

REMOTE SENSING & GIS

Subject Code: A70140

Regulations: R15 - JNTUH

Class : IV Year B.Tech CE I Semester



Department of Civil Engineering

BHARAT INSTITUTE OF ENGINEERING AND TECHNOLOGY

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REMOTE SENSING & GIS (A70140) COURSE PLANNER

I. COURSE OVERVIEW:

Remote Sensing and GIS is a relatively recent discipline and is an area of emerging technology with a phenomenal growth over last four decades. The Remote Sensing technology is now beyond the art of Map making from satellite or Aerial images. It has interleaved with information technology where raw digital data is converted to information which in turn aid to the knowledge

base for quick and correct decision making. The digital data handling led to the development of GIS (Geographical Information System). Remote Sensing coupled with GIS and GPS techniques has dramatically enhanced human capability for natural and manmade resources exploration, mapping and monitoring on local and global scale. The demand for Remote Sensing and GIS is increasing day by day in Government and Private sector. The course is not only going to enhance job opportunity for the civil students but shall also open an avenue of effective and viable interaction with national establishments related to various aspects of remote sensing

II. PREREQUISITE(S):

Level	Credits	Periods/Week	Prerequisites
UG	3	5	Knowledge of surveying, map reading and basic mathematics

III. COURSE OBJECTIVES:

- i. Apply the concepts of Photogrammetry and its applications such as determination of heights of objects on terrain.
- ii. Understand the basic concept of Remote Sensing and know about different types of satellite and sensors.
- iii. Illustrate Energy interactions with atmosphere and with earth surface features, Interpretation of satellite and top sheet maps
- iv. Understand different components of GIS and Learning about map projection and coordinate system
- v. Develop knowledge on conversion of data from analogue to digital and working with GIS software.

IV. COURSE OUTCOMES:

After completing this course the student will have acquired the ability on the following.

1. Understand the concepts of Photogrammetry and compute the heights of objects
2. Understand the principles of aerial and satellite remote sensing, Able to comprehend the energy interactions with earth surface features, spectral properties of water bodies .
3. Understand the basic concept of GIS and its applications, know different types of data representation in GIS
4. Understand and Develop models for GIS spatial Analysis and will be able to know what the questions that GIS can answer are
5. Apply knowledge of GIS software and able to work with GIS software in various application fields
6. Illustrate spatial and non spatial data features in GIS and understand the map projections and coordinates systems
7. Apply knowledge of GIS and understand the integration of Remote Sensing and GIS

V. HOW PROGRAM OUTCOMES ARE ASSESSED:

Program Outcomes	Level	Proficiency assessed by

PO1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	S	Assignments, Tutorials.
PO2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences	H	Assignments, Tutorials, Exams.
PO3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and	H	Assignments, Tutorials, Exams
PO4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	S	--
PO5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.	H	Assignments, Exams
PO6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.	S	--
PO7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	S	--
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.	S	Assignments, Exams.
PO9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	H	Assignments and Exams

PO10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions	H	Assignments and Exams
PO11	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	H	Assignments and Exams
PO12	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member	N	--

N – Not Applicable

S – Supportive

H - Highly Related

VI. HOW PROGRAM SPECIFIC OUTCOMES ARE ASSESSED:

Program specific outcomes		Level	Proficiency Assessed By
PSO1	ENGINEERING KNOWLEDGE: Graduates shall demonstrate sound knowledge in analysis, design, laboratory investigations and construction aspects of civil engineering infrastructure, along with good foundation in mathematics, basic sciences and technical communication.	H	Assignment, Tutorials Exams
PSO2	BROADNESS AND DIVERSITY: Graduates will have a broad understanding of economical, environmental, societal, health and safety factors involved in infrastructural development, and shall demonstrate ability to function within multidisciplinary teams with competence in modern tool usage	H	Projects
PSO3	SELF-LEARNING AND SERVICE: Graduates will be motivated for continuous self-learning in engineering practice and/ or pursue research in advanced areas of civil engineering in order to offer engineering services to the society, ethically and responsibly.	S	Guest Lectures

VII. SYLLABUS:

UNIT – I: INTRODUCTION TO PHOTOGRAMMETRY

Principles and types of aerial photographs, geometry of vertical and aerial photograph, Scale and Height measurement on single and vertical aerial photograph, Height measurement based on

relief displacement, Fundamentals of Stereoscopy, fiducial points, parallax measurement using fiducial line.

UNIT – II: REMOTE SENSING Basic concepts and foundation of Remote Sensing elements, Data information, Remote sensing data collection, Remote sensing advantages and Limitations, Remote sensing process.

Electromagnetic spectrum, Energy interaction with atmosphere and with earth surface features (soil, water, and vegetation) Indian Satellites and Sensors characteristics, Map and Image false color composite, introduction to digital data, elements of visual interpretations techniques.

UNIT – III: GEOGRAPHIC INFORMATION SYSTEMS

Introduction to GIS, Components of GIS, Geospatial data: Spatial Data – Attribute Data- Joining Spatial and Attribute Data, GIS Operations: Spatial Data input- Attribute Data Management-Data Display-Data Exploration-Data Analysis. COORDINATE SYSTEMS: Geographic Coordinate system; Approximation of Earth, Datum: Map Projections; Types of Map Projections-Map Projection Parameters-Commonly used Map Projections – Projected Coordinate Systems.

UNIT – IV: VECTOR DATA MODEL

Representation of simple features- Topology and its importance: coverage and its data structure, shape file:, data models for composite features Object Based Vector Data Model; Classes and their Relationships: The geobased data model: Geometric representation of Spatial feature and data structure: Topology rules.

UNIT – V: RASTER DATA MODEL

Elements of Raster data model: Types of Raster data: Raster data structure: Data conversion, Integration of Raster and Vector data.

Data Input: Metadata: Conversion of Existing data, Creating new data, Remote sensing data, Field data, Digitizing, Scanning, on screen digitizing, importance of source map, Data Editing.

SUGGESTED BOOKS:

TEXT BOOKS:

1. Remote Sensing of the environment- An earth resource perspective- 2nd edition- by John R. Jensen, Pearson Education.
2. Introduction to geographic information system- kang – Tsung Chang, Tata McGraw- Hill Education Private Limited.

REFERENCES:

1. Concepts & Techniques of GIS by C.P.Lo Albert, K.W. Yonng, Prentice Hall (India) Publications.
2. Remote Sensing and Geographical Information systems by M.Anji Reddy JNTU Hyderabad 2001, B.S. Publications.
3. Principals of Geo physical Information System- Peter A Burragh and Rachael A. Mc Donnell, Oxford Publishers 2004
4. Basics of Remote Sensing and GIS by S. Kumar, laxmi Publications.

NPTEL WEB COURSE:

<http://nptel.ac.in/downloads/105108077/>

NPTEL VIDEO COURSE:

<http://nptel.ac.in/downloads/105108077/#>

GATE SYLLABUS:

NA

IES SYLLABUS:

NA

VIII. COURSE PLAN:

Lecture No.	Week	Unit	Topics to be covered	Learning Objective	References
1.	1	1	Introduction to Photogrammetry	Understand the concept of Photogrammetry	T :2, R2
2.	1	1	Principle and types of aerial photograph	Understand the Principle and types of aerial photograph	T: 2, R2
3.	1	1			
4.	1	1	Geometry of vertical aerial photograph	Understand Geometry of vertical aerial photograph	T: 2, R2
5.	2	1			
6.	2	1			
7.	2	1	Scale and Height measurement	Calculate the Scale and Height measurement	T: 2, R2
8.	2	1			
9.	3	1			
10.	3	1			
11.	3	1	Scale and Height measurement on single vertical aerial photograph,	Calculate Scale and Height measurement on single vertical aerial photograph,	T: 2, R2
12.	3	1	Height measurement based on relief displacement	Calculate Height measurement based on relief displacement	T: 2, R2
13.	4	1	Fundamentals of stereoscopy	Understand Fundamentals of stereoscopy	T: 2, R2
14.	4	1			
15.	4	1	fiducial points	Understand fiducial points related Aerial photographs	T: 2, R2
16.	4	1			
17.	5	1	parallax measurements using fiducial points.	Understand the parallax measurements using fiducial points.	T: 2, R2
18.	5	1			
19.	5	2	Remote Sensing	Apply the knowledge Remote Sensing	T: 2, R2
20.	5	2			
21.	6	2	Basic concept of Remote sensing	Understand Basic concept of Remote sensing	T: 2, R2
22.	6	2			
23.	6	2	Data and information	Analyze the Data and information	T: 2, R2
24.	6	2			
25.	7	2	Remote Sensing data collection	Analyze Remote Sensing data collection	T: 2, R2
26.	7	2	Remote sensing advantages and Limitations	Understand Remote sensing advantages and Limitations	T: 2, R2
27.	7	2			
28.	7	2	Electromagnetic spectrum	Understand the physics of Electromagnetic spectrum	T: 2, R2

29.	8	2	Energy interactions with atmosphere and with earth surface features(soil, water, vegetation)	Understand the Energy interactions with atmosphere and with earth surface features(soil, water, vegetation)	T:1, R2
30.	8	2	Indian satellites and sensors characteristics	Understand the importance of Indian satellites and sensors characteristics	T:1, R2
31.	8	2	Resolution	Differentiate the Resolution	T:1, R2
32.	8	2	Map and image and false color composite,	Differentiate Map and image and false color composite,	T:1, R2
33.	9	2	Introduction to digital data	Understand Introduction to digital data	T:1, R2
34.	9	2	Elements of visual interpretation techniques.	Understand the importance of Elements of visual interpretation techniques.	T:1, R2
35.	9	3	Geographic Information System	Importance Geographic Information System	T:1, R2
36.	9	3			
37.	10	3	Introduction to GIS Components of a GIS	Understand Introduction to GIS, Components of a GIS	T:1, R2
38.	10	3			
39.	10	3	Geospatial data: Spatial Data Attribute data Joining Spatial and Attribute data;	Understand Geospatial data: Spatial Data Attribute data Joining Spatial and Attribute data;	T:1, R2
40.	10	3			
41.	11	3	GIS Operations: Spatial Data Input- attribute data management	Understand GIS Operations: Spatial Data Input- attribute data management	T:1, R2
42.	11	3			
43.	11	3	Data display-Data Exploration, Data Analysis. Coordinate Systems	Analyze Data display-Data Exploration, Data Analysis. COORDINATE SYSTEMS	T:1, R2
44.	11	3			
45.	12	3	Geographic Coordinate System,	Analyze Geographic Coordinate System,	T:1, R2
46.	12	3			
47.	12	3	Approximation of the Earth	Approximation of the Earth	T:1, R2
48.	12	3	Datum; map projections,	Analyze Datum; map projections,	T:1, R2
49.	13	3	Types of Map Projections- map projection parameters	Understand Types of Map Projections- map projection parameters	T:1, R2
50.	13	3	Commonly Used map Projections- projected coordinate Systems	Understand Commonly Used map Projections- projected coordinate	T:1, R

				Systems	
51.	13	4	Vector Data Model : representation of simple features,	Analyze Vector Data Model : representation of simple features	T:1, R2
52.	13	4	Topology and its importance	Topology and its importance	T:1, R2
53.	14	4	coverage and its data structure, Shape file	Create coverage and its data structure, Shape file	T:1, R2
54.	14	4	Data models for composite features Object Based Vector Data model;	Analyze Data models for composite features Object Based Vector Data model;	T:1, R2
55.	14	4			
56.	14	4	Classes and their Relationship;	Discuss Classes and their Relationship;	T:1, R2
57.	15	4	The geo data base data model;	Analyze The geodatabase data model;	T:1, R2
58.	15	4	geometric representation of spatial feature and data structure , Topology rules.	Geometric representation of spatial feature and data structure , Topology rules.	T:1, R2
59.	15	5	Raster data Model: Elements of the Raster Data model, Types of Raster data	Discuss Raster data Model: Elements of the Raster Data model, Types of Raster data	T:1, R2
60.	15	5	Raster Data structure, data conversion ,	Analyze the Raster Data structure, data conversion ,	T:1, R2
61.	16	5	Integration of Raster and Vector data	Integration of Raster and Vector data	T:1, R2
62.	16	5	Data Input: Metadata , Conversion of existing data	Analyze Data Input: Metadata , Conversion of existing data	T:1, R2
63.	16	5	Creating new data ; Remote Sensing data, data, fields data, Text data ,	Creating new data ; Remote Sensing data, Data, field's data, Text data,	T:1, R2
64.	16	5	digitizing, Scanning, on screen digitizing,	digitizing, Scanning, on screen digitizing,	T:1, R2

IX. MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Objectives						Program Outcomes					Program Specific Outcomes				
	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PSO1	PSO2	PSO3

	1	2	3	4	5	6	7	8	9	10	1	2			
I	S	H											H		S
II	H	S											H	S	
III				H			S						H	S	
IV											S		S	H	
V			H	S						S			S	H	S

X. QUESTION BANK: (JNTUH)

UNIT – I:

SHORT ANSWER QUESTIONS-

S.No	Question	Blooms Taxonomy Level	Course Outcome
1	What is meant by photogrammetry	Remember	1,2
2	How many minimum number of photographs are required for Stereo	Remember	1,2
3	Define drift in while taking aerial photographs.	Remember	1,2
4	What is meant by Focal length of lens is aerial photography?	Remember	1,2
5	What are fiducial marks on an image negative in aerial photogrammetry?	Understand	1,2
6	Define the Scale of a vertical aerial photograph?	Remember	1,2
7	What is stereoscope	Remember	1,2
8	What is meant by Relief Displacement?	Understand	1,2
9	Define parallax?	Understand	1,2
10	What is mosaic	Remember	1,2

LONG ANSWER QUESTIONS-

S.No	Question	Blooms Taxonomy Level	Course Outcome
1	What is photo scale? Discuss with an example	Understand	1,2
2	If the distance of a line on the photographic known as 1 cm, what is it's equivalent distance on the ground if the	Remember	1,2
3	Elucidate the basic geometrical elements of a vertical aerial	Understand	1,2
4	Distinguish the difference between a map and an ortho photo	Remember	1,2
5	Discuss how the height of an object on the terrain can be determined using stereo parallax measurements.	Remember	1,2
6	Illustrate how the difference in elevation displaces the position of a photographic image.	Understand	1,2
7	Discuss about various types of Aerial Photogrammetric techniques.	Remember	1,2
8	What is Fiducial Center? How it is determined explain with a neat diagram	Remember	1,2
9	Define the following 1) Nadir Point	Remember	1,2

10	There are three types of errors in photogrammetry. Discuss	Remember	1,2
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UNIT – II

SHORT ANSWER QUESTIONS-

S.No	Question	Blooms Taxonomy Level	Course Outcome
1	Define Remote Sensing.	Remember	2
2	Define Scattering	Remember	2
3	What is active remote sensing?	Remember	2
4	What is passive remote Sensing?	Remember	2
5	What is image Interpretation?	Understand	2
6	What is passive remote sensing?	Understand	2
7	Define Ground control points	Remember	2
8	How do you define Temporal Resolution?	Understand	2
9	Name the elements of image interpretation	Remember	2
10	Define Mie Scattering?	Remember	2

LONG ANSWER QUESTIONS-

S.No	Question	Blooms Taxonomy Level	Course Outcome
1	Analyze the elements or processes involved in earth remote sensing with a neat diagram.	Remember	2
2	Illustrate the Electromagnetic spectrum, with emphasis on optical visible spectral bands/	Understand	2
3	Discuss the difference between active and passive remote	Remember	2
4	Scrutinize various applications and advantages of aerial and	Understand	2
5	Explain about two energy sources available for earth passive remote sensing and elucidate with their spectral characteristic	Understand	2
6	Describe spectral properties of water bodies and how these can	Understand	2
7	In earth remote sensing, What are the visible wavelength bands used.	Remember	2
8	Discuss the interaction of Electromagnetic Radiation with the	Remember	2
9	Write a detailed note on NOAA Satellite. And Discuss the particulars of NOAA Satellites.	Remember	2
10	Draw a neat diagram classification of imaging sensor systems	Remember	2
11	What resolution? Illustrate different types of resolution.	Understand	2
12	Which part of the EMR spectrum is used for radar remote	Remember	2

UNIT – III

SHORT ANSWER QUESTIONS-

S.No	Question	Blooms Taxonomy Level	Course Outcome
1	Define GIS	Understand	2,3
2	What are the 4Ms of GIS	Remember	2,3
3	Define Spatial data	Understand	2,3
4	Define Attribute data	Understand	2,3
5	Joining spatial and Attribute data	Remember	2,3
6	Define Coordinate system	Understand	2,3
7	What are the data used in ArcGIS	Understand	2,3
8	What is Map	Remember	2,3
9	Define Datum	Remember	2,3
10	Define projection	Remember	2,3

LONG ANSWER QUESTIONS-

S.No	Question	Blooms Taxonomy Level	Course Outcome
1.	Name the three basic types of map projections classified based on developable surfaces	Remember	2,3
2.	Define map projection. Why is map projection necessary in map making	Remember	2,3
3.	Define the following term in the context of geographic coordinate system of Earth : latitude, longitude, parallel, meridian	Understand	2,3
4.	Define the following terms : a) georeferencing b) mean sea level, geodetic datum, vertical datum	Understand	2,3
5.	Explain the meaning of map scale 1: 10,000. Is this a larger or smaller map scale than a map scale of 1: 1,000?	Remember	2,3
6.	Describe the characteristics and functions of DBMS	Remember	2,3
7.	Differentiate between the study of GIS as a special field of academic discipline and the study of GIS as a branch of Information Technology	Understand	2,3
8.	List the major application areas of GIS	Remember	2,3
9.	How GIS is helpful in taking decision for planning.	Understand	2,3
10.	Discuss GIS as a Tool for decision support system.	Remember	2,3
11.	Geographic Information System (GIS) can be defined in many ways. Write three frequently used definitions of GIS.	Understand	2,3
12.	Describe various data storage methods used in GIS	Remember	2,3
13.	Describe vector data storage and attribute data storage in GIS	Understand	2,3

UNIT – IV

SHORT ANSWER QUESTIONS-

S.No	Question	Blooms Taxonomy	Course Outcome
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		Level	
1.	Define topographic map	Understand	3,4,5
2.	What is the feature used for showing the location	Remember	3,4,5
3.	Define Geographic Information System?	Remember	3,4,5
4.	What are the major elements of Geographic Information System?	Understand	3,4,5
5.	Define types of vector data.	Remember	3,4,5
6.	Write any two uses of Geographic Information System?	Remember	3,4,5
7.	What is Non- Spatial data	Understand	3,4,5
8.	What is spatial data?	Understand	3,4,5
9.	What is attribute data or non spatial data?	Understand	3,4,5
10.	What feature in vector GIS?	Understand	3,4,5

LONG ANSWER QUESTIONS-

S.No	Question	Blooms Taxonomy Level	Course Outcome
1.	Explain the difference between the concepts of data accuracy” and data precision.”	Remember	3,4,5
2.	What are the components of geospatial data standards	Remember	3,4,5
3.	What is shape file? What are the different types of features in vector data model	Understand	3,4,5
4.	Compare and contrast the raster and vector data model.	Understand	3,4,5
5.	What are the advantages of raster data model	Remember	3,4,5
6.	Discuss what is the overall goal of data base management system	Understand	3,4,5
7.	Describe layers in GIS. Draw with a neat diagram	Understand	3,4,5
8.	Name three basic file structures used in GIS?	Understand	3,4,5
9.	What is the Difference between choropleth and Isopleth thematic maps	Remember	3,4,5
10.	What purpose does the Grid or Cell serve in data representation?	Understand	3,4,5

UNIT – V

SHORT ANSWER QUESTIONS-

S.No	Question	Blooms Taxonomy Level	Course Outcome
1.	What is Digital remote sensing images.	Remember	6,7
2.	What is DN number.s	Remember	6
3.	What is data conversion.	Remember	6,7
4.	Define Adhoc data?	Remember	6,7
5.	Digital aerial photographs are represented in in raster data form or vector data form? Why?	Remember	6,7
6.	Give some examples of data that is stored in Vector form?	Understand	6,7
7.	Name the methods used for conversion of data between raster and vector data forms.	Remember	6,7

8.	Name three basic file structures used in GIS?	Remember	6,7
9.	What is meant by Cleaning in data editing?	Understand	6,7
10.	Define classes?	Understand	6,7

LONG ANSWER QUESTIONS-

S.No	Question	Blooms Taxonomy Level	Course Outcome
1.	Describe the data stream flow in GIS system with a block diagram.	Remember	6,7
2.	Critically examine what is meant by Layer based GIS with examples.	Understand	6,7
3.	What are Raster and Vector data forms. Compare Raster data and Vector data representations.	Understand	6,7
4.	Explain about data capture, data input, and data output in Geographic Information System	Remember	6,7
5.	What are the advantages of vector model data model	Understand	6,7
6.	Explain with a neat diagram how real world data is converted into Raster format.	Understand	6,7
7.	Define data. What are the input data sources for GIS that serve as primary data? List out the secondary data sources.	Understand	6,7
8.	What is overlay operation in GIS?	Understand	6,7
9.	What is meant by cleaning in data editing?	Understand	6,7
10.	Explain integrated analysis of spatial and attribute data	Understand	6,7

XI. OBJECTIVE QUESTIONS: JNTUH

UNIT I

- Which one of the following statements is correct?
 - Snow albedo falls at all wave length with the increase of grain size
 - The effect of grain size on reflection is maximum in the near-IR region
 - The effect of grain size on reflection is low in the visible region of the spectrum
 - All of these
- The refractive index of the ocean water:
 - Increases with salinity
 - Increases with temperature
 - Decreases with salinity
 - Decreases with temperature
- The arrangement of terrain features which provides attributes: the shape, size and texture of objects, is called :
 - Spectral variation
 - Spatial variation
 - Temporal variation
 - None of these.
- Electromagnetic radiation :
 - Produces a time varying magnetic field and vice versa
 - Once generated, remains self-propagating.
 - is capable to travel across space
 - consists of magnetic and electric fields
 - All of these
- Pick up the important characteristic of a target which facilitates its identification from the following:
 - Spectral variation
 - Spatial variation
 - Temporal variation
 - Polarization variation
 - All of these
- Which one of the following frequency regions is a part of sun's radiation?

- (a)Ultraviolet frequency region (d)Visible frequency region
(C)Infrared frequency region (d)Radio frequency region (e)All of these
7. The instruments which provide electromagnetic radiation of specified wave length or a band of wave lengths to illuminate the earth surface, are called :
(a)passive sensors (b)active sensors
(c)None of these (d) Sensors
8. Due to perturbation of the orbit, satellite orbit parameters are frequently updated on measurements carried out by its
(a) Six ground stations (b) Five ground stations
(c) Four ground stations (d) Three ground stations
9. Coherence of two electromagnetic waves takes place if their phase difference is :
(a)constant in time (b)constant in space
(c)constant in time and space (d)None of these
10. The part radiation due to scattered/diffused radiation entering the field of view of a remote sensor other than that from the required target,
(a)reduces the contrast of the image and also its sharpness
(b)increases the contrast of the image but reduces the sharpness
(c)increases both the contrast and sharpness
(d)reduces the contrast but increases the sharpness

UNIT II

1. The most convenient co-ordinate system for specifying the relative positions of heavenly bodies on the celestial sphere, is
(a) declination and hour angle system B)declination and altitude system
C)altitude and azimuth system D)declination and right ascension system
2. Places having same latitude
(a) are equidistant from the nearer pole (b)are equidistant from both the poles
©are equidistant from the equator (d)all
3. The relief displacement of a minar 72 m high on photograph is 7.2 mm and its top appears 10 cm away from principal point. The flying height of the camera, is
(a) 500 m (b) 2000 m. (c) 1500 m (d)1000 m
4. The station which is selected close to the main triangulation station, to avoid intervening obstruction, is not known as
(a) eccentric station (b>false station (c)satellite station (d)pivot station.
5. The shortest distance between two places measured along the surface of the earth, is length of the equator between their longitudes (b)length of the parallel between their longitudes
(a)none of these. D)length of the arc of the great circle passing through them
6. The principal plane contains
(a)iso centre B)principal point C)principal axis and principal line D)all
7. Triangulation surveys are carried out for locating
(a) All B)control points for surveys of large areas
(b) engineering works, i.e. terminal points of long tunnels, bridge abutments, etc.
(c) control points for photogrammetric surveys
8. The height displacement on a vertical photograph
(a) increases as the horizontal distance increases from the principal point
(b) decreases as the flying height increases C)all
(c) increases as the ground elevation increases

9. The parallax of a point on the photograph is due to
(a) flying height B)length of air base C)focal length of the camera. D)all

UNIT III

1. In the world of GIS, another term for the property of connectivity is:
(a) Proximity b)neighborhood c)topology d)boolean identity e)location
2. Which of the following are true of AM/FM systems?
(a) The terms GIS and AM/FM are synonymous. B)AM/FM are always vector based.
(b) AM/FM is a specialized GIS.
(c) AM/FM systems are always confined to the utility industry.
(d) The systems use amplitude and frequency modulation.
3. By definition a GIS must include:
(a) A subsystem for data reporting and product generation
(b) A method for data storage, retrieval, and representation
(c) A method for storing demographic information
(d) A method for scanning maps to produce raster files (e)Data analysis functions
(f)A means for the input of spatial and non-spatial data
4. Which of the following statements are true of the history of GIS?
(a) The development of the first true GIS depended upon the invention of the microcomputer in the early 1980s.
(b) Some of the first applications were natural resource inventories.
(c) Public utilities were early users of automated mapping and GIS technologies.
(d) Municipal government agencies have been slow to adopt GIS.
5. Layers or levels in a GIS can be used to:
(a) Group related geographic features by function
(b) Isolate point, line, and area features
(c) Develop thematic maps
(d) Combine non-spatial and attribute information
(e) Highlight logical relationships among geographic features
6. Which of the following are types of infrastructure?
(a) An electrical distribution system. (b)A telephone cable network
©US Bureau of Census TIGER maps (d)Habitat of endangered species
(e)The US Interstate highway system (f)City zoning classifications
(g)1, 2, and 5 h)1,3,4, and 5
7. Which of the following are areas of GIS application in *commercial* industry?
(a) Oil and gas exploration b)Dispatch of emergency medical services
c)Timber and lumber production d)Direct marketing and retailing
e) Managing telecommunication networks e)Monitoring wetland habitats
8. Which of the following are true of GIS?
(a) The terms GIS and AM are synonymous (b)AM/FM is a specialized GIS
© GIS produce better maps than AM systems (d)GIS and CAD are synonymous
(e)Tabular data can be both an input and output of GIS
(f)Aerial photographs are preferred to satellite images in creating GIS.
9. Which of the following are true?
(a) Digitizing is defined as converting aerial photographs into maps
(b) Digitizing involves tracing map features into a computer
(c) A keyboard cannot be used to digitize maps, only to enter attribute information

- (d) Digitizing from a tablet involves using a template
 - (e) A digitizing tablet and mouse are examples of input devices used in digitizing
10. Attribute data are one type of spatial data.
- a. True
 - b. False

UNIT IV & V

1. The vector data model is based on which of the following?
 - (a) Collections of points joined by straight lines.
 - (b) Cartesian coordinate system.
 - (c) Pixels or grid cells
2. The raster data model is based on which of the following?
 - Grid cells or pixels grouped to form spatial entities.
 - (a) Tessellations. B)Grid cells. C)Discrete XY coordinate pairs.
3. Which of the following is NOT a raster data structure?
 - (a) Run-length encoding. B)Spaghetti. C)Quadtree d)Block encoding.
4. Which of the following are advantages of DEMs over TINs when creating Digital Terrain Models (DTMs)?
 - (a) DEMs efficiently store data over varied terrain.
 - (b) DEMs use a simple data model.
 - (c) DEMs do not require resampling if irregularly spaced input data is used.
 - (d) DEMs can directly accept inputs from digital height grids.
5. Which of the following are methods of identifying surface significant points in the construction of a TIN?
 - (a) The drop heuristic method b)The filter or VIP method
 - (b) The skeleton method (c)The supervised selection method
 - (d)The topographic intersection method.
6. Which of the following are applications of network analysis?
 - (a) Shortest path calculations (b)Line in polygon overlay.
 - ©Flood routing (d)Travelling salesperson problem
 - (b) Spatial search and query.
7. Which of the following might be considered as the fourth dimension in GIS?
 - (a) Space. (b)Scale. (c) Time. (d)Location.
8. Object-oriented models in GIS refer to models where data is:
 - (a) organized into thematic layers.
 - (b) organized into a single layer containing all entities.
 - (c) organized into a series of tiles.
9. Which of the following problems might 3D data models be applied to?
 - (a) Visibility analysis.(b)Landscape visualization.
 - (c) Network analysis. (d)Hydrological models. (e)Polygon overlay.
10. When using a vector data model the maximum number of points possible should be used to represent a feature.
 - (a) True False

XII. GATE QUESTIONS:

NA

IES QUESTIONS:

NA

XIII. WEBSITES:

1. <http://www.isro.org/>

2. <http://www.nrsc.gov.in/>
3. <http://www.surveyofindia.gov.in/>
4. <http://www.geoinformatics.com/>
5. <http://www.portal.gsi.gov.in/>
6. <http://www.gislounge.com/>
7. <http://en.wikipedia.org>

XIV. EXPERT DETAILS:

1. Dr. K. Radhakrishnan, Chairman, Indian Space Research Organization, Chairman, Space Commission, Secretary, Department of Space, GOI
2. Dr. V. K. Dadhwal, Director, National Remote Sensing Centre, Department of Space, Government Of India
3. Dr. Swarna Subba Rao, Surveyor General of India, The National Survey and Mapping Organisation, Department of Science & Technology, GOI
4. Dr. Sudesh Kumar Wadhawan, Director General, Geological Survey of India, Ministry Of Mines, Union Government of India
5. John R. Jensen,
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Department of Geography, Columbia, SC 29208
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XV. JOURNALS:

1. International Journal of Applied Remote Sensing
2. Journal of the Indian Society of Remote Sensing
3. Journal of Remote Sensing and GIS
4. International Journal of Remote Sensing and GIS
5. GIS@Development
6. GIS India

XVI. LIST OF TOPICS FOR STUDENT SEMINARS:

Water Resource Applications

1. Land use/Land cover in water resources
2. Surface water mapping and inventory
3. Rainfall – runoff relations and runoff potential indices of watersheds
4. Flood and drought impact assessment and monitoring
5. Watershed management for sustainable development
6. Watershed characteristics
7. Reservoir sedimentation
8. Fluvial geomorphology
9. Water resources management and monitoring
10. Ground water targeting
11. Identification of sites for artificial recharge structures
12. Drainage morphometry
13. Inland water quality survey and management
14. Water depth estimation and bathymetry

XVII. CASE STUDIES / SMALL PROJECTS:

1. Study of a Toposheet and delineate various features
2. Study of a Satellite Imagery and prepare different thematic layers
3. Prepare a Land Use/Land Cover map for an area of interest

4. Creation of a GIS for a city