SARVAJANIK UNIVERSITY
Sarvajanik College of Engineering and Technology
Bachelor of Technology
Civil Engineering

B. Tech. III Semester – V

Subject Name : Remote Sensing and GIS **Subject Code:** BTCL15502

Type of course : Open Elective - I
Prerequisite : -
Rationale : The purpose of this course is to introduce the students to the basic concepts and principles of various components of remote sensing and also provide an exposure to GIS and its practical applications in civil engineering.

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:** Definition -Historical Components of Remote Sensing Principles & methods of remote sensing - Active and Passive remote sensing - Remote Sensing platforms -Electromagnetic radiation- Spectrum- Block body radiation – planks law – Stefan – Boltzmann law – satellites classification – based on orbit- sun synchronous and Geosynchronous based on purpose Earth Resources satellites, communication satellite Weather satellites Spy satellites Sensors Description of sensor in landscape, spot, IRS series and current satellites- Radar SLAR- and SAR.	10	25%
2.	**EMR Interactions:** Interaction with atmosphere Scattering of EMR Raleigh, Mie, Non Selective and Raman Scattering Bach scattering Speckle EMR Interaction with water and Ozone Atmospheric windows and its significance EMR interaction with the earth surface materials Radiance, irradiance, Absorbed and Transmitting energy – reflectance- Specular- and diffuse surface- Spectral signature – and curves EMR interaction with soil Resolution Spectral, Spatial, Radiometric, and Temporal.	9	20%

OE - I: Open Elective - I

3.	**Resources Engineering:** Characteristics of Digital satellite image enhancement Filtering Applications of Aerial photographs and satellite imageries – merits – Limitations – Water resources – watershed management – Urban Studies – Flood Management- Fishing Forestry etc.	8	10%
4.	**Geographic Information System(GIS):** Components of GIS – Hardware, Software and Organizational Context – Data – Spatial and NonSpatial – Maps – Types of Maps – Projection – Types of Projection - Data Input – Digitizer, Scanner – Editing – Raster and Vector data structures – Comparison of Raster and Vector data structure – Analysis using Raster and Vector data – Retrieval, Reclassification, Overlaying, Buffering – Data Output – Printers and Plotters.	10	25%
5.	**Miscellaneous Topics:** Visual Interpretation of Satellite Images – Elements of Interpretation - Interpretation Keys Characteristics of Digital Satellite Image – Image enhancement – Filtering – Classification - Integration of GIS and Remote Sensing – Application of Remote Sensing and GIS – Urban Applications- Integration of GIS and Remote Sensing – Application of Remote Sensing and GIS – Water resources – Urban Analysis – Watershed Management – Resources Information Systems.	8	20%

Suggested Specification table with Marks (Theory/Practical):

% Distribution of Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
25	25	20	10	10	10

Reference Text Books:

Sr. No.	**Title of book /article**	**Author(s)**	**Publisher and details like ISBN**	**Year of publication**	**Publication Edition**
1	Fundamentals of Remote Sensing	Joseph, G	Universities Press (India) Pvt. Ltd, Hyderabad, India.	2018	3rd
2	Remote Sensing and Image Interpretation	Lillesand, T. M., Ralph, K. W. &Chipman, J	John Wiley.	2008	6th
3	Remote Sensing and GIS	Bhatta B	Oxford University Press, New Delhi	2021	3rd

OE - I: Open Elective - I

4	Introduction to Remote Sensing	Campbell, J. B., Randolph H. Wynne	Guilford Press.	2011	5th
5	Concepts and Techniques of Geographical Information Systems	Lo C.P. and Yeung Albert K.W.,	Prentice-Hall of India Pvt. Ltd. New Delhi	2006	2nd

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 and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcome:

Sr. No.	CO Statement After learning this subject, students will be able to	Marks % weightage
CO-1	Learn the concepts of Electro Magnetic energy, spectrum and spectral signature curves in the practical problems. *(R, U, A….cognitive level)*	20
CO-2	Discover the concepts of satellite and sensor parameters and characteristics of different platforms. *(R, U, A….cognitive level)*	25
CO-3	Apply the concepts of DBMS in GIS. *(R, U, A, N, E….cognitive level)*	25
CO-4	Analyze raster and vector data and modelling in GIS. *(R, U, A, N, E, C ….cognitive level)*	15
CO-5	Learn to apply GIS in land use, disaster management, ITS and resource information systems. *(R, U, A, N, E , C….cognitive level)*	15

Mapping with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO-1	3	3	3	3	3	1	1	2	2	1	2	3	2	2	2
CO-2	2	2	2	1	3	-	-	3	3	1	-	3	2	3	3
CO-3	3	3	3	3	3	1	1	2	2	-	1	3	2	2	3
CO-4	3	3	3	3	3	2	-	3	3	1	1	3	2	2	2
CO-5	3	3	3	3	3	3	3	3	3	3	2	3	3	3	3
Rationale*	**14**	**14**	**14**	**13**	**15**	**7**	**5**	**13**	**13**	**6**	**6**	**15**	**11**	**12**	**13**

Rationale*: Developing a basic understanding about GIS techniques, remote sensing and its application and also enable to apply the tools to solve various problems related to Civil Engineering.

OE - I: Open Elective - I

LIST OF PRACTICALS:

- Introduction to Google Earth Pro
- Mark and identify location, path and landuse in Google Earth Pro
- Introduction to different software of GIS
- Introduction to QGIS Software
- Explore Satellite image of a location from Bhuvan, USGS
- Georefrencing
- Make DEM

Major Equipment:

- High configuration desktop with required software
- GIS License version software

List of Open learning website:

- http://landmap.mimas.ac.uk/ipc/ccrs/fundam_e.html
  - CCRS Canada Centre for Remote Sensing
- http://rst.gsfc.nasa.gov/
  - NASA Remote Sensing Tutorial
- http://rsinc.com/envi/
  - ENVI
- http://www.ermapper.com/
  - ER Mapper
- http://www.clarklabs.org/
  - IDRIS

List of Open Source Software:

- Commercial ERDAS Imagine - http://gi.leica-geosystems.com/LGISub1x33x0.aspx
- PCI Geomatics - http://www.pcigeomatics.com/
- QGIS