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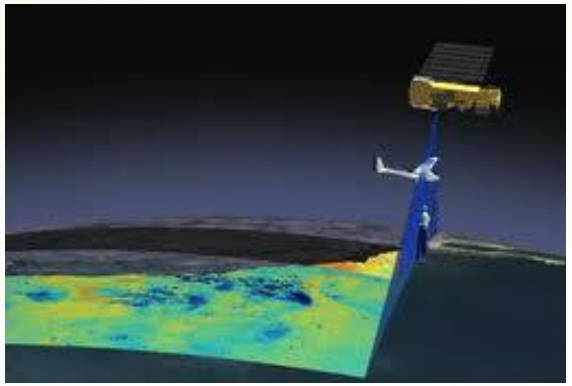
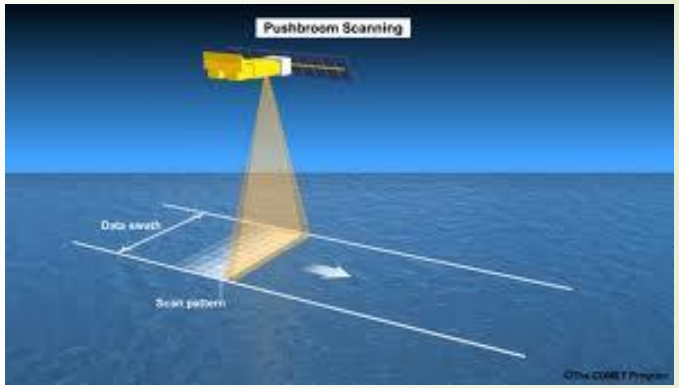
Ecol – 501 Remote Sensing and GIS





Course Teacher

e-Learning Module

Dr. S. Jayakumar
Professor
Department of Ecology and Environmental Sciences
Pondicherry University
Puducherry

Content

1. General Information
2. Course description
3. Course goal
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1. General Information

Course Code	:	ECOL - 501
Course Title System	:	Remote Sensing and Geographical Information
Number of Credits	:	4.5 ECTS
Course duration	:	18 Weeks
Level	:	Postgraduate
Course Teacher	:	Prof. S. Jayakumar
Prerequisite English	:	Basic understanding on Mathematics (school higher level), language skill, computer operation (Windows/Mac).

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2. Course description

This 3 ECTS course provides the students the fundamentals of remote sensing and Geographical information system. It teaches the characteristics of different frequencies of electromagnetic radiation and its interaction with atmosphere and earth's surface. This course introduces the reflective, thermal and microwave remote sensing to students. It also makes the students understand the aerial photography, photogrammetry and global positioning system. It introduces the concept of image interpretation and various sensor characteristics. It makes the students understand the concept of data structures and basic spatial modelling concepts.

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3. Course goals

The main course objective is to make the students understand the fundamentals and applications of remote sensing and Geographical information system in natural resources management. To enable the students understand the different types of remote sensing, sensor characteristics, payload. To make the students understand how EMR interacts with earth's surface. To give students fundamental and applications of GPS. To introduce the students to the theory of spatial data structure, projections and coordinate systems. To make them understand the thematic maps, weightage and spatial modeling.

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4. Course outcome

By the end of the course, successful students will:

1. Know the principles of remote sensing, GIS and GPS
2. Understand the interactions of EMR with earth's materials.
3. Be able to distinguish the significance between reflective, thermal and microwave remote sensing
4. Understand the payload characteristics and how to determine different resolutions
5. Know the basics of coordinate system and projections
6. Know the concept of digitalization, and thematic map preparation.
7. Know the basic data structure in GIS and their significance.
8. Be familiar with the data integration and weightages used in spatial modeling.
9. Know the basic concept of modeling and how to conceptualize a model.
10. Understand the applications of RS and GIS in various fields.

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5. Course structure

5.a. Course Content

Week -1	**Fundamentals of remote sensing**
	Components of RS
Week -2	Electromagnetic radiation
	Atmospheric window and effects of atmosphere
	Principles of Scanner and CCD array
Week -3	Types of Sensor and bands
	The pixel
	Spectral reflectance of soil, water and vegetation
Week - 4	Thermal Remote Sensing
	Microwave Remote Sensing
Week - 5	Satellite and Sensors
	Satellite orbits and for different resolution
Week - 6	Digital image processing-mosaicing, histogram equalization
	Image Classification
Week - 7	Air borne and space borne data: Fundamentals of photogrammetry, aerial cameras, planning of aerial photography
Week - 8	Planning of aerial photos and characters of aerial photo
	Types of Aerial photos, Photogrammetry
Week - 9	Elements of aerial photo interpretation
Week - 10	Satellite data availability - Indian space agency - data centre and USGS Earth Explorer

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5. Course structure

5.a. Course Content

Week - 11	**GIS terms and terminologies**
Week - 12	GIS components
	How to create a thematic map from satellite image
	Raster and Vector data structure
Week - 13	Map Projection and coordinate system
	Digital Cartography and elements of map
Week - 14	Overlay analysis
	Weighted overlay analysis
Week - 15	Fundamentals and applications of Navigation system
	Classification Methods and RS in forestry
Week - 16	RS in forestry and water
Week - 17	RS in LULC Mineral Disaster
	RS in Forest fire
	RS in Agriculture

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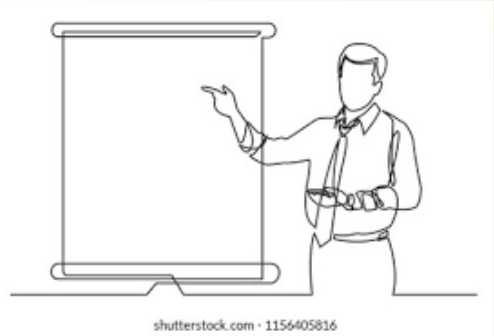
5. Course structure

5.b. Mode of delivery

PULSE
PONDICHERRY UNIVERSITY LEARNING SYSTEM

On-line lectures



In-class lectures

Microsoft OneDrive

Microsoft Teams

Students will get enrolled in Pondicherry University Learning Management System and the classes will be handled in hybrid mode

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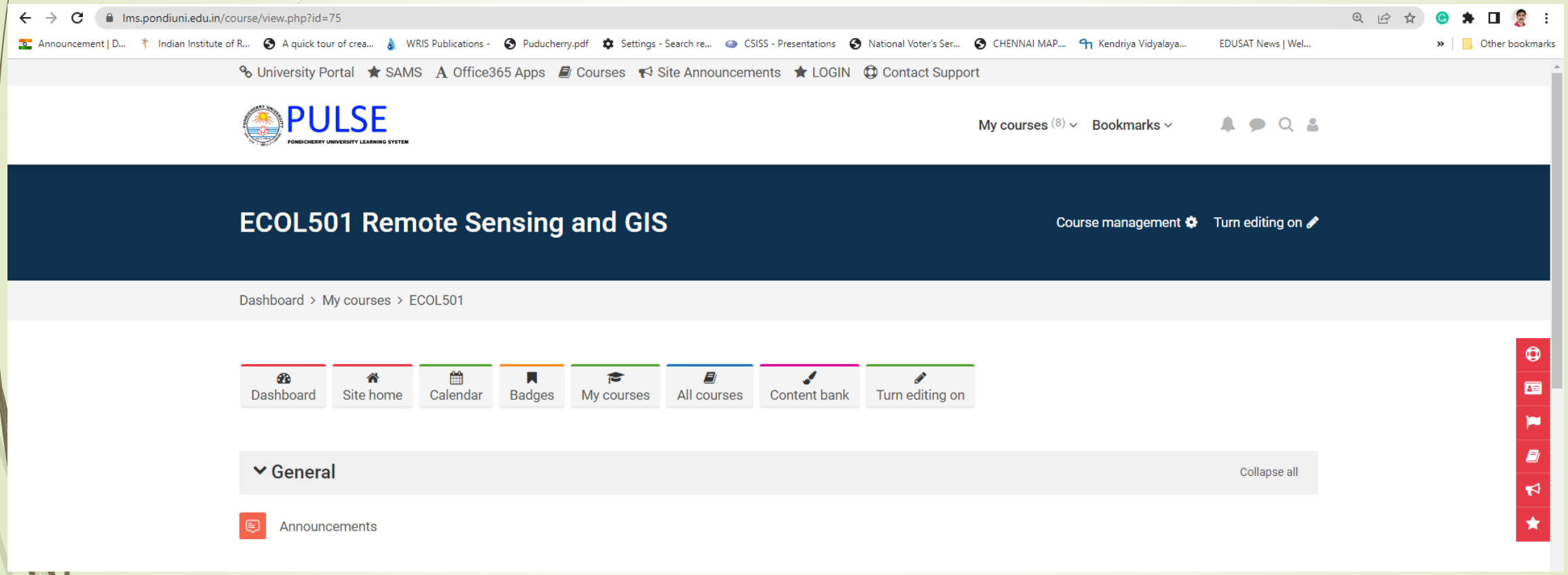

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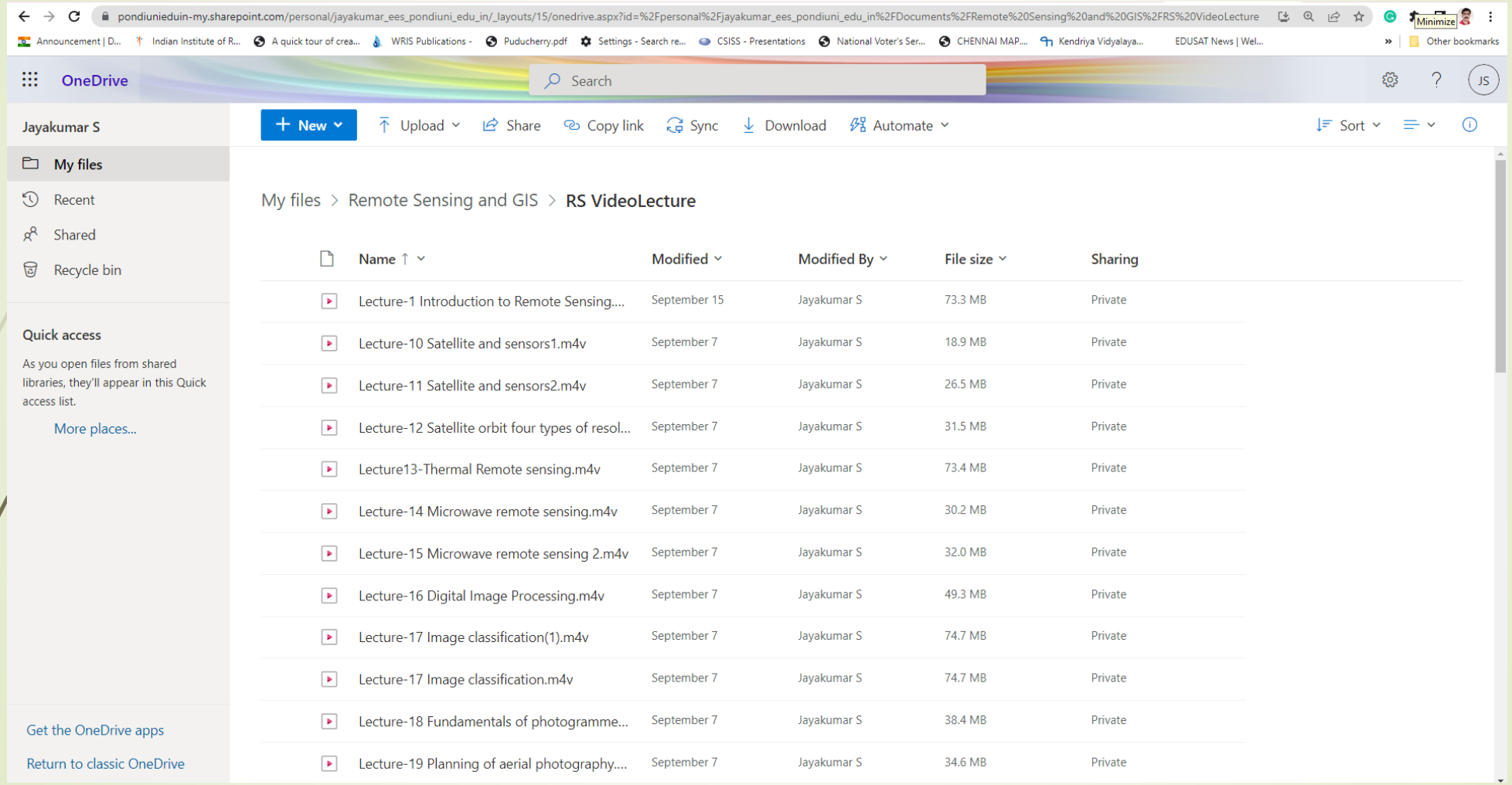
Video Lectures stored in Microsoft One drive



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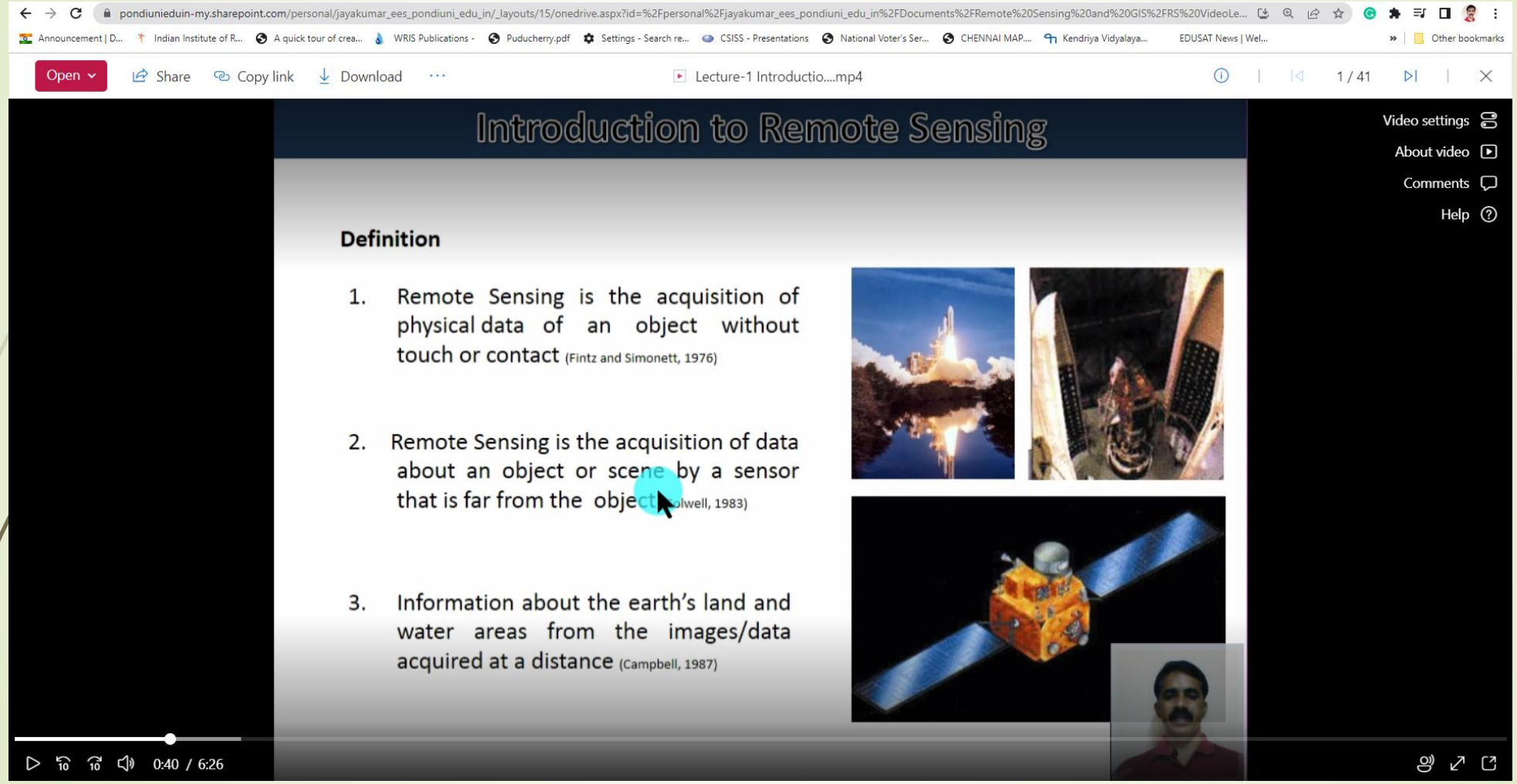
Introduction to remote sensing



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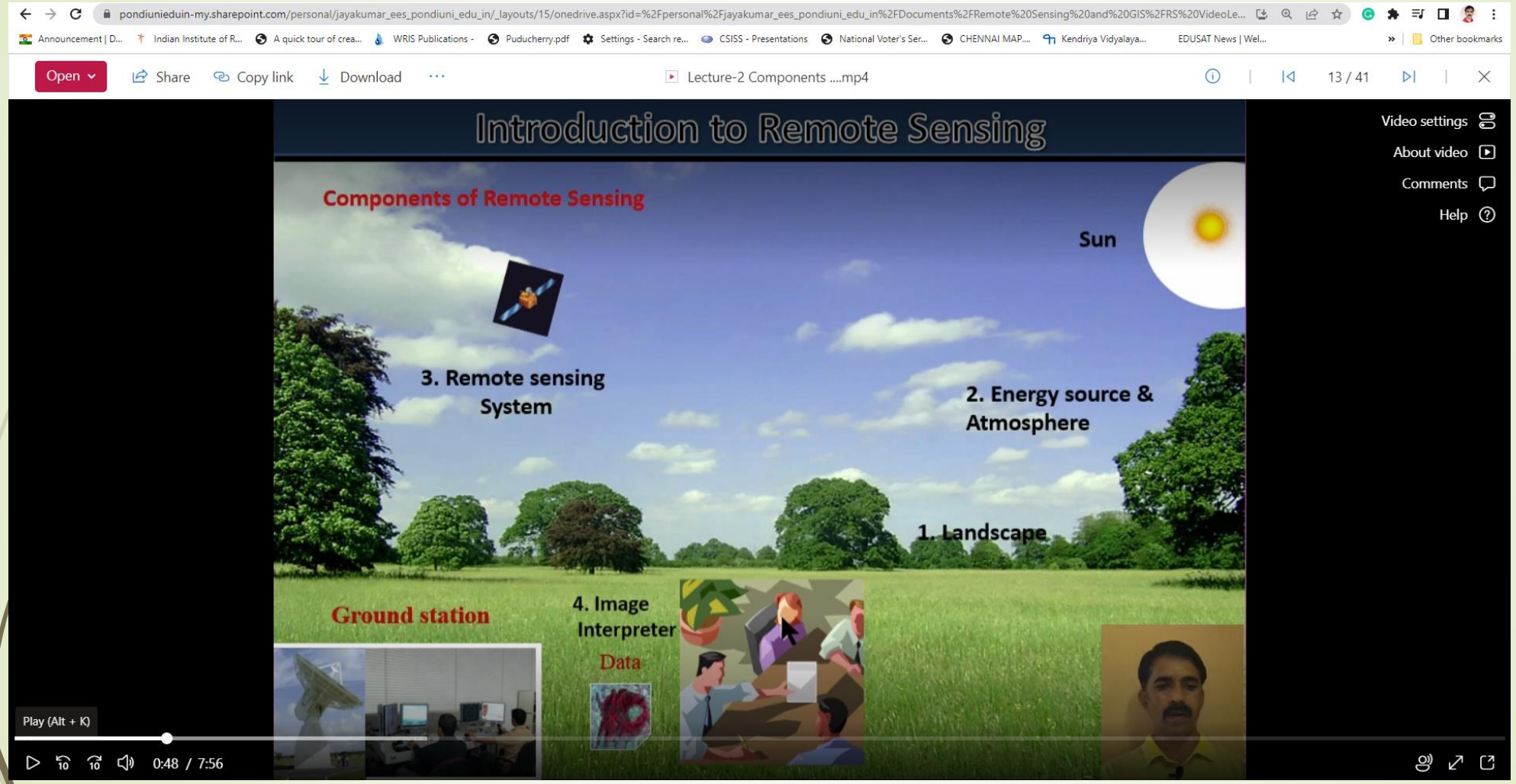
Components of remote sensing



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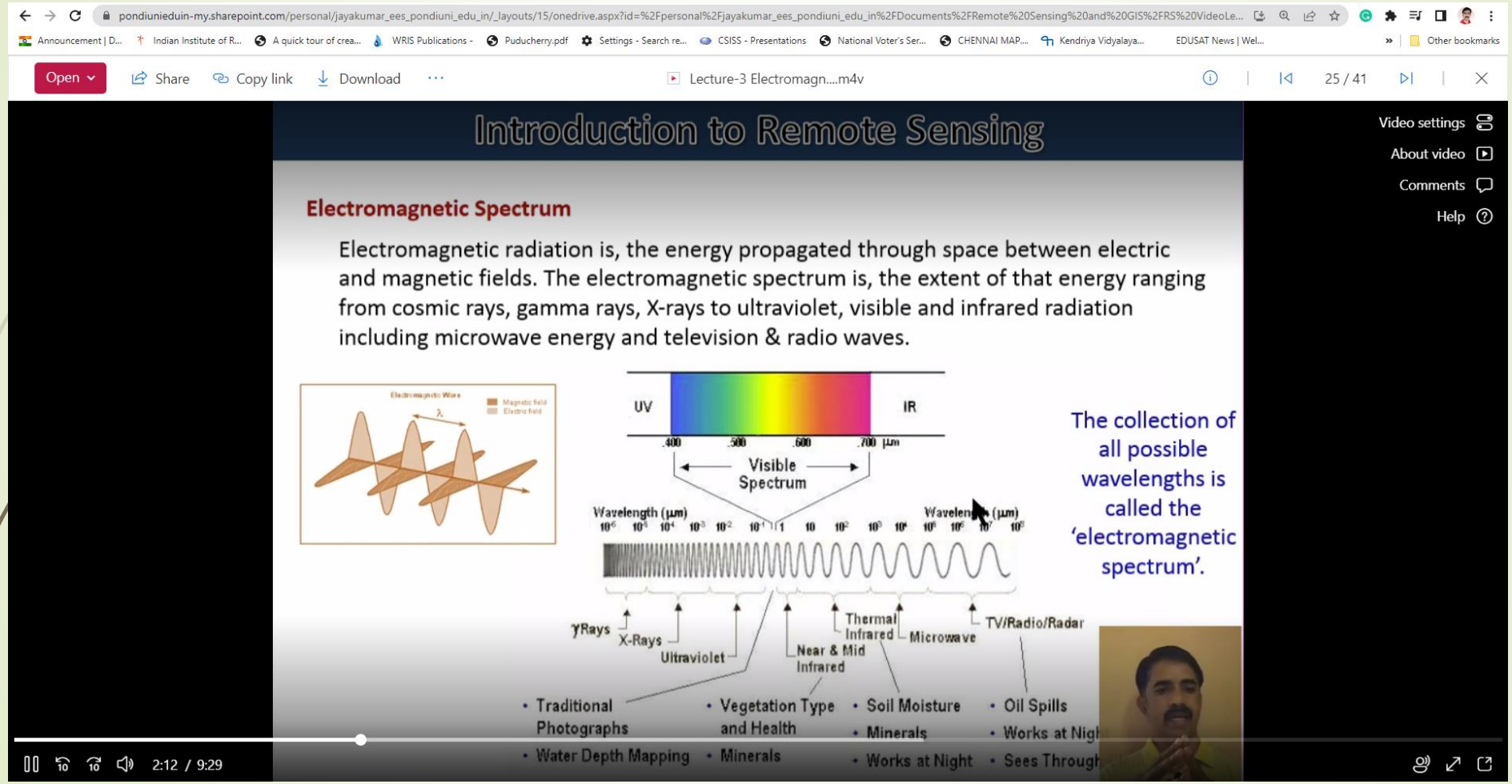
Electromagnetic Radiation



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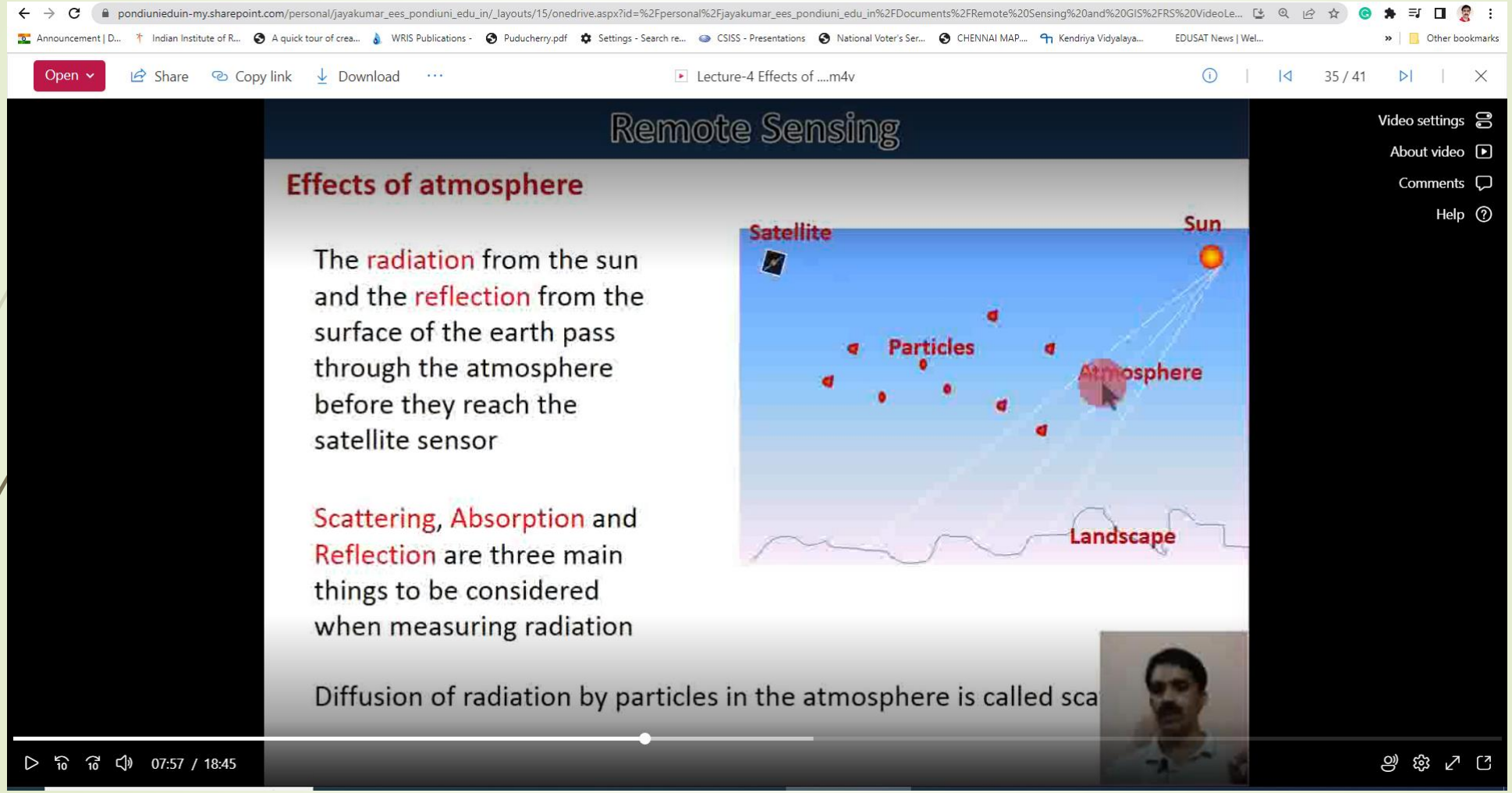
Effects of Atmosphere



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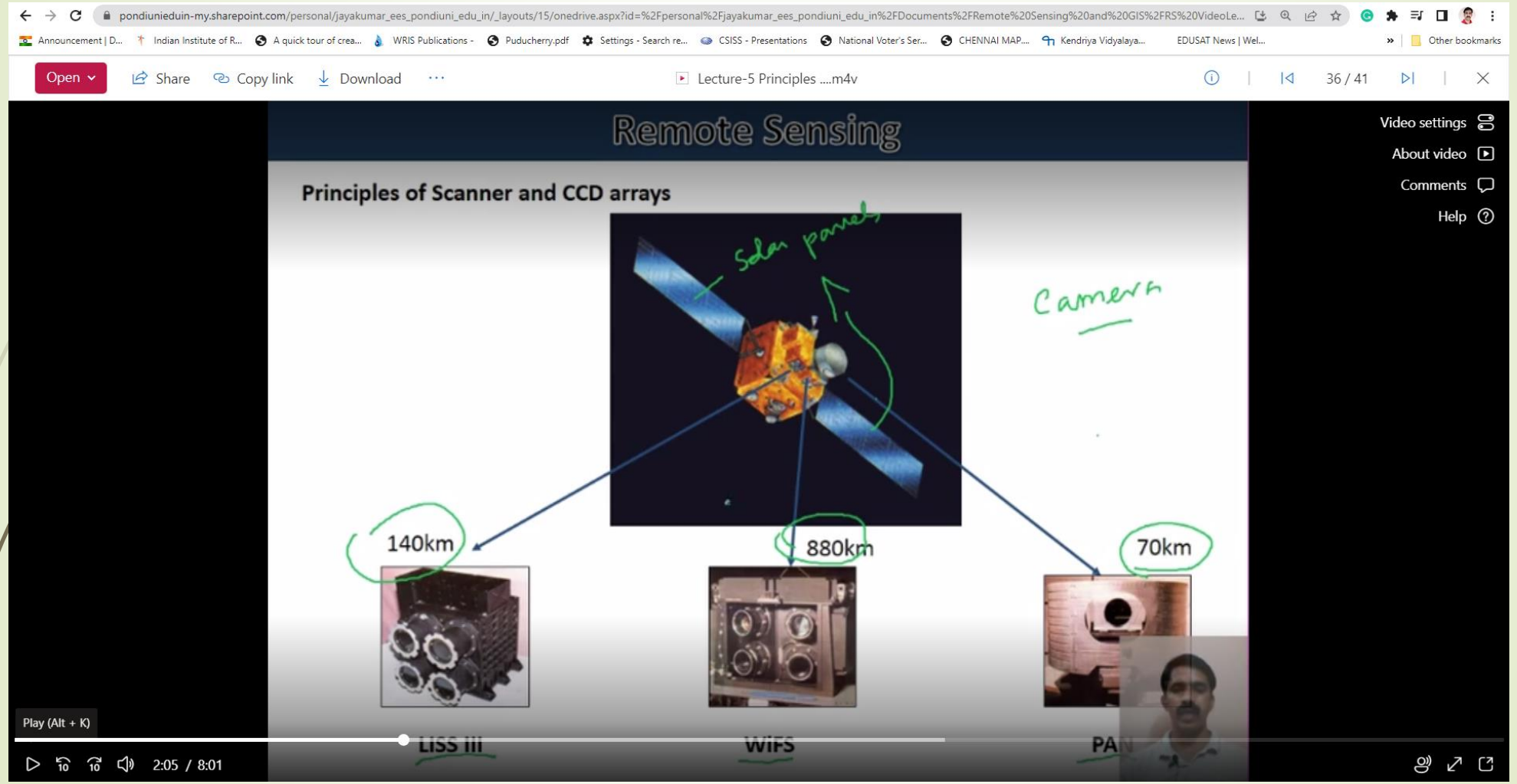
Principles of scanner and CCD arrays



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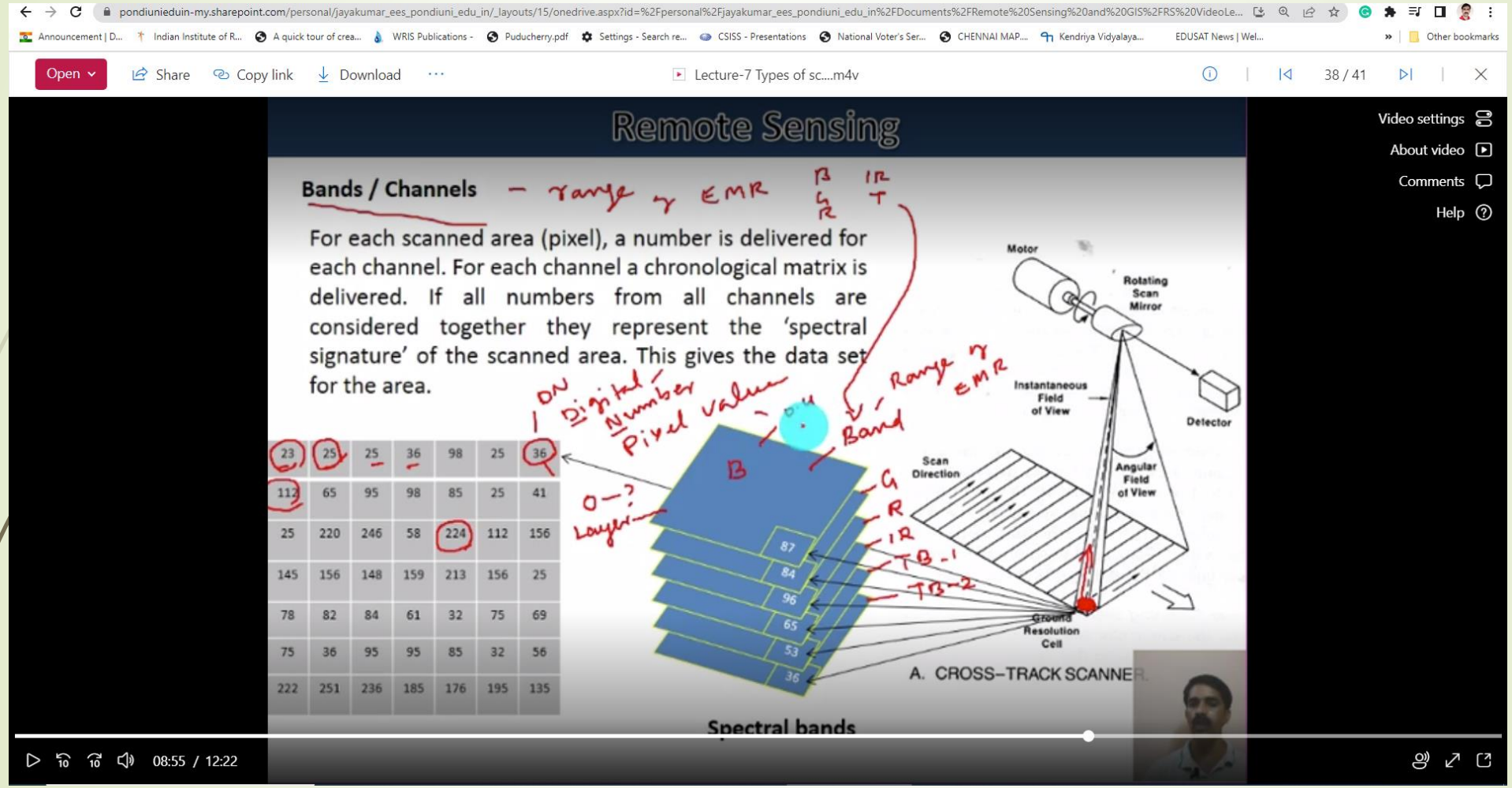
Types of scanner, bands and pixels



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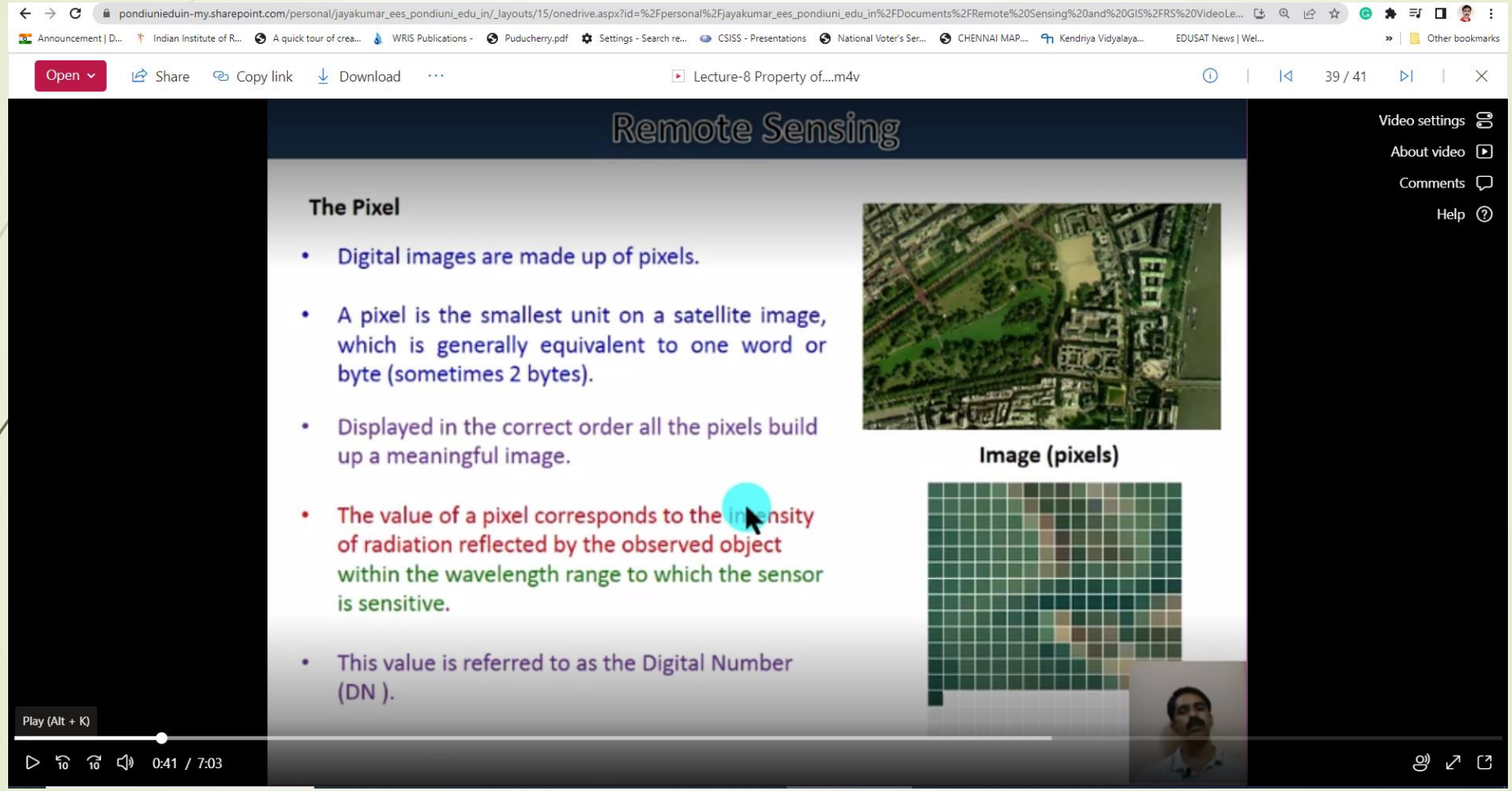
The Pixel



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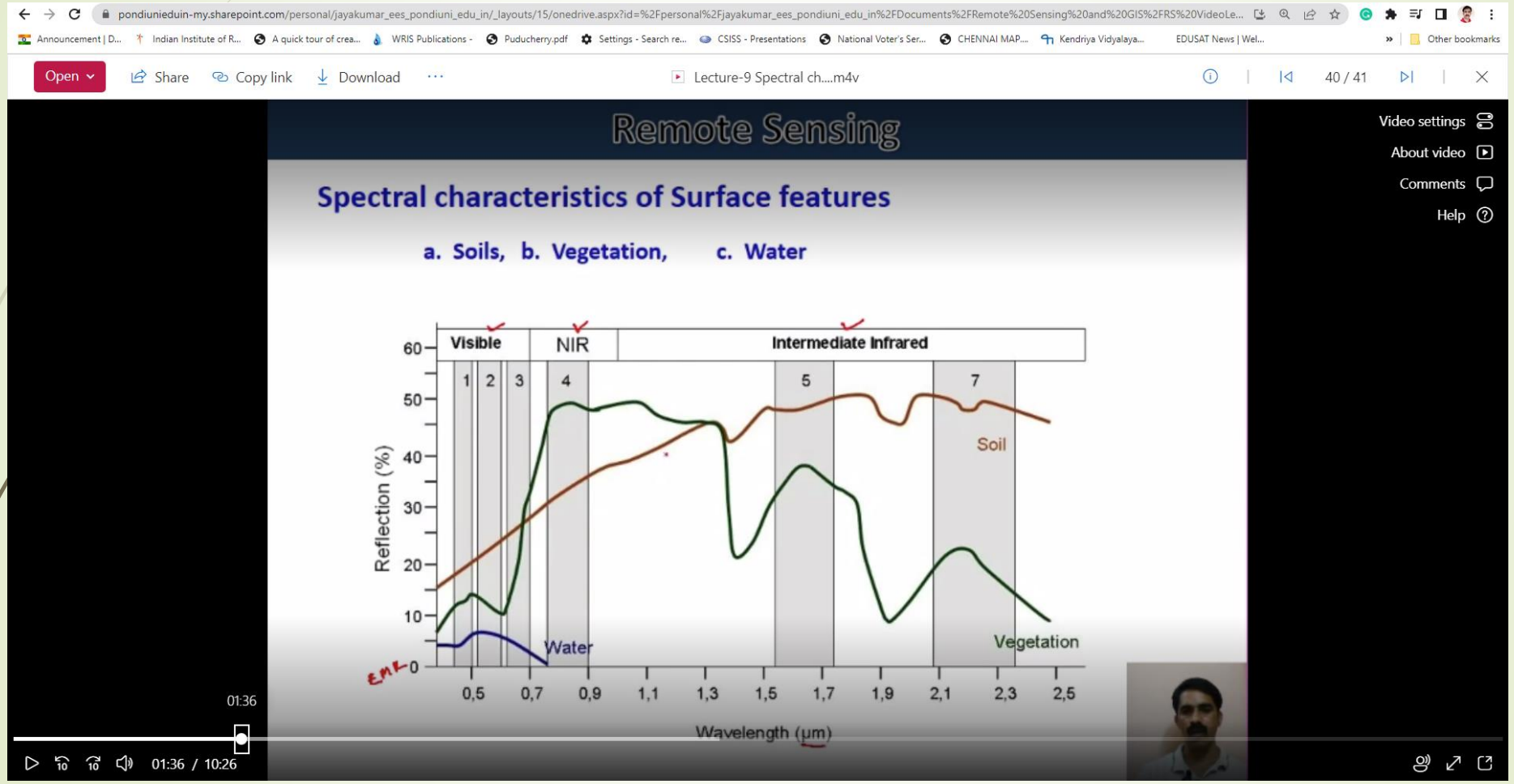
Spectral characteristics of surface features



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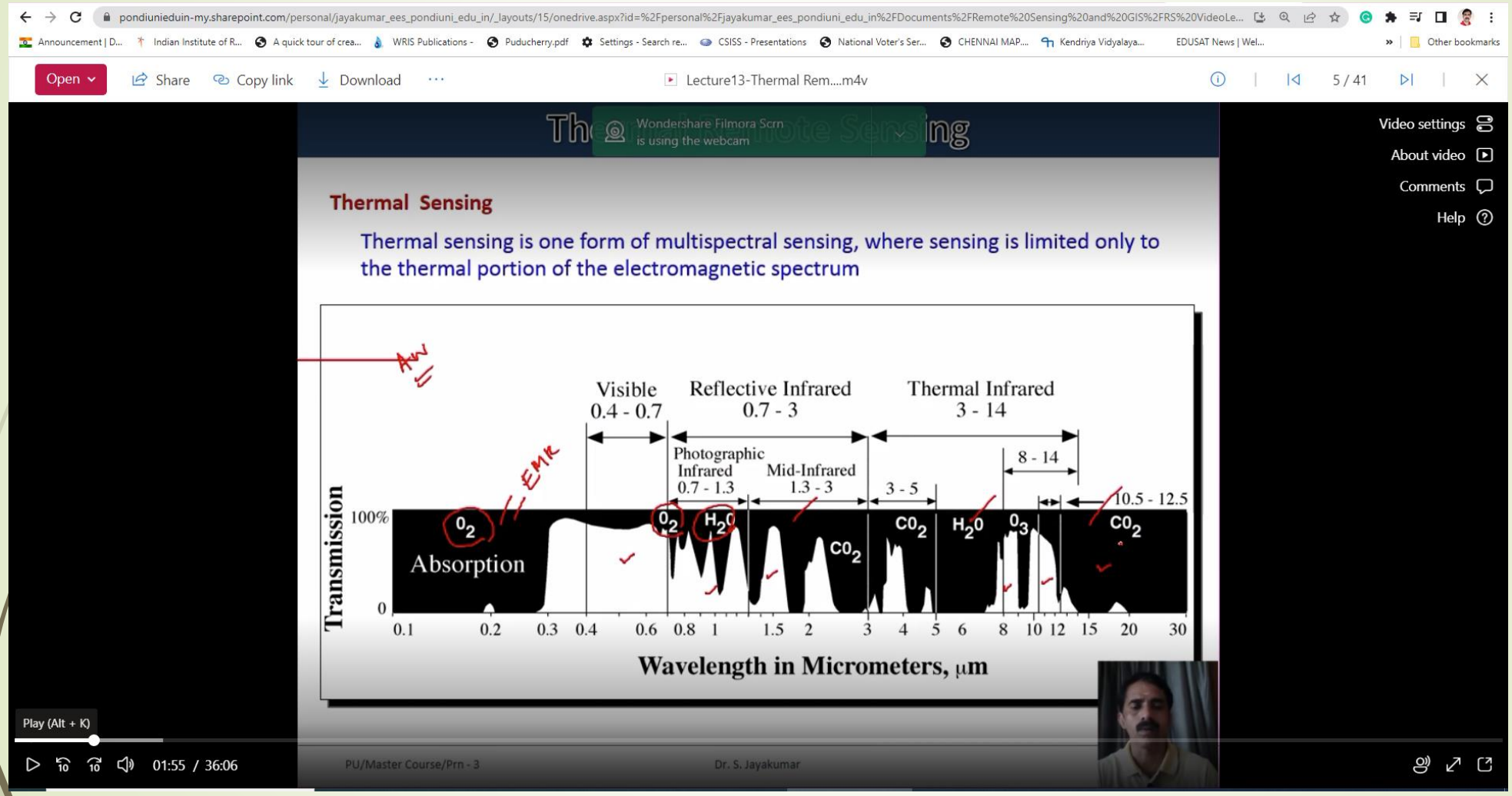
Thermal Remote sensing



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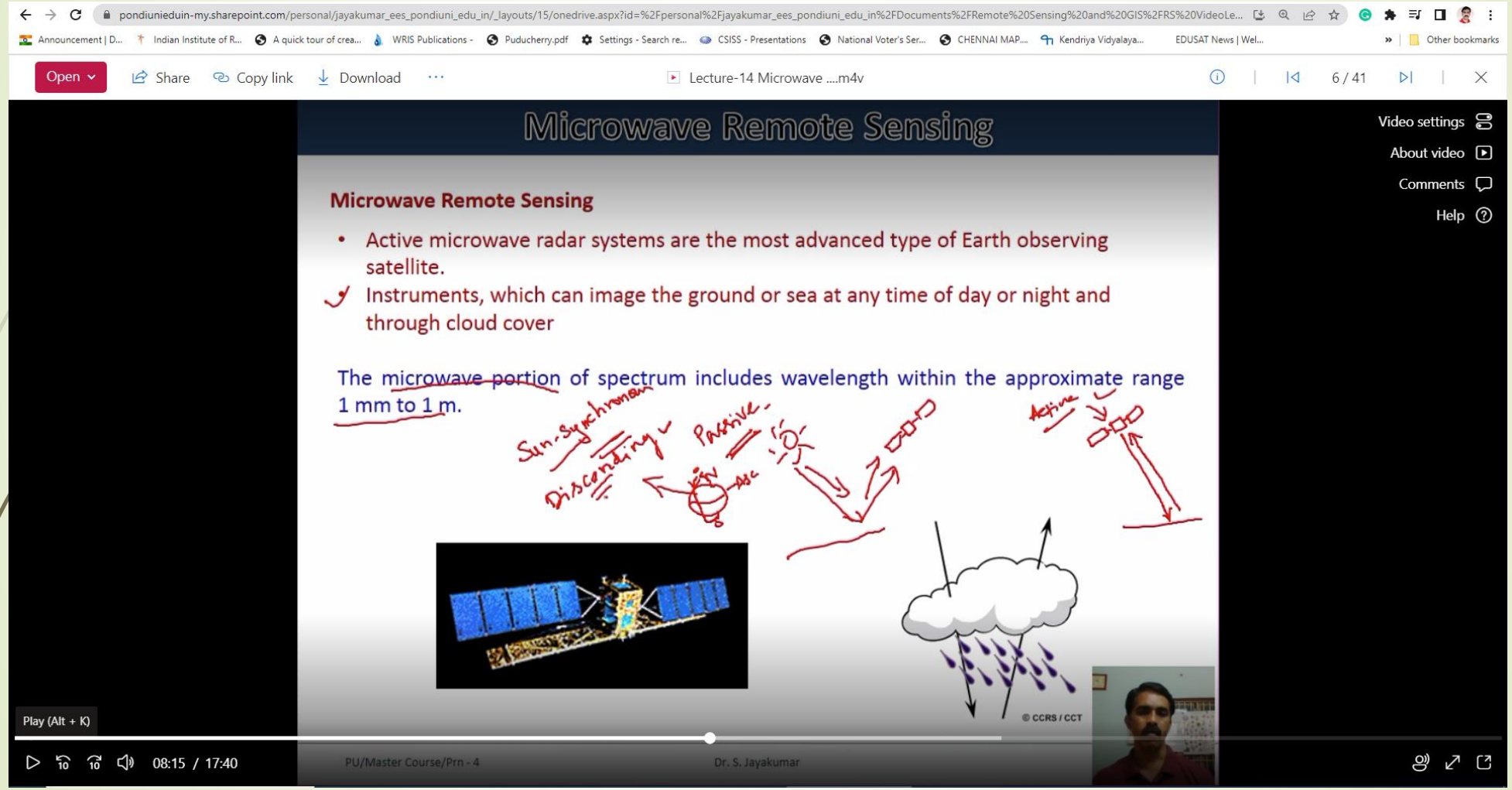
Microwave Remote sensing



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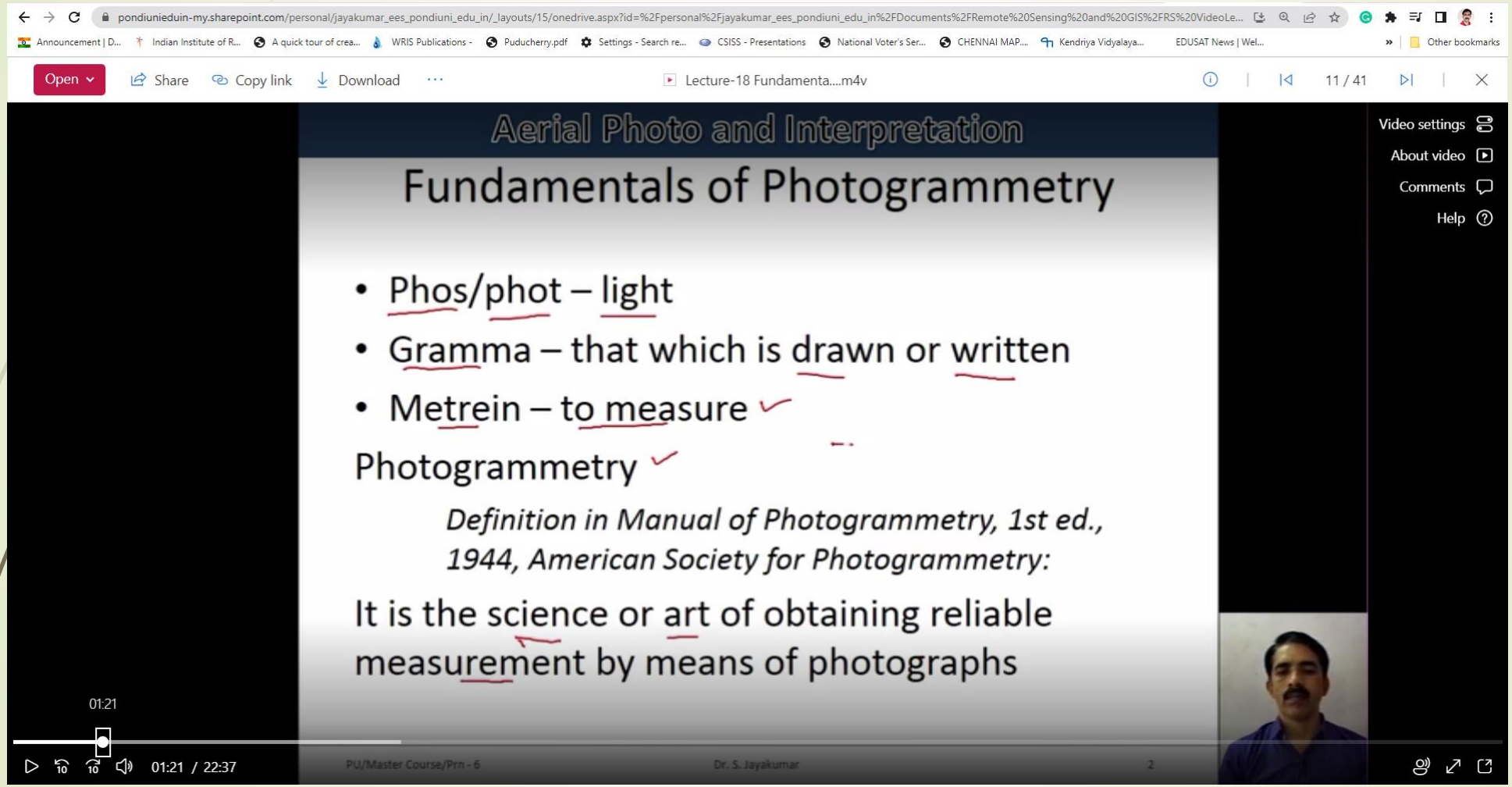
Aerial photography and Photogrammetry



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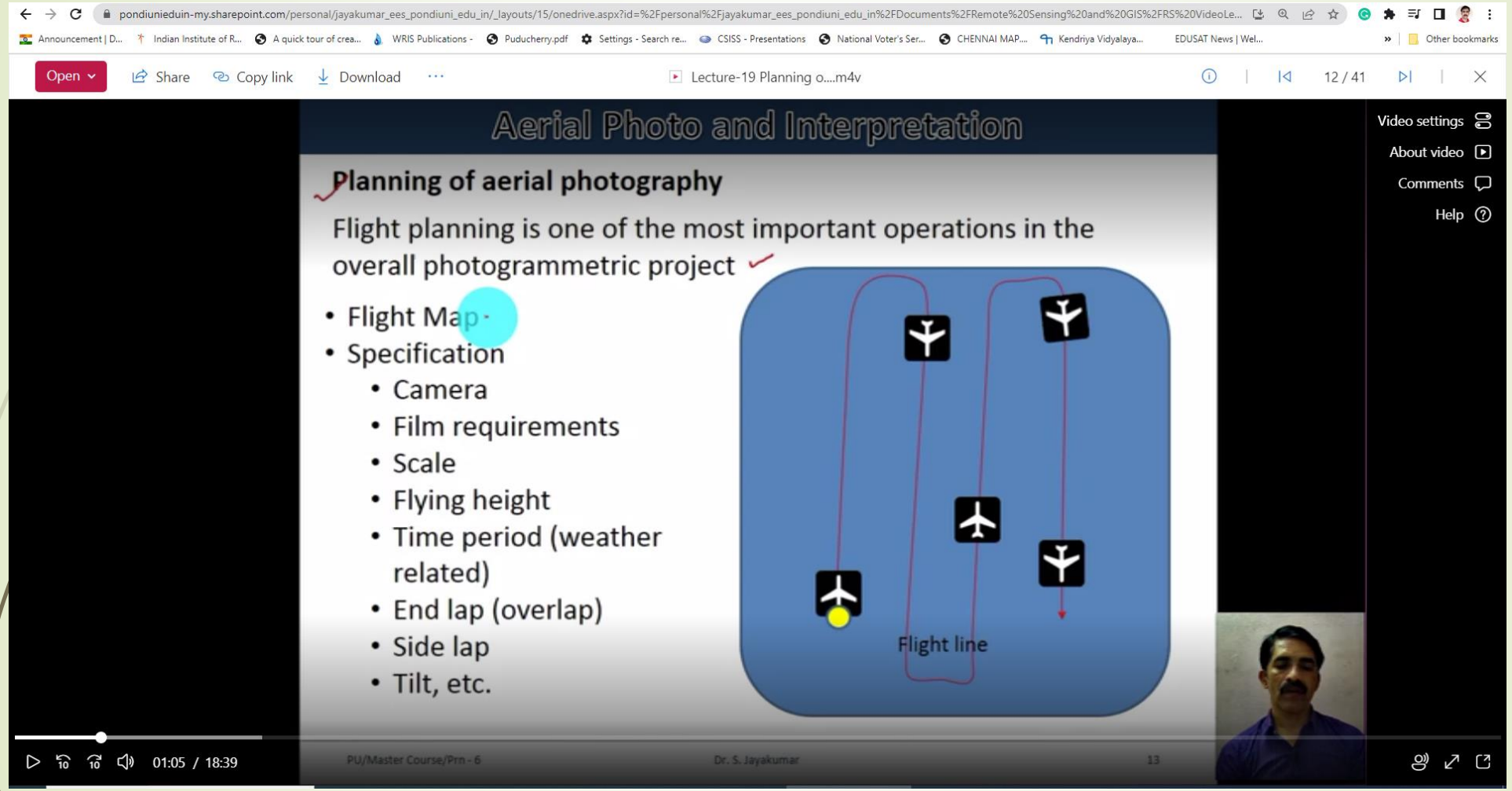
Planning of Aerial photography



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5. Course structure

5.c. In-class discussion

The discussion will focus on how to map natural resources using the relevant satellite data, classification technique and selecting appropriate scale.

5.d. In-class assignments & field assignment

Understanding satellites and sensors available and preparedness for field study, data collection, and data quality standards and ground truth verification.

5.e. Reading and discussion of assigned papers for seminars

Understanding the level of RS and GIS technique integrated in the study, debate the novel approach in the methodology, need for such studies, data and tools utilized.

5.f. Group project presentation

Students will conduct group project and make a presentation in the class.

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6. Course Assessment

Type of assessment	Percentage of Marks
In-class discussion	5
Assignment	5
Seminars	10
Group projects	10
Internal assessment test (MCQ types)	10
Final assessment	60
Total	**100**

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7. References

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