SARVAJANIK UNIVERSITY
Sarvajanik College of Engineering and Technology
Master of Technology
Environmental Engineering

M. Tech. I Semester II

Subject Name: Application of RS and GIS in Environmental Engineering **Subject Code:** MTEN14203

Type of course: PE-III
Prerequisite: Basics of Environment Engineering

Rationale: Provide comprehensive instruction in the underlying concepts and principles of geographic information system (GIS) technology and its application to the design and analysis of environmental engineering systems.

Teaching and Examination Scheme:

TEACHING SCHEME				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	150
3	0	2	4	60	25	15	30	20	

CA1: Continuous Assessment (assignments/projects/open book tests/closed book tests **CA2:** Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems **TEE:** Term End Examination **TEP:** Term End Practical Exam (Performance and viva on practical skills learned in course) **CA3:** Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

Content:

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1.	**Remote Sensing Application** : Definition, Components of Remote Sensing, Principles of Remote Sensing,Active and Passive Remote Sensing, Electro Magnetic energy, EMR spectrum, EMR interaction with atmosphere, Scattering, Atmospheric Windows and its Significance, EMR interaction with Earth Surface Materials, Spectral Signature, EMR interaction with water, soil and Earth Surface, Remote Sensing application on soil salinity mapping, OCM and MODIS applications on suspended sediment mapping, Monitor and mapping of atmosphere constituents, aerosol mapping using MODIS satellite, Site suitability analysis for disposal of solid waste using Multi Criterion Analysis, GIS for health and emergency management.	14	33%
2.	**Fundamentals of Geographic Information System**: Essential components of GIS, GIS Data Geo-referenced data, Data input and output, Data Models DBMS, geographic grid, map projection, coordinate systems. Vector data and its representation, topological and non-topological vector data, TIN, vector analysis. Acquiring and handling of raster data, GIS data analysis. Advantage	14	33%

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	and disadvantage of GIS application. ,SPATIAL DATA ANALYSIS:GIS analysis functions, Retrieval, Reclassification, Buffering and Neighbourhood , Overlaying, Data Output, Implementation of GIS		
3.	**Introduction to Image Processing**: Pre-processing and corrections, Visual Interpretation of Satellite Images , Environmental Satellites, GOES, NOAA, AVHRR, CZCR, OCM and MODIS, Water supply and sewerage network modeling, Groundwater vulnerability for pollution, DRASTIC and SINTACS model, Eutrophication and sedimentation in lakes and reservoir, Impact urbanization on catchment, nutrients transport modeling.	10	23%
4.	**GPS:** Basic Concepts, components, factors affecting, GPS Setup, Accessories, Segment, Satellite and receivers, application and case studies.	04	11%

Suggested Specification table with Marks (Theory/Practical):

% Distribution of Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
15	**10**	**15**	**25**	**25**	**10**

Legends: R: Remembrance, **U:** Understanding; **A:** Application, **N:** Analyze, **E:** Evaluate **C:** Create and above Levels **(Revised Bloom's Taxonomy)**

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

Reference Text Books:

Sr no	Title of book /article	Author(s)	Publisher and details like ISBN	Year of publication	Publication Edition
1	Remote Sensing Principles and Interpretation	Sabins, F	W. H. Freeman and Company, New York	2007	Third
2	GIS Environmental Modeling and Engineering	Allan Brimicombe	Taylor & Francis	2009	Second
3	Remote Sensing and Geographical information System	A.M. Chandra and S.K. Ghosh	Narosa Publishing House, New Delhi ISBN: 978-81-8487-454-9	2006	Second
4.	Remote Sensing and GIS	Bhatta B	Oxford University Press, New Delhi	2008	Second
5.	Essentials of GPS	Agrawal N.K.,	Spatial Network Pvt. Ltd., Hydrabad	2004	-

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6.	Remote Sensing and Geographical information System	A.M. Chandra and S.K. Ghosh	Narosa Publishing House, New Delhi ISBN: 978-81-8487-454-9	2006	Second
7.	Remote Sensing and image Interpretation	Lilliesand T.M. and Kiefer R.W	John Wiley and Sons ISBN: 978-1-118-34328-9	2015	Seventh

Course Outcome:

Sr. No.	CO statement	Marks % weightage
CO-1	To summarize the basic spectral mechanism behind remote sensing and GIS techniques (R,Ucognitive level)	30
CO-2	To explain different software for data creation, analysis and modelling(R,U,N,Ccognitive level)	20
CO-3	To understand geo database development and geo-spatial analysis for environmental applications (U,N cognitive level)	20
CO-4	To apply the image processing techniques for various environmental problems(U,N,Acognitive level)	20
CO-5	To understand basic knowledge of GPS (U,Acognitive level)	10

LIST OF PRACTICALS:

1. Map generation in GIS. Vectorization, Geo-referencing of map.
2. Creating point, line, polygon layers and removal of errors.
3. Attaching Raster based and Vector based data with map.
4. Queries and Spatial analysis.
5. Network analysis.
6. Surface modeling, generation of DTM, its applications.
7. Survey with GPS receivers, collection of data and its analysis.

List of Open Source/learning website:

1. **https://nptel.ac.in/courses/105/103/10510319 lecture 1**
2. **https://nptel.ac.in/courses/105/103/105103193 lecture 2**
3. **https://nptel.ac.in/courses/105/103/105103193/ Lecture7 to 12**
4. **https://nptel.ac.in/courses/105/103/10510319 Lecture 22 to 24**
5. **https://nptel.ac.in/courses/105/107/105107062/ Lecture 1**
6.

List of Open Source Software:

1. QGIS
2. GRASS GIS
3. SAGA GIS
4. Google Earth

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