M.SC SYLLABUS IN GEOGRAPHY

CHOICE BASED CREDIT SYSTEM (CBCS)

(EFFECTIVE FROM THE ACADEMIC SESSION 2017-18)

DEPARTMENT OF GEOGRAPHY

RAIGANJ UNIVERSITY

COLLEGE PARA, P.O, RAIGANJ
DIST. UTTAR DINAJPUR
PIN – 733 134
# Proforma for the Scheme of Study & Examination of Choice Based Credit System, Master of Science in Geography

## SEMESTER - I

<table>
<thead>
<tr>
<th>Code/Module</th>
<th>Title of the paper</th>
<th>Type</th>
<th>Duration of Examination (hour)</th>
<th>End-term Assessment</th>
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<td>Geotectonic and Geomorphology</td>
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Notes: PG – Post Graduation; GEO – Geography; CC – Core Course; T - Theory; GP – General Practical; IDC – Inter-disciplinary Course

## SEMESTER - II

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<th>Code/Module</th>
<th>Title of the paper</th>
<th>Type</th>
<th>Duration of Examination (hour)</th>
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<td>Remote Sensing and Geographical Information System</td>
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# SEMESTER - III

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Notes: PG – Post Graduation; GEO – Geography; CC– Core Course; T – Theory; CE – Continuing Evaluation; GP – General Practical; IDC – Inter-disciplinary Course

# SEMESTER - IV

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* Special Course to be offered: cartography, urban geography, population geography, fluvial geomorphology

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SEMESTER – I
MODULE – PGEOCC101
GEOTECTONIC AND GEOMORPHOLOGY

End-term Assessment - 38
Internal assessment - 12
Total - 50

UNIT - I
Objectives and History of Geomorphology: Methods of Geomorphic analysis - Concept of system and types, equilibrium, adjustment in nature; Geomorphological Mapping - schemes and basis of landform classification; Energy and Force in Geomorphology - behavior, strength and resistance of rocks, soil and water.

UNIT - II
Plate Tectonics and Geodynamics: Concept of plate tectonics and plate tectonics hypothesis, Vine-Mathew’s hypothesis, Isostatic adjustment and geodynamics, palaeomagnetism, reconstruction of palaeomagnetism, reversal of polarity. Application of plate tectonics theory to - Continental drift, Mountain building, volcanicity, earthquakes and sea floor spreading.

UNIT - III
Hill Slope forms and Processes: processes for slope development; Slopes - evolution, forms, parallel retreat and slope replacement models.

UNIT - IV

Recommended Books


Semester – I
Module – pggeocct-102
Soil and Bio Geography

End-term Assessment – 38
Internal assessment – 12
Total – 50

Unit I

Biogeography: Definition scope and significance of biogeography; Elements of biogeography with special reference to India; environment, habitat, plant-animal association; zoo geography of India; World distribution of forests and major plants communities. Biogeographical Regions: phytogeographical and zoogeographical regions of the world. Distribution of major animal communities. Conservation of forests, wildlife sanctuaries and parks.

Unit II


Unit III
**Soil Geography:** Definition, components of soils; Origin and formation of soils-weathering process, Soil forming factors; soil forming process, soil profile development under different climatic conditions; Physical properties of soils;

**UNIT IV**

Soil Classification and Significance: Genetic classification of soil. Factors of soil erosion. Soil conservation measures. Soil degradation and Wasteland - Definition of soil degradation and its causes; Soil reclamation and management.

**Recommended Books**

35. Watts, David, Principles of Biogeography, London.

SEMESTER — I
MODULE — pggeocct-103
ECONOMIC GEOGRAPHY

End-term Assessment – 38
Internal assessment – 12
Total – 50

UNIT I
Economic Geography: Scope content and importance of Economic Geography; approaches to the study of Economic Geography; relation of Economic Geography with other branches of geography; Economic sectors - primary, secondary and tertiary; types of economies.

UNIT II
Von Thunen’s model and selected agricultural concepts: Von Thunen’s model of agricultural land use and its modifications; Selected agricultural concepts: crop concentration, crop diversification, crop combination, agricultural productivity and efficiency.

Unit III
Theories of industrial location: Alfred Weber, TordPalander, August Losch, Walter Isard and Rawstron’s principles. Methods of measuring the spatial distribution of manufacturing; location quotient and co-efficient of Geographical association.
Unit IV

Transport and Network: Modes of transport; Transport Network - elements, connectivity and accessibility; traffic flow; role of transport in economic development; morphology and periodicity of market, role of market in economic development.

Suggested Readings

1. Alexander, J.W., Economic Geography
8. Hartshon, T.A., Economic Geography
20. Thoman, R., "Economic Geography" in International Encyclopaedia of Science
Semester – I
Module – pggeocct-104
Settlement Geography

End-term Assessment – 38
Internal assessment – 12
Total – 50

Unit I
Settlement Geography: Definition, scope and approaches to study the Settlement Geography; Archeological finds and settlements - Mesopotamia, the Nile valley, the Indus valley; Place names versus settlements; The rural urban continuum.

Unit II
Origin, distribution and functional classification of settlements: Origin and distribution pattern of rural settlements and urban centers (with special reference to India); Functional Classification of rural and urban centers (with special reference to India).

Unit III
Settlement Structure: Models explaining morphological pattern of rural settlements (with special reference to India), Models and theories explaining morphological pattern of urban centers, shape analysis of rural settlements and urban centers.

Unit IV
Settlement Hierarchy: Central place theory - theory of Walter Christaller and its application; theory of August Losch and its application; measurements of centrality, hierarchy of settlements in India.

Suggested Readings


**SEMESTER – I**

**MODULE – pggeocgp-105**

**GENERAL PRACTICAL**

End-term Assessment – 100

**UNIT I**

**Study of Topographical Maps**

- Morphometric analysis of drainage basin: Stream ordering (Horton and Strahler), Drainage density and texture in different ecological set up
- Basin circulatory and elongation
- Altimetric curve, hypsometric curve
- Ruggedness index, dissection index
- Nearest neighbour analysis of settlements (based on topographical maps)
- Quantitative relation between settlement and different relief aspects by linear regression analysis

**UNIT II**

**Weather Instruments**

- Pluviometric chart
- Thermo-hydrograph
- Barometric chart
UNIT IV

Thematic Mapping

- Methods of measuring - crop combination, agricultural efficiency, location quotient and co-efficient of Geographical association
- Time Series analysis for measuring trend of land value /land use by the method of Semi averages and Least Squares - Straight line and Parabola of the second degree
- a) Measurement of breaking points and detour index. b) Spatial Distribution of Population Mapping and Population Potential
- Lorenz Curve, Ginni’s coefficient of localisation (already in UG course) and Centographic measures

Laboratory Note Book and Viva-Voce

Suggested Readings

6. Rabinson, Arthur H., Morison, Joel L., Muehrcke, Philip C., Kimerling,
SEMESTER – I
MODULE – PGGEOIDC-1
Interdisciplinary Course -1
(for other streams)

ENVIRONMENTAL GEOGRAPHY AND DISASTER MANAGEMENT

End term: 75 (6 credit)
Internal assessment: 25 (2 credit)
Total:100 (8 credit)

UNIT I
Environmental Geography: Meaning and scope of Environmental Geography; Relations of Environmental Geography with other sciences; meaning, component and types of environment, approaches to the study of man-environment relationships.

UNIT II
Ecosystems: meaning, types and components of ecosystem; function of ecosystem, trophic levels, food chain and food webs; Ecological pyramid and flow of energy; Bio-geo-chemical Cycles, Nitrogen cycle, Carbon cycle and Hydrological cycle.

UNIT III
Environmental Degradation and Pollution: concept and types of environmental degradation; causes of environmental degradation; sources and types of pollution; Air Pollution - adverse effect of air pollution on weather and climate; ozone depletion, green house effects, effects on human health water pollution - surface and ground water pollution, adverse effects on human health.

UNIT IV
Environmental Planning and Management: Environmental management – methods and approaches; ecological basis of environmental management – ecological principles; environmental impact assessment (EIA).

UNIT V
Disaster: meaning and concept; hazards, risk and vulnerability. Disaster – classification of disasters; Natural disaster – earthquake, floods, drought and global warming: causes, consequences and mitigation; Manmade disasters, their types – technological and industrial disasters. Social disasters: causes, consequences and mitigation.

Unit VI

Disaster management: relief and response; reconstruction and rehabilitation; Disaster management: prevention, preparedness and mitigation. Importance of information in disaster management, significance of remote sensing and GIS; Mitigation and management - role of Government, NGOs; Plans and policies and laws.

Suggested Readings


Notes:

1. Question paper shall be divided into Group A and Group B. Group A shall consist of long answer type questions and Group B brief answer type questions.
2. In Group A, there shall be two questions each carrying 10 marks from each unit. Out of two, examinees are to answer one question from each unit. Thus, six units shall carry 6 x 10 = 60 marks of long answer type questions.
3. Group B shall consist of five questions each of 3 marks covering any five units. Thus, total marks for Group B shall be 3 x 5 = 15
4. For internal assessment, total marks are 25.

Semester – II
Module – pggeocct-201
CLIMATOLOGY

End-term Assessment – 38
Internal assessment – 12
Total – 50

UNIT I

Climatology: Nature and scope of climatology and its relationship with meteorology; Insolation and heat budget; Green house effect; Atmospheric motion: forces controlling motion of air; general circulation in the atmosphere; local winds; jet stream; Atmospheric moisture: humidity, evaporation, condensation; processes of precipitation formation and types of precipitation; Acid rain: causes and impact.

UNIT II

Ocean atmospheric interaction: El Nino, Southern oscillation (ENSO) and La Nina. Atmospheric disturbances: Cyclones – tropical and extra-tropical; Thunderstorms – origin, characteristics, classification and distribution; Western disturbances.
UNIT III

Climatic changes: Evidences, possible causes and impact; Global warming: environmental impacts and society’s response.

UNIT IV


Suggested Readings

UNIT I

Hydrological cycle and surface hydrology: Hydrology -definition, hydrological cycle, characteristics, significance and interpretation;Surface hydrology - runoff characteristics, runoff cycle; Conceptual and empirical relationship between rainfall and runoff;Drainage basin hydrology - components, interface and flood analysis;Stream flow measurement - techniques and their application.

UNIT II

Sub-surface hydrology and basin management: Basic concept -aquifer and their characteristics,hydraulic conductivity, specific yield and watershed leakage.Components - Definition and characteristics of precipitation, evaporation, evapo-transpiration, infiltration, rainfall recharge. Principles of integrated basin management-concept of micro watershed planning, water management in tropical cities and rainwater harvesting.

UNIT III

Ocean Morphology: Fundamental - origin, characteristics and classification of the major structure and morphological features of the ocean with particular reference to Plate Techniques Bottom configuration - Pacific, Atlantic and Indian Ocean.Ocean sediments: Origin, classification and movement coral reefs and atolls; evolution.

UNIT IV

Chemical Oceanography: Composition of sea water, classification of elements based on their distribution, chemical exchanges across interfaces and residence times in sea water; Biological Oceanography: Classification of the marine environment and marine organisms; Physio- chemical factors affecting marine life, adaptation and biological processes; Primary and secondary production; factors controlling phytoplankton and zooplankton abundance and diversity.

Suggested Readings
SEMESTER – II
MODULE – PGGEOCCT-203
SOCIAL AND CULTURAL GEOGRAPHY

Unit I
Social Geography: Definition, Evolution and approaches; relation of social geography with other social sciences; social structure and social system: concept and element of social structure; Society – meaning, nature, characteristics and types of society; Social groups - classification, characteristics, importance and; Primary and secondary social groups; community; social space; social processes and its forms, social inequality, social justice, social well being.

Unit II
Cultural Geography: Definition, development, scope and content, cultural region,, theme of cultural integration, theme of cultural landscape, methodology, culture – concept, significance, characteristics, functions and components;cultural hearth and cultural realm, cultural diffusion, cultural lag, cultural landscape, Cultural Region; Folk culture – folk culture regions, cultural diffusion in Folk Geography; cultural integration in Folk Geography; Cultural process - cultural assimilation, integration and acculturation; Cultural segregation and cultural regeneration.

Unit III
Elements of Social and Cultural Geography in India: Caste System – meaning and characteristics, changes in caste system during British rule, caste in independent India; Caste and social stratification – the scheduled caste: definition and problems of scheduled castes, measures for welfare for scheduled castes; the Backward Classes: definition and description of backward classes, the Backward classes movement.

Unit IV
The Scheduled Tribes: concept and definition of tribes – issues in Indian context; Tribes in India – their classification; Perspectives on Tribal India - approaches to tribal problems, major problems and related issues; Forests, tribals and forest policy; Development policies; tribal displacement and problems of rehabilitation; Issues of Social Change and Transformation in India: Constitutional imperatives - constitution and social change.Development planning and social change.

Suggested Readings
4. Bhowmick, Prabodh Kumar Ed: Tribal people of India: Society, culture and development (R N, Bhattacharya Kolkata, 2008), (DELNET)
5. Bhupinder Singh and Mahanti, Neeti, Tribal policy in India. (Inter-India Publication, New Delhi, 1997) (NHRC)
8. Choudhary, R N and Naqvi: Commentary on the scheduledcastes and scheduled tribes act, 1989. (Orient Publication, New Delhi, 2007) (DELNET)
18. Meena, Radhakrishna: Dishonoured by history: Criminal tribes & British colonial policy. (Orient Longman, New Delhi, 2001) (NHRC)
26. Russell, R V: Tribes and Castes of the Central Provinces of India. (Delhi, 1975) (DELNET)
29. Schwartzberg Joseph; An Historical Atlas of South Asia, University of Chicago Press,
34. Singh, K S :Scheduled Tribes : People of India.
40. Upadhyay, H C :Reservation for Scheduled Castes andScheduled Tribes (Anmol Publications, New Delhi, 1991) (SCJL)
SEMESTER – II
MODULE – pggeocct-204
FUNDAMENTALS OFREMOTE SENSING AND GEOFUNDAMENTALS OF REMOTE SENSING AND GEOFUNDAMENTALS OF REMOTE SENSING AND GEOGRAPHICAL INFORMATION SYSTEM

End-term Assessment - 38
Internal assessment - 12
Total - 50

UNIT-I

Fundamentals: Remote Sensing –concept, data, process, source of energy, interaction with atmosphere and target, recording of energy by sensor, transmission, reception and processing, interpretation and analysis; Types of Remote Sensing and Sensor Characteristics; historical development of remote sensing with special reference to Indian Space Programme; Photographic imaging; digital imaging; Visual image interpretation; Digital image processing; Data integration, analysis and presentation; Application of remote sensing – Landcover and Landuse, agriculture, forestry, geomorphology, urban applications, hydrology, ocean and coastal monitoring.

UNIT-II

Aerial Photographs - types of aerial-photographs and their applications, measurement of scale, heights and slope from vertical aerial photos; image interpretation techniques, photo mosaics; Identification and mapping of elements of natural and cultural landscape including topography, drainage, surficial material, vegetation, settlements, transport networks and land use, image interpretation techniques, photo mosaics.

UNIT-III

Geographical Information System: concept of GIS, definition and development; Key concepts of GIS – Hardware, software, Procedure, Data and users; GIS -an integration of Spatial and Attribute Information; GIS and related terms; GIS - a knowledge hub; Functions,areas of application,and advantages of GIS, functional requirements of GIS,limitation of GIS; Spatial data model,Process of GIS: Data capture, data sources, data encoding method, linking of spatial and attribute data.

UNIT-IV

Geospatial Analysis: Geospatial data analysis, integration and modelling of Geospatial data, Geospatial data analysis methods, database query-vector and raster data query; Geostatistics,
Geovisualization; Modern trends of GIS: Local to global concepts in GIS, increase in dimension in GIS, Linear to non-linear techniques in GIS, development in relation between geometry and algebra in GIS, developments of common techniques in GIS, integration of GIS and remote sensing and its application in resource mapping, urban management.

Suggested Readings:

SEMESTER – II
MODULE – pggeoocgp-205
GENERAL PRACTICAL

End-term Assessment – 100

UNIT I
Surveying 30

- Contouring of an area with the help of Dumpy Level
- Measurement of height of an object with the help of Theodolite when the base is inaccessible.
- Theodolite survey: Principles and Application, Traversing, Computation of Co-ordinates and areas.

UNIT II
Remote Sensing 30

(i) Identification of Flight Line and Scale of Photographs; Determination of height of objects from single vertical photographs
(ii) Identification of objects and features with stereoscope.
(iii) Image to image rectification /Geo-referencing of satellite imagery in image processing software.
(iv) Preprocessing techniques, image transformation techniques.
(v) Image classification techniques and Preparation of thematic maps on landuse/land cover
(vi) Image mosaicking and creation of subset; Merging images of various resolution
(vii) Post-classification analysis and accuracy assessment, generation of classification report.

UNIT III
Geographical Information System and Geospatial Analysis 30

(i) Geo-referencing of scanned maps and satellite images applying reference spheroids (WGS-84 and Everest etc.) and Projections (Universal Transverse Mercator’s and Polyconic).
(ii) Creation of Geo-data base and shape file.
(iii) On screen digitization/vectorisation of spatial data in the form of - layers: polygon, polyline and point; adding attributes to these layers and statistical calculations.
(iv) Digitization of administrative maps, drainage basin;
(v) Geospatial Analysis a) Geospatial measurements b) overlay operations c) network analysis b) surface analysis
(vi) Displaying attribute data on map by various methods.
(vii) Preparing layout and printing of theme map.
(viii) Uses of GPS device.

UNIT IV

Laboratory Analysis of Soil

1. Soil Analysis
   • Kit Box analysis (N.P.K., Organic Matter, and pH)
   • Soil Profile Recognition and Microbial change

Suggested Readings:

12. Lilles&Klefer, Remote sensing & Image Interpretation.
SEMESTER – II
MODULE – PGGEOIDC-2
Interdisciplinary Course-2
(for other streams)

LANDFORMS, ATMOSPHERE AND RESOURCES

Paper Code – PGGEOIDC-2
End Term : 75 (6 credit)
Internal assessment - 25 (2 credit)
Total :100 (8 credit)

UNIT I
Fundamental Concepts in Geomorphology - Geological structures and landforms; principles
of uniformitarianism; Cycle of Erosion - concepts of Davis and Penck; Continental Drift
Theory – concept of Wegener; Plate Tectonics – concept and related views.

UNIT II
Earth’s Movement – endogenetic forces, folds, faults, rift valleys, exogenetic forces;
Dynamics of fluvial processes and resulting landforms; Dynamics of glacial processes and
resulting landforms; Dynamics of Aeolian processes and resulting landforms; Ground water
Dynamics and Karst Landforms.

UNIT III
Nature and scope of climatology and its relationship with meteorology. The atmosphere:
Structure and composition, insolation, heat-balance of the earth. Distribution of temperature:
Temporal, vertical and horizontal, Green House effect. Distribution of atmospheric pressure
and winds.

UNIT IV
Climatic Phenomena: Air masses and fronts, origin, growth, classification. Frontogenesis,
types and weather associated with fronts. Climatic Classifications: Koppen's Thornthwaites -
A critical appraisal of each classification.

UNIT V
Nature, scope and significance of Geography of Resources. Definition and concept of natural
resources. Classification of resources. Characteristics of natural resources: Resource
conservation and management with reference to land and forest resource.

UNIT VI
Theories of Resource Use - Theories of agricultural location; Theories of industrial location: Weber and Losch; Energy resources-Conventional energy resources - coal, petroleum, non-conventional - solar and geothermal energy.

Suggested Readings

A. For Landforms


B. For Atmosphere

2. Blair, T.A., Climatology-General and Regional.
4. Donn, W.L., Meteorology.
7. Lal, D.S., Climatology.
11. Rummey, G., Climatology and the world's climate.
12. Stringer., Foundation of Climatology.

C. For Resources


Notes:

1. Question paper will be divided into Group A and Group B. Group A shall consist of long answer type questions and Group B brief answer type questions.
2. In Group A, there shall be two questions each carrying 10 marks from each unit. Out of two, examinees are to answer one question from each unit. Thus, six units shall carry 6 x 10 = 60 marks of long answer type questions.
3. Group B shall consist of five questions each of 3 marks covering any five units. Thus, total marks for Group B shall be 3 x 5 = 15
4. For internal assessment total marks are 25.
UNIT I
Geography of Tourism: Definition, nature, scope importance and extent; Relationship between Geography and Tourism; Tourism Promotion– Ecotourism, Agro-tourism, Heritage tourism and Adventure tourism. Factors affecting tourism – physical and cultural factors; Tourism motivation, tourism as an industry.

UNIT II

UNIT III
Infrastructure and Support System: Accommodation, transport; other facilities and amenities; Impact of tourism: physical, economic and social and perceptual positive and negative impacts.

UNIT IV
Indian Tourism: Regional dimensions of tourist attraction, evolution of tourism, promotion of tourism. Tourism development in North Bengal: Darjeeling Himalayas, Duars and other places of North Bengal Region.

Suggested Readings


**Semester – III**

**Module – pggeocct-302**

**Regional geography of india**

End-term Assessment – 38  
Internal assessment – 12  
Total – 50

**UNIT -I**

Climate: Genesis of Indian Monsoon; Role of Jet Stream on Indian Monsoon; distribution of rainfall and rainfall zones in India; climatic regions and their characteristics; identification of drought and flood prone areas in India.

**UNIT - II**

Agriculture: Agricultural characteristics; agrarian problems and causes of low productivity; Green Revolution and White Revolution in India; Major agro-climatic and agro-ecological regions of India.

**UNIT – III**
Energy resources, Industry: Production and use of conventional and non-conventional sources of energy; Energy crises and conservation; Industrial development: historical perspective – development during Five Year Plans; Industrial policy; Impact of liberalization, Industrial problems ; industrial regions.

UNIT – IV

Micro-Regions: Case Study of North Bengal - Resource base of North Bengal: Physical, Economic and Manpower.

Suggested Readings

6. Centre for studies in Social Sciences: Problems of the economy and planning in West Bengal.
13. Govt. of West Bengal – West Bengal Forests. (Forest Directorate Centenary Commemoration Volume)
SEMESTER – III
MODULE – PGGEOCCT-303
POPULATION GEOGRAPHY

UNIT - I
Population Geography: Scope of Population Geography; development of Population Geography; Sources of population data; Classical and modern theories in population.

UNIT - II
Population Dynamics: Fertility - concepts, measures and world pattern. Mortality - concepts, measures and world pattern; Migration - causes, consequences and world pattern.

UNIT - III

UNIT - IV
India’s Population: Population distribution and density; growth of population, age-sex structure, rural-urban composition, urbanization, literacy, economic activities, Scheduled Caste and Scheduled Tribe population, population policy.

Suggested Readings

UNIT – I

Geography during the Ancient and Medieval period: Ancient period: Contribution of Greeks, Romans and Indians; Medieval period - Dark Age in Geography; Arab Geographical thoughts; Age of Explorations and Travels.

UNIT – II

Geography during the Modern period (since 18th Century): Contribution of German School; Contribution of French School; Contribution of Russian School; Contribution of American School; Contribution of British School.

UNIT – III

Recent Trends in Geography (Since 1950): Positivist spatial science view point and systems approach; Behavioural Geography; Humanistic Geography; Relevant, Liberal and Radical Geography.

UNIT – IV

Explanation in Geography: Philosophy, methodology and explanation in Geography; Role of laws, theories and models in explanations in Geography.

Suggested Readings

3. Ambrose, P. Analytical Human Geography.
8. Coffey, William J., Geography towards general spatial systems approach.
10. Cox, K. R.: Man; Location and Behaviour: An Introduction to Human Geography
11. Dickinson, R. E.; The makers of modern Geography.
15. Hagget, Peter; Locational analysis in Human Geography.
18. Harvey, David, Explanation in Geography
20. James, P. E.; All possible world: A history of Geographical Ideas.
27. Minshull, Roger, Regional Geography: Theory and Practice.
31. Taylor, Griffith, Geography in the twentieth century
**Semester – III**  
**Module – pggeoce-305**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Seminar/Viva/Group Discussion</th>
<th>Marks</th>
<th>Credit</th>
<th>Remarks</th>
</tr>
</thead>
</table>
| 1      | Seminar (Report+Presentation) | 30+20=50 | 4      | 1. Student shall choose any specific topic (within the purview of the syllabus) and prepare it in report form to be presented through seminar. The report may be prepared through field study and using primary and secondary data.  
2. Seminar presentation shall be conducted by all the internal teachers and one external teacher. |
| 2      | Group Discussion              | 25     | 2      | 1. Group discussion shall be conducted by all the internal teachers and one external teacher. |
| 3      | VIVA                          | 25     | 2      | 1. Viva shall be conducted by all the internal teachers and one external teacher. |
|        | Total Marks/credits           | 100    | 8      |
Semester – III
Module – pggeocgp-306
General Practical

End-term Assessment – 100

UNIT- I

Computer Applications in Geography

- Fundamentals of computer
- Computer organization, Components of Hardware and Software.
- Operating Systems: MS-DOS, MS-Windows, etc.
- Data Structure and Data Format, A – D and D – A presentation, Data representation, Computer Programming and Networking.
- Familiar with MS-Office, Page Maker, Corel Draw, etc. scanning,
- Work on Ms excel/SPSS: data entry, tabulation and analysis (Central tendency, Dispersion, Coefficient of Variation)
- Representation of geographic data through computer aided techniques: scatter diagram with trend line, bar graph, pie graph, and histograms. Diagrammatic illustrations and mapping.

UNIT- II

Statistics

- Samples and Sampling: Sampling units and sample frame, methods of different sampling, estimates of mean, proportion and their standard errors, sample size.
- Bi-variety analysis: Measuring the strength of association and relationship; Scatter diagram, Product moment correlation coefficient and Spearman’s rank correlation coefficient, Ordinary least squares method; Simple linear regression equation, prediction, explanation, residuals, test of significance of the regression coefficient and correlation coefficient.
- Chi-Square tests for goodness of fit and association.

UNIT- III

Map Projections

- Concept and properties

Marks: 25
• Gall’s Stereographic Projection
• Mercator’s Projection
• Mollweide’s Projection.
• Simple Conical Projection with Two Standard Parallels
• Conical Equal-Area Projection (with one SP).
• Conical Equal-Area Projection (with two SP).
• Conical Orthomorphic Projection with one S.P.
• Interrupted Sinusoidal Projection

UNIT IV

Marks: 25

• Megascopic Identification of Rocks and Minerals
• Interpretation of Geological Maps (folds and faults)

Suggested Readings

17. Monkhouse & Monkhouse: *Maps and Diagrams*
28. Silk, J. 1979: Statistical techniques in Geography, George Allen and Unwin, London:
34. Walford, P., 1995: Geographical Data Analysis, John Wiley and Sons Inc., New York:
SEMESTER – IV
MODULE – PGEOCC-401
REGIONAL PLANNING AND DEVELOPMENT

End-term Assessment – 38
Internal assessment – 12
Total – 50

UNIT – I
Region, Regionalization and Regional Planning: Concept of region, classification of region, methods of delineation of region, schemes of regionalization of India; Concept of Planning and Regional Planning.

UNIT – II
Regional Development Strategies: Growth pole theory, Neo-populist regional development strategies; Market town as rural growth centre of EAJ Johnson; Integrated regional development of RondinelliandRuddle; selective spatial closure of StohrandTodtling. Territorial Regional Planning and development from below; Agro-politan development of Friendmann and Douglass.

UNIT – III
Regional Disparity in India: Indicators of regional development, extent of interstate imbalances in India & policy measures to remove regional disparity.

UNIT – IV
Regional planning practices in India: District level planning and Block level planning. Target group and Target area approach.

Suggested Readings
1. AVARD – Block level planning.
19. Mundle S. – District planning in India.
Semester – IV  
Module – PGGEOSPCT-402  
Special course  
Cartography

End-term Assessment – 38  
Internal assessment – 12  
Total – 50

UNIT – I
Fundamentals of Cartography

a) Scope, content and history of Cartography.  
b) Sources of Cartographic Information and data.  
c) Cartographic techniques and methods in the preparation of cartograms.

UNIT - II
Spherical Trigonometry

a) Fundamental Principles of spherical triangle, Spherical Excess.  
b) Napier’s Rule of circular parts.  
c) Application for determination of distance, azimuth and area on the Earth’s Surface.

UNIT – III
Surveying with Theodolite and Levels

a) Theodolite Traversing (Omitted Measurements), Determination of coordinates and area from the data.  
b) Principles and methods of Triangulation Surveying, Base line measurement and corrections, Satellite stations.  
c) Determination of heights, distance and reduced levels by Tachometric Surveying.  
d) Principles, corrections for curvature and refraction of Reciprocal Surveying, and determination of reduced level of a place.

UNIT – IV
Instruments

a) Clinometer  
b) Abney’s level.  
c) Planimeter.  
d) Box Sextant.
SEMESTER – IV
MODULE – pggeospct-403
SPECIAL COURSE
CARTOGRAPHY

End-term Assessment – 38
Internal assessment – 12
Total – 50

UNIT - I

Fundamentals of Map Projections

a) Scale and choice of map projections.
b) Classification of map projection and different properties.
c) Application of spherical trigonometry in polar zenithal cases of map projections – Gnomonic, Stereographic and Orthographic and calculation of distance, azimuth and scale variations.

UNIT - II:

Conical Projections

a) Conical Orthomorphic with two standard parallels.
b) Conical Equal Area with two standard parallels.
c) Polyconic Projection.
d) Modified International Projections.
e) Calculation of distance, azimuth and scale variations.

UNIT - III

Cylindrical projections

a) Cylindrical Equal Area Projection with two standard parallels.
b) Mercator’s Projection.
c) Cassini’s Projection.
d) Calculation of distance, azimuth and scale variations.

UNIT - IV

Conventional Projections

a) Mollweide’s Projection (Normal case)
b) Parabolic Projection (Normal and Oblique cases)
c) Calculation of distance and azimuth and scale variations.
**SEMESTER – IV**  
**MODULE – PGGEOSPCT-404**  
**SPECIAL COURSE**  
**CARTOGRAPHY**

End-term Assessment - 38  
Internal assessment - 12  
Total - 50

**UNIT - I**

Air Photographs

a) Definition, scope and history of Aerial photography.  
b) Fundamentals of photography.  
c) Basic information of Aerial photography, Determination of scale of aerial photograph, Different corrections in Aerial photography.  
d) Geometry of Aerial Photographs.  
e) Elements of air photo interpretations.  
   i) Visual interpretation of air photographs.  
f) Air photo mosaics.  
   i) Merits and demerits of air photo mosaics.  
   ii) Preparation of maps from air photographs.  
g) Difference between maps and air photos

**UNIT - II**

Remote Sensing

a) Definition, scope and Basics of Remote Sensing.  
b) Satellites, Platforms and Scanners.  
c) Data acquisition and data products.  
d) Manual Methods of Image Interpretation  
e) Digital Image Processing, rectification and enhancement.  
f) Image classifications.

**UNIT - III**

Geographic Information Systems

a) Geographic Information System: definition  
b) Components & Structure of GIS  
c) Data Entry, Editing & Validation  
d) Manipulation & Analysis  
e) Display & Product creation
f) Emerging Trends in GIS

g) Geospatial Analysis
   a) Geospatial measurements
   b) overlay operations
   c) network analysis
   b) surface analysis

UNIT – IV: Applications of Remote Sensing and GIS in different Geographical Studies

   a) Water resource
   b) Urban & Rural Planning
   c) Agriculture Resource
   d) Forest Management.

Suggested Readings

5. Kanetkar, T. G. & Konkani S. V. – Surveying and leveling Part I & II.
8. Lieder, D. R. – Aerial Photo Interpretation – Principles theories and application.
UNIT – I

Surveying
a) Determination of area by traversing with Theodolite.
b) Base line corrections with the help of triangulation survey with Theodolite.
c) Determination of reduced level of a place by Reciprocal survey by Dumpy level.
d) Determination of difference in heights by Tacheometric surveying with Theodolite.

UNIT - II

Map Projections
a) Conical projection with two standard parallels.
b) Mercator’s projection (Normal Case)
c) Mollweide’s Projection (Normal Case)
d) Parabolic Projection (Normal Case)

UNIT - III

Air photo Interpretation
a) Calculation of Scale and number of photographs.
b) Identification of objects from air photo.
c) Visual interpretation of air photographs.
d) Preparation of mosaics from air photos.

UNIT - IV

Interpretation of Satellite Imagery and Application of GIS
a) Visual interpretation of satellite imagery.
b) Digital Image processing.
c) Application of GIS in Thematic Maps.

Suggested Readings
5. Kanetkar, T. G. & Konkani S. V. – Surveying and leveling Part I & II.
8. Lieder, D. R. – Aerial Photo Interpretation – Principles theories and application.
16. Tobler, W. R. – A classification of Map Projection
Semester – IV  
Module – pggeospct-402  
Special course  
Urban geography

End-term Assessment - 38  
Internal assessment - 12  
Total - 50

UNIT – I
Scope and content of Urban Geography and its changing nature; definition of urban places.

UNIT – II
Origin and growth of Pre-industrial cities: the ancient cities and the medieval cities; growth of modern cities; trends in urbanisation in the third world during the modern period with particular reference to India.

UNIT – III
Concept of sub-urbanisation, counter urbanisation and re-urbanisation.

UNIT – IV
Size and spacing of cities with reference to rank-size relationships.
UNIT – I
Classification of urban settlements: Functional Classification of Urban Centres and the concept of Basic and Non-Basic Functions.

UNIT – II
Theories on urban land use structure; Urban Morphology with particular reference to Indian cities; Physical Structure and Functions of the C.B.D.

UNIT – III
The Concept and Structure of the city Region; Impact of the city on its Countryside; Concept of Urban Field.

UNIT – IV
Principles of urban planning and the major elements of a city plan; Master planning and land use zoning. Town Planning in India with specific Case Study.
SEMESTER – IV
MODULE – pggeospct-404
SPECIAL COURSE
URBAN GEOGRAPHY

End-term Assessment - 38
Internal assessment - 12
Total - 50

UNIT – I
Demographic Characteristics of Urban Populations; Pattern of rural-urban migration: its causes and impact. Urban land values: Factors determining urban land values; spatial structure of urban land values; urban land value theory.

UNIT – II
Urbanisation and environmental problems problems; Sustainable development and cities: its needs and implications; city as an ecological unit.

UNIT – III
Solid waste Management: Types and various sources; Associated problems and planning with particular reference to Indian cities.

UNIT – IV
Slums, urban renewal and urban sprawl in India.
UNIT – I
Analysis of breaking points and detour index.

UNIT – II
Analysis of Morphology of the Urban area
  a) Preparation of Thematic Map of Urban Land use.
  b) Preparation of land use/land cover map using R.S. data.

UNIT – III
Interpretation of Urban land values using time series data
  a) Preparation of spatial distribution maps.
  b) Trend analysis by fitting:
     i. Straight line.
     ii. Parabola of the second degree and
     iii. Exponential form.

UNIT – IV
Testing Urban Rank Size Rule and its applications.

Suggested Readings

15. Clark, D. – Urban Geography.
19. Dickinson, R. E. – City and Region.
24. Hegde, P. V. – Ancient and Medieval Town Planning in India.
32. Ratcliffe, J. – Introduction to Town and Country Planning.
33. Sexena, D. P. – Rural Migration in India.
35. Sjoberg, G. – The Pre-Industrial City.
Semester – IV
Module – pggeospct-402
Special course
Fluvial geomorphology

End-term Assessment – 38
Internal assessment – 12
Total – 50

UNIT - I
Fundamentals of river hydraulics and mechanics
a) Fluid mechanics.
b) Forces acting in channels.
c) Factors controlling flow velocity.
d) Velocity and its distribution.
e) Measurement of velocity and discharge.
f) Types of stream flow.

UNIT - II
Hydraulic Geometry
a) Shape of the channel.
b) Variation of Hydraulic Characteristics at a given Cross Section.
c) Variation of Hydraulic Characteristics in a Downstream Direction.
d) Longitudinal profile of the river Channel.

UNIT - III
Transportation of the sediment load
a) Competency, and Capacity of a Stream.
b) Energy Losses in Stream flow.
c) Loss of Transporting ability.
d) The Debris load of rivers.
f) Computation of Sediment Load.

UNIT - IV
Channel Behaviour
a) Behaviour of Tidal channels and their associated problems of maintenance in South Bengal.
b) Flood problems of West Bengal and their remedies with special reference to North Bengal.
UNIT - I
Major Changes of River Courses in Bengal during historical period
  a) Tista.
  b) Damodar.
  c) Bhagirathi-Hooghly.
  d) River Metamorphosis in Sub-Himalayan West Bengal: Causes and Effects.

UNIT - II
Channel Forms and Processes of Indian Rivers
  a) Bhagirathi-Hooghly.
  b) Tista.

UNIT - III
Drainage Basin as a Fundamental Geomorphic Unit
  a) Morphometric units.
  b) Linear Aspects of the basin.
  c) Areal Aspects of the basin.
  d) Relief aspects of the basin

UNIT - IV
Channel pattern
  a) Straight channel.
  b) Braided channel.
  c) Meandering channel.
  d) Meandering valleys.
  e) The configuration of Floodplain channels.
UNIT - I
Evolution of drainage Patterns and their Geomorphic Characteristics of some Indian Rivers
   a) Ganga.
   b) Brahmaputra.
   c) Mahanadi.
   d) Narmada.

UNIT - II
National Policy of Water Resource Development
   a) Hydrological regions.
   b) Irrigation and Water power.
   c) Inter-Basin Water transfer.
   d) Flood Control and Stream flow routing.
   e) National Water Grid.

UNIT - III
Channel behavior under human influence (with Indian example)
   a) Effect of Dam.
   b) Effect of Reservoir.
   c) Effect of Embankments.
   d) Hydrological effects of urbanisation.

UNIT - IV
Remote Sensing and GIS applications to the Fluvial Environment.
Quantitative and qualitative geomorphic analysis of a selected drainage basin:

a) Morphometric analysis of drainage basin.
b) Use of Hydrological instruments.
c) Univariate & Bi-variate analysis.
d) Geomorphological mapping.
e) Fluvio-Geomorphological mapping with the help of RS and GIS techniques.

Suggested Readings

SEMESTER – IV
MODULE – PGGEOSPCT-402
SPECIAL COURSE
POPULATION GEOGRAPHY

End-term Assessment – 38
Internal assessment – 12
Total – 50

UNIT – I
Scope and content of Population Geography. Sources of Demographic data; History of Census – World with special reference to India.

UNIT – II
Population Theories.

UNIT – III

UNIT – IV
Human resource development
SEMESTER – IV
MODULE – pggeospct-403
SPECIAL COURSE
POPULATION GEOGRAPHY

End-term Assessment – 38
Internal assessment – 12
Total – 50

UNIT – I

UNIT – II
Age-sex Structure of population in India. Rural & Urban Population in India.

UNIT – III
Social Characteristics of Population in India.

UNIT – IV
Population problems and policies in India. Human resource development planning in India.
SEMESTER – IV
MODULE – PGGEOSPCT-404
SPECIAL COURSE
POPULATION GEOGRAPHY

End-term Assessment - 38
Internal assessment - 12
Total - 50

UNIT – I
Population trends in Developed and Developing countries of the world,
Population Explosion.

UNIT – II
Fertility; Concepts, sources of data, measures, factors affecting fertility.

UNIT – III
Mortality, Concept, measures, affects.

UNIT – IV
Migration: Definition, sources of data, measures, type, laws, causes and consequences,
migration pattern in modern period. Urbanisation: concepts, measures, pattern, in
Developing and Developed Countries
SEMESTER – IV  
MODULE – PGGEOSPCP-405  
SPECIAL COURSE PRACTICAL  
POPULATION GEOGRAPHY

End-term Assessment - 50

UNIT – I

a) Measurement of density of population and its changes.
b) Trends of population growth.

UNIT – II

Determination of change of population pressure by central tendency

a) Mean centres of population and area
b) Median centres of population and area

UNIT – III

Measures of Age sex

a) Fertility
b) Mortality
(Selecting five developed and five developing countries of the world)

UNIT – IV

Age-sex ratio of selected countries of the world and India.

Suggested Readings

1. A. Bhattacharya – Population Geography of India.
2. A. Mitra – India’s Population, Vol. I & II.
5. J. Garnier – Geography of Population.
16. R. B. Mandal & V.N.P. Sinha; Recent trends and concepts in geography, Vol. III.
17. R. J. Harrison Church – Africa and the Island.
24. Walter Fitzerland – Africa
SEMESTER – IV
MODULE – PGGEOSPCT-402
SPECIAL COURSE
ADVANCED GEOTECTONIC AND GEOLOGY

End-term Assessment – 38
Internal assessment – 12
Total – 50

UNIT – I

Earth Systems Science: Definitions and Scope of Geotectonic, Geology, Meteorology, Significance of Exogenetic and Endogenetic forces.

UNIT – II

Elementary information on solar system, members of the solar system, terrestrial and Jovian planets. Origin of the solar system, nebular hypothesis, formation of planets. Layered structure of Earth, differentiation of Earth’s core, mantle and crust, formation of Earth’s oceans and atmosphere.

UNIT – III

Earth as a system of interacting components- solid earth, atmosphere, hydrosphere, biosphere. History of development of geological thoughts, Neptunism, Plutonium, Uniformitarian’s, law of superposition, law of faunal succession. Contribution of Werner, Hutton, Smith and Lyell.

UNIT – IV

SEMESTER – IV
MODULE – PGGEOSPCT-403
SPECIAL COURSE
ADVANCED GEOTECTONIC AND GEOLOGY

End-term Assessment - 38
Internal assessment - 12
Total – 50

UNIT – I


UNIT – II

Earth’s surface processes, weathering, erosion, mass wasting; bed rock, regolith, soil, soil profile. Erosion, transportation and deposition by wind, river, glacier, groundwater and ocean. Common landforms related to action of wind, river, glacier; coastal landform. Ice ages, evidence and causes. Oceanic and atmospheric circulation patterns.

UNIT – III


UNIT – IV

Earth’s internal processes, magmatism, metamorphism, deformation. Volcanoes and volcanism, products of volcanic eruption, eruptive styles, volcanic belts, recent volcanism in India.
UNIT – I

Earthquakes, causes, elastic rebound theory, focus and epicenter, intensity and magnitude. Seismic waves, seismograms, travel-time curves for seismic waves, seismic discontinuities, locating epicenter, and determining magnitude. Earthquake belts. Effects of earthquakes, seismic zones of India

UNIT – II

Internal Constitution of Earth; Evidence from seismic waves, meteorites, other lines of evidence. Heat flow, basic concepts, geothermal gradient. Hotspot and mantle plume. Gravity and magnetic field of the earth; and gravity anomaly on Earth, Bouguer and free-air anomaly. Concept of isostasy and compensation, hypotheses of Airy, and Pratt. Gravity and magnetic field of the earth; and gravity anomaly on Earth, Bouguer and free-air anomaly. Concept of isostasy and compensation, hypotheses of Airy, and Pratt.

UNIT – III

Principles of determination of relative ages of rock bodies and geologic event. Absolute ages of Rocks and minerals, fundamental principles radiometric dating. Age of the Earth. Geologic TimeTable up to the level of Eras and Periods. The fossil record; Fossils as evidence of past life; modes of preservation of fossils. Uses of fossil.

UNIT – IV

Physical meteorology, Atmospheric electricity, cloud physics, Dynamic meteorology, numerical weather prediction, general circulation and climate modelling; Aviation meteorology.
UNIT – I

**Systematic study of hand specimens of the minerals listed below on the following points:** Form and structure, colour, transparency, lustre, streak, cleavage, parting, fractures, hardness, specific gravity, magnetism, and treatment with dilute HCl. Haematite, magnetite, goethite, ilmenite, chromite, pyrolusite, psilomelane, bauxite; Pyrite, chalcopyrite, pyrrhotite, sphalerite, galena; Calcite, aragonite, dolomite, magnesite, siderite, malachite; Fluorite, gypsum, barite, wolframite, apatite, graphite; Quartz, feldspar, muscovite, biotite, pyroxene, amphibole, beryl, tourmaline, garnet, serpentine (including asbestos variety), talc, chlorite, kyanite, sillimanite, staurolite.

UNIT – II

**Structural Geology:** Reading and interpretation of topographic maps; Use of Clinometer and Brunton compass, measurement of attitude of planar and linear structural elements. Graphical solution of true dip – apparent dip problems, three-point problems. Stereographic projection of planes and lines: solution of simple structural problems using a net, e.g., true dip – apparent dip relations, determination of axis of cylindrical folds. Construction of block diagrams of homoclinal beds and folded beds.

UNIT – III

a. **Identification in hand specimen by studying mineralogical composition and texture of the following rock types:** Granite, granodiorite, syenite, nepheline syenite, aplite, granophyre, diorite, gabbro, anorthosite, pyroxenite, peridotite, mica-lamprophyre, dolerite, basalt, andesite, and rhyolite; C.I.P.W. norm calculation of granitic and basic rock (without foid).

b. Orthographic projection of cubic, tetragonal and orthorhombic crystal models; Stereograms (with and without the stereonets) from given crystallographic data.

c. **Field Work - Field work of approximately 10 days (under the supervision of teacher)**

   i. Geological mapping of a small area, collection and study of samples and preparation of Geological Maps.

   ii. Chain/Tape and compass surveying and use of Brunton compass, and GPS.
UNIT - IV

a. Remote Sensing, GIS and GPS: Stereo test. Interpretation of stereogram under pocket stereoscopes. Interpretation of single vertical air photo, including boarder Information. Interpretation of stereo pairs of vertical air photos under mirror stereoscopes. Interpretation of multi band satellite images. Interpretation of false colour composites. Use of topographic maps, air photos and satellite images for geological mapping and resource surveys.

b. Geomathematics and Geo-statistics: Scientific methods & some basic concept of statistics; Sample - Universe: Measurement- scale and error; Models; Measurement of variability; Probability. Population distribution- binomial, normal, Poisson; Statistical inferences- errors in judgment Confidence Intervals. Small sampling theory- Chi-square, Student’s t, Snedecor’s F tests Non -parametric tests- Kolmogorov-Smirnov. ANOVA-correlation & linear regression
UNIT – I
History of Development, Approaches Modes of transportation: Contribution of different scholars; Functional Approach; Significance of transportation in world and regional economies.

UNIT – II
Development and distribution of different modes: Characteristics and significance; Landways - roadways, railways and pipeline; Waterways - ocean and inland; Airways.

UNIT – III
Factors associated with their growth Characteristics and relative significance of different modes of transport.

UNIT – IV
Location of seaports and airports: Factors associated with their growth - Physical factors; Economic factors; Political factors.
SEMESTER – IV
MODULE – PGGEOCON-403
SPECIAL COURSE
GEOGRAPHY OF TRANSPORT AND TRADE

End-term Assessment – 38
Internal assessment – 12
Total – 50

UNIT – I

Network structure and measurement of accessibility: Nodes and routes; Hierarchies; Hinterlands; Models of network changes; Graph theoretic measures; Traffic flow; Gravity models; Transport network and economic development.

UNIT – II

Concept, development and significance of trade: Concept of trade, types of trade, concept of balance of trade; role of trade in the world and regions; significance of trade.

UNIT – III

Urban transport - growth and their problems: Growth of urban transportation in developing countries; Transport and environmental degradation; vehicular pollution and congestion; alternative transport system in mega cities of India; national highway development and planning in India.
SEMESTER – IV  
MODULE – pggeospct-404  
SPECIAL COURSE  
GEOGRAPHY OF TRANSPORT AND TRADE

End-term Assessment – 38  
Internal assessment – 12  
Total – 50

UNIT – I


UNIT – II

International trade: Trade areas and economic blocks; Various treaties of trade at international level; History and development of International trade; Geographical factors influencing international trade; Problems and prospects of international trade in globalisation.

UNIT – III

Transport India’s foreign trade: Transport development: Rail, Road, water, air transport and Ports; Transport and pollution; Volume of trade, patterns of imports, composition of export tradeoff India, features of India’s foreign trade, trade with U.S.A, U.K, Germany, Russia, Canada, Japan.
Semester – IV
Module – pggeospcp-405
Special course practical
Geography of transport and trade

End-term Assessment – 50

UNIT – I
Indices of transport network analysis – Detour Index and shape index

UNIT – II
Measures of network connectivity and accessibility.

UNIT – III
Relation between settlement and physiography (transect chart), Road density with topographical map, identify route map from aerial photograph and satellite imagery.

UNIT – IV
Traffic Flow line map of a particular area in west Bengal; statistical analysis of transport and settlement data, agriculture and industrial data.

Suggested Readings
Digital Thematic Mapping

**UNIT - I:** Preparation of Choropleth Map by using Computer.

**UNIT - II:** Preparation of Chorochromatic (Mono and Multi) Map by using Computer.

**UNIT - III:** Preparation of Digital Thematic Map by using Statistical and Cartographic Techniques.
A. Project Report \hspace{1cm} Marks: 75
B. Viva-voce on project report \hspace{1cm} 25
\textbf{Total} \hspace{1cm} 100

1. Preparation of a Report containing at least 50 pages (including maps, diagrams and tables) which will involve the application of any one of the topics of the concerned Special Course: The report based on fieldwork (not exceeding a week and under the supervision of a teacher) should be well represented by suitable statistical techniques and cartographic methods.

2. The students should follow the research guidelines by reading Research Methodology before taking up the Project Work.

3. The Project Report should include followings:

\begin{itemize}
    \item[a)] Title of the project
    \item[b)] Introduction
    \item[b)] Objectives
    \item[c)] Methodology and Data sources
    \item[d)] Study Area
    \item[e)] Review of literature
    \item[f)] Results and Discussion
    \item[g)] Conclusion
    \item[h)] Bibliography
    \item[i)] Appendices
\end{itemize}

\textbf{Suggested Readings}