Department of Civil Engineering

Details of Lesson Plan

S.No.	Particulars	Details
1.	Course Name	Surveying & Geomatics
2.	Course Code	CE-404
3.	Academic Year	2024-25
4.	Semester	4th
5.	Number of Lesson plans	37
6.	Faculty Assigned	Dr. Bhagwan Das

Faculty Signature

Lesson Plan No. 1	Course Name: Surveying & Geomatics	Course No.: CE-404

Objectives	At the end of the lesson the student shall be able to: • Students will be able to define simple and compound curves. • Students will be able to identify the key features of simple curves (circle, arc, ellipse). • Students will be able to distinguish between simple and compound curves.
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) 2. Start by showing students real-world examples of objects with simple and compound curves (e.g., ball, racetrack, leaf). 3. Ask them to identify the curves they see and what makes them different. 4. Briefly introduce the concept of curves in design and engineering 5. **Development** (30 minutes) **Details of the Lesson (30 minutes):** 1. **Simple Curves (10 minutes):** o Define a simple curve: A path traced by a single point that continuously changes direction. o Introduce the three main types of simple curves: ▪ Circle: Perfect round shape with all points equidistant from the center. ▪ Arc: A portion of a circle. ▪ Ellipse: Oval shape with two focal points. o Use visuals (diagrams, models) to illustrate each type with key features labeled. 2. **Key Features (10 minutes):** o Focus on key features common to simple curves: ▪ Center point (circle) or focal points (ellipse) ▪ Radius (circle) or major/minor axis (ellipse) ▪ Starting and ending points (arc) o Explain how these features define the shape and size of the curve. o Encourage students to draw simple curves while identifying these features. 3. **Compound Curves (10 minutes):**

	○ Define a compound curve: A combination of two or more simple curves joined smoothly. ○ Show examples of compound curves (e.g., spiral staircase, car fender, flower petal). ○ Discuss how different combinations of simple curves create unique shapes with more complexity. 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 Reading- BC punmia book 3. Homework- Study fundamental parts of theodolite. **Quiz Questions (3 minutes):** What is the difference between a circle and an arc? What are the key features needed to define an ellipse? Give an example of a real-world object with a compound curve. 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 Cloud Computing Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 2	Course Name: Surveying & Geomatics	Course No.: CE-404

Objectives	At the end of the lesson the student shall be able to: • Students will understand the importance of setting out in construction projects. • Students will be familiar with the basic steps involved in the setting out process. • Students will be able to identify the common tools and equipment used for setting out. • .
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	**Introduction (5 Minutes):** 1. Begin by asking students if they have ever built something, like a LEGO set or a sandcastle. Briefly discuss the importance of following instructions and planning where things go. 2. Introduce the concept of setting out in construction. Explain that it's the crucial first step that ensures all building elements are positioned accurately according to the plans. 3. Briefly mention the consequences of inaccurate setting out, such as delays, wasted materials, and structural problems. 4. **Development** (30 minutes) **Details of the Lesson (30 Minutes):** **1 Site Preparation (10 Minutes):** o Explain the importance of preparing the construction site before setting out. This includes clearing the area, removing debris, and establishing a level surface. o Briefly discuss tools used for site preparation, such as shovels, rakes, and levels. **3 Transferring Design Information (10 Minutes):** o Explain how the architect's plans and measurements are transferred to the physical site. This might involve

	using reference points from a surveying team or establishing temporary markers. ○ Introduce common tools used for transferring information, such as tapes, measuring wheels, and theodolite (for advanced applications). **3. Marking and Leveling (10 Minutes):** ○ Discuss how the building footprint, foundation lines, and other elements are marked on the ground. This might involve stakes, string lines, or spray paint. ○ Briefly explain the concept of leveling and how it ensures all elements are built at the correct elevation. Mention tools like dumpy levels and leveling rods. ○ . 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 Reading- BC punmia book 3. Homework- Study fundamental parts of theodolite. **Quiz Questions (5 Minutes):** 1. Why is setting out important in construction projects? 2. What is one tool used for site preparation? 3. How are design measurements transferred from plans to the construction site? 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 Cloud Computing Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 3	Course Name: Surveying & Geomatics	Course No.: CE-404

Objectives	At the end of the lesson the student shall be able to: • Students will be able to define a reverse curve. • Students will identify the key elements of a reverse curve design. • Students will understand the reasons for using reverse curves.
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	**Introduction (5 minutes):** 1. **Attention Grabber:** Begin by showing a short video clip of a winding road with a reverse curve (YouTube video of car driving on a reverse curve: link will vary depending on the video chosen). Ask students to describe the road they saw. 2. **Introduce the Topic:** Define a reverse curve and explain that it's a specific road design element used in certain situations. 3. **Relate to Real World:** Briefly discuss why roads might not be perfectly straight and the importance of safe road design. 4. **Development** (30 minutes) **4. Details of the Lesson (30 minutes):** • **Elements of Reverse Curves (10 minutes):** ○ **Curve Tangency:** Explain how a reverse curve consists of two horizontal curves that meet at a tangent point, with a short straight section in between. Diagrams or illustrations can be used here. ○ **Length of Tangent:** Discuss the importance of the tangent length for driver safety and smooth vehicle transition. ○ **Superelevation:** Explain how superelevation (tilting of the roadway) plays a role in both curves of a reverse curve for proper vehicle stability. • **Reasons for Using Reverse Curves (10 minutes):** ○ **Limited Space:** Discuss situations where geographical limitations might necessitate using a reverse curve instead of long, single curves.

	○ **Improved Visibility:** Explain how reverse curves can sometimes offer better driver visibility on winding roads compared to a single long curve. ○ **Aesthetics:** Briefly mention that reverse curves can sometimes be used for aesthetic purposes in road design. • **Real-World Examples (10 minutes):** ○ Show pictures or diagrams of real-world examples of reverse curves on highways or mountain roads. ○ Encourage students to discuss the design choices and potential benefits/challenges of these examples. 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 Reading- BC punmia book 3. Homework- Study fundamental parts of theodolite. **5. Quiz Questions (5 minutes):** 1. What is a key feature that distinguishes a reverse curve from a single horizontal curve? 2. Why might a road designer choose to use a reverse curve instead of a long, single curve? (Give two reasons) 3. Briefly explain the role of superelevation in a reverse curve design. 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 Cloud Computing Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 4	Course Name: Surveying & Geomatics	Course No.: CE-404

Objectives	At the end of the lesson the student shall be able to: • Students will be able to define a transition curve and explain its importance in road design. • Students will be able to identify the different types of transition curves. • Students will understand the basic principles behind the design of transition curves.
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	**Introduction (5 minutes):** 1. Begin by asking students if they have ever driven on a curvy road. What happens to the car as it enters and exits the curve? (Feeling of being thrown outwards) 2. Explain that sudden changes in curvature can be uncomfortable and dangerous for drivers. 3. Introduce the concept of transition curves as a smooth connection between straight sections and circular curves. 4. . 5. **Development** (30 minutes) **Details of the Lesson (30 minutes):** • **Types of Transition Curves:** (10 minutes) o Linear transition curve o Parabolic transition curve o Spiral transition curve o Briefly explain the basic equation and shape of each type. • **Importance of Transition Curves:** (10 minutes) o Provides a smooth transition in steering angle required for negotiation of a curve. o Reduces lateral jerk experienced by passengers, improving ride comfort and safety. o Allows for gradual introduction of superelevation (banking) on the road. • **Design Considerations:** (10 minutes) o Length of the transition curve (based on design speed and radius of the main curve).

	○ Rate of change of curvature. ○ Relationship between transition curve and superelevation. 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 Reading- BC punmia book 3. Homework- Study fundamental parts of theodolite. **5. Quiz Questions (5 minutes):** 1. What is the purpose of a transition curve in road design? 2. What are the three most common types of transition curves? 3. Why is a smooth transition in steering angle important on a curved road? 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 Cloud Computing Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 5	Course Name: Surveying & Geomatics	Course No.: CE-404

Objectives	At the end of the lesson the student shall be able to: • Students will be able to define the concept of arc length. • Students will be able to understand how to approximate the length of a curve using straight line segments. • Students will be able to apply the formula for arc length of a circle.
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	**Introduction (5 minutes):** 1. **Intrigue:** Start by showing a picture of a winding road or a spiral staircase. Ask students: Can we measure the length of these paths using a ruler? What challenges do we face? 2. **Introduce Arc Length:** Define arc length as the actual distance traveled along a curved path. Explain that a straight ruler cannot measure curves directly, so we need other methods. 3. **Preview:** Briefly mention that today we will explore ways to estimate and calculate the length of curves. 4. **Development** (30 minutes) **Details of the Lesson (30 minutes):** • **Approximating with Straight Lines (10 minutes):** o Show a picture of a curved line segment. o Divide the segment into small subintervals and connect the endpoints with straight lines. o Explain that the sum of these straight line segments approximates the actual length of the curve. o Discuss how using more subintervals leads to a better approximation. • **Formula for Circle (10 minutes):** o Introduce the formula for the circumference of a circle ($C = 2\pi r$). Explain the meaning of π (pi) and radius (r). o Relate the circle's circumference to the arc length of a full circle (360°). o Derive a formula for the arc length (s) of a circle sector based on the central angle (θ) in degrees, radius (r), and full circle circumference ($s = (\theta/360) * 2\pi r$).

	• **Real-World Applications (10 minutes):** ○ Discuss real-life examples where calculating arc length is important, such as designing race tracks, laying electrical wires, or measuring the distance traveled by a car on a curved road. 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 Reading- BC punmia book 3. Homework- Study fundamental parts of theodolite. **5. Quiz Questions (5 minutes):** 1. What is the difference between the actual length of a curve and the measurement obtained using a ruler? 2. How can we improve the accuracy of approximating the length of a curve? 3. A circle has a radius of 5 cm. What is the arc length of a sector with a central angle of 60°? (Use the formula provided in the lesson) 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 Cloud Computing Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 6	Course Name: Surveying & Geomatics	Course No.: CE-404

Objectives	At the end of the lesson the student shall be able to: • Define transition curves and their role in road design. • Identify the key elements of a transition curve (length, curvature, and tangent lengths). • Explain the importance of each element for smooth traffic flow and safety.
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	**Introduction (5 minutes):** • Start with a real-world scenario: Ask students to imagine driving on a road with a sharp turn. What challenges might they face? Discuss the importance of smooth transitions on roads. • Introduce the concept of transition curves as sections of road that gradually connect straight sections with curves, allowing for a smooth change in direction. **Details of the Lesson (30 minutes):** • **Elements of Transition Curve:** o **Length (L):** Explain how transition curve length determines the rate of change in curvature (graduality). Discuss factors influencing length such as design speed and maximum superelevation. o **Curvature (K):** Introduce curvature as a measure of how sharp a curve is. Explain how transition curves have a variable curvature that starts from zero and gradually increases to the constant curvature of the main curve. o **Tangent Lengths (T):** Define tangent lengths as the straight sections of road on either side of the transition curve. Explain their role in providing enough space for the curvature change. • **Benefits of Transition Curves:** (Show diagrams or animations if available) o Improved driver comfort: Transition curves prevent jerks and sudden changes in direction, leading to a smoother driving experience. o Enhanced safety: They reduce the risk of vehicle rollovers due to abrupt steering maneuvers.

	○ Increased traffic flow: Smoother transitions allow for higher speeds and better traffic flow. • **Applications:** Discuss how transition curves are used in various road designs, including highways, intersections, and ramps. 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 Reading- BC punmia book 3. Homework- Study fundamental parts of theodolite. **5. Quiz Questions (5 minutes):** 1. What is the purpose of a transition curve? 2. Name three key elements of a transition curve. 3. How does the length of a transition curve affect driver experience? 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 Cloud Computing Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 7	Course Name: Surveying & Geomatics	Course No.: CE-404

Objectives	At the end of the lesson the student shall be able to: • Students will be able to define a vertical curve. • Students will be able to explain the importance of vertical curves in road design. • Students will be able to identify the different types of vertical curves • .
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	**Introduction (5 minutes):** • Begin by asking students if they have ever driven on a road with hills or dips. • Explain that these changes in elevation are called vertical curves. • Briefly discuss the importance of safe road design and how vertical curves play a role in ensuring driver visibility and smooth travel. **Details of the Lesson (30 minutes):** • **Types of Vertical Curves:** o Crest curves: These are convex curves that provide drivers with a clear view of the road ahead (stopping sight distance). o Sag curves: These are concave curves that allow for drainage and can limit driver visibility (stopping sight distance becomes important). o Vertical tangents: These are the straight sections of road that connect vertical curves. • **Importance of Vertical Curves:** o Maintain driver sight distance for safe stopping and overtaking maneuvers. o Ensure a comfortable driving experience by providing a smooth transition between grades. o Facilitate proper drainage of rainwater on the road surface. • **Design Considerations:**

	○ The type of vertical curve is chosen based on design speed, stopping sight distance requirements, and topography. ○ The length and curvature of the vertical curve are determined using engineering calculations to ensure a smooth transition. ○ Safety features like guardrails may be added on certain vertical curves for additional protection. 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 Reading- BC punmia book 3. Homework- Study fundamental parts of theodolite. **5. Quiz Questions (5 minutes):** 1. What is a vertical curve? 2. Why are vertical curves important in road design? (Choose two) ○ a) To create a bumpy ride for drivers. ○ b) To maintain safe stopping sight distance. ○ c) To make the road look more interesting. 3. What are the two main types of vertical curves? 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 Cloud Computing Spend 5 minutes to evaluate student assimilation of the lesson contents

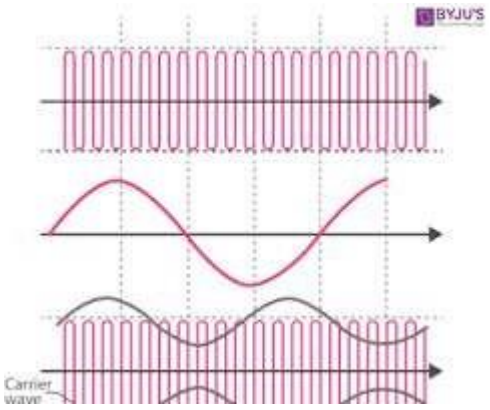
Lesson Plan No. 8	Course Name: Surveying & Geomatics	Course No.: CE-404

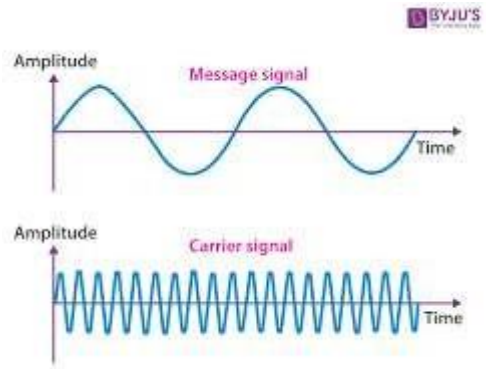
Objectives	At the end of the lesson the student shall be able to: a. create lesson plan for a class of 55 minutes for the topic "Capital Budgeting" b. Each lesson plan should have the following contents 1. Topic 2. Objectives of topic 3. Introduction for 5 minutes 4. Bulleted three points for Details of the lesson that will cover 30 minutes 5. Three simple quiz questions to test the learnings of the students. 6. URLs of this topic for reference. 7. YouTube video reference
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) 2. Start by asking students how they would traditionally measure distance. (e.g., tape measure, ruler) 3. Introduce the concept of electronic distance measurement and its advantages over traditional methods (speed, accuracy, efficiency). 4. Briefly mention applications of electronic distance measurement (surveying, construction, navigation). 5. **Development** (30 minutes) **Details of the Lesson (30 minutes):** 1. **Electromagnetic Waves and Time of Flight:** o Explain that electronic distance measurement uses electromagnetic waves (like light or radio waves). o Introduce the concept of "time of flight" - the time it takes for a wave to travel from the instrument to the target and back. o Discuss how the distance is calculated by multiplying the speed of the wave by the time of flight (distance = speed x time). 2. **Types of Electronic Distance Measurement Instruments:** o Briefly introduce two common types of instruments: ▪ Total station (combines Electronic Distance Meter (EDM) with theodolite for angles) ▪ Global Navigation Satellite System (GNSS) - uses satellites for positioning

	○ Briefly explain the working principle of each instrument (simplified explanation, details can be adjusted based on student level). 3. **Limitations and Accuracy:** ○ Discuss that electronic distance measurement can be affected by factors like atmospheric conditions and obstacles. ○ Briefly explain the concept of instrument accuracy and how it relates to reliable measurements. 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 Reading- BC punmia book 3. Homework- Study fundamental parts of theodolite. **Quiz Questions (3 minutes):** 1. What is the main advantage of electronic distance measurement compared to traditional methods? 2. How does electronic distance measurement use electromagnetic waves? 3. Briefly describe two common types of electronic distance measurement instruments. 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 Cloud Computing Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 9	Course Name: Surveying & Geomatics	Course No.: CE-404

Objectives	At the end of the lesson the student shall be able to: a. Students will be able to define modulation and its purpose in communication systems. b. Students will be able to differentiate between Amplitude Modulation (AM) and Frequency Modulation (FM). c. Students will be able to explain the basic principles of AM and FM modulation.
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) 2. Begin by asking students how information travels wirelessly (cell phones, radio, etc.). 3. Briefly explain that a carrier wave is used to transmit information, but it cannot carry information on its own. 4. Introduce the concept of modulation as a process of adding information to a carrier wave. 5. **Development** (30 minutes) **Details of the Lesson (30 minutes):** 6. **Electromagnetic Waves and Time of Flight:** a. Explain that electronic distance measurement uses electromagnetic waves (like light or radio waves). b. Introduce the concept of "time of flight" - the time it takes for a wave to travel from the instrument to the target and back. c. Discuss how the distance is calculated by multiplying the speed of the wave by the time of flight (distance = speed x time). 7. **Types of Electronic Distance Measurement Instruments:** **4. Details of the Lesson (30 minutes):** 8. **Carrier Wave:** a. Explain the properties of a carrier wave (frequency, amplitude). b. Use an analogy (e.g., a high-pitched sound wave) to illustrate its characteristics. 9. **Modulation:**

	a. Define modulation as the process of varying the properties (amplitude or frequency) of a carrier wave in accordance with an information signal (e.g., voice, music). b. Briefly discuss the need for modulation (easier transmission and filtering of information). 10. **Types of Modulation:** a. Introduce Amplitude Modulation (AM): i. Explain how AM works by varying the amplitude of the carrier wave according to the information signal. ( )  Opens in a new window byjus.com Amplitude Modulation Waveform b. pen_spark i. Use an example (e.g., dimming a light bulb with music) to illustrate. c. Introduce Frequency Modulation (FM): i. Explain how FM works by varying the frequency of the carrier wave according to the information signal. ( )

	 Opens in a new window byjus.com Frequency Modulation Waveform ii. Use an analogy (e.g., stretching a spring faster/slower with music) to illustrate. . 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 Reading- BC punmia book 3. Homework- Study fundamental parts of theodolite. **Quiz Questions (3 minutes):** **. 1** What is the purpose of modulation in communication systems? 2 Differentiate between Amplitude Modulation (AM) and Frequency Modulation (FM) in terms of how they add information to a carrier wave. 3 Briefly explain why modulation is necessary for wireless communication. 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 Cloud Computing Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 10	Course Name: Surveying & Geomatics	Course No.: CE-404

Objectives	At the end of the lesson the student shall be able to: **. Quiz Questions (3 minutes):** 1. What is the purpose of modulation in communication systems? 2. Differentiate between Amplitude Modulation (AM) and Frequency Modulation (FM) in terms of how they add information to a carrier wave. 3. Briefly explain why modulation is necessary for wireless communication.
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) 2. **Hook:** Play a short excerpt of a popular EDM song and ask students to identify the instruments they hear. Discuss the importance of instruments in creating the overall sound of EDM. 3. **What is EDM?** Briefly explain Electronic Dance Music (EDM) and its characteristics. Mention that EDM utilizes a variety of electronic and digital instruments to produce sound. 4. **Development** (30 minutes) **Details of the Lesson (30 minutes):** • **Common EDM Instruments:** o Synthesizers: Explain that synthesizers are electronic keyboards that can generate a wide range of sounds, from classic tones to complex textures. They are essential for creating basslines, leads, pads, and other melodic elements in EDM. o Drum Machines & Samplers: Discuss how drum machines create rhythmic patterns and samplers allow incorporating pre-recorded sounds (e.g., drum loops, vocal samples) into EDM tracks. o Digital Audio Workstations (DAWs): Briefly introduce DAWs as software programs that function as a recording studio for electronic music production. DAWs enable musicians to combine sounds from

	various instruments, add effects, and arrange the music. • **The Role of Instruments in EDM Production:** o Explain how different instruments contribute to the overall structure of an EDM song. Discuss how basslines provide the low-end foundation, synthesizers create melodies and harmonies, drum machines generate rhythm, and samples add unique textures and sound effects. o Play short examples showcasing how each instrument contributes to the final song. • **Exploring Different Sounds:** o Divide students into small groups and assign each group a specific EDM instrument (e.g., synthesizer, drum machine). o Provide them with online resources or audio samples to explore the different sounds each instrument can produce. o Ask each group to present their findings to the class, demonstrating the variety of sounds possible with each instrument. 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 Reading- BC punmia book 3. Homework- Study fundamental parts of theodolite. **Quiz Questions (3 minutes):** 1. **.** What instrument is typically used to create the low-end foundation in EDM music? o (a) Synthesizer o (b) Drum Machine o (c) Bassline (correct) o (d) Sampler 2. What is the function of a sampler in EDM production? o (a) To generate rhythmic patterns o (b) To create melodic lines o (c) To incorporate pre-recorded sounds (correct) o (d) To manipulate audio effects 3. DAWs are a type of software used for: o (a) Playing live EDM performances o (b) Recording and editing electronic music (correct) o (c) Projecting visuals during EDM concerts o (d) Distributing EDM music online

	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 Cloud Computing Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 11	Course Name: Surveying & Geomatics	Course No.: CE-404

Objectives	At the end of the lesson the student shall be able to: **. Quiz Questions (3 minutes):** • Students will be able to define what a distomat is and its role in surveying. • Students will be able to explain the different types of distomats. • Students will understand the working principle of a distomat.
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) 2. **Capture Attention:** Begin by asking the students if they have ever used a measuring tool. What kind of measuring tools do they know? (Tape measure, ruler, etc.) 3. **Introduce the Topic:** Explain that in surveying, we use specialized tools for accurate distance measurement. Today, we will learn about one such tool called a distomat. 4. **Relate to Daily Life:** Briefly mention how accurate distance measurement is important in various professions like construction, civil engineering, etc. 5. . 6. **Development** (30 minutes) **Details of the Lesson (30 minutes):** 1. **What is a Distomat? (10 minutes):** o Define a distomat as an electronic distance measuring instrument (EDM) that uses electromagnetic waves (usually light) to measure distances. o Explain how it differs from traditional measuring tools like tape measures by highlighting its advantages (accuracy, speed, ease of use). o Briefly mention different applications of distomats in surveying tasks (land surveying, construction stakeout, etc.). 2. **Types of Distomats (10 minutes):** o Introduce two main types of distomats: Total Station and Reflectorless Distomat.

	○ Briefly explain how a Total Station EDM works by transmitting and receiving a light signal to a reflector prism at a known distance. ○ Explain how a Reflectorless Distomat directly measures the distance to a target surface without needing a reflector. 3. **Working Principle of a Distomat (10 minutes):** ○ In simple terms, explain how a distomat transmits a light pulse and measures the time it takes for the signal to reflect back from the target. ○ Relate the time measurement to distance calculation using the speed of light. ○ Briefly mention additional functionalities of some distomats like angle measurement (Total Station) for advanced surveying applications. 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 Reading- BC punmia book 3. Homework- Study fundamental parts of theodolite. **Quiz Questions (3 minutes):** 1. What is the main difference between a distomat and a traditional measuring tape? 2. Briefly describe two types of distomats. 3. How does a distomat measure distance? 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 Cloud Computing Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 12	Course Name: Surveying & Geomatics	Course No.: CE-404

Objectives	At the end of the lesson the student shall be able to: **. Quiz Questions (3 minutes):** • Students will be able to identify the major components of a total station. • Students will understand the function of each component. • Students will be able to explain how the components work together to perform surveying tasks.
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) 2. Begin by asking the students if they have ever seen a surveying instrument. Briefly discuss the importance of surveying in construction and land development projects. 3. Introduce the total station as a modern surveying tool that combines electronic distance measurement (EDM) and electronic theodolite functionalities. 4. Show a picture of a total station and highlight the key parts: the telescope, the electronic distance meter (EDM), and the control panel. 5. . 6. **Development** (30 minutes) **Details of the Lesson (30 minutes):** 1. **Theodolite:** o Explain that the theodolite is the core of the total station, allowing for horizontal and vertical angle measurements. o Discuss the alidade (rotating part with the telescope), leveling screws, and horizontal and vertical circles for precise angle measurement. 2. **Electronic Distance Meter (EDM):** o Introduce the EDM as a component that uses light or electromagnetic waves to measure distances electronically. o Briefly explain the different types of EDMs (infrared, laser) and their advantages (faster, more accurate measurements).

	3. **Control Panel and Display:** o Discuss the control panel as the user interface for the total station. o Highlight the buttons and knobs for operating the instrument, as well as the display screen for viewing measurements and data. 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 Reading- BC punmia book 3. Homework- Study fundamental parts of theodolite. **Quiz Questions (3 minutes):** 1. What are the three main components of a total station? 2. What is the function of the theodolite? 3. How does the electronic distance meter (EDM) work? 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 Cloud Computing Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 13	Course Name: Surveying & Geomatics	Course No.: CE-404

Objectives	At the end of the lesson the student shall be able to: • Students will be able to define a total station and its key components. • Students will be able to identify the advantages of using a total station compared to traditional surveying methods. • Students will be able to explain various applications of total stations in different fields.
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) 2. Begin by asking students if they are familiar with surveying and how it's done. Briefly discuss traditional surveying methods using theodolites and tapes. 3. Introduce the concept of a total station as a modern surveying instrument that combines the functionalities of a theodolite, electronic distance meter (EDM), and data collector. 4. . 5. **Development** (30 minutes) **Details of the Lesson (30 minutes):** 1. **Components and Functionality (10 minutes):** o Briefly explain the main components of a total station: telescope, electronic distance meter (EDM), microprocessor, and data collector. o Discuss how the EDM measures distances electronically using light or electromagnetic waves. o Explain how the microprocessor combines data from the telescope and EDM to calculate angles, distances, and coordinates. 2. **Advantages of Total Stations (10 minutes):** o Discuss the key advantages of total stations compared to traditional methods: ▪ **Increased Accuracy and Efficiency:** Highlight the higher precision of EDM measurements and the ability to store data electronically, reducing human error.

	▪ **One-Person Operation:** Emphasize the convenience of a single instrument for measuring angles, distances, and collecting data. ▪ **Data Versatility:** Discuss the ability to export data to various formats for further analysis and computer-aided design (CAD) software. 3. **Applications of Total Stations (10 minutes):** o Introduce various applications of total stations in different fields: ▪ **Construction:** Setting out foundations, monitoring building movements, calculating volumes for earthwork. ▪ **Land Surveying:** Measuring property boundaries, creating topographic maps, establishing control points for future projects. ▪ **Infrastructure Development:** Road alignment, pipeline surveying, setting up pylons for electricity transmission. 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 Reading- BC punmia book 3. Homework- Study fundamental parts of theodolite. **Quiz Questions (3 minutes):** 1. What is the main difference between a total station and a theodolite? 2. List two advantages of using a total station for surveying tasks. 3. Give an example of how a total station is used in the construction industry. 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 Cloud Computing Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 15	Course Name: Surveying & Geomatics	Course No.: CE-404

Objectives	At the end of the lesson the student shall be able to: • Students will be able to identify the key components of a total station setup. • Students will be able to explain the steps involved in setting up a total station in the field. • Students will be able to describe the basic operation of a total station for taking measurements.
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) 2. Begin by asking students if they are familiar with surveying instruments. Briefly discuss theodolites and their limitations. 3. Introduce the total station as a modern surveying instrument that combines the functionality of a theodolite with an electronic distance meter (EDM). 4. Explain the importance of proper field procedures for accurate and efficient data collection with a total station 5. **Development** (30 minutes) **Details of the Lesson (30 minutes):** i. measuring angles, distances, and collecting data. ii. **Data Versatility:** Discuss the ability to export data to various formats for further analysis and computer-aided design (CAD) software. 6. **Applications of Total Stations (10 minutes):** 7. **Setting Up the Total Station (10 minutes):** a. Explain the components of a total station setup: tripod, leveling bubble, total station instrument, prism pole, and battery. b. Discuss the importance of setting up the tripod on stable ground and leveling the instrument using the leveling bubble. c. Briefly introduce the process of centering the instrument over the station point. 8. **Taking Measurements with the Total Station (10 minutes):**

	a. Explain the basic operation of the total station for taking horizontal and vertical angles. b. Introduce the concept of targeting the prism pole with the instrument's telescope for distance measurement. c. Briefly discuss the recording of data points in the data collector. 9. **Field Safety and Precautions (10 minutes):** a. Emphasize the importance of working in a safe manner in the field, including wearing proper clothing and eye protection. b. Discuss being aware of your surroundings and potential hazards like overhead power lines or uneven terrain. c. Briefly touch upon the importance of proper communication with teammates and following established safety protocols. i. . 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 Reading- BC punmia book 3. Homework- Study fundamental parts of theodolite. **Quiz Questions (3 minutes):** 1. What are the three key components needed to set up a total station? 2. How is the accuracy of horizontal and vertical measurements ensured when using a total station? 3. Why is safety a critical aspect of field procedures with a total station? 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 Cloud Computing Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 16	Course Name: Surveying & Geomatics	Course No.: CE-404

Objectives	At the end of the lesson the student shall be able to: • Students will be able to identify common errors that can occur during a total station survey. • Students will be able to explain the impact of these errors on the accuracy of their surveys. • Students will learn methods to minimize these errors during data collection.
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) 2. Briefly introduce the concept of total station surveys and their importance in various fields. 3. Mention that like any measuring instrument, total stations are also prone to errors. 4. Discuss the importance of understanding these errors to ensure the accuracy of survey results 5. **Development** (30 minutes) **Details of the Lesson (30 minutes):** 1. **Types of Errors:** o Explain the difference between systematic errors and random errors. ▪ Provide examples of each type of error in the context of total station surveys. (e.g., instrumental collimation error (systematic), atmospheric conditions (random)) o Briefly discuss gross errors caused by human mistakes or equipment malfunctions. 2. **Impact of Errors:** o Discuss how errors can affect the final results of a survey, such as coordinates, distances, and elevations. o Emphasize the importance of minimizing errors to achieve reliable survey data. 3. **Minimizing Errors:** o Explain proper instrument setup and calibration procedures to minimize systematic errors.

	○ Discuss techniques to reduce random errors, such as repeating measurements and averaging the results. ○ Briefly mention the importance of following proper surveying practices to avoid human errors. . 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 Reading- BC punmia book 3. Homework- Study fundamental parts of theodolite. **Quiz Questions (3 minutes):** 1. What are the two main categories of errors in total station surveys? 2. How can atmospheric conditions affect the accuracy of a survey? 3. What are some ways to minimize errors during a total station survey? 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 Cloud Computing Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 17	Course Name: Surveying & Geomatics	Course No.: CE-404

Objectives	At the end of the lesson the student shall be able to: • Students will understand the basic concept of GPS and its components. • Students will explain how GPS determines location. • Students will identify some real-world applications of GPS technology.
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) 2. Briefly introduce the concept of total station surveys and their importance in various fields. 3. Mention that like any measuring instrument, total stations are also prone to errors. 4. Discuss the importance of understanding these errors to ensure the accuracy of survey results 5. **Development** (30 minutes) **Details of the Lesson (30 minutes):** • **The GPS Network:** o Explain that GPS is a constellation of satellites orbiting Earth, constantly sending signals. o Briefly mention that GPS is owned and operated by the US Air Force but is freely available for civilian use. • **How GPS Works:** o Introduce the concept of triangulation. Explain that a GPS receiver receives signals from multiple satellites, allowing it to calculate its position on Earth. o Briefly discuss the role of time and precise atomic clocks onboard the satellites in accurate positioning. • **Applications of GPS:** o Show real-world examples of GPS usage: navigation apps, emergency services, tracking devices, etc. o Encourage students to brainstorm other potential applications of GPS technology. 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 Reading- BC punmia book 3. Homework- Study fundamental parts of theodolite. **Quiz Questions (3 minutes):** 1. What is the main purpose of the GPS network? 2. How does a GPS receiver determine your location? (Explain triangulation) 3. Give two examples of how GPS is used in everyday life. 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 Cloud Computing Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 18	Course Name: Surveying & Geomatics	Course No.: CE-404

Objectives	At the end of the lesson the student shall be able to: • Students will understand the basic principles of GPS technology. • Students will be able to identify the applications of GPS surveying. • Students will learn the advantages and limitations of GPS surveying compared to traditional methods.
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) 2. Begin by asking students how they use navigation apps on their phones. 3. Briefly introduce the concept of GPS (Global Positioning System) and how it uses satellites to determine location. 4. Explain that this lesson will explore how GPS is used for surveying purposes. 5. **Development** (30 minutes) **Details of the Lesson (30 minutes):** • **How GPS Works for Surveying:** o Explain that surveying GPS units are more precise than those in phones. o Briefly discuss the concept of triangulation using multiple satellites for accurate positioning. o Mention Differential GPS (DGPS) that improves accuracy further by using a reference station. • **Applications of GPS Surveying:** o List some common uses of GPS surveying such as mapping land boundaries, construction projects, and environmental monitoring. o Briefly discuss how GPS data can be integrated with Geographic Information Systems (GIS) for further analysis. • **Advantages and Limitations:** o Highlight the advantages of GPS surveying like speed, efficiency, and cost-effectiveness compared to traditional methods.

	○ Discuss limitations like accuracy dependence on factors like satellite visibility and atmospheric conditions. 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 Reading- BC punmia book 3. Homework- Study fundamental parts of theodolite. **Quiz Questions (3 minutes):** 1. What does GPS stand for? 2. How does GPS determine location? 3. Name one advantage and one limitation of GPS surveying. 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 Cloud Computing Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 19	Course Name: Surveying & Geomatics	Course No.: CE-404

Objectives	At the end of the lesson the student shall be able to: • Students will be able to identify factors affecting GPS surveying accuracy. • Students will be able to explain different methods used to improve GPS surveying accuracy. • Students will be able to differentiate between different levels of GPS surveying accuracy required for various projects
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) 2. Begin by asking the students about their experience with GPS technology (e.g., using navigation apps on smartphones). 3. Briefly explain the principles of GPS surveying and how it differs from traditional surveying methods. 4. Introduce the concept of accuracy in surveying and its importance for reliable data collection. 5. **Development** (30 minutes) **Details of the Lesson (30 minutes):** 6. **Factors Affecting Accuracy:** a. Satellite geometry: Explain how the position of satellites relative to the receiver affects accuracy (e.g., more satellites above the horizon = better accuracy). b. Signal interference: Discuss how obstacles (buildings, trees) and atmospheric conditions can weaken GPS signals and reduce accuracy. c. Equipment quality: Explain how the type and quality of GPS receiver affect accuracy (e.g., higher-grade receivers offer better accuracy). 7. **Methods to Improve Accuracy:** a. Differential GPS (DGPS): Briefly explain how DGPS uses a reference station to correct errors in real-time, improving overall accuracy. b. Real-Time Kinematic (RTK): Discuss how RTK uses a network of reference stations and real-time data transmission for high-precision surveying.

	c. Post-processing: Explain how post-processing software can be used to analyze and refine GPS data collected in the field, potentially improving accuracy. 8. **Accuracy Requirements:** a. Discuss how the required accuracy for a GPS surveying project depends on its purpose (e.g., high accuracy needed for boundary surveys, lower accuracy might be acceptable for basic site mapping). b. Introduce concepts like positional accuracy (meters) and Differential Global Positioning System (DGPS) accuracy (centimeters). . 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 Reading- BC punmia book 3. Homework- Study fundamental parts of theodolite. **Quiz Questions (3 minutes):** 1. What are three factors that can affect the accuracy of GPS surveying? 2. How does Differential GPS (DGPS) improve accuracy compared to a basic GPS receiver? 3. Why might a construction project require a different level of GPS surveying accuracy compared to a land boundary survey? 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 Cloud Computing Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 20	Course Name: Surveying & Geomatics	Course No.: CE-404

Objectives	At the end of the lesson the student shall be able to: • Understand the basic principles of photogrammetric surveying. • Identify the applications and significance of photogrammetry in various fields. • Gain insight into the workflow and process involved in photogrammetric surveying.
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz

Teaching Development	- **Introduction** (5 minutes)
	- Ask questions.
	- Briefly introduce the concept of photogrammetric surveying.
	- Highlight its importance in various industries such as cartography, urban planning, and environmental monitoring.
	- Motivate students by discussing real-world examples where photogrammetry is used.
	- **Development** (30 minutes)
	Definition and Concept:
	• **Basic Principles of Photogrammetry:**
	  • Definition and scope of photogrammetry.
	  • Concepts of aerial photography and remote sensing.
	  • Principles of stereo vision and parallax.
	• **Applications of Photogrammetry:**
	  • Mapping and cartography.
	  • Land surveying and topographic mapping.
	  • 3D modeling and reconstruction.
	• **Workflow in Photogrammetric Surveying:**
	  • Image acquisition: aerial and terrestrial.
	  • Data processing: image orientation, feature extraction, and point cloud generation.

	• Product generation: digital elevation models, orthophotos, and 3D models. 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 Reading- BC punmia book 3. Homework- Study fundamental parts of theodolite. **Quiz Questions:** 1. What are the primary principles of photogrammetry? 2. Name two applications of photogrammetric surveying. 3. Briefly explain the workflow involved in photogrammetric surveying. 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 Cloud Computing Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 21	Course Name: Surveying & Geomatics	Course No.: CE-404

Objectives	At the end of the lesson the student shall be able to: • Understand the basic concepts of perspective geometry in aerial photography. • Learn about the different types of perspectives and how they are applied in interpreting aerial photographs. • Gain insights into the practical applications of perspective geometry in various fields like cartography, urban planning, and environmental studies.
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	- **Introduction** (5 minutes) - Ask questions. - Begin by discussing the importance of aerial photography in modern mapping and surveying. - Highlight how perspective geometry plays a crucial role in interpreting aerial images. - Introduce key terms such as vertical and oblique perspectives, focal length, scale, and distortion. - **Development** (30 minutes) Definition and Concept: - **Explanation of Perspective Geometry:** Discuss the principles of perspective geometry in aerial photography, including how objects appear differently based on their distance from the camera and the angle of the photograph. - **Types of Perspectives:** Explore vertical and oblique perspectives, explaining their differences and applications. - **Factors Affecting Perspective:** Cover factors such as altitude, camera tilt, and focal length, and how they influence the perspective in aerial photography. 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 Reading- BC punmia book 3. Homework- Study fundamental parts of theodolite. **Quiz Questions:** 1. What is the difference between vertical and oblique perspectives in aerial photography? 2. How does altitude affect the perspective in aerial photographs? 3. Name one practical application of perspective geometry in aerial photography. 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 Cloud Computing Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 22	Course Name: Surveying & Geomatics	Course No.: CE-404

Objectives	At the end of the lesson the student shall be able to: • Understand the concepts of relief displacement and tilt displacement in photogrammetric surveying. • Learn how relief and tilt displacements affect aerial photographs and measurements. • Explore methods to mitigate relief and tilt displacements in photogrammetric surveying.
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz

Teaching Development	- **Introduction** (5 minutes)
	- Ask questions.
	- Briefly introduce the importance of accurate measurements in photogrammetric surveying.
	- Define relief displacement and tilt displacement.
	- Explain why understanding these displacements is crucial for accurate surveying.
	-
	- **Development** (30 minutes)
	Definition and Concept:
	• **Concept of Relief Displacement:**
	  • Explanation of relief displacement and its causes.
	  • Effects of relief displacement on aerial photographs.
	  • Methods to account for relief displacement in surveying.
	• **Concept of Tilt Displacement:**
	  • Explanation of tilt displacement and its causes.
	  • Effects of tilt displacement on aerial photographs.
	  • Methods to correct tilt displacement in photogrammetric surveying.
	• **Mitigation Techniques:**
	  • Discuss advanced techniques and technologies used to mitigate relief and tilt displacements.
	  • Practical examples illustrating the application of mitigation techniques.

	• Importance of quality control measures to minimize errors. 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 Reading- BC punmia book 3. Homework- Study fundamental parts of theodolite. **Quiz Questions:** 1. What is relief displacement in photogrammetric surveying, and how does it affect aerial photographs? 2. Explain tilt displacement and its impact on surveying accuracy. 3. Name two methods to mitigate relief and tilt displacements in photogrammetric surveying. 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 Cloud Computing Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 23	Course Name: Surveying & Geomatics	Course No.: CE-404

Objectives	At the end of the lesson the student shall be able to: • Understand the concept of terrestrial photogrammetry. • Learn the basic principles and techniques involved. • Explore applications and importance in various fields.
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz

Teaching Development	- **Introduction** (5 minutes)
	- Ask questions.
	- Briefly define terrestrial photogrammetry as a technique used to obtain measurements and geometric information from photographs taken from ground-level cameras.
	- Discuss its importance in fields such as surveying, architecture, archaeology, and urban planning.
	- Highlight how advancements in technology have made terrestrial photogrammetry more accessible and accurate.
	- .
	-
	- **Development** (30 minutes)
	Definition and Concept:
	• Explanation of Photogrammetry Basics:
	  • Definition and brief history of photogrammetry.
	  • Key components: cameras, overlapping images, control points.
	  • Principles of image acquisition and processing.
	• Techniques in Terrestrial Photogrammetry:
	  • Ground control points and their significance.
	  • Camera calibration and settings.
	  • Image processing software and workflow.
	• Applications and Case Studies:
	  • Surveying and mapping of land areas.
	  • 3D modeling of buildings and structures.
	  • Cultural heritage preservation and documentation.
	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 Reading- BC punmia book 3. Homework- Study fundamental parts of theodolite. **Quiz Questions:** 1. What are the essential components of terrestrial photogrammetry? 2. How are ground control points used in photogrammetric processing? 3. Name two applications of terrestrial photogrammetry outside of surveying. 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 Cloud Computing Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 24	Course Name: Surveying & Geomatics	Course No.: CE-404

Objectives	At the end of the lesson the student shall be able to: • Understand the concept of stereoscopy and its applications. • Learn about the principles behind creating 3D images. • Explore the history and evolution of stereoscopy.
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz

Teaching Development	- **Introduction** (5 minutes)
	- Ask questions.
	- Begin with a thought-provoking question: "Have you ever wondered how 3D movies or images work?"
	- Define stereoscopy as the technique for creating or enhancing the illusion of depth in an image.
	- Highlight the relevance of stereoscopy in various fields such as entertainment, medicine, and science.
	-
	- **Development** (30 minutes)
	Definition and Concept:
	• **Explanation of Stereoscopy:**
	  • Definition and basic principles.
	  • How stereoscopic vision works in humans.
	  • Types of stereoscopy: Anaglyph, Polarized, Active shutter, etc.
	• **Techniques for Creating Stereoscopic Images:**
	  • Dual-camera systems and their setup.
	  • Parallax and its role in creating depth perception.
	  • Post-processing methods for creating stereoscopic effects.
	• **Applications and Examples:**
	  • 3D movies and their production process.
	  • Medical imaging and surgical applications.
	  • Virtual reality and augmented reality experiences.
	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 Reading- BC punmia book 3. Homework- Study fundamental parts of theodolite.

	Quiz Questions: 1. What is the primary principle behind stereoscopy? 2. Name two types of stereoscopic techniques used in modern cinema. 3. How does stereoscopy enhance depth perception in images? 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 Cloud Computing Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 25	Course Name: Surveying & Geomatics	Course No.: CE-404

Objectives	At the end of the lesson the student shall be able to: • Understand the concept of ground control extension in photographic mapping. • Learn the importance of ground control points in ensuring accuracy in mapping. • Explore techniques for establishing and utilizing ground control points effectively.
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	- **Introduction** (5 minutes) - Ask questions. - Begin with a brief overview of the importance of accuracy in photographic mapping. - Introduce the concept of ground control points and their significance in ensuring precise mapping. - Explain the relevance of ground control extension in expanding the coverage and accuracy of mapping projects. - - **Development** (30 minutes) Definition and Concept: - Importance of Ground Control Points: o Definition and purpose of ground control points. o Role in georeferencing and aligning aerial or satellite imagery. o Impact on the accuracy of mapping outputs. - Techniques for Establishing Ground Control Points: o Differential GPS (DGPS) and Real-Time Kinematic (RTK) GPS methods. o Surveying techniques for ground control point establishment. o Considerations for distributing ground control points across the mapping area. - Utilizing Ground Control Points for Photographic Mapping:

	○ Integration of ground control points into GIS and mapping software. ○ Workflow for incorporating ground control data into mapping projects. ○ Quality assessment and refinement of mapping outputs using ground control points ○ 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 Reading- BC punmia book 3. Homework- Study fundamental parts of theodolite. **Quiz Questions:** 1. What is the primary purpose of ground control points in photographic mapping? 2. Name two techniques for establishing ground control points. 3. How do ground control points contribute to improving the accuracy of mapping outputs? 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 Cloud Computing Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 26	Course Name: Surveying & Geomatics	Course No.: CE-404

Objectives	At the end of the lesson the student shall be able to: • Understand the concept of aerial triangulation. • Learn the importance of aerial triangulation in photogrammetry. • Familiarize with the process and techniques involved in aerial triangulation.
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz

Teaching Development	- **Introduction** (5 minutes)
	- Ask questions.
	- Begin with a brief explanation of what aerial triangulation is.
	- Discuss its significance in mapping, surveying, and creating accurate 3D models from aerial photographs.
	- Mention the role of aerial triangulation in reducing errors and improving the accuracy of geospatial data.
	-
	- **Development** (30 minutes)
	Definition and Concept:
	• **Definition and Basics**
	  • Explain the fundamental concept of aerial triangulation.
	  • Discuss how it involves determining the spatial positions of points on the Earth's surface using triangulation methods.
	  • Introduce the concept of control points and tie points in aerial triangulation.
	• **Process of Aerial Triangulation**
	  • Describe the workflow of aerial triangulation, including image acquisition, feature extraction, bundle adjustment, and point cloud generation.
	  • Explain the role of ground control points (GCPs) in establishing the relationship between image coordinates and ground coordinates.

	• Discuss the importance of image orientation parameters in the aerial triangulation process.
	• **Applications and Significance**
	  • Explore the various applications of aerial triangulation in cartography, urban planning, environmental monitoring, and infrastructure development.
	  • Emphasize the significance of accurate aerial triangulation in producing high-quality orthophotos and digital elevation models (DEMs).
	  • Highlight the role of aerial triangulation in improving the efficiency and precision of photogrammetric projects.
	
	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 Reading- BC punmia book 3. Homework- Study fundamental parts of theodolite. **Quiz Questions:** 1. What is the primary objective of aerial triangulation? 2. How do ground control points contribute to the accuracy of aerial triangulation? 3. Name one application where accurate aerial triangulation is crucial. 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 Cloud Computing Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 27	Course Name: Surveying & Geomatics	Course No.: CE-404

Objectives	At the end of the lesson the student shall be able to: • Understand the concept of radial triangulation in geometry. • Learn the methods and techniques used in radial triangulation. • Apply radial triangulation in solving geometric problems.
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	- **Introduction** (5 minutes) - Ask questions. - Begin with a brief overview of what triangulation is in geometry. - Introduce the concept of radial triangulation as a specific method within triangulation. - Discuss the importance of radial triangulation in various fields such as cartography, navigation, and surveying. - - **Development** (30 minutes) Definition and Concept: • Definition of Radial Triangulation • Methods and Techniques: 1. Polar Triangulation 2. Rectangular Triangulation 3. Triangulation by Direct Measurement • Applications and Examples: • Cartography • Navigation Systems • Surveying and Mapping 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 Reading- BC punmia book 3. Homework- Study fundamental parts of theodolite.

	Quiz Questions: 1. What is radial triangulation, and how does it differ from other types of triangulation? 2. Explain the concept of polar triangulation and provide an example where it can be applied. 3. How is radial triangulation utilized in surveying and mapping tasks? 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 Cloud Computing Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 28	Course Name: Surveying & Geomatics	Course No.: CE-404

Objectives	At the end of the lesson the student shall be able to: • Understand the concept of photographic mapping. • Learn about the tools and techniques used in photographic mapping. • Explore applications and significance of photographic mapping in various fields.
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz

Teaching Development	- **Introduction** (5 minutes)
	- Ask questions.
	- Begin the class by displaying a captivating aerial photograph of a landscape.
	- Ask students what they observe in the image and how they think such images are captured.
	- Introduce the concept of photographic mapping and its importance in various disciplines such as geography, urban planning, environmental studies, etc.
	-
	- **Development** (30 minutes)
	Definition and Concept:
	• **Tools and Techniques:**
	  • Discuss the equipment used in photographic mapping such as cameras, drones, satellites, etc.
	  • Explain the process of capturing images from different altitudes and perspectives.
	  • Highlight the importance of image resolution and quality in mapping accuracy.
	• **Data Processing:**
	  • Explain the process of image stitching and georeferencing.
	  • Discuss how photogrammetry is used to extract 3D information from 2D images.
	  • Introduce GIS software and its role in analyzing and interpreting photographic data.

	• **Applications:**
	  • Explore real-world applications of photographic mapping in fields like agriculture, disaster management, archaeology, etc.
	  • Discuss case studies or examples showcasing how photographic mapping has revolutionized various industries.
	  • Encourage students to brainstorm potential innovative applications of photographic mapping.
	
	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 Reading- BC punmia book 3. Homework- Study fundamental parts of theodolite. **Quiz Questions:** 1. What are the primary tools used in photographic mapping? 2. How is photogrammetry used in extracting 3D information from 2D images? 3. Name one real-world application where photographic mapping has been instrumental 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 Cloud Computing Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 29	Course Name: Surveying & Geomatics	Course No.: CE-404

Objectives	At the end of the lesson the student shall be able to: • Understand the basics of mapping using paper prints. • Learn how to read and interpret maps effectively. • Develop skills in creating simple maps using paper prints.
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz

Teaching Development	- **Introduction** (5 minutes)
	- Ask questions.
	- Start the class by discussing the importance of maps in our daily lives.
	- Highlight the significance of understanding map reading and basic map-making skills.
	- Introduce the concept of mapping using paper prints and its relevance in various fields such as geography, navigation, and urban planning.
	-
	- **Development** (30 minutes)
	Definition and Concept:
	• **Understanding Map Components:**
	  • Discuss the key components of a map such as legend, scale, symbols, and compass rose.
	  • Explain the importance of each component in interpreting a map accurately.
	  • Engage students in identifying these components on different maps provided.
	• **Reading and Interpreting Maps:**
	  • Demonstrate how to read a map effectively, emphasizing the importance of scale and direction.
	  • Provide examples of various types of maps (e.g., topographic maps, road maps) and guide students in interpreting them.
	  • Engage students in activities where they have to follow directions on a map to locate specific landmarks or destinations.
	• **Creating Simple Maps:**

	• Introduce basic techniques for creating simple maps using paper prints. • Teach students how to draw a basic map of their classroom, school, or neighborhood. • Provide guidance on using scale and symbols to represent different features on the map accurately. 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 Reading- BC punmia book 3. Homework- Study fundamental parts of theodolite. **Quiz Questions:** 1. What are the key components of a map, and why are they important? 2. How does scale affect the representation of distance on a map? 3. Can you name three symbols commonly used on maps and explain what they represent? 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 Cloud Computing Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 30	Course Name: Surveying & Geomatics	Course No.: CE-404

Objectives	At the end of the lesson the student shall be able to: • Understand the concept of stereoplotting in mapping. • Learn the basic principles of using stereoplotting instruments. • Explore applications of stereoplotting in various fields like cartography, geology, and urban planning.
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz

Teaching Development	- **Introduction** (5 minutes)
	- Ask questions.
	- Begin with a brief explanation of the importance of accurate mapping in various fields.
	- Introduce stereoplotting as a method used for creating accurate maps.
	- Engage students by discussing the relevance of stereoplotting in modern mapping techniques.
	-
	- **Development** (30 minutes)
	Definition and Concept:
	• **Principles of Stereoplotting:**
	  • Definition and basic concept of stereoplotting.
	  • Explanation of how stereoscopic vision is utilized in mapping.
	  • Demonstration of stereoplotting instruments and their components.
	• **Techniques in Stereoplotting:**
	  • Explanation of aerial photographs and their role in stereoplotting.
	  • Step-by-step process of using stereoplotting instruments to interpret aerial imagery.
	  • Hands-on practice session for students to familiarize themselves with the instruments.
	• **Applications of Stereoplotting:**
	  • Discuss various fields where stereoplotting is utilized, such as cartography, geology, and urban planning.

	• Showcase real-world examples of maps created using stereoplotting techniques. • Encourage students to brainstorm additional potential applications of stereoplotting. 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 Reading- BC punmia book 3. Homework- Study fundamental parts of theodolite. **Quiz Questions:** 1. What is the basic principle behind stereoplotting? 2. How are aerial photographs utilized in stereoplotting? 3. Name one field other than cartography where stereoplotting is commonly used. 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 Cloud Computing Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 31	Course Name: Surveying & Geomatics	Course No.: CE-404

Objectives	At the end of the lesson the student shall be able to: • Understand the concept of remote sensing and its significance. • Learn about the basic principles and components of remote sensing systems. • Explore various applications and fields where remote sensing is employed.
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz

Teaching Development	- **Introduction** (5 minutes)
	- Ask questions.
	- Begin the class by asking students if they have heard about remote sensing before. Provide a brief definition of remote sensing as the process of obtaining information about objects or areas from a distance without making physical contact. Highlight its importance in various fields such as environmental monitoring, agriculture, urban planning, etc.
	- **Development** (30 minutes)
	Definition and Concept:
	• **Definition and Principles:**
	  • Explanation of remote sensing and its objectives.
	  • Discussion on the electromagnetic spectrum and how it relates to remote sensing.
	  • Overview of the principles of remote sensing including interaction of electromagnetic radiation with objects, sensors, and platforms.
	• **Components of Remote Sensing Systems:**
	  • Explanation of key components such as the sensor, platform, and data processing techniques.
	  • Discuss different types of sensors (passive and active) and platforms (satellites, aircraft, drones).
	  • Illustrate the workflow of remote sensing data collection, transmission, and interpretation.
	• **Applications of Remote Sensing:**

	• Explore various fields where remote sensing is applied including agriculture, forestry, environmental monitoring, disaster management, urban planning, etc. • Showcase examples and case studies to demonstrate the real-world impact of remote sensing technologies. 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 Reading- BC punmia book 3. Homework- Study fundamental parts of theodolite. **Quiz Questions:** 4. What is remote sensing, and why is it important? 5. Name two components of remote sensing systems and explain their roles. 6. Provide an example of an application of remote sensing in environmental monitoring. 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 Cloud Computing Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 32	Course Name: Surveying & Geomatics	Course No.: CE-404

Objectives	At the end of the lesson the student shall be able to: • Understand the concept of the electromagnetic spectrum. • Identify different regions of the electromagnetic spectrum and their characteristics. • Recognize the applications of various segments of the electromagnetic spectrum in daily life and scientific research.
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	- **Introduction** (5 minutes) - Ask questions. - Begin the class by asking students if they have heard of the term "electromagnetic spectrum" and what they understand by it. - Define the electromagnetic spectrum as the range of all possible frequencies of electromagnetic radiation. - Highlight that the spectrum includes familiar forms of radiation such as visible light, radio waves, microwaves, and X-rays - . - **Development** (30 minutes) Definition and Concept: **Key Points:** 1. Explanation of the Electromagnetic Spectrum: Describe how the electromagnetic spectrum is organized according to wavelength or frequency. 2. Types of Waves: Discuss different types of waves within the spectrum, such as radio waves, microwaves, infrared radiation, visible light, ultraviolet radiation, X-rays, and gamma rays. 3. Applications: Explore various applications of each segment of the spectrum, from communication (radio waves) to medical imaging (X-rays) and beyond. 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 Reading- BC punmia book 3. Homework- Study fundamental parts of theodolite. **Quiz Questions:** 1. Which segment of the electromagnetic spectrum has the longest wavelength? 2. What type of radiation is commonly used in microwave ovens? 3. How does visible light differ from other forms of electromagnetic radiation? 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 Cloud Computing Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 33	Course Name: Surveying & Geomatics	Course No.: CE-404

Objectives	At the end of the lesson the student shall be able to: • Understand the interaction processes of electromagnetic radiation with the atmosphere and Earth's surface. • Identify the factors influencing these interactions. • Explain the significance of these interactions in various Earth systems.
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	- **Introduction** (5 minutes) - Ask questions. - Start with a brief explanation of electromagnetic radiation and its importance in Earth science. - Discuss why understanding its interaction with the atmosphere and Earth's surface is crucial. - Introduce key terms such as absorption, reflection, and transmission. - . - **Development** (30 minutes) Definition and Concept: • **Absorption:** Discuss how different components of the atmosphere absorb certain wavelengths of electromagnetic radiation. • **Reflection:** Explain how various surfaces reflect incoming radiation differently based on their albedo. • **Transmission:** Explore how some radiation passes through the atmosphere and interacts with the Earth's surface. 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 Reading- BC punmia book 3. Homework- Study fundamental parts of theodolite.

	Quiz Questions: 1. What term describes the process by which the atmosphere absorbs certain wavelengths of electromagnetic radiation? 2. How does the albedo of a surface affect the reflection of incoming radiation? 3. Can you explain how the greenhouse effect is related to the transmission of electromagnetic radiation through the atmosphere? 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 Cloud Computing Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 34	Course Name: Surveying & Geomatics	Course No.: CE-404

Objectives	At the end of the lesson the student shall be able to: • Understand the concept of remote sensing and its significance. • Learn about different methods and technologies used in remote sensing data acquisition. • Explore the applications and importance of remote sensing data in various fields.
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	- **Introduction** (5 minutes) - Ask questions. - Begin by defining remote sensing as the process of gathering information about an object or phenomenon without making physical contact with it. - Highlight the importance of remote sensing in various fields such as agriculture, environmental monitoring, urban planning, etc. - Discuss the basic principles behind remote sensing and its applications in real-world scenarios. - . - **Development** (30 minutes) Definition and Concept: • **Methods of Remote Sensing Data Acquisition:** • Satellite Remote Sensing: Discuss the use of satellites equipped with sensors to capture images and data from Earth's surface. • Aerial Photography: Explain how aircraft equipped with cameras are used to capture high-resolution images. • LiDAR (Light Detection and Ranging): Introduce the technology that uses laser pulses to measure distances to the Earth's surface. • **Technologies Used in Remote Sensing:**

	• Passive Remote Sensing: Explain how sensors passively detect and record radiation emitted or reflected by objects. • Active Remote Sensing: Discuss active techniques where sensors emit energy and measure the reflected or emitted signals. • Hyperspectral Imaging: Describe the technology that captures and processes information from across the electromagnetic spectrum. • **Applications of Remote Sensing Data:** • Environmental Monitoring: Explore how remote sensing is used to monitor changes in land use, deforestation, climate change, etc. • Agriculture: Discuss applications such as crop monitoring, yield estimation, and precision agriculture. • Disaster Management: Highlight the role of remote sensing in assessing and responding to natural disasters like floods, wildfires, etc. 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 Reading- BC punmia book 3. Homework- Study fundamental parts of theodolite. **Quiz Questions:** 1. What is the difference between passive and active remote sensing techniques? 2. Name two applications of remote sensing in environmental monitoring. 3. Explain the principle behind LiDAR technology and its applications. 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 Cloud Computing

	Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 35	Course Name: Surveying & Geomatics	Course No.: CE-404

Objectives	At the end of the lesson the student shall be able to: • Understand the concept of platforms and sensors in remote sensing. • Identify different types of platforms and sensors used in remote sensing applications. • Recognize the importance of platforms and sensors in collecting remote sensing data.
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz

Teaching Development	- **Introduction** (5 minutes)
	- Ask questions.
	- Begin with a brief explanation of what remote sensing is and its significance in various fields such as environmental monitoring, agriculture, urban planning, etc.
	- Introduce the key components of remote sensing, emphasizing platforms and sensors as crucial elements in data collection.
	- .
	- **Development** (30 minutes)
	Definition and Concept:
	• Types of Platforms:
	  • Satellite Platforms
	  • Airborne Platforms (Aircraft, UAVs)
	  • Ground-Based Platforms (Fixed stations, Mobile platforms)
	• Types of Sensors:
	  • Passive Sensors (collect energy that is naturally emitted or reflected)
	  • Active Sensors (emit energy to scan objects and areas)
	  • Multispectral Sensors (capture data across multiple bands of the electromagnetic spectrum)
	• Applications and Characteristics:
	  • Discuss specific applications of different platforms and sensors in various fields like agriculture, forestry, disaster management, etc.

	• Highlight the characteristics such as spatial resolution, spectral resolution, temporal resolution, and radiometric resolution. 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 Reading- BC punmia book 3. Homework- Study fundamental parts of theodolite. **Quiz Questions:** 1. What are the two main categories of remote sensing platforms? 2. Differentiate between passive and active remote sensing sensors. 3. How do platforms and sensors contribute to the effectiveness of remote sensing in environmental monitoring? 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 Cloud Computing Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 36	Course Name: Surveying & Geomatics	Course No.: CE-404

Objectives	At the end of the lesson the student shall be able to: • Understand the basics of visual image interpretation in remote sensing. • Learn the key elements involved in interpreting visual images. • Explore practical applications of visual image interpretation in various fields.
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	- **Introduction** (5 minutes) - Ask questions. - Begin with a brief definition of remote sensing and its significance. - Introduce the concept of visual image interpretation and its role in remote sensing. - Highlight the importance of visual interpretation skills in analyzing satellite and aerial imagery. - - **Development** (30 minutes) Definition and Concept: Key Elements of Visual Image Interpretation: 1. Types of Visual Images (e.g., aerial photographs, satellite images). 2. Characteristics of Visual Images (e.g., resolution, spectral bands). 3. Interpretation Techniques (e.g., image enhancement, feature recognition). 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 Reading- BC punmia book 3. Homework- Study fundamental parts of theodolite.

	Quiz Questions: 1. What are the two main types of visual images used in remote sensing? 2. Name one characteristic of visual images that affects their interpretability. 3. What are some common techniques used in visual image interpretation? 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 Cloud Computing Spend 5 minutes to evaluate student assimilation of the lesson contents