

# **Syllabus for M.A/ MSc. Course in Geography**

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EFFECTIVE FROM THE ACADEMIC SESSION 2014-15



**West Bengal State University**

**Berunanpukuria, Malikapur**

**Barasat, North 24 Parganas**

**West Bengal – 700126**

# MSc Course in Geography

## Section 1: Course Structure

### BASIC STRUCTURE

1. There shall be full-time M.A. / M. Sc. Course in Geography of two years' duration.
2. There shall be Semester System spreading over four Semesters.
3. There shall be 1000 marks in total and each Semester shall carry 250 marks.
4. There shall be 20 Papers (14 theoretical and 6 practical) to cover the whole Syllabus and each Semester shall contain 5 Papers. Each theory paper carries 50 marks (40 marks in End Semester Examination and 10 marks through internal assessment).
5. The Practical courses also carry 50 marks. The practical papers will be evaluated on (a) continuous basis, which would carry 80% of the marks allotted for the paper and (b) The rest 20% of the marks will be given to the students on the basis of a viva-voce to be conducted by internal and external examiners during the End Semester Examination.
6. Each theoretical course is 4 credit and each practical course is 3 credit covered within 60 hours of teaching spread over 15 weeks. The total credit points covered in this entire course is 74.
7. Internal assessment means that the students shall be evaluated by all the teachers regularly by term papers/ reviews/ small research projects/ case studies/ group discussions/ field work/ seminar presentations/ home assignments and class assignments. The internal assessment marks shall be a part of their examination system. Such assessments shall be held on the topic(s) of the theoretical papers.
8. Medium of instruction is English, and the answers are to be written/ presented in English.

## Section 2: Programme Specific Outcome (PSO)

The postgraduate syllabus for M.Sc. course in Geography has been framed with the objective of giving the students a holistic understanding of the subject putting equal weightage on two main aspects of Geography — Physical and Human and their interactive relationships. The principal goal of the syllabus is to enable the students to secure a job at the end of the postgraduate programme. Keeping this in mind and in tune with the changing nature of Geography, adequate emphasis is rendered on the applied aspects of the subject.

### PSO01: Physical Geography

The courses in Physical geography focusses on geography as earth sciences and covers areas such as biogeography, climatology and meteorology, geomorphology, environment management, hydrology, oceanography, paleo-geography, and quaternary science. On completion of the

programme, with a specialisation in Physical Geography the students will develop knowledge base and skills as follows:

Knowledge base:

- Genesis of major geomorphic features and their potential use as indicators of environmental change.
- Physical processes of tropical ecosystems with focus on soils, vegetation and changing land use.
- The relationship between environmental change and human activity including resilience, vulnerability and adaptive processes.
- The interplay between atmospheric circulation and energy balance and correlation with global climate change and hydrology.
- Methods and equipment used in the study of fluvial, estuarine and marine environments, the potential effect of sea-level and climate change.

Skills:

- Identify and describe key factors that control a range of biogeochemical processes and net effects in terms of the environmental impact of pollutants and greenhouse gases
- Assess how models at different scales and databases can be used to enhance our understanding of present and past climate and predict future development in climatic trends.
- Review a scientific literature and communicate results of projects orally and in writing.
- Field methods used in studies of sediment transport in the fluvial, estuarine and marine environment

**PSO02: Human Geography**

The courses in Human geography deals more with patterns and processes that shape human society and covers areas such as culture, development, economy, health, geopolitics, demography, religion, society, transport and regional development and planning. On completion of the programme, with a specialisation in Human Geography the students will develop knowledge base and skills as follows:

Knowledge base:

- Conceptualisations of space and place including social, economic and development issues as well as human environment interactions.
- Globalisation processes and their geographical implications, transformation of cities, regions and landscapes, migration, urbanisation, rural-urban connections and land use change.
- The role of uneven geographical development including its implications for urban and regional development and planning.

Skills:

- Work at a scientific and application-oriented level with a broad range of theoretical and methodological approaches to human geography
- Work with interdisciplinary dimensions of human geographical processes and their impacts and spatial aspects at different scales.
- Work in and understand the implications of cross-cultural contexts.

### **PSO03: Applied Geographical Aspects**

The Applied aspects in Geography include courses in Remote Sensing and GIS, advanced techniques of mapping and field-based data generation. On completion of the programme, in Geography the students will develop specific skills as follows:

#### Skills

- Student will be able to analyse the problems of physical as well as cultural environments of both rural and urban areas. They will try to find out the possible measures to solve those problems through Social Survey Project:
- Integrate RS data with other data in a GIS environment for applications in spatial planning, environmental monitoring and modelling.
- Advanced methods of field mapping and primary data collection.
- Assess data quality, in terms of uncertainty, in order to understand and describe the limitations of current RS and GIS technology.
- Develop the capability of observation through field experience so that they will be able to identify the socio-environmental problems of a locality.

### **Section 3: Course Outcome (CO)**

#### **/// PAPER-GEO 101: GEOMORPHOLOGY**

- Making the students' aware about the basic concepts of Geomorphology with background knowledge of geology and environmental sciences.
- Develop understanding of fluvial and other geomorphic processes together with emphasis upon the applied aspect of Geomorphology and hazard management.
- Geographers can be engaged as Emergency Management Specialists' who can co-ordinate disaster response and crisis management through planning, assessment and vulnerability analysis. With the introduction of GIS and remote sensing in Geomorphology, preparation of maps for effective management has been very effective.

#### **/// PAPER-GEO 102: CLIMATOLOGY**

- Developing the students' understanding about the Earth's atmosphere and global climate.
- Understanding the major forms of weather disturbances and the dynamics of the Monsoon
- Assessing the phenomenon of climate change and its implications including the role of man in global climate change.
- Exposure of students to the various branches of Applied Climatology

- Geographers can be absorbed as climate change analysts, studying and interpreting data, maps reports, photographs and charts to predict long and short scale patterns.

### **///PAPER-GEO 103: POPULATION AND SETTLEMENT GEOGRAPHY**

- Making students aware about the basic concepts and theories of human population and their development.
- Developing concepts about the morphology and function of rural and urban settlements.
- Sensitize the students about the problems of population growth.
- Enabling students' ability to understand the changing structure of contemporary cities and to relate the urbanisation process with existing urban policies.

### **///PAPER GEO 104: SOCIAL AND CULTURAL GEOGRAPHY**

- Develop the understanding about the relationship between cultures, pattern of living and economic development.
- Familiarizing the students with the concept of the society through social theory and philosophical approaches.
- Examines region as a social unit in India in the light of its social, cultural and historical background.
- The students will enrich their knowledge on customs and traditions and enhance their moral ethics

### **///PAPER GEO 105: STATISTICAL TECHNIQUES AND COMPUTER APPLICATION**

- Using statistical techniques in order to summarize, represent, analyze and interpret data.
- Introduce basic statistical procedures and train the students to apply these procedures towards analysing the geographical problems.
- The course also aims to provide training in application of computers in analysis and synthesis of a variety of quantitative data.

### **///PAPER GEO 201: HYDROLOGY AND OCEANOGRAPHY**

- Understanding the variations of global hydrological cycle and analysing the concept of Hydrology as an integral part of all living things in the world.
- Developing understanding about the significance of a systematic study on fresh water resources, their storage and utilization, emphasizing the significance of groundwater quality and its circulation.
- Introduce students to the physical and chemical properties of sea water, atmospheric and oceanic linkage.
- Students will be able to understand aquifer properties and its dynamics after the completion of the course and get an exposure towards the behavior and characteristics of the global oceans and the national and international laws for governing the coastal area and territorial sea

- Students can be involved in managing, monitoring and protecting water and water resources. They can be involved in planning, development and sustainable use of natural and domestic water resources.

### **///PAPER GEO 202: BIOGEOGRAPHY**

- Objective of this course is to appraise the students with the interrelationship between man and the environment within which he lives and his linkages with other organisms.
- The importance of conserving biodiversity to maintain ecological balance has also been emphasized in the course. The course also aims to introduce the students to soil which is one of the important elements of the earth supporting the life system
- Explaining the pedological and edaphological approaches to soil studies, emphasizing on processes of soil types, formation, and principles of soil and land classification and management.
- Introducing ecosystem and biosphere concepts together with analyzing the importance and role of conservation programmes and policies.

### **///PAPER GEO 203: GEOGRAPHY OF ECONOMIC ACTIVITY**

- Integrate the various factors of economic development and acquaint the students about the dynamic aspects of economic geography.
- To familiarise the students with the concept, origin, and development of agriculture; to examine the role of agricultural determinants towards changing cropping patterns, intensity, productivity, diversification and specialization.
- To familiarise the students to understand the location of major manufacturing activities with the support of various industrial location theories and models.
- The students can take up transportation planning projects to satisfy the needs of an area, balancing the needs of economy, environment and society.

### **///PAPER GEO 204: GEOGRAPHY OF INDIA**

- The objective of the course is to understand India in terms of various regional divisions, their important characteristics and to analyse the natural and human resource endowments, their conservation and management.
- It also aims to sensitize the students with development issues and policies designed for regional development. The paper also gives an insight into the geography of West Bengal, to acquaint the students with the state — its problems and prospects.

### **///PAPER GEO 205: MAPPING TECHNIQUES**

- The objective of the paper is to apprise the student with latest trends in the development of cartography as a tool in mapping thematic and quantitative data.

- The course aims to give hands-on-training in preparation of thematic maps from satellite images and application of GPS.
- The students can apply these techniques in their map interpretations and hence can work as map analysts in several Institutes.

### **/// PAPER-GEO 301: PHILOSOPHY OF GEOGRAPHY**

- Gain knowledge about development of geographical thought from ancient to modern times.
- Develop an idea about evolution of geographical thinking and disciplinary trends in different parts of the world.
- Build an idea about the dichotomous nature of Geography.
- Establishing relationship of Geography with other disciplines and man-environment relationships
- Analysing modern and contemporary philosophies of Post-colonialism, Post-structuralism, Modernism and Post-modernism in Geography

### **/// PAPER GEO 302: RESEARCH METHODOLOGY AND STATISTICAL APPLICATIONS**

- The objective of the course is to impart fundamental understanding in developing research methodology in Geography. This would facilitate the students in their future dissertation work.
- On a general level the students should be able to understand the concept of analysing multivariate data.
- On successful completion of the course the student will have an understanding of the link between multivariate and univariate techniques. Students will be able to use multivariate techniques appropriately, undertake multivariate hypothesis tests and draw appropriate conclusions.
- The students can apply in several Research Institutes // Funded Project as field assistants in Governmental and in NGOs on the basis of this courses outcome

### **/// PAPER GEO 303A: APPLIED GEOMORPHOLOGY (OPTIONAL PAPER)**

- The rivers being the major geomorphic agent of erosion, the course assumes significance as it mainly deals with an understanding of the fluvial system.
- The students are introduced to the forces resisting and driving the flow of water which has its resultant effect on the flow patterns and sediment load.
- The course also emphasises on anthropogenic disturbance of channel, floodplain and estuaries and the possible management options that can be undertaken.

### **/// PAPER GEO 303B: REGIONAL PLANNING AND RURAL DEVELOPMENT (OPTIONAL PAPER)**

- The aim of the course is to familiarise the students with the concept of micro-region as a dynamic entity emerging from the interaction and interrelationship of the physical and socio-economic elements.

- Developing an understanding about the evolution of micro-planning, the concept of participatory planning and other paradigms of micro regional planning.
- While planning our rural areas the planners must ensure that development is sustainable, and that the countryside is preserved alongside development. The work of planners also makes a positive contribution to tackling the effects of climate change.

#### **///PAPER GEO 304: REMOTE SENSING AND GEOGRAPHICAL INFORMATION SYSTEM**

- The objective of the course is to introduce to the students the basic principles of remote sensing and the methods of digital interpretations of satellite images.
- The course provides hands-on-training on the basic elements of GIS and its areas of application.
- Geospatial analysis is a growing field of employment. The role includes analysis of data, design and use of this database.
- The work of a geospatial analyst varies greatly depending on which sector the student wants to work.

#### **///PAPER GEO 305: SPATIAL ANALYSIS AND FIELD METHODS**

- Main objective of field method is to provide the students the understanding of ground reality; mapping of land use and to enhance the skill of the students during field survey.
- The course also aims to train the students in various methods of analysing socio-economic data.
- On completion of this course students shall be able to understand the advantages of electronic surveying over conventional surveying methods.
- Students completing this course would have acquired practical knowledge on handling survey instruments like Theodolite and Total station and have adequate knowledge to carryout Triangulation surveying including general field marking for various projects.
- The students should be able to take decisions regarding what measurements to take, and which instruments to use.

#### **///PAPER GEO 401: ENVIRONMENTAL GEOGRAPHY AND GEOPOLITICS**

- The importance of conserving the environment to sustain ecological balance has been emphasised in the course.
- Examples of human-induced social and ecological changes and some environmental issues in contemporary India have also been highlighted.
- Jobs in environmental sectors are increasing in number. Environmental consultants work for commercial or governmental organisations to assist where environmental concerns and legislation need to be considered.
- At the end of the course students should be able to analyse environmental impacts, evaluate waste disposal sites and reduce pollution.



- Main objective of the course on Geopolitics is to provide insight into the complex relationship between geographical factors that have a strong bearing on the political scenario at global, regional and local level. It aims to sensitize the students to geopolitical understanding of conflicts and regional cooperation.

#### **///PAPER GEO 402: URBAN AND REGIONAL DEVELOPMENT**

- On the basis of concepts and theories of Urbanization, Urban Land use planning and Land Policies and Urban Management the students will be enriched with the basic knowledge required for entry into the job market in urban planning cells in the various municipalities and other urban administrative units as planners.
- They can also serve as advisors to the urban authorities on solution to the various urban problems as they have an insight on these issues.

#### **///PAPER GEO 403A: APPLIED GEOMORPHOLOGY (OPTIONAL PAPER)**

- This course includes interpretation of coastal environment and its management
- Sensitize the students regarding the problems of groundwater and soil.
- The course also highlights the necessity of watershed management and the application of geomorphological knowledge in environmental management.
- Geomorphologists can find career opportunities as Environmental Consultant in engineering consulting firms and government agencies.
- Regional or local case studies will teach the students the techniques of geomorphic assessment of specific problems.

#### **///PAPER GEO 403B: REGIONAL PLANNING AND RURAL DEVELOPMENT (OPTIONAL PAPER)**

- Most of the students are from the rural background. So a theoretical knowledge on the administrative functions and policies of rural India will enrich their practical knowledge and provide a better understanding.
- They can relate themselves with the process of rural reconstruction and the consequent changing rurality. Hence they can act as advisors and consultants in administrative units and in marketing management.

#### **///PAPER GEO 404A: APPLIED GEOMORPHOLOGY PRACTICAL (OPTIONAL PAPER)**

- The course aims to give hands-on-training on interpretation and quantification of fluvial and coastal processes.
- The students are trained on water and sediment analysis procedures which are indicators of the operating geomorphic processes.

#### **///PAPER GEO 404B: REGIONAL PLANNING AND RURAL DEVELOPMENT PRACTICAL (OPTIONAL PAPER)**

- The course includes techniques of collection of primary and secondary data

- Organising, processing and analysing socio-economic data and techniques of formulating rural planning for holistic development.
- After completion of the course, the students can work as analysts in rural development schemes through the several quantitative and qualitative techniques. With their skill enhancement through Remote sensing and GIS the job opportunities in rural area particularly in the digitization of mauza maps, as Surveyors and in e-planning is a highly potential one .The students can also apply in several Research Institutes/ Funded Project as field assistants in Governmental and in NGOs on the basis of this courses outcome

**/// PAPER GEO 405: TECHNIQUES IN PHYSICAL GEOGRAPHY (PRACTICAL)**

- The course aims to familiarise the students with the basic techniques of measuring soil and water quality and estimating noise pollution level. The dissertation will be based on the optional paper (A or B).



**Section 4: Division of Marks, Credits and Papers**

| Semester |             |   | Marks | Credit |
|----------|-------------|---|-------|--------|
| I        | Theoretical | GEO 101: Geomorphology                                      | 50    | 4      |
|          |             | GEO 102: Climatology  | 50    | 4      |
|          |             | GEO 103: Population and Settlement Geography.               | 50    | 4      |
|          |             | GEO 104: Social and Cultural Geography                      | 50    | 4      |
|          | Practical   | GEO 105 Statistical Techniques and Computer Application     | 50    | 3      |
| II       | Theoretical | GEO 201: Hydrology and Oceanography                         | 50    | 4      |
|          |             | GEO 202: Soil and Biogeography                              | 50    | 4      |
|          |             | GEO 203: Geography of Economic Activities                   | 50    | 4      |
|          |             | GEO 204: Geography of India                                 | 50    | 4      |
|          | Practical   | GEO 205: Mapping and Map interpretation Techniques.         | 50    | 3      |
| III      | Theoretical | GEO 301: Philosophy of Geography                            | 50    | 4      |
|          |             | GEO 302: Research Methodology and Statistical Applications  | 50    | 4      |
|          |             | GEO 303: Special Paper (A/ B)                               | 50    | 4      |
|          | Practical   | GEO 304: Remote Sensing and Geographical Information System | 50    | 3      |
|          |             | GEO 305: Spatial Analysis and Field Methods.                | 50    | 3      |
| IV       | THEORETICAL | GEO 401: Environmental Geography and Geopolitics            | 50    | 4      |
|          |             | GEO 402: Urban and Regional Development                     | 50    | 4      |
|          |             | GEO 403: Special Paper (A/ B)                               | 50    | 4      |
|          | PRACTICAL   | GEO 404 Practical on Special Paper (A/ B)                   | 50    | 3      |
|          |             | GEO 405 A: Techniques in Physical Geography                 | 10    | 1      |
|          |             | GEO 405 B: Dissertation Based on Special Paper (A/B)        | 40    | 2      |

OPTIONAL A: Applied Geomorphology

OPTIONAL B: Regional Planning and Rural Development.

# Semester – I

## **/// GEO 101: GEOMORPHOLOGY**

| <b>Unit1: Basic Concepts in Geomorphology</b>   | Teaching hrs. |
|---|---------------|
| 1.1 Principle of Uniformitarianism, Catastrophism, inheritance from the past; Systems Approach; feedback mechanisms, ideas of equilibrium and threshold.        | 4             |
| 1.2 Geological time scale; principles of relative and absolute dating.  | 3             |
| 1.3 Morphogenetic regions and their importance. Significance of process studies in geomorphology  | 4             |
| 1.4 Tectonic Geomorphology — principles, geomorphic markers, rates of uplift and erosion, isostatic relations, tectonic and structural landforms.               | 4             |
| <b>Unit 2: Fluvial Processes and Form</b>   |               |
| 2.1 Channel initiation and network development  | 4             |
| 2.2 Significance of drainage basin as a geomorphic unit   | 3             |
| 2.3 Catchment processes; river hydraulics: flow and energy; factors regulating entrainment, transportation and deposition of sediments.                         | 4             |
| 2.4 Long term and short term channel adjustment and changes.  | 4             |
| <b>Unit 3: Geomorphic Processes and Resultant Landforms</b>   |               |
| 3.1 Coastal morphodynamic variables and their influence on evolution of coastal forms.  | 4             |
| 3.2 Processes of evolution of aeolian and karst landforms   | 4             |
| 3.3 Processes of evolution of periglacial landforms   | 3             |
| 3.4 Slope evolution models - King, Wood and Young   | 4             |
| <b>Unit 4: Applied Geomorphology</b>  |               |
| 4.1 Principles and Purpose; Anthropogenic Geomorphology — humans as geomorphic agents.  | 3             |
| 4.2 Principles of terrain evaluation and their significance; remote sensing and GIS techniques in geomorphology   | 4             |
| 4.3 Geomorphology in feasibility assessment of engineering and industrial projects.   | 4             |
| 4.4 Geomorphic approach to hazard studies: factors, vulnerability, consequences and management of landslides, floods, river bank erosion and river degeneration | 4             |

## **/// GEO 102: CLIMATOLOGY**

| <b>Unit1: Atmospheric Dynamics</b>                  |  | Teaching hrs |
|---|--|--------------|
| 1.1   | The climate system; the concept of micro, meso and macro-climate.  | 3            |
| 1.2   | Atmospheric temperature; equations of state for ideal gases; First and Second Laws of Thermodynamics.  | 4            |
| 1.3   | Atmospheric moisture; process of condensation and precipitation; Carnot Cycle and Clausius-Clapeyron equation, conditions of stability and instability.    | 4            |
| 1.4   | Concepts and equations of pressure, gravity, centripetal and coriolis forces; geostrophic and gradient winds; divergence and vertical motion and vorticity | 4            |
| <b>Unit 2: Tropical Climate and Weather Hazards</b> |  |              |
| 2.1   | Tropical wet and dry climates; Tropical air masses and their convergence and divergence.   | 4            |
| 2.2   | Tropical circulations: Hadley and Walker, ENSO phenomena   | 4            |
| 2.3   | Mechanism of of Indian Monsoon and the causes of its variability   | 4            |
| 2.4   | Weather hazards: heat and cold waves, thunderstorm and cyclone — genesis and forecasting.  | 3            |
| <b>Unit–3: Climate Change</b>                       |  |              |
| 3.1   | Scientific evidences of climate change; reconstruction of past climates  | 4            |
| 3.2   | Theories of climate change.  | 4            |
| 3.3   | The climate cycle and climate trends.  | 3            |
| 3.4   | Implications and arguments on recent trends of global climate  | 4            |
| <b>Unit 4: Applied Climatology</b>                  |  |              |
| 4.1   | Bioclimatology: Human comfort in relation to climate.  | 4            |
| 4.2   | Agroclimatology—importance, water budget and crop calendar   | 3            |
| 4.3   | Urban climatology — with special reference to urban heat island  | 4            |
| 4.4   | Approaches and techniques of weather forecasting in India: short, medium and long range  | 4            |

## **/// GEO 103: POPULATION AND SETTLEMENT GEOGRAPHY**

| <b>Unit1: Concepts</b>   | Teaching hrs |
|--|--------------|
| 1.1 Population Geography and Demography.   | 3            |
| 1.2 Population distribution and density: physical and socio-economic forces.   | 4            |
| 1.3 Population dynamics of: fertility, morbidity and mortality and migration.  | 4            |
| 1.4 Population composition by gender, level of education, occupation and ethnic variations in urban and rural areas.                 | 4            |
| <b>Unit 2: Population Theories and Policies</b>  |              |
| 2.1 Theories of population growth: biological, social, and economic.   | 4            |
| 2.2 Migration, mobility and population- resource regions.  | 4            |
| 2.3 Migration theories: Ravenstein, Lee and Todaro.  | 3            |
| 2.4 Population policies in India, China and U.S.A  | 4            |
| <b>Unit 3: Rural Settlements</b>   |              |
| 3.1 Scope and content of Settlement Geography; rural, urban and peri-urban areas   | 5            |
| 3.2 Evolution and hierarchy of settlements, Rural Service Centres  | 3            |
| 3.3 House types and internal morphology of settlements in rural India  | 3            |
| 3.4 Problems and policies related to rural infrastructure with reference to India  | 4            |
| <b>Unit 4: Urban Settlements</b>   |              |
| 4.1 Definition and classification of urban settlements. Concept of metropolis, megacity, conurbation and other urban agglomerations. | 5            |
| 4.2 Landuse and morphology of towns: classical and modern models.  | 4            |
| 4.3 Urban expansion, peri-urban development and suburbanization.   | 3            |
| 4.4 Urban problems and National urban policies.  | 3            |

## **/// GEO 104: SOCIAL AND CULTURAL GEOGRAPHY**

| <b>Unit1: Concept</b>  | Teaching hrs |
|--|--------------|
| 1.1 Definition and approaches in Social Geography: different schools of thought.                               | 3            |
| 1.2 Social structure and processes: concept of social space and social distance; region as a social unit.      | 4            |
| 1.3 Social wellbeing and social pathology.   | 4            |
| 1.4 Social security, social change and social justice.   | 4            |
| <b>Unit 2: Elements of Social Geography</b>  |              |
| 2.1 Social structure in India: Economic and Ethnic.  | 4            |
| 2.2 Race and racial distribution.  | 3            |
| 2.3 Language and dialects — classification and spatial distribution.   | 4            |
| 2.4 Religion — classification and spatial distribution in the world.   | 4            |
| <b>Unit 3: Concepts in Cultural Geography</b>  |              |
| 3.1 Concept of culture: material and non- material; evolution of Cultural Geography, its nature and content.   | 4            |
| 3.2 Cultural system, cultural region, cultural Hearth and cultural realm.                                      | 4            |
| 3.3 Concept and theories of cultural diffusion.  | 3            |
| 3.4 Culture and environment; technocentric and ecocentric views of development.                                | 4            |
| <b>Unit 4: Social-Cultural Relation</b>  |              |
| 4.1 Social groups in tribal, traditional and modern society.   | 4            |
| 4.2 Cultural segregation and cultural diversity  | 4            |
| 4.3 Culture and technology — acculturation, assimilation and integration, detribalization and sanskritization. | 4            |
| 4.4 Cultural globalization and its impact on tribal culture.   | 3            |

## **/// GEO 105: STATISTICAL TECHNIQUES AND COMPUTER APPLICATION**

| <b>Unit1: Sampling, Scales of Measurement and Population Analysis</b>   | Teaching hrs |
|---|--------------|
| 1.1 Geographical data: Discrete and continuous series, scales of measurements, frequency distribution.  | 6            |
| 1.2 Measures of dispersion: absolute and relative measures; range, standard deviation, variance, quartile deviation, coefficient of variability, skewness and kurtosis. | 12           |
| 1.3 Probability - normal, poisson and binomial, normal probability curve and its application  | 6            |
| 1.4 Geometric mean and harmonic mean; sampling theories and methods; application of random numbers, sampling error.   | 6            |
| <b>Unit 2: Correlation and Regression</b>   |              |
| 2.1 Concept of covariance, correlation and regression; bivariate analysis — linear, exponential, power relationship; residuals and mapping of residuals.                | 6            |
| 2.2 Types of correlation: product moment and rank correlation.  | 6            |
| 2.3 Hypothesis testing: formulation, rejection rule, significance level and type of errors.   | 12           |
| 2.4 Students t Test and Chi Square Test   | 6            |
| <b>Unit 3: Computer Application for Descriptive Statistics</b>  |              |
| 3.1 Tabulation, frequency distribution, cumulative frequency distribution, mean, median, mode, standard deviation, mean deviation.                                      | 12           |
| 3.2 Histogram, scatter diagram.   | 6            |
| 3.3 Correlation and regression analysis: fitting of trend line, displaying regression equation and correlation co-efficient   | 6            |
| 3.4 Time Series analysis.   | 6            |
| <b>Unit 4: Laboratory Note Book and Viva voce</b>   |              |



# Semester – II

## **/// GEO 201: HYDROLOGY AND OCEANOGRAPHY**

| <b>Unit1: Components of Hydrology</b>  | Teaching hrs |
|--|--------------|
| 1.1 Global Hydrological cycle as a systems concept.  | 3            |
| 1.2 Catchment hydrology: drainage basin as a hydrological unit, catchment processes, runoff cycle. | 4            |
| 1.3 Groundwater hydrology: factors, processes and laws controlling movement.                       | 4            |
| 1.4 Hydrological analysis: methods and models.   | 4            |
| <b>Unit 2: Applied Hydrology</b>   |              |
| 2.1 Water harvesting: models and feasibility.  | 3            |
| 2.2 Water management in tropical farmlands: techniques and approaches.                             | 4            |
| 2.3 Integrated watershed management: its models and applicability in local environment.            | 4            |
| 2.4 Urban hydrology: water logging and drainage management.  | 4            |
| <b>Unit 3: Morphology of Ocean Basin</b>   |              |
| 3.1 Origin of the ocean basin, morphology of the ocean floor with reference to plate tectonics.    | 4            |
| 3.2 Marine sediments: origin and classification.   | 4            |
| 3.3 Morphology and evolution of coral islands.   | 3            |
| 3.4 Evolution and bottom topography of Indian ocean.   | 4            |
| <b>Unit 4: Properties of Ocean Water and Marine Resources</b>                                      |              |
| 4.1 Water mass: origin, physical and chemical properties.  | 4            |
| 4.2 Air-sea interactions   | 3            |
| 4.3 Ocean circulation: waves and models of formation, tides and currents.                          | 4            |
| 4.4 Anthropogenic utilisation of the oceans with special reference to EEZ and CRZ.                 | 4            |

## **/// GEO 202: BIOGEOGRAPHY**

| <b>Unit1: Soil Geography</b>  | Teaching hrs |
|---|--------------|
| 1.1 Soil as a component of Biosphere; Soil-water-plant relationship.  | 3            |
| 1.2 Soil forming processes: physical, biotic and chemical.  | 4            |
| 1.3 Soil nutrient, moisture and organisms and their role in controlling soil fertility and productivity.          | 4            |
| 1.4 Soil degradation; amelioration and conservation.  | 4            |
| <br>  |              |
| <b>Unit 2: Plant Geography</b>  |              |
| 2.1 Plant ecology; habitat factors; plant responses to physical environment: adaptation, succession and climax    | 4            |
| 2.2 Forest types: Phytogeographical regions; Plant species, family and genera.                                    | 4            |
| 2.3 Deforestation and degradation of forest: causes and consequences; measures of conservation and afforestation. | 4            |
| 2.4 Plants as resource: timber and non-timber forest produces and their use.                                      | 3            |
| <br>  |              |
| <b>Unit 3: Zoo Geography</b>  |              |
| 3.1 Evolution of species: Darwin's theory and later views.  | 4            |
| 3.2 Distribution of animals in different geological periods.  | 4            |
| 3.3 Dispersal and migration of animals; means and barriers; zoo-geographical regions of the world.                | 4            |
| 3.4 Conservation of wild life; relevance of sanctuaries and parks.  | 3            |
| <br>  |              |
| <b>Unit 4: Ecology and Ecosystem</b>  |              |
| 4.1 Principles of physical and human ecology; Ecosystem models  | 4            |
| 4.2 Major natural ecosystems: forms and functions of desert and marine ecosystems                                 | 4            |
| 4.3 Biodiversity: controlling factors and depletion, Biodiversity hotspot.  | 4            |
| 4.4 International Biological Programme; Man and Biosphere Programme.  | 3            |

## **/// GEO 203: GEOGRAPHY OF ECONOMIC ACTIVITY**

| <b>Unit1: Concept of Economic Resource and Economies</b>   | Teaching hrs |
|--|--------------|
| 1.1 Concept of Economic Resource: Adequacy and scarcity.   | 3            |
| 1.2 Conservation and Management of Land, Water and Biotic Resources.   | 4            |
| 1.3 Sustainable use of Energy Resources: Renewable and Non-renewable.  | 4            |
| 1.4 Sectors of Economy; Ranking of World economies.  | 4            |
| <b>Unit 2: Agricultural Geography</b>  |              |
| 2.1 Agricultural Region: Concepts, Techniques and Delineation.   | 3            |
| 2.2 Role of Technological Changes in Agricultural Productivity and Efficiency, Green, White and Blue Revolutions in India. | 4            |
| 2.3 World Agricultural Systems.  | 4            |
| 2.4 Land tenure and land reforms in Indian agricultural system.  | 4            |
| <b>Unit 3: Industrial Geography</b>  |              |
| 3.1 Theories of Industrial Location: Hoover, Smith and Losch; Industrial complexes.  | 6            |
| 3.2 Industrial Regions of India.   | 3            |
| 3.3 Industrial Policies of India; Impact of Globalisation with special reference to India.                                 | 4            |
| 3.4 Impact of new industries on Indian economy: IT Sector and tourism.   | 2            |
| <b>Unit 4: Geography of Trade and Transport</b>  |              |
| 4.1 Transport network analysis and transportation models.  | 3            |
| 4.2 Significance of trade in national and international economy: WTO, GATT, G8 countries TRIPS and MNC's.                  | 4            |
| 4.3 Market system: Market-centres and their orders, frequency, wholesale and retailing.                                    | 4            |
| 4.4 Concept of e-commerce; SEZ, EPZ and their significance.  | 4            |

## **/// GEO 204: GEOGRAPHY OF INDIA**

| <b>Unit1: Regions of India</b>                           |   | Teaching hrs |
|--|---|--------------|
| 1.1  | Different schemes of classification of Indian regions, problems of regional delineation.                    | 4            |
| 1.2  | Physiographic regions.  | 4            |
| 1.3  | Agro-climatic regions   | 4            |
| 1.4  | Planning regions.   | 3            |
| <br>   |   |              |
| <b>Unit 2: Natural resource appraisal and management</b> |   |              |
| 2.1  | Water resource management: big dams, river linkage, utilisation of ground water.                            | 4            |
| 2.2  | Biotic resource management: Biodiversity conservation and participatory forest management, social forestry. | 4            |
| 2.3  | Land resource management: wastelands and wetlands.  | 4            |
| 2.4  | Mineral & energy resource conservation and management.  | 3            |
| <br>   |   |              |
| <b>Unit 3: Socio-economic issues</b>                     |   |              |
| 3.1  | Regional variations in population growth, structure and composition; Human Development disparity.           | 4            |
| 3.2  | Urbanization in India: urban problems and policies; rural-urban linkage.                                    | 4            |
| 3.3  | Problems and prospects of industrial development in India.  | 4            |
| 3.4  | Trade and transport policies of India.  | 3            |
| <br>   |   |              |
| <b>Unit 4: Geography of Deltaic West Bengal</b>          |   |              |
| 4.1  | Hydromorphological characteristics: geomorphic units, changes in surface hydrology.                         | 4            |
| 4.2  | Problems of flood, drought and ground water contamination   | 3            |
| 4.3  | Population dynamics : growth, migration and changing composition  | 4            |
| 4.4  | Agricultural and industrial scenario: problems and prospects.   | 4            |

## ***/*GEO 205: MAPPING TECHNIQUES**

| <b>Unit1: Map Projections and Analysis of Topographical Sheets</b>   | Teaching hrs |
|--|--------------|
| 1.1 Map projections with special reference to Polyconic, Transverse Mercators and UTM.                                   | 9            |
| 1.2 Referencing schemes of SOI topographical maps.   | 6            |
| 1.3 Mapping of linear and relief aspect of drainage basins.  | 9            |
| 1.4 Mapping and interpretation of cultural attributes: Nearest neighbour analysis, accessibility index and detour index. | 6            |
| <br><b>Unit 2: Analysis and Interpretations of Aerial Photographs and Satellite Images</b>                               |              |
| 2.1 Basic photogrammetry using stereo-pairs.   | 9            |
| 2.2 Mapping of physical and cultural features from aerial photographs.   | 6            |
| 2.3 Application of satellite sensors and their resolutions in mapping.   | 9            |
| 2.4 Landuse and landcover mapping from standard FCC's.   | 6            |
| <br><b>Unit 3: Global positioning system</b>   |              |
| 3.1 Principles of GPS positioning, applicability of WGS-84 and Everest reference spheroids.                              | 9            |
| 3.2 Different techniques of GPS survey and capability of GPS receivers.  | 6            |
| 3.3 Generation of on-field vectors using UTM Projection and their manual plotting.                                       | 6            |
| 3.4 Exporting GPS vectors to GIS programme.  | 9            |
| <br><b>Unit 4: Laboratory Note Book and Viva voce</b>  |              |

# Semester – III

## **/// GEO 301: PHILOSOPHY OF GEOGRAPHY**

| <b>Unit1: Evolution of Geographical Thought</b> |  | Teaching hrs |
|---|--|--------------|
| 1.1   | Developments up to 18 <sup>th</sup> Century: Greek, Roman, Arab geographers.   | 4            |
| 1.2   | Developments in 19 <sup>th</sup> Century: Humboldt and Ritter.   | 4            |
| 1.3   | Developments after Humboldt and Ritter: Ratzel, Hettner (Germany), Mackinder (Britain), Huntington, Semple (USA).                | 3            |
| 1.4   | Developments post 2 <sup>nd</sup> . World War: Hartshorne- Schaefer debate, Quantitative revolution, Radical and Marxist School. | 4            |
| <br>  |  |              |
| <b>Unit 2: Geography as a Social Science</b>    |  |              |
| 2.1   | Welfare Geography  | 4            |
| 2.2   | Geography as Human Ecology   | 4            |
| 2.3   | Geography of Gender  | 3            |
| 2.4   | Critical theory: Habermas  | 4            |
| <br>  |  |              |
| <b>Unit 3: Paradigm Shift in Geography</b>      |  |              |
| 3.1   | Landscape Morphology: Carl Sauer.  | 3            |
| 3.2   | Colonialism and post-colonialism.  | 4            |
| 3.3   | Post structuralism   | 4            |
| 3.4   | Modernism and postmodernism  | 4            |
| <br>  |  |              |
| <b>Unit 4: Contemporary Trends in Geography</b> |  |              |
| 4.1   | Revival of Environmentalism and ecological approach.   | 4            |
| 4.2   | Laws, theories and models in Geography   | 4            |
| 4.3   | Systems Approach   | 3            |
| 4.4   | Issues of sustainability and globalisation.  | 4            |

## **/// GEO 302: RESEARCH METHODOLOGY AND STATISTICAL APPLICATIONS**

| <b>Unit1: Approach to Geographical Research</b>            |  | Teaching hrs |
|--|--|--------------|
| 1.1  | Contemporary research trends, identification of research problem and selection of study area.  | 4            |
| 1.2  | Specifying objectives and framing research questions.  | 3            |
| 1.3  | Literature review, exploring relevant sources.   | 4            |
| 1.4  | Development of methodology – Physical geography and human geography, recognition of limitations, formulation of research hypothesis. | 4            |
| <b>Unit 2: Data collection</b>                             |  |              |
| 2.1  | Applicability of quantitative information.   | 4            |
| 2.2  | Identification of secondary data sources and collection.   | 3            |
| 2.3  | Field methods in physical geography: Instrument-based study, sample collection, ground truthing.                                     | 4            |
| 2.4  | Field methods human geography: Preparation of survey schedule and questionnaire.   | 4            |
| <b>Unit 3: Report writing and presentation of research</b> |  |              |
| 3.1  | Principles of hypothesis testing and drawing conclusions.  | 4            |
| 3.2  | Methods of report writing and seminar presentation.  | 4            |
| 3.3  | Style of referencing, preparation of glossary and bibliography.  | 4            |
| 3.4  | Editing, page arrangement and set-up.  | 3            |
| <b>Unit 4: Statistical Application</b>                     |  |              |
| 4.1  | Techniques of multivariate analysis  | 3            |
| 4.2  | Principles and methods of multiple and partial correlation analysis  | 4            |
| 4.3  | Principal Component Analysis   | 4            |
| 4.4  | Factor Analysis  | 4            |

**/// GEO 303A: APPLIED GEOMORPHOLOGY (OPTIONAL)**

| <b>Unit 1: Applied Geomorphology in fluvial process</b>   | Teaching hrs |
|---|--------------|
| 1.1 Applied Geomorphology in management and planning.   | 3            |
| 1.2 Methods of monitoring geomorphic change   | 4            |
| 1.3 River hydraulics.   | 4            |
| 1.4 Stable and unstable channel geometries and plan form  | 4            |
| <b>Unit 2: Anthropogenic interferences in channel management</b>                                      |              |
| 2.1 Causes and patterns of shifting of river course.  | 4            |
| 2.2 Effects of construction of dams and embankments, Decommissioning of big dams, River Action Plans. | 4            |
| 2.3 Channelization, water diversion and augmentation.   | 4            |
| 2.4 River stabilization and restoration   | 3            |
| <b>Unit 3: Floodplains and flood management</b>   |              |
| 3.1 Floodplain processes and landforms.   | 4            |
| 3.2 Micromorphology of floodplain and related landuse.  | 3            |
| 3.3 Causes and characteristics of floods in relation with discharge, basin characteristics, landuse.  | 4            |
| 3.4 Perception of flood and flood management  | 4            |
| <b>Unit 4: Estuarine problems and management</b>  |              |
| 4.1 Estuarine morphology and sedimentary environment. ;   | 4            |
| 4.2 Estuarine hydrodynamics; influence of tide and wave processes.                                    | 4            |
| 4.3 Anthropogenic impact on estuaries.  | 3            |
| 4.4 Estuarine problems and their management.  | 4            |



## **/// GEO 303B: REGIONAL PLANNING AND RURAL DEVELOPMENT**

### **(OPTIONAL)**

| <b>Unit1: Evolution of Decentralised Planning</b>   | Teaching hrs |
|---|--------------|
| 1.1 Concept of Regional Planning and Community Development  | 3            |
| 1.2 Rural Development – institutions, their structures and functions.   | 4            |
| 1.3 73rd Constitutional Amendment, West Bengal Panchayati Raj Acts and consequences.                                    | 4            |
| 1.4 Decentralised framework of micro-level planning and development.  | 4            |
| <b>Unit 2: Concepts of Participatory Development</b>  |              |
| 2.1 Concept of participatory development: Grass root democracy and implications of empowerment of people.               | 4            |
| 2.2 Participatory planning process.   | 4            |
| 2.3 Co-operative and Self Help Group Movement in India.   | 4            |
| 2.4 Agents and institutions for promoting people's participation: Government departments, NGO's and other facilitators. | 3            |
| <b>Unit 3: Special Area Development</b>   |              |
| 3.1 Identification of Backward regions. Target area and target population   | 4            |
| 3.2 Tribal Area Development Programme: Development policies and programmes  | 4            |
| 3.3 Drought prone Area Development Programme: Development policies and programmes                                       | 4            |
| 3.4 Hill Area Development Programme: Development policies and programmes  | 3            |
| <b>Unit 4: Regional Development and Rural Development in India</b>  |              |
| 4.1 Regional inequalities in India and policies of balanced regional development.                                       | 4            |
| 4.2 Impact of Land Reforms on rural development.  | 4            |
| 4.3 Service Centre approach to rural development.   | 3            |
| 4.4 Major programmes of Rural Development in the Five Year Plans.   | 4            |

## **/// GEO 304: REMOTE SENSING AND GEOGRAPHICAL INFORMATION SYSTEM**

| <b>Unit1: Fundamentals of Remote Sensing</b>   | Teaching hrs |
|--|--------------|
| 1.1 Principles of remote sensing: EMR, radiation laws; energy interaction with atmosphere and earth's surface. | 6            |
| 1.2 Satellite sensors and their resolutions.   | 6            |
| 1.3 Georeferencing and mosaicing of maps and satellite images.   | 9            |
| 1.4 Preparation of colour composites using different band combinations.  | 9            |
| <b>Unit 2: Digital Image Processing</b>  |              |
| 2.1 Extraction of spectral signature from satellite data, Image Enhancement.                                   | 6            |
| 2.2 Unsupervised classification of satellite data.   | 9            |
| 2.3 Supervised classification of satellite data.   | 9            |
| 2.4 Generation of signature separability, signature statistics and classification report.                      | 6            |
| <b>Unit 3: Geographical Information System</b>   |              |
| 3.1 Generation of vector layers and buffers.   | 9            |
| 3.2 Attaching and editing attribute tables   | 6            |
| 3.3 Preparation of thematic maps and change detection using multi-dated maps and images.                       | 9            |
| 3.4 Construction of Digital Elevation Models from SRTM data.   | 6            |
| <b>Unit 4: Laboratory note book and Viva voce</b>  |              |

## **/// GEO 305: SPATIAL ANALYSIS AND FIELD METHODS**

### **Unit1: Spatial Pattern and Inequality** Teaching hrs

- |     |   |   |
|-----|---|---|
| 1.1 | Location of mean center and standard distance measure.                    | 9 |
| 1.2 | Population projection using exponential curve and Breaking point analysis | 6 |
| 1.3 | Location Quotient, Functional classification by Ternary diagram.          | 6 |
| 1.4 | Lorenz Curve and Gini Coefficient.  | 9 |

### **Unit 2: Field Survey Techniques**

- |     |   |   |
|-----|---|---|
| 2.1 | Measurement of slope and dip with the help of Abney Level and Clinometer.   | 6 |
| 2.2 | Measurement of height and distance of an inaccessible object by Theodolite. | 9 |
| 2.3 | Preparation of Contour map by Total Station.                                | 9 |
| 2.4 | Land survey by Tacheometric principle                                       | 6 |

### **Unit 3: Laboratory Note Book and Viva Voce**

### **Unit 4: Field Report on Group project** 30

Guidelines for Field Work: 5 to 6 students per group. Topic based on relevant local problem.

Either a rural or an urban area of about 5 km<sup>2</sup> is to be selected for study.

The work is to be based mainly on processing of primary data collected from field with the help of appropriate schedules for physical and socio-economic survey, stressing on any local problem or any contemporary issue.

Duration of the field study not to exceed seven days. The area and supervisor (s) of the Report are to be determined by the Departmental Committee.

The following are to be taken as base maps, subject to availability: (a) cadastral maps, (b) 1:50,000 and/or 1:25,000 toposheets and (c) Satellite imageries and/or data.

Interrelations between different aspects of the study should be the focus of the Report.

Text of the Report should not exceed 6,000 words and should ideally be divided into the following sections:

- Introduction
- Statement of problem(s) and Objectives
- Materials and methods
- Discussions
- Conclusion
- References / Bibliography and Appendices (if any).

Maps, diagrams and sketches, excluding photographs, should not exceed 15 pages of A4 size paper.

Handwritten Report duly endorsed by the Supervisor(s) is to be produced individually by the students. Photocopying and computer typing are not to be allowed in any form.

# Semester – IV

## **/// GEO 401: ENVIRONMENTAL GEOGRAPHY AND GEOPOLITICS**

| <b>Unit1: Concepts</b>  | Teaching hrs |
|---|--------------|
| 1.1 Concept of Environmental Geography and perception of degradation, pollution, hazard and disaster.   | 4            |
| 1.2 Population Equilibrium, Biodiversity, Biotechnology and economics of biodiversity.  | 4            |
| 1.3 Ecological Issues – past and present, ecosystem resilience; ecosystem management.   | 4            |
| 1.4 Resource conservation and management with special reference to wetlands.  | 3            |
| <b>Unit 2: Contemporary Environmental Issues, Problems and Policies</b>   |              |
| 2.1 Problems of large national projects with emphasis on Big Dams.  | 4            |
| 2.2 Urban expansion, pollution, waste management and ecological consequences  | 4            |
| 2.3 Environmental Movements in India, problem of environmental refugees   | 3            |
| 2.4 National Environmental Policies and Sustainable Development Goals 2015.   | 4            |
| <b>Unit 3: Political Geography and Geopolitics</b>  |              |
| 3.1 Political Geography as the politics of place; Functional approach, unified field theory and genetic-functional theory of Political Geography. | 3            |
| 3.2 Changing perspectives of world power: views of Mahan, Spykman and Cohen.  | 4            |
| 3.3 Concepts and characteristics of Nation, State and nationalism; Buffer States and Land-locked States, Electoral Geography and Federalism.      | 4            |
| 3.4 Politics of World Resource with special reference to oil.   | 4            |
| <b>Unit 4: Political Geography of Indian Subcontinent</b>   |              |
| 4.1 Changing Political Map of India since Independence; emergence of new states.  | 4            |
| 4.2 Political Geography of SAARC Region: boundary dispute and trade relations   | 3            |
| 4.3 Geopolitics of the Indian Ocean; International and interstate water dispute with reference to Ganga and Kaveri water.                         | 4            |
| 4.4 Geo-political Problems in Border States: Enclaves, exclaves and cross-border infiltration.  | 4            |

## **/// GEO 402: URBAN AND REGIONAL DEVELOPMENT**

### **Unit 1: Concepts and theories of Urbanization:**

- |      |   |   |
|------|---|---|
| 1.1. | Urbanization, Urbanism and Urban Development  | 3 |
| 1.2  | Selected Theories and Concepts of Urbanization and Urban Development: Modernization theory, Dependence Theory and World System theory; global cities and smart cities | 4 |
| 1.3  | Rural-Urban Migration and urban sprawl : Concepts of Suburbanization, Satellite Towns, Urban Agglomerations and City Region   | 4 |
| 1.4  | Metropolitan Development Concepts: Metropolitan Area, Metropolitan Region and Urban Agglomeration, Metropolitanization and Metropolitan Development                   | 4 |

### **Unit- 2: Theories of Regional Development**

- |      |   |   |
|------|---|---|
| 2.1  | Concepts of Growth and Development, spatial integration; factors affecting regional development | 3 |
| 2.2. | Classical and Neoclassical Growth models: Smith, Keynes, Rostow, Marx                           | 4 |
| 2.3. | Models of industrialisation-urbanisation: Perroux, Hirschman, Friedmann                         | 4 |
| 2.4  | . Alternative models: Agropolitan Development, Basic Needs Approach, Export-led Development     | 4 |

### **Unit 3: Geography of Development:**

- |     |  |   |
|-----|--|---|
| 3.1 | Economic Development: Role of environment, technology and institutions in economic development, Regional development in relation to trade and global aid | 4 |
| 3.2 | Human Development: Demographic indicators of development, Social and cultural components of development  | 4 |
| 3.3 | Informal Sector Development : Urban Informal Sector Theory; formal- informal sector linkage  | 3 |
| 3.4 | Globalization and Development: Impact of Globalisation and Liberalisation in urban and regional development in India.                                    | 4 |

### **Unit 4: Urban Scenario of India:**

- |     |  |   |
|-----|--|---|
| 4.1 | Urban Land use planning and Land Policies : Case study of National Capital Region/ Kolkata Metropolitan Region;, case study of a medium sized town of West Bengal. | 4 |
| 4.2 | Urban Economy: Sector wise distribution of workforce : Industry, Tertiary sector, and Informal sector  | 4 |
| 4.3 | Problems related to urban slums : pollution & health ; Poverty and crime   | 4 |
| 4.4 | Urban Management with special reference to : Drinking water, Sewage and Sanitation Kolkata   | 3 |

## **/// GEO 403A: APPLIED GEOMORPHOLOGY (OPTIONAL)**

### **Unit 1: Coastal management**

- 1.1 Ecological significance of mangroves in coastal geomorphology: threats and management.
- 1.2 Coastal erosion: processes and management approaches.
- 1.3 Sea level change: patterns, consequences and management.
- 1.4 Integrated Coastal Zone Management (ICZM)

### **Unit 2: Groundwater and soil: geomorphic problems and management**

- 2.1 Groundwater accumulation and flow mechanics.
- 2.2 Groundwater problems and management: conjunctive use of ground water
- 2.3 Formation of badlands on laterite duricrusts; Strategies for badland reclamation.
- 2.4 Processes of soil erosion and degradation and management options.

### **Unit 3: Watershed management and urban hydrology**

- 3.1 Introduction to watershed management, different stakeholders and their relative importance, watershed management policies
- 3.2 Watershed resource appraisal – Physical, hydrological, landuse/cover.
- 3.3 Techniques in watershed management: Applications of GIS and RS, role of Decision Support System and EIA.
- 3.4 Approaches to urban hydrology; Effects of urbanisation on runoff generation.

### **Unit 4: Case studies**

- 4.1 Management of river discharge with special reference to DVC/ Farakka Barrage Project
- 4.2 Management of urban waste water with special reference to East Kolkata Wetlands
- 4.3 Management of Reclaimed Coastal areas with special reference to Indian Sundarban
- 4.4 Management of coastal erosion with special reference to Digha township

## **/// GEO 403B: REGIONAL PLANNING AND RURAL DEVELOPMENT (OPTIONAL)**

### **Unit 1: Administrative Functions and Policies**

- 1.1 Decentralised Functions, Powers and Devolution of Funds: Provisions in 73<sup>rd</sup> Constitutional Amendment Act
- 1.2 Livelihood strategies: Access to minimum needs, food security and sustainable farming
- 1.3. Rural Infrastructure Development: physical and social infrastructures
- 1.4 Rural Development machineries: Role and functions of line departments

### **Unit 2: Development and Displacement:**

- 2.1 Land use change due to rapid non agricultural use
- 2.2 Development induced displacement: deforestation, dam- construction, industrial expansion and residential growth
- 2.3 Consequences of displacement: Social movements, compensation and rehabilitation
- 2.4 Adverses of Development Displacement : poverty, inequality, social exclusion and out migration

### **Unit 3: Rural reconstruction and Changing Rurality:**

- 3.1 Process of Transformation: rural employment schemes, flagship programmes, Structural adjustment , PPP and institutional changes
- 3.2 Effect of implementation of schemes: Social and economic development of different sections of population
- 3.3 Effect of emerging industries with special reference to food processing, handicrafts, rural tourism, etc.
- 3.4 Impact of globalisation and liberalisation in rural development

### **Unit 4: Rural Planning at Micro level**

- 4.1 Role of Institutions in Rural Development : framework and actors
- 4.2 Block level Planning
- 4.3 Planning at Gram Panchayat and Gram Sansad level
- 4.4 Achievements and failures in rural development programmes with case studies

## **/// GEO 404A: APPLIED GEOMORPHOLOGY PRACTICAL (OPTIONAL)**

### **Unit 1: Quantification and interpretation of fluvial processes and forms**

- 1.1 Measurement of channel planform: Braiding index, Sinuosity index, Meander wavelength and Radius of curvature.
- 1.2 Calculation of hydraulic geometry equations from field data
- 1.3 Calculation of velocity and discharge using Manning's equation, measurement of velocity by using current meter.
- 1.4 Analysis and interpretation of Thiessen polygon of drainage basins, Flow Duration Curves and Stage-discharge rating curves.

### **Unit 2: Quantification and interpretation of coastal processes and forms**

- 2.1 Preparation of wave refraction diagram and interpretation
- 2.2 Monitoring tide in field and its interpretation
- 2.3 Determination of breaker types and computation of breaking wave energy by empirical equations.
- 2.4 Identification of sedimentary structures and biogenic forms in beach environment.

### **Unit 3: Sediment and water analysis**

- 3.1 Measurement of suspended sediment concentration
- 3.2 Analyses of Pebbles: Shape Indices,
- 3.3 Textural analysis by sieving and pipette method.
- 3.4 Measurement of salinity

### **Unit 4: Practical Note Book and viva voce:**



## **/// GEO 405A AND B: TECHNIQUES IN PHYSICAL GEOGRAPHY (PRACTICAL)**

### **Unit1: Techniques in physical geography**

- 1.1 Interpretation of geological maps with faults and/or intrusions carbon of soil samples.
- 1.2 Assessment of soil status by soil testing kit: N, P, K, organic carbon and pH
- 1.3 Determination of water quality: Alkalinity, CO<sub>2</sub>, DO and Nitrate

### **Unit 2: Dissertation based on optional paper and viva**

Each Examinee shall prepare a Dissertation Paper under the supervision of a Departmental Faculty on his / her own chosen Theme.

The Report must be documented in duplicate (1 = examinee, 1 = seminar library) under the following Heads:

- Introduction and Conceptual Background;
- Statement of the Problem;
- Objectives of Study;
- Literature Review;
- Methodology including data / information / map collection;
- Location of the Study Area;
- Analysis, Display and Interpretation of Data (relating to each objective separately);
- and • Conclusion.

The Dissertation Paper should contain • Acknowledgement, • Preface, • Table of Content, • List of Tables, • List of Figures, • List of Plates, • References and • Appendix.

Pages containing Illustrations (maps, diagrams, graphs and photographs) = 40 (maximum).

Word Limit = 10000 (maximum) excluding tables and appendix (Computer typed,

Line Spacing = 1.5; Font = Arial font size 11/ Times New Roman font size = 12 / 11).

Each Examinee shall submit a copy of the Report before the actual day of Examination.

Each Examinee shall present his / her Paper before an audience comprising Internal / External Examiners and others on the day of Examination using LCD Projector (maximum 25 slides about - concept / idea / theme; major objectives; methodology; study area; observations and analysis; conclusion).

Time allotted for each presentation = 20 minutes (maximum) Marks on performance of individual students (= 6) during preparation of the Dissertation Report and its content (= 6) shall be awarded by the Internal Examiner(s) and on the Research and Academic Quality of the Report (= 12) followed by the Presentation and Viva Voce (= 16) by the External Examiner(s).

## Section 5: Suggested readings

### **/// GEO 101: GEOMORPHOLOGY**

- ▶ Ballantyne, C.K. (2008): *Periglacial Geomorphology and Sedimentology*, Blackwell Publishing Inc., London.
- ▶ Brown, A.G. (1997): *Alluvial Geoarchaeology: Floodplain Archaeology and Environment Change*, Cambridge University Press, Cambridge.
- ▶ Chorley, R., Schumm, S. and Sugden, D.E. (1994): *Geomorphology*, Methuen, London.
- ▶ Clark, J.R. (1996): *Coastal Zone Management Handbook*, CRC Press / Lewes Publishers, New York.
- ▶ Coch, N.K. (1994): *Geohazards: Natural and Human*, Prentice-Hall, Englewood Cliffs.
- ▶ Cook, R.U. and Doorncamp, J. C. (1990) *Geomorphology in Environment Management: A New Introduction*, 2nd edition, Clarendon Press-Oxford, Oxford.
- ▶ Cooke, R.U., Warren, A. and Goudie. A.S. (1993): *Desert Geomorphology*, CRC Press, London.
- ▶ Cox, A. and Hart, R.B. (1986) : *Plate Tectonics: How it Works*, Blackwell Scientific Publications, Oxford.
- ▶ Goudie, A (editor) (2004): *Encyclopaedia of Geomorphology*, Volumes 1 & 2, Routledge, London.
- ▶ Goudie, A. (editor) (1990): *Geomorphological Techniques*, 2nd edition, Allen Unwin, Crows Nest (Australia).
- ▶ Huggett, R. (2006): *Fundamentals of Geomorphology*, Routledge, London.
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