**Techno India NJR Institute of Technology**



**Course File**

Geographic information System and

Remote Sensing

**(Subject Code: 6CE5-16)**

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(Assistant Professor)

**Department of CE**

Table

Description automatically generated

**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.

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:**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **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 |
| 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 multidate 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 |

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

**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.

**Teaching and Learning resources unit-wise:**

**Unit-1**

**Photogrammetry**

Video Tutorials:

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

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

Theory concepts:

<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](https://www.patnauniversity.ac.in/e-%20%20%20content/social_sciences/geography/MAGeog71.pdf)

Sample Quiz:

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

**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>

**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)

**CO MAPPING**

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| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **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 |  |