

**DEPARTMENT OF GEOGRAPHY, OSMANIA UNIVERSITY**  
**M.Sc. GEOGRAPHY - Syllabus (2016-17 & onwards) as per CBCS**  
**Scheme of Instruction and Examination**

S.No.	Subject Code	Paper	C O U R S E	Teach ing Hrs (per week)	MARKS (20+80 Theory)	CREDITS
<b>SEMESTER-I</b>						
1.	GG101T	I	Geomorphology	4	100	4
2.	GG102T	II	Social and Population Geography	4	100	4
3.	GG103T	III	Geographical Thought	4	100	4
4.	GG104T	IV	Regional Geography of India with Special ref. to Telangana State	4	100	4
5.	GG151P	I	Basic Techniques of Mapping & Map Interpretation and Terrain Analysis	4	50	2
6.	GG152P	II	Statistical Techniques & Research Methods	4	50	2
7.	GG153P	III	Introduction to G.I.S.	4	50	2
8.	GG154*	IV	Communicative English & Soft Skills	4	50	2
	<b>Total</b>				<b>600</b>	<b>24</b>
<b>SEMESTER-II</b>						
1.	GG201T	I	Climatology & Oceanography	4	100	4
2.	GG202T	II	Economic Geography	4	100	4
3.	GG203T	III	Environmental Studies	4	100	4
4.	GG204T	IV	Principles of Remote Sensing	4	100	4
5.	GG251P	I	GIS Applications	4	50	2
6.	GG252P	II	Instrumental and Field Survey	4	50	2
7.	GG253P	III	Map Projections	4	50	2
8.	GG254*	IV	Basics of Computer Science	4	50	2
	<b>Total</b>				<b>600</b>	<b>24</b>

\*ADD ON COURSE: SEMESTER – I & II:

Paper-IV: Communicative English & Soft Skills or Combating Corruption (2 Credits)

Paper-IV: Human Values and Professional Ethics or Basics of Computer Science (2 Credits)

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S.No.	Subject Code	Paper	C O U R S E	Teach ing Hrs (per week)	MARKS (20+80 Theory)	CREDITS
<b>SEMESTER-III</b>						
1.	GG301T	I	Urban Geography and Planning	4	100	4
2.	GG302T	II	Agricultural Geography	4	100	4
3.	GG303T	III	Photogrammetry	4	100	4
4.	GG304T**	IV	Natural Resource Management	4	100	4
	GG304T**	IV	Political Geography			
5.	GG351P	I	Techniques of Agricultural & Urban Analysis	4	50	2
6.	GG352P	II	Aerial Photo Interpretation & Image Analysis	4	50	2
7.	GG353P	III	Geoinformatics	4	50	2
8.	GG354(ID)	IV	<b>Environmental Studies</b>	4	50	2
	<b>Total</b>				<b>600</b>	<b>24</b>
<b>SEMESTER-IV</b>						
1.	GG401T	I	Advanced GIS	4	100	4
2.	GG402T	II	Regional Development Studies	4	100	4
3.	GG403T**	III	Rural Development and Planning	4	100	4
	GG403T**	III	Geography of Climate Change with special reference to India			
4.	GG404T**	IV	Principles of GPS	4	100	4
	GG404T**	IV	Principles of Cartography			
5.	GG451P	I	G.P.S Survey	8	100	4
6.	GG456 (Project)	II	PROJECT(Dissertation and Viva Voce)	8	100	4
	<b>Total</b>				<b>600</b>	<b>24</b>
		<b>Grand Total Marks and Credits</b>			<b>2400</b>	<b>96</b>

ID: Inter Disciplinary Paper

\*\* Elective Paper (Discipline Centric)

**M.SC. GEOGRAPHY**  
**I-SEMESTER**

**THEORY PAPER-I (GG101T)**  
**GEOMORPHOLOGY**

(4 Credits)

**Unit-I**

1. Definition and Scope of Geomorphology, Fundamental Concepts in Geomorphology, Geological Time Scale.
2. Interior of the Earth – Chemical composition, layering system of the earth, Evidences from the theories of the origin of earth. Rocks – Classification of Rocks, Igneous, Sedimentary and Metamorphic Rocks
3. Earthquakes and Volcanos – Causes of Earthquakes, Classification and world distribution of Earthquakes, Concept and causes of Vulcanicity, types of Volcanoes, world distribution of Volcanos, Landforms formed by Volcanos.

**Unit-II**

4. Isostasy – Concept and Theories of Airy and Pratt.
5. Earth Movements – Types; Folds and Faults, Mountain building.
6. Continental Drift – Wegener's Theory and Plate Tectonics.

**Unit-III**

7. Denudation, Weathering, Erosion, Mass wasting.
8. Erosional and Depositional Landforms by: -
  - a) Rivers.
  - b) Glaciers.
  - c) Wind.
  - d) Underground Water.
  - e) Waves and Currents.

**Unit-IV**

9. Concept of Cycle of Erosion.
10. Davis and Penck's Cycles of Erosion.
11. Concept of Rejuvenation and Evidences.

**REFERENCE BOOKS:**

1. W. D. Thornbury – Principles of Geomorphology, Wiley Eastern Ltd., New Delhi, 1993.
2. P. G. Worcester – A text book of Geomorphology, East - West Press Pvt. Ltd., New Delhi, 1961.
3. A. K. Lobeck - Geomorphology, Mc Graw Hill Book Co. Ltd., New York, 1969.
4. Hamblin W. K. and Christiansen E. H. – Earth Dynamic Systems (10<sup>th</sup> Edition), John Willey and Sons, 2013
5. Alan Strahler with Zeeya Merali – Visualizing Physical Geography (8<sup>th</sup> Edition), Willey Visualizing, 2007.
6. Butser, K. W. – Geomorphology from the Earth, Longmans, London 1963, Harper & Row Publishers, New York, 1976.
7. Robert E. Gabler, James F. Peterson, L. Michael Trapasso, Dorothy Sack – Physical Geography 9<sup>th</sup> Edt<sup>n</sup>. Brooks/Cole, Cengage Learning 2009.
8. Richard John Hugget – Fundamentals of Geomorphology (2<sup>nd</sup> Edition), Routledge Taylor and Francies Group, London and New York, 2007.
9. C. A. M. King – Perspective on Landform Evolution (Benchmark series in Geology) – Dowden, Hutchinson & Ross Inch. Pennsylvania, U.S.A., 1976.
10. K. Siddartha – Earth Dynamic Surface, Transworld Media & Communications Publication, Patna, 1994.
11. Savindra Singh – Geomorphology/Physical Geography, Prayag Pustak Bhawan, New Delhi. 2005.

**THEORY PAPER-II (GG102T)**  
**SOCIAL AND POPULATION GEOGRAPHY** (4 Credits)

**UNIT-I**

1. Nature and scope of social Geography
2. Elements of social processes – Race, Tribe, Dialect, Language, Caste and Religion.
3. Concept of social wellbeing, Human development Index.

**UNIT-II**

4. Concept of culture – areas and cultural regions
5. Factors for cultural region formation
6. Major cultural Realms of the world

**UNIT-III**

7. Factors determining the distribution of world population pattern.
8. Patterns of Fertility and Mortality, sex ratio and age pyramid
9. Growth trends and density of population – Optimum Population

**UNIT-IV**

10. Theory of Demographic transition - Malthusian theory on population growth.
11. Population and resources – Implication for development
12. Patterns and Processes of Migration., International Migrations (Past & Present)

**REFERENCES:**

1. Zimmerman, RW – World resources and industries, Marper Brother, New York.
2. Clark, J.L.-Population Geography, Pergamon Press, Oxford, 1972.
3. Garnier J.B.- Geography of Population, Longman, Harlow, 1966
4. UNESCO – Determinates and consequences of World & Population Trends.
5. R. B. Mandal, Joseph Uyanga and H. Prashad – Introductory Methods in Population Analysis, Concept Publication Co. New Delhi, 2007.
6. Arun Kumar Sharma – Population and Society: Present Scenario and Future Prospect, Concept Publication Co., New Delhi, 2012.

**THEORY PAPER-III (GG103T)**  
**GEOGRAPHICAL THOUGHT** (4 Credits)

**UNIT - I**

1. Geographical Thought in Classical and Medieval Period – Greeks and Roman Contributions, Arab Contributions.
2. Contemporary Times – Immanuel Kant, Alexander von Humboldt, Carl Ritter, Friedrich Ratzel, Vidal de la Blache, Halford J. Mackinder and Patrick Geddes.
3. Development of Concepts in Geography – Environmental Determinism, Possibilism and Human Ecology.

**UNIT - II**

4. Geography as Study of Distribution and Areal Differentiation.
5. Dualisms and Dichotomies in Geography.
6. Behavioral approach in geography.

**UNIT - III**

7. Quantitative Revolution in Geography.
8. Relevance of Models in Geography.
9. Systems approach in geography.

**UNIT - IV**

10. Marxism in geography.
11. Postmodernism and Social Justice.
12. Welfare Geography.

**REFERENCES:**

1. Kimble, G. H. T. - Geography in the middle Ages, University Press, London, 1952.
2. Holt Jenson – Geography: Its History and Concepts, Longman, 1980.
3. Griffith Taylor - Geography in Twentieth Century, Philosophical Library, New York 1960.
4. Dickinson R. E. – The Makers of Modern Geography, Routledge and Kegan Paul, London, 1969.
5. James P. E. – All Possible World, The Odyssey press, New York, 1972.
6. Lalita Rana – Geographical Thought: Classical to Contemporary, Concept Science, 2014.
7. Harvey D. – Explanation in Geography, Edward Arnold, London, 1969.
8. Broek J. E. E. M. – Geography: Its Scope and Spirit, Charles E. Nerrill, Columbus, Ohio, 1965.
9. Hartshorne R. - Perspective on the Nature of Geography Annals, Association of American Geographers, Washington D. C., 1959.
10. Abler, Adams and Gould - Spatial Organization, Engewood, Cliff, New Jersey, 1971.
11. Gregory D. – Ideology, Science and Human Geography, St. Martin's Press New York, 1978.
12. Johnston R. J. – Geography and Geographers, Arnold Heinemann, London, 1983.
13. Chorley R. J. – Directions in Geography, Pergomen, London, 1969.
14. Woolridge S. & East W.G.: The Spirit and Purpose of Geography, Hutchinson, London, 1966.
15. Minshull R. – The Changing Nature of Geography, Hutchinson, London, 1970.
16. David Harvey - Justice Nature and Geography of Differences, Blackwell, 2000.
17. David Harvey - The Condition of Postmodernity, Oxford, 1989.
18. E. W. Soja - Postmodern Geographies, Verso, 1989.
19. M. E. Harvey - Themes in Geographic thought 2002.
20. David Harvey - Social Justice and the City, JHUP, 1973
21. R. D. Dikshit - Geographical Thought: A Contextual History of Ideas, PHIL.
22. M. Husain - Evolution of Geographical Thought, rp, 2002.

**THEORY PAPER-IV (GG104T)**  
**REGIONAL GEOGRAPHY OF INDIA**  
**WITH SPL. REFERENCE TO TELANGANA STATE**

**UNIT-I**

**(4 Credits)**

1. Regional Studies- Significance, Nature Scope and Content of regional Geography.
2. Physical Aspects- Physiography, Drainage, Climate, Soils and Vegetation.
3. Natural Regions of India and Sub-Regions, Drought prone and Flood prone regions.

**UNIT-II**

4. Resource base – Distribution - Utilization and Conservation of Land, Water, Forest, Mineral and Energy resources.
5. Human Aspects – Population – Growth, Density, Distribution, problems and policies; Ethnographic diversities, Caste, Tribe and Religion.
6. Rural and Urban settlements – Pattern of Urbanisation – Concept of Smart Cities.

**UNIT-III**

7. Agriculture – Land Use and Cropping Pattern - Major Crops: Rice, Wheat, Tea, Coffee, Cotton and Sugar cane. Green Revolution- Agricultural regions of India.
8. Industry – Industrial regions – Study of Iron and Steel and Cotton Textile, Sugar Industry
9. Transport – Roads, Railways, Ports and Information and Communication; India's International Trade.

**UNIT-IV**

10. Regional planning and development – Five year plans.
11. Regional Disparities and impact of globalization.
12. Regional consciousness and National integration.

**REFERENCES:**

1. Spate O. H. K - India and Pakistan, 1974, Methuen & Co., London, 1967.
2. R. L. Singh (ed), India – A Regional Geography, National Geographical Society of India, Varanasi, 1971.
3. C. D. Deshpandey - Regional Geography of India.
4. R. C. Tiwari - Geography of India (3<sup>rd</sup> Edition), Prayag Pustak Bhawan, 2006.
5. Gazetteer of India vols. 1 to 3, Ministry of Information & Broadcasting, Govt. of India, New Delhi, 1965.
6. Kullar D. R. – India: A Comprehensive Geography, 2014.
7. C. B. Memoria - Economic and Commercial Geography of India.
8. Govt. of A.P. Planning Department, 'Perspective Plans for Telangana, coastal Andhra and Rayalaseema.
9. Planning Atlas of Andhra Pradesh, Dept. of Geography, O. U.
10. Venkat Ram Reddy and Kosal Ram, Multilevel Planning of A.P., Published by CESS.
11. V. Vidyath, Resource Inventory of A.P.
12. Data News features, Changing Horizons of A. P.
13. Data News Features, A. P at 50 a data based analysis.
14. Simhadri S. & P. L. Vishweshwar Rao, Telangana: Dimensions of Under development, Center for Telangana Studies, 1997.
15. Fifty years of Andhra Pradesh: 1956-2006, Centre for Documentation, Research and Communication, 2008.

## **PRACTICAL PAPER-I (GG151P)**

### **Basic Techniques of Mapping & Map Interpretation and Terrain Analysis**

(2 Credits)

1. Map Scales – Types and Conversion.
2. Symbology – Qualitative and Quantitative , Elements of Map Design , Point , Line , Area , Techniques of Mapping – Choropleth , Flow Diagram , Interpolation Techniques , Isopleth Mapping , Triangular Graphs.
3. Interpretation of Indian Topographical Maps and Weather Maps.
4. Methods of Representation of relief – Profiles.
5. Basic Geological cross sections – Analysis.
6. Methods of Express on of Slope and Slope Analysis.
7. Altimetric Frequency Analysis.
8. Hypsometric Analysis.
9. Clinometric Analysis.
10. Relative Relief Analysis
11. Drainage Analysis (Numerical & Linear Characters).

#### **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. Lewis, Peter – Maps and Statistics, Methuen and Co., Ltd., London, 1977.
5. Dickinson, G.C. – Maps and Air Photos, Edward Arnold Ltd., London, 1969.
6. Cuff, D.J. and Mattson, M.J. – Thematic Maps: Their Design and Production, Methuen, New York 1982.
7. Mishra R. P. and Ramesh A – Fundamentals of Cartography, Concept Publishing Company, New Delhi, 1989.
8. Judith A. Tyner – Principles of Map Design, The Gulford Press, New York, London, 2010.

## **PRACTICAL PAPER-II (GG152P)**

### **STATISTICAL TECHNIQUES AND RESEARCH METHODS**

**(2 Credits)**

1. Descriptive Statistics – Scope and Applications
2. Sources and Methods of collection of Data – Sampling Techniques, Field Survey Techniques
3. Measures of Central Tendency – Merits & Demerits, Mean, Median, Mode
4. Measures of Dispersion: Standard Deviation, Coefficient of Variation, Skewness, (Karl Pearson's and Bowley's) Kurtosis.
5. Correlation – Karl Pearson's Correlation coefficient and Spearman's Rank Correlation, Regression Analysis.
6. Statistical Applications - Analysis of Variance, Chi-square tests, Time series Analysis
7. Scientific Methods and Research - Hypothesis Development, Basis for Hypothesis, Hypothesis Formation, Hypothesis test.
8. Research Process - Preparation of Research Design, Collection of Data, Determining Sample Design, Data Processing and data Analysis.

#### **REFERENCES:**

1. R. P. Mishra - Research Methodology,
2. Harikesh N. Mishra and Vijai P. Singh - Research Methodology in Geography,
3. Kothari C. R. - Research Methodology: Methods and Techniques,
4. Cole J. P. & King CAM – Quantitative methods in Geography, John Wiley & Sons, New York, 1968.
5. Gregory S. – Statistical methods and the Geographer, Longmans, London, 1963.
6. Jones P. A. – Field work in Geography, Longman, London, 1968.
7. Johnson R. J. – Multivariate statistical analysis in Geography, Longman, London, 1978.
8. King L. J. –Statistical Analysis in Geography, Prentice Hall, Englewood Cliffs, N. J.
9. Tomislav Hengl – A practical Guide to Geostatistical Mapping, University of Amsterdam, 2009.



## **PRACTICAL PAPER-III (GG153P)**

### **INTRODUCTION TO GIS**

**(2 Credits)**

1. Computer components – Input, Output and storage devices.
2. Computer Software Operating Systems – DOS and Windows Commands.
3. System Software, Application Software.
4. Directory, File structures and Databases.
5. Working with Documents and worksheets.
6. Introduction to G.I.S.
7. Sources and Components of Information Systems.
8. Computer fundamentals of G.I.S.
9. Creation of Map coverage – Scanning, Digitization, Editing.

#### **REFERENCES: -**

1. Taylor D. R. F - GIS: The Micro Computer and Modern Cartography, Pergamon Press, Oxford.
2. C. P. Lo and Yeung A. W. - Concepts and Techniques of Geographical Information Systems, Prentice Hall of India Pvt. Ltd., 2002.
3. I. Heywood, 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.

**M.Sc. Geography**

**II-Semester**

**THEORY PAPER-I (GG201T)**  
**CLIMATOLOGY AND OCEANOGRAPHY**      **(4 Credits)**

**UNIT-I**

1. Atmosphere – Structure, Chemical composition of the atmosphere, Elements of Weather and Climate.
2. Insolation and Temperature Distribution – Factors affecting the distribution of Insolation, Heat Budget of the Earth and the Atmosphere, Vertical distribution of Temperature – Inversion of Temperature and its Significance, Horizontal distribution of Temperature.
3. Atmospheric Pressure and Winds – Horizontal distribution of Air Pressure and Pressure belts, Pressure Gradient and Air circulation, Coriolis force, Ferrel's Law; Planetary Winds – Global Pattern of Planetary Winds; Monsoon Winds: Meaning and Distribution, Origin of Indian Monsoon; Local Winds, Jet Streams – Types and Significance of Jet Streams.
4. Humidity and Moisture in the atmosphere - Forms of condensation, Rainfall types and distribution. Classification of Clouds, Other forms of Precipitation.

**UNIT-II**

5. Air masses and Fronts: Air Masses - Characteristics, Source Region, Classification; Fronts and Frontogenesis, Conditions for Frontogenesis, Classification of Fronts.
6. Cyclones and Anticyclones:
  - i. Temperate Cyclones: Origin, Stages of Life Cycle and weather conditions associated with it.
  - ii. Tropical Cyclones: General Characteristics, Types, Origin, Distribution and Weather conditions associated with it.
  - iii. Thunder Storms: General Characteristics, Structure and Conditions for Thunder Storm development.
  - iv. Anticyclones: General Characteristics, Weather conditions associated with it.
7. Classification of climates – Koppen's Classification, Thornthwaite's scheme of climatic classification – 1931 and 1948.

**UNIT-III**

8. Relief of Ocean Basins – Hypsometry, The Continental Shelf, The Continental Slope, The Deep Sea Plains, Submarine Canyons – Characteristics, Origin and Distribution. Bottom Relief of Atlantic, Pacific and Indian Ocean.
9. Temperature and Density of Ocean Waters – Horizontal and Vertical Temperature Distribution, Density of Oceans.
10. Salinity and Ocean Deposits – Composition of Sea Water, Controlling factors, Distribution (Horizontal and Vertical) and Significance of Salinity; Ocean Deposits and Marine resources - Sources, Types and Distribution.

**UNIT-IV**

11. Distribution of Ocean Currents and Oceanic Circulation – Origin, Effects and Factors modifying Ocean Currents, Oceanic Circulation: Currents of Atlantic, Pacific and Indian Oceans.
12. Ocean Tides – Origin, Types and Theories on the origin of tides, Tidal Bores, and Tidal Currents.
13. Coral Reefs, Atoll and Marine Oceanic Resources – Origin, Types of Coral Reefs, Importance of Marine Resources.

## **REFERENCES:**

1. G. T. Threwartha – Introduction to Climatology, Mc. Graw Hill Book Co. Inc., New York, 1981.
2. H. J .Critchfield - General Climatology, Prentice Hall of India Ltd., New Delhi, 2002.
3. Barry & Chroley – Atmosphere, Weather and Climate, Methuen & Co. Ltd., London, 1995.
4. Miller A.et al and Merrill – Elements of Meteorology, Columbus, 1983.
5. Savindra Singh – Climatology/Physical Geography, Prayag Pustak Bhawan, New Delhi. 2005.
6. Alan Strahler – Visualizing Physical Geography, Willey Visualization, New York and London, 2007.
7. C. Donald Ahrens – Essentials of Meteorology: An Invitation to the Atmosphere (5<sup>th</sup> Edition), Thomson Learning Inc. Canada, 2008.
8. John Marshall and R. Alan Plumb – Atmosphere, Oceans and Climate Dynamics, Cambridge, Massachusetts, Elsevier Academic Press, 2008.
9. V. P. Subramanyam – Applied Indian Climatology.
10. C.A.M.King – Oceanography for Geographers, Edward Arnold publishers Ltd.
11. Kshudiram Saha – The Earth’s Atmosphere: Its Physics and Dyanamics, Springer Verlang Berlin Heidelberg, 2008.
12. Siddarth K. – Oceans, Transworld Media & Communication Publication, Patna.

**THEORY PAPER-II (GG202T)**  
**ECONOMIC GEOGRAPHY**

(4 Credits)

**UNIT-I**

1. Scope and Contents and Importance of Economic Geography.
2. Classification of Economic activities: Primary, Secondary, Tertiary and Quaternary.
3. Concept of Resources: Classification and Types of Resources.

**UNIT-II**

4. Types and Distribution of Agriculture, Forest, Minerals and Energy Resources.
5. Resource Utilization and its Impacts (Positive and Negative).
6. Conservation and Management of Resources.

**UNIT-III**

7. Factors Influencing Industrial Location.
8. Industrial Location Theories: Alfred Weber's and August Losch's approaches.
9. Von Thunen's Agricultural Model.

**UNIT-IV**

10. Transport : Principles of Transportation , Transportation and Economic development
11. Taffe's Model on Transportation development
12. Economic Regionalization and Role of Geographer in Economic Planning.

**REFERENCES:**

1. Norman Pounds – Success in Economic Geography, John Murray Pub Ltd, London 1981.
2. Jones C. F. and Darkenwald C. G. – Economic Geography, Surjeet Pub, 1982.
3. Alexander Gibson: Economic Geography, Prentice Hall International, New Delhi, 1979.
4. Hodder B. W. and Regerlee – Economic Geography, Methuen Co. Ltd., 1977.
5. Von Roben and Bengtson – Fundamentals of Economic Geography, Prentice Hall, New Delhi, 1971.
6. Thatcher W. D. – Economic Geography, Longmans Business Education Series, Landmans, London, New York, 1984.
7. Williams T. R. – Economic Geography, Longmans Business Education Series, New York, 1984.

## **THEORY PAPER-III (GG203T)**

### **ENVIRONMENTAL STUDIES (4 Credits)**

#### **UNIT-I**

1. Context, scope, related sciences, and environmental components
2. Ecosystem, types – biomes and food chain.
3. Biomes-Terrestrial and Aquatic biomes and food chain.

#### **UNIT-II**

4. Environmental degradation and pollution- soil, water, air, and noise.
5. Global warming and climate change – impact and remedial measures
6. Ozone layer depletion – causes and consequences.

#### **UNIT-III**

7. Environmental – Economic development debate
8. Environmental movements in India – Chipko, Silent valley, Tehri Dam and Narmada Bachao Andolan – Role of NGOs.
9. Environmental planning and legislation in India.

#### **UNIT-IV**

10. Concept of sustainable growth and development.
11. Biodiversity – Hotspots of biodiversity and threats – its conservation.
12. Natural Disaster Management – NDMA – Role of GIS and Remote Sensing.

#### **REFERENCES: -**

1. David Harvey - Justice, Nature, and Geography of Differences, Blackwell, 2000.
2. John Bellomy Foster - The Vulnerable Planet, Monthly Review Press, 1994.
3. Savindra Singh - Environmental Geography, PPB, 2000.
4. David Pepper - Eco-socialism: From Deep Ecology to Social Justice, Routledge, 1993.
5. Gadgil M. & R. Guha - This Fissured Land: An Ecological History of India, OUP, 1995.
6. Guha R. - The Unquiet Woods, OUP. 2000.
7. John McCormick - The Global Environmental Movement, JWS, 1995.
8. Reiner Grundmann - Marxism and Ecology, Clarendon Press, Oxford, 1991.
9. Desai V. & Potter R. B. (ed) - The Companion to Development Studies, 2002.
10. The Hindu - Survey of the Environment 2002.
11. Down to Earth-Science and Environment (Fortnightly Journal).
12. Bill McGuire, Ian Manson and Christopher Kilburn – Natural Hazards and Environmental Change, Oxford University Press Inc. New York, 2002.
13. John C. Pine – Natural Hazards Analysis: Reducing the Impact of Disasters, CRC Press, Taylor and Francis Group, London, New York. 2008.

## **THEORY PAPER-IV (GG204T)**

### **PRINCIPLES OF REMOTE SENSING** (4 Credits)

#### **UNIT-I**

1. Introduction to Remote Sensing: Concept, Definition, History and Scope.
2. Energy flow from source to the sensor: Electromagnetic Energy, Radiant Flux
3. Energy Interaction with the Atmosphere and Object.

#### **UNIT-II**

4. Spectral Reflectance Curve: Spectral Signatures.
5. Scanning:
  - a) Multi-spectral:
    - i. Across Track scanning
    - ii. Along Track scanning.
  - b) Thermal
6. Microwave Remote Sensing.

#### **UNIT-III**

7. Types of Sensors, Their Characteristics and Purpose: Spatial, Spectral, Radiometric, and Temporal.
8. Types of Satellites, Orbit and orbital, Swath and IFOV, Their Characteristics and Purpose: IRS, LANDSAT, SPOT, ADEOS, Quick Bird, Resource Sat, Ocean Sat
9. Electro Magnetic Spectrum, Atmospheric Window.

#### **UNIT-IV**

10. Application of Remote Sensing to land-use/land-cover mapping.
11. Interpretative aspects of Satellite Imagery – Visual and Digital.
12. Ground Truth Concept.

#### **REFERENCES:**

1. Nejel Veziroglu – Remote Sensing: Energy related studies – Hemisphere Publishing Corporation, Washington, 1975.
2. Paul Curren – Principles of Remote Sensing, English Language Book Society, London, 1988.
3. Robert, G. Reeves (ed) – Manual of Remote Sensing: Vol. I & II. American Society of Photogrammetry, New York, 1978.
4. James B. Campbell and Randolph H. Wynne – Introduction to Remote Sensing (5<sup>th</sup> Edition), The Guilford Press, New York and London, 2011.
5. W. G. Rees – Physical Principles of Remote Sensing (2<sup>nd</sup> Edition), Cambridge University Press, 2001.
6. R.C. Olsen – Remote Sensing from Air and Space, SPIE Press, USA, 2007.
7. P. S. Ray, R. S. Dwivedi and D. Vijayan – Remote Sensing Applications, NRSC, Hyderabad, 2010.
8. Qihao Weng – Remote Sensing and GIS Integration: Theories, Methods and Applications, McGraw Hill, 2010.

**PRACTICAL PAPER-I (GG251P)**

**GIS APPLICATIONS**

**(2 Credits)**

1. Spatial and Non-spatial Data Management.
2. Creation of Thematic Maps – Choropleth & Dot Maps, Charts.
3. Map Layouts, Designing and Output Generation.
4. GIS Single layer operations - Clip, Split, Dissolve, Map Join, Buffering.
5. Overlay Functions in G.I.S. – Union, Intersect, Identity.
6. Set Theoretical Concepts – Venn Diagrams and Boolean Concept.
7. Simple and Complex Querying using GIS Data.
8. Network Analysis.
9. Digital Elevation Model.

**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. Ltd., 2002.
3. Ian Heywood, Cornelius S. and 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.

## **PRACTICAL PAPER-II (GG252P)**

### **INSTRUMENTAL AND FIELD SURVEY**

**(2 Credits)**

1. Importance of field instrument survey- scope and purpose, principles and application of selected survey instruments.
2. Chain survey: use of tapes-open traverse, triangulation survey.
3. Plane table surveying.
4. Prismatic compass, Open and Closed Traverse.

#### **REFERENCES:**

1. Clendinning J. - Principles of Surveying (2<sup>nd</sup> edition), 1960.
2. Hotine Major - The Re-Triangulation of Great Britain Empire Survey Review, 1935.
3. Mishra R. P. and Ramesh A. - Fundamentals of Cartography Revised Edition, Concept Publication, New Delhi, 2002.
4. Monk house – Maps and Diagrams, Methurn, 1971.
5. Negi, Balbir Singh - Practical Geography (Third Revised Ed), Kedar Nasth and Ram Nath, Meerut & Delhi, 1994-95.
6. Sandover J. A. - Plane Table Surveying, Arnold, 1961.
7. Singh & Karanjta – Map Work and Practical Geography Central Book Depot, Allahabad, 1972.
8. Singh R. L. and Dutt P. K. - Elements of Practical Geography, Students Friends, Allahabad, 1968.
9. Agarwal A. K. - Fundamentals of Global Positioning System.
10. Huffmann Wellerhofb - GPS Theory and Practice, H. Lichtenegger & J. Collins, Springer Wien, New York, 1977.
11. Leick A. - GPS Satellite Surveying (2nd edn), Wiley, New York, 1995.
12. Ferguson M. - GPS Land Navigation, Glanford Publishing, Boise, Idaho, 1997.



## **PRACTICAL PAPER-III (GG253P)**

### **MAP PROJECTIONS**

**(2 Credits)**

1. Types of Map Projections – Uses and Choice of Projections
2. Construction of Simple Conical (one and two standard parallels)
3. Bonne's and Polyconic projections
4. Simple Cylindrical (Equal Area and Equidistant),
5. Zenithal Equal Area, Gnomonic and Stereographic
6. Mercator's (Universal Transverse Mercator – UTM Projection).

### **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. Lewis, Peter – Maps and Statistics, Methuen and Co., Ltd., London, 1977.
5. Dickinson, G.C. – Maps and Air Photos, Edward Arnold Ltd., London, 1969.
6. Cuff, D.J. and Mattson, M.J. – Thematic Maps: Their Design and Production, Methuen, New York 1982.
7. Mishra R. P. and Ramesh A – Fundamentals of Cartography, Concept Publishing Company, New Delhi, 1989.
8. Judith A. Tyner – Principles of Map Design, The Gulford Press, New York, London, 2010.

**DEPARTMENT OF GEOGRAPHY, OSMANIA UNIVERSITY**  
**M.Sc. GEOINFORMATICS - Syllabus (2016-17 & onwards) as per CBCS**  
**Scheme of Instruction and Examination**

S.No.	Subject Code	<i>C O U R S E</i>	<i>Teaching Hr s</i> (per week)	<i>MARKS</i> 20+80 (Theory)	<i>CREDITS</i>
<b><i>SEMESTER-I</i></b>					
1.	GI-101T	Introduction to Geoinformatics	4	100	4
2.	GI-102T	Physical & Socio – Economic Environment	4	100	4
3.	GI-103T	Principles of Remote Sensing	4	100	4
4.	GI-104T	Principles of Cartography	4	100	4
5.	GI-151P	Cartographic Techniques & Field Survey	4	50	2
6.	GI-152P	Spatial Statistics	4	50	2
7.	GI-153P	Introduction to GIS	4	50	2
8.	GI-154*	Communicative English & Soft Skills	4	50	2
	Total			600	24
<b><i>SEMESTER-II</i></b>					
1.	GI-201T	Advanced G.I.S.	4	100	4
2.	GI-202T	Environmental Studies	4	100	4
3.	GI-203T	Photogrammetry	4	100	4
4.	GI-204T	Programming Languages	4	100	4
5.	GI-251P	Computer Programming Lab & Visual Computing	4	50	2
6.	GI-252P	G.I.S. Applications	4	50	2
7.	GI-253P	Map & Aerial Photo Interpretation	4	50	2
8.	GI-254*	Basics of Computer Science	4	50	2
	Total			600	24

\*ADD ON COURSE: SEMESTER – I & II

Paper-I: Communicative English & Soft Skills or Combating Corruption (2 Credits).

Paper-II: Human Values and Professional Ethics or Basics of Computer Science (2 Credits)

DEPARTMENT OF GEOGRAPHY, OSMANIA UNIVERSITY  
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S.No.	Subject Code	C O U R S E	Teach ing Hrs per week	MARKS 20+80 (Theory)	CREDITS
<b>SEMESTER-III</b>					
1.	GI-301T	Urban and Regional Planning	4	100	4
2.	GI-302T	Resource Management and GIS	4	100	4
3.	GI-303T	Principles of GPS	4	100	4
4.	GI-304T**	Web G.I.S.	4	100	4
	GI-304T**	Geodatabase for GIS	4	100	4
5.	GI-351P	Cartographic Applications (Terrain, Agricultural and Urban)	4	50	2
6.	GI-352P	GIS & Map Customization and Web Technology	4	50	2
7.	GI-353P	GPS Survey	4	50	2
8.	GI-354(ID)	Basics of Geoinformatics	4	50	2
	Total			600	24
<b>SEMESTER-IV</b>					
1.	GI-401T	Digital Image Processing.	4	100	4
2.	GI-402T	Disaster Management Studies	4	100	4
3.	GI-403T**	Information Systems and Management	4	100	4
	GI-403T**	Urban GIS - Study of Hyderabad and HMDA			
4.	GI-404T**	RS & GIS Applications for Agriculture and Rural development	4	100	4
	GI-404T**	Geoinformatics in Utility Management			
5.	GI-451P	Image Analysis	8	100	4
6.	GI-456 (Project)	PROJECT (Dissertation and Viva Voce)	8	100	4
	Total			600	24
	Grand Total Marks and Credits			2400	96

ID: Inter Disciplinary Paper

\*\* Elective Paper (Discipline Centric)

**M.Sc. GEOINFORMATICS**  
**SEMESTER-I**

**THEORY PAPER-I (GI-101T)**  
**INTRODUCTION TO GEOINFORMATICS**      **(4 Credits)**

**UNIT-I**

1. Scope and Importance of Geo-informatics, Basic Concepts about Spatial Information.
2. Philosophy and Definition of GIS.
3. Geo-informatics and other Information Sciences, Approaches to the study of G.I.S.: G.I.S. as a Special field of Academic study, G.I.S. as a Branch of Information Technology.

**UNIT-II**

4. Role of RS and GIS in Geo-Informatics.
5. Geo-informatics – Spatial and Non-Spatial data Management.
  - a) Fundamentals of Data Storage, Information Organization and Data Structure, Basic File Structures;
  - b) Tabular Databases – Advantages of Databases, Types of Databases – Hierarchical Systems, Relational Systems and Object – Oriented Database System (OODS).
  - c) Data Models – Entity Relationship Model, Relational Model, Data Structure; Raster Data Structures, Vector Data Structures.
  - d) GIS Data Requirement, Sources and Collection, Methods of Data Capture – Scanning,
6. Digitization and Associated Errors, Conversion from other Digital Sources, Attribute Data Input and Management, Edge Matching, Creating Digital Data – Remote Sensing, Generating Data from Existing Data; Metadata, Different Kinds of Geospatial Data, Detecting and Evaluating Errors, Data Quality Measurement and Assessment, Digital Output Options.

**UNIT-III**

7. Components of GIS: Hardware, Software and Liveware.
8. Maps and G.I.S.
  - a) Vector and Raster Data Query.
  - b) Topological Relationships, Creation of Topology and Error Correction.
  - c) Accuracy and Precision - The Importance of Error, Accuracy and Precision, Types of Error, Sources of Error and Data Quality.
9. Geographic Visualization.

**UNIT-IV**

10. Spatial Information Technology;
  - a) Image Storage Formats, Data Retrieval, Data Compression, NSDI, GSDI.
  - b) GIS as DSS.
  - c) Human Resources and Education.
  - d) Interactive Data Exploration.
11. G.I.S. as a Spatial Data Institution and its Social Implications.
12. Information and Communication Technologies; Internet, Web Technology and Geo-informatics – MIS, DBMS.

## **REFERENCES:**

1. Kang-Tsung Chang 2002, 'Introduction to Geographic Information Systems' Tata McGraw Hill, New Delhi.
2. C. P. Lo and Albert K. W. Yeung 2005 "Concepts and Techniques of Geographic Information Systems" Prentice Hall of India, New Delhi.
3. Burrough Peter A. and Rachael McDonnell -Principles of Geographical Information Systems, Oxford University Press, New York, 1998.
4. Maguire David J., Goodchild Michael F., P. A. Longley and Rhind David W. - Geographical Information Systems: Principles, Techniques, Management and Applications, Longman Group, U. K, 1991.
5. Goodchild M. F. and Karen K. Kemp – Developing a Curriculum in GIS: The NCGIA Core Curriculum Project, University of California, Santa, Barbara 1990.
6. Ian Heywood, Sarah Cornelius and Steve Carver – An Introduction to GIS, Longman, New York, 2000.
7. Mishra H. C. – A Handbook on GIS, GIS India, Hyderabad, 2000.
8. Smith T.R. and Piquet D. - GIS London Press, London, 1985.
9. Taylor DRF – GIS: The Micro Computer and Modern Cartography, Pergamon Press, Oxford, 1991.
10. C. P. Lo, Yeung and Albert K. W. - Concepts & Techniques of Geographical Information Systems, Prentice Hall of India, New Delhi, 2003.
11. Qihao Weng – Remote Sensing and GIS Integration: Theories, Methods and Applications, McGraw Hill, 2010.
12. Gottfried Konecny – Geoinformation: Remote Sensing, Photogrammetry and Geographic Information System, Taylor and Francis, Newyork and London, 2003.
13. Sahab Fazal – GIS Basics, New Age International Publisher, 2008.
14. Rolf A.de By (Ed) – Principles of Geographic Information System: An Introductory Text Book, ITC Educational Textbook Series, Netherland, 2001.

**THEORY PAPER-II (GI-102T)**  
**PHYSICAL & SOCIO-ECONOMIC ENVIRONMENT**      (4 Credits)

**UNIT-I**

1. Interior of the Earth, Pangea, Slow and Sudden Movement of Earth.
2. Processes of Landforms: Faulting, Folding, Earthquakes and Volcanoes.
3. Erosional & Depositional Features of Rivers, Glaciers, Wind and Underground Water.

**UNIT-II**

4. Structure and Composition of the Atmosphere.
5. Factors effecting Insolation –Heat Budget.
6. Ocean: Ocean Relief, Temperature, Salinity & Oceanic Circulations.

**UNIT-III**

7. Population: Factors influencing, Distribution and Characteristics of World Population.
8. Population Theories, Growth Trends.
9. Population Density, Optimum Population.

**UNIT-IV**

10. Types of Economies: Primary, Secondary, Tertiary and Quaternary.
11. Factors for Location of Agriculture, Factor for Location of Industry.
12. Locational Theories: Von Thunen Theory, Johnson Theory, Weber's Theory.

**REFERENCES:**

1. William David Thornbury -Principles of Geomorphology, Wiley Eastern Ltd, New Delhi 1993.
2. Phillip G. Worcester 'A Text Book of Geomorphology', East-West Press Pvt. Ltd., New Delhi 1961.
3. Alan Strahler with Zeeya Merali – Visualizing Physical Geography (8<sup>th</sup> Edition), Willey Visualizing, 2007.
4. John Innes Clarke: 'Population Geography', Pergamon Press, Oxford 1965.
5. Garnier J. B.: 'Geography of Population, St. Martin's Press, New York, 1966.
6. Majid Husain: 'Agricultural Geography', Rawat Publication, New Delhi 2007.
7. R. Knoweles and J. Wareing: 'Economic and Social Geography Made Simple', Rupa & Co., New Delhi 2005.
8. Hamblin W. K. and Christiansen E. H. – Earth Dynamic Systems (10<sup>th</sup> Edition), John Willey and Sons, 2013.
9. Robert W. Christopherson – Geosystems: An Introduction to Physical Geography, Pearson Prentice Hall, New Jersey, 2005.
10. Michael Craghan – Physical Geography: A Self Teaching Guide, John Willey & Sons Inc., 2003.
11. Peter Smithson, Ken Addison and Ken Atkinson – Fundamentals of Physical Environment, Taylor and Francis, New York and London, 2008.
12. Robert E. Gabler, James F. Peterson, L. Michael Trapasso, Dorothy Sack – Physical Geography 9<sup>th</sup> Ed<sup>th</sup>. Brooks/Cole, Cengage Learning 2009.
13. Richard John Hugget – Fundamentals of Geomorphology (2<sup>nd</sup> Edition), Routledge Taylor and Francies Group, London and New York, 2007.
14. R. B. Mandal, Joseph Uyanga and H. Prashad – Introductory Methods in Population Analysis, Concept Publication Co. New Delhi, 2007.
15. Arun Kumar Sharma – Population and Society: Present Scenario and Future Prospect, Concept Publication Co., New Delhi, 2012.

**THEORY PAPER-III (GI-103T)**  
**PRINCIPLES OF REMOTE SENSING** (4 Credits)

**UNIT-I**

1. Introduction to Remote Sensing: Definition, Concept and Types of Remote Sensing.
  - i) Passive Remote Sensing.
  - ii) Active Remote Sensing.
2. History of Remote Sensing :-
  - a) The Early Age (1839 – 1907).
  - b) The Middle Age (1908 – 1948).
  - c) The Modern Age (1949 onwards).
3. Energy flow From Source to Sensors :-
  - a) Electro Magnetic Energy: Definition and Concept.
  - b) Characteristics of Electro Magnetic Radiation and its interaction with the Atmosphere.
  - c) Electromagnetic Spectrum.

**UNIT-II**

4. Remote Sensing Platforms, Atmospheric Window.
5. Spectral Reflectance Curve :-
  - a) Spectral Signatures.
6. Scanning System :-
  - a) Multispectral.
    - i) Across Track Scanning.
    - ii) Along Track Scanning.
  - b) Thermal Imaging.

**UNIT-III**

7. Sensors Resolution: - Spatial, Spectral, Radiometric and Temporal Resolution.
8. Types of Errors and Rectifications.
9. Geometry of Remote Sensing :-
  - a) Orbit of Satellites:-
    - i) Geosynchronous.
    - ii) Geostationary.
    - iii) Sun Synchronous.
  - b) Swath, Nadir and IFOV.

**UNIT-IV**

10. Characteristics of IRS, LANDSAT, IKONOS, SPOT.
11. Ground Truth.
  - a) Definition.
  - b) Parameters of Ground Truth.
12. Types of Imageries:
  - a) Aerial Photography.
  - b) Satellite Imagery.
  - c) RADAR Imagery
  - d) LiDAR and UAV.

**REFERENCES:**

1. Nejel Veziroglu - Remote Sensing: Energy, Related Studies, Hemisphere Publishing Corporation, Washington, 1975.
2. Paul J. Curran - Principles of Remote Sensing, English Language Book Society, London, 1988.

3. Robert G. R. - Manual of Remote Sensing vol. I & II, American Society of Photogrammetry, New York, 1975 & 1978.
4. Phillip H. Swain & Shirley M. Davis - Remote Sensing: The Quantitative approach, McGraw Hill International Book Co., 1978.
5. Thomas M. Lillesand & Ralph W. Kiefer - Remote Sensing & Image Interpretation, John Wiley & Sons, New York 1987.
6. Deekshatalu B.L. & Rajan Y. S. - Remote Sensing, Indian Academy of Sciences, 1984.
7. Basudeb Bhatta - Remote Sensing and GIS, Oxford University Press, 2008.
8. James B. Campbell and Randolph H. Wynne – Introduction to Remote Sensing (5<sup>th</sup> Edition), The Guilford Press, New York and London, 2011.
9. W. G. Rees – Principles of Remote Sensing (2<sup>nd</sup> Edition), Cambridge University Press, 2001.
10. R. C. Olsen – Remote Sensing from Air and Space, SPIE Press, USA, 2006.
11. Thomas M. Lillesand and Ralf W. Kiefer – Remote Sensing and Image Interpretation (4<sup>th</sup> Edition) John Willey & Sons Inc.
12. P. S. Ray, R. S. Dwivedi and D. Vijayan – Remote Sensing Applications, NRSC, Hyderabad, 2010.



**THEORY PAPER-IV (GI-104T)**

**PRINCIPLES OF CARTOGRAPHY**

**(4 Credits)**

**UNIT-I**

1. History of cartography:
  - a) Sequence of development.
  - b) Impact of changing ideas.
  - c) Concept of Representation.
  - d) Concept of Distribution.
  - e) Impact of Changing Technology.
2. Nature and Scope of Cartography:-
  - a) Scope of Cartography.
  - b) Needs for Maps: - Basic Characteristics of Maps.
  - c) Cartographer as a Consultant.
3. Types of Maps: - Classed by Scale, Functions & Subject matter.

**UNIT-II**

4. Map Scale, Projections and Co-ordinate Systems: -
  - a) Types of Scales: Statement, R. F., Graphic Scales.
  - b) Transforming the map scale.
  - c) Map Projections: - Definition, Types of Projections: - Based on Property, Surface, Aspect and Source of Light.
  - d) Coordinate Systems: - Rectangular, Geodetic & Cartesian.
5. Cartographic Design & Methods: -
  - a) Map Designing: Design Principles, Controls on Map Design and Elements of Map design.
6. Design Planning: - Choropleth, Isopleth, Dot and Choro-Chromatic methods.

**UNIT-III**

7. Generalization: - Elements of Generalization, Controls of Generalization, Manipulations.
8. Symbolization: Types of symbols: - Qualitative and Quantitative, Point, Line and Area. Measurement Levels, Feature Dimensions, Shape, Size, Colour and Patterns. Selection and Simplification of Symbols.
9. Colours and Patterns in Cartography: -
  - a) Nature of Colour: - Colour Trol Chart, Dimensions of Colour, Vision, Functions of Colours and Patterns.
  - b) Selection of Colours for Mapping.

**UNIT-IV**

10. Types of Graphs: - Line Graph, Bar Graph, Combine Line and Compound Bar Graph, Polygraph, Band Graph, Climo-Graph, Hyther Graph, Ergo Graph.
11. Types of Diagrams: Star Diagram, Wheel Diagram, Wind Rose, Age and Sex Pyramid, Flow Maps, Cartograms and Histograms, Importance of using Graphs and Diagrams in Cartography.
12. Digital cartography: -
  - a) Types of Data: Spatial, Non-Spatial (Attribute) and DBMS.
  - b) Organization, Comprehension, Manipulation, Analysis and Display of Digital Data.
  - c) Automation and Map Reproduction.

**REFERENCES:**

1. Robinson A. H. et al - Elements of Cartography, John Wiley & Sons. New York, 1978.
2. Monkhouse F. J. & Wilkinson - Maps & Diagrams, Methuen & Co. London, 1967.

3. Raisz and Erwin - Principles of Cartography, McGraw Hill, New York, 1962.
4. Campbell John - Introductory Cartography, Prentice Hall, Inc. Englewood Cliff, New.
5. Lawrence G. R. P. - Cartographic Methods, Methuen, London, 1974.
6. Menno- Jan Keraak and Ferjan Ormeling – Cartography: Visualization of Spatial Data (3<sup>rd</sup> Edition), Prentice Hall, 2010.
7. Gretchen N. Peterson – GIS Cartography: A guide to Effective Map Design, CRC Press, Taylor and Francis Group, 2009.
8. John Krygier and Denis Wood – Making Maps: A Visual Guide to Map Design for GIS, The Guilford Press, New York and London, 2005.
9. Judith A. Tyner – Principles of Map Designing, The Guilford Press, New York and London, 2010.

**PRACTICAL PAPER-I (GI-151P)**

**CARTOGRAPHIC TECHNIQUES AND FIELD SURVEY**

**(2 Credits)**

1. Map Scale – Types of Scales, Scale Conversion.
2. Map Projections: Cylindrical, Conical & Zenithal projection, UTM Projection
3. Techniques of Mapping – Choropleth, Flow Diagram, Interpolation Techniques, Isopleth Mapping, Triangular Graphs.
4. Symbolization - Preparation of Thematic Maps using - Point, Line, Area Symbols.
5. Importance of Field Survey – Principles & Applications with reference to:
  - a. Chain Survey – Triangulation method.
  - b. Plane Table Survey, Plan Preparation, Resection
  - c. Prismatic Compass Survey – Open & Closed Traverse; Elimination of Error.
  - d. Total Station Surveying.
  - e. GPS and DGPS Surveying.

**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. Lewis , Peter – Maps and Statistics , Methuen and Co., Ltd., London , 1977.
5. Dickinson , G.C. – Maps and Air Photos , Edward Arnold Ltd., London , 1969.
6. Cuff , D.J. and Mattson , M.J. – Thematic Maps : Their Design and Production , Methuen , New York 1982.
7. Mishra R. P. and Ramesh A – Fundamentals of Cartography, Concept Publishing Company, New Delhi, 1989.
8. Judith A. Tyner – Principles of Map Design, The Guilford Press, New York, London, 2010.
9. Getchen N. Peterson – GIS Cartography: A Guide to Effective Map Design, CRC Press, Taylor and Francis, New York and London, 2009.
10. John Krygier and Denis Wood – Making Maps: A Visual Guide to Map Design for GIS, The Guilford Press, New York and London, 2005.

**PRACTICAL PAPER-II (GI-152P)**

**SPATIAL STATISTICS**

**(2 Credits)**

1. Introduction to Spatial Statistics.
2. Measurement Scales: Nominal, Ordinal, Interval, Ratio.
3. Spatial distributions – Nearest Neighbour Analysis, Rank Size Rule.
4. Simple Correlation and tests of significance.
5. Regression and Ratio of variation.
6. Residuals from regression – Maps of residuals.
7. Measures of inequality – Location quotient, Lorenz curve.
8. Network Analysis – Measures of centrality and connectivity.
9. Multivariate Analysis.

**REFERENCES:**

1. Elhance D. N. – Fundamentals of Statistic, Kitab Mahal Allahabad, 1972
2. Gregory S. – Statistical Method and the Geographer, Longman, London, 1963
3. Cole J. P. & King C. A. M. – Quantitative Methods in Geography, John Willey & Sons, New York, 1968.
4. Kafka F. & G. Simpson – Basic Statistics, Oxford & I.B.H. Publishing Co., Calcutta, 1971.
5. Jones P. A. – Field Work in Geography, Longman, London, 1968.
6. Johnston R. A. - Multivariate Statistical Analysis in Geography, Longman, London, 1978
7. King L. J. - Statistical Analysis in Geography, Prentice Hall, Englewood Cliffs, New Jersey, 1978.
8. Steve McKillup and Melinda Darbi Dyar – Geostatistics Explained, Cambridge University Press, UK, 2010.
9. Alan E. Gelfand, Peter J. Diggle, Montserrat Fuentes and Peter Guttorp – Hand book of Spatial Statistics, CRC Press, Taylor and Francis, New York and London, 2010.
10. Michael Sherman – Spatial Statistics and Spatio Temporal Data: Covariance Functions and Directional Properties, John Willey and Sons Ltd., 2011.
11. Brian D. Ripley – Spatial Statistics, John Willey and Sons Ltd., New York and London, 2004.
12. Carlo Gaetan and Xavier Guyon – Spatial Statica and Modeling, Springer, 2010.

**PRACTICAL PAPER-III (GI-153P)**

**INTRODUCTION TO GIS**

**(2 Credits)**

1. Fundamentals of Computers, Components of Computers; Input unit, memory unit, Central processing unit & Output unit.
2. Computer Software Operating Systems & Commands.
3. Scanning and Digitization of Maps
4. Geo Referencing & Editing of layers
5. Creating Attribute Data and Editing
6. Creation of Maps – Choropleth & Dot Maps.
7. Fundamentals of GPS – Hand Held GPS and Differential GPS (Static and Kinematic Mode)
8. Identification of Location & Altitude with G.P.S.
9. Position fixing and route navigation using hand held GPS.
10. GPS for GIS and Mapping.

**References:**

1. Taylor D. R. F - GIS: The Microcomputer 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. Ltd., 2002.
3. Heywood I., Cornelius S. and 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. Hfmann W. - GPS Theory and Practice, H. Lichtenegger & J. Collins, Springer-Wien, New York.
7. Bob Booth and Andy Mitchell – Getting Started with ArcGIS: GIS by ESRI, ESRI Publications, USA.
8. Gergory T. French – Understanding The GPS: An Introduction to Global Positioning System, GeoResearch Inc., USA, 1996.
9. Elliot D. Koplán and Christopher J. Hegarty – Understanding GPS: Principles and Applications, Artech House, Boston, London, 2006.
10. Ahmed El-Rabbani – Introduction to GPS: The Global Positioning System, Artech House, Boston, London, 2002.

**M.Sc. – GEOINFOMATICS**  
**SEMESTER – II**

**THEORY PAPER-I (GI-201T)**  
**ADVANCED G.I.S.**

**(4 Credits)**

**UNIT-I**

1. Data Capture, Storing, Retrieval, Manipulation, Querying, Analysis and Graphical Display.
2. Types of Data used in G.I.S. – Spatial, Non-Spatial (Attribute) and Temporal.
3. Spatial Data Models and Structures: Raster Data Models and Vector Models – Spaghetti, Point Dictionary and Topology Models, Raster Data Compaction Methods – Chain Coding, Run-Length, Encoding, Block Coding and Quad-Tree-Raster, Vector Model Verses Raster Models, Non-Spatial Data Structures – Hierarchical, Network, Relational and Object-Oriented Methods.

**UNIT-II**

4. Geo-Referencing and Geo-Coding, Continuous, Direct, Relative and Discrete Georeferencing Systems, Addresses Geocoding.
5. Data Input Methods in GIS Environment: Key Board Entry, Manual Digitizing, Scanning and Automatic.
6. Digitizing Data Capturing with GPS and Digital Imageries – Detecting and Correcting Errors in GIS Data Types and Sources of Errors – Data Reduction and Generalization, Edge Matching and Rubber Sheeting.

**UNIT-III**

7. Spatial Data Analysis: Data Measurements Methods, Reclassification Single Layer Operations, Multiple Layer Operations, Data Query – Buffering, Network Proximity and Overlay Analysis.
8. Digital Terrain Modeling – Definitions – DTM, DSM, DEM, DTED, TIN – Approaches to Digital Terrain Data Sampling – Systematic and Adaptive – Characteristics of DEM and TIN.
9. Digital Terrain Visualization and Processing, Applications and uses of Digital Terrain Models.

**UNIT-IV**

10. G.I.S. Application areas – Resources Management, Urban Planning, Rural Development, Land Management, Forest Management, Demographic Studies, Property Development.
11. Decision making in a G.I.S. Context – Role of Information in the Decision Making Process of Data Transformation and Stages of Decision Making – DSS Characteristics – GIS as a Tool of Decision Making and Accelerating the Process.
12. Other forms of GIS in Specialized Fields: MIS, LIS, LIMS, FIS, ENVIS, RMIS
13. Recent trends in GIS: Open source GIS- Cloud computing, crowd sourcing and open geospatial consortium, Mobile 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 HC – 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.

**THEORY PAPER-II (GI-202T)**  
**ENVIRONMENTAL STUDIES** (4 Credits)

**UNIT-I**

1. Environmental Studies – Content, Scope and Relationship with other disciplines, Environmental Types and Components.
2. Eco System – Meaning of Eco System, Types of Eco System and Components of Eco System. Biodiversity
3. Biomes – Meaning of Biome, Biome Types – Terrestrial and Aquatic Biome.

**UNIT-II**

4. Environmental Degradation and Environmental Pollution – Meaning, Types of Environmental Degradation, Causes and Effects of Degradation – Definition of Pollution, Types of pollution - Air, Water, Soil and Noise Pollution.
5. Environmental Impact Assessment– Meaning and concept of EIA, Methods of EIA, various steps in EIA, Procedures for EIA.
6. Environmental Information System – Broad Objectives – Long Term and Short Term Objectives, Salient features of Environmental Information System.

**UNIT-III**

7. Application of G.I.S. and Remote Sensing in Environmental Protection – LULC Mapping, Flood Hazard Mapping and Zonation, Hydro-Morphological Studies and Wasteland Mapping.
8. Global Ecological Database.
9. Sustainable Development – Concept of Sustainable Growth and Development.

**UNIT-IV**

10. Environmental Movement and Policies in India – Bishnoi Movement, Chipko Movement, Narmada Bachao Andolan, Baliyapal Movement, Tehri Dam and Silent Valley. Environment Planning and Legislation in India.
11. Global Environmental Problems and International Conventions – Major Global Problems, Global Warming - Climate Changes and its Impact.
12. International Co-operations, Earth Summits, Kyoto Protocol.

**REFERENCES:**

1. David Harvey - Justice, Nature and Geography of Difference, Blackwell, 2000.
2. John Bellamy Foster - The Valuable Planet, Monthly Review Press, 1994.
3. Savindra Singh - Environmental Geography, PPB, 2000.
4. David Pepper - Eco-socialism: From Deep Ecology to Social Justice, Routledge, 1993.
5. Gadgil M. & R. Guha - This Fissured Land: An Ecological History of India, OUP, 1995.
6. Guha R. - The Unquiet Woods, OUP. 2000.
7. John McCormick - The Global Environmental Movement, JWS, 1995.
8. Reiner Grundmann - Marxism and Ecology, Clarendon Press, Oxford, 1991.
9. Desai V. & Potter R. B. (ed) - The Companion to Development Studies, 2002.
10. The Hindu - Survey of the Environment 2002.
11. Down to Earth-Science and Environment (Fortnightly Journal).
12. Bill McGuire, Ian Manson and Christopher Kilburn – Natural Hazards and Environmental Change, Oxford University Press Inc. New York, 2002.
13. John C. Pine – Natural Hazards Analysis: Reducing the Impact of Disasters, CRC Press, Taylor and Francis Group, London, New York. 2008.

**THEORY PAPER-III (GI-203T)**  
**PHOTOGRAMMETRY**

**(4 Credits)**

**UNIT-I**

1. Meaning, History and Purpose of Photogrammetry.
2. Atmospheric Window used for Aerial Photography.
3. Image Sources: Analogue and Digital.

**UNIT-II**

4. Photogrammetric Evaluation Methods (Geometric Aspects): Camera Position, Focal length, Image Orientation and Relative Camera Position (Stereo).
5. Classification of Aerial Photographs.
6. Ortho Photos, Stereo Pairs and Mosaics.

**UNIT-III**

7. Stereoscopic Vision & Depth Perception.
8. DTM Creation and DEM Extraction, Ortho photo Generation.
9. Aerial Triangulation, Coordinate Transformation in 2D and 3D.

**UNIT-IV**

10. Flight Planning & Acquisition of Aerial Photographs.
11. Errors in Aerial Photography.
12. Application of Aerial Photographs: Land use land cover mapping, Urban Studies, Topographic Mapping, Architecture, Engineering, and Geology.

**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. Sloma C.C. Manual of Photogrammetry, American Society of Photogrammetry, Virginia, 1980.
5. Zhilin Li, Jun Chen and Emmanuel Baltsavias (Edt) - Advances in Photogrammetry, Remote Sensing and Spatial Information Science, ISPRS Congress Books, 2008.
6. Yves Egeles and Michael Kasser – Digital Photogrammetry, Taylor and Francis, London and New York, 2002.
7. Wilfried Linder – Digital Photogrammetry: A Practical Course (2<sup>nd</sup> Edition), Springer, 2005.
8. Thomas M. Lillesand and Ralf W. Kiefer – Remote Sensing and Image Interpretation (4<sup>th</sup> Edition) John Willey & Sons Inc.
9. Schenk T. – Digital Photogrammetry (Vol-1), Terra Science, 1999.
10. Linder Wilfried – Digital Photogrammetry: A Practical Course (3<sup>rd</sup> Edition), Springer, 2009.



**THEORY PAPER-IV (GI-204T)**

**PROGRAMMING LANGUAGES**

**(4 Credits)**

**UNIT-I**

1. Application and use of different Programming languages in GIS Environment (C, JAVA, Dot NET, SQL)
2. C. Language: - Introduction to C, Variables, Data types, if statements, if-else, Nested its statements (Conditional Statement), Interactive, Statements (Programs using Interactive Statements).
3. Concept of Arrays, 1-D, 2-D, 3-D, arrays, Concept of functions (functions), Recursive functions (Programs using these concepts).

**UNIT-II**

4. Structures, Unions, Files concept, Graph concept - Plotting concepts and Enumerated Data Types.
5. SQL: Spatial Data Queries, Data Manipulation, Transaction Controls, Data Definition, Data Control, Procedural Extensions, Editing Geodatabase Data in SQL, Creating Tables with SQL.
6. SQL Server: Creating Geodatabase in SQL Server.

**UNIT-III**

7. Visual Basic: Date types, G.U.I's concept (Designing Screens)
8. VB.Net: Data Base connectivity concept (connecting the front end tool with backend).
9. VB.Net: Writing procedures for retrieval of data, Developing Applications.

**UNIT-IV**

10. JAVA Programming.
11. Python Programming.
12. Arc Macro Language (A.M.L.) in Arc Info, Avenue (in ARCVIEW)

**REFERENCES:**

1. Let us C by Yashwanth Kanithkar
2. ESRI Publications
3. C Programming by Balaguru Swamy
4. C Programming by Kochan
5. Complete reference using C – C.C.R.
6. Practical V.B. 6 – Bob Reselmanu and Richard Peasley.
7. The complete reference VB 6 – Noel Jeske.

**PRACTICAL PAPER-I (GI-251P)**

**COMPUTER PROGRAMMING LAB AND  
VISUAL COMPUTING**

**(2 Credits)**

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. Arc GIS Applications
9. Using controls to build a form
10. Branching and Looping in VBA
11. Working with Variables and Functions in VBA
12. Adding layers to a map
13. Defining layer symbology
14. Querying data.
15. Creating ActiveX DLLs and added to the ArcGIS applications.
16. Coding in VB.Net
17. Introduction to ArcGIS Engine
18. Using the Map Control, TOC Control, Toolbar control.

**REFERENCES:**

1. Let us C by Yashwanth Kanithkar
2. ESRI Publications
3. C Programming by Balaguru Swamy
4. C Programming by Kochan
5. Complete reference using C – C.C.R.
6. Practical V.B. 6 – Bob Reselmanu and Richard Peasley.
7. The complete reference VB 6 – Noel Jeske.

**PRACTICAL PAPER-II (GI-252P)**

**G.I.S. APPLICATIONS**

**(2 Credits)**

1. GIS Single layer operations - Clip, Split, Dissolve, Map Join, Buffering.
2. Overlay Functions in G.I.S. – Union, Intersect, Identity,
3. Simple and complex querying using GIS Data.
4. Network Analysis
5. Techniques of Interpolation.
6. Digital Elevation Models.

**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. Ltd., 2002.
3. Heywood I., Cornelius S. and 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. Bob Booth and Andy Mitchel – Getting Started with ArcGIS: GIS by ESRI, ESRI Publications, USA, 2012.

**PRACTICAL PAPER-III (GI 253-P)**  
**MAP AND AERIAL PHOTO INTERPRETATION**

**(2 Credits)**

1. Interpretation of Indian Topographical Maps.
2. Interpretation of Weather Maps
3. Characteristics of Aerial Photographs.
4. Drawing of flight line.
5. Generating 3D view from Stereo Pairs and Interpretation
6. Digital Aerial Photo Interpretation.

**ReferenceS:**

1. Monkhouse F. J. – Maps and Diagrams, Methuen and Co., London, 1967.
2. Robinson A. H. – Elements of Cartography, John Willey and Sons, New York, 1982.
3. Sing R. L. – Elements of Practical Geography, Kalyani Publishers, New Delhi, 1994.
4. Mejal Veziroglu – Remote Sensing: Energy related studies, Hemisphere Publishing Corporation, Washington, 1975.
5. David P. Paine – Aerial Photography and Image Interpretation for Resource Management, John Wiley & Sons, New York, 1981.
6. G. Dury & J. A. – The land from the Air: A Photographic Geography, London, 1978.
7. Gautam N. C. – Urban land use studies through Aerial photo interpretation techniques, Pink Publishing House, 1978.
8. David P. Paine – Aerial Photography and Image Interpretation for Resource Management, John Wiley & Sons, New York, 1981.
9. Gautam N. C. - Urban landuse Studies through Aerial photo interpretation techniques, Pink Publishing, House, 1978.
10. Dickinson, G.G. – Maps and Aerial Photographs, Edward Arnold Ltd., London, 1969.
11. Paul W. Wolf – Elements of Photogrammetry.
12. Zhilin Li, Jun Chen and Emmanuel Baltsavias (Edt) - Advances in Photogrammetry, Remote Sensing and Spatial Information Science, ISPRS Congress Books, 2008.
13. Yves Egeles and Michael Kasser – Digital Photogrammetry, Taylor and Francis, London and New York, 2002.
14. Wilfried Linder – Digital Photogrammetry: A Practical Course (2<sup>nd</sup> Edition), Springer, 2005.
15. Thomas M. Lillesand and Ralf W. Kiefer – Remote Sensing and Image Interpretation (4<sup>th</sup> Edition) John Willey & Sons Inc.