

Techno India NJR Institute of Technology



Course File

Geographic information System and
Remote Sensing

(Subject Code: 6CE5-16)

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Department of CE

For Techno India NJR Institute of Technology
पंकज पौरवाल
Dr. Pankaj Kumar Porwal
(Principal)



RAJASTHAN TECHNICAL UNIVERSITY, KOTA

Syllabus

3rd Year - VI Semester: B.Tech. (Civil Engineering)

6CE5-16: GEOGRAPHIC INFORMATION SYSTEM & REMOTE SENSING

Credit: 2
2L+0T+0P

Max. Marks: 100(IA:20, ETE:80)
End Term Exam: 2 Hours

SN	CONTENTS	Hours
1	Introduction: Objective, scope and outcome of the course.	1
2	Photogrammetry: Definition of Photogrammetric Terms, Geometry of aerial and terrestrial photographs, Aerial camera and photo-theodolite, Scale of a Photograph, Tilt and Height displacements, Stereoscopic vision and stereoscopes, Height determination from parallax measurements, Flight planning, Maps and Map substitutes and their uses.	7
3	Remote Sensing: Introduction and definition of remote sensing terms, Remote Sensing System, Electromagnetic radiation and spectrum, Spectral signature, Atmospheric windows.	4/6
4	Different types of platforms, sensors and their characteristics, Orbital parameters of a satellite, Multiconcept in Remote Sensing.	4/4
5	Image Interpretation: Principles of interpretation of aerial and satellite images, equipments and aids required for interpretation, ground truth – collection and verification, advantages of multiband and multiband images. Digital Image Processing concept.	6/5
6	Geographic Information System (GIS) : Introduction & applications of GIS in map revision, Land use, Agriculture, Forestry, Archaeology, Municipal, Geology, water resources, Soil Erosion, Land suitability analysis, change detection.	6/5
	TOTAL	28

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Course Overview:

Student will learn basics of RS and GIS from this 28-hour course. They will be able to work on Remote sensing Software and find a **continuous and constant source of information about the Earth**, and geographic information systems (GIS) are a methodology for handling all this geographic data. They will study the spatial distribution of uncertainty in categorical maps. Nowadays Geographic Information System and Remote Sensing are playing a crucial role in our environmental development, raw materials assessment, urbanization, study of watershed, survey and management of cultivable land, study of forestry, geological structure, disaster management and supervision

Rs and Gis is the basic requirement for the job role of Research Engineer in the companies like Geo Climate Risk Solutions, Geoinfosys etc.

Course Outcomes:

CO. NO.	Cognitive Level	Course Outcome
1	Synthesis	Student will be able to Understand the basic concept of Remote Sensing and know about different types of satellite and sensors.
2	Application	Student will be able to Apply the concepts of Photogrammetry and its applications such as determination of heights of objects on terrain.
3	Comprehension	Students will be able to Express the principles of aerial and satellite remote sensing, Able to comprehend the energy interactions with earth surface features, spectral properties of water bodies.
4	Analysis	Students will be able Illustrate spatial and non-spatial data features in GIS and understand the map projections and coordinates systems
5	Synthesis	Students will be able Develop knowledge on conversion of data from analogue to digital and working with GIS software.

Prerequisites:

1. Prepare Geographic Information Systems and the geographic space with concepts and terms commonly used to build operating models in GIS
2. Use diverse techniques and instruments adequately to measure, locate and find bearings on a map and in a field.

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3. Photo-interpret basic environmental and socioeconomic variables using photographs taken in Spain.
4. Compute knowledge of remote sensing and GIS in different civil engineering applications.
5. Compute an image visually and digitally with digital image processing techniques.

Course Outcome Mapping with Program Outcome:

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO367.1	3	1	2	1	1	2	2	1	1	1	1	1	1	1	0
CO367.2	3	2	2	1	1	1	1	1	1	1	1	2	1	1	0
CO367.3	3	1	2	1	1	2	2	1	1	1	1	1	1	1	0
CO367.4	1	1	1	1	3	1	1	1	1	1	1	1	1	1	0
CO367.5	1	1	1	1	3	1	1	1	1	1	1	1	1	1	0
CO367 (AVG)	2.2	1.2	1.6	1	1.8	1.4	1.4	1	1	1	1	1.2	1	1	0

Course Coverage Module Wise:

Lecture No.	Unit	Topic
1	1	INTRODUCTION: Objective, scope and outcome of the course
2	2	PHOTOGRAMMETRY: Definition of Photogrammetric Terms, Geometry of aerial and terrestrial photographs
3	2	Aerial camera and photo theodolite, Scale of a Photograph
4	2	Tilt and Height displacements, Stereoscopic vision and stereoscopes
5	2	Height determination from parallax measurements
6	2	Flight planning
7	2	Maps and Map substitutes and their uses
8	3	REMOTE SENSING: Introduction & definition of remote sensing terms
9	3	Remote Sensing System

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10	3	Remote Sensing System
11	3	Electromagnetic radiation and spectrum
12	3	Spectral signature, Atmospheric windows
13	4	DIFFERENT TYPES OF PLATFORMS, sensors and their characteristics
14	4	Different types of platforms, sensors and their characteristics
15	4	Orbital parameters of a satellite
16	4	Multiconcept in Remote Sensing
17	5	IMAGE INTERPRETATION: Principles of interpretation of aerial and Satellite images.
18	5	Equipment's and aids required for interpretation
19	5	Ground truth – collection and verification
20	5	Advantages of multirate and multiband images
21	5	Digital Image Processing concept
22	6	GEOGRAPHIC INFORMATION SYSTEM (GIS) : Introduction & applications of GIS in map revision
23	6	Geographic Information System (GIS)
24	6	Geographic Information System (GIS)
25	6	Land use, Agriculture, Forestry, Archaeology, Municipal
26	6	Geology, water resources, Soil Erosion
27	6	Land suitability analysis, change detection
28		Revision of course work
29		Revision of course work
30		Revision of course work

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TEXT/REFERENCE BOOKS

1. Floyd F. Sabins, Remote Sensing Principles and Interpretation, W.H. Freeman and Co. 2007.
2. Lillisand T.M and Kiefer R.W, Remote Sensing and Image Interpretation, John Wiley and Sons, 2008.
3. Paul R. Wolf: Elements of Photogrammetry, with Air Photo Interpretation and Remote Sensing, McGraw Hill International Book Company, 2000

Course Level Problems (Test Items):

CO.NO.	Problem description
1	Q 1. Remote sensing system. Q 2. Electromagnetic radiation [E M R]. Q 3. Signatures and electromagnetic spectrum. Q 4. Atmospheric windows. Q 5. Types of remote-sensing and scattering.
2	Q 1. Sensors & their characteristics. Q 2. Detail of orbital parameters. Q 3. Inclination, semi major and semi minor axis. Q 4. Multi concepts of remote sensing. Q 5. Detail information about ground-based platforms.
3	Q 1. Space borne platforms detail information. Q 2. What is photogrammetry. Q 3. Types of photogrammetry. Q 4. Close – range photogrammetry, plan – table photogrammetry. Q 5. Geometry of Aerial and Terrestrial photographs.
4	Q 1. Aerial camera detail information. Q 2. 6 km highway covers 2 km on an Air photo. Calculate the scale.

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	<p>Q 3. Focal length is 158 mm and altitude above ground level (AGL) is 8600 m, Calculate the scale.</p> <p>Q 4. Height or Relief Displacement.</p> <p>Q 5. Flight planning for aerial photographs.</p>
5	<p>Q 1. Height measurement from parallel.</p> <p>Q 2. Stereoscopic viewing.</p> <p>Q 3. Tilt of a photographs.</p> <p>Q 4. GIS application in Agriculture.</p> <p>Q 5. Image Interpretation.</p> <p>Q 6. Ground truth in Remote sensing.</p> <p>Q 7. GIS application in Forestry.</p>

Assessment Methodology

1. Assignments one from each unit.
2. Midterm subjective paper where they have to write algorithms to perform different operations on different data structures as mentioned in the modules. (Twice during the semester)
3. Final paper at the end of the semester subjective.

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Teaching and Learning resources unit-wise:

Unit-1

Photogrammetry

Video Tutorials:

https://www.youtube.com/watch?v=mOG_lPnpY

<https://www.youtube.com/watch?v=f6RotlJ9qcQ>

Theory concepts:

[http://www.nitjsr.ac.in/course_assignment/CE04CE1402Survey-II%20\(Photogrammetry\).pdf](http://www.nitjsr.ac.in/course_assignment/CE04CE1402Survey-II%20(Photogrammetry).pdf)

Sample Quiz:

<https://testbook.com/objective-questions/mcq-on-photogrammetry--5eea6a0839140f30f369d70f>

Unit-2

Remote Sensing

Video Tutorials: https://www.youtube.com/watch?v=qGBA_RVM-t0

Theory concepts: <https://nptel.ac.in/courses/105/108/105108077/>

Sample Quiz: <https://www.objectivebooks.com/2017/11/remote-sensing-objective-questions-and.html>

Unit-3

Platforms

Video Tutorials: <https://www.youtube.com/watch?v=Yt54A2KIXp8>

Theory concepts:

https://www.patnauniversity.ac.in/e-content/social_sciences/geography/MAGeog71.pdf

Sample Quiz:

<https://www.discountpdh.com/principles-electromagnetic-spectrum-satellite-platforms-quiz>

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Unit-4

Image Interpretation

Video Tutorials: https://www.youtube.com/watch?v=WgAo-4y_q04

Theory concepts:

https://www.nateko.lu.se/sites/nateko.lu.se/files/um-flygbilderintro2image_interpretation_2016_english_v3.pdf

Sample Quiz:

http://web.pdx.edu/~jduh/courses/Archive/geog481w07/Questions_Schedule.htm

Unit-5

GIS

Video Tutorials: <https://www.youtube.com/watch?v=Z1eiKW8TwVw>

Theory concepts: https://openjicareport.jica.go.jp/pdf/12086922_04.pdf

Sample Quiz:

<https://study.com/academy/practice/quiz-worksheet-geographic-information-systems.html>

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TECHNO INDIA NJR INSTITUTE OF TECHNOLOGY

UDAIPUR

Civil Engineering Department

B. TECH IV– YEAR (VI Sem.)

II MID-TERM (2020-2021)

SUBJECT –Geographic information system and Remote Sensing.

Time: 1Hr 30 minutes + 15 Minutes for Submission

Max. Marks: 40

Attempt any five questions.

[5 * 8 =40]

1. Write a note on introduction of Photogrammetry in detail? (Co3)
2. Explain in detail Geometry of aerial and terrestrial Photographs? (Co2)
3. Explain in detail the parts of a Aerial Camera? (Co2)
4. Write a note on Stereoscopic viewing in detail? (Co3)
5. Write a note on introduction of GIS? (Co1)
6. What is the application of GIS on Forestry? (Co1)
7. What is application of GIS on Municipal Gis services? (Co1)

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CO MAPPING

DEPARTMENT OF CIVIL ENGINEERING					
GIS and Remote sensing VI SEM					
S.NO.	NAME OF STUDENT				
	CO MAPPED	CO1	CO2	CO3	TOTAL
	MAX MARKS	15	10	10	35
1	Akash soni	4	4	8	16
2	Asif ansari	9	8	5	22
3	Bhavna Meena	10	10	5	25
4	Bhupesh chanderiya	14	4	4	22
5	Chagan singh	7	4	8	19
6	Dikshant panya	15	5	4	24
7	Divyanshu Purbia	7	3	4	14
8	Hardik goswmi				A
9	Ishika Sharma	6	3	3	12
10	Jayesh nagda	10	7	3	20
11	Kartik sharma				A
12	Kuldeep prjapat	6		5	11
13	Nikhil kumawat	10		7	17
14	Pawan salvi	7	4	7	18
15	Pearl bhanawat	7	2	6	16
16	Priyal kothari	9	9	4	22
17	Rohit Bishnoi	4	6	3	13
18	Sanjay prajapat	A			A
19	Vaibhav Tamboli	7	7	3	17

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