YESHWANTRAO CHAVAN COLLEGE OF ENGINEERING
(An Autonomous Institution affiliated to R T M Nagpur University Nagpur)
Accredited by NAAC (1st Cycle) with 'A' Grade (Score 3.25 on 4 Point Scale)
Wanadongri, Hingna Road, Nagpur-441110

Department of Civil Engineering
(Honors in RS&GIS)

B.E. Honors in Remote Sensing & GIS
SoE & Syllabus 2021-22

Information Brochure of Honor Program

1. Title of Program: **B.E. Hons in Remote Sensing & GIS**
2. Type of Program : **Honor**
3. Department offering the program: **Civil Engineering**
4. Industrial Collaboration : ***Ceinsys Tech. Ltd.***
   10/5, IT Park, Opposite VNIT,
   Nagpur – 440022, Maharashtra, India
5. **Students of Department of Civil Engineering are only eligible to opt for this program.**

6. General information about courses in program:

Remote Sensing (RS) and Geographic Information Systems (GIS) have advanced and important role in environmental fields including land and water management, forestry, climate science, biodiversity conservation, urban and rural planning, and social research. This course provides the theoretical knowledge and practical skills needed to use remote sensing and GIS data and techniques to address applications in environment and society. It provides a true enabling technology for the earth, life and social sciences and a rich source of computational and representational challenges for the computer sciences.

Important components of remote sensing technology are data procurement, data processing and analysis. The result efficiency of this technology for certain application depends upon the spectral response pattern of the scene, atmospheric conditions and the capability and capacity of the sensor which is expressed in terms of spatial, spectral, radiometric and temporal resolutions.

GIS is a powerful set of tools for assimilating, storing, retrieving, transforming, converting, presenting and displaying spatial and non-spatial data from the real world. It has the ability to assimilate divergent sources of data both spatial (i.e. data related to space-geographical data) and non-spatial (i.e. attribute data). Geographic information system allows the user to integrate database generated from various sources as single platform and analyze them efficiently in a

spatio-temporal domain. GIS technology forms combination of cartography, statistical analysis and computer technology. Geographic information system provides support in resource management, decision making and many more streams.

The study of GIS and RS techniques can be used for environmental protection and management, with a special focus on the current topics of water and drought in the landscape and protection of biodiversity under the condition of a global climate change. Learning Outcomes are: students will have the knowledge and skills to: Understand spatial environment and society research and applications, Synthesize and apply that knowledge to formulate new applications, Pursue a guided investigation of a topic involving remote sensing and/or GIS, Communicate the results of that investigation in seminar and written formats.

7. Advance knowledge or research orientation of Program:

Remote Sensing and GIS has become beneficial, exciting glamorous due to different upcoming opportunities and nowadays it is useful in our day-to-day life. Recently scientists, researchers, students, and even common people are showing great interest for better understanding of our environment & processes in it. Environment refers to geographic space and the events that happen there. In different ways, we notice that geographic space along with the data denoting it, is part of our world; many decisions we take which are influenced by fact of geographical world. Advancement in GIS & RS i.e. Geoinformatics stream which can provide large volume of spatial data i.e. geographic data, with minimum costs of computer hardware and software has made Remote Sensing and G.I.S. affordable to not only complex geospatial situation but also affordable to increasingly varied individuals. Advance technologies of Remote Sensing and GIS as a powerful tool for spatial analysis. It includes computerization of the spatial data. It reduces the time and cost in organizing the data in data center. It provides efficient methods for analysis of land use issues and tools for land use planning and modeling. GIS is broadly available through internet. RS & GIS Technology supports to visualization, data management and data analysis, and also having capability to link with other softwares.

8. Employability potential of program:

The graduates can find employment both in private and state-funded institutions working in the environmental management, in particular as a spatial data analyst or at an entry-level management post. In the private sector, the graduate can find employment e.g. in companies providing ecological monitoring or analyses, recultivation, landscape planning or in companies specializing directly in GIS and remote sensing. Last but not least, the graduates can act as freelance experts/consultants, whose services are currently much sought-after. Of course, the graduates can also opt for continuing in their Masters' studies, for which students will be very well prepared. There are many study programmes focused on RS and GIS worldwide. Student can become experts besides RS and GIS in other specializations of the environmental science and Engg.

9. Departmental Steering committee:

SN	Name of the Faculty Member	Post	Designation	e-mail ID	Contact Number
1	Dr. V.G. Meshram	Chairman	Associate Professor & Head	hod_ce@ycce.edu	9850340838
2	Dr. S.R. Khandeshwar	Member	Professor	khandeshwar333@yahoo.com	9822578533
3	Dr. S.V. Ambekar	Member	Professor	sv_ambekar@rediffmail.com	9422105597
4	Dr. A.R Gajbhiye	Member	Professor	yccehodcivil@yahoo.in	9850958980
5	Dr. Ms. M.S. Bhagat	Co-Ordinator	Assistant Professor	msbciv2gmail.com	7620494011

10. Departmental coordinator:

SN	Name of the Faculty Member	Post	Designation	e-mail ID	Contact Number
1	Dr. Ms. M.S. Bhagat	Co-Ordinator	Assistant Professor	msbciv2gmail.com	7620494011

Scheme of Exminations
Honors in Remote Sensing & GIS

B.E Honors (Remote Sensing & GIS)													
SN	Sem.	Sub. Code	Subject	T/P	Contact Hours				Credit	% Weightage			ESE Duration Hours
					L	T	P	Hrs		MSEs*	TA**	ESE	
1	V	CVH131	Introduction to Remote Sensing	**T**	3	0	0	3	3	30	30	40	3
2	V	CVH132	**Lab-** Remote Sensing	**P**	0	0	2	2	1		60	40	
3	VI	CVH141	Geographical Information Systems	**T**	3	0	0	3	3	30	30	40	3
4	VI	CVH142	**Lab-** Geographical Information System	**P**	0	0	2	2	1		60	40	
5	VI	CVH143	Applications of RS-GIS for Urban Planning	**T**	3	0	0	3	3	30	30	40	3
6	VII	CVH151	GIS for Environmental Management	**T**	3	0	0	3	3	30	30	40	3
7	VII	CVH152	Advanced GIS Modelling	**T**	3	0	0	3	3	30	30	40	3
8	VII	CVH153	**Lab-** Surveying using GPS	**P**	0	0	2	2	1		60	40	
			TOTAL		**15**	**0**	**6**		**21**	**18**			

MSEs* = Three MSEs of 15 Marks each will conducted and marks of better 2 of these 3 MSEs will be considered for Continuous Assessment

TA ** = for Theory : 20 marks on lecture quizzes, 8 marks on assignments, 2 marks on class performance

TA = for Practical : MSPA will be 15 marks each**

V Semester

CVH131	Introduction to Remote Sensing			L= 3	T = 0	P = 0	Credits = 3
Evaluation Scheme *Best Two out of three MSE's would be considered	MSE-I*	MSE-II*	MSE-III*	TA	ESE	Total	ESE Duration
	15	15	15	30	40	100	3 Hrs.
Prerequisites							

COURSE OBJECTIVES	COURSE OUTCOMES
Students should be able to 1. To provide exposure to students in gaining knowledge on concepts of Geo-informatics. 2. To provide the knowledge of Geo-informatics for various surveys, information extraction, and its application.	Students should be able to 1. Explain the principles of Geo-informatics. 2. Describe the process of data acquisition of satellite images and their characteristics. 3. Illustrate knowledge of remote sensing and GIS in different civil engineering applications.
Mapped Program Outcomes: 1,2,5,10	

UNIT–1 : Basics of Remote Sensing: Definition of Remote sensing ,Principles of Remote Sensing, Electromagnetic spectrum, Interaction of EM Radiation with atmosphere, and target, Atmospheric Widows, Spectral signature of various land cover features.	**[06 Hrs.]**
UNIT–2 : Elements of Remote Sensing System : Platforms : Types of platforms, ground, airborne, and space born platforms, Orbit of satellites, satellites for Earth observations studies, Sensors : Types and classification of sensors, sensor resolutions. Scanners : Types of scanners, push broom scanner, whiskbroom scanner.	**[07 Hrs.]**
UNIT–3 : Basics of Aerial Photogrammetry, Determination and calculation of elevation from RS data, Relief displacement, image parallax and vertical exaggeration, Visual Image Interpretation: Elements of interpretation, interpretation key.	**[07 Hrs.]**
UNIT–4 : Digital Image Processing : Basics of DIP, Image Rectification and Registration, Image Enhancement, Image Classification . Remote Sensing Data Formats.	**[07 Hrs.]**

UNIT–5 : Introduction to Geographical Information System, Introduction to Global Positioning System (GPS).	**[06 Hrs.]**
UNIT–6 : Role of Remote Sensing and GIS in Natural Resources Management, Environmental Imapct Assessment, Agriculture, Land use & Land Cover, Disaster Management.	**[06 Hrs.]**

Text Books:

	Title	Edition	Author	Publisher
1	Remote Sensing And GIS		Basudeb. Bhatta	Oxford University Press
2	Remote Sensing Principles And Applications		Dr. B. C. Panda	Viva Books Pvt. Ltd.

Reference Book:

	Title	Edition	Author	Publisher
1	Remote Sensing Of The Environment: An Earth Resource Perspective	2nd Edition	Jensen	Pearson, India
2	Fundamentals of Satellite Remote sensing: An Environmental Approach	2nd Edition	Emilio Chuvieco	CRC Press/Taylor & Francis, Boca Raton, Florida, USA
3	Integrating Scale in Remote Sensing and GIS		Dale A. Quattrochi, Elizabeth Wentz, Nina Siu-Ngan Lam, and Charles W. Emerson	CRC Press
4	Introduction to Remote Sensing,		James B. Campbell, Randolph H. Wynne	Guilford Press

V Semester

CVH132	LAB - Remote Sensing			L=0	T=0	P=1	Credits=1
Evaluation Scheme	MSPA-I	MSPA-II	MSPA-III	TA	ESE	Total	ESE Duration
	--	--	--	60	40	100	3 Hrs

COURSE OBJECTIVE	COURSE OUTCOME
Students should be able to 1. Familiarization with image processing, registration, enhancement, techniques, interpretation, classification, Accuracy assessment. 2. Vector layer operations in images. 3. Digital Photogrammetry.	Students should be able to 1. Develop image processing technique and its accuracy assessment. 2. Understand vector layer operations in image for AOI and estimation of area and perimeter. 3. Apply stereo data & 3D aerial triangulation, point measurement auto tie point generations.
Mapped Program Outcomes: 1,2,3,4,5,10,11	

Lab Session - 1 : Familiarization with image processing – Image data loading, visual understanding of image and
identification of objects, image histogram and layer information,

Lab Session - 2 : Image registration and analysis- base map / topo map registration, image to map and image to
image registration, raster data extraction and working with mask, mosaic.

Lab Session - 3 : Image enhancement techniques- linear and non-linear contrast enhancement, details band
composition, edge enhancement, high pass and low pass filtering.

Lab session - 4 : Visual image interpretation- identification of features on image (Physical features, urban
features, forest and agricultural landuse), true color and FCC, Interpretation of thermal and Radar images.

Lab session - 5 : Image classification- supervised and unsupervised classification with maximum likelihood,
minimum distance to mean technique.

Lab session – 6 : Accuracy assessment of image- understanding error matrix, overall and mapping accuracy,
kappa coefficient, ground truth.

Lab session – 7 : Vector layer operations in image- open vector layer for AOI concept understanding, area and
perimeter estimation.

Lab session -8: Digital Photogrammetry –understanding stereo data & 3D, aerial triangulation, point measurement, auto tie point generations, understanding DTM & DSM, ortho data.

Reference Book:

	Title	Edition	Author	Publisher
1	Remote Sensing and Image Interpretation		Lillesand T.M and Kiefer R.W	John Wiley and Sons
2	Aerial Photographic Interpretation		Lueder, D.R.,	Mc Graw Hill Book Company, New York

VI Semester

CVH141	Geographical Information Systems			L= 3	T = 0	P = 0	Credits = 3
Evaluation Scheme *Best Two out of three MSE's would be considered	MSE-I*	MSE-II*	MSE-III*	TA	ESE	Total	ESE Duration
	15	15	15	30	40	100	3 Hrs.
Prerequisites							

COURSE OBJECTIVES	COURSE OUTCOMES
Students should be able to 1. To introduce the fundamentals and components of Geographic Information System. 2. To provide details of spatial data structures and input, management and output processes.	Students should be able to 1. The basic concepts and components of GIS. 2. Concepts of spatial and non spatial data, map projections and operations.
Mapped Program Outcomes : 1,2,5,10	

UNIT–1 : Introduction - A Brief History of GIS - Geographical concepts and terminology - Essential components of GIS -utility of GIS- Hardware, Software, Data, People, Methods – Proprietary and open source Software Various GIS packages.	**[06 Hrs.]**
UNIT–2 : Data: Spatial and Non-Spatial Data Spatial Data: Points, Lines, Polygons/Area and Surface - Non-Spatial Data - Scales/Levels of Measurement. Data Base: Data sources, Data Base Structure models.	**[07 Hrs.]**
UNIT–3 : Data acquisition: Vector Data Models, Raster data model, Data Compression, arc-node data structure - Raster to vector conversion - Topology and spatial relationships - Data storage verification and editing.	**[07 Hrs.]**
UNIT–4 : Coordinate systems, Datums- Map projections - Coordinate transformation, Georeferencing, Digitization- Methods of digitization, Common errors in digitization.	**[06 Hrs.]**
UNIT–5 : Discrete and continuous surfaces- Digital elevation models, sources of DEM, TIN structure, Extraction of topographic parameters: slope, aspect, delineation of watershed and drainage network DEM applications.	**[06 Hrs.]**

UNIT–6 : Operations in GIS - Overlay, Buffers, Spatial analysis, Network analysis, Application of GIS to various natural resources mapping and monitoring and other civil engineering related problems.	**[07 Hrs.]**

Text Books:

	Title	Edition	Author	Publisher
1	Geographic Information systems and Science		Paul Longley	John Wiley & Sons,
2	The design and implementation of Geographic Information Systems,		John E. Harmon & Steven J. Anderson	John Wiley & Sons
3	Basic Readings in Geographic Information System		Marble, D.F & Calkins, H.W	Spad System Ltd
4	Introduction to Geographic Information Systems		Kang Tsung Chang	Tata Mc Graw Hill Publishing Company Ltd, New Delhi

Reference Book:

	Title	Edition	Author	Publisher
1	Principles of GIS for Land Resource Assessment		Burrough, P.A	Oxford Publications
2	Concepts and Techniques of Geographic Information Systems		C.P.Lo & Albert K. W.Yeung	Prentice Hall India Pvt.Ltd,
3	Introduction to Geospatial Technologies	Fourth Edition	Bradley A. Shellito	Macmillan Learning
4	Applied GIS and Spatial Analysis		John Stillwell , Graham Clarke	Wiley Publications
5	GIS Fundamentals: A First Text on Geographic Information Systems		Paul Bolstad,	Eider Press,

VI Semester

CVH142	LAB - Geographical Information System			L=0	T=0	P=1	Credits=1
Evaluation Scheme	MSPA-I	MSPA-II	MSPA-III	TA	ESE	Total	ESE Duration
	--	--	--	60	40	100	3 Hrs

COURSE OBJECTIVE	COURSE OUTCOME
Students should be able to 1. Georeferencing application- with special reference to UTM, WGS and Geodatabase handling 2. Spatial analysis- by geoprocessing tools and Network analysis by creating network model 3. Map design and its presentation	Students should be able to 1. Apply The Fundamental Principles of GIS And Related Applications. 2. Understand Geoprocessing Tools, Analyze And Create Network Model 3. Carry Out Map Design and Its Presentation
Mapped Program Outcomes : 1,2,3,5,10,11	

Lab session - 1 : Georeferencing application- Coordinates system, datum conversion/map projection use and
types with special reference to UTM and WGS.

Lab session – 2 : Spatial data input- scanning, Heads-up/on screen digitization, creating new features, selecting
features, editing features, understanding and use of topology, linear and area measurement, linking of attributes
data with geographic features.

Lab session – 3 : Attribute data input- Use of MS Office, excel and access, data updating, queries of table in GIS
software (union, intersection, join, relate), creation of graphs.

Lab session -4 : Geodatabase handling- Spatial data formats, feature dataset, feature classes, import of data,
understanding layers and data frames, map symbology, labelling features.

Lab session – 5 : Spatial analysis- Query (location and attribute), geoprocessing tools and wizard. Spatial
searching (buffer analysis).

Lab session - 6 : Network analysis- utility of network, network model creation, shortest path analysis.

Lab session- 7: Map design and presentation- Map layout presentation with scale, index, north line, coordinate
etc., thematic maps, export map with different formats.

Reference Book:				
	Title	**Edition**	**Author**	**Publisher**
1	An Introduction to Geographical Information Systems		Ian Heywood / Sarah Cornelius / Steve Carver	Prentice Hall
2	GIS: Fundamentals, Applications and Implementations		Elangovan,	NIPA
3	GIS-An Introduction to Mapping Technologies		Patrick McHaffie ,Sungsoon Hwang,Cassie Follett	CRC PRESS

VI Semester

CVH143	**Applications of RS-GIS for Urban Planning**			**L=3**	**T=0**	**P=0**	**Credits= 3**
Evaluation Scheme *Best Two out of three MSE's would be considered	MSE-I*	MSE-II*	MSE-III*	TA	ESE	Tota	ESE Duration
	15	15	15	30	40	100	3 Hrs.
Prerequisites							

COURSE OBJECTIVES	**COURSE OUTCOMES**
Students should be able to 1. To provide students a set of operational skills enabling them to support urban planning and management with remote sensing and GIS-based assessment	Students should be able to 1. Basic concepts of urban planning 2. The use of modern techniques of remote sensing and GIS in key areas of urban planning
Mapped Program Outcomes: 1,2,5,10	

UNIT–1 : **Basic** Concepts of Urbanization and Urban Areas - concept of regions - formal and functional regions - census classification of urban areas - Planning Goals: Natural Resources Management.	**[06 Hrs.]**
UNIT–2 : Urban Socio-economic management and infrastructure planning - Planning physical structures and functional domains - data and information for urban and regional planning by Remote Sensing - Planning goals for urban areas and regions.	**[07 Hrs.]**
UNIT–3 : Urban morphology – Housing typology – Population estimation from remote sensing – Infrastructure demand analysis – Land suitability analysis for Urban renewal – Plan formulation for sectoral and regional, development.	**[07 Hrs.]**
UNIT–4 : Site specific GIS: Housing development, parks and social facilities planning. Use of remote sensing and GIS in assessment, estimation and projections - Design of Urban and regional information systems – revenue and tax collection GIS.	**[07 Hrs.]**
UNIT–5 : Classification of traffic – Optimum route and plans / shortest path – Alignment planning – Traffic and flow management – Accident analysis – case studies. Utility Planning and Asset Management – urban and regional transportation corridors - wholesale and retail trade interactions – commuting.	**[06 Hrs.]**

UNIT–6 : Application of RS and GIS for smarcity concepts, Study for various departmental models and for urban area as well as for rural development schemes. Basic use of LIDAR and Drone technology for smart city.	**[06 Hrs.]**

Text Books:

	Title	Edition	Author	Publisher
1	Urban Remote Sensing: Monitoring, Synthesis and Modeling in the Urban Environment		Xiaojun Yang	Wiley-Blackwell
2	Geographical Information Systems for Urban and Regional Planning,		Henk J. Scholten John C. H. Stillwell	Springer,

Reference Book:

	Title	Edition	Author	Publisher
1	Decision Support Systems in Urban Planning		Harry Timmermans (Ed.),	E&FN SPON, London
2	Building Smart Cities: Analytics, ICT, and Design Thinking		Carol L. Stimmel	CRC Press, New York

VII Semester

CVH151	GIS for Environmental Management			L=3	T=0	P=0	Credits= 3
Evaluation Scheme *Best Two out of three MSE's would be considered	MSE-I*	MSE-II*	MSE-III*	TA	ESE	Tota	ESE Duration
	15	15	15	30	40	100	3 Hrs.
Prerequisites							

COURSE OBJECTIVES	COURSE OUTCOMES
Students should be able to 1. To enable the students to have a sound knowledge of application of remote sensing and GIS and for understanding the changes in environment, monitoring the pollution affected areas.	Students should be able to 1. Concept of use of satellite imaging for environmental management. 2. Use of remote sensing for soil characterization. 3. Use of GIS for forest management 4. Application of GIS tools and software to water quality management.
Mapped Program Outcomes:1,2,5,10	

UNIT–1 : Introduction - Environmental satellite Mission: GEOS, NOAA, AVHRR, CZCS, Oceansat, Kalpana and others – Spectral characteristics - Data Products – Analysis Tools - Monitoring land, water, atmosphere and ocean using Remote Sensing Data.	**[06 Hrs.]**
UNIT–2 : Soil classifications – Soil survey, Types and methods – Hydrological Soil grouping - Factors influencing soil reflectance properties – Characteristics of saline & alkaline Soils –principle component analysis and orthogonal rotation transformation - Soil mapping - watershed management - Problem soil identification – land evaluation – Case studies.	**[07 Hrs.]**
UNIT–3 : Concepts of Integrated surveys– global effects and climatic changes: land degradation and desertification, extreme events, - effect on forest produces health, forest hazards, sustainable forest Management and practice - biodiversity issues – invasive biotics – mitigation and adaptation – RS & GIS for drawing out action plans – watershed approach – landuse planning for sustainable development – precision farming – Case studies.	**[07 Hrs.]**
UNIT–4 : Forest taxonomy – inventory of forest land – forest types and density mapping – Forest stock mapping – factors influencing degradation of forest – Delineation of degraded forest - Forest change detection and monitoring – Forest fire mapping & damage assessment.	**[07 Hrs.]**
UNIT–5 : Classification of water quality - Sampling procedure - Quality analysis and GIS modeling Pipe Network Design using GIS - Spectral responses of clear and contaminated water.	**[06 Hrs.]**

UNIT–6 : Definition – sources – identification of storage and collection location - Analysis of collection route - Site selection: Transfer station, Disposal site – Waste allocation – design of leachate and gas collection in sanitary landfills – leachate model - case studies.	**[06 Hrs.]**

Text Books:

	Title	Edition	Author	Publisher
1	Water Resources Conservation and Managemen		Chatterjee, S. N.,	Atlantic Publishers
2	Land and Water Management		Murthy, V.V.N	Khalyani Publishers
3	Watershed Management		Muthy, J. V. S	New Age International Publishers

Reference Book:

	Title	Edition	Author	Publisher
1	Soil and Water Conservation Practices		Suresh Rao	Standard Publishers
2	Geographic Information Systems in Water Resources Engineering		Lynn E. Johnson	CRC Press
3	Hydroinformatics: Data Integrative Approaches in Computation, Analysis, and Modeling,		Praveen Kumar, Mike Folk, Momcilo Markus and Jay C. Alameda	CRC Press
4	GIS, Environmental Modeling and Engineering	Second Edition	Allan Brimicombe	CRC Press

VII Semester

CVH152	Advanced GIS Modeling			L=3	T=0	P=0	Credits= 3
Evaluation Scheme *Best Two out of three MSE's would be considered	MSE-I*	MSE-II*	MSE-III*	TA	ESE	Tota	ESE Duration
	15	15	15	30	40	100	3 Hrs.
Prerequisites							

COURSE OBJECTIVES	COURSE OUTCOMES
Students should be able to 1. To acquire a profound knowledge and understanding of advanced concepts and techniques used in modeling geographic reality and analysis of geo-data and acquire a capability to apply these techniques independently	Students should be able to 1. Conduct advanced spatial analyses using GIS tools. 2. Study GIS data with complex geospatial models 3. Solve the geospatial problems using programming tools
Mapped Program Outcomes: 1,2,5,10	

UNIT–1 : Aquifer Vulnerability: Intrinsic and specific vulnerability - DRASTIC, SINTACS – Ground Water Quality Modelling: MODFLOW, MT3D – Sea water Intrusion Modelling – pollution diffusion model in river - Case studies.	**[06 Hrs.]**
UNIT–2 : Introduction to Geographic Resources Analysis Support System (GRASS) GIS - Raster data handling – Reclassification, recode - map algebra - Resampling and interpolation of raster data – Overlaying - Spatial analysis Neighborhood analysis and cross-category statistics - Buffering - Cost surfaces.	**[07 Hrs.]**
UNIT–3 : Terrain and watershed analysis – Modeling raster data – Vector data handling - Topological operations – Buffering – Overlay – Dissolve – clip, union intersect – Network analysis – Spatial interpolation – handling LIDAR point cloud data.	**[07 Hrs.]**
UNIT–4 : Introduction - creating raster surface from points - interpolating a raster surface - creating TIN surface vector data - building TIN - creating a TIN from a raster- creating a raster from a TIN.	**[07 Hrs.]**
UNIT–5 : Introduction - Need for Spatial models- Conceptual model for solving spatial problems- steps involved, Types of Spatial Models- Descriptive and Process models - Types of Spatial Models- Descriptive and Process models - Types of Process models - Creating Conceptual models - Site Suitability model.	**[06 Hrs.]**

UNIT–6 : DEM and socio-economic – Land use Transportation interaction models – Intelligent transportation systems –Risk, vulnerability models in crime, accidents and disasters - case studies.	**[06 Hrs.]**

Text Books:

	Title	Edition	Author	Publisher
1	Principles of Geographical Information Systems		Burrough, P. A and Racael A. McDonnell	Oxford University Publications
2	Concepts and Techniques of Geographic Information Systems		C.P.Lo., Albert K and W.Yeung	Prentice Hall India Pvt.Ltd, New Delhi

Reference Book:

	Title	Edition	Author	Publisher
1	Web GIS: Principles and Applications		Pinde Fu and Jiulin Sun	ESRI Press

VII Semester

CVH153	LAB - Surveying Using GPS			L=0	T=0	P=1	Credits=1
Evaluation Scheme	MSPA-I	MSPA-II	MSPA-III	TA	ESE	Total	ESE Duration
	--	--	--	60	40	100	3 Hrs

COURSE OBJECTIVE	COURSE OUTCOME
Students should be able to 1. Inputting GPS Data, DGPS Survey for Analysis. 2. Geospatial Industry for Understanding Current Trend of GIS And Remote Sensing In Project. 3. Field Using Satellite Images, Aerial Photographs and Maps, With GPS Data for Better Interpretation.	Students should be able to 1. Process and Analyze DGPS Survey Data. 2. Understand Current Trend Of GIS And Remote Sensing In Actual Project. 3. Develop & Analyze The Satellite Images, GPS Data And Its Practical Application To Actual Field.
Mapped Program Outcomes : 1,2,3,4,5,10,11	

Lab session -1: GPS- methods of coordinate collection, GPS accuracy and signals, inputting GPS data in
computer for analysis.

Lab session -2: DGPS survey-Selection of reference station, DGPS data collection, data processing and accuracy. Navigation.

Lab session -3: Industry tour- Visiting any geospatial industry and understanding current trend of GIS and
Remote Sensing, project understanding, discussing and training session.

Lab session -4: Study tour- Identification and understanding of features in the field using satellite images, aerial
photographs and maps, ground truth verification with GPS data collection, features photograph collection for
better interpretation.

Reference Book:

	Title	Edition	Author	Publisher
1	Advanced Surveying - Total Station, GIS And Surveying		Satheesh Gopi, R. Sathikumar, N. Madhu	Pearson.
2	GPS For Land Surveys		Jan Van Sickle	CRC Press
3	GPS System: Technology, Operation And Application		Ben Levitan, Lawrence Harte	Discover Net Publishing