

TELANGANA UNIVERSITY
DEPARTMENT OF GEOINFORMATICS



M.Sc (GEOINFORMATICS)
PREVIOUS SYLLABUS
SCHEME OF INSTRUCTION AND EXAMINATION
WITH EFFECT FROM 2017-18

**DEPARTMENT OF GEOINFORMATICS
SOUTH CAMPUS, TELANGANA UNIVERSITY
BHIKNOOR, NIZAMABAD**

**M. Sc Geoinformatics Syllabus & Scheme of Instruction and Examinations
WITH EFFECT FROM 2017-18**

SEMESTER I

S.No	Subject Code	Course	Instruction hrs./ week	Theory Marks 70+30	Credits	Duration of Exam in hrs.
1	GI-101T	Geographic Information Systems	4	100	4	3 hrs
2	GI-102T	Earth Systems Sciences	4	100	4	3 hrs
3	GI-103T	Principles of Remote Sensing	4	100	4	3 hrs
4	GI-104T	Cartography and Digital Mapping	4	100	4	3 hrs
5	GI-105P	Techniques of Mapping Analysis and Field Survey	9	100	3	3 hrs
6	GI-106P	Basics of GIS & GPS	9	100	3	3 hrs
		Seminar	2		1	
	Total			600	24	

SEMESTER II

1	GI-201T	Digital Image Processing	4	100	4	3 hrs
2	GI-202T	Photogrammetry	4	100	4	3 hrs
3	GI-203T	Spatial Analysis and Modeling	4	100	4	3 hrs
4	GI-204T	Programming Languages	4	100	4	3 hrs
5	GI-205P	Programming Languages & Open Source GIS	9	100	3	3 hrs
6	GI-206P	Visual and Digital Image Analysis & Aerial Photo Interpretation	9	100	3	3 hrs
		Seminar	2		1	
	Total			600	24	
Total for I& II Semesters				1200	48	

Note: Examination will be at the end of Semester II

SEMESTER - I
GEOGRAPHIC INFORMATION SYSTEM
Theory –I (GI-101T)

UNIT-I

- 1.1. Definition and historical evolution of GIS
- 1.2. Difference between GIS and CAD
- 1.3. Basic concepts of spatial information, thematic characteristics and sources of spatial and non-spatial data
- 1.4. GIS components; hardware and software requirements.

UNIT-II

- 2.1. Spatial data models – raster and vector
- 2.2. Representation of raster data; data structure, data compression - (block code, chain code, run length code quadtree); data files, data conversion.
- 2.3. Vector data representation, data structure, topology and topological models.
- 2.4. Data files, topological and non-topological vector data conversion.
- 2.5. Comparison between raster and vector data; file organization and formats.

UNIT-III

- 3.1. Data input – method of data capture, techniques and procedures for digitizing (scanners, digitizers – manual and automated.
- 3.2. Digital data base creation – point, line and polygon features, vector data editing, correcting topological errors, edge matching.
- 3.3. Rectification of digital maps, data editing – removal of errors – overshoot and undershoot, snapping
- 3.4. Data collection and integration, non-spatial data attachment; working with tables and geo-processing wizard.
- 3.5. Spatial data accuracy and sources of errors; difference between accuracy and precision; RMS error.

UNIT-IV

- 4.1. Advantages of DBMS in GIS context
- 4.2. RDBMS concepts and components
- 4.3. Basic concept of geodatabase
- 4.4. Linkage of spatial and non-spatial data.
- 4.5. Spatial data Analysis – Raster Data analysis tools – local, focal, global and regional; vector data analysis (topological and non-topological) – Analyzing geographic relationship; overlay analysis, distance measurement, buffering, interpolation (DEM generation)
- 4.6. Vector and raster data query – logical expressions, types of operations; difference between 2D, 2.5D, 3D and 4D GIS; Geographic visualization and map comparison; integration of RS and GIS; current issues in GIS; current issues and trends in GIS.

References:

1. Goodchild M.F. and Kemp K. – Developing a curriculum in GIS : The NCGIA Core curriculum project, University of California, Santa, Barbara 1990.
2. Ian Haywood Cornelius and Steve Carver – An introduction to GIS, Longman, New York, 2000.
3. Misra H.C. – A Handbook on GIS, GIS India, Hyderabad,1995.
4. Smith T.R. and Piquet, GIS, London Press, London, 1985.
5. Taylor DRF – GIS: The Microcomputer and Modern Cartography, Pergamon Press, Oxford, 1991.
6. Heywood I, et al, An Introduction to Geographical Information System, Longman, New Delhi, 1998.
7. Lo CP & Young AKW, Concepts & Techniques of Geographical Information System, Prentice Hall of India, New Delhi- 2003.
8. Kang tsung Chang (2007) : Introduction to Geographical Information Systems. Tata Mc Graw Hills, New Delhi
9. Maguire, DJ, Good Child MF, Rhind DM (2005 : Geographical Information Systems : Principles and Applications (Vol. 1). Longman Group, London.

SEMESTER - I
EARTH SYSTEM SCIENCES
Theory –II (GI-102T)

Unit-1

- 1.1. Concept of Earth System – lithosphere, biosphere, hydrosphere and atmosphere
- 1.2. Fundamental concepts in geomorphology and branches.
- 1.3. Interior of earth, evidence from temperature, pressure, density and earthquake waves
- 1.4. Tectonic Geomorphology - Principles, Geomorphic Markers, Rates of Uplift and Erosion, Isostatic Relations
- 1.5. Linkages between Climate Change and Tectonics; Idea of Snowball Earth

Unit-II

- 2.1. Convection current theory of Holmes, Isostasy, Wegners' theory of Continental Drift;
- 2.2. Distribution of oceans and continents;
- 2.3. Palaeomagnetism, seafloor spreading, plate tectonics;
- 2.4. Geochronology - Basic Concepts, Methods of Dating Landscapes

Unit-III

- 3.1 Diastrophism, folds and faults and their types; joints and lineaments; rock types
- 3.2 Geomorphic processes- weathering, mass movement, theories of cycle of erosion; transportation.
- 3.3 Slope morphology and models of slope development – King, Wood and Young.
- 3.4 Systems Approach in Geomorphology Feedback Mechanisms, Ideas of Equilibrium, Threshold, Ergodicity and Hysteresis

Unit-IV

- 4.1 Evolution of landforms; fluvial processes and landforms; Aeolian processes and landforms; coastal processes and landforms; karst processes glacial processes and landforms; ice ages.
- 4.2 Principles and Purpose; Anthropogenic Geomorphology - Humans as Geomorphic Agents
- 4.3 Quantitative Geomorphology: Methods and Applications; Applications of Remote Sensing and GIS techniques in Geomorphology
- 4.4 Anthropogenic Impacts on the riparian environment, Principles of River Restoration
- 4.5 Urban Geomorphology - landscape modification and impact on geomorphic processes

REFERENCES

1. Aleshire, A. (2007): *The Extreme Earth: Ocean Ridges and Trenches*, Infobase Publishing, New York
2. Anderson, R.S. and Anderson, S.P. (2010): *Geomorphology: The Mechanics and Chemistry of Landscapes*, Cambridge University Press, Cambridge
3. Bloom, A.L. (2002): *Geomorphology: A Systematic Analysis of Late Cenozoic Landforms*, Prentice Hall, Upper Saddle River, New Jersey
4. Chorley, R.J. and Kennedy, B.A. (1971): *Physical Geography: A Systems Approach*, Prentice Hall, Upper Saddle River, New Jersey
5. Condie, K.C. (2003): *Plate Tectonics and Crustal Evolution*, Butterworth-Heinemann, Oxford, Burlington
6. Cooke, R.U. and Doornkamp, J.C. (1974): *Geomorphology in Environment Management*, Clarendon Press, London
7. Faniran, A. and Jeje, L.K. (1983): *Humid Tropical Geomorphology*, Longman, London
8. Firsich, W., Meschede, M. and Blakey, R. (2011): *Plate Tectonics, Continental Drift and Mountain Building*, Springer-Verlag, Berlin
9. Goudie, A.S. (1990): *Geomorphological Techniques*, Unwin Hyman, London
10. Goudie, A.S. (ed.) (2004): *Encyclopaedia of Geomorphology*, Routledge, London
11. Goudie, A.S. and Viles, H. (2010): *Landscapes and Geomorphology: A Very Short Introduction*, Oxford University Press, Oxford
12. Gutierrez, M. (2013): *Geomorphology*, CRC Press, Boca Ranton, Florida
13. Hamblin, W.K. and Christiansen, E. (2003): *Earth's Dynamic Systems*, Prentice Hall, Upper Saddle River, New Jersey
14. Hart, M.G. (1986): *Geomorphology: Pure and Applied*, George Allen and Unwin, London
15. Huggett, R.J. (2011): *Fundamentals of Geomorphology*, Routledge, New York
16. Keary, P. and Vine, M. (1997): *Global Tectonics*, Blackwell Scientific Publications, Oxford
17. Leopold, L. B., Wolman, M. G. and Miller, J. P. (1964): *Fluvial Processes in Geomorphology*, W.H. Freeman, San Francisco
18. Ollier, C.D. (1981): *Tectonics and Landforms*, Longman Group Ltd., London
19. Richards, K. (1982): *Rivers: Form and processes in alluvial channels*, Methuen, London
20. Schumm, S.A. (1977): *Fluvial Systems*, Wiley, New York
21. Selby, M.J. (1985): *Earth's Changing Surface: An Introduction to Geomorphology*, Clarendon Press, Oxford
22. Small, R.J. (1978): *The Study of Landforms: A Textbook of Geomorphology*, Cambridge University Press, Cambridge
23. Sparks, B.W. (1972): *Geomorphology*, Longman, London
24. Summerfield, M.A. (1991): *Global Geomorphology: An Introduction to the Study of Landforms*, Longman, London
25. Summerfield, M.A. (ed.) (2000): *Geomorphology and Global Tectonics*, Wiley, Chichester
26. Thomas, M.F. (1994): *Geomorphology in the Tropics: A study of weathering and denudation in low latitudes*, John Wiley & Sons, Chichester
27. Thorn, C. (1988): *Introduction to Theoretical Geomorphology*, Unwin Hyman, Boston
28. Thornbury, W. D. (1960): *Principles of Geomorphology*, John Wiley & Sons, New York
29. Young, A. (1972): *Slopes*, Oliver and Boyd, Edinburgh

SEMESTER - I
PRINCIPLES OF REMOTE SENSING
Theory –III (GI-103T)

UNIT-I

- 1.1 Principles of remote sensing – chronological development, advantages and limitations, concepts.
- 1.2 Electromagnetic radiation (EMR), energy interaction in the atmosphere and earth surface, wavelength regions and their applications, atmospheric windows.
- 1.3 Spectral response of different regions of EMR
- 1.4 Resolutions - Spectral, Spatial, Radiometric and Temporal
- 1.5 Sensors, scanners and detectors – photographic cameras, filter and films, platform, types of platform and its characteristics; sensor classification – Active and Passive, optical mechanical scanners and push broom scanners.

UNIT-II

- 2.1. Satellite Programs – weather and Communication Satellites – satellite programs of the world with special reference to Indian Space Program; introduction to commonly used multi-spectral remote sensing satellite systems – IRS series of satellites (up to the current launches), Landsat, SPOT, IKONOS, Quick bird, MODIS, PLANETLAB, RADARSAT, ERS etc.
- 2.2. Weather and communication satellites introduction – NOAA, TERRA, MOS, INSAT, GOES etc.
- 2.3. Introduction to Thermal Infrared – radiation properties, kinetic heat, temperature, radiant energy and flux, methods of transferring heat.
- 2.4. Ground Truth Instruments

UNIT-III

- 3.1. Thermal properties of terrain, thermal capacity, thermal conductivity, thermal inertia, thermal infrared multi-spectral scanners, thermal infrared (TIR) examples.
- 3.2. Basics of Hyper-spectral remote sensing
- 3.3. Microwave remote sensing principles, passive and active sensors, Synthetic Aperture Radar (SAR), Side-Looking Radar (SLAR), Scatterometer

UNIT-IV

- 4.1. Basic concepts of digital photogrammetry
- 4.2. Generation of digital photogrammetric images,
- 4.3. Interior and exterior orientation
- 4.4. Digital Elevation Models – DEM, DTM and DSM and ortho images.

References:

1. Jensen, J.R., (2006) “Remote Sensing of the Environment – An Earth Resources Perspective”, Pearson Education, Inc. (Singapore) Pte. Ltd., Indian edition, Delhi.
2. George Joseph, (2004) “Fundamentals of remote sensing”, Universities press (India) Pte Ltd., Hyderabad.
3. Sabins, F.F. Jr., (2007) Edition. ‘Remote Sensing – Principles and Interpretation”, W.H. Freeman & Co.
4. Reeves, Robert G. (1991), “Manual of Remote Sensing, Vol. I, American Society of Photogrammetry and Remote Sensing, Falls Church, Virginia, USA
5. Lilliesand, Thomas M. and Kiefer, Ralph, W., (2007) “Remote Sensing and Image

SEMESTER - I
Cartography and Digital Mapping
Theory –IV (GI-104T)

UNIT-I

- 1.1 Introduction to Cartography – nature, scope and its role.
- 1.2 Basic characteristics of map, study of different types of maps and scale
- 1.3 Survey of India National Series Maps and its interpretation
- 1.4 Introduction to geomatics, reference and coordinate systems.

UNIT-II

- 2.1. Basic assumptions and use of projections, classification and selection of projection.
- 2.2. Importance of Map Projections – Conical, Cylindrical, Zenithal, Mercator, Polyconic, Lambert, Orthomorphic, UTM Grid and their comparison
- 2.3. Map projection transformation, analysis and visualization of distortion.

UNIT-III

- 3.1. Generalization elements, control and classification (semantic and geometric)
- 3.2. Symbolization for different features, attributes, pattern, cartographic methods and mapping techniques – dot, Choropleth, isopleth mapping.
- 3.3. Map compilation and methods of printing.
- 3.4. Cartography as graphic means of communication; components and control of map design, graphic symbology and visual variables.

UNIT-IV

- 4.1. Multi-variate, interactive cartography and 3D visualization
- 4.2. Analog to digital conversion of data
- 4.3. Elements of digital cartography, relation between digital cartography and GIS
- 4.4. Conventional mapping vs. digital mapping.

References:

1. Robinson A.H. et al (1995) : Elements of Cartography. John Wiley & Sons, New York.
2. Keates, JS. (2008 : Cartographic Design and Production. Longman, London
3. Ramesh, P.A., (2000) : Fundamentals of Cartography. Concept pub. Co., New Delhi.
4. Singh, RL and Dutt, PK (2008) : Elements of Practical Geography. Students Friends, Allahabad.
5. Peterson, M.P. (1995) : Interactive Animated Cartography. Prentice Hall, Upper Saddle River, NJ.
6. Anson, RW and Ormeling, FJ (2008) : Basic Cartography, Vol. 1 (2nd ed). Elsevier Applied Science Pub. London.
7. Monk House F.J. & Wilkinson (1967) : Maps & Diagrams. Methuen & Co., London.
8. Raisz, Erwin (1962) : Principles of Cartography. Mc Graw Hill pub., NY
9. Campbell, John : Introductory Cartography, Prentice Hall, Englewood Cliff, New York,

SEMESTER - I
Techniques of Mapping Analysis and Field Survey
Practical – I (GI-105P)

1. An introduction to Cartographic Applications
2. Map Scale, Projection systems (Cylindrical, Conical & Zenithal projection)
3. Data representation through maps: Choropleth , Isopleth , Choro-chromatic and Choro-schematic map
4. Drawing and Interpretation of the following Thematic Maps.
 - (i) Population Distribution by Uniform & Multiple Dots.
 - (ii) Distribution of Urban Population spheres & proportional circles.
 - (iii) Climograph, Hythergraph, Ergograph.
5. Symbolization - Point, Line, Area
6. Preparing block, flow and Pie Diagrams for the datasets
7. Importance of Field Survey – Principles & Application of Survey instruments.
8. Chain & Tape Survey – Triangulation method.
9. Plane Table Survey, Plan Preparation, Resection
10. Prismatic Compass Survey – Open & Closed Traverse; Elimination of error – Bowdich method.

References:

1. Monkhouse , F.J.1967 – Maps and Diagrams , Methuen and Co., London.
2. Robinson , A.H. –1982 Elements of Cartography, John Willey and Sons , New York .
3. Sing R.L. – Elements of Practical Geography , Kalyani Publishers , New Delhi , 1994.
4. Meena-Ja Kraak & Ferjan Ormeling (2013) – Cartography visualization of |Geospatial data, 4th edition, pearson Educational Pvt. Ltd – New delhi
5. Lewis , Peter – Maps and Statistics , Methuen and Co., Ltd., London , 1977.
6. Dickinson , G.C. – Maps and Air Photos , Edward Arnold Ltd., London , 1969.
7. Cuff , D.J. and Mattson , M.J. – Thematic Maps : Their Design and Production , Methuen , New York 1982.
8. Misra R. P. and Ramesh A – Fundamentals of Cartography – Concept Publishing Company, New Delhi , 1989.
9. Misra R. P. and Ramesh A – 2nd edition 2014 Fundamentals of Cartography, prasaranga, University of Mysore.
10. Mark Monmonier (2015) The history of cartography volume 6, University of Chicago press.

Web Resources:

11. <http://www.loc.gov/rr/geogmap/refweb.html>
12. <http://www.lib.uiowa.edu/maps/cartographic/html>
13. <http://www.earthsensing.com/cart/resources/carthelp.html>.

SEMESTER - I
Basics of GIS AND GPS
Practical – II (GI-106P)

1. Brief history of Computer and Computing.
2. Fundamentals of Computers, Components of Computers; Input unit, memory unit, Central processing unit & Output unit.
3. Computer Software Operating Systems & Commands.
4. Scanning and Digitization of Maps
5. Georeferencing & Editing of layers
6. Creating Attribute Data and Editing
7. Creation of Maps – Choropleth & Dot Maps.
8. GPS Satellites, Fundamentals of GPS, Space, ground and control Segments.
9. Identification of Location & Altitude with G.P.S.
10. Position fixing and route navigation using hand held GPS.
11. GPS for GIS and Mapping.

References:

1. Taylor D.R.F, GIS: The Micro Computer and Modern Cartography, Pergamon Press, Oxford
2. Lo C.P., and Yeung A.W., - Concepts and Techniques of Geographical Information Systems, Prentice Hall of India Pvt. Ltc., 2002.
3. Heywood I., Cornelius S., Carrer S., An Introduction to Geographical Information Systems, Pearson Education Pvt. Ltd., 2002.
4. Kang-Stung-Chang, Introduction to Geographical Information Systems, Tata McGraw Hill Publishing Co., 2002.
5. Agarwal, A.K., Fundamentals of Global Positioning System.
6. Hofmann W., GPS Theory and Practice, H.Lichtenegger & J.Collins, Springer-wien, New York

SEMESTER-II
Digital Image Processing
Theory – I (GI-201T)

UNIT-I

- 1.1 concepts about digital image and its characteristics; Resolution
- 1.2 Visuals vs digital methods, image data storage and retrieval.
- 1.3 System design considerations
- 1.4 Sources of Image Degradation –Image Restoration and noise abatement, radiometric and geometric correction technique.
- 1.5 Information methods- linear and non-linear transformation for geometric corrections.

UNIT-II

- 2.1 Lookup tables (LUT) and types of image displays and FCC.
- 2.2 Radiometric Enhancement Techniques, Spatial Enhancement Techniques.
- 2.3 Contrast stretching – Linear and non-linear methods
- 2.4 Low pass filtering –image smoothing; High Pass Filtering- edge enhancement and edge detection.
- 2.5 Multiband Enhancement Techniques – Band ratio and type of vegetation indices; Principal Component Analysis.

UNIT-III

- 3.1 Concept of Pattern Recognition, Multispectral Pattern Recognition.
- 3.2 Spectral Discrimination, Signature Bank, Parametric and Non- Parametric Classifiers.
- 3.3 Unsupervised classification methods.
- 3.4 Supervisor Classification Techniques, Limitation of Standard Classifiers.
- 3.5 Post Classification Smoothing, Classification Accuracy Assessment Error matrix.

UNIT-IV

- 4.1 image fusion techniques- multi-date, multi-linear, multi resolution
- 4.2 Multi-date data analysis and change detection.
- 4.3 Methods of change detection, advantage and limitation of each method.

References:

1. Sabins, F F (2007) Remote Sensing Principles and interpretation H. freeman &c NY.
2. Jensen, JR. (2006) Remote sensing of the environment An Earth Resources Perspective, Prentice Hall inc. NY.
3. Curren p (1985) Principles of Remote Sensing. Longman London.
4. Campbell, James B(2006) Introduction Remote SENSING Principles & Concepts, Roulledge.
5. Cracknell, AP & Hayes , LLB (2007) – Introduction to remote Sensing . Taylor & Francis, London.

SEMESTER-II
Theory- PHOTOGRAMMETRY
Theory – II (GI-202T)

UNIT-I

- 1.1 Historical development of Aerial Photography; Definition and terms, concepts, Principles and types of photogrammetry; types of aerial photographs.
- 1.2 Aerial cameras, Analog & Digital geometry and scale orientation and measurements, Distortions, displacements and their corrections, photographic bands, principles of Photography.
- 1.2 Planimetric Information from aerial photographs - Overlapping of vertical photographs, determination of scale and flying height.

UNIT-II

- 2.1 Stereoscopy and Parallax, Stereoscopic viewing, Stereoscopes, Orientation for viewing, Vertical exaggeration, Floating mark. Triangulation, Ortho-photos & Aerial mosaics
- 2.2 Photo mosaics – no of photos and film roll – exposure time and interval – drift analysis- seasons and weather conditions ; Mosaics , ground control points – mosaic types and characteristics.

UNIT-III

- 3.1 Photogrammetric Project Planning - Flight Planning, Photographic scale, Relief displacement, Tilt, Crab and drift, flying height, base-height ratio, flight line spacing Ground coverage.
- 3.2 Stereoscopic plotting procedures and instruments – direct optical projecting plotters projection system , viewing system, measuring & tracing system , orientation of photography, stereo plotting with mechanical or optical mechanical projection.
- 3.3 photographic instrument using Zeus parallelogram , instrument with optical – mechanical projection, automated stereo plotting, analytical plotting.

UNIT-IV

- 4.1 Orthophotography, meaning need procedure, characteristics, uses and problems.
- 4.2 Principles of aerial photo interpretation; 3D visualization in digital environment, anaglyph, polarization, digital image matching, line interleaved, quad buffer; Interior, relative, absolute and exterior orientation parameters and process.
- 4.3 Database attachments, interactive editing, and layer concepts. Advantages of digital photogrammetry.

References:

1. David P.Paine – Aerial Photography & Image Interpretation for Resource Management, John Wiley & Sons, New York, 1981.
2. Dickinson G.G. Maps and Aerial Photographs, Edward Arnold Ltd., London, 1969.
3. Wolf P.R. Elements of Photogrammetry, McGraw Hill, New York, 1983.
4. Solma C.C. Manual of Photogrammetry, American Society of Photogrammetry, Virginia, 1980.
5. Kracs, K (2007): photography : geometry from images and laser scan, walter de Groyter, Germany.
6. Michail M. Bethel S, Mc Glone C, (2001): INTRODUCTION TO Modern Photogrammetry, John Wiley & Sons . Inc. NY
7. Moffit H.F & Edward, MM (1980) : PHOTOGRAMMETRY Harper & Row Publishers NY.
8. Burside, C.D ., (1985): MAPPING FROM AERIAL PHOTOGRAPHY COLLING pvs.
9. Kasser M. Egels ;(2002) Digital Photogrammetry Taylor & Francis , London.

SEMESTER - II
Spatial Analysis and Modelling
Theory III – (GI-203T)

UNIT – I

- 1.1. Spatial data definition, analysis, processes and steps; software and tools for performing Spatial Data Analysis;
- 1.2. Raster-based and vector-based GIS modeling; Binary Models, Regression Models, Process models; basics of geodatabase model, role of database in GIS, creating editing and managing geodatabases.
- 1.3. Classification scheme of vector based and raster based GIS operations
- 1.4. Raster based techniques – methods of re-classification, overlay analysis, slope and aspects, buffering, cost-distance calculation; vector based techniques – map manipulation, buffering, overlay analysis, network analysis.
- 1.5. Digital terrain Analysis and modeling – TIN and DEM, Surface Representation and analysis.

UNIT – II

- 2.1. Spatial interpolation – introduction, control points
- 2.2. Global methods – Trend Surface Analysis, Regression Models
- 2.3. Local Methods – Thiessen Polygons, Density Estimation, Inverse Distance Weighted Interpolation
- 2.4. Kriging – Ordinary Kriging (Semi-variance, Semi-variogram), Universal Kriging

UNIT – III

- 3.1 Introduction to Decision Support System (DSS); GIS and DSS, Introduction to decision making process and DSS, Introduction of a framework for planning and decision making, Spatial Decision Making
- 3.2 Development of DSS, DSS architecture
- 3.3 Database management system, Model Based Management System
- 3.4 Graphical and tabular report generator, user interface, data visualization, decision tables

UNIT – IV

- 4.1 Analysis and Decision Making – Principles and components of Multiple Criteria Decision Making (MCDM); evaluation and techniques of MCDM;
- 4.2 MCDM in spatial data analysis
- 4.3 Basic principles of Analytical Hierarchy Process (AHP);
- 4.4 Effect table; pair-wise comparison and standardization; weightage performance score and methods.

References:

- 1 Bonczek, R.H., C.W. Holsapple, and A.B. Whinston, (1981), Foundations of Decision Support Systems, Academic Press, New York. Basic text on DSS
- 2 Geoffrion, A.M., (1983). "Can OR/MS evolve fast enough? Interfaces 13:10. Source for six essential characteristics of DSS
- 3 House, W.C. (ed.), (1983). Decision Support Systems, Petrocelli, New York. Basic DSS text
- 4 Sprague, R.H., (1997). "A framework for the development of decision support systems, "Management Information Sciences Quarterly 4:1-26. Source for DSS development model
- 5 Sprague, R.H., and Carlson, E.D., (1982). Building Effective Decision Support Systems, Prentice-Hall, Englewood Cliffs NJ. Basic DSS text
- 6 Burrough, Peter A. and Rachael McDonnell., (1998), Principles of Geographical Information Systems. Oxford University Press, New York
- 7 Laurini, Robert and Derek Thompson. , (1992), Fundamentals of Spatial Information Systems. Academic Pr., London
- 8 Kluwer Fotheringham A S, O'Kelly M E., (1998), Spatial Interaction Models: Formulations and Applications.
- 9 Paul Longley, Michael Goodchild, David Maguire and David Rhind:, (2005), Geographical Information Systems. Principles, Techniques, Applications and Management. John Wiley & Sons.

SEMESTER - II
PROGRAMMING LANGUAGES
Theory – IV (GI-204T)

UNIT-I

- 1.1. Introduction to Principles of programming, Art of language design, Programming language spectrum.
- 1.2. Compilation and interpretation – Lexical and Syntax analysis
- 1.3. Semantic analysis and Intermediate code generation, Target code generation, code improvement. Programming Language Syntax: Specifying Syntax, Scanning, Parsing.
- 1.4. Basics of C-Language; constants; operators, expressions, statements; Variand branching; decision making and looping.

UNIT-II

- 2.1. C with user defined data structures-Arrays – 1D and 2D Arrays; Functions, passing parameters to functions, recursive functions;
- 2.2. Strings and Pointers – Strings and string handling; Pointers-use and benefit of pointers
- 2.3. Structures-user defined data structures-enumerators, Unions and structure, Files concept, Graph concept (Plotting concepts). {Enumerated Data Types}; file handling- sequential and random files;

UNIT-III

- 3.1 Visual Basic-Data Base connectivity concept; (connecting the front end tool with backend).
- 3.2 VB- Writing Procedures for retrieval of data.
- 3.3 Visual Basic: Data types, Graphic User Interface concept-Designing of Screens.
- 3.4 Applications development using visual basic

UNIT-IV

- 4.1 Object Oriented Concept with C++ , Functions, Function Overloading; Classes, Constructors and Destructors;
- 4.2 Programming skills in C++- Inheritance and its types; Advance Feature of Classes; Templates;
- 4.3 Arc Macro Languages (A.M.L.) in Arc Info, Avenue (in Arc View)

References:

1. Yashwanth Kanithkar "Let Us C". BPB Publications
2. Balaguru Swamy, E (2009) : Programming in ANSI C. Tata Mc Graw Hills, Delhi
3. Kochan : C Programming
4. Complete reference using C- C.C.R.
5. Bob Reselmanu and Richard Peasley : Practical V.B.6.
6. Noel Jeske : The complete reference VB 6.

SEMESTER - II
Programming Languages & Open Source GIS
Practical – I (GI-205P)

1. C program that evaluates an algebraic expression after reading necessary values from the user
2. C program that prints the given 3 integers in ascending order using IF-ELSE
3. C program Using WHILE statement to find the sum of $1 + 2 + 3 + 4 + \dots + n$
4. C program using FOR statement to find the following from a given set of 20 integers
5. C procedures to add, subtract, multiply and divide two complex numbers $(x + y)$ and $(a + ib)$. Also write the main program that uses these procedures.
6. Creating a class with private and public variables and declare constructors with and without parameters to the class.
7. C++ program that declares two classes as friends to each other and uses data from the friend class.
8. Using controls to build a form
9. Working with Variables and Functions in VBA
10. Familiarization with Q GIS Software
11. Geo-referencing, Creating Vector Data Model
12. Digitizing – Point, Line and Polygon features
13. Map Layout and Exporting Map in Different Format
14. Preparation of Cartographic Maps – Choropleth, Bar, Pie and Stacked
15. Buffer Analysis, Overlay Analysis
16. Query Building and Executing to analysis the data using Open source GIS Softwares.

Reference Books:

1. “Let us C” by Yashwanth Kanithkar
2. ESRI Publications
3. C Programming by Balaguru Swamy
4. C Programming by Kochan
5. **C.P.Lo and AlbertK. W. Yeung**, Concepts and Techniques of Geographic Information System, 2002 Prentice –Hall, India.
6. **George Joseph**, Fundamentals of Remote Sensing, 2004, Universities Press Pvt. Ltd., Hyderabad.
7. **Mohini Bherwani,(2012)**,Metadata in context to opean source softwares,Published by Dattsons.
8. **Sam Ockman,Chris DiBona & Mark Stone** ,7th edition (2013), Opean Source: Vocises from the Open Source Revolution, Published by O'Reilly Media.

Web resources:

1. www.gisgeography.com › Software
2. <https://grass.osgeo.org/>
3. www.qgis.org/
4. <https://www.gislounge.com/open-source-gis-applications/>
5. www.bhuvan.nrsc.gov.in/

SEMESTER - II

Visual & Digital Image Analysis and Aerial Photo Interpretation & GPS Application Practical – II (GI-206P)

1. Basic concepts of visual & Digital Images and analysis
2. Satellite Imageries of various Scales/Bands.
3. Identification of ground truth Locations on Satellite Imagery.
4. Identification of Land Cover changes – with the help of Multi-Date Imagery.
5. Accuracy Estimation of Thematic Details from Satellite Imagery.
6. Introduction to Image Processing – G.I.S. Techniques.
7. Image Rectification: Geometric and Radiometric Corrections.
8. Image Enhancement – Contrast & Band Ratioing.
9. Unsupervised Classification and Supervised Classification.
10. Land use Applications.
11. Viewing Photographs Stereoscopically.
12. Stereoscopic Depth perception.
13. Photographic flight line access for parallax measurement.
14. Principle of floating Mark.
15. Stereoscopic Method of Parallax Measurement.
16. Mapping with stereoscope and parallax bar.
17. Digital Aerial Photo Interpretation.
18. Basic of GPS & DGPS
19. Familiarization with GPS instruments software and other recent trends.
20. Area measurement (Track & route), Length measurements (routes)
21. GPS survey of natural & culture features.
22. Post processing of the GPS data.
23. GPS and GIS data integration & output preparation.
24. GPS application in different fields.
25. G.P.S. use in Static mode for Generic Mapping.
26. Limitations of G.P.S. Survey.

References:

1. Curran Paul J. Principles of Remote sensing, Longman Publications.
2. Remote Sensing & Image Interpretation, John Wiley & Sons.
3. Green W.B, Digital Image Processing, Von Nasr & Reinhold Co.
4. Castle man J.M. Digital Image Processing, Engel wood Cliff.
5. Mather Paul M. Computer Processing of Remotely sensed Images: An Introduction, John Wiley, New York, 1987.
6. Shapiro L.G. & Rosenfeld (Eds) Computer Vision & Image Processing, Academic Press, New York, 1992.
7. Tou J.T. & Gonzalez R.C. Pattern Recognition Principles, Addison, Wiley, 1974.
8. David P.Paine – Aerial Photography & Image Interpretation for Resource Management, John Wiley & Sons, New York, 1981.
9. Dickinson G.G. Maps and Aerial Photographs, Edward Arnold Ltd., London, 1969.
10. Wolf P.R. Elements of Photogrammetry, McGraw Hill, New York, 1983.
11. Solma C.C. Manual of Photogrammetry, American Society of Photogrammetry, Virginia, 1980.
12. Leica Photogrammetry Suite – Orthobase and orthobase Pro User Guide, Leica Geosystems, GIS and Mapping, Atlanta, USA, 2003

13. GPS satellite Surveying, John Wiley & Sons, USA, New York
14. GPS positioning Guide :A user guide to the Global Positioning System. Natural Resources, Canada, URC :<http://www.geod.nrcan.gc.ca>.
15. Aggarwal, N.K. Essentials of GPS, Spatial Network Pvt. Ltd 2002
16. Trimble GPS tutorials
17. Rampal K.K (1993): Mapping and Compilation, Concept Publishing co., New Delhi

TELANGANA UNIVERSITY
DEPARTMENT OF GEOINFORMATICS



M.Sc (GEOINFORMATICS)
FINAL YEAR SYLLABUS
SCHEME OF INSTRUCTION AND EXAMINATION
WITH EFFECT FROM 2018-19

**DEPARTMENT OF GEOINFORMATICS
SOUTH CAMPUS, TELANGANA UNIVERSITY
BHIKNOOR, NIZAMABAD**

M. Sc Geoinformatics Syllabus & Scheme of Instruction and Examinations

SEMESTER III

S.No	Subject Code	Course	Instruction hrs./ week	Theory Marks 70+30	Credits	Duration of Exam in hrs.
1	GI-301T	Climatology & Oceanography	4	100	4	3 hrs
2	GI-302T	Geo Informatics In Disaster Management Studies	4	100	4	3 hrs
3	GI-303T	Web mapping and web GIS.	4	100	4	3 hrs
4	GI-304T	Research Methodology and Spatial Analysis	4	100	4	3 hrs
5	GI-305P	Web GIS and Mobile GIS	9	100	3	3 hrs
6	GI-306P	Terrain Analysis	9	100	3	3 hrs
		Seminar	2		1	
Total				600	23	

SEMESTER IV

1	GI-401T	Principles and Applications of GPS and GNSS	4	100	4	3 hrs
2	GI-402T	Perspective in Spatial Studies	4	100	4	3 hrs
3	GI-403T	Trends in Urbanization	4	100	4	3 hrs
4	GI-404T	Geoinformatics in Societal Development	4	100	4	3 hrs
5	GI-405P	Statistical techniques in population and urban geography	9	100	3	3 hrs
6	GI-406P	Project Work	9	100	3	3 hrs
		Seminar	2		1	
	Total			600	23	
Total for III& IV Semesters				1200	46	

SEMESTER – III
Climatology and Oceanography

Theory –I (GI-301T)

UNIT -1

1. Climatology - Atmospheric Composition and Structure – Variation with Altitude, Latitude and Season. Insolation and Temperature – Factors and Distribution, Heat Budget, Temperature Inversion.
2. Atmospheric Pressure and Winds – Planetary Winds, Forces affecting Winds, General Circulation, Jet Streams. Atmospheric Moisture – Evaporation, Humidity, Condensation, Fog and Clouds, Precipitation Types, Stability and Instability.

UNIT -II

- 3 Atmospheric disturbances: Cyclones – Tropical and temperate cyclones - Anticyclones-and their associated weather conditions. Thunderstorms, Jet streams, Monsoons- mechanism of monsoon formation. Ocean- atmospheric interaction- El Nino, Southern oscillation and La Nina.
4. Climatic classification of Koeppen, Thornthwaite and Trewartha- A critical appraisal of each classification. Major climatic types of Koeppen’s classification.- a) B-Dry climate-BS Steppe, b) C-Humid Sub tropical- Cf China type c) E-Polar d) H-Mountain

UNIT -III

5. Climatic changes in the past and present-Theories –Evidences- Possible causes –ozone depletion -Global warming and its impacts
6. Developments in modern climatology: Applied climatology. Concepts of micro climatology, Agro-climatology-Agro climatic regions of India Urban climates-Urban heat island

UNIT -IV

7. Oceanography: Ocean deposits; Coral reefs; Temperature and salinity of the oceans; Density of sea water; Tides – generating forces types and theories and effects and ocean currents.
8. Marine resources and coastal management , Pelagic and Benthic Communities of the Ocean, Marine and Coastal Area Management Policies - EEZ, CRZ, ICZM

References :

1. Barry, R.G. and Chorley P.J.: Atmosphere, Weather and Climate, Routledge, London and New York, 1998.

2. Critchfield, J.H.: General Climatology, Prentice Hall, India, New Delhi, 1993
3. Das, P.K.: Monsoons National Book Trust, New Delhi, 1987
4. Davis, R.J.A. (1986): *Oceanography - An Introduction of the Marine Environment*, Win C. Brown, Iowa
5. Fein, J.S. and Stephens, P.N. : Monsoon. Wiley Interscience, 1987
6. India Met. Deptt. : Climatological Tables of Observatories in India, Govt. of India, 1968
7. Lal, D.S.: Climatology. Chaitanya Publications, Allahabad, 1986
8. Lydolph, P.E. : The Climate of the Earth, Rowman, 1985
9. Menon, P.A. : Our Weather, N.B.T., New Delhi, 1989
10. Peterson, S. : Introduction to Meteorology, Mc Graw Hill Book, London, 1969
11. Robionson, P.J.& Henderson, S. : Contemporary Climatology, Henlow, 1999
12. Thompson, R.D. and Perry, A(ed.): Applied Clomatology, Principles and Practice, Routlegde, London, 1997
13. Thorpe, S.A., Steele, J.H., Turekian, K.K. (eds.) (2009): *Elements of Physical Oceanography*, Academic Press, London
14. Thurnman, H.V. (1978): *Introduction to Oceanography*, Charles E. Merrill Pub. Co., London
15. Weyl, P.K. (1970): *Oceanography: An Introduction of the Marine Environment*, John Wiley and Sons Ltd., London

SEMESTER – III
GEO INFORMATICS IN DISASTER MANAGEMENT STUDIES
Theory –II (GI-302T)

UNIT-I

- 1.1 Fundamental Concept of Hazards and Disaster their types and characterization.
- 1.2 Hazard s Zonation naturall and Human Indused Disaster .
- 1.3 Disasters and Natural lones, Historical perfectice of Disaster in india.

UNIT-II

- 2.1 Hydrometrological hazards – cloud burnt, dam burnt, flash flouds and river flouds ; cyclone and coastal hazards ; thunderstorms hail storms heat and cold waves; drought and types.
- 2.2 Geological Hazards- Earthquakes, landslides, mining hazards, with reference to land subsidence, mine flooding etc.
- 2.3 Environmental Hazards- Deforestation Forest Degradation , Forest Fire , Land And Soil Degradation , Desertification, Wetland Degradation

UNIT-III

- 3.1 Human induced disasters: Urban and industrial disasters pollution with reference to land water and air.
- 3.2 GI Application-Indian case studies with reference to earthquakes, floods in gangetic plain, Brahmaputra; landslides in Himalayas drought ; forest fires; cyclones and multiple hazard mapping.

UNIT-IV

- 4.1 Fundamental Concept of Disaster management.
- 4.2 Disaster risk amendment and preparedness Geoinformatics in disaster migrigation.
- 4.3 Government, NGO’Ss and people participation in disaster management.
- 4.4 organizational temperature for managing disaster in india

References:

1. Burton, I., Kates, R.W. and White, G.F., *Environment as Hazard*, 2nd edition, Guilford Press, New York, 1993.
2. Chakraborty, S.C., *Natural Hazards and disaster management*, Pragatishil Prakashak, Kolkata, 2007.
3. Schneid, T. and Collins, L., *Disaster Management and Preparedness*, Lewis Publishers, Washington, D.C., 1998.
4. Bryant Edwards (2005): *Natural Hazards*, Cambridge University Press, U.K.
5. Roy, P.S.; Van Westen, C.J.; Jha, V.K.; Lakhera, R.C. and Champati Ray, P.K., *Natural Disaster and their Mitigation: Remote Sensing and Geographical Information System Perspectives*, IIRS, Dehra Dun, Govt. of India, 2000.
6. Hewitt, K., *Regions of Risk: A Geographical Introduction to Disasters*, Longman, London, 1997
7. Rajib Shaw and R.R.Krishna Murthy (eds), 2009: *Disaster Management : Global challenges and local solutions*, University Press, Hyderabad.
8. D.B.N.Murthy, *Disaster Management: Text and Case Studies*, Publisher: Deep & Deep Publications
9. Bergman E.F., Renwick W. H., and Vasantha Kumaran T., 2008 : *Introduction to Geography: People, Places and Environment*, Pearson Education Inc.

SEMESTER - III
Web Mapping and Web GIS
Theory –III (GI-303T)

UNIT-I

- 1.1 Introduction to Information Technology: Meaning, Scope & recent developments
Information Systems: Concepts & Overview, Components of Information System
- 1.2 Types of information systems: Transaction Processing Systems (TPS), Management Reporting Systems (MRS), Executive Information Systems (EIS), Decision Support Systems (DSS)

UNIT-II

- 2.1 Data base Management Systems for Information Systems: Data Resources, Structure & Functional Aspects.
- 2.2 Internet & Information Management: web and Internet; Fundamentals of computer networking – Network environment – network communication models – protocols – TCP/IP.

UNIT-III

- 3.1 Web Mapping – Static and Interactive Web Mapping, collaborative Web Mapping - Web Mapping Services - Open source GIS-Google Maps, Yahoo Maps, Quantum GIS, Mobile GIS, 3D Web GIS
- 3.2 Web GIS Implementation: Web Map servers and Data servers, recent trends in Web GIS as Decision Support System.

UNIT-IV

- 4.1 Web Mapping with Open Source tool kit - Merits and demerits of web mapping, 4.2 Different Kinds of web mapping – Open layers, Geo server – Geospatial Data Library – Open source Tool Kits.

References:

1. Introduction to Information Technology – Alexis Leond Mathews leen.
2. Fundamentals of Information Technology – Deepak Bharihoke.
3. Modern Systems Analysis & Design – J.A. Hoffer, Tocy F. George and Joseph S. Velacich.
4. Fundamentals of Information Technology – Srivastava.
5. GIS for Web Developers: Adding *Where* to Your Web Applications by Scott Davis, The Pragmatic Programmers, 2007
6. Web Mapping Illustrated: Using Open Source GIS Toolkits by Tyler Mitchell O'Reilly Media, Inc., 2005
7. Beginning MapServer: Open Source GIS Development by Bill Kropla, Apress, 2005
8. Ron Lake, David S. Burggraf, Milan Trninic, Laurie Rae, 2004, Geography mark-up language (GML) John Wiley & Sons Ltd.

III. SEMESTER

Theory-IV: RESEARCH METHODOLOGY & SPATIAL ANALYSIS

Theory –IV (GI-304T)

Unit - I

1. Introduction to Research Methodology: Meaning & types of Research - Methods of Research - Review of literature – need and sources of review literature
2. Planning of Research: planning process, formulation of the research problem, objectives and hypothesis

Unit - II

3. Sampling: Sampling Techniques (Random, Non-Random), Characteristics of a good sample, Sampling Errors.
4. Methods of Data collection: meaning, importance and sources of data - use of secondary data – methods and tools of collecting primary data.

Unit - III

5. Processing & Analysis of data & Research Report: classification & coding, transcription and tabulation - Statistical Techniques of Research Analysis – Measure of Central Tendency, Dispersion, Association And Hypothesis Testing.
6. Reporting of Research: Research Report format - title page – list of contents, table graphs, images – Acknowledgements – chapters of research - References and Bibliography.

Unit - IV

7. Spatial Analysis: Understanding Spatial Analysis - Operators And Functions – Local, Focal, Zonal, Global
8. Application Functions: Surface Analysis; Slope, Hydrologic Analysis and Population Analysis

References:

1. Research Methodology. Methods & Techniques: Kothari, C.R.
2. Tests, Measurements and Research Methods in Behavioral Sciences. Singh, A.K.
3. The Craft of Research, 2nd Edition (Chicago Guides to Writing, Editing and Publishing). Wayne C. Booth, Joseph M. Williams, Gregory G. Colomb.
4. Wayne Goddard, Stuart Melville, Research Methodology: An Introduction 2nd Edn, Juta
Juta Academic , Lansdowne, 2004
5. John W. Creswell, Research design: Qualitative, Quantitative, and Mixed Method
Approaches, 2nd Edn, SAGE, 2003
6. Heywood.L, Comelius.S and S. Carver (2006) An Introduction to Geographical
Information Systems, Dorling Kinderseley (India) Pvt. Ltd.
7. Heywood, Cornellius and Carver, 2001, 2 nd Indian Reprint. A n Introduction to
Geographical Information Systems Parsian Education (Singapore) Pte. Ltd., Indian
Branch, Delhi – 110 092, India.
8. Tsung Chang – Kang, 2002, Introduction to Geographic Information Systems, Tata
McGraw -Hill Publishing Company Limited, New Delhi.

Web GIS/ Mobile GIS

Overview of Web & Open source GIS

1. Basic QGIS usage - Map display (zooms, layers order), Keyboard shortcuts, Plug-ins (search and installation), Projects, and Identify features
2. Map content display - Vector layers symbology, Vector classification methods, Feature labeling, Raster layers display and WMS layers
3. Map reading - Measurement (distance, area), Attributes, Coordinates
4. Map development – Geo-referencing images, Digitizing and editing, Snapping tolerance, topology errors, creating a new Shape file, attribute table building, and CSV import
5. Attribute management - Attribute modification, SQL query builder, Field calculator
6. Simple data analysis – Buffers, Overlays, Selection by location, Selection by attribute, Extraction of selected features
7. Print composer - Map components and composition, Resolution concept, Formats (jpg, png, tiff, SVG, pdf), Map decorations (north arrow, scale bar, legend ...)

Applications of Geoinformatics in Resource Management

1. Creation of spatial & non-spatial data bases of physiographic, soils, slopes etc. using GIS
2. Land use analysis and change analysis using remote sensing technique
3. RS & GIS applications in Agricultural water management
4. Forest classification and forest type mapping – GIS & Remote sensing approach (NDVI)
5. Forest change detection and monitoring – GIS & Remote sensing approach
6. Environmental impact assessment (EIA) – GIS & Remote sensing approach
7. Urban area land use mapping and classification – GIS & Remote sensing approach

SEMESTER - IV
Principles and Applications of GPS and GNSS
Theory -I (GI-401T)

Section-A

1. GNSS Overview - GNSS Systems (GPS, GLONASS, Galileo, BeiDou, IRNSS and QZNSS).
2. GNSS-Architecture, Signals, Positioning, User equipment, Augmentation.
3. Basic GNSS Concepts-Satellites, Propagation, Reception, Computation and Application.

Section-B

1. GNSS Satellite System - (GPS - Segments and Modernization) (GLONASS - system Design, Segments, Signals and Modernization) (BEIDOU Navigation Satellite System and signals) GELELIO System
2. Regional Navigation Satellite System – IRNSS Architecture Signals and Applications, QZSS, GNSS signals,

Section-C

1. GNSS Error Sources – Satellite Clocks, Orbit errors, Ionosphere delay, Troposphere delay and Multi path.
2. Resolving Errors – Multi Constellation, Multi Frequency, GNSS Measurements, Differential GNSS and satellite based Augmentation system(WAAS, EGNOS, MSAS, GAGAN, SDCM other SBAS system and Ground Based Augmentation System).

Section-D

1. GNSS/INS Integrated Navigation – Inertial Navigation System, and INS error dynamics.
2. GNSS/INS Integration, General sensor fusion concepts.
3. GNSS Applications – Geospatial databases, GNSS Navigation – Navigation, Communication and Surveillance.

References:

1. Indian strategic guardian of the sky: IRNSS by P.Vithiyapathy, K.W Publisher PVT. LTD First Edition
2. Generation of IRNSS Standard Positioning Signal Paperback – December 2, 2016 by [Siva Nagendra Reddy P.](#) (Author), [A. R. Yashaswini](#) (Author), [Kodanda Ramaiah G. N.](#) (Author)
3. GPS/GNSS Antennas (GNSS Technology and Applications) by [B. Rama Rao](#) (Author), [W. Kunysz](#) (Author), [R. Fante](#) (Author), [K. McDonald](#) (Author)
4. <http://www.isro.org/index.aspx>
5. GNSS – Global Navigation Satellite Systems: GPS, GLONASS, Galileo, 2008th Edition by [Bernhard Hofmann-Wellenhof](#) (Author), [Herbert Lichtenegger](#) (Author), [Elmar Wasle](#) (Author)
6. GNSS Markets and Applications (GNSS Technology and Applications) 1st Edition by [Len Jacobson](#) (Author)
7. Understanding GPS/GNSS: Principles and Applications, Third Edition (Gnss Technology and Applications Series) 3rd Edition by [Elliott Kaplan](#) (Author), [Christopher J. Hegarty](#) (Author)
8. Engineering Satellite-Based Navigation and Timing: Global Navigation Satellite Systems, Signals, and Receivers 1st Edition by [John W. Betz](#) (Author)
9. Global Navigation Satellite Systems, Inertial Navigation, and Integration 3rd Edition by [Mohinder S. Grewal](#) (Author), [Angus P. Andrews](#) (Author), [Chris G. Bartone](#) (Author)
10. Springer Handbook of Global Navigation Satellite Systems (Springer Handbooks) Hardcover – 23 May 2017 by [Peter Teunissen](#) (Editor), [Oliver Montenbruck](#) (Editor)
11. GNSS - Global Navigation Satellite Systems: GPS, GLONASS, Galileo, and more Paperback – 20 Nov 2007 by [Bernhard Hofmann-Wellenhof](#) (Author), [Herbert Lichtenegger](#) (Author), [Elmar Wasle](#) (Author)
12. Global Navigation Satellite Systems: Insights into GPS, GLONASS, Galileo, Compass, and Others Hardcover – 15 Feb 2010 by [Basudeb Bhatta](#) (Author)

SEMESTER - IV
Perspectives in Spatial Studies
Theory –II(GI-402T)

Section-A: Development of Geography

1. Definition, Scope and Content of Geography
2. Development of Geography in the Ancient and Mediaeval Periods (up to 19th Century)
3. Development of Modern Scientific Geography in the 19th Century with particular reference to the Contributions of Humboldt and Ritter
4. Development of Geography in the 20th Century

Section-B: Development of Schools of Thought in Modern Geography

1. German School
2. British School
3. American School
4. Indian School

Section-C: Concepts and Trends in Geography

1. Concepts of Determinism, Possibilism and Neo-Determinism
2. Concepts of Empiricism and Positivism
3. Approaches to Geographic Studies: Systematic vs Regional and Ecological.
4. Critique of Quantitative Revolution in Geography; Behaviouralism, Feminism, Post Modernism

Section—D: Modern political ideas:

1. Heartland concept of Halfords
2. Mackinder; Rim land Theory of Spike man

Reference Books

- Husain, M.; Evaluation of Geographical thought, Rawat Publication, Jaipur, 1984.
- Arentsen M., Stam R. and Thuijjs R., 2000: Post-modern Approaches to Space, ebook.
- Bhat, L.S. (2009) Geography in India (Selected Themes). Pearson
- Bonnett A., 2008: What is Geography? Sage.
- Dikshit R. D., 1997: Geographical Thought: A Contextual History of Ideas, Prentice–Hall India.
- Hartshorne R., 1959: Perspectives of Nature of Geography, Rand MacNally and Co.
- Holt-Jensen A., 2011: Geography: History and Its Concepts: A Students Guide, SAGE.
- Johnston R. J., 1997: Geography and Geographers, Anglo-American Human Geography since 1945, Arnold, London.
- Kapur A., 2001: Indian Geography Voice of Concern, Concept Publications.
- Martin Geoffrey J., 2005: All Possible Worlds: A History of Geographical Ideas, Oxford.
- Soja, Edward 1989. Post-modern Geographies, Verso, London. Reprinted 1997: Rawat Publ., Jaipur and New Delhi

SEMESTER - IV
Trends in Urbanization
Theory –III (GI-403T)

Section-A

1. Urban society: Urban Structure, smart city concept, Social Space, Urban environment: water, sanitation, solid waste and slums; urban economy, urban crime;
2. Towns and Cities found due to Natural resources, Transport nodes places founded due to transport Development.

Section-B

1. Hinterland / Market areas, Agglomeration, similar business activities, local clusters. Resource nodes, Downtown intersection surrounded by most expansive real estate, festival landscape parks/museums/ arenas, convention centers, recreational/ fun.
2. Urban heat islands remedies lung space , alternate energy for transportation solar and electrified

Section-C

1. Models in Urban studies sector model by Homer Hoytt, concentric zone Model by Burges pos industrial cities. Urban sprawl anti growth movement and growth boundaries.
2. New locations for the expansion of a city / counter urbanization.
3. Concept of re-urbanization, rural urban fringe, settlement function and Social-leap frogging

Section-D

1. Growth poles and their multiplier effect that results in mushrooming of other companies/investment mixed use buildings containing housing & commercial space. new urbanism/ teleworking.
2. Metropolization and Peri-Urban growth; Metropolitan growth: regional comparison; Impacts in PUIs: Land use, environmental, resources livelihood, and infrastructure;
3. Peri-urban governance; Case studies: Hyderabad and Nizamabad

References:

1. Berry B.J.L. & Horton. F.E. (Ed), Geographic Perspectives on Urban systems, Prentice Hall, New Jersey, 1970.
2. Ramachandran. H “Urbanization, and Urban systems in India”, Oxford University Press, 1980
3. Carter – The study of Urban Geography, Edward Arnold, London, 1972.
4. Northam R.M. Urban Geography, John Wiley, New York, 1975.
5. R.P. Mishra & K.V. Sundaram, Multi-level Planning and Integrated Rural Development in India, Heritage Publishers, New Delhi, 1987.
6. R.C. Chandana, Regional Planning – A comprehensive Text, Kalyani Publishers, 2003.
7. Ch. Hanumantha Rao & S. Mahendra Dev, Andhrapradesh Development, CESS, 2004.
8. Paul Chaval, An Introduction to Regional Geography, Black well Publishers, Oxford, 2002.

SEMESTER - IV
Geoinformatics in Societal Development
Theory –IV (GI-404T)

Section-A

1. Geo-demographics : Spatial distribution of population according to age, gender, and socio-group, racial and socioeconomic segregation, geo-ethnography, labour market exploration, health equality, crime analysis, population and environmental linkage, spatial planning, temporal analysis, spatial dispersal and sparsity.
2. Changing pattern of demography, GIS functionality for demographic analysis.

Section-B

1. Business GIS : Competitive market analysis, trade area analysis site analysis and selection for distribution centers and shopping centers, customer service stations, facility management, target marketing, market demographics- demographic analysis for marketing based on customer profiling, lifestyle matching and consumer behaviour, sales promotion planning, advertisements targeting;
2. Geo-market segmentation by product category, sales territory rationalization, forecasting market potential and modeling sales.

Section-C

1. Health GIS: Spatial epidemiology - RS and GIS in study of epidemics and their control- Malaria, Leprosy, Polio, TB, Fileria, Dengue, Chikungunya, Cholera, AIDs, Cancer; Disease Mapping, Ecological analysis, disease clustering, Bioterrorism and disease surveillance, infectious disease modeling.
2. Health infrastructure and facility location mapping, planning future health facility requirement, disease surveillance and monitoring and other health indicators, Karnataka Health Systems Development Project, health and disease atlas of India and medical geography, internet and health GIS, integrated disease surveillance system, spatial distribution and spread of diseases.

Section-D

1. Power: Site suitability assessment for power plants - and impact assessment. GIS in management of electricity distribution network, underground cable maintenance and management in power sector, GIS as decision support system,
2. Telecommunication: Applications of GIS in telecommunication industry, internet GIS for telecommunication, facility management in telecommunication industry, optical fiber cable alignment.
3. Transportation :Transportation GIS - vehicle routing and scheduling, optimizing routes and schedules, delivery routing/fleet management, vehicle navigation, vehicle tracking system, intelligent transportation system

References:

1. Efrain Turban, Decision Support & Expert Systems: Management Support Systems, MacMillan, New York, 1993. Deshpandey, C.D., Regional Geography of India.
2. Kim T.J. Wiggins L.L. & Wright J.R. Expert System Applications to Urban Planning, Springer, New York, 1990.

Statistical Techniques in Population & Urban Geography (405-P)

1. Human development index
2. Poverty index
3. Gender related development index
4. Models for population resource development
5. Basic measures for urbanization
6. Calculation of CBD by Vance and Evan's method
7. Size of locality of residence of median inhabitant
8. Index of city distribution, methods of urban renewal and calculation of urban sprawl

References:

1. Mandal, R. B., Uyanga, J. and Prasad, H. (2007): Introductory Methods in Population Analysis, Concept Publishing Company, New Delhi .
2. Taylor, P. J. (1977): Quantitative Methods in Geography, Houghton Mifflin Co., Boston.
3. Shryock, H. S. (1970): The Methods and Materials of Demography, Academic Press, New York.
4. Wilkinson, F. J. and Monkhouse, H. R. (1966): Maps and Diagrams – Their Compilation and Construction, Methuen and Co., London.
5. Pathak, K. B. and Ram, F. (2013): Techniques of Demographic Analysis, Himalaya Publishing House, Mumbai .
6. Siddharth, K. and Mukherjee, S. (2013): Cities, Urbanization and Urban System, Kisalaya Publishing Pvt. Ltd., New Delhi .
7. Wilkinson, F. J. and Monkhouse H. R. (1966): Maps and Diagrams – Their Compilation and Construction, Methuen and Co., London .
8. Ramachandran, R. (1997) Urbanization and Urban Systems in India, Oxford University Press, Delhi.

Project Work (406-P)