

**SYLLABUS**  
For  
**M. Sc. COURSE IN GEOGRAPHY**  
*2018*



**DEPARTMENT OF GEOGRAPHY**  
**FACULTY OF SCIENCE**  
**JADAVPUR UNIVERSITY**

### PG Course Structure in Geography

Paper	Semester I	Semester II	Semester III	Semester IV
Theoretical	4 (200)	4 (200)	3 (150)	3 (150)
Practical	2 (100)	2 (100)	3 (150)	3 (150)
Total	6 (300)	6 (300)	6 (300)	6 (300)
<b>GRAND TOTAL</b>	<b>1200</b>			

#### Outline of the Syllabus

<b>1<sup>st</sup> Year 1<sup>st</sup> Semester: 300 Marks</b>				
PAPER	SUBJECT	UNIT	MARKS	PERIODS PER WEEK
GEOG-101T	Quaternary Geomorphology	5	50	
GEOG-102T	Hydrology and Oceanography	5	50	
GEOG-103T	Contemporary Ideas in Human Geography	5	50	
GEOG-104T	Geography of Development	5	50	
GEOG-105P	Quantitative Techniques in Physical Geography-I	5	50	
GEOG-106P	Advanced Statistical Techniques	5	50	
<b>1<sup>st</sup> Year 2<sup>nd</sup> Semester: 300 Marks</b>				
PAPER	SUBJECT	UNIT	MARKS	PERIODS PER WEEK
GEOG-107T	Synoptic and Applied Climatology	5	50	
GEOG-108T	Soil Science and Biogeography	5	50	
GEOG-109T	Spatial Dimensions of Culture and Society	5	50	
GEOG-110T	Global Resource Crisis and Geopolitical Issues	5	50	
GEOG-111P	Quantitative Techniques in Physical Geography-II	5	50	
GEOG-112P	Quantitative Techniques in Human Geography	5	50	
<b>2<sup>nd</sup> Year 1<sup>st</sup> Semester: 300 Marks</b>				
PAPER	SUBJECT	UNIT	MARKS	PERIODS PER WEEK
GEOG-213T	Geo-informatics (Theory)	5	50	
GEOG-214T	Theories and Models of Regional Development	5	50	
GEOG-215T	Elective Paper-I (Theory)	5	50	
GEOG-216P	Geo-informatics (Practical)	5	50	
GEOG-217P	Elective Paper-I (Practical)	5	50	
GEOG-218P	Field Survey and Community Outreach Programme	-	50	
<b>2<sup>nd</sup> Year 2<sup>nd</sup> Semester: 300 Marks</b>				
PAPER	SUBJECT	UNIT	MARKS	PERIODS PER WEEK
GEOG-219T	Geography of Hazards	5	50	
GEOG-220T	Geography of Leisure and Tourism	5	50	
GEOG-221T	Elective Paper-II(Theory)	5	50	
GEOG-222P	Elective Paper-II (Practical)	5	50	
GEOG-223P	Dissertation	-	50	
GEOG-224P	Seminar Presentation (Dissertation)	-	25	
	Grand Viva	-	25	

#### Elective Papers

Subject Core	Elective I		Elective II	
	Code	Name	Code	Name
Physical Geography	A	Watershed Management	A	Coastal Management
	B	Landscape Ecology	B	Environmental Planning and Management
Human Geography	C	Rural Planning and Management	C	Urban Planning and Management
	D	Population Studies	D	Geography of Well Being

# Syllabus

## 1<sup>st</sup>Year 1<sup>st</sup> Semester: 300 Marks

### **GEOG-101T: Quaternary Geomorphology**

**Total Marks: 50 (Semester Examination - 40 and Internal Assessment - 10)**

- Unit I: Concepts and Techniques in Geomorphology:** Definition of Quaternary; Quaternary Stratigraphy; Oxygen Isotope Stratigraphy, Biostratigraphy and Magneto Stratigraphy; Neotectonics; Process Geomorphology; System Approach and Feedback Mechanism; Hillslope Evolution Theories (Wood, Savigere, Young); Erosion Surface
- Unit II: Channel Morphology and Drainage Basin:** Flow Patterns in Open Channel; Velocity Distribution; Channel Geometry; Stream Power; Channel Processes and Forms; Channel Classification; Concept of Channel Stability; Concept, Delineation, and Utilities of Drainage Basin
- Unit III: Geomorphological Processes and Landforms:** Landform Development in the Quaternary – Glacial Cycles; Eustatic Changes; Glacial Isostasy; Periglacial Processes and Landforms; Dynamics of Fluvial Accretional Landforms
- Unit IV: Applied Geomorphology:** Scope; Anthropogenic Geomorphology; Geomorphology in Hazard Management; River Restoration; Urban Geomorphology
- Unit V: Internal Assessment**

### **GEOG-102T: Hydrology and Oceanography**

**Total Marks: 50 (Semester Examination - 40 and Internal Assessment - 10)**

- Unit I: Hydrological Systems:** Concept of Watershed; Rainfall-runoff Controls; Evapotranspiration, Infiltration and Runoff Fluxes; Groundwater Storage; Types and Characteristics of Aquifers; Fresh and Salt-Water Relationships in Coastal and Inland Areas
- Unit II: Models and Theories in Hydrology:** Stream-flow and Flood Relationships; Stage-Discharge Relationship; Theory of Groundwater Flow; Darcy's Law and Its Applications; Linear and Kinematic Wave Models; Overland Flow Model
- Unit III: Physical Oceanography:** Structural and Morphological Features of Ocean Floor; Waves - Propagation, Refraction, and Reflection; Tide Mechanism; Sea-level Change Types; Tsunami Wave Formation and Propagation
- Unit IV: Dynamic Oceanography:** Ocean Circulation; Ekman Spiral; Oceanic Eddies; Subtropical Gyres; Western Boundary Currents; Langmuir Current; Cycling and Air-Sea Exchange of Dissolved Gases; Thermohaline Circulations; Deep-Sea Ecology
- Unit V: Internal Assessment**

## **GEOG-103T: Contemporary Ideas in Human Geography**

**Total Marks: 50 (Semester Examination - 40 and Internal Assessment - 10)**

**Unit I: Post World War Perspectives in Human Geography:** Conceptualization of Space; Behavioural and Perception Studies; Locational Analysis; Theorization and Model Building; Colonialism and Post-colonialism; Structuralism and Post-structuralism; Modernism and Postmodernism

**Unit II: Critical Perspectives in Modern Geography:** Idealism, Phenomenology, and Existentialism; Radical Movement in Geography; Fordism and Post-Fordism; Neo-Marxism; Social Justice

**Unit III: Changing Trends in Human Geography in the Late 20<sup>th</sup> Century:** Humanistic Geography; Welfare Approach and Geography of Inequality; Geographies of Consumption; Diaspora, Identity Crisis and Ageing; Geography of Gender and Feminism

**Unit IV: Emerging Ideas in Geographical Research:** Emotional Geographies; Geography of Power; Security and Surveillance; Space-time Compression; Political Ecology; Iconography

**Unit V: Internal Assessment**

## **GEOG-104T: Geography of Development**

**Total Marks: 50 (Semester Examination - 40 and Internal Assessment - 10)**

**Unit I: Basic Concepts of Economic Organization:** Physical, Economic and Institutional Bases of Economic Geography; Concept of Human Capital

**Unit II: Development Perspectives in Geography:** Defining, Conceptualizing and Measuring Development; Agents of Development; Changing Perspectives of Development and Emerging Issues; Sustainable Development

**Unit III: Environment-Society Interaction in Developing Countries:** Gender; Culture; Households; Disability; Ageing; People, Culture and Development

**Unit IV: Geographical Dimensions of Inequality:** Marginalization and Exclusion; Poverty Reduction and Inclusion; Health and Inequality

**Unit V: Internal Assessment**

## **GEOG-105P: Quantitative Techniques in Physical Geography-I**

**Total Marks: 50 (Semester Examination - 40 and Internal Assessment - 10)**

**Unit I: Morphometric Analyses of Drainage Basin:** Channel Geometry and Planform Analysis; Measurement of Hydraulic Radius and Efficiency; Estimation of Discharge and Velocity

**Unit II: Spatial Techniques in Geomorphology:** Terrain Mapping by Total Station; Geomorphological Map; Identification of Geomorphological Features from Satellite Imagery

**Unit III: Physical Analyses of Sediments:** Particle Size Determination and Distribution; Estimation of Specific Gravity and Bulk Density; Facies Analysis

**Unit IV: Quantitative Hydrology:** Rating Curve; Flood Frequency Analysis; Flood Area Estimation from Satellite Imagery; Estimation of Infiltration and Potential Evapotranspiration

**Unit V: Internal Assessment**

## **GEOG-106P: Advanced Statistical Techniques**

**Total Marks: 50 (Semester Examination - 40 and Internal Assessment - 10)**

**Unit I: Probability and Sampling Theory:** Random Variables; Normal Probability Distribution; Binomial and Poisson Distributions; Standard Error and Sample Size; Testing of Adequacy of Samples

**Unit II: Inferential Statistics:** Hypothesis Testing; Goodness of Fit; Significance and Confidence Levels; Testing Errors; One and Two Tailed Tests; Chi-square Test, Z Test, t Test, F Test

**Unit III: Regression Analyses:** Exponential and Power Law Regression; Correlation Matrix, Partial and Multiple Correlation; Multiple Linear Regression

**Unit IV: Multivariate Analyses:** Principal Component Analysis; Factor Analysis; ANOVA and ANCOVA (One-way and Two-way)

**Unit V: Internal Assessment**

# **1<sup>st</sup> Year 2<sup>nd</sup> Semester: 300 Marks**

## **GEOG-107T: Synoptic and Applied Climatology**

**Total Marks: 50 (Semester Examination - 40 and Internal Assessment - 10)**

**Unit I: Dynamics of Atmospheric Circulation:** Blackbody Radiation; Entropy and Enthalpy; Laws of Thermodynamics; Convergence-Divergence; Vertical Motion; Vorticity; Hydrostatic Equilibrium; Concepts of Primary, Secondary and Tertiary Circulations

**Unit II: Weather Disturbances and Hazards:** Easterly Waves; Heat and Cold Waves; ENSO and Calvin Waves; Thunderstorm; Tornado; Cloudburst

**Unit III: Climatic Changes, Policies and Mitigation:** Theories of Global Climate Changes; Evidences of Paleo-climate Changes; Climate Cycle; Climatic Changes during the Holocene; International Treaties and Protocols to Mitigate Climate Change - Nature and Impacts

**Unit IV: Applied Climatology:** Agro-climatology; Urban Microclimate; Synoptic Climatology; Weather Forecasting; Global Climate Models

**Unit V: Internal Assessment**

## **GEOG-108T: Soil Science and Biogeography**

**Total Marks: 50 (Semester Examination - 40 and Internal Assessment - 10)**

**Unit I: Pedogenic Processes and Forms:** Soil Mineralogy, Organic Matter and Humification; Base Exchange; Pedoturbation; Podo-transfer Processes; Concept of Soil Catena

**Unit II: Soils of Humid Tropics:** Origin, Types and Formative Processes (Leaching and Oxidation-Reduction); Resultant Features

**Unit III: Dynamic Biogeography:** Speciation, Diversification and Extinction; Evolution of Life through Geological Ages; Community; Succession and Climax; Concept of Seré; Pleistocene Megafauna Extinctions

**Unit IV: Spatial Dimensions in Biogeography:** Ecogeographic Rules; Habitat and Niche; Phytogeographic and Zoogeographic Kingdoms; Migration and Dispersal; Vicariance; Theory of Island Biogeography

**Unit V: Internal Assessment**

## **GEOG-109T: Spatial Dimensions of Human Culture and Society**

**Total Marks: 50 (Semester Examination - 40 and Internal Assessment - 10)**

**Unit I: Evolution of Human Societies:** Cultural Evolutionary Theory; Diffusion and Acculturation; Cultural Hearth and Cultural Realm; Role of Technology and Network Society; Gene Culture

**Unit II: Dichotomies in Rural-Urban Societies:** Contemporary Indian Rural Society: Caste Hierarchy and Segregation; Urban Society: Stratification and Occupational Divergence; Residential Segregation; Patterns of Dominance-Dependence

**Unit III: Changing Socio-cultural Identities and Evolution of Landscapes:** Tribal Societies – Culture and Recent Changes; Social Transformation; Tribal Movements and Conflicts

**Unit IV: Cultural Transformation in Globalizing Cities:** Metropolitan Consciousness and Cosmopolitanism; Neo-Liberalism and Global Capital; Neo-consumerism; Gated Communities; Cybercrime; Terrorism and Cities

**Unit V: Internal Assessment**

## **GEOG-110T: Global Resource Crisis and Geopolitical Issues**

**Total Marks: 50 (Semester Examination - 40 and Internal Assessment - 10)**

**Unit I: Global Resources Depletion:** Economic Activities and Use of Global Resources; Effect of Ecological Footprints on Resources; Ecological Credit Crunch

**Unit II: Energy Use Scenario and Crisis:** Present World Energy Scenario; Resources and Alternative Energy Sources; World Energy Crisis

**Unit III: Global Political Conflicts and Resources:** Tragedy of the Commons; Politics of Resources - National and International; Contemporary Case Studies; Politics of Ocean Water, Oil, Territory and River

**Unit IV: Geopolitics and Sustainable Development:** Barriers to Alternative Energy Uses; Common Property Resources and Conflicts; Roles of International Organizations in Sustainable Development (FAO, WHO, UNEP) and Relevant Treaties

**Unit V: Internal Assessment**

## **GEOG-111P: Quantitative Techniques in Physical Geography-II**

**Total Marks: 50 (Semester Examination - 40 and Internal Assessment - 10)**

**Unit I: Mapping and Representation of Weather Data:** Time Series Analysis of Climatic Data; Mean and Standard Error Estimation of Weather Data; Synoptic Station Model; Measurement of Evapotranspiration

**Unit II: Quantitative Analysis of Environmental Data:** Measurement of Noise Level; Measurement of CO<sub>2</sub> Level; Dust Fall Estimation

**Unit III: Chemical Analyses of Soil Sample:** Organic Carbon; Electrical Conductivity; Alkalinity

**Unit IV: Laboratory Techniques for Water Quality Analyses:** Measurement of Dissolved Oxygen, BOD and COD of Water; Total Suspended Solids; Total Dissolved Solids

**Unit V: Internal Assessment**

## **GEOG-112P: Quantitative Techniques in Human Geography**

**Total Marks: 50 (Semester Examination - 40 and Internal Assessment - 10)**

**Unit I: Spatial Distributions and Interactions:** Nearest Neighbour Analysis; Gravity Model; Dispersion and Concentration of Settlements; Mean Centre of Population and Standard Distance Measure; Shifting of Mean Centres

**Unit II: Measures of Inequality:** Lorenz Curve and Gini's Coefficient; Location Quotient; Index of Similarity and Dissimilarity

**Unit III: Network Analyses:** Detour Index; Transport Indices (Konig Number; Alpha, Beta, and Gama Indices); Shortest Path Matrix (Shimble's Index), Smeed's Index, Route Shape Analysis

**Unit IV: Application of Composite Indices:** Human Development Index; Gender Development Index; Kendall's Method; Bhatia's Method, Pi Index

**Unit V: Internal Assessment**



## **2<sup>nd</sup> Year 1<sup>st</sup> Semester: 300 Marks**

### **GEOG-213T: Geo-informatics (Theory)**

**Total Marks: 50 (Semester Examination - 40 and Internal Assessment - 10)**

- Unit I: Physics of Remote Sensing:** Spectral Signature and its Response of Soil, Vegetation, Built-up and Water; Thermal Infrared Radiation Properties; Methods of Transferring Heat; Thermal Properties of Terrain; Hyperspectral Imaging; Microwave Sensors, RADAR, LiDAR Sensors and Functions
- Unit II: Principles of Digital Image Processing:** System Design Considerations; Pre-Processing of Satellite Image; Atmospheric, Radiometric and Geometric Correction and Enhancement Techniques; Look-Up Tables; Filtering–Low/ High Pass and Directional/Non-Directional; Band Ratio; Types of Indices; Change Detection; Pattern Recognition; Parametric and Non-Parametric Classifiers; Unsupervised and Supervised Classifications; Accuracy Assessment
- Unit III: Database Management in GIS:** GIS Data Sources and collection; Conversion from other Digital Sources, Attribute Data Input and Management; Metadata; Errors; Data Quality Assessment, Image Storage Formats; Data Retrieval and Compression; NSDI, GSDI; Raster Data and Structure, Vector Database; Topological Relationships; Relational Language
- Unit IV: Modelling in GIS:** Geodata visualization and analysis; 2/3/4<sup>th</sup> dimension viewing; Concept of Hyper Map; Virtual Images and Web GIS; Conceptual Models; Natural and Scale Analogue Models; Mathematical Models; Modelling the Decision Making Process; Visualization Model – TIN, DEM, DTM; Interpolation, Overlay, Buffering, and Neighbourhood Functions; Network Analyses
- Unit V: Internal Assessment**

### **GEOG-214T: Theories and Models of Regional Development**

**Total Marks: 50 (Semester Examination - 40 and Internal Assessment - 10)**

- Unit I: Classical Theories:** Marxian Theory; Harrod Domar Growth Model; Schumpeter's Theory; Rostov's Growth Stage Theory; Friedman's Core Periphery Theory
- Unit II: Neo-classical Theories:** Central Place Theory (Losch); Lewis Theory of Structural Change; Neo-colonial Dependency Models; Neo-classical Growth Theory (Solow)
- Unit III: Contemporary Models:** Industrial Complex Theory; Coastal Penetration Model (Garrison); Kuznets Growth Model
- Unit IV: Emerging Issues on Regional Development:** Capacity Building; Role of Institution and Leadership; Impact of ICT and Decisions Support Systems
- Unit V: Internal Assessment**

## **GEOG-215T: Elective-I(Theory)**

### **GEOG-216P: Geo-informatics (Practical)**

**Total Marks: 50 (Semester Examination - 40 and Internal Assessment - 10)**

**Unit I: Digital Image Processing:** Reading and Displaying satellite data from BIL, BSQ, and BIP Formats; Generating True, False and Pseudo Colour Composite; Determination of Area of Interest; Geometric Correction of Satellite Image; Enhancement using Different Filters; Image Fusion; Mosaic; Image Subset; Principal Component Analysis; Band Rationing

**Unit II: Digital Image Analyses:** Unsupervised Classification; Supervised Classification; Accuracy Assessment; Class Editing; Image Statistics Generation; Change Detection Study; Class Export to Vectors; Layout Preparation

**Unit III: Data Analyses in GIS:** Measurements of Lengths, Perimeter and Area; Buffering and Neighbourhood Functions; Raster and Vector Overlay - Point-on-polygon, Line-on-polygon and Polygon-on-polygon; Spatial Interpolation; Analysis of Surfaces – Network Analysis (Shortest Path Problem, Travelling Problem, Location and Allocation of Resources)

**Unit IV: Geo-statistical Analyses:**Spatial Autocorrelation - Computation of Geary's S and Moran's I; Triangulation; Inverse Distance Average; 3D Splines; Krigging and Variogram; Kernel Density Estimation; Geographically Weighted Regression

**Unit V: Internal Assessment**

## **GEOG-217P: Elective-I (Practical)**

### **GEOG-218P: Field Survey and Community Outreach Programme**

**Total Marks: 50 (Field Report –25, Viva-voce - 15 and Community Outreach Programme - 10)**

**Unit I: Field Survey and Report:** Guidelines of execution -

1. Either a rural or an urban unit is to be conveniently selected for study. The work is to be based mainly on primary data, stressing on any local problem or any contemporary issue.
2. Duration of the field study is not to exceed seven days. The study area and supervisor(s) of the survey are to be determined by the Departmental Committee.
3. Text of the Report should not exceed 8,000 words and should ideally be divided into the following sections: Introduction, Statement of problem(s) and Objectives, Materials and methods, Results, Discussions, Conclusion, References/ Bibliography and Appendices (if any).
4. Maps, diagrams and sketches, excluding photographs, should not exceed 15 pages of A4 size paper. Every table, figure, photograph should have a caption.
5. Computer typed Report duly endorsed by the Supervisor(s) is to be produced individually by the students. Report should be typed with 1.5 Line Spacing, Arial/ Times New Roman/ Calibri Font, and 12 Font Size (Table and Figure Entries of 10 Font Size).
6. The list of references should be given at the end in the format - author(s)) name, year, article/ book title, journal name, publisher name (book), place of publication, journal volume and page numbers

**Unit II: Community Outreach Programme:** Students will pursue a Community Outreach Programme on any pertinent issue to be identified in the field area

## **2<sup>nd</sup> Year 2<sup>nd</sup> Semester: 300 Marks**

### **GEOG-219T: Geography of Hazards**

**Total Marks: 50 (Semester Examination - 40 and Internal Assessment - 10)**

**Unit I: Hazards in Spatial Context:** Distribution, Origin and Spread of Hazard over Space and Time; Global Marine Pollution; Impact of Plantation Agriculture and Green Revolution; Epidemic Outbreak

**Unit II: Society, Technology and Hazards:** Hazard and Development Paradoxes; Social Response to Hazards; Hazards and Community Adaptability; Brown and Green Technology; Understanding Exposure, Vulnerability, Risk, Resilience and Mitigation

**Unit III: Origin, Nature and Mitigation:** Arsenic, Fluoride and Nitrate Pollution; Municipal Solid Wastes; Mining Hazard; Urban Floods; Plastic Pollution; Sound Pollution; Nuclear Fallout

**Unit IV: Management of Hazards:** Roles of Public and Private Organizations, NGOs and International Donor Bodies; Management of E-wastes; Mitigation of Plastic Pollution; Role of ICT in Hazard Management

**Unit V: Internal Assessment**

### **GEOG-220T: Geography of Leisure and Tourism**

**Total Marks: 50 (Semester Examination - 40 and Internal Assessment - 10)**

**Unit I: Basic Concepts of Tourism Geography:** Scope and Content; Concept of Leisure, Recreation and Tourism; Types of Tourism; Tourism as an Interdisciplinary Study

**Unit II: Tourism and Development:** Changing Spatial Patterns of International Tourism; Infrastructure Development and Tourism; Environmental Consequences of Tourism Development; Tourism and Economic Development in Developing Countries

**Unit III: Sustainable Tourism Planning:** Ethical and Esthetical Issues in Tourism; Tourism Planning; Eco-tourism; Adventure Tourism; Geo-heritage and Geomorphosites; Tourism and Sustainable Rural Development

**Unit IV: Leisure and Recreation in Cities:** Outdoor Recreational Resources; Parks, Open Spaces, and Common Spaces in Cities; Sports and Cultural Tourism

**Unit V: Internal Assessment**

### **GEOG-221T: Elective-II (Theory)**

### **GEOG-222P: Elective-II (Practical)**

## **GEOG-223P: Dissertation**

General Guide Lines for preparing the write-up:

1. The final report should cover the following aspects. a. Introduction to the problem. b. Aims and objectives of the study. c. Methodology d. Results and Analysis. e. Conclusions f. References/ Bibliography
2. Computer typed Report duly endorsed by the Supervisor(s) is to be produced individually by the students. Report should be typed with 1.5 Line Spacing, Arial/ Times New Roman/ Calibri Font, and 12 Font Size (Table and Figure Entries of 10 Font Size).
3. The list of references should be given at the end in the format - author(s)) name, year, article/ book title, journal name, publisher name (book), place of publication, journal volume and page numbers
4. Every table, figure, photograph should have a caption and with references.
5. The total number of pages should be maximum 50 including text, figures, tables, photographs, references and appendices. Maximum word limit is 10,000.

## **GEOG-224P: Grand Viva and Seminar Presentation**

**Total Marks: 50 (Grand Viva – 25 and Seminar Presentation - 25)**

1. The students will have to face a Grand Viva Voce based on the practical papers done in the entire course of study.
2. The seminar presentation will be based on the work done by the candidate in his/her dissertation project. The candidate will have to present and justify the work done in the dissertation.

## **Elective Paper- I**

### **GEOG-215T (Elective Paper- IA): Watershed Management**

**Total Marks: 50 (Semester Examination - 40 and Internal Assessment - 10)**

**Unit I: Watershed as a Unit of Study:** Definition; Scope and Necessity; Brief History of Watershed Management; Roles of Stakeholders; Concept of Scale and Hierarchy

**Unit II: Fundamentals of Watershed Management:** Delineation of Watershed; Mapping of Watershed Characteristics; Sustainability Issues of Watershed Management; Integrated Approaches to Soil-Plant-Water Conservation; Perspective Planning and Development

**Unit III: Techniques of Watershed Management:** Farming and Irrigation Techniques; Storm Water Management; Mitigation of Flood and Drought Impacts; Management of Arid and Semi-arid Watersheds; Big Dams and River Linking Projects; Artificial Rainmaking

**Unit IV: Watershed Management Initiatives:** Multipurpose Projects; Initiatives in India: Tehri and Narmada; Watershed Hierarchy - Macro, Meso and Micro Regimes; CAPART Scheme

**Unit V: Internal Assessment**

## **GEOG-215T (Elective Paper- IB): Landscape Ecology**

**Total Marks: 50 (Semester Examination - 40 and Internal Assessment - 10)**

**Unit I: Fundamentals of Landscape Ecology:** Definition and Scope; Relations with Human Ecology, Political Ecology and Deep Ecology; Concept of Scale and Hierarchy in Landscape Studies

**Unit II: Patterns and Processes of Landscapes:** Physical, Biotic and Human Patterns of Landscapes; Change and Disturbance; Ecosystem Diversity and Services

**Unit III: Landscape Metrics and Models:** Patch, Corridor and Mosaic; Neutral Model; Diversity Indices

**Unit IV: Applied Landscape Ecology:** Habitat Fragmentation Assessment; Eco-sensitivity Zonation; Restoration of Landscapes

**Unit V: Internal Assessment**

## **GEOG-215T (Elective Paper- IC): Rural Planning and Management**

**Total Marks: 50 (Semester Examination - 40 and Internal Assessment - 10)**

**Unit I: Basic Concepts of Rural Planning:** Scope and Content; Facets of Rural Societies; Origin and Evolution of Rural Planning; Planning for Rural Development

**Unit II: Planning Process:** Multi-Level Planning; District Planning; Grassroots Level Planning - Block Level Planning and Village Level Planning; PURA Initiative

**Unit III: Land Reforms and Rural Development:** Land Reforms and Agrarian Class Structure in India; Globalisation and Indian Peasantry; Land Reforms in West Bengal

**Unit IV: Rural Infrastructure Management:** Importance of Rural Infrastructure; Economy and Rural Development; Linkages with Livelihood; Impact of Infrastructure upon Rural Development; Rural Development Programmes with special reference to 73<sup>rd</sup> Constitutional Amendment Act

**Unit V: Internal Assessment**

## **GEOG-215T (Elective Paper- ID): Population Studies**

**Total Marks: 50 (Semester Examination - 40 and Internal Assessment - 10)**

**Unit I: Basic Concepts of Population Studies:** Scope and Content of Population Geography and Relation with Demographic Studies; Different Schools of Thoughts in Population Studies; Demographic Dividend

**Unit II: Population Theories:** Malthus; Neo-Malthusian; Marx; Catton; Simon/ Boserup; Optimum Theory of Population - Carr-Saunders and Its Criticism; Migration Theories - Lee, Ravenstein, Zelinsky, Lewis, Spencer and Todaro

**Unit III: Population Dynamics:** Theories of Fertility and Concept of Cohort Fertility; Mortality and Morbidity and Its Significance; International Migration and Its Effects; Diaspora and Enclaves

**Unit IV: Population Policies and Programs:** Population Policies on Fertility, Mortality and Migration; Population Policies Adopted in India, China and Sweden; Family Welfare Programmes in India

**Unit V: Internal Assessment**

## **GEOG-217P (Elective Paper- IA): Watershed Management**

**Total Marks: 50 (Semester Examination - 40 and Internal Assessment - 10)**

**Unit I: Morphometric Analyses of Watershed:** Watershed Delineation; Shape-form Measurements; Drainage Pattern Analysis; Basin-Network Mapping

**Unit II: Geo-hydrological Analyses of Watershed:** Estimating Hydraulic Geometry Parameters from Field Data; Bed load - Discharge Relation; Measurement of Suspended Sediment Concentration

**Unit III: Environmental Assessment of Watershed:** Basin Prioritization; Mapping of Point Sources of River Pollution; Multi-parameter Riparian Health Index

**Unit IV: Geospatial Applications in Watershed Management:** Risk Zoning from Maps and Images - Flood and Landslide; Meteorological Drought Assessment; Multi-temporal Change Detection; Watershed Evaluation

**Unit V: Internal Assessment**

## **GEOG-217P (Elective Paper- IB): Landscape Ecology**

**Total Marks: 50 (Semester Examination - 40 and Internal Assessment - 10)**

**Unit I: Qualitative Ecological Assessment:** PRA and PLA Techniques; Likert Scaling; SWOT Analysis

**Unit II: Quantitative Ecological Assessment:** Basal Area; Canopy Cover; Tree Density; Species Diversity

**Unit III: Statistical Techniques in Ecology:** Cronbach's Reliability Test; Multidimensional Scaling; Cluster Analysis; Analytic Hierarchy Process

**Unit IV: RS-GIS Applications in Ecology:** Construction of Landscape/ Patch Metrics; Vegetation Indices; Network and Buffer Creation; Mapping of Eco-Sensitive Zone

**Unit V: Internal Assessment**

## **GEOG-217P (Elective Paper- IC): Rural Planning and Management**

**Total Marks: 50 (Semester Examination - 40 and Internal Assessment - 10)**

**Unit I: Participatory Methods of Data Collection:** Various Methods of Data Collection; Interpretation of Qualitative and Quantitative Data; Participatory Methods; FSA; Rapid Rural Appraisal; PRA and PLA; Focus Group Discussion; Buzz Group Analysis Method

**Unit II: Remote Sensing and GIS in Rural Planning:** Preparation of Thematic Maps at Village Level (Cadastral Maps); Administrative Map, Land Use/ Land Cover, Soil Map

**Unit III: GPS and Mapping of Primary Data:** Social and Resource Mapping, Village Information Map Using GPS

**Unit IV: Village Survey:** Collection of Primary Data with GPS; Data Collection by Survey Schedule

**Unit V: Internal Assessment**

## **GEOG-217P (Elective Paper- ID): Population Studies**

**Total Marks: 50 (Semester Examination - 40 and Internal Assessment - 10)**

- Unit I: Measures of Growth and Composition:** Population Growth Rate: Absolute and Compound; Regression Analysis; Measures of Fertility and Mortality; Population Packing
- Unit II: Population Projection:** Simple Population Forecasting Models - The Linear Model, Exponential Curves, Modified Exponential; Gompertz Growth Curve; Comparative Method; The Cohort- Survival Model
- Unit III: Measures of Development:** Literacy and Educational Level; Gross Enrolment Ratio and Dropout; Sex Ratio and Work Participation Rate; GNP, GDP and SDP per Capita; Population Potential
- Unit IV: Census and Statistical Data:** Components of Data Handling; Retrieval of Data; Compilation, Analysis and Representation of Demographic Data
- Unit V: Internal Assessment**

## **Elective Paper- II**

### **GEOG-221T (Elective Paper- IIA): Coastal Management**

**Total Marks: 50 (Semester Examination - 40 and Internal Assessment - 10)**

- Unit I: Processes and Forms of Coastal Landscapes:** Coastal Morphodynamics - Wave, Tidal and Fluvial Processes in Coastal Areas; Sediment Fluxes; Processes and Effects of Bioturbation; Bio-Tidal Accretion; Formation, System of Change and Classification of Coastal Landforms; Coral Formation – Theories and Examples; Morphology of Coastal Dunes, Deltas and Beaches
- Unit II: Human-Environment Interactions in Coastal Landscapes:** High Tides and Coastal Flooding; Impacts of Storm Surges and Tsunamis; Coastal Erosion; Coastal Pollution - Sources and Impacts; Saltwater Intrusion; Dune Propagation; Effects of Climate Change
- Unit III: Sustainable Management of Coastal Areas:** Planning and Management of Coastal Environments; Concept of Coastal Engineering; Application of Dredging, Erosion Preventive Structures and Beach Nourishment; Mitigation of Hyper-salinity and Dune Encroachment; Coastal Reclamation - Types, Techniques and Effects; Integrated Coastal Zone Management; Coastal Regulation Zone Guidelines; Management of Coastal Biodiversity and Protected Areas
- Unit IV: Coastal Management in India:** Coastal Ecosystems of West Bengal: Threats and Management; Sethusamudram Project in Tamil Nadu; Management of Large Lagoons – Chilka; Controversies on Coastal Atomic Power Plants
- Unit V: Internal Assessment**

## **GEOG-221T (Elective Paper- IIB): Environmental Planning and Management**

**Total Marks: 50 (Semester Examination - 40 and Internal Assessment - 10)**

**Unit I: Fundamentals of Environmental Planning:** Concepts and History of Environmental Planning; Bio-aesthetics; Ecosystem Valuation; Life Cycle Analysis

**Unit II: Environmental Movements, Laws and Policies:** Global Environmental Movements; Green Politics; Carbon Trading; Clean Development Mechanism; Indian Legislations for Environmental Protection; Forestry in Colonial and Postcolonial India

**Unit III: Sustainable Management of Ecosystems:** Abandoned Mines, Agroecosystem, Forest, River, Valley, Wasteland, and Wetland; Reclamation of Saline, Alkaline and Acidic Soils; Integrated Coastal Zone Management; Ecotourism Initiatives in India

**Unit IV: Planning for Green Infrastructure:** Significance of Green Infrastructure; Components and Hierarchy of Green Infrastructure; Protected Area, Neighbourhood Open Space, Urban Riverfront; Rainwater Harvesting; Organic Farming

**Unit V: Internal Assessment**

## **GEOG-221T (Elective Paper- IIC): Urban Planning and Management**

**Total Marks: 50 (Semester Examination - 40 and Internal Assessment - 10)**

**Unit I: Planning Principles:** Origin and Evolution of Planning; Impacts of Industrial Revolution on Town Planning and Regional Planning; Contributions of Ebenezer Howard, Patrick Geddes, Tony Garnier, Lewis Mumford, Le-Corbusier and Others in Planning

**Unit II: Urban Policy and Planning:** Goals of Urban Planning; Nature of Urban Policy; Neighbourhoods in Planning; Urban Renewal and Its Aftermath; Role of NGOs in Planning; Urban Social Movements; Urban Architecture; Social Construction of Urban Landscape; Neighbourhood Planning

**Unit III: Urban Land Use:** Urban Morphogenesis; Critics of Classical Models and Recent Developments; Central Business District; Urban Landscape; Land Use Transformation; Ecological Models

**Unit IV: Urban Governance and Management:** Concept of Urban Management and Governance; Role of Urban Development Bodies and Local Bodies in Urban Development; Good Urban Governance and Indicators; Smart Cities; Liveable Cities and Urban Governance

**Unit V: Internal Assessment**



**GEOG-221T (Elective Paper- IID): Geography of Well Being**  
**Total Marks: 50 (Semester Examination - 40 and Internal Assessment - 10)**

- Unit I: Concepts:** Well-Being - Definition and Scope; Nature and Approaches; Evolution of the Concept of Well-Being; Social Well-Being in Geography; Emergence of Welfare Geography
- Unit II: Approaches and Indicators of Social Well-Being:** Economic Vs Social Indicators of Well-Being; Identification and Choice of Indicators; Approaches to Well Being - Social, Human and Economic
- Unit III: Education and Well-Being:** Concept of Human Resource Development; Education and Human Resource Development; Education and Enlarging Choices; Empowerment and Wellbeing; Education, Occupational Changes, Employment and Un-Employment in India; Education and Social Change
- Unit IV: Health and Well-Being:** Health and Social Wellbeing; Health Care Systems (Public and Private) In India; Disparity in Healthcare Provision in India; Disease, Disease Prevalence and Disease Ecologies in India; Environment and Health with Special Reference to Large Urban Areas of India; Occupational Health and Associated Risks; Poverty and Health in India
- Unit V: Internal Assessment**

**GEOG-222P (Elective Paper- IIA): Coastal Management**  
**Total Marks: 50 (Semester Examination - 40 and Internal Assessment - 10)**

- Unit I: Qualitative Techniques of Coastal Assessment:** Preparation of Wave Refraction Diagram; Participatory Methods - Rapid Rural Appraisal, PRA and PLA; Coastal Land Use Transects
- Unit II: Quantitative Techniques of Coastal Assessment:** Identification and Measurement of Sedimentary and Biogenic Forms; Determination of Breaker Types by Empirical Equations; Determination of Discharge of Tidal Streams Using Field Equipment; Longshore Drift Estimation Using Tracers
- Unit III: Applications of RS-GIS:** Digital Coastal Mapping and Profiling Using Total Station and GPS; Quantification of Eroded Area; Coastal Vulnerability Zonation; Modelling of Coastal Parameters
- Unit IV: Development of Integrated Management Plan:** Prerequisites of Integrated Coastal Planning; Content Analysis: Policy/ Planning Reports and Documents; Plan Preparation Using Multiple Data Sources for Any Coastal Locality
- Unit V: Internal Assessment**

## **GEOG-222P (Elective Paper- IIB): Environmental Planning and Management**

**Total Marks: 50 (Semester Examination - 40 and Internal Assessment - 10)**

- Unit I: Techniques of Environmental Auditing:** Cost-Benefit Analysis; Environmental Impact Assessment; Estimation of Carbon Footprint of Any Landholding
- Unit II: Techniques of Ecosystem Valuation:** Classification of Ecosystem Values; Contingent Valuation Method; Hedonic Pricing Method
- Unit III: Sustainability Assessment Methods:** Development of Sustainability Index; Participatory Tourist Appraisal; Environmental Quality Monitoring of Agricultural Farm/ Industry/ Real Estate
- Unit IV: Applications of RS-GIS:** Land Surface Temperature Mapping; Mapping of Pollution and Contamination; Identification of Spread Pattern of Contagious Diseases (Using CPCB/WBPCB/KMC data)
- Unit V: Internal Assessment**

## **GEOG-222P (Elective Paper- IIC): Urban Planning and Management**

**Total Marks: 50 (Semester Examination - 40 and Internal Assessment - 10)**

- Unit I: Techniques of Urban Planning:** Dominant and Distinctive (Nelson's Ternary); Quality of Life Index for Urban Residential Areas; Sopher's Index of Disparity; Rank-Size Distribution of Cities
- Unit II: Qualitative Methods in Urban Research:** Urban Ethnography – Interview, FGDs, Participant Observations; Understanding “Everyday Urban Life” – Perceived Spaces (Observer and Citizens); Visual Geography – Using Visual Data and Imageries; Content Analysis - Policy/Planning Reports and Documents
- Unit III: Perception Studies and Mental Mapping:** Various Components of Existing Urban/ Suburban/ Fringe Areas (*e.g.* Housing Typology and Layouts, Building and Population Densities, Streets, Junctions, Open Spaces and Its Hierarchy, Heritage Buildings, etc.)
- Unit- IV: Mapping the Built Environment (Using RS-GIS Techniques):** Mapping of Urban Land Cover and Land Use; Change Detection of Urban Environment -NDVI, Temperature Zonation, Urban Expansion; Attribute Data Interfaces – Mapping of Services (Using the Ward as a Unit)
- Unit V: Internal Assessment**

## **GEOG-222P (Elective Paper- IID): Geography of Well Being**

**Total Marks: 50 (Semester Examination - 40 and Internal Assessment - 10)**

**Unit I: Techniques of Measuring Well Being:** Community Well Being Index; Oxfam Human Kind Index; Well Being Index; PRA and PLA Techniques of Well Being Appraisal

**Unit II: Assessment of Well Being of Health:** Health Index, Better Life Index (Ranking Method); Mapping Service Areas of Health Centers; Disease Outbreak Mapping (Based on Published Data)

**Unit III: Measures of Quality of Life:** Dropout Ratio; Dependency Ratio; Analysis of Seasonal Unemployment (Based on Primary Data)

**Unit- IV: Mapping of Well Being:** Economic Well Being Maps Based on PPP, GDP, HDI and GDI

**Unit V: Internal Assessment**

## Suggested Readings

### **Paper: GEOG-101T: Quaternary Geomorphology**

- Chorley, R., Schumm, S. and Sugden, D.E. (1994). *Geomorphology*. London: Methuen.
- Fairbridge, R.W. (1968). *The encyclopedia of geomorphology, (Edge)*. New York: Reinhold Book.
- Kale, V.S., and Gupta, A. (2001). *Introduction to geomorphology*. Hyderabad: Orient Longman Ltd.
- King, L.C. (1965). *Morphology of the earth*. Edinburgh: Oliver and Boyd.
- Knighton, D. (2014). *Fluvial forms and processes: a new perspective*. London: Routledge.
- Leopold, L.B., Wolman, M.G., and Miller, J.P. (2012). *Fluvial processes in geomorphology*. New York: Dover Publications, Inc.
- Ollier, C.D. (1981). *Tectonic geomorphology*. London: Longman Scientific & Technical.
- Selby, M.J. (1985). *An introduction to geomorphology*. Oxford: Clarendon.
- Strahler, A.H., and Strahler, A.N. (1992). *Modern physical geography*. New York: John Wiley.
- Summerfield, M.A. (1991). *Global geomorphology: an introduction to the study of landforms*. New York: John Wiley and Sons Ltd.
- Thornbury, W.D. (1969). *Principles of geomorphology*. New Delhi: Wiley Eastern Limited.
- Young, A. (1972). *Slopes*. Edinburgh: Oliver and Boyd.

### **Paper: GEOG-102T: Hydrology and Oceanography**

- Garrison, T.S. (2015). *Oceanography: an invitation to marine science*. Massachusetts: Cengage Learning.
- Pethick, J.S. (1984). *An introduction to coastal geomorphology*. London: Department of Geography, University of Hull.
- Petts, G.E., and Amoros, C. (1996). *Fluvial hydrosystems*. London: Chapman and Hall.
- Raghunath, H.M. (2006). *Hydrology: Principles, Analysis and Design*. New Delhi: New Age International (P) Limited Publishers.
- Sharma, R.C., and Vatal, M. (1962). *Oceanography for geographers*. Allahabad: Chaitanya Publishing.
- Talley, L.D. (2011). *Descriptive physical oceanography: an introduction*. Massachusetts: Academic Press.
- Todd, D.K. (1959). *Ground water hydrology*. New York: John Wiley and Sons.
- Viessman, W., Lewis, G.L., and Knapp, J.W. (1989). *Introduction to hydrology*. New York: Harper & Row Publishers.

### **Paper: GEOG-103T: Contemporary Ideas in Human Geography**

- Adhikari, S. (1992). *Geographical thought*. Allahabad: Chaitanya Pub. House.
- Chorley, R.J., and Hagget, P. (1965). *Frontiers in geographical teaching*. Oxford: OUP.
- Daniels Stephen and Lee Roger, (eds.) (1996): *Exploring human geography- a reader*. Arnold: London.
- Dickinson, R.E. (1969). *Makers of modern geography*. London: Routledge.
- Dikshit, R.D. (2004). *Geographical thought: a critical history of ideas*. New Delhi: Prentice Hall-India.
- Gregory, D., and Walford, R. (1988). *Horizons in Human Geography*. London: Macmillan.
- Harvey, D. (1973). *Social Justice and the City*. London: Arnold.
- Hussain, M. (1995). *Evolution of Geographical thought*. New Delhi: Rawat Publishing.
- Peet, R. (1998). *Modern Geographical Thought*. Massachusetts: Blackwell Publishers Inc.

- Stoddart, D.R. (1986). *On geography and its history*. Oxford: Basil Blackwell.
- Soja E., (1997). *Postmodern geographies- the reassertion in critical theory*. New Delhi: Rawat Publishing.
- Tuan, Y. (1977). *Space and place: the perspective of experience*. London: Edward Arnold.

**Paper: GEOG-104T: Geography of Development**

- Boyce, R. R. (1974). *The bases of economic geography*. New York: Holt, Rine Hart and Winston Inc,
- Coates, B.E., Johnston, R.J., and Knox, P. (1977). *Geography and inequality*. Oxford: Oxford University Press
- Desai, V. and Robert, P.B. (eds.) (2011). *The companion to development studies*. London: A Hodder – Viva Edition.
- Dreze, J., and Sen, A. (1996). *Economic development and social opportunity*. New Delhi: Oxford University Press.
- Potter, R., Binns, T., Smith, D.W., and Elliott, J. (2008). *Geographies of development: an introduction to development studies*. New York: Prentice Hall.
- Potter, R. et al. (2012). *Key concepts in development geography*. London: Sage.
- United Nations Populations Fund. (1997). *India towards population and development goals*. New Delhi: Oxford University Press.
- Unwin, T. (1994). *Atlas of world development*. Chi Chester: John Wiley and Sons Ltd.
- Williams, G., Meth, P., and Willis, K. (2009). *Geographies of developing areas: the global south in a changing world*. London: Routledge.
- World Resources Institute (1998). *World resources 1998-99: a guide to the global environment*. Oxford: Oxford University Press.
- Yusuf, S. (2009). *Development economics through the decades: a critical look at 30 years of the World Development Report*. Washington D.C.: World Bank.

**Paper: GEOG-105P: Quantitative Techniques in Physical Geography-I**

- Black, P.E. (1991). *Watershed hydrology*. London: Prentice Hall.
- Khan, N. (1998). *Quantitative methods in geographical research*. New Delhi: Concept Publishing Company.
- Murty, J.V.S. (1998). *Watershed management*. New Delhi: New Age International.
- Raghunath, H.M. (2006). *Hydrology: Principles, Analysis and Design*. New Delhi: New Age International (P) Limited Publishers.
- Swan, A.R.H., Sandilands, M., and McCabe, P. (1995). *Introduction to geological data analysis*. Oxford: Blackwell Science Ltd.

**Paper: GEOG-106P: Advanced Statistical Techniques**

- Alvi, Z. (1995). *Statistical geography: methods and applications*. New Delhi: Rawat Publications.
- Griffith, D.A., and Amrhein, C.G. (1997). *Multivariate statistical analysis for geographers*. New Jersey: Prentice Hall.
- Johnston, R.J. (1978). *Multivariate statistical analysis in geography: a primer on the general linear model*. Harlow: Longman.
- Pal, S.K. (1999). *Statistics for geoscientists*. New Delhi: Concept publishing Company.
- Rogerson, P.A. (2001). *Statistical methods for geography*. London; New Delhi: Sage publications.
- Silk, J. (1979). *Statistical techniques in geography*. London: George Allen and Unwin.

**Paper: GEOG-107T: Synoptic and Applied Climatology**

- Barry, R.G., and Chorley, R.T. (1992). *Atmosphere, weather and climate*. London: Routledge.
- Chandrasekar, A. (2010). *Basics of atmospheric science*. New Delhi: PHI Learning Pvt. Ltd.
- Critchfield, H.J. (1983). *General climatology*. New Delhi: Prentice Hall India Ltd.
- Das, P.K. (1995). *Monsoons*. New Delhi: National Book Trust.
- Fredrick, K.L., and Edward, J.T. (1979). *The atmosphere: an introduction to meteorology*. New Jersey: Prentice Hall, Englewood Cliffs.
- Lal, D.S. (2006). *Textbook of climatology*. Allahabad: ShardaPustakBhawan.
- McIlveen, R. (2010). *Fundamentals of weather and climate*. Oxford: Oxford University Press
- Trewartha, G.T. (1937). *An introduction to weather and climate*. New York: McGraw-Hill.

**Paper: GEOG-108T: Soil Science and Biogeography**

- Biswas, T.D., and Mukherjee, S.K. (1987). *Textbook of soil science*. New York: McGraw-Hill.
- Boul, S.W., Hole, F.D., and McCracken, R.J. (1993). *Soil genesis and classification*. New Delhi: Affiliated East-West Press.
- Brady, N.C., and Weil, R.R. (1996). *The nature and properties of soil*. London: Longman.
- Chapman, J.L., and Reiss, M.J. (1993). *Ecology: principles and applications*. Cambridge: Cambridge University Press.
- Coleman, D.C., and Crossby, J. (1996). *Fundamentals of soil ecology*. San Diego: Academic Press.
- Myers, A.A., and Giller, P.S. (1988). *Analytical biogeography: an integrated approach to the study of animal and plant distributions*. London: Chapman and Hall.
- Odum, E.P. (1997). *Ecology: a bridge between science and society*. Sunderland: Sinauer Associates Inc. Publishers.
- Sharma, P.D., and Sharma, P.D. (2010). *Ecology and environment*. UP: Rastogi Publications.
- Tivy, J. (1993). *Biogeography: a study of plants in the ecosphere*. Essex: Longman Scientific and Technical.

**Paper: GEOG-109T: Spatial Dimensions of Culture and Society**

- Ahmad, A. (1993). *Social structure and regional development*. New Delhi: Rawat Pub.
- Banerjee Guha, S. (2004). *Space, society and geography*. New Delhi: Rawat Publication.
- De Blij, H.J. (1996). *Human geography: culture, society and space*. New York: John Wiley and Sons.
- Dohrs, I., and Sommers, L. (1967). *Cultural geography*. US: Thomas Crowell Company.
- Fellmann, J.D., Getis, A., and Getis, J. (2000). *Human geography- landscape of human activity*. New York: McGraw Hill.
- Gavin, S. (2013). *Contesting the Indian city - global visions and the politics of the local*. John Wiley and Sons.
- Helmut, K., Anheier, and Isar, Y.R. (2012). *Cities, cultural policy and governance*. SAyse.
- Johnston, R.J., Gregory, D., Pratt, G., and Watts, M. (2000). *The dictionary of human geography*. Oxford: Blackwell Publishers.
- Megarry, T. (1995). *Society in prehistory: the origins of human culture*. New York: NYU Press.
- Pandey, V. (2016). *Indian society and culture*. New Delhi: Rawat Publication.
- Raw, M. (1986). *Understanding human geography: a practical approach*. London: Bell and Hyman.
- Smith, D.M. (1977). *Human geography: a welfare approach*. London: Gerald Duckworth and Co. Ltd.
- van der Borg, J. and Russo, A.P. (2005). *The impacts of culture on the economic development of cities*. Erasmus University Rotterdam: European Institute for Comparative Urban Research.
- Weyland, P. (1997). *Space, culture and power: new identities in globalizing cities*. Zed Books Ltd.

**Paper: GEOG-110T: Global Resource Crisis and Geopolitical Issues**

- Alexander, J.W. (1973). *Economic geography*. New Jersey: Prentice Hall.
- Chapple, K.(2014). *Planning sustainable cities and regions: towards more equitable development*. Routledge
- Dikshit, R.D. (1987). *Political geography and geopolitics*. New Delhi: Tata McGraw Hill.
- Elliotte, J. A. (1994). *An Introduction to sustainable development: the developing world*. London: Routledge.
- Favennec, J.P. (2011). *The geopolitics of energy*.
- Frederiksen, L., Bean, M. and Nance, H.(2011)*Global resource sharing*. Chandos Publishing.
- Johnston, R.J., Taylor, P.J. and Watts, M.J. (1995). *Geographies of global change: remapping the world in the late twentieth century*. Oxford: Blackwell.
- Johnston, R.J., Taylor, P.J. and Watts, M.J. (1995). *Geographies of global change: remapping the world in the late twentieth century*. Oxford: Blackwell.
- Jones, M. (2004). *An introduction to political geography: space, place and politics*. London: Routledge.
- Mitch, D., Steven, E. and O'Brien, B.(2015).*The new politics of strategic resources: energy and food security challenges in the 21st century*. Brookings Institution Press.
- Mitchell, B. (1997). *Resources and environment management*. Harlow:Routledge.
- Nanda, N. and Ganeshan, S. (Eds.).*2013 India's resource security: trade, geopolitics and efficiency dimensions*. TERI.

**Paper: GEOG-111P: Quantitative Techniques in Physical Geography-II**

- Alloway, B., and Ayres, D.C. (1997). *Chemical principles of environmental pollution*. Florida: CRC press.
- Barry, R.G. and Chorley, R.T. (1992). *Atmosphere, weather and climate*. London: Routledge.
- Evangelou, V.P., and Evangelou, V.P. (1998). *Environmental soil and water chemistry: principles and applications*. New York: Wiley.
- Gilbert, R.O. (1987). *Statistical methods for environmental pollution monitoring*. New York: John Wiley and Sons.
- Hesse, P.R., and Hesse, P.R. (1971). *A textbook of soil chemical analysis*. Cambridge: Cambridge University Press.
- Linacre, E. and Geerts, B. (1997). *Climates and weather explained*. London: Routledge.
- Liu, C., and Evett, J.B. (1984). *Soil properties: testing, measurement and evaluation*. New Jersey: Prentice Hall.
- Rama Sastry, A.A. (1984). *Weather and weather forecasting*. New Delhi: Government of India.
- Snoeyink, V.L., Jenkins, D., and Jenkins, D. (1980). *Water chemistry*. New York: Wiley.
- Van Den Berg, R. (2009). *Evaluating climate change and development*. New Jersey: Transaction Publishers.

**Paper: GEOG-112P: Quantitative Techniques in Human Geography**

- Blunden, J., Haggett, P., Harnnett, C. and Sarre, P. (1985). *The fundamentals of human geography*. New York: Harper and Row.
- Clark, J.I. (1973). *Population geography*. Oxford: Pergamum Press Ltd.
- Cloke, P., Cook, I., Crang, P., Goodwin, M., Painter, J., and Philo, C. (2004). *Practising human geography*. London, New Delhi: Sage.
- Fotheringham, A.S., Brunson, C. and Charlton, M. (2007).*Quantitative geography: perspectives on spatial data analysis*. New Delhi: SAGE Publications India Pvt. Ltd.

Robinson, G.M. (1998). *Methods and techniques in human geography*. New York: John Wiley & Sons.  
Smith, D.M. (1977). *Patterns in human geography*. London: Penguin Books.  
Yeates, M. (1974). *An introduction to quantitative analysis in human geography*. New York: McGraw-Hill.

**Paper: GEOG-213T: Geo-informatics (Theory)**

Burrough, P.A., and McDonnell, R.A. (2000). *Principles of Geographical Information System*. Oxford: Oxford University Press.  
Heywood, D.I., Cornelius, S. and Carver, S. (2011). *An introduction to Geographical Information Systems*. Harlow; Toronto: Prentice Hall.  
Lillesand, T.M. and Kiefer, R.W. (1994). *Remote sensing and image interpretation*. New York: John Wiley and Sons.  
Longley, P.A., Goodchild, M., Maguire, D.J. and Rhind, D.W. (2010). *Geographic Information Systems and science*. New York: Wiley.  
Longley, P.A., Goodchild, M.F., Maguire, D.J., and Rhind, D.W. (2005). *Geographic Information Systems and science*. New York: John Wiley & Sons.  
Sabins, F.F. (1997). *Remote sensing: principles and applications*. New York: W.H. Freeman and company.  
Sahu, K.C. (2007). *Textbook of remote sensing and Geographical Information Systems*. New Delhi: Atlantic Publishers.

**Paper: GEOG-214T: Theories and Models of Regional Development**

Benjamin, H.H. (1995). *Regional development theories and their application*. Routledge  
Chand, M. and Puri, V.K. (1983). *Regional planning in India*. New Delhi: Allied Publishers.  
Dickinson, J., Gould, B., Clarke, C., Mather, S., Prothero, R.M., Siddle, D., Smith, C., and Thomas-Hope, E. (1996). *A geography of the third world*. London: Routledge.  
Hall, P., and Tewdwr-Jones, M. (2010). *Urban and regional planning*. London: Routledge.  
Mandal, R.B. (1988). *Systems of rural Settlements in developing counties*. New Delhi: Concept Publishing Company.  
Mishra, R.P., Sundram, K.U., and Prakash Rao, V.V.S. (1974). *Regional development planning in India*. New Delhi: Vikas Publishing.  
Misra, R.P. (1987). *Contributions to Indian geography: rural geography*. New Delhi: Heritage.  
Raychaudhuri, J. (2001). *An introduction to development and regional planning: with special reference to India*. New Delhi: Orient Blakswan.  
Singh, R.L. (1971). *India: a regional geography*. New Delhi: National Geographical Society of India.  
Stimson, R., Stough, J., Roger R. and Brian H. (2002). *Regional economic development*. Springer.  
Todaro, M.P., and Smith, S.C. (2012) *Economic development*. New Delhi: Pearson Education.  
Wilson, A.G. (1974). *Urban and regional models in geography and planning*. New York: John Wiley and Sons.

**Paper: GEOG-215T: (Elective Paper- IA): Watershed Management**

Black, P.E. (1991). *Watershed hydrology*. London: Prentice Hall.  
Charlton, R. (2007). *Fundamentals of fluvial geomorphology*. London: Routledge.  
Leopold, L.B., Wolman, M.G., and Miller, P. (1954). *Fluvial processes in geomorphology*. San Francisco: Freeman and Co.



- Murty, J.V.S. (1998). *Watershed management*. New Delhi: New Age International.
- Petts, G., and Foster, I. (1985). *Rivers and landscapes*. London: Edward Arnold.
- Purandare, A.P., and Jaiswal, A.K. (1995). *Watershed development in India*. Hyderabad: National Institute of Rural Development.
- Raghunath, H.M. (2006). *Hydrology: Principles, Analysis and Design*. New Delhi: New Age International (P) Limited Publishers.
- Singh, R.V. (2000). *Watershed planning and management*. Bikaner: Yash Publishing House.

**Paper: GEOG-215T: (Elective Paper- IB): Landscape Ecology**

- Forman, R.T.T. (1995). *Land mosaics: the ecology of landscapes and region*. Cambridge: Cambridge University Press.
- Haines-Young, R., Green, D.R., and Cousins, S.H. (2003). *Landscape ecology and geographical information systems*. Florida: CRC Press.
- Jog, S.R. and Suryawanshi, R.S. (2004). *Costal landscape*. Pune: Global Scientific.
- Petts, G., and Foster, I. (1985). *Rivers and landscapes*. London: Edward Arnold.
- Turner, M.G., Gardner, R.H., and O'Neill, R.V. (2001). *Landscape ecology in theory and practice: pattern and process*. New York: Springer Science & Business Media.
- Vink, A.P.A. (1983). *Landscape ecology and land use*. London: Longman.

**Paper: GEOG-215T: (Elective Paper- IC): Rural Planning and Management**

- Chisholm, M. (1967). *Rural settlement and land use*. New York: John Wiley.
- Chitambar, J.B. (1993). *Introductory rural sociology*. New Delhi: Wiley Eastern.
- Gallent, N. and Scott, N.(2017). *Rural planning and development*. Routledge.
- Hudson, F.S. (1976). *A geography of settlements*. New York: Macdonald and Evans.
- Mandal, R.B. (1988). *Systems of rural settlements in developing counties*. New Delhi: Concept Publishing Company.
- Narayanasamy,N. (2009). *Participatory rural appraisal: principles, methods and application*. Sage Publications.
- Rao, R.N. (1986). *Strategy for integrated rural development*. New Delhi: B.R. Publication.
- Singh, K.(2009). *Rural development: principles, policies and management*. Sage Publications
- Srinivas, M.N. (1968). *Village India*. Bombay: Asia Publication House.

**Paper: GEOG-215T: (Elective Paper- ID): Population Studies**

- Bhende, A., and Kanitkar, T. (1982). *Principles of population studies*. Bombay: Himalaya Publishing.
- Blunden, J., Hagggett, P., Harnnett, C., and Sarre, P. (1985). *The fundamentals of human geography*. New York: Harper and Row.
- Chandna, R.C. (2010). *A geography of population: concepts, determinants and patterns*. New Delhi: Kalyani Publishers.
- De Blij, H.J. (1996). *Human geography: culture, society and space*. New York: John Wiley and Sons.
- Hussain, M. (1994). *Human geography*. New Delhi: Rawat Publishing Company.
- Newman, J. and Matzke,G.(1984). *Population, pattern, dynamics and prospects*. Prentice Hall

**Paper: GEOG-216P: Geo-informatics (Practical)**

- Burrough, P.A., and McDonnell, R.A. (2000). *Principles of geographical information system*. Oxford: Oxford University Press.

- Lillesand, T.M., and Kiefer, R.W. (1994). *Remote sensing and image interpretation*. New York: John Wiley and Sons.
- Lonfley, P.A., Goodchild, M.F., Maguire, D.J., and Rhind, D.W. (2002). *Introduction to geographic information systems and science*. (2002). New York: John Wiley and Sons Ltd.
- Lunetta, R.S., and Elvidge, C.D. (1999). *Remote sensing change detection*. UK: Taylor & Francis.
- Mesev, V. (2008). *Integration of GIS and remote sensing*. New York: John Wiley & Sons.
- Weng, Q. (2009). *Remote sensing and GIS integration: theories, methods, and applications*. New York: McGraw-Hill Education.

**Paper: GEOG-217P: (Elective Paper- IA): Watershed Management**

- Black, P.E. (1991). *Watershed hydrology*. London: Prentice Hall.
- Charlton, R. (2007). *Fundamentals of fluvial geomorphology*. London: Routledge.
- Leopold, L.B., Wolman, M.G., and Miller, P. (1954). *Fluvial processes in geomorphology*. San Francisco: Freeman and Co.
- Murty, J.V.S. (1998). *Watershed management*. New Delhi: New Age International.
- Petts, G., and Foster, I. (1985). *Rivers and landscapes*. London: Edward Arnold.
- Purandare, A.P., and Jaiswal, A.K. (1995). *Watershed development in India*. Hyderabad: National Institute of Rural Development.
- Singh, R.V. (2000). *Watershed planning and management*. Bikaner: Yash Publishing House.

**Paper: GEOG-217P: (Elective Paper- IB): Landscape Ecology**

- Forman, R.T.T. (1995). *Land mosaics: the ecology of landscapes and region*. Cambridge: Cambridge University Press.
- Haines-Young, R., Green, D.R., and Cousins, S.H. (2003). *Landscape ecology and geographical information systems*. Florida: CRC Press.
- Jog, S.R. and Suryawanshi, R.S. (2004). *Costal landscape*. Pune: Global Scientific.
- Petts, G., and Foster, I. (1985). *Rivers and landscapes*. London: Edward Arnold.
- Turner, M.G., Gardner, R.H., and O'Neill, R.V. (2001). *Landscape ecology in theory and practice: pattern and process*. New York: Springer Science & Business Media.
- Vink, A.P.A. (1983). *Landscape ecology and land use*. London: Longman.

**Paper: GEOG-217P: (Elective Paper- IC): Rural Planning and Management**

- Chisholm, M. (1967). *Rural settlement and land use*. New York: John Wiley.
- Chitambar, J.B. (1993). *Introductory rural sociology*. New Delhi: Wiley Eastern.
- Hudson, F.S. (1976). *A geography of settlements*. New York: Macdonald and Evans.
- Mandal, R.B. (1988). *Systems of rural settlements in developing counties*. New Delhi: Concept Publishing Company.
- Narayanasamy, N. (2009). *Participatory rural appraisal: principles, methods and application*. Sage Publications.
- Rao, R.N. (1986). *Strategy for integrated rural development*. New Delhi: B.R. Publication.
- Srinivas, M.N. (1968). *Village India*. Bombay: Asia Publication House.

**Paper: GEOG-217P: (Elective Paper- ID): Population Studies**

- Bhende, A., and Kanitkar, T. (1982). *Principles of population studies*. Bombay: Himalaya Publishing.
- Blunden, J., Haggett, P., Harnnett, C., and Sarre, P. (1985). *The fundamentals of human geography*. New York: Harper and Row.
- Chandna, R.C. (2010). *A geography of population: concepts, determinants and patterns*. New Delhi: Kalyani Publishers.

De Blij, H.J. (1996). *Human geography: culture, society and space*. New York: John Wiley and Sons.  
Hussain, M. (1994). *Human geography*. New Delhi: Rawat Publishing Company.

**Paper: GEOG-218P: Field Survey and Community Outreach Programme**

Subramanian, R. (2012). *Surveying and levelling*. Oxford: Oxford University Press.

**Paper: GEOG-219T: Geography of Hazards**

Alexander, D. (1993). *Natural disasters*. London: ULC Press Ltd.

Bryant, E.A. (1991). *Natural hazards*. Cambridge: Cambridge University Press.

Chapman, D. (1994). *Natural hazard*. Melbourne: Oxford University Press.

Collins, L.R., and Scheind, T.D. (2000). *Disaster management and preparedness*. UK: Taylor and Francis.

Sharma, R.K., and Sharma, G. (2005). *Natural disaster*. New Delhi: APH Publishing Corporation.

Smith, K. (1996). *Environmental hazards: assessing risk and reducing disaster*. London: Routledge.

**Paper: GEOG-220T: Geography of Leisure and Tourism**

Beeton, S. (2006). *Community development through tourism*. Australia: Landlinks Press.

Butler, R., and Hinch, T. (2007). *Tourism and indigenous peoples*. UK: Taylor and Francis.

Dwyer, L., Gill, A., and Seetaram, N. (2012). *Handbook of research methods in tourism: quantitative and qualitative approaches*. Cheltenham; Massachusetts: Edward Elgar.

Hudman, L.E., and Jackson, R.H. (2003). *Geography of travel and tourism*. New York: Thomson/Delmar Learning.

Kaul, R.K. (1985). *Dynamics of tourism and recreation*. New Delhi: Inter-India.

Robinson, H. (1999). *A geography of tourism*. London: McDonalds and Evans.

Smith, S.L.J. (1999). *Recreation geography*. Harlow: Longman.

**Paper: GEOG-221T: (Elective Paper- IIA): Coastal Management**

Bird, E.C.F. (2000). *An introduction to coastal geomorphology*. New York: John Wiley and Sons Ltd.

Carter, R.W.G. (1988). *Coastal environments: an introduction to the physical, ecological and cultural systems of coastlines*. London: Academic Press.

Davis, J.L. (1980). *Geographical variation in coastal development*. New York: Longman.

Garrison, T.S. (2015). *Oceanography: an invitation to marine science*. Massachusetts: Cengage Learning.

Jog, S.R., and Suryawanshi R.S. (2004). *Costal landscape*. Pune: Global Scientific.

Karlekar, S. (2009). *Coastal processes and landforms*. Pune: Diamond Publication.

Pethick, J. (1984). *An introduction to coastal geomorphology*. London: Edward Arnold.

**Paper: GEOG-221T: (Elective Paper- IIB): Environmental Planning and Management**

Adams, W.M. (1995). *Green development: environmental sustainability in the third world*. London: Routledge, London.

Campbell, J.B., and Wynne, R.H. (2011). *Introduction to remote sensing*. New York: Guilford Press.

Cooke, R.U., and Doornkamp, J.C. (1974). *Geomorphology in environmental management*. Oxford: Oxford University Press.

Dresner, S. (2002). *The principles of sustainability*. London: Earthscan.

Konecny, G. (2002). *Geoinformation: remote sensing, photogrammetry and geographical information systems*. Florida: CRC Press.

Mitchell, B. (1997). *Resources and environment management*. Harlow: Addison Wesley Ltd.

Pearce, D., Atkinson, G., and Mourato, S. (2006). *Cost-benefit analysis and the environment: recent developments*. Paris: OECD.

**Paper: GEOG-221T: (Elective Paper- IIC): Urban Planning and Management**

Bourne, L. (Ed.) (1982). *Internal structure of the city*. New York: Oxford University Press.

Gallion, A.B., Eisner, S., and Stoner, A. (1963). *The urban pattern: city planning and design*. New York: Van Nostrand.

Hall, P.G. (1997). *Cities of tomorrow: an intellectual history of urban planning and design in the twentieth century*. New Jersey: Wiley Blackwell.

Kaiser, E.J., Godschalk, D.R., and Chapin, F.S. (1995). *Urban land use planning*. Urbana: University of Illinois Press.

Macionis, J. and Parrillo, V. (2010) *Cities and urban life*. PHI

Ramchandran, R. (1997). *Urbanization and urban systems in India*. Oxford: Oxford University Press.

Sundaram, K.V. (1977). *Urban and regional planning in India*. New Delhi: South Asia Books.

**Paper: GEOG-221T: (Elective Paper- IID): Geography of Well Being**

Dasgupta, P. (1993). *An enquiry into wellbeing and destitution*. New York: Oxford University Press.

De Blij, H.J. (1996). *Human geography: culture, society and space*. New York: John Wiley and Sons.

Diener, E., and Suh, E.M. (2003). *Culture and subjective well-being*. Massachusetts: MIT press.

Harvey, D. (1973). *Social justice and the city*. London: Edward Arnold.

Short, J.R. (2017). *An introduction to urban geography*. London: Routledge.

Smith, D.M. (1973). *The geography of social well-being in the United States: an introduction to territorial social indicators*. London: McGraw-Hill.

Smith, D.M. (1977). *Human geography: A welfare approach*. London: St. Martin's Press.

**Paper: GEOG-222P: (Elective Paper- IIA): Coastal Management**

Bird, E.C.F. (2000). *An introduction to coastal geomorphology*. New York: John Wiley and Sons Ltd.

Carter, R.W.G. (1988). *Coastal environments: an introduction to the physical, ecological and cultural systems of coastlines*. London: Academic Press.

Davis, J.L. (1980). *Geographical variation in coastal development*. New York: Longman.

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Karlekar, S. (2009). *Coastal processes and landforms*. Pune: Diamond publication.

Pethick, J. (1984). *An introduction to coastal geomorphology*. London: Edward Arnold.

**Paper: GEOG-222P: (Elective Paper- IIB): Environmental Planning and Management**

Adams, W.M. (1995). *Green development: environmental sustainability in the third world*. London: Routledge, London.

Campbell, J.B., and Wynne, R.H. (2011). *Introduction to remote sensing*. New York: Guilford Press.

De Groot, R. S. (1992). *Functions of nature: evaluation of nature in environmental planning, management and decision making*. Wolters-Noordhoff BV.

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Randolph, J. (2004). *Environmental land use planning and management*. USA: Island Press.

**Paper: GEOG-222P: (Elective Paper- IIC): Urban Planning and Management**

- Bourne, L. (Ed.) (1982). *Internal structure of the city*. New York: Oxford University Press.
- Gallion, A.B., Eisner, S., and Stoner, A. (1963). *The urban pattern: city planning and design*. New York: Van Nostrand.
- Hall, P.G. (1997). *Cities of tomorrow: an intellectual history of urban planning and design in the twentieth century*. New Jersey: Wiley Blackwell.
- Kaiser, E.J., Godschalk, D.R., and Chapin, F.S. (1995). *Urban land use planning*. Urbana: University of Illinois Press.
- Ramchandran, R. (1997). *Urbanization and urban systems in India*. Oxford: Oxford University Press.
- Sundaram, K.V. (1977). *Urban and regional planning in India*. New Delhi: South Asia Books.

**Paper: GEOG-222P: (Elective Paper- IID): Geography of Well Being**

- Dasgupta, P. (1993). *An enquiry into wellbeing and destitution*. New York: Oxford University Press.
- Diener, E., and Suh, E.M. (2003). *Culture and subjective well-being*. Massachusetts: MIT press.
- Harvey, D. (1973). *Social justice and the city*. London: Edward Arnold.
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