

**Sadhu Ram Chand Murmu University of Jhargram
Jhargram, West Bengal**



Syllabus
of
Master of Science (M.Sc.)
in
Geography

Under Semester System
Course Duration: 2 years, 4 Semesters
[W.e.f. : 2022-2023]

**Geography
Programme Structure**

| Semester | Course Code | Course Title | Full Marks | Credit |
|------------|-----------------|--|------------|--------|
| I | GEO -101 | Geographical Philosophy | 40+10 | 4 |
| | GEO -102 | Geotectonics & Geomorphology | 40+10 | 4 |
| | GEO -103 | Climatology | 40+10 | 4 |
| | GEO -104 | Population And Settlement | 40+10 | 4 |
| | GEO -195 | Geological And Topographical Mapping | 50 | 4 |
| | GEO -196 | Map Projection And Surveying | 50 | 4 |
| | Total | | 300 | 24 |
| II | GEO -201 (CBCS) | Land And People | 40+10 | 4 |
| | GEO -202 | Hydrology And Oceanography | 40+10 | 4 |
| | GEO -203 | Environmental Geography | 40+10 | 4 |
| | GEO -204 | Geography Of Resources: Land, Water, Soil And Forest | 40+10 | 4 |
| | GEO -295 | Statistical Techniques In Geography And Computer Programming (Practical) | 50 | 4 |
| | GEO -296 | Geospatial Techniques For Thematic Mapping (Practical) | 50 | 4 |
| | Total | | 300 | 24 |
| III | GEO -301 (CBCS) | Hazard And Disaster Management(Minor Elective) | 40+10 | 4 |
| | GEO -302 | Regional Planning And Development | 40+10 | 4 |
| | GEO -303 | Social And Cultural Geography | 40+10 | 4 |
| | GEO -304 | Special Paper (Elective Major) | 40+10 | 4 |
| | | Option 1: Advanced Geomorphology | 40+10 | 4 |
| | | Option 2: Agricultural Geography | 40+10 | 4 |
| | | Option 3: Tourism Geography | 40+10 | 4 |
| | | Option4: Regional Planning & Urban Geography | 40+10 | 4 |
| | GEO -395 | General Field Work And Community Outreach | 50 | 4 |
| | GEO -306 | Research Methodology And Ethics | 50 | 4 |
| | Total | | 300 | 24 |
| IV | GEO -401 | Geography Of India | 40+10 | 4 |
| | GEO -402 | Political Geography And Geopolitics | 40+10 | 4 |
| | GEO -403 | Contemporary Issues In Geography | 40+10 | 4 |
| | GEO -404 | Special Paper (Elective Major) | 40+10 | 4 |
| | | Option 1: Advanced Geomorphology | 40+10 | 4 |
| | | Option 2: Agricultural Geography | 40+10 | 4 |
| | | Option 3: Tourism Geography | 40+10 | 4 |
| | | Option4: Regional Planning & Urban Geography | 40+10 | 4 |

Geography Programme Structure

| | | | | |
|--------------------|--------------|--|-------|----|
| | GEO -495 | Special Paper (Elective Major) | 50 | 4 |
| | | Option 1: Advanced Geomorphology | 40+10 | 4 |
| | | Option 2: Applied Agricultural Geography | 40+10 | 4 |
| | | Option 3: Tourism Geography | 40+10 | 4 |
| | | Option4: Regional Planning & Urban Geography | 40+10 | 4 |
| | GEO -406 | Dissertation | 50 | 4 |
| | Total | | 300 | 24 |
| Grand Total | | | 1200 | 96 |

Theory :50 Marks, Written – 40 Marks, Internal Assessment- 10 Marks

Theory :25 Marks, Written – 20 Marks, Internal Assessment- 05 Marks

Practical: 50 Marks

SEMESTER – I (300 Marks)
THEORY (200 Marks) + PRACTICAL (100 Marks)

PAPER GEO - 101: GEOGRAPHICAL PHILOSOPHY

Full Marks - 50 (End term Examination - **40** and Internal Assessment - **10**)

Pattern of setting questions:

Group- A (Long Answer Type): Four questions, each of 10 marks (to be divided into at least two parts), will be answered out of eight options to be set from all the units.

Learning Objectives:

Learners will be informed on the nature of the discipline as a science of synthesis and the evolution of the philosophical frameworks since ancient times to the modern age. Major developments of the theoretical foundation in the 20th century are added in a logical order of sequence. They will know the cross-cutting issues like Radicalism, Structuralism, Modernism, Postmodernism, Structuralism and Post structuralism. They will explore all possible dimensions and fields where geographical knowledge could be applied.

Course Specific Outcomes:

Learners will foster their interests in the philosophical background of different discourses of Geography. They will develop clear insight into theoretical foundation of the subject which guides them to design objectives and methodological framework of geographical enquiry. They will think in a way to treat geography as a science of holistic synthesis.

Course Content:

1. Geography as a science of synthesis. Changing nature of Geography: paradigm shift
2. Geography in ancient age. Development in Mediaeval Age: Voyages and exploration.
3. Development in 19th Century: Comparing the contribution of German, French, British and American schools of thought. Contribution of Indian Geographers.
4. Development in 20th Century: Determinism, Regional Approach, Positivism and Quantitative revolution in geography
5. Development of critical social theories: Humanistic geography, Behaviouralism, Radicalism, Welfare geography, Feminist geography
6. Structuralism and Post-structuralism, Modernism and Postmodernism.
7. Space and Time Dimensions in Geography: absolute, relative and social space, concept of 3rdspace; temporal geography, time-space prism.

8. Applied Geography. Scope and opportunities under modern technology.

Reference

1. Berry, B.L.J. (1973) A Paradigm of Modern Geography. In R.J. Chorley(ed), Directions in Geography. Lodon, Methuen 3-22.
2. Bird.J. (1989): *Changing Worlds of Geography: A Critical Guide to Concepts and Methods*, Oxford University Press
3. Chorley,R.J.and Hagget,P.(editors)(1965):*Frontiersin Geographical Teaching*, OUP, Oxford: 231p. Delhi
4. Golledge,R.G. and Stimson, R.S. (1997) Spatial Behaviour: a geographic perspective, New York: Guilford Press
5. Gould, P.R. (1999) *Becoming a Geographer*, Syracuse: Syracuse University Press
6. Gregory D. and Walford, R. (editors) (1988): *Horizons in Human Geography*, Macmillan, London: 390p.Hussain, M. (1995): *Evolution of Geographical thought*, 3rdedition, Rawat Pub. Co., New Delhi: 432p.
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8. Harvey D. (1996): *Justice, Nature and the Geography of Difference*, Oxford: Blackwell
9. Harvey, D. (1969): *Explanations in Geography*, London, Edward Arnold
10. James, P. (1972): *All possible worlds: A history of geographical ideas*. Indianapolis: Bobbs Merrill.
11. Johnston, R..J (1997): *Geography and Geographer: Anglo American Human Geography*, Arnold pub. Johnston, R.J. (ed.) (2006):*Dictionary of Human Geography*, Blackwell.
12. Maiti, R.K. and Moitra Maiti, M. (2018): *Development of Geographical Thought, Contextualisation and Synthesis of Philosophies*, Nabodaya Publications, Kolkata: 576P.
13. Peet, R. (1978): *Radical Geography: Alternative viewpoints on contemporary social issue*. London: Methuen
14. Peet, R. (1998): *Modern Geographical Thought*, Oxford: Blackwell.
15. Soja, E.W.(1989): *Post modern Geographies: The reassertion of space in social theory*. London: Verso
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GEO - 102: GEOTECTONICS & GEOMORPHOLOGY

Full Marks - 50 (End term Examination - **40** and Internal Assessment - **10**)

Pattern of setting questions:

Group- A (Long Answer Type): Four questions, each of 10 marks (to be divided into at least two parts), will be answered out of eight options to be set from all the units.

Learning Objectives:

Learners will be provided the scope for holistic understanding of earth-surface processes under different geotectonic and lithological boundary conditions. They will know how the working of external geomorphic processes controlled by internal geotectonic forces are. They could understand the mechanism of plate tectonics and resultant impacts or landforms on earth surface. They will elucidate all the key concepts that help them to organize the ideas and rigorously explain process-landform relationship. All the external processes like weathering, mass wasting, river, glacier wind and coastal wave and tide are elucidated in details in connection to the landforms developed. Fluvial processes and associated forms are explained in details understanding their regional as well as global importance. Under the present age of Anthropocene, learners will put more importance to anthropological intervention on geomorphic processes and alteration of landforms. Scope of applied geomorphology in different academic, economic, administrative and managerial dimensions are explored in this course.

Course Specific Outcome:

Students will learn the mechanism of both internal and external processes that shape present earth-surface at varied spatial and temporal scale. Learners will enhance their ability to take part in resource and environment management. On completion of this course they can formulate hydrological, geologic and economic and landscape planning. Learners may take part in hazard management in their locality.

Course Contents:

1. Lithology and structures: Bearings on landforms and surface drainage. Dating: principles and techniques.
2. Plate tectonics: Unified theory of orogenesis, volcanism, and earthquake at global scale. Paleomagnetism, Sea floor spreading. Tectonic evidences of Indian Sub-continent: Himalaya, Rift Valleys, Deccan Plateau
3. Isostatic Adjustments; Neo-tectonics and its worldwide evidences.
4. Key Concepts in Geomorphology. System approach and ideas of feedback, scale dependency, equilibrium, threshold and boundary conditions.
5. Weathering, Mass wasting and Slope processes, Process-form relationship: Coastal, glacial and periglacial and aeolian. Impacts of Pleistocene glaciations on landscape evolution.

6. Rivers and river basins: Drainage network development, hydraulic geometry of channels, flow hydraulics and stream power. Depositional landforms. Source to mouth continuity of process and form in a river basin.
7. Anthropogeomorphology: Geomorphic impacts of land use conversion, mining, River engineering, alteration of coastal process-form, destabilizing slope.
8. Regional geomorphology of Chotonagpur plateau and fringe areas. Applied Geomorphology in Hydrology, mineral exploration, hazard management and EIA.

References

1. Anderson, R.S. and Anderson, S.P. 2010. Geomorphology, the Mechanics and Chemistry of Landscape, Cambridge: Cambridge University Press.
2. Bierman, P.R. and Montgomery, D.R. 2014. Key Concepts in Geomorphology, New York: W.H. Freeman and Company Publishers.
3. Bloom, Arthur L., 2003. Geomorphology – A systematic analysis of Late Cenozoic Landforms, 3rd Edn.
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5. Chorley, R.J. and Kennedy, B.A. (1971) Physical Geography: a System Approach. London: Prentice Hall.
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8. Goudie, A. (Ed) (1990): Geomorphological Techniques, 2nd edition, Allen Unwin Crows Nest (Australia).
9. Holmes, Arthur (1978): Holmes Principles Of Physical Geology, Francis & Taylor.
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11. Kale, V.S. and Gupta, A. 2001. Introduction to Geomorphology, Orient Longman Ltd., Hyderabad: 274p.
12. Kale, V.S. and Gupta, A. 2001. Introduction to Geomorphology, Orient Longman Ltd., Hyderabad: 274p.
13. Keary, P. and Vine, M. 1997. Global Tectonics, 2nd edition, Blackwell Scientific Publications, Oxford: 302p.
14. Knighton, D. 1998 : Fluvial Forms and Processes: A New Perspective, Arnold, London: 385p.
15. Leopold, L.B., Wolman, M.G. and Miller, J.P. 1964. Fluvial Processes in Geomorphology, San Francisco: W.H. Freeman & Co.
16. Maiti, R. K. 2016. Modern Approaches to Fluvial Geomorphology. New Delhi: Primus.
17. Morisawa, M. (editor) 1994. Geomorphology and Natural Hazards, Elsevier, Amsterdam: 355p.
18. Morisawa, M. 1985. River Form and Process, London: Longman.
19. Morisawa, M. 1985. Rivers, Longman, London: 222p
20. Morisawa, M. 1985. Streams, their Dynamics and Morphology, New York: McGraw-Hill.

21. Murthy, K.S. 1998. Watershed Management in India, 3rd edition, Wiley Eastern Ltd. / New Age International Ltd., New Delhi: 198p
22. Newson, M. 1992. Land Water and Development, River Basin Systems and their Sustainable Management, Routledge, London: 350p.
23. Ollier, C.D. 1981: Tectonic Geomorphology, Longman Scientific & Technical, London:
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25. Ollier, C.D.(1969). Weathering, Edinburgh: Oliver & Boyd.
26. Pethick, J. 1984. An Introduction to Coastal Geomorphology, Edward Arnold, London: 259 p.
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39. Thornbury, W.D. (1969): Principles of Geomorphology, Wiley Eastern Limited, New Delhi: 594 p

GEO - 103: CLIMATOLOGY

Full Marks - 50 (End term Examination - **40** and Internal Assessment - **10**)

Pattern of setting questions:

Group- A (Long Answer Type): Four questions, each of 10 marks (to be divided into at least two parts), will be answered out of eight options to be set from all the units.

Learning Objective:

Learners will be provided detail ideas in regard to climate, climate change phenomena, climatic hazards and the impact of climate on society and economy. The prime objectives are to exchange knowledge and ideas about all climate related phenomena worldwide especially in India among learners. The learners will put more emphasis on understanding the earth surface processes and its interaction with climate and climate change phenomena. To explore the importance of climate in different field of socio-economic growth and development may be taken into account as the major learning objective of the course. They will find interest in the scopes for resilience and adaptive capacity to climate related hazards and National policies and planning to address climate change issues.

Course Specific Outcome:

Students will come to know about climate system, general circulation of atmosphere, weather related hazards climate change phenomena, climate action plan for sustainable development at global regional and local level. Not only will those students acquire knowledge in regard to climate change induced global warming, they will also understand its linkage with other environmental systems, agriculture, health aspect, settlements etc. After completion of the course they can make aware the people at community level on climate induced various hazards and its possible adaptation strategies.

Course Content:

1. Scope of climatology and its relation with meteorology; Climate system with space and time, jet stream, adiabatic processes and instabilities, Linkage of climate with other environmental system.
2. Tropical circulation and temperate circulation: Hadley and Walker circulation, ENSO phenomena; Indian monsoon: mechanism, significance and prediction, Indian Ocean Dipole (IOD).
3. Climatic classification schemes (Koppen, Trewartha, Thornthwaite). Climate zones of the world: Savana, desert, dry, wet and highland
4. Weather hazards: thunderstorms, tornado, storm surges and cyclones- formation, distribution, significance and forecasting; Maritime impact on coastal weather-seasonal changes and storm events
5. Evidences of climate change; Reconstruction of past climates; anthropogenic interferences on climate prognostication.
6. Climate trends in the Holocene period; recent trends of global climates.

7. Climate and agriculture, water budget and crop calendar, climate and health aspects; Climate and settlement-Urban Heat Island
8. The climate action: resilience and adaptive capacity to climate related hazards; climate change measures: National policies, strategies and planning; climate change mitigation, adaptation and early warning.

References:

1. Ackerman, S.A. and Knox, J.A. (2012): *Meteorology: Understanding the Atmosphere*, Jones & Bartlett Learning, London
2. Anthes, R. 1997: *Meteorology*, 7th edition, Prentice-Hall Inc., Upper Saddle River
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GEO-104: POPULATION AND SETTLEMENT

Full Marks - 50 (End term Examination - **40** and Internal Assessment - **10**)

Pattern of setting questions:

Group- A (Long Answer Type): Four questions, each of 10 marks (to be divided into at least two parts), will be answered out of eight options to be set from all the units.

Learning Objectives:

The goal of this course is to introduce students to interdisciplinary viewpoints on population concerns at various geographic dimensions. It will educate the student about the importance of spatial perspectives in illustrating population changes and their impact on the economy, community, nature, and governance in diverse locations with special emphasis on SDG-5. The goal of this course is to familiarize students with rural and urban challenges and components.

Course Specific Outcomes:

After completion of this course, a candidate should be able to perceive the active function of population geography as a distinct discipline of human geography. Students should be able to evaluate population change's numerous components, as well as its drivers and implications. Students will be able to comprehend the principles and components of rural and urban settlement growth, development, and administration.

Course Content:

1. Demography and Population Geography: nature, scope, development, sources of population data
2. Dynamics of population growth – Birth rate, Death rate and Migration; Diaspora; Population Composition: age, sex, literacy, rural- urban
3. Mortality: measurements, theories, regional patterns; Fertility and Nuptiality: measurements, theories, regional patterns
4. Population and Developmental issues: Human Development Index (HDI), Food & Energy crisis in Future, Poverty and Famine and Malnutrition, Gender equity – global to local perspectives
5. Evolution of Settlement Geography, Human Settlement as a System, Growth of rural settlements and their factors
6. Site, location, types and pattern of rural settlement, morphology of rural settlement
7. Concept and definitions of urban system: Urban, urbanization, urbanism and urban ecology; Morphology of urban settlements, Settlement hierarchy with special reference to central place theory, Rank size Rule

8. Rural urban fringe, structure, characteristics and functions, rural urban interaction, Forms processes of rural-urban interaction: changes and adjustment in the fringe areas

Reference:

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2. Chandna, R. C. (2006): Geography of Population. Kalyani Publishers., New Delhi
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GEO - 195: GEOLOGICAL AND TOPOGRAPHICAL MAPPING

Full Marks - 50 (End term Examination – **40** (30 + 10 (Practical notebook and Viva voce – 5 + 5)) and Internal Assessment - **10**)

Pattern of setting questions:

Group- A (*Long Answer Type*): *Three compulsory questions, each of 10 marks will be answered.*

Learning Objectives:

The geological map's purpose is to investigate the geological structure as well as the evolution of landforms and drainage in various geological structures. Toposheet will educate the student about the ground relief (landforms and terrain), drainage (lakes and rivers), forest cover, administrative areas, population areas, transportation routes and amenities (including roads and railroads), and other man-made elements.

Course Specific Outcomes:

After study of geological map, a candidate should be able to perceive the interrelations between structure and relief and how the sub-aerial denudation processes evolve landscape which is the basis of physical geography. Toposheet can be used to plan a building complex, an industrial plant, a railway, and an irrigation project, among other things. Bridges, tunnels, and dams can all be planned using Toposheet.

Course Content:

1. Geological Map: Exposure pattern, Dip, Strike and Unconformity. Identification of Geological structures
2. Geological maps for horizontal and uniclinal structure
3. Geological maps for folded and faulted structure
4. Numbering of topographical maps , Comparative utility of topographical maps, aerial photos and satellite images as sources of geographical data
5. Interpretation of physical and cultural landscapes: Relief, Drainage, Vegetation, Settlement and Transport
6. Basin Morphometry: Relief and Drainage character through Average Slope, Ruggedness Index, Hypsometric analysis
7. Stream Order, Drainage Density, Braiding index, Sinuosity index, Radius of curvature
8. Nearest Neighbour Analysis, Shortest path matrix, Correlation analysis, Transect chart

Reference

1. Gokhale N. W.: Manual of Geological Maps. *CBS Publishers and Distributors*
2. Kanan, M. & Yadav, S.: Practical Geography. *Rawat Books*.
3. Pradhan, N. (2016): Basic Geological Mapping. *Scitrus Academics*
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GEO-196: MAP PROJECTION AND SURVEYING

Full Marks - 50 (End term Examination – **40** (30 + 10 (Practical notebook and Viva voce – 5 + 5)) and Internal Assessment - **10**)

Pattern of setting questions:

Group- A (*Long Answer Type*): *Three compulsory questions, each of 10 marks will be answered.*

Learning Objectives:

The basic objective of this course is to introduce students in regard to map projection and surveying techniques. Students will learn different types of datum and their uses for map making. The system of transformation of latitudes and longitudes into metric scale and the relative departures will help the students in correlating generating globes with prepared maps. Learners will be informed on the principles and construction of different projections method. They will be trained on various instrument-based surveying techniques and associated map making.

Course Specific Outcomes:

After completion of these course students will be capable on taking decision about selection of the projection method for different thematic maps on different parts of the world. They will prepare the plans of buildings, campuses, residential complexes etc. even on cadastral level using sophisticated survey instruments. The proper understanding on surveying and mapping technique will contribute a lot to develop land use and land cover map, contour map, cadastral map etc. They can become efficient surveyors and thus could address the issue of employability.

Course Content:

1. Datum: Types and uses; Geodesy, conversion of latitude and longitude to meter, calculation of departure
2. Zenithal Projection - Gnomonic, Stereographic and Orthographic Projection (Equatorial Case)
3. Mercator's and Mollweide's Projections
4. UTM Projection
5. Prismatic Compass Survey: Open and Closed traverse
6. Dumpy and Auto Level Survey – Topographic Profile and Contouring
7. Measurement of Height using Theodolite – Static and Oblique Method
8. Land Use Land Cover Mapping using Tacheometer and Total Station

Reference

1. Dorling, D. and Fairbairn, D. 1997: Mapping Ways of Representing the World, Longman. England.
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6. Kochher, C.L. 1993 : A Text Book of Surveying, S.K. Katariya & Sons, Delhi:
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9. Raisz, E. 1962: Principles of Cartography, International Student Edition. Japan.
10. Robinson, A. H., Morrison, J. L., Muehrcke, P. C., Kimerling, A. J., Guptill, S. C. 2002: Elements of Cartography, John Wiley and Sons (ASIA). Singapore.
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SEMESTER - II

GEO 201: LAND AND PEOPLE (CBCS)

Full Marks - 50 (End term Examination - **40** and Internal Assessment - **10**)

Pattern of setting questions:

Group- A (Long Answer Type): Four questions, each of 10 marks (to be divided into at least two parts), will be answered out of eight options to be set from all the units.

Learning Objectives:

The goal of this course is to introduce students to interdisciplinary viewpoints on various geographic dimensions. It will educate the student about the importance of spatial perspectives in illustrating geographical changes and their impact on the economy, community, nature, and governance in diverse locations with special emphasis Jangal Mahal (West Bengal).

Course Specific Outcomes:

After completion of this course, a candidate should be able to perceive the active function of population geography as a distinct discipline of physical and human geography. Students should be able to evaluate components and drivers of population change, as well as its implications.

Course Content:

1. Fundamentals of Geomorphology, Continental Drift, Plate Tectonics, Sea Floor Spreading,
2. Landforms evolution by Glacial, Fluvial and Aeolian processes, Hydrological Cycle – Global and Basin
3. Weather and Climate, Elements of Climate, Energy Budget, Pressure belts and General Wind Circulation
4. Cyclones and Anti-cyclones, Monsoon and ENSO Phenomena, Climate Actions – SDG 13
5. Human Resource: Concept, Migration, Major Industrial Regions of India and West Bengal
6. Jangal Mahal: Geographical Significance and Physical Setup, Surface, Sub-surface water distribution
7. Jangal Mahal: Natural and Human Resource
8. Problems and prospects of Jangal Mahal: Agriculture, Transport and Communication, Industry, Tourism

Reference:

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3. Huggett, R.J.: Fundamentals of Geomorphology. *Routledge Publishers*
4. Singh, R.L.: India: A Regional Geography. *National Geographical Society of India*
5. Mishra, R.L.: Planning: Concepts, Techniques, Policies and Case Studies. *Concept Publishers.*
6. McCarty, H.M. and James, B.L.: A Preface to Economic Geography. *Prentice Hall, New Jersey*
7. Siddartha, K.: Climatology: Atmosphere Weather Climate. *Kitab Mahal Publishers*
8. Singh, S.: Geomorphology. *Pravalika Purblishers*
9. Singh, S.: Climatology. *Pravalika Purblishers.*

GEO - 202: HYDROLOGY AND OCEANOGRAPHY

Full Marks - 50 (End term Examination - **40** and Internal Assessment - **10**)

Pattern of setting questions:

Group- A (Long Answer Type): Four questions, each of 10 marks (to be divided into at least two parts), will be answered out of eight options to be set from all the units.

Learning Objectives:

Students will learn the systematic interaction among the hydrological parameters at both local, global and watershed scales. The working of hydrological cycle and relative roles of runoff, evaporation and infiltration under different land use-soil-vegetation complex will be discussed in detail. They will know various hydrological processes and their significance in sustaining environment and ecology at global and regional scale. They will learn the analysis of hydrological data in understanding the trend of hydrological events such as drought and floods and will be able to predict them efficiently.

Course Specific outcomes:

The students will enrich their knowledge on hydrology after completion this course and will take part in water resource management, floodplain planning, and river basin management. Learners may contribute their knowledge on anthropogenic intervention on hydrological system and its impact on environment and society to local community for sustainable future.

Course Content:

1. Hydrological system: Components and sources of hydrological data at basin scale; Hydrological cycle at global and basin scale, significance
2. Water in earth: precipitation, infiltration, evapotranspiration and soil-vegetation complex; stream flow, storage, recharge and discharge of water and water budgeting at watershed level
3. Measurement of hydrologic data: hydrologic frequency analysis, run-off estimation, unit hydrograph and rating curve, stream discharge, infiltration and evaporation estimates
4. Application of hydrologic data: flood and drought management in tropical region, integrated basin management, issues related to damming of large rivers
5. Oceanic environment and processes: Ocean floor-major structural and relief features, ocean circulation-classification and significance, waves and tides-genetic classification and characteristics

6. Physical and chemical structure of oceans: water masses-origin, evolution and their properties, sediment in the sea, sea level change-types, causes and implications
7. Coastal forms and processes: coastal waves, currents and tides, beach profiles, coastal dunes, coral reef-origin and evolution, anthropogenic interventions on the coastline
8. Ocean as a resource: nature and extent of anthropogenic utilisation of the oceans; EEZ and CRZ: delimitation, significance and UNCLOS.

References:

1. Black, P.E. (1991): *Watershed Hydrology*, Prentice Hall, London
2. Davis, R.J.A. (1986): *Oceanography - An Introduction of the Marine Environment*, Win C. Brown, Iowa
3. Day, T. (2006): *Oceans*, Chelsea House, New York
4. Erickson, J. (2003): *Marine Geology: Exploring the New Frontiers of the Ocean*, Facts on File, Inc., New York
5. Garrison, T. (2009): *Essentials of Oceanography*, Brooks/Cole, Belmont, California
6. H.M.,Raghunath (1985): *Hydrology, Principles, Analysis, Design*, New Age International Publishers
7. Ilyin, A.V. (2003): *Evolution of the Ocean Floof Morphostructure - Actualistic Model*, in Evans, I.S., Dikau, R. Tokunaga, E., Ohmori, H. and Hirano, M. (eds.) *Concepts and Modelling in Geomorphology: International Perspectives*, Terrapub, Tokyo, pp. 43-59
8. John, J. A. (1997): *Global Hydrology : Processes, Resources and Environment Management*, Longman Publishers
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12. Murthy, J.V.S. (1994): *Watershed Management In India*, Wiley Eastern, New Delhi
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14. Pinet, P.R. (2009): *Invitation to Oceanography*, Jones and Bartlett Publishers, Sudbury, Massachusetts
15. R.K. Linsley, Applied Hydrology M.A. Kohler & Paulhus
16. Reddy P J., A textbook of Hydrology,
17. Robert, C.M. (2009): *Global Sedimentology of the Ocean: An Interplay between Geodynamics and the Palaeoenvironment*, Elsevier, Amsterdam
18. Stahler, A.N. and Stahler A.N. (1997): *Geography and Man's Environment*, John Wiley and Sons, New York
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21. Weyl, P.K. (1970): *Oceanography: An Introduction of the Marine Environment*, John Wiley and Sons Ltd., London.

GEO - 203: ENVIRONMENTAL GEOGRAPHY

Full Marks - 50 (End term Examination - **40** and Internal Assessment - **10**)

Pattern of setting questions:

Group- A (Long Answer Type): Four questions, each of 10 marks (to be divided into at least two parts), will be answered out of eight options to be set from all the units.

Course Objectives:

This paper will present you what is the role of environment in our Ecological Home. This paper will encourage you how to do motivate the society to conserve the environment. The sustainable development goals through resource management will be analyzed in this module.

Course Specific outcome:

Students will enhance their understanding on general concept of Environmental management and its significance in 21st century. They will understand the debate on Development and Environmental crisis for only one Earth and the need to establish strategies in local, national, international context. Students will gain knowledge of environment and holistic approaches for resource utilization, management and eco-sustainable development in regional level.

Course Content:

1. Environmental Geography: Meaning, Concept and Ecology in Geography
2. Man - Environmental Relationship and Approaches: Human Ecology, Evolution of Civilization, Environmental Determinism and Holistic Approaches
3. Environmental Degradation and Ecological crisis: Pollution, Environmental Hazards and Disasters
4. Population and Resources crisis : Land, Water, Forest, Foods and Ecological Home
5. Conservation and Management of Environment: Approaches, Issues , Methods and Ethics
6. Environmental Impact Assessment and Strategies: Objectives and Characteristics, Eco-Auditing, Green and Environmental Auditing, EMP
7. Development Goals: MDGs, SDGs-2030
8. Environmental Management Policies and Politics on Environment: Global, National and Regional context.

References:

1. Chandna R. C., 2002: Environmental Geography, Kalyani, Ludhiana.
2. Cunningham W. P. and Cunningham M. A., 2004: Principals of Environmental Science: Inquiry and Applications, Tata Macgraw Hill, New Delhi.
3. Goudie A., 2001: The Nature of the Environment, Blackwell, Oxford.
4. Miller G. T., 2004: Environmental Science: Working with the Earth, Thomson Brooks Cole, Singapore.
5. MoEF, 2006: National Environmental Policy-2006, Ministry of Environment and Forests, Government of India.
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GEO - 204: GEOGRAPHY OF RESOURCES: LAND, WATER, SOIL AND FOREST

Full Marks - 50 (End term Examination - **40** and Internal Assessment - **10**)

Pattern of setting questions:

Group- A (Long Answer Type): Four questions, each of 10 marks (to be divided into at least two parts), will be answered out of eight options to be set from all the units.

Learning Objectives:

Learners will be provided adequate ideas and knowledge on resource availability, classification of resources scarcity of resources and associated environmental issues in India and across the Globe. Students will learn the availability and adequacy of major natural resources i.e. land, soil, water and forest and their effective utilization for socio-economic development at global and regional scale. Special emphasis has been given on the resource adequacy and scarcity in relation to populations. They will know about the importance, vulnerability and degradation of land, soil, forest and water resources and also the methods for their conservation.

Course Specific Outcomes:

After completion of this course learners will acquire knowledge about the anthropogenic activities and its role in depletion and crisis of natural resources which will also help them to take part in resource planning and management for sustainable development.

Course Content:

1. Concept of resource: Resource adequacy and scarcity, resource classification-Ackerman's scheme; world resources-distribution and pattern
2. Population and resource: population-resource region, population and development, population and vulnerability, population equilibrium
3. Land resource: Major component of land and land use, land classification- USDA, land capability classes, land degradation and resource depletion, extraction of mineral resources and land subsidence
4. Soil: Major soil types, Hydrological soil groups (HSGs), soil erosion and its impact on agricultural productivity; land-soil conservation and improvement
5. Water resources: Availability, accessibility, scarcity, Water poverty index. Deterioration of river health; salt water intrusion in coastal area

6. Forest resources: Characterisation and diversity of forest resources, Non-timber forest products (NTFP); depletion of forest cover. Management of forest: social forestry, agro-forestry, forest restoration
7. Resource and livelihood: Resource and development; livelihood vulnerability IPCC AR4 and AR5, resource depletion and nature - based livelihood challenges
8. Resource assessment, management and mapping: Resource database preparation; Resource appraisal- application of ICT; micro-level resource planning at watershed scale, human resource development in backward region; geography and resource mapping

References:

1. A.P. Subudhi, B. S. Sokhi, Dr. P. S. Roy (2001): Remote Sensing and GIS: Application in Urban and , Government of India, – Urbanization
2. Chris Rowley (2012): Human Resource Management in the Asia-Pacific Region: Convergence Revisited, Routledge.
3. Christian M. Stracke (2011): Competence Modelling for Human Resources Development and European Policies: Bridging Business, Education and Training; E-competences Tools, GITO mbh Verlag,
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5. De, N.K and Jana, N.C (1997): The Land: A Multifaceted Appraisal and Management, Sribhumi Publishing Co.
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21. Singh J S Singh S P Gupta S R (2008): Ecology environment and resource conservation, Anamaya publishers New Delhi. Rangarajan Mahesh: Fencing the forest: conservation and ecological change in India's central provinces 1860-1914, Oxford University Press Oxford.
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24. YasmiYurdi (2010): Conflict over forests and land in Asia Impacts, causes, and management, The Centre for People and Forest, RECOFTC: Website: www.recoftc.org

GEO - 295: STATISTICAL TECHNIQUES IN GEOGRAPHY AND COMPUTER PROGRAMMING (PRACTICAL)

Full Marks - 50 (End term Examination – **40** (30 + 10 (Practical notebook and Viva voce – 5 + 5)) and Internal Assessment - **10**)

Pattern of setting questions:

*Group- A (Long Answer Type): Three compulsory questions, each of **10 marks** will be answered.*

Learning Objectives:

Students will be trained on various statistical techniques used to analyse geographical data. Various types of probability distribution in relation to specific geographical data sets will be explained in detail. They will be informed on various types of hypothesis testing and their selections under different situation. The correlation and regression between bivariate and multivariate data sets will enhance their learning experience. They will know how to design websites using MY MAP and web page designing using HTML and also computer programming under JAVA and PYTHON.

Course Specific Outcomes:

After completion of this course students will be able to apply various statistical techniques to analyse different sets of geographical data. The capacity of analysing probability of geographical data will be enhanced. They will be able to handle huge data sets as well analyse them after the attainment of this course. After achieving this course, the students would be eligible for different sectors of planning and development which will enhance their job opportunities. The ability of the learners in comparing population mean with the sample mean through various types of hypothesis testing will be improved. Their learning experience will be boosted when they will know how to design websites using MY MAP and web page using HTML and also computer programming through JAVA and PYTHON.

Course Content:

1. Spatial Sampling Techniques and Estimation – Point and Areal
2. Probability: Elementary Probability Theory; Random Variables and Probability Distributions; Normal Distribution; Binomial Distribution; Poisson Distribution; Baye's Theorem
3. Testing Hypotheses in a Geographic Context - Point and Interval Estimation; Key Steps in Testing Hypotheses; PROB-VALUE Method of Hypothesis Testing; Statistical Significance; Two Samples: The t-Test; Analysis of Variance (ANOVA)

4. Correlation Analysis - Product Moment Correlation; Non-Parametric Correlation; Areal Association; Spatial Autocorrelation
5. Regression Analysis - Ordinary Least Squares (OLS), Multiple Regression Models in Spatial Context; Non-linear Models: Trend Surface Analyses
6. Use of Google site and My Map for Website designing
7. Computer Programming- JAVA and Python
8. WEB page designing using HTML

Reference

1. Acevedo, M.F. 2012. Data Analysis and Statistics for Geography, Environmental Science and Engineering, CRC Press.
2. Alvi, Z. 1995: Statistical Geography: Methods and Applications, Rawat Pub. New Delhi.
3. Harris, R., Jarvis, C. 2011. Statistics for Geography and Environmental Science, Prentice Hall.
4. Herbert schildt., 2017: Java: The complete reference.
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GEO 296: GEOSPATIAL TECHNIQUES FOR THEMATIC MAPPING (PRACTICAL)

Full Marks - 50 (End term Examination – **40** (30 + 10 (Practical notebook and Viva voce – 5 + 5)) and Internal Assessment - **10**)

Pattern of setting questions:

*Group- A (Long Answer Type): Three compulsory questions, each of **10 marks** will be answered.*

Learning Objectives:

The course will highlight upon the applications of geospatial tools in geographical studies. The basic objective is to make the participant efficient in geospatial techniques and thematic mapping. Students will learn how to convert non-geographic data to Geospatial Data. They will know the different methods for geo-processing of vector data. They will be trained on preparing various types of thematic maps from geospatial datasets through different techniques of image processing. The course also aims to make the participants eligible in different sectors of planning and developmental activities at regional and national level where geospatial tools and thematic mapping has become more relevant in the present day.

Course specific Outcomes:

Students will come to know about the geospatial tools and techniques for analysing various aspects of geographical parameters. After achieving the knowledge in regard to geospatial techniques and thematic mapping, students will apply this modern technique of geographical studies in regional planning and development. The idea on geospatial techniques and thematic mapping may also be applied in resource appraisal, hazard and disaster management at global, regional and local scale. After completion of this course learners will enhance their capacity to use geospatial techniques in preparing useful thematic maps which will boost their ability in mapping and spatial analysis.

Course Content:

1. Conversion of Non-geographic data to Geospatial Data; and Generation of Point, Linear and Areal data – Physiographic and Administrative
2. Geoprocessing of vector data – Buffer, Dissolve, Intersection, Union
3. Preparation of Thematic Maps using Spatial Interpolation: Kriging, Natural Neighbour and IDW
4. Procuring of Satellite Data: RESOURCE SAT 2, LANDSAT- 9, Sentinel -1, 2, 5(P), LIDAR
5. Image Enhancement: Band Rationing - NDVI, NDBI, MNDWI and Preparation of Thematic Maps
6. Classification of Satellite Images and Accuracy Assessment and Mapping

7. Collection of soil and water samples using GNSS devices: Testing and Mapping of Physico - chemical parameters of soil and water
8. Use of Geospatial and other data for Crop Combination and Crop Diversification Mapping

Reference

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2. Bolstad, P. 2016. GIS Fundamentals: A First Text on Geographic Information Systems, 5th ed, XanEdu Publishing.
3. Brewer, C.A. 2015. Designing Better Maps: A Guide for GIS Users, 2nd ed, Esri Press.
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SEMESTER III

GEO 301: HAZARD AND DISASTER MANAGEMENT

CBCS (MINOR ELECTIVE)

Full Marks - 50 (End term Examination - **40** and Internal Assessment - **10**)

Pattern of setting questions:

Group- A (Long Answer Type): Four questions, each of 10 marks (to be divided into at least two parts), will be answered out of eight options to be set from all the units.

Learning Objective:

The basic aims of the course are to make the students well aware about destructive impacts of various types' of hazards and disasters. The course will help a lot to adapt with hazards and disasters. The objective of this paper is to make the participants aware about the natural hazards and associated disasters in India – its major management strategies. They will be informed on the concepts of risk and vulnerability in connection to climatic extreme events, riverine and coastal hazards, desertification and high altitude extremes. The course also aims to the application of modern tools and techniques in hazards and disasters management. The participants will learn about the modern tools and techniques of disasters management.

Course Specific Outcomes:

After completion of this course learners will enhance their understanding on different attributes of climatic extreme events, riverine and coastal hazards, desertification and high altitude extremes. This will capacitate them for direct participation and effective contribution in hazard management. Thus, this course addresses the issues of social relevance and boost employability. After completion of the course students can make the people aware at community level on various hazards and its possible adaptation strategies.

Course Content:

1. Natural Hazards and Disaster: Concept and classification; Risk and Vulnerability, Hazard Reduction and Disaster Management
2. Climatic Hazard – Climatic extremes, ENSO, and their impact on India
3. Riverine Hazard – Bank Erosion, Flooding – with examples from West Bengal
4. Coastal Hazard – Tsunami, Coastal Erosion, Storm surge in coastal West Bengal
5. Sea level rise – threat and resilience with special emphasis on island countries
6. Mountain Hazard – Landslide with examples from Darjeeling Himalaya and management strategies
7. Desertification – Drought Indexing and management strategies in India
8. Case studies of Climatic Extremes in Bay of Bengal – *Bhola, Aila, Amphan, Yaas*

Reference

1. Coch, N.K. 1994. Geohazards: Natural and Human, Pearson College.
2. Coenraads, R. (Ed.) 2006. Natural Disasters and How We Cope, Millennium House.
3. Cutter, S.L. 2006. Hazards Vulnerability and Environmental Justice, Routledge
Government of India. 1997. Vulnerability Atlas of India, Revised ed, Building Materials & Technology Promotion Council, Ministry of Urban Development.
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5. Hyndman,D., Hyndman, D. 2016. Natural Hazards and Disasters, 5th ed, Brooks Cole.
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GEO 302: REGIONAL PLANNING AND DEVELOPMENT

Full Marks - 50 (End term Examination - **40** and Internal Assessment - **10**)

Pattern of setting questions:

Group- A (Long Answer Type): Four questions, each of 10 marks (to be divided into at least two parts), will be answered out of eight options to be set from all the units.

Learning Objectives:

This paper will show you how to do a spatial analysis of rural and urban functions. The social and economic characteristics of cities and suburbs will be covered in this research. The environmental and ecological effects of urban land usage will be examined. The essentials of urban geography, such as city definitions, central place theory, and classic urban spatial structure models, will be covered in this module.

Course Specific Outcomes:

Understanding and recognizing regions is a crucial part of geography. Recognize the many aspects of development as well as geographical differences in order to design balanced development. Students will gain understanding of rural and urban development as historic, geographic, social, and environmental impact of rural and urban related concerns through coverage to the disciplines of Geography and Planning.

Course Content:

1. Concept of region and regionalization, Classification of Regions
2. Planning Regions of India; Concept of Balanced and Unbalanced Growth, Regional disparities in India
3. Rural economy: Size and structure of Indian rural economy; Role of agricultural and non-agricultural sector; Rural Backwardness
4. Rural Poverty: Types and incidences of Rural Poverty; Measurement; Poverty eradication policies in India
5. Selection criteria, prospects and potentialities of target area and target population: Border Area, Drought prone Area, Tribal Area, Hilly Area and Coastal Area
6. Urban development: Metropolitan concept, Metropolis, Metropolitan area, Metropolitan region, Mega-city and Primate city - need and importance

7. Concept of Urban Planning, National Policies on Urbanization, Conceptualize Urban, urbanization, urbanism and urban ecology, Rural-urban fringe - structure, characteristics, functions, changes and adjustment
8. Cities and suburbs: Suburban Sprawl, Smart growth, Exurbs, New Cities and Gated communities; Manifestations of Poverty in Cities - Slums, Informal Sector, Crime, Social exclusion; JNNURM & AMRUT Schemes

Reference

1. Agarwal, A.N. (1995): Indian Economy, Problems of Development and Planning, Vishwa Prakashan, New Delhi.
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4. Boudeville,J.R.(1966): Problems of Regional Economic Planning, Edinburgh University Press, Edinburgh.
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6. Chandra, Bipin(1992): "The Colonial Legacy", in The Indian Economy Problems and Prospects, Ed: Bimal, J, Penguin Books, New Delhi.
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11. Dickinson.R.E, (1964): City, Region and Regionalism, A geographical Contribution to Human ecology Kegan Paul Ltd., London.
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16. Husain, M. (1994). Regional Geography. New Delhi: Anmol Publication Pvt.Ltd.
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GEO 303: SOCIAL AND CULTURAL GEOGRAPHY

Full Marks - 50 (End term Examination - **40** and Internal Assessment - **10**)

Pattern of setting questions:

Group- A (Long Answer Type): Four questions, each of 10 marks (to be divided into at least two parts), will be answered out of eight options to be set from all the units.

Learning Objective:

Learners will understand changing nature of social and cultural geography in the context of changing perspective of analysis to deal with the dynamic social and cultural traits. They will be interested to enquire into the structural components and their relations in the form of social processes. They will learn the spatial dimensions of social wellbeing, social justice and social exclusion. They will know the planning initiatives to maximise the social wellbeing and social equity. Learners will be know the development of cultural landscape through man-nature relationship and how it varies across the regions. They will be informed on different mechanism of cultural transformation through technological innovation. Learners will become inquisitive on the multicultural identity of India.

Course Specific Outcome:

After completion of this course learners will develop understanding on the spatial as well as temporal variation of society and their culture as a dynamic interface between man and nature. They will be sensitive towards cross cutting issues like social justice, social exclusion and social wellbeing and will be able to evaluate the role of planning initiatives in inclusive growth and maximisation of social justice. This course will sensitize learners towards indigenous culture and community wisdom and potential threat in the age of globalisation. They will develop their understanding on the unique multicultural identity of India.

Course Content:

1. Changing nature of social geography – evolution of perspectives; ethnicity, tribe, dialect, language, caste and religion as social components.
2. Social structure and processes: social implications of caste-class divides and rural-urban divides with special reference to India. Changing social order: fragmentation, segregation and polarization.
3. Social justice and social geography of India: concept and theories, achieving social justice, geographies of social well-being
4. Social Planning: Constitutional provisions, Inclusive growth and its measures; spatial implications

5. Cultural Geography: Definition, scope and nature. Race, religion, language as cultural attributes with special reference to India - North-South, socio-cultural divide, Concept of Cultural Landscape
6. Role of Technology in the evolution of Culture, Cultural Take off, Cultural Diffusion and Socio-Cultural Transformation
7. Cultural Innovation, Acculturation and Regeneration. Traditional folk culture-crisis and transformation
8. World cultural Realms and diversity - Cultural Globalization and Cultural Segregation. India and its multicultural identity. Cities as melting pot of culture

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PAPER NO. - GEO 304 (THEORY), SPECIAL PAPER (ELECTIVE MAJOR)

Option 1: ADVANCED GEOMORPHOLOGY

Full Marks - 50 (End term Examination - **40** and Internal Assessment - **10**)

Pattern of setting questions:

Group- A (Long Answer Type): Four questions, each of 10 marks (to be divided into at least two parts), will be answered out of eight options to be set from all the units.

Learning Objectives:

This course aims to instruct the learner about key concepts and approaches of Geomorphology in order to organize and maximize their understandings. They will be trained on the multi-disciplinary nature of the subject. They will know how the processes work and vary spatially and temporarily within a river basin-scale. Emphasis are given on impact of fluvial systems on hill slope, river hydraulics and its response to channel adjustments, dynamicity of coastal processes and forms under human interventions in the context of climate change and sea level rise etc. to raise their interests on contemporary and technical issues of the discipline.

Course Specific outcome:

Learners will be able to understand the nature of working of geomorphic processes to develop their characteristic landform assemblage. They will develop skill to evaluate landscape as a holistic system through multi-disciplinary approach. They can participate in landscape management by thorough analysis of process-form dynamics under fluvial and coastal systems.

Course Content:

1. Quantitative and Modern approaches to geomorphology; system concept and scale in geomorphology, development of geomorphology in India
2. Geomorphology and allied disciplines: geophysics, geochemistry, sedimentology, hydrology, climatology, pedology and engineering
3. Drainage basin hydrology: spatial and temporal variation of discharge; run-off generation and channel development
4. Fluvial processes and slope evolution: hill slope drainage, fluvial erosion, sediment transport and deposition, flow character and flow regime of alluvial channel through time
5. Fluvial process and its response to channel adjustment and forms; channel planforms
6. Relevance of coastal study, coastal processes and landforms
7. Anthropogenic interventions and coastal landscape changes; coastal ecosystem and vulnerability with special reference to West Bengal

8. Climate change and sea level rise, landscape development, catchment linkage and connectivity; complex interaction between fluvial and coastal processes

References:

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3. Bloom, A.L. (2002): *Geomorphology: A Systematic Analysis of Late Cenozoic Landforms*, Prentice Hall, Upper Saddle River, New Jersey
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23. Small, R.J. (1978): *The Study of Landforms: A Textbook of Geomorphology*, Cambridge University Press, Cambridge 2
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25. Summerfield, M.A. (1991): *Global Geomorphology: An Introduction to the Study of Landforms*, Longman, London
26. Summerfield, M.A. (ed.) (2000): *Geomorphology and Global Tectonics*, Wiley, Chichester

27. Thomas, M.F. (1994): *Geomorphology in the Tropics: A study of weathering and denudation in low latitudes*, John Wiley & Sons, Chichester
28. Thorn, C. (1988): *Introduction to Theoretical Geomorphology*, Unwin Hyman, Boston
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PAPER NO. - GEO 304 (THEORY), SPECIAL PAPER (ELECTIVE MAJOR)

Option 2: AGRICULTURAL GEOGRAPHY

Full Marks - 50 (End term Examination - **40** and Internal Assessment - **10**)

Pattern of setting questions:

Group- A (Long Answer Type): Four questions, each of 10 marks (to be divided into at least two parts), will be answered out of eight options to be set from all the units.

Learning Objectives:

This course aims to enhance understanding on the role of agriculture in human civilization. This paper will encourage the learners how to get involved in agricultural practices through modern Agro-science and technology. They will be curious in learning geographical factors influencing agriculture. world agriculture system, agricultural types and pattern. agriculture and occupational structure in India. They will boost their understanding on role of agriculture in Indian economy, food security and food safety.

Course specific outcome:

After completion of this course students will find interest in understanding geographical perspectives of agriculture. They will develop knowledge on development and prosperity of modern agricultural practices for sustainable economic growth to establish policies in local, national, international context. Students will acquire knowledge of organic agriculture and its practices for proper resource utilization and eco-sustainable development in regional level.

Course Content:

1. Origin and Dispersal of Agriculture: Meaning, concept, evolution of agricultural systems, role of agriculture on human society, approaches to study of agricultural geography
2. Progress and Development of Agricultural Geography: Economic Geography and Agricultural Geography, Agricultural Geography and Socio-Cultural Geography
3. Man, Environment and Agriculture: Geographical factors influencing agriculture. world agriculture system, agricultural types and pattern. agriculture and occupational structure in india
4. Agricultural Models, Contemporary perspective of Von Thunen Model. APSIM, DSSAT, Aqua Crop Model
5. Agriculture in India: Growth and development of Indian agriculture, agriculture and Indian economy, food security and food safety
6. Agricultural issues and crisis; Agricultural policies in Post- Independent India

7. Agriculture and globalization: World Economy, Agro world Market, Exchange of Agro products, Agriculture and 'Zero-Hunger'
8. Agricultural biotechnology: Bio-fertilizer, biological means of pest management, technology on organic farm and protein farm

Reference Books

1. Basu, D.N., and Guha, G.S., 1996: Agro-Climatic Regional Planning in India, Vol.I & II, Concept Publication, New Delhi.
2. Bryant, C.R., Johnston, T.R, 1992: Agriculture in the City Countryside, Belhaven Press, London.
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5. Ilbery B. W., 1985: Agricultural Geography: A Social and Economic Analysis, Oxford University Press.
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8. Shafi, M., 2006: Agricultural Geography, Doring Kindersley India Pvt. Ltd., New Delhi
9. Singh, J., and Dhillon, S.S., 1984: Agricultural Geography, Tata McGraw Hill, New Delhi.
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PAPER NO. - GEO 304 (THEORY), SPECIAL PAPER (ELECTIVE MAJOR)

Option 3: TOURISM GEOGRAPHY

Full Marks - 50 (End term Examination - **40** and Internal Assessment - **10**)

Pattern of setting questions:

Group- A (Long Answer Type): Four questions, each of 10 marks (to be divided into at least two parts), will be answered out of eight options to be set from all the units.

Learning Objectives:

Major objectives of this course are to make learners aware on changing spatial patterns of international tourism, tourism infrastructure, environmental and social consequences of tourism development. Ethical and Esthetical Issues in Tourism will be discussed in details. They will learn roles of tourism in domestic economy and balance of payments. Roles and functions of various organizations at national and international level will be evaluated. They will be interested on National Tourism promotion campaigns and policy measures for tourism development.

Course Specific outcome:

Students will be interested in understanding geographical perspectives of Tourism. They will take part in development of tourism for sustainable economic growth to establish policies in local, national, international context. Students will foster knowledge of tourism and event management for resource utilization and eco-sustainable development in regional level.

Course Content:

1. Scope and Content of tourism geography; Concept of Leisure, Recreation and Tourism; Types of Tourism
2. Changing Spatial Patterns of International Tourism; Structural Dynamics and Infrastructure Development and Tourism; Environmental Consequences of Tourism Development; Impact of Pandemic (Covid-19) on Global Tourism Industry
3. Ethical and Esthetical Issues in Tourism; Tourism Planning; Eco-tourism; Adventure Tourism; Geo-heritage and Geomorphosites; Tourism and Sustainable Rural Development, Tourism and Cultural Exchange
4. Leisure and Recreation in Cities: Outdoor Recreational Resources; Parks, Open Spaces, and Common Spaces in Cities; Sports and Cultural Tourism
5. The economic impacts of tourism: Direct, indirect, induced and negative; The measurement of economic impact, multiplier effect – meaning and types economic impact, linkage and leakages. Tourism impact on balance of payments and exchange rates

6. Role and Function of World Tourism Organization (WTO), Pacific Asia Travel Association (PATA), World Tourism & Travel Council (WTTC), Tourism Ministry of India (ITDC, IRCTC)
7. National Tourism promotion campaigns - Incredible India, Atthi Devo Bhava; Promotion-mix factors; advertising- creative advertising, PR tools in tourism and hospitality industry

Reference Books

1. Chuck Y. Gee , Travel industry:
2. R Gartner, Tourism Development: Tourism System: Mill R.C & Morrison
3. P.M. Seth, Successful Tourism Management:
4. J.K. Sharma , Tourism Planning & Development:
5. Cooper C, Fletcher J, and Gilbert D & Wahill S. Tourism; Principles & Practices
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PAPER NO. - GEO 304 (THEORY), SPECIAL PAPER (ELECTIVE MAJOR)

OPTION 4: REGIONAL PLANNING & URBAN GEOGRAPHY

Full Marks - 50 (End term Examination - **40** and Internal Assessment - **10**)

Pattern of setting questions:

Group- A (Long Answer Type): Four questions, each of 10 marks (to be divided into at least two parts), will be answered out of eight options to be set from all the units.

Learning Objectives:

This paper will show how to do a spatial analysis of rural and urban functions. The social and economic characteristics of cities and suburbs will be covered in this research. The environmental and ecological effects of urban land usage will be examined. The essentials of urban geography, such as city definitions, central place theory, and classic urban spatial structure models, will be covered in this module. Students will also learn about current urban topics such as global cities, urban sprawl, urban green space, urban environment, and footprints.

Course Specific Outcomes:

Understanding and recognizing regions is a crucial part of geography. Recognize the many aspects of development as well as geographical differences in order to design balanced development strategies. Students will gain understanding of rural and urban development as historic, geographic, social, and environmental impact of rural and urban related concerns through coverage to the disciplines of Geography and Planning.

Course Content:

1. Concept of region and regionalization, Classification of Regions: based on Principle (Homogeneity and Interlinking regions), based on Size (Macro, Meso, Micro and Minor), based on Genesis (Naïve, Instituted and Denoted)
2. Planning Regions of India: Purpose and methods of delineation; Balanced and Unbalanced Growth, Regional disparities in India and Five year plans, NITI Aayog
3. Concept and Approaches to Rural Development: Gandhi's and Tagore's perspective; Sectoral Approach; Area Approach; Target Group Approach; Service Centre Approach and Rural Livelihood Approach
4. Role of NABARD, Micro Finance Institutions, NGOs and Civil Society Organizations in rural development
5. Problem of planning in growth foci; Metropolitan Concept: Metropolis, Metropolitan Area, Metropolitan Region, City region

6. Urban Renewal vs. Urban Redevelopment, Urban Sustainability in India–SDG Urban index
7. Rural – Urban linkage, Rural – Urban migration, AMRUT Scheme and HRIDAY Scheme
8. Special Economic Zones: Perspectives of Development with special reference to West Bengal, Paschimanchal Unnayan Parshad; Land Acquisition and Challenges, Flagship Programmes in West Bengal: Success and Challenges

Reference

1. Gallion, A. B. & Simon, E. (1969). *The Urban Pattern*, Van Nostrand Reinhold Co., Affiliated East-West Press Pvt. Ltd., New Delh.
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PAPER NO. - GEO 395 (PRACTICAL), SPECIAL PAPER (ELECTIVE MAJOR)

PAPER GEO 305: GENERAL FIELD WORK AND COMMUNITY OUTREACH

A. General Field Work (Report Writing + Viva Voce + Internal Assessment) (15 + 10 + 5)

Learning Objectives:

Fieldwork should be conducted with following objectives:

1. To train the students how to conduct and organise field work with an aim to develop managerial skill.
2. to make them interested in linking practical issues with theoretical knowledge
3. to draw their attention to contemporary issues, sensitize them to local problems and finding solutions

General Guidelines for conducting fieldwork and preparing field report

1. Field work will be organised to address any local problem and/or contemporary issue.
2. Field work should focus on collection of primary data using appropriate techniques along with supplementary secondary data collected from reliable source(s).
3. Collected data will be analysed using statistical methods (preferably advanced statistical methods learnt in the other courses) and will be represented through suitable cartograms and standard maps (preferably using GIS). Entire analysis will aim to understand the interrelationship among different geographical attributes with special reference to man-nature relationship.
4. Report should not exceed 50 pages (including maps, diagrams and plates) and should be arranged under following Sub-heads: Introduction; Relevance of the work; Objectives, Materials and Methods; Results and Discussions, Conclusion, References / Bibliography and Appendices (if any).
5. Report should be duly endorsed by the Supervisor(s) with a declaration that 'the report is original in nature and is not submitted fully or partially elsewhere for any degree'. The report will be produced individually by the students.

B. Community Outreach: Report + Presentation + Internal Assessment (10+5+5)

Learning Objectives:

Community outreach should be conducted with following objectives:

1. To take part in community-level activities which will extend either logistic or expert support to local community to solve their problems and/ or various kind of awareness programme.
2. To make the students responsible towards local society and environment
3. To strengthen society- academia relationship.
4. To understand the development culture and society in combination to their natural milieu nature of geography as the field science

Guidelines for Conducting Community Out-reach Programme

1. Students will take part in community-level activities which will extend either logistic or expert support to local community to solve their problems and/ or in various kind of awareness programme.
2. Interaction with community, providing them assistance, and Awareness programme are to be documented and will be included in the report for evaluation in end-term examination.

PAPER GEO 306: RESEARCH METHODOLOGY AND ETHICS

Full Marks - 50 (End term Examination – **40** (30 + 10 (Practical notebook and Viva voce – 5 + 5)) and Internal Assessment - **10**)

Pattern of setting questions:

*Group- A (Long Answer Type): Three compulsory questions, each of **10 marks** will be answered.*

Learning Objectives:

Learners will get initial training on need for research, their types and objectives. They will know how to find out research gaps through literature review and to fix research objectives accordingly. They will know how to collect and analyze data in coordination with research objectives. Students will be curious to know the procedure of research design, writing a proposal and writing research reports. This course aims to train the students on the ethical issues during data collection-consent of the parties; responsibility towards participants, collaborators and society; and publication ethics etc.

Course Specific Outcome:

The learners will be interested in the major steps for conducting geographical research. They will be inquisitive in understanding general methodological framework including data collection, data analysis, and representation. They will develop the skills for designing a research work and writing a good research proposal and research report. This course aims to develop research interest among the students.

Course Content:

1. Fundamentals of Research: Motivation for research, objective for research, research types
2. Research problems, literature review, research gap and research objectives
3. Methods: data collection- primary and secondary; data analysis and presentation. Research design under inductive and deductive axioms. Association among philosophy, approach and research methods
4. Writing research Proposal and research reports: writing notes, style of referencing, bibliography and appendices, abstract and synopsis writing
5. Ethical obligation during data collection: Informed consent of the parties, Ethical code in Human and Animal subject and agricultural research. International Committee of Medical Journal Editors (ICMJE) guidelines

6. Responsibility towards participants and society: Confidentiality of personal information, Potential harm out of a research
7. Responsibility towards collaborators and co-researchers: Conflict of interest
8. Publication ethics: Plagiarism and Intellectual Property Right; Predator Journals and UGC CARE. Committee on Publication Ethics(COPE) guidelines

References

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SEMESTER IV

PAPER NO. GEO 401 (THEORY)

PAPER GEO 401: GEOGRAPHY OF INDIA

Full Marks - 50 (End term Examination - **40** and Internal Assessment - **10**)

Pattern of setting questions:

Group- A (Long Answer Type): Four questions, each of 10 marks (to be divided into at least two parts), will be answered out of eight options to be set from all the units.

Learning Objective:

This course aims to inform the learners in the history of state reorganization of India after Independence and the nature and intensity of regional inequality in the growth of industry and agriculture. Various large scale development projects like; multipurpose project, the policies of green revolution, forest policies etc. will be evaluated for better understanding of their functioning at national scale. The regional issues of Rarh Bengal and forest fringe areas will also be dealt with.

Course Specific Outcomes:

The students will be well acquainted with various physical and social aspects of India. After completion of this course the learners will be aware about the India – its history and major developmental policies, their consequences and contemporary issues. They will come to know the role of physiographic and socio-economic parameters in regional planning and development. They will find interest on the regional issues of Rarh Bengal and plateau fringe areas of West Bengal.

Course Content:

1. State reorganization of India after Independence
2. Growth of Industry and agriculture in India since Independence, Land reforms in India
3. Regional Inequality in India: Factors and challenges
4. Large Scale Development Projects and impacts (Big Dams and Mining)
5. Green Revolution: Economic, Social and Ecological Consequences
6. Forest Policies and Forest People; Success and Failure of Forest Management
7. Regional Development of West Bengal with special reference to Rarh Bengal and Deltaic West Bengal
8. Livelihood and development in Plateau Fringe areas of West Bengal

Reference

1. Ghurey, G.S. 1963. The Scheduled Tribes of India, 1980 reprint, Transaction Books.
2. Johnson, B.L.C. (Ed) 2001. Geographical Dictionary of India, Vision Books.
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6. Sharma, T.C. 2012. Economic Geography of India, Rawat Publications.
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PAPER NO. - GEO 402 (THEORY)

PAPER GEO 402: POLITICAL GEOGRAPHY AND GEOPOLITICS

Full Marks - 50 (End term Examination - **40** and Internal Assessment - **10**)

Pattern of setting questions:

Group- A (Long Answer Type): Four questions, each of 10 marks (to be divided into at least two parts), will be answered out of eight options to be set from all the units.

Course Objectives:

Major objective of this course is to make learners aware on the politics of space and associated resources and related competition and conflicts among the neighbouring countries and states for controlling the space and its resources. They will learn various ideas and concepts of governance and related spatial administrative and political units. Much emphasis has been given on the politics of water and petroleum resources at national as well as global scale. The power and functions of worlds trade and political blocks will enhance their learning experience.

Course Specific outcome:

After completion of this course learners will enrich their understanding on the politics of space and associated resources. They will foster their understanding on the political strategy in controlling important resources like water and petroleum resources at national as well as global scale. They will be more curious in understanding the geographical factors of federal structure of India. The power and functions of worlds trade and political blocks will enhance their learning experience.

Course Content:

1. Connotation of Political Geography: Nature and Scope, Recent Trends
2. Concept of Organic State, Geopolitik and Geopolitics; Whiteness's Law – Landscape Approach, Hartshorne's Functional Approach
3. State and Nation, Territoriality, Frontier, Boundary, Location, Exclave, Enclave, Nation-state
4. Global Strategic Models: Heartland and Rimland theory
5. Federalism: Concept, Geographical Perspective, Federalism in India
6. Politics of Resources: Resources and International Strategy, Petroleum and Global policy, National and International water dispute, One belt one road initiatives
7. Electoral Geography: Trend in Electoral Geography, Voter participation, Model and Process for Electoral Systems

8. World Organizations and regional associations: UNO, WTO, OPEC, NATO, BRICS, ASEAN, SAARC

References:

1. Agnew J., 2002: Making Political Geography, Arnold.
2. Agnew J., Mitchell K. and Toal G., 2003: A Companion to Political Geography, Blackwell.
3. Cox K. R., Low M. and Robinson J., 2008: The Sage Handbook of Political Geography, Sage Publications.
4. Cox K., 2002: Political Geography: Territory, State and Society, Wiley-Blackwell
5. Gallaher C., et al, 2009: Key Concepts in Political Geography, Sage Publications.
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7. Jones M., 2004: An Introduction to Political Geography: Space, Place and Politics, Routledg.
8. Mathur H M and M Cernea (eds.) Development, Displacement and Resettlement – Focus on Asian Experience, Vikas, Delhi
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10. Taylor P. and Flint C., 2000: Political Geography, Pearson Education.
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12. Hodder Dick, Sarah J Llyod and Keith S McLachlan (1998), Land Locked States of Africa and Asia (vo.2), Frank Cass.
13. Adhikary, S(1997): Political Geography, Rawat Publications, Jaipur, India

PAPER NO. - GEO 403 (THEORY)

PAPER GEO 403: CONTEMPORARY ISSUES IN GEOGRAPHY

Full Marks - 50 (End term Examination - **40** and Internal Assessment - **10**)

Pattern of setting questions:

Group- A (Long Answer Type): Four questions, each of 10 marks (to be divided into at least two parts), will be answered out of eight options to be set from all the units.

Learning Objectives:

This paper will show you how to do a spatial analysis of rural and urban functions. This paper prepares students for careers as leaders in comprehending and addressing complex environmental hazard and disaster from a multidisciplinary, problem-solving perspective. The environmental and ecological effects of urban land usage will be examined. The essentials of urban geography, such as city definitions, central place theory, and classic urban spatial structure models, will be covered in this module.

Course Specific Outcomes:

Understanding and recognizing regions is a crucial part of geography. Students will increase their abilities to manage a variety of natural hazards by analysing risk and vulnerability. Students will gain understanding of rural and urban development as historic, geographic, social, and environmental impact of rural and urban related concerns through coverage to the disciplines of Geography and Planning.

Course Content:

1. Sustainable Development: Introduction, History, Concepts, Targets, Strategies and Measurement, Sustainable Utilisation of Resources: Land, Water and Energy
2. Developmental Projects and consequences: Thermal Power Project (Indian Case), Big-Dam Issue (DVC), River linking Projects in India, Mining and rehabilitation problem in India
3. Development and its Measurement: Human Development Index, World Happiness Index, Corruption Perception Index, Global Hunger Index, Media Freedom Index, Global Climate Risk Index
4. Sustainable Development Goals: Indian initiatives and achievements
5. Climate change and Environmental Risk: Sea and land surface temperature Rising, Sea Level Rising, Hydro-meteorological extreme events (Cyclone, Flood, GLOF, Heat and Cold Wave, Drought)

6. IPCC-Assessment Report on Vulnerability & Risk, Sendai Framework for Disaster Risk Reduction, Paris Agreement, UN Climate Change Conference in Glasgow (COP26) and India's Commitment
7. Global crisis: Covid-19 Pandemic–Global to Regional; Terrorism in Asia and Africa; Refuge problems in Syria, Afghanistan, South Sudan, Myanmar
8. Gender Inequality, Poverty, Crime and Homelessness, Divided city

Reference

1. Alex, S. (2008). *Global Perspectives in the Geography Curriculum*. Routledge. Talyor & Francis Group.
2. Basu, R & Bhaduri, S (2007). *Contemporary Issues and Techniques in Geography*. Progressive Publishers.
3. Friedmann, J. (1995). Where we stand: A Decade of World City Research, In: P. L. Knox and P. Taylor (eds) *World Cities in a World-system*. 21-47. Cambridge University Press, Cambridge.
4. Gore, C. (1984). *Regions in Question: Space, Development Theory and Regional Policy*, London, Methuen
5. Hubbard, P., Kitchin, R., Bartley, B., & Fuller, D. (2005). *Thinking Geographically. Space, Theory and Contemporary Human Geography*, Continuum: London
6. Mandal, R.B. & Sinha, V.N.P. (2016). *Recent Trends and Concepts in Geography (3 VOL SET)*. Routledge. Talyor & Francis Group.
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9. Roy, A. & Trudgill, S. (2003). *Contemporary Meanings in Physical Geography - From What to Why?* Routledge. Talyor & Francis Group.
10. Warwick E. M. & John, O. (2015). *Geographies of Globalization*. Routledge. Talyor & Francis Group.

GEO 404 (THEORY), SPECIAL PAPER (ELECTIVE MAJOR)

OPTION 1: ADVANCED GEOMORPHOLOGY

Full Marks - 50 (End term Examination - **40** and Internal Assessment - **10**)

Pattern of setting questions:

Group- A (Long Answer Type): Four questions, each of 10 marks (to be divided into at least two parts), will be answered out of eight options to be set from all the units.

Learning Objectives:

This course aims to train the learner on how they will explore the possibilities of application of geomorphic knowledge for the solution of social problems. This course will offer scope for application of theoretical understandings on the practical issues of integrated river basin management, coastal zone management, application of geomorphology in EIA, management of river discharge, urban water supply and disposal, management of reclaimed coastal areas, management of flood, river bank erosion, landslides in Darjeeling Himalaya taking local examples through the applications of geo-spatial technology and models.

Course Specific outcome:

Learners will be able to find areas of application of their knowledge in either resource management, Environmental Impact Assessment, or hazard management. They will foster their interest in evaluation of large scale river valley project like Damodar Valley Corporations and Farakka projects. Their unique skill of evaluating landscape as a holistic system through multi-disciplinary approach will help them preparing effective plan for urban water supply, waste management, protection of coast, protection of slope, and protection of river banks and riparian areas. They can participate in landscape management by thorough analysis of process-form dynamics under fluvial and coastal systems applying advanced technology.

Course Content:

1. Landform studies: Badlands on laterite duricrusts; Alluvial fans in Sub-Himalayan West Bengal; Deltas and estuaries in West Bengal
2. Geomorphology in integrated river basin management and coastal zone management
3. Geomorphology and identification of resource potentiality; application of geomorphology in EIA
4. Geomorphology and Management of river discharge with special reference to Damodar Valley Corporation and Farakka Barrage Project

5. Geomorphology and Management of urban water supply and disposal with special reference to Kolkata; Management of reclaimed coastal areas with special reference to Indian Sundarban
6. Geomorphology and management of flood and river bank erosion with special reference to West Bengal
7. Management of landslides in Darjeeling Himalaya and management of coastal erosion in West Bengal coast
8. Application of Geo-Spatial Technology and Models in flood and landslide hazards zonation mapping

Reference

1. Gallion, A. B. & Simon, E. (1969). *The Urban Pattern*, Van Nostrand Reinhold Co., Affiliated East-West Press Pvt. Ltd., New Delh.
2. Hall, P. (1992). *Urban and Regional Planning*, Routledge, London.
3. Hall, P. & Tewdwr, J.M. (2010). *Urban and Regional Planning*, Routledge, London and New York.
4. Hauser, Philip M. and Schnore, Leo F. (ed.) (1965). *The Study of Urbanisation*, Wiley, N.Y.
5. Hiraskar, G. K. (1989). *Fundamentals of Town Planning*, Dhanpat Rai & Sons, Delhi.
6. Kulshreshta, S.K. (2012). *Urban and Regional Planning in India: A Handbook for Professional Practice*, Sage, New Delhi.
7. Lichfield N., Kettle P. & Whitbread M. (2016). *Evaluation in the Planning Process: The Urban and Regional Planning Series (Volume 10)*, Elsevier.
8. Meyor, H. M., Kohn, C. F. (1955) *Readings in Urban Geography*, University of Chicago Press, Chicago, 1955.
9. RahmaanA, U. (2011). *The Imperatives of Urban and Regional Planning: Concepts and Case Studies from the Developing World*, Xlibris Corporation.
10. Ramchandran, R. (1992). *Urbanization & Urban Systems in India*, Oxford University Press, Delhi, 1992
11. Rao, V.L.S.P.(1995). *Urbanisation in India: Spatial Dimensions*, Concept Publishing Co., New Delhi.
12. Stiftel, B. & Watson, V. (2005). *Dialogues in Urban and Regional Planning*, Psychology Press
13. Venkatarayappa, K.N. (1972). *Slums: A Study in Urban Problem*, Sterling Publishers (P) Ltd., New Delhi.
14. Wong, C. (2006). *Indicators for Urban and Regional Planning: The Interplay of Policy and Methods*, Routledge

PAPER NO. – GEO - 404 (THEORY), SPECIAL PAPER (ELECTIVE MAJOR)

OPTION 2: Agricultural Geography

Full Marks - 50 (End term Examination - **40** and Internal Assessment - **10**)

Pattern of setting questions:

Group- A (Long Answer Type): Four questions, each of 10 marks (to be divided into at least two parts), will be answered out of eight options to be set from all the units.

Learning Objectives:

This course aims to enhance understanding on agricultural regionalization in India. This paper will encourage the learners to explore application of modern technology in agricultural practices. They will be curious in learning problems of Indian agriculture especially the problem of low productivity, natural hazards and possible damage, threats from vagaries of monsoon. They will boost their understanding on role of agriculture in Indian economy.

Course Specific outcome:

After completion of this course students will find interest in locating agricultural regions in India. They will be able to explore application of modern technology in agricultural practices. understanding geographical perspectives of agriculture. They will boost their learning experience on They will be curious in learning problems of Indian agriculture especially the problem of low productivity, natural hazards and possible damage, threats from vagaries of monsoon. They will understand the role of agriculture in Indian economy.

Course Content:

1. Agriculture in ancient age, food habit and types of crops.
2. Land Classification schemes, Soils of India and agricultural productivity, Land utilization in Indian agriculture – interstate variation
3. Development of agriculture in India during Five Years Plan Periods and beyond
4. Agricultural Regionalization in India, Agro-climatic regions, Distribution of Horticulture and Cash crops
5. Agriculture and Application of Technology: Irrigation techniques and regional variation, Water Saving and Micro- irrigation, Greenhouse Farming, Bio-technology in Agriculture, Precession farming
6. Problems of Indian Agriculture: Problem of Low Productivity, Natural hazards and Crisis of Agriculture, Vagaries of monsoon and Indian agriculture

7. Agriculture and Indian Economy: Minimum support price (MSP), Agriculture and Indian Economic Budget, subsidy in Indian Agriculture, Agricultural products and international trade balance
8. Sustainable Agriculture and Development: Agro-Farming, Agro tourism, Organic Farming, Mixed Farming, Roof cultivation, Nutrients Garden and Herbal Garden

Reference Books

1. Basu, D.N., and Guha, G.S., 1996: Agro-Climatic Regional Planning in India, Vol.I & II, Concept Publication, New Delhi.
2. Bryant, C.R., Johnston, T.R, 1992: Agriculture in the City Countryside, Belhaven Press, London.
3. Burger, A., 1994: Agriculture of the World, Aldershot, Avebury.
4. Grigg, D.B., 1984: Introduction to Agricultural Geography, Hutchinson, London.
5. Ilbery B. W., 1985: Agricultural Geography: A Social and Economic Analysis, Oxford University Press.
6. Mohammad, N., 1992: New Dimension in Agriculture Geography, Vol. I to VIII, Concept Pub., New Delhi.
7. Roling, N.G., and Wageruters, M.A.E.,(ed.) 1998: Facilitating Sustainable Agriculture, Cambridge University Press, Cambridge.
8. Shafi, M., 2006: Agricultural Geography, Doring Kindersley India Pvt. Ltd., New Delhi
9. Singh, J., and Dhillon, S.S., 1984: Agricultural Geography, Tata McGraw Hill, New Delhi.
10. Tarrant J. R., 1973: Agricultural Geography, David and Charles, Devon.
11. Nag, Ahindra; 2008: Agricultural Biotechnology, PHI Learning Private Limited, New Delhi.

PAPER NO. – GEO - 404 (THEORY), SPECIAL PAPER (ELECTIVE MAJOR)

OPTION 3: TOURISM GEOGRAPHY

Full Marks - 50 (End term Examination - **40** and Internal Assessment - **10**)

Pattern of setting questions:

Group- A (Long Answer Type): Four questions, each of 10 marks (to be divided into at least two parts), will be answered out of eight options to be set from all the units.

Geography of Rural Recreation and Tourism

Learning Objectives:

Major objectives of this course are to make learners aware on changing approaches and different theories on travel motivation. They will learn about the personality-attitudes and beliefs-values-perception of the tourists as individual and groups. Legal perspectives of tourism will be discussed in details. They will explore job opportunity in tourism industry.

Course Specific outcome:

After completion of the course learners will boost their understanding on the theoretical perspectives of travel motivation. They will find interest on the psychological aspects of tourist and their behaviour, which will enhance their ability of tourism management. They will learn different legal provisions related to tourism which will capacitate them to address different issues associated to tourism. They will enhance their learning experience by exploring tourism prospects and challenges in West Bengal.

Course Content:

1. Classification of Tourist: Tourist, Traveller, Visitor; Different schemes of classification of Tourist; Tourism product and Typology and their changing characteristics
2. Theories of Travel Motivation: Socio-psychological models of Crompton and Iso-Ahola, Doxey's Irritation Index Model, Butler's Tourist Area Life Cycle Model, Hall's Theory of Tourism Market System
3. Tourism Individual Behaviour and Differences- Personality-Attitudes and Beliefs-Values-Perception – Perceptual Selectivity – Transactional Analysis – Johari window-Management of Stress
4. Tourism Group Behaviour – Group Dynamics, Conflict Resolutions, Motivation and Motivation theories, Motivation and Productivity, Leadership Styles & Model

5. Tourism Legislation in India, Sources of Tourism Law, The Indian Scenario Laws related to Ancient Monuments, The Ancient Monuments Act, Regulations made by the Archaeological Survey of India
6. Regulatory Laws for Tourism Business in India: Inbound and outbound travel, Transport industry and Airlines, Accommodation and Hotel Industry, Foreign Exchange Regulation Act
7. Tourist related Laws: Citizenship, Passport, Visa, Foreigners, Foreigners Registration, customs Acts
8. Tourism-Development Dilemma: Ecological impacts of Tourism, Tourism-Poverty nexus; Tourism career – opportunities and courses offered by different institutes in India, Tourism Prospects and Challenges in West Bengal

References:

1. Koontz, O'Donnell & Weihrich, Management, Tokyo: McGraw – Hill Inc.
2. Robbins, Organizational Behaviour,
3. 7th ed., New Delhi: Prentice-Hall of India.
4. Singh, D. Emotional Intelligence at work, Response Books, New Delhi: Sage Publication.
5. Basham, A.L., The Wonder That Was India. Rupa & Co. New Delhi
6. Thapar, Romila , A History of India: Volume 1. Penguin Book, New Delhi,
7. Basham, A.L., A Cultural History of India. Oxford University Press, USA.
8. Singh, Upinder, .A History of Ancient and Early Medieval India: From the Stone Age To The 12Th Century, Pearson Education India, New Delhi.
9. Chandra, B., History of Modern India. Orient Blackswan, New Delhi
10. Brown, P., Indian Architecture (Buddhist and Hindu Period), Tobey Press, New York
11. Brown, P. , Indian Architecture (the Islamic Period), Palmer Press, New York
12. Allchin, B., Allchin, F.R. et al. Conservation of Indian Heritage, Cosmo Publishers, New Delhi.
13. New Inskip, Edward, Tourism Planning: An Integrated and Sustainable Development Approach ,VNR, New York.
14. Ashworth, G. J. The Tourist Historic City. Retrospect and Prospect of Managing the Heritage City, Pergamon, Oxford
15. UNESCO-IUCN Eds. Masterworks of Man and Nature, Pantoga, Australia.
16. T.C. Victor M, and H. Rebecca (1998) Sustainable Tourism- A Marketing Perspective, Routledge, U.K.
17. Salah Wahab and John J. Pigram (1997) Tourism, Development and Growth: The Challenge of Sustainability, Routledge, U.K.
18. Rao, P.K. (2000) Sustainable Development – Economics and Policy, Wiley-Blackwell, New Jersey

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20. Dixit, M (2001) Tourism Products, Royal Publishers, New Delhi
21. Hall, C.M. and Duval T (2003) Safety and Security in Tourism Relationship Management and Marketing, Victoria University, Australia.
22. Chand, M (2016) Opportunities and Challenges for Tourism and Hospitality in the Bric Nations, Information Science Reference, India
23. Singh, J (2010) Ecotourism, I.K. International Publishing House Pvt. Ltd, New Delhi
24. Chandra, P (2003) International Ecotourism; Environmental Rules & Regulations, Kanishka Publishers Distributors, New Delhi

PAPER NO. - GEO 404 (THEORY), SPECIAL PAPER (ELECTIVE MAJOR)

OPTION 4: REGIONAL PLANNING & URBAN GEOGRAPHY

Full Marks - 50 (End term Examination - **40** and Internal Assessment - **10**)

Pattern of setting questions:

Group- A (Long Answer Type): Four questions, each of 10 marks (Preferably divided into two parts), will be answered out of eight options to be set from all the units.

Learning Objectives:

This paper will show how to do a spatial analysis of rural and urban functions. The social and economic characteristics of cities and suburbs will be covered in this research. The environmental and ecological effects of urban land usage will be examined. The essentials of urban geography, such as city definitions, central place theory, and classic urban spatial structure models, will be covered in this module. Students will also learn about current urban topics such as global cities, urban sprawl, urban green space, urban environment, and footprints.

Course Specific Outcomes:

Understanding and recognizing regions is a crucial part of geography. Recognize the many aspects of development as well as geographical differences in order to design balanced development strategies. Students will gain understanding of rural and urban development as historic, geographic, social, and environmental impact of rural and urban related concerns through coverage to the disciplines of Geography and Planning.

Course Content:

1. Types of Urban Plans in India: Master Plan/Development Plan, Transportation Plan; Strategic Plan; City Development Plan, Local Area Plan
2. Impact of New Economic Policies on regional inequality in India; Location of new regional economic activities
3. Sustainable neighbourhoods, healthy urban communities; walkability
4. Cities' Future: New Town, Smart Growth, Urban Agriculture, Resilient City
5. Cities and social justice in contemporary India: The relevance of slum in Indian cities; Slum development policies in India; Eviction of Squatter Settlements and Resettlement Debate
6. Environment and Urbanization, Urban Heat Island (UHI), Green City, Urban Livability
7. Metropolitan problems and issues: environment, transport, land, water, Solid and liquid waste

8. Metropolitan Planning in West Bengal: Kolkata, Asansol, Siliguri; metropolitan governance

Reference

1. Gallion, A. B. & Simon, E. (1969). *The Urban Pattern*, Van Nostrand Reinhold Co., Affiliated East-West Press Pvt. Ltd., New Delh.
2. Hall, P. (1992). *Urban and Regional Planning*, Routledge, London.
3. Hall, P. & Tewdwr, J.M. (2010). *Urban and Regional Planning*, Routledge, London and New York.
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8. Meyor, H. M., Kohn, C. F. (1955) *Readings in Urban Geography*, University of Chicago Press, Chicago, 1955.
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10. Ramchandran, R. (1992). *Urbanization & Urban Systems in India*, Oxford University Press, Delhi, 1992
11. Rao, V.L.S.P.(1995). *Urbanisation in India: Spatial Dimensions*, Concept Publishing Co., New Delhi.
12. Stiftel, B. & Watson, V. (2005). *Dialogues in Urban and Regional Planning*, Psychology Press
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14. Wong, C. (2006). *Indicators for Urban and Regional Planning: The Interplay of Policy and Methods*, Routledge

PAPER NO. - GEO 495 (PRACTICAL), SPECIAL PAPER (ELECTIVE MAJOR)

OPTION 1: ADVANCED GEOMORPHOLOGY

Full Marks - 50 (End term Examination - **40** and Internal Assessment - **10**)

Pattern of setting questions:

Group- A (Long Answer Type): Four questions, each of 10 marks (Preferably divided into two parts), will be answered out of eight options to be set from all the units.

Learning Objectives:

This course aims to train the learner on the essential quantitative techniques and tools. They will be given hands-on training on estimation of river discharge, stream power and associated hydraulic parameters. They will learn to analyse linear, areal and relief aspects of a river basin as well as the plan-form of a river channel. They will learn to run the SCS-CN model for estimating runoff tendency of a river basin and also to prepare varied forms of hydrograph to analyse flood potentiality and runoff efficiency. They will develop their skill in application of geospatial tools for flood and coastal erosion hazard zonation mapping; Landslide hazard zonation mapping using weighted overlay and AHP model and also identification of bank erosion vulnerable zones through estimating BEHI parameters.

Course Specific outcome:

After completion of this course learners will develop their skill on essential quantitative techniques and tools. They will be able to estimate river discharge, stream power and associated hydraulic parameters. They will develop their skill of landscape analysis by investigating the linear, areal and relief aspects of a river basin as well as the plan-form of a river channel. They will be able to run various models like SCS-CN model for estimating runoff tendency of a river basin, BEHI model for identification of bank erosion vulnerable zones. They will be able to analyse flood potentiality and runoff efficiency through preparing and analysing hydrograph. Learners will build up ability of flood and coastal erosion hazard zonation mapping, landslide hazard zonation etc. through application of geospatial techniques.

Course Contents:

1. Measurement and Quantitative Analysis of Linear, Areal and Relief Properties of Drainage Basin; Stream Ordering (Horton and Strahler); Bifurcation Ratio, Law of Stream Number and Length, Stream Frequency and Drainage Density
2. Estimation of flow velocities and discharge; stream power, stream hydraulic parameters-critical flow, Froude number, and Reynolds number
3. Estimation of surface run-off using SCS-CN method, flood probability analysis after Weibull and Gumbel
4. Preparation of Hydrograph, Unit Hydrograph and Rating Curve

5. Channel cross profile, width-depth ratio, channel thalweg, maximum depth and velocity; depth-velocity profile.
6. Estimation of channel morphology-braiding index, sinuosity, radii of curvature, arc angle, meander wavelength; channel bed forms.
7. Application of Geospatial tools Flood and coastal erosion hazard zonation mapping; Landslide hazard zonation mapping using weighted overlay and AHP model
8. Estimation of BEHI parameters- and identification of bank erosion vulnerable zones

References:

1. Aleshire, A. (2007): *The Extreme Earth: Ocean Ridges and Trenches*, Infobase Publishing, New York
2. Anderson, R.S. and Anderson, S.P. (2010): *Geomorphology: The Mechanics and Chemistry of Landscapes*, Cambridge University Press, Cambridge
3. Bloom, A.L. (2002): *Geomorphology: A Systematic Analysis of Late Cenozoic Landforms*, Prentice Hall, Upper Saddle River, New Jersey
4. Chorley, R.J. and Kennedy, B.A. (1971): *Physical Geography: A Systems Approach*, Prentice Hall, Upper Saddle River, New Jersey
5. Condie, K.C. (2003): *Plate Tectonics and Crustal Evolution*, Butterworth-Heinemann, Oxford, Burlington
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10. Goudie, A.S. (ed.) (2004): *Encyclopaedia of Geomorphology*, Routledge, London
11. Goudie, A.S. and Viles, H. (2010): *Landscapes and Geomorphology: A Very Short Introduction*, Oxford University Press, Oxford
12. Gutierrez, M. (2013): *Geomorphology*, CRC Press, Boca Ranton, Florida
13. Hamblin, W.K. and Christiansen, E. (2003): *Earth's Dynamic Systems*, Prentice Hall, Upper Saddle River, New Jersey
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15. Huggett, R.J. (2011): *Fundamentals of Geomorphology*, Routledge, New York
16. Kale, V.S. and Gupta, A. (2001): *Introduction to Geomorphology*, Orient Longman, Kolkata
17. Keary, P. and Vine, M. (1997): *Global Tectonics*, Blackwell Scientific Publications, Oxford
18. Leopold, L. B., Wolman, M. G. and Miller, J. P. (1964): *Fluvial Processes in Geomorphology*, W.H. Freeman, San Francisco
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20. Richards, K. (1982): *Rivers: Form and processes in alluvial channels*, Methuen, London

21. Schumm, S.A. (1977): *Fluvial Systems*, Wiley, New York
22. Selby, M.J. (1985): *Earth's Changing Surface: An Introduction to Geomorphology*, Clarendon Press, Oxford
23. Small, R.J. (1978): *The Study of Landforms: A Textbook of Geomorphology*, Cambridge University Press, Cambridge 2
24. Sparks, B.W. (1972): *Geomorphology*, Longman, London
25. Summerfield, M.A. (1991): *Global Geomorphology: An Introduction to the Study of Landforms*, Longman, London
26. Summerfield, M.A. (ed.) (2000): *Geomorphology and Global Tectonics*, Wiley, Chichester
27. Thomas, M.F. (1994): *Geomorphology in the Tropics: A study of weathering and denudation in low latitudes*, John Wiley & Sons, Chichester
28. Thorn, C. (1988): *Introduction to Theoretical Geomorphology*, Unwin Hyman, Boston
29. Thornbury, W. D. (1960): *Principles of Geomorphology*, John Wiley & Sons, New York
30. Young, A. (1972): *Slopes*, Oliver and Boyd, Edinburgh.

PAPER NO. – GEO 495 (PRACTICAL), SPECIAL PAPER (ELECTIVE MAJOR)

OPTION 2: APPLIED AGRICULTURAL GEOGRAPHY

Pattern of setting questions:

Long Answer Type: Four questions, each of **10 marks (Preferably divided into two parts)**, will be answered out of eight options to be set from all the units.

Full Marks – 50 (End term Examination – 40 and Internal Assessment – 10)

Course Objectives:

This paper will train the learners on preparation of landuse map with the application of geospatial technology. They will be able to map crop diversity from remote sensing data and also to prepare crop combination maps. They will boost their technical skill in calculating Agricultural productivity index following state-of-art techniques.

Course Specific outcome:

After completion of this course learners will boost their ability to handle spatial data on agriculture for preparing different useful maps. They will enhance their capacity of spatial analysis of agricultural systems. Various laboratory-based techniques of soil analysis will enhance their learning experience. After completion of this course they will take part in modern agriculture in their locality and also can be absorbed as agricultural expert.

Course Content:

1. Identification of Lands and Soils: Mapping of LULC based on cadastral map, Identify agricultural land and fallow land from Google earth image
2. Mapping of crop diversity using remote sensing data
3. Soils testing: Methods of Soils collection, Estimation of chemical properties of soil: N, P, K, P^H, EC, and OC with the help of soils kit.
4. Measurement of Physical properties of Soils: Mapping of soils profile, soils layer, soils texture, structure with help of suitable techniques
5. Construction of Ternary diagram and interpretation
6. Crop combination and crop diversification mapping
7. Agricultural productivity index: Shafi; Singh and Dhillon
8. Micro farms for Sustainable Economic growths: Greenhouse, Nursery Hubs, Roof Garden, Mushroom Hubs, Bio-compost

Reference Books:

1. Basu, D.N., and Guha, G.S., 1996: Agro-Climatic Regional Planning in India, Vol.I & II, Concept Publication, New Delhi.
2. Bryant, C.R., Johnston, T.R., 1992: Agriculture in the City Countryside, Belhaven Press, London.
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PAPER NO. - GEO 495 (PRACTICAL), SPECIAL PAPER (ELECTIVE MAJOR)

OPTION 3: TOURISM GEOGRAPHY

Intensive Field Study, Project Report and Viva –Voce

Learning Objectives:

Major objectives of this course to enhance the technical skills of the learners on various mapping techniques and ability to handle large data set using sophisticated computer technique. They will find interest in technique for tourism potentiality analysis, SWOT analysis, AHP analysis. They will prepare maps of tourism sites in national and regional scale. They will be trained to prepare tourist area life cycle model and modelling tourism destination.

Course Specific outcome:

After completion of this course learners will enhance their technical skills to handle large data set using sophisticated computer technique and various mapping techniques. They will be able in tourism potentiality analysis, SWOT analysis, AHP analysis and preparing tourist area life cycle model and modelling tourism destination. They can participate in tourism management and thus boost employability.

Course Content:

1. Indexing the Global and National Tourism Scenario from UNWTO and IBEF dataset
2. Designing of questionnaires for tourism Importance – Performance (IP) analysis
3. Delphi technique for tourism potentiality analysis (Tourism Destination Resource and attractors, Tourism Destination Strategies and Tourism Destination Environs)
4. MCDM approach in tourism: AHP & FUZZY AHP approach, SWOT analysis
5. Mapping Geoheritage and Geomorphosite Tourism from West Bengal/ India
6. Modelling Tourism Destination, Tourist Area Life Cycle Model, Irritation Index Model
7. Geographical Weighted Regression model in tourism studies
8. Tourism growth and Environmental Impact Assessment – Case Studies from Mandarmani/ Digha/ Sundarban/ Darjeeling/ Dooars/ Jangal Mahal

Reference

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PAPER NO. - GEO 495 (PRACTICAL), SPECIAL PAPER (ELECTIVE MAJOR)

OPTION 4: REGIONAL PLANNING AND URBAN GEOGRAPHY

Learning Objectives:

For resource planning and decision-making, Geoinformatics has evolved as a vital technology for the collection, storage, and analysis of spatially referenced data. It now serves as the cornerstone for many decision – making systems and location-based services in the New Information Economy. Planners are decision-makers who employ geospatial technologies in a variety of fields such as forestry, mining, water resources, environmental research, and infrastructure

Course Specific Outcomes:

Students will be able to assess regional development challenges and backwardness. In Urban Geography, students will be able to comprehend new concepts, objectives, theories, policies, and practices. When it comes to Metropolitan Regions, students will be able to recognise a variety of approaches to urban geography.

Course Content:

1. Mapping of Hierarchy of Settlement and Development Perspectives
2. Measurement of Inequality by Lorenz Curve, Concentration by Location Quotient, coefficient of localization
3. Nearest Neighbour Mapping, Spatial Gradient Analysis
4. Network Analysis (Cyclomatic Number, Alpha, Beta, Gamma and Eta Indices)
5. Rank-Size Rule, Size-Class Distribution of Urban Centres
6. Mapping of sphere of influence of Urban Centres
7. Urban Sustainability Analysis (Using NITI Aayog approach)
8. City Planning Interactive Mapping using Web-GIS

Reference

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PAPER NO. - GEO 406 (DISSERTATION)

(Report Writing + Viva Voce Including Presentation+ Internal Assessment) (25+15+10) (Internal assessment will be done by the supervisor based on level of involvement of the student and research aptitude developed)

Major Guidelines

- 1. Dissertation project will be prepared by the students through individual effort under the guidance of teachers within the department. No external teacher will guide the dissertations.**
- 2. Students will be distributed among the faculties according to the distribution of special paper.**
- 3. Dissertation topics should be geographically relevant: may be problem oriented or theoretical and review based.**
- 4. Entire work will be focused on suitably stated research problem/(s).**
- 5. Report should not exceed 75 pages (including maps, diagrams and plates) and should be arranged under following Sub-heads: Introduction; Relevance of the work; Objectives, Materials and Methods; Results and Discussions, Conclusion, References / Bibliography and Appendices (if any).**
- 6. Report should be duly endorsed by the Supervisor(s) with a declaration that *‘the report is original in nature and is not submitted fully or partially elsewhere for any degree’.***
- 7. Emphasis will be given on**
 - a. Literature review and finding research gap
 - b. Formulating specific objectives
 - c. Selection of methods to address the selected objectives (Objective based methods)
 - d. Emphasis on the collection of primary data using appropriate techniques along with supplementary secondary data collected from reliable source(s).
 - e. Analysis of Collected data using statistical methods (preferably advanced statistical methods learnt in the earlier courses) and will be represented through suitable cartograms and standard maps (preferably using GIS). Entire analysis will aim to understand the interrelationship among different geographical attributes with special reference to man-nature relationship.