UTKAL UNIVERSITY
P.G DEPARTMENT OF GEOGRAPHY

Credit System (M.Sc. Geo-informatics): Details of the Courses and Credits – 2018

COURSE CODE	COURSE TITLE	CREDITS per Course	Credits to be Completed	
			Course-wise	semester-Wise
Core	**SEMESTER I**			
GI 101	Principles of Remote Sensing& Aerial Photography	4	**4**	
GI 102	Introduction to Geographical Information System	4	**4**	
GI 103	Principles of Cartography and Map Interpretation	4	**4**	
G1 104	Introduction to Computer Programming C & C++ (P)	4	**4**	
GI 105	GIS & GPS (P)	4	**4**	
	Total credits in semester I	**20**	**20**	**20**
Core	**SEMESTER II**			
GI 201	Digital Image Processing	4	**4**	
GI 202	Database Management System (DBMS)	4	**4**	
GI 203	Web technology, GIS Mapping & Programming	4	**4**	
GI 204	Image Processing& Remote Sensing (P)	4	**4**	
GI 205	Fundamental of Statistics & Statistical Methods (P)	4	**4**	
	Total credits in semester II	**20**	**20**	**20**
Core	**SEMESTER III**			
GI 301	Research Methodology & Research Proposal development	4	**4**	
GI 302	Climate Change, Disaster Management and Environmental Sustainability	4	**4**	
GI 303	Digital Elevation Models & its Applications	4	**4**	
GI 304	Spatial analysis and Geo-spatial data processing using GIS Software's (P)	4	**4**	
GI 305	Term Paper & Seminar Presentation	4	**4**	
	Total credits in semester III	**20**	**20**	**20**
	SEMESTER IV			
Elective	Application of Geoinformatics in Sustainable development (Any two of the following fields/areas)			
GI 401	Urban & Regional Planning	4	**4**	
GI 402	Water Resource Management	4	**4**	
GI 403	Land use planning & development	4	**4**	
GI 404	Disaster Management	4	**4**	
Core	**Core**			
GI 405	Application of Geo-informatics (RS,GIS & GPS) (P)	4	**4**	
GI 406	Project Work	8	**8**	
	Total credits in semester IV	20	**20**	**20**
	TOTAL CREDITS IN ALL SEMESTERS		**80**	**80**

Semester I

Code No: GI: 101	Title: Principles of Remote Sensing		
No. of Credits: 4			No. of Periods: 60
Sr. No.	**Topics**	**Sub-topics**	**Lectures**
1	Introduction to Remote Sensing	Concepts Definition, History Development, Stages in RS-EMR, EMR Spectrum, Theories of EMR, Types of RS and Laws of Radiation	15
2	Interaction of EMR	Interaction with Earth's atmosphere	12
3	Spectral Signature	Interaction with soil, water and vegetation	8
4	Platforms, Sensors, Orbits	Types of platform, types of sensors, cameras and satellite orbits	10
5	Aerial photography & Remote Sensing Data Products	Principles of aerial photography and Satellite Data Generation, formats and Satellite & Aerial Photograph data products	15

Books:

1. Joseph, G. (2004): Fundamentals of Remote Sensing, Universities Press, Hyderabad, India

2. Lillesand, T. M., Kiefer, R. W. and Chipman, J. W. (2008): Remote Sensing and Image Interpretation, John Wiley & Sons, New Delhi

3. Sabins, F. F. (1996): Remote Sensing: Principles and Interpretation, W. H. Freeman and Company, San Francisco

4. Jensen, J. R. (2005): Introductory Digital Image Processing, Prentice Hall, New Jersey

5. Drury, S. A. (2001): Image Interpretation in Geology, Blackwell, Oxford

6. Campbell, J. (2002): Introduction to Remote Sensing, Taylor & Francis, London

7. Anji Reddy, M. (2008): Textbook of Remote Sensing and Geographic Information System, B.S. Publication, Hyderabad

Code No: GI: 102	Title: Introduction to Geographical Information System		
No. of Credits: 4			No. of Periods: 60
Sr. No.	**Topics**	**Sub-topics**	**Lectures**
1	Introduction to GIS	Definitions, evolution, components and Objectives	6
2	Hardware & Software requirements	Hardware: Basic blocks of computer, processor, memory, Secondary storage devices, input/output devices, Binary numbers. Software: Operating System, application, Compliers, editors. Overview of GIS software Packages.	7
3	Spatial data	Types of Geographic data, levels of measurements. Concepts of space and time, layers coverage. Spatial data models, Representation of Geographic features in vector, raster data models. Concept of arc, node, vertices and topology. Object oriented models: advantages and disadvantages. .	12
4	Non-Spatial data	Database and Data base Management System. Conceptual implementation models, Hierarchical, Network, Relational models. RDBMS: components, concept, database Spatial data input - Digitization, error identification. Errors: Types, sources, correction. Editing and topology Building	12 8
6	Concepts of GPS	History, types, navigation systems and Applications	15

Books:

1. Longley, P. A., Goodchild, M. F., Maguire, D. J., Rhind, D. W. (2002): Geographical Information Systems and Science, John Wiley & Sons, Chichester

2. Lo, C. P., Yeung, A. W. (2002): Concepts Techniques of Geographical Information Systems, Prentice-Hall of India, New Delhi

3. Chang, K. T. (2008): Introduction to Geographic Information Systems, Avenue of the Americas, McGraw-Hill, New York

4. Korte, G. B. (2001): The GIS Book, Onward Press, Bangalore

5. Demers, M. N. (2000): Fundamentals of Geographic Information Systems, John Wiley and Sons, New Delhi

6. Burrough, P. A. and McDonnell, R. A. (2000): Principles of Geographical Information Systems, Oxford University Press, New York

7. Heywood, I., Cornelisus, S., Carver, S. (2011): An Introduction to Geographical Information Systems, Pearson Education, New Delhi

8. Ahmed, E. L. Rabbany (2002): Introduction to Global Positioning Systems, Artech House, Boston

Code No: GI: 103	Title: Principles of Cartography and Map Interpretation		
No. of Credits: 4			No. of Periods: 60
Sr. No.	**Topics**	**Sub-topics**	**Lectures**
1	Map scale	Types conversions, vertical exaggeration, enlargement and reduction	5
2	Map projections	Concept, Classification, types and uses	11
3	Representation of statistical data	Choropleth, Isopleths and Dot method. Unimodal, two dimensional and three-dimensional diagrams	15
4	Introduction to Survey of India topographical Maps.	Numbering, scales, grid reference, signs and symbols, colour system	5
5	Relief representation Techniques.	Profiles, Identification and representation of landforms from toposheets of fluvial, coastal, Aeolian and glacial landscapes	12
6	Interpretation of maps.	Study and interpretation: SOI toposheet, cadastral and thematic maps	12

Books:

1. Singh, R. L. (1979): Elements of Practical Geography, Kalyani Publishers, New Delhi

2. Tamaskar, B. G., Deshmukh, V. M. (1974): Geographical Interpretation of Indian Topographical Maps, Orient Longman Ltd., Bombay

3. Croxton, F. E., Cowden, D. J., Klein, S. (1975): Applied General Statistics, Prentice-Hall of India, New Delhi

4. Frank, H. Althoen, S. C. (1994): Statistics Concepts and Applications, Cambridge University Press

5. Robinson, A. H., Morrison, J. L., Muehrcke, P. C., Kimerling, A. J. Guptill, S. C. (1995): Elements of Cartography, Wiley, New York

6. Yeates, M. (1974): An Introduction to Quantitative Analysis in Human Geography, McGraw-Hill, New York

7. Ramamurthy, K. (1982): Map Interpretation, Rex Printers, Madras

8. Vaidyanadhan, R. (1968): Index to a set of sixty Topographic Maps: Illustrating Specified Physiographic Features from India, Council of Scientific and Industrial Research, Ministry of Education, Government of India

9. Gupta, K. K. Tyagi, (1992): Working with maps, Survey of India Publication, DST, New Delhi

10. Understanding Map Projection (2003-2004): GIS by ESRI, Redlands

Code No: GI: 104	Title: Introduction to Computer Programming C and C++		
No. of Credits: 4			No. of Periods: 60
Sr. No.	**Topics**	**Sub-topics**	**Lectures**
1	Computer Fundamentals	Characteristics and limitations, Computer Architecture: Computer block diagram, Flow chart, Operating System, data storages. Networking: LAN, MAN, WAN, various topologies like Ring, Bus, Star, Networking devices like hub, repeaters, switch, bridge, router. Web Concepts: OSI Model, URL, Ports, Firewall, DNS, IP address, proxy, Session, cookies. Client and server architecture: Various protocols like Http, https, FTP, SMTP, POP3. Distributed computing: Introduction to Distributed networking and Cloud computing	10
2	C Language	Introduction to C: History of Programming language, importance of computer languages, Understanding Compiler. Input /Output functions: Console input output, Formatted input output. Data types and operators: types and uses of various operators. Control structures: Various looping mechanism, types of loops. Introduction to Array: Understanding Array, Working with Single multidimensional array. Limitations of array, Structure Unions. Introduction to functions: Need of function, defining, calling function, different types of functions. Understanding of pointer. File handling: Reading and writing the data to File	25
3	C++Language	Introduction to OOP: Importance of OOP Understanding Classes, objects, Methods and Properties. Characteristic of OOP: Abstraction, Inheritance, Polymorphism, Encapsulation. OOP and POP: Difference between OOP and POP Constructors and destructors: Creating classes and objects. Memory allocation of Objects. Heap and stack memory. Managing input /Output File handling: C++ stream classes, formatted I/O Manipulators. Access modifiers: modifying access of Classes, methods using public, private keywords. Functions and Operators: Function overloading and Overriding, Operator precedence, Operator overloading, Friend and virtual function.	25

Books:

1. Kernighan, R. (1998): C Programming Language, (ANSI C Version), Prentice Hall, New Jersey
2. Balagurusamy, E. (2006): Object Oriented Programming with C++, Tata McGraw Hill, New Delhi
3. Balagurusamy, E. (2002): Programming in ANSI C, Tata McGraw Hill, New Delhi
4. Kanetkar, Y. (2000): Let US C++, BPB publications, New Delhi
5. Kanetkar, Y. (2001): Let Us C, BPB Publications, New Delhi
6. P K SINHA, Computer Fundamentals, , BPB Publications, New Delhi

Code No: GI: 105	Title: GIS & GPS (P)		
No. of Credits: 4			No. of Periods: 60
Sr. No.	**Topics**	**Sub-topics**	**Lectures**
1	Computer Basics	Basics of Computer & File Management Text editing, data management& overview of GIS Software's Basics of Computer & File Management	4
2	Spatial data input	Geo-referencing, Digitisation, Spatial and Non-spatial data management Spatial data Manipulation & editing (Transformation, Topology building, editing Projection)	5
3	Spatial analysis	Integration of RS & GIS, Creation of Thematic maps, Choropleth & Dot Methods, Charts Spatial analysis (Buffering, Overlaying, Dissolve Integration of RS & GIS, Creation of Thematic maps, Choropleth & Dot Methods, Charts Spatial analysis (Buffering, Overlaying, Dissolve	4
4	GPS & Field Survey	Introduction to GPS &Identification of features in the field using aerial photographs and/or satellite images	2

Books:

1. Demers, M. N. (2000): Fundamentals of Geographic Information Systems, John Wiley and Sons, New Delhi
2. Burrough, P. A. and McDonnell, R. A. (2000): Principles of Geographical Information Systems, Oxford University Press, New York
3. Makrewski, J. (1999): GIS Multi-criteria Analysis, John Wiley and Sons, New York
4. Chang, K. T. (2008): Introduction to Geographic Information Systems, Avenue of the Americas, McGraw-Hill, New York
5. Longley, P. A., Goodchild, M. F., Maguire, D. J. Rhind, D. W. (2002): Geographical Information Systems and Science, John Wiley & Sons, Chichester
6. Lo, C. P. Yeung, A. W. (2002): Concepts Techniques of Geographical Information Systems, Prentice-Hall of India, New Delhi.

Semester II

Code No: GI: 201	Title: Digital Image Processing		
No. of Credits: 4			No. of Periods: 60
Sr. No.	**Topics**	**Sub-topics**	**Lectures**
1	Introduction to Digitalimage Processing	Digital images: Types Sources of errors: Atmospheric, radiometric Image rectification: Geometric correction,radiometric correction, noise removal	12
2	Image enhancement techniques	Contrast enhancement: Linear, non-linear, logarithmic and exponential, GaussianStretch, density slicing. Spatial filtering: low frequency, high frequency, edge enhancement, band rationing and band combination	12
3	Digitalimage classification	Classification scheme: Supervised classification: Training sitesselection and statistical informationExtraction, Discriminate functions.Classifier: Maximum Likelihood, Euclidiandistance, Mahalanobis distance, Parallelopiped. Unsupervised classification. Classification accuracy assessment and errorMatrix	12
4	Histogram Equalization	Image Subtraction, Image Averaging, Spatial Filtering,Smoothing,Sharpening Filters, Frequency Domain Filters,Homomorphic Filtering, Principal Components	12

Books:

1. Richards, J. A, Jia, X. (1999): Remote Sensing and Digital Image Processing, Springer, Verlag Berlin
2. Cha, B., Dattaa, D., Majumdar (2001): Digital Image Processing Analysis, Prentice-Hall of India, New Delhi
3. Nag, P. Kudrat, M. (1998): Digital Remote Sensing, Concept Publishing Company, New Delhi
4. Jensen, J. R. (2005): Introductory Digital Image Processing, Prentice Hall, New Jersey
5. Lillesand, T. M., Kiefer, R. W. Chipman, J. W.(2008): Remote Sensing and Image Interpretation, John Wiley & Sons, New Delhi
6. Sabins, F. F. (1996): Remote Sensing: Principles an Interpretation, W. H. Freeman Company, New York

Code No: GI: 202	Title: Database Management System		
No. of Credits: 5			No. of Periods: 75
Sr. No.	**Topics**	**Sub-topics**	**Lectures**
1	DBMS	Introduction: DBMS, RDBMS, SQL and Oracle architecture Data base security concept and advantages of RDBMS and ER modelling	8
2	Controlling user access	Control database access, Privileges, creating user, concept of Role, creating, granting privileges to role, Revoking privileges. Changing password	10
3	Managing schema object	Data types, DDL, DML, DCL Constraints: types of constraints, Primary key, foreign key, check constraint, Not Null, Altering constraint, concept of backup Recovery. Overview of Index, view	10
4	Manipulating dataset using SQL statement	Basic select statement, selecting specific column, using arithmetic expressions, defining column alias, Using where clause	10
5	Restricting & Sorting data	Using comparison condition (=,<=,>=etc), using logical operator: AND, OR, NOT, using BETWEEN, LIKE conditions Rule of Precedence. Using order by clause	10
6	SQL Function displaying data from multiple tables, Sub-query	Concept of function, types, group functions, Use of group by, having clause. Types of joins, concept of sub-query, types of sub Queries	9
7	PL/SQL	Introduction to PL/SQL, variables and types Declaration in PL/SQL. Simple program in PL/SQL: Assignment operator, output statement, accepting input From user. Simple program in PL/SQL using table: syntax of using 'select' statement in PL/SQL, 'If' statement and Loops in PL/SQL. Creating procedure, function, cursor, trigger Packages	18

Books:

1. Deshpande, P. S. (2008): SQL & PL/SQL for Oracle 10g, Blackbook, Dreamtech Press, New Delhi
2. Freeman, R. G. (2000): Oracle DBA 7.3 to 8 Upgrade, Dreamtech Press, New Delhi
3. http://docs.oracle.com/cd/B19306_01/server.102/b14220.pdf
4. http://www.smart-soft.co.uk/tutorial.html
5. http://ask2seenu.blogspot.in/2011/09/best-oracle-plsql-ebooks-download-for.html

Code No: GI: 203	Title: Web Technology, GIS Mapping & Programming	
No. of Credits: 4		No. of Periods: 60

Sr. No.	Topics	Sub-topics	Lectures
1	.NET Language	Introduction: .Net architecture. CLR, CLS, CTS, JIT compiler C # .net: Introduction to C# .net. Syntax used in defining classes, methods, variables Interface abstract class: Understanding abstract classes, access modifiers and abstract classes, access modifiers and Interface. Creating and using Custom interfaces, Sample programs Implementing OOP: Introduction to classes used in .net, Implementing OOPs characteristics, Working with windows forms application, console application, building Logic in the sample application. Event handling: handling various events in Windows forms application Exception handling: Usage of Try, catch and Finally block. .Net interoperability: Working with managed and unmanaged code Windows forms application Exception handling: Usage of Try, catch and Finally block. .Net interoperability: Working with managed and unmanaged code	35
2	Arc Object	SDK development environment, basic customizations, deploying and sharing customizations, Maps and layers, workspaces, Geometry operators, graphic elements, Cursors, Geo-processing and Engine SDK	25

1. Evjen, B., Hollis, B., Rockford, L. (2006): Professional VB.NET (2003), Wiley Publishing Inc. USA
2. Holzner, S. (2010): Visual Basics.NET Programming Black Book, Paraglyph Press USA Dreamtech Press
3. http://www.ebooksdownloadfree.com/Miscellaneous/C-Black-Book-BI20346.html
4. http://www.tutorialspoint.com/csharp/csharp_tutorial.pdf
5. www.completecsharptutorial.com
6. http://help.arcgis.com/en/sdk/10.0/arcobjects_net/conceptualhelp/index.html
7. https://www.dur.ac.uk/resources/its/info/guides/93AMLGIS.pdf
8. http://ebookily.org/pdf/arcobject-c
9. Balagurusamy, E. (2011): Programming with JAVA- a Primer, Tata-McGraw Hill Education Pvt. Ltd., New Delhi

Code No: GI: 204	Title: Image Processing & Remote Sensing Practical	
No. of Credits: 5		No. of Practical's: 15
Sr. No.	**Topics**	**Sub-topics**	**Practical's**
1	Familiarization with image processing system	Loading of image data, identification of objects on visual display, study of histograms and layer information	1
2	Image enhancement techniques	Linear and non- linear contrast enhancement, Band rationing, edge enhancement, high and low pass filtering, density slicing	3
3	Image registration	Registration of bases map/ topomap, image to map, image to image	3
4	Image Classification	Classification : Supervised, unsupervised and use of different algorithms	3
5	Accuracy analysis	Producer, user accuracy, overall and mapping accuracy, Kappa Coefficient	2
6	Vector layers	Generation of Vector layer, editing and topology building, area and perimeter Estimation	2
7	Presentation	Map composition	1

(Note: For 5 credits 5 hrs. practical's a week)

Books:

1. ERDAS (2010): ERDAS field Guide, ERDAS incorporation, Norcross, GA, USA
2. http://GIospatial.intergraph.com/Libraries/Tech_Docs/Erdas_Field_Guide.sflb.ashx
3. Gupta, R. P. (2003): Remote Sensing Geology, Springer, Verlag Berlin

Code No: GI: 205	Title: fundamental of statistics &Statistical Methods (P)	
No. of Credits: 4		No. of Periods: 60
Sr. No.	**Topics**	**Sub-topics**	**Lectures**
1	Geographic data	Sources, types, discrete and continuous series, scales of measurements, population, sample and sampling techniques	12
2	Organization of data	Frequency distribution, moments of Distribution, Central tendency & Dispersion	12
3	Matrices	Matrix Algebra: Types and properties of Matrices. Addition, subtraction, multiplication and Inverse	12
4	Correlation and Regression	Correlation: concepts and methods Regression: bi-variate, linear, exponential, Logarithmic, power-law. Multivariate regression and correlation. Principal Component Analysis (PCA)	12
5	Probability	Normal, Binomial and Poison	12

Books:

1. Hammond, R. and McCullough, P. (1991): Quantitative Techniques in Geography, Clarendon Press, Oxford

2. Gregory, S. (1978): Statistical Methods for Geographers, Longman, London

3. Frank, H. and Althorn, S. C. (1994): Statistics: Concepts Applications, Cambridge University Press, Cambridge

4. Ebdon, D. (1977): Statistics in Geography, Basil Blackwell, Oxford

5. RoGIrson, P. A. (2010): Statistical Methods for Geography, SaGI Publications, London

Code No: GI: 301	Title: Research methodology and research proposal development	
No. of Credits: 4		No of Lectures:-60
Sr No.	**Topics**	**Lectures**
1	Concept and Definition of Social Science Research, Salient Features of Students Research, Classification of Research, Basic Norms of Scientific Community Research Process Model: Steps and Interpretation	15
2	Selecting and Justifying a Research Topic Source of suggestions for Topics, Techniques for Generating Research Topics Preliminaries of Research The Issue, Problem Identification or Statement of Problem, Research Rationale, Scope and Limitation, Assumption or Premise, Research Objectives and Hypothesis, Budgeting and Working with a Supervisor, Development of a Research Proposal.	15
3	Coordination Schema (Assembling the components of a research e.g. Objectives, Parameters, Variables and Values), Utility, Format, Fitting, Approach, Steps, Construction Methods of Data Collection, Source (Primary and Secondary), Types, Reconnaissance, observation, survey, interviews (Structure and Unstructured and Scheduled), Group Discussion, Key Informants, Methods for Developing a Structured Questionnaire and Survey	15
4	Literature Review Finding the literature (Types Searching Skills etc), Managing the Literature (Keeping Track, Annotating, Summary and Critical Comment), Using the Literature (Exploring a Topic, Developing a Research Question, Articulating a Rationale and Designing Method), The Formal Literature Review (Purpose, Coverage, The Writing Process, Style and Tone) Planning for the Research Project Need, Network Planning, Resources and Scheduling, Role of Network Planning in Research	15

Books-:

1. Research Methodology: Methods and Techniques**by** C R Kothari
2. Research Design: Qualitative, Quantitative, and Mixed Methods Approaches **by John W. Creswel**

3. **Research Methodology by D K Bhattacharyya**

Code No:302 Climate Change, Disaster management & Environmental Sustainability			
No. of Credits: 4			No of Lectures:-60
Sr no	**Topics**	**Sub-topics**	**Lectures**
1	Climate Change	Climate change and Coastal Erosion, Climate change and its impacts on environment, Global Warming, Greenhouse Gases & Ozone depletion, El-Nino & Southern oscillation (ENSO), La-Nina, Monitoring weather phenomena & Weather forecast.	20
2	Disaster management	Concept and dimension of Disaster Management, Types, Occurrence & characteristics of natural Disasters: Earthquake, Flood, Cyclone, Drought, Volcanic Eruption, Tsunami, Land Slide, Bushfire, Epidemic. The concept of disaster management cycle (Post Disaster review, Prevention, Mitigation, Preparedness, Disaster Impact, Response, Recovery & Development)	20
3	Environmental sustainability	Population & Economic Development, Poverty and Environment, sustainable Development: Concept, Goal & Dimension, Principles Strategies of sustainable living	20

Books-:

1. CLIMATE CHANGE NOW - The Story of Carbon Colonisation by S.S Jeevan,Richard Mahapatra,Down To Earth Publication.

2.**Climate Change: What Everyone Needs to Know(r)by Joseph Romm.**

3. Disaster Management: Future Challenges and OpportunitiesBook by Jagbir Singh

4.**Environmental Sustainability: Role of Green Technologiesby P. Thangavel (Editor), G. Sridevi (Editor)**

Code No:303 Digital Elevation Model & its Applications			
No. of Credits: 4			
Sr no	**Topics**	**Sub-topics**	
1	Concept of DEM	Digital Elevation Model(DEM), Digital Surface Model(DSM)& Digital Terrain Model(DTM) Need for DEM, Structures of DEM- Line Model, TIN, Grid network	
2	Data Sources and Sampling methods	Products derived from DEM Sampling methods: Selective, Purposive, Progressive, Composite sampling	
3	Applications of DEM	Terrain analysis and land evaluation Geological & Geomorphological mapping, Model waterflow for Hydrology, Watershed management, Mapping Purpose & Educational Program.	

Books-:

1. **Digital Elevation Model Technologies and Applications: The Dem Users Manual By Dave F. Maune**
2. **https://coast.noaa.gov/data/docs/geotools/2017/presentations/Maune.pdf**
3. **Digital Terrain Modelling,** Development and Applications in a Policy Support Environment By Peckham**, Robert Joseph,** Jordan**, Gyozo (Eds.)**
4. **https://onlinelibrary.wiley.com/doi/pdf/10.1002/9781118786352.wbieg0768**
5. **http://www.isprs.org/proceedings/XXXVIII/1_4_7-W5/paper/Aktaruzzaman-138.pdf**

Code No: GI: 304	Title: Spatial Analysis		
No. of Credits: 4			No. of Periods: 60
Sr. No.	**Topics**	**Sub-topics**	**Lectures**
1	Introduction to Spatial analysis	Significance of spatial analysis. Overview of tools for analysis	5
2	Spatial analysis – Vector based	Overlay operations: Point-in-polygon, Line-in-polygon, polygon-in-polygon. Single layer operations: Feature identification, extraction, classification manipulation. Multilayer operation: Union, intersection, symmetrical difference, update, merge, append and dissolve	10
3	Spatial analysis – Raster based	Map algebra, grid based operations, local, focal, zonal and global functions, cost surface analysis, optimal path and proximity search	10
4	Network analysis	Concepts, evaluation of network complexity using Alpha-gamma indices. C-matrices for evaluating connectivity of the network. Network data model. Path analysis. Linear referencing and segmentation. Types of network analysis: Optimum cyclic path, vehicle routing, path determination and cost-path analysis. Geocoding	10
5	Point pattern analysis	Methods for evaluating point patterns: clustered and random distribution	5
6	Surface analysis	Interpolation methods: Trend surface analysis, IDW, kriging, measures of arrangement and dispersion, autocorrelation, semi-variogram, DEM, TIN, slope, aspect, hill shade and view shed	10
7	Spatial modelling	Role of spatial model, explanative, predictive and normative models. Correlation-regression analysis in model building. Handling complex spatial query and case studies	10

Books:

6. Demers, M. N. (2000): Fundamentals of Geographic Information Systems, John Wiley and Sons, New Delhi

7. Burrough, P. A. and McDonnell, R. A. (2000): Principles of Geographical Information Systems, Oxford University Press, New York

8. Makrewski, J. (1999): GIS Multi-criteria Analysis, John Wiley and Sons, New York

9. Chang, K. T. (2008): Introduction to Geographic Information Systems, Avenue of the Americas, McGraw-Hill, New York

10. Longley, P. A., Goodchild, M. F., Maguire, D. J. Rhind, D. W. (2002): Geographical Information Systems and Science, John Wiley & Sons, Chichester

11. Lo, C. P. Yeung, A. W. (2002): Concepts Techniques of Geographical Information Systems, Prentice-Hall of India, New Delhi

Term Paper & Seminar Presentation

Semester IV (Any two)

Code No: GI: 401	Title: Urban & Regional Planning		
No. of Credits: 4			No. of Periods: 60
Sr. No.	**Topics**	**Sub-topics**	**Lectures**
1	Urban & Regional Area Analysis	Urbanization & Trends in urbanization, Urban morphology, Theories of Urban morphological growth, Concentric Zone Theory, Sector Theory, Multiple Nuclei Theory, Quantitative & Qualitative application of Town Urban resources, services & facilities analysis.	20
2	Urban issues & Planning	Land use Drainage & Sewerage Transport Slums Urban Poverty	20
3	Geo-Spatial technology for Urban Environmental Planning	Green space Planning Environmental Impact Assessment(EIA) & Ecology Ecosystem Analysis Forest Mapping Wetland Management	20

Books-:

1. **Urban and Regional Planning by Peter Hall &Mark Tewdwr-Jones.**
2. **The Urban and Regional Planning Reader (Routledge Urban Reader Series). By Eugénie Birch**
3. **Planning and Urban Design Standards (Ramsey/Sleeper Architectural Graphic Standards Series)by Frederick R. Steiner& Kent Butler**
4. **Urban Planning: Theory & Practice 1st Edition by M. Pratap Rao**

Code No: GI: 402	Title: WATER RESOURCE MANAGEMENT		
No. of Credits: 4			No. of Periods: 60
Sr. No.	**Topics**	**Sub-topics**	**Lectures**
1	Water Resource Assessment	Morph metric Analysis of Fluvial Landscape Testing, The Laws of Morphmetry (laws of Stream Order, Length,area,Slope,& algometric growth),Drainage Density, Sinuosity index as a measure of stream pattern vs. water volume & Capacity.	20
2	Watershed Analysis & Planning	Concept of River basin,Catchment,Watershed,Watershed Delineation(Flow Direction, Flow Accumulation,Sink,Stream Ordering, Flow Length,Contour,watershed management. Types of watersheds-:Micro & Macro Level Watersheds	20
3	Water Resource Management & Development	Integrated Water Resource Management(IWRM) Role of International Agencies in implementing IWRM IWRM Case Study Water Availability & Demand Coastal Zone Management. Water Quality(Surface & Ground Water) Role of River Basin Organizations(RBO's) in Basin Management	20

Books-:

1. Watershed Management, Kindle Edition By Madan Mohan Das (Prentice Hall of India)
2. Integrated Watershed Management: Principles and Practice by Isobel W Heathcote.

3. Hydrology of Small Watersheds by P V Seethapathi

Code No: GI: 403	Title: Land use Planning & Development		
No. of Credits: 4			No. of Periods: 60
Sr. No.	**Topics**	**Sub-topics**	**Lectures**
1	Land use Planning & Development	Urban & Rural Land use Classification Scheme of Rural & Urban Land use Land use Policies Integration of Land use Planning & Infrastructure.	20
2	Land use Change & Development	Climate Change Through Land use Planning. Social Equity Through Land use Planning. Local Economic Deelopment Through Land use planning.	20
3	Natural Hazards & Land use Planning.	Flood Risk Sensitive & Land use Planning. Earthquake Risk & Land use Planning. Heat wave Risk && Land use Planning.	20

Books-:

1.Land use planning and development regulation law by Julian Conrad Juergensmeyer

2. Land-use planning for sustainable development by Jane Silberstein.

3.Integrated Land Use Planning for Sustainable Agriculture and Rural Development by M. V. Rao, V. Suresh Babu, Suman Chandra, G. Ravindra Chary.

Code No: GI: 404	Title: Disaster Management		
No. of Credits: 4			No. of Periods: 60
Sr. No.	**Topics**	**Sub-topics**	**Lectures**
1	Natural Hazards & Disasters	Concept, types, Occurence & Characteristics of natural disasters:-Earthquake, Flood, Cyclone, Drought & Tsunami. New Disaster Threats: Heat Wave, Lightening & Thunderstorm	20
2	Disaster Management	Concept of Disaster Management Concept of Vulnerability & Risk in the Disaster Management. Major Requirements for Coping with the disaster management. Disaster Policy. Disaster Management Cycle.	20
3	Comprehensive Disaster Management Plan	Components-: Contingency Planning, Natural Plan & Legislation, Warning System, Public Awareness& Community Participation. Role of Government,NGO's,Stakeholders,International agencies in disaster management	20

Books-:

1. Disaster Management by Jagbir Singh .
2. Disaster Management by Harsh K. Gupta.
3. https://www.researchgate.net/publication/277327554_Introduction_to_Disaster_Management

Code No: GI: 405

Applications of GIS & RS Practical

Code No: GI: 406

PROJECT WORK