Gyanmanjari
Innovative University

Subject: Remote Sensing and GIS - METTC11507

Type of course: Minor stream

Prerequisite: NIL

Rationale: Remote Sensing and GIS are essential tools in town and country planning. Remote sensing provides up-to-date, accurate data on land use, infrastructure, and environmental conditions, facilitating informed decision-making. GIS integrates this data, enabling planners to visualize spatial relationships and trends, analyze potential impacts, and optimize land use. These technologies aid in monitoring urban growth, planning transportation networks, and managing natural resources. They support sustainable development by identifying suitable sites for housing, industry, and green spaces, while also ensuring the preservation of natural landscapes. In disaster management, Remote Sensing and GIS help in risk assessment, emergency planning, and response coordination. Overall, these tools enhance the efficiency, accuracy, and sustainability of planning processes, contributing to better-managed towns and rural areas.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
CI	T	P	C	Theory Marks		Practical Marks		CA	
				ESE	MSE	V	P	ALA	
04	00	02	5	60	30	10	20	30	150

Legends: CI-Class Room Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.

Continuous Assessment:

Sr. No	Active Learning Activities	Marks
1	**Land Use and Land Cover Mapping** Students can analyze satellite imagery to classify different land uses and land cover types in a specific region. They can then compare their findings with historical data to study changes over time. And upload on GMIU Web Portal.	10

2	**Urban Growth Analysis** Students can use remote sensing imagery to map and analyze urban expansion over a set period. The project can include predicting future growth patterns and discussing the implications for urban planning. Upload on GMIU Web Portal.	10
3	**Water Resource Management** Students can use GIS to map water bodies and analyze the changes in their sizes over time. They can also assess the impact of these changes on local ecosystems and human activities. And upload GMIU Web Portal.	10
	Total	**30**

Course Content:

Sr. No	Course content	Hrs	% Weightage
1	**Introduction** Concept and Scope of Remote Sensing: Definitions, Process, and Characteristics of Remote Sensing System, Advantages and limitations. Concept of Electromagnetic Radiation (EMR): Wave length frequency- energy relationship of EMR, EMR Spectrum and its properties, EMR wavelength regions and their applications, Energy Interaction in the atmosphere: Scattering, absorption, transmission, atmospheric windows. Energy Interactions with Earth Surface Features.	14	25
2	**Remote Sensing** Types and Characteristics of Sensor: Imaging and non-imaging sensors, Active and passive sensors, Resolution of Sensors - Spectral, Spatial, Radiometric & Temporal, Scale, Mapping unit, multiband concepts, and False Colour Composites, Orbital Characteristics – Coverage, Passes, Pointing Accuracy, types of orbits. Multispectral and Hyper-spectral RS, Radar, Lidar; Feature identification and identification keys	14	25
3	**GIS** Basic Concepts: definition of GIS, Components of GIS, Variables - points, lines, polygon, Functionality of GIS, Areas of GIS application, Advantage and Limitation of GIS	10	15
4	**GIS Data** GIS Data: Spatial and Attribute Data, Data Structures - Raster and Vector data structures, GIS Software, and formats, Geo-database. Digitization, georeferencing, spatial and non-spatial data	10	15
5	**Digital Cartography** Nominal, Ordinal, Interval and Ratio Scales, Qualitative vs. Quantitative data, Discrete vs. Continuous data.	12	20
	Total	**60**	**100**

Suggested Specification table with Marks (Theory): 60

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	30%	50%	20%	NA	NA	NA

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcome:

After learning the course, the students should be able to:	
CO1	Have a fundamental knowledge of Geographic data imagery and its systems
CO2	Collect and analyze the Geographic Information of any region using relevant applications
CO3	Distinguish between the satellite imagery used for various data applications
CO4	Prepare projects by collecting the data from any imagery system and analyse it
CO5	Create analytical representative maps using GIS software

List of Assignment

Assignment and tutorial base on above mention topic.

Instructional Method:

The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of the tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

Web links and Video Lectures (e-Resources):

1. ESRI:
   https://www.youtube.com/user/esritv
2. Geo Delta Labs:
   https://www.youtube.com/c/GeoDeltaLabs
3. Remote Sensing and GIS
   https://onlinecourses.nptel.ac.in/noc21_ce61/preview

Reference Books

[1] Computers and Information Systems, Crown R.G. and S. John,1984, McGraw Hill Book Company, Mumbai.

[2] Remote Sensing in Hydrology and Water Management, Schultz, G. A., and Engman, E. T., 2000, Springer-Verlag, Berlin, Germany.

[3] An Introduction to Database Systems (8th Ed.), C.J.Date, A. Kannan S. Swamynathan,2009, Pearson Education.

[4] Database Management Systems, Raghu Ramakrishnan, Johannes Gehrke, 2002, McGraw-Hill.