the key operations in each round of AES? - Explain the difference between ECB and CBC modes of AES. - How many rounds are used in AES for a 128-bit key? - Alternatively, have students discuss the pros and cons of different AES modes in small groups and present their findings. <p>Use Nearpod to collect responses and discuss the answers.</p>
Closure	<ol style="list-style-type: none"> 1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. <ul style="list-style-type: none"> - Summarize the key points about AES, including its structure, key expansion, rounds, and modes of operation. - Reinforce why AES is widely used and its strengths in providing data security. 2. Suggested NPTEL Video lecture https://nptel.ac.in/courses/106105183 3. Homework <ol style="list-style-type: none"> a. Discuss AES and its operation b. Reading Assignment: Assign students to read about AES attacks (e.g., side-channel attacks) and prepare a short report on countermeasures. <p>Spend 5 minutes to wrap up and consolidate the learnings</p>
Evaluation	<ol style="list-style-type: none"> 1. Reflective Questions (What, why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Advanced Encryption Standard <p>Spend 5 minutes to evaluate student assimilation of the lesson contents</p>



Lesson Plan No. 39	Course Name: Computer Network Topic: RSA	Course No.: MCA-203
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Objectives	At the end of the lesson the student shall be able to: <ul style="list-style-type: none"> a. Understand the principles behind the RSA encryption algorithm. b. Learn how RSA uses public and private keys for encryption and decryption. c. Understand the process of key generation, encryption, and decryption in RSA. d. Evaluate the strengths and weaknesses of RSA encryption in securing data.
Teaching Aids (if any)	<ul style="list-style-type: none"> a. Power point presentation b. Use of Near pod tool for online quiz
Teaching Development	<p>1. Introduction (5 minutes)</p> <ul style="list-style-type: none"> - Discuss what students already know about encryption and cryptographic systems. - Recap symmetric vs. asymmetric encryption and introduce RSA as an asymmetric encryption method. - Introduction to RSA (5 minutes): - Explain that RSA (Rivest-Shamir-Adleman) is one of the first public-key cryptosystems and is widely used for secure data transmission. - Briefly mention how it works: RSA uses two keys, a public key (for encryption) and a private key (for decryption). <p>Development (30 minutes)</p> <ul style="list-style-type: none"> a. RSA Algorithm Overview (10 minutes) <ul style="list-style-type: none"> - Public Key and Private Key: - Discuss the concept of public and private keys in asymmetric encryption. - Explain how public keys are used to encrypt data and private keys are used to decrypt it. - Mathematical Foundations of RSA: - Introduce the mathematical concepts behind RSA: prime numbers, modular arithmetic, and Euler's totient function. - Explain why the difficulty of factoring large numbers makes RSA secure. b. RSA Key Generation (10 minutes) <ul style="list-style-type: none"> - Step-by-Step Key Generation: c. RSA Encryption and Decryption (10 minutes) <ul style="list-style-type: none"> - RSA Encryption: - Explain how encryption works: ciphertext = plaintext^e mod n. - Provide a simple example to show how plaintext is encrypted using the public key. - RSA Decryption: - Explain how decryption works: plaintext = ciphertext^d mod n.



	<ul style="list-style-type: none">- Walk through the decryption process to retrieve the original message using the private key.- Example of RSA Encryption/Decryption <p>1. Exercise (5 minutes) –</p> <ul style="list-style-type: none">- Give students a quick quiz or a set of questions to check their understanding of RSA, including:- What are the two keys used in RSA?- Why are prime numbers important in RSA?- What mathematical operations are used in RSA encryption and decryption? <p>Use Nearpod to collect responses and discuss the answers.</p>
Closure	<ol style="list-style-type: none">1. Summarize the Lesson Learning Outcomes and get affirmation from students on these.<ul style="list-style-type: none">- Summarize the RSA algorithm: key generation, encryption, decryption.- Emphasize how the security of RSA is based on the difficulty of factoring large numbers.2. Suggested NPTEL Video lecture https://nptel.ac.in/courses/1061051833. Homework<ol style="list-style-type: none">a. Discuss RSA and its algorithmb. Research Assignment: Ask students to research the potential vulnerabilities of RSA, such as quantum computing's impact on RSA security, and present their findings in the next class. <p>Spend 5 minutes to wrap up and consolidate the learnings</p>
Evaluation	<ol style="list-style-type: none">1. Reflective Questions (What, why, Who?). Allow students to answer and discuss.<ul style="list-style-type: none">- Problem Set: Assign problems where students must calculate the RSA keys, encrypt, and decrypt small numbers.2. Nearpod Quiz on RSA <p>Spend 5 minutes to evaluate student assimilation of the lesson contents</p>



Lesson Plan No. 40	Course Name: Computer Network Topic: Key Exchange Method	Course No.: MCA-203
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Objectives	At the end of the lesson the student shall be able to: <ul style="list-style-type: none"> a. Understand the concept of key exchange in cryptography. b. Learn about the common key exchange protocols (e.g., Diffie-Hellman, RSA, ECDH). c. Compare and contrast different key exchange methods. d. Understand the importance of secure key exchange for encryption and secure communications.
Teaching Aids (if any)	<ul style="list-style-type: none"> a. Power point presentation b. Use of Near pod tool for online quiz
Teaching Development	<p>1. Introduction (5 minutes)</p> <ul style="list-style-type: none"> - Briefly discuss what students know about encryption and security protocols. - Highlight the importance of keys in encryption and why secure key exchange is crucial. <p>Introduction to Key Exchange (5 minutes):</p> <ul style="list-style-type: none"> - Explain what a key exchange is: a process by which two parties securely share cryptographic keys over an insecure channel. - Highlight the role of key exchange in enabling secure communication in cryptographic systems. <p>Development (30 minutes)</p> <ul style="list-style-type: none"> a. Key Exchange Fundamentals (10 minutes) <ul style="list-style-type: none"> - Symmetric vs Asymmetric Encryption: <ul style="list-style-type: none"> - Briefly explain the difference between symmetric (same key for encryption and decryption) and asymmetric encryption (public and private keys). - Need for Key Exchange: <ul style="list-style-type: none"> - Discuss why key exchange is necessary in symmetric encryption systems. - Explain how it enables two parties to communicate securely without prior shared secrets. b. Key Exchange Methods (20 minutes) <ul style="list-style-type: none"> • Diffie-Hellman Key Exchange (DH) (7 minutes): <ul style="list-style-type: none"> - Introduce the Diffie-Hellman protocol. - Explain how it allows two parties to exchange a secret key over a public channel without actually sending the key. - Draw a simple example of the Diffie-Hellman key exchange on the board. • RSA Key Exchange (7 minutes): <ul style="list-style-type: none"> - Introduce the RSA algorithm for key exchange. - Explain how RSA uses a pair of public and private keys for secure communication. - Demonstrate the basic concept of how RSA is used in key exchange. • Elliptic Curve Diffie-Hellman (ECDH) (6 minutes):



	<ul style="list-style-type: none">- Explain how ECDH is a more efficient version of Diffie-Hellman, using elliptic curve cryptography.- Discuss the benefits of ECDH in terms of faster performance and lower computational requirements. <p>c. Comparison of Methods (10 minutes)</p> <ul style="list-style-type: none">• Advantages and Disadvantages:<ul style="list-style-type: none">- Compare Diffie-Hellman, RSA, and ECDH in terms of security, efficiency, and usage in modern systems.- Discuss scenarios where each method is preferred (e.g., Diffie-Hellman in secure key exchange, RSA in public-key encryption). <p>2. Exercise (5 minutes) –</p> <ul style="list-style-type: none">- Divide the students into small groups.- Ask each group to discuss the strengths and weaknesses of the key exchange methods covered (Diffie-Hellman, RSA, and ECDH). <p>Use Nearpod to collect responses and discuss the answers.</p>
Closure	<ol style="list-style-type: none">1. Summarize the Lesson Learning Outcomes and get affirmation from students on these.<ul style="list-style-type: none">- Reiterate the importance of secure key exchange in cryptography.- Review the three key exchange methods (Diffie-Hellman, RSA, ECDH) and their use cases.2. Suggested NPTEL Video lecture https://nptel.ac.in/courses/1061051833. Homework<ol style="list-style-type: none">a. Discuss Key Exchange method and its algorithm <p>Spend 5 minutes to wrap up and consolidate the learnings</p>
Evaluation	<ol style="list-style-type: none">1. Reflective Questions (What, why, Who?). Allow students to answer and discuss.<ul style="list-style-type: none">- Ask students to write a short essay (1-2 pages) on the evolution of key exchange methods and their importance in modern cryptographic systems.2. Nearpod Quiz on Key Exchange method <p>Spend 5 minutes to evaluate student assimilation of the lesson contents</p>