Aliah University

Syllabus for

2-Year M.A./M.Sc.

(Applicable from: 2021-22)

Department of Geography
Aliah University
(Park Circus Campus)
17, Gora Chand Road, Kolkata – 700 014
www.aliah.ac.in

A. Programme Outcome

On completion of the advanced levels of programme in Arts and Humanities the learners must:

1. Develop and upgrade the learners' rationality and aptitude and enhance qualifications for work that sets high standards of analytical power for scientific competence and reasoning.
2. Enhance knowledge and skill by acquiring deep insight into and be able to assess the appropriateness and application of concepts, theories and methods
3. Be able to communicate the role of their specialization from a holistic and coherent way with broader perspectives,
4. Be able make themselves suitable for the employment in different fields,
5. Be able to conduct their studies and researches in accordance with recognized ethical standards for research,
6. Be able to identify and critically evaluate relevant techno-ethical issues within their specialization,
7. Be able to disseminate research through recognized national and international channels such as research journals, other periodicals and books etc.,
8. Be able to lead research projects within specified limits and participate constructively in more complex interdisciplinary research projects,
9. Develop competence to give input in the policy making process, and
10. Acquire skill and competence to make ready for the contemporary job market.

B. Programme Specific Outcome

1. The PG Programme in Geography will help learners to acquire knowledge in regional science with thorough understanding of spatial characteristics of geographic characteristics.
2. The learners are trained to acquire sufficient knowledge in geospatial analysis techniques, equipped with cartography, geoinformatics and quantitative techniques etc.
3. Handling quantitative data pertaining to demography, meteorology, hydro-geomorphological, environment, health and wellbeing and meaningful analysis and portray of data are the expertise that learners acquire during completion of the programme.
4. Communicate research effectively to other experts and the general to make long lasting mark in terms of contribution.
5. Systematically and analytically acquire and communicate new knowledge to advance the society and solve new and upcoming problems.
6. Independently assess and reflect upon the methodological, ethical and practical challenges of research and make way to solve the problems to make advancement.
7. Initiate and provide constructive input to professional development activities in the field of spatial science.
8. Independently design and conduct focused research projects to suite the need of the society.
9. The learner having completed this programme will be a responsible individual of the society and a better citizen of the country with knowledge of resource management,

environmental and climate change, gender issues and understanding inequality in the society.

10. The job prospect of the students is this programme is quite good in the field of Census, Meteorology, Forest, Agriculture, Urban Development, City and Country Planning etc. apart from administrative, teaching and research jobs.

Detailed Course Structure with Credit Distribution

Semester I

Course Name	Course Type	Course Code	L-T-P	Course Credit	Marks
Philosophy of Geography	Core Course- I	GEOPGCCT01	3+1+0	4	50
Geomorphology	Core Course- II	GEOPGCCT02	3+1+0	4	50
Climatology	Core Course- III	GEOPGCCT03	3+1+0	4	50
Economic Geography	Core Course- IV	GEOPGCCT04	3+1+0	4	50
Quantitative Methods in Geography	Core Course- V	GEOPGCCP01	0+1+3	4	50
Elementary Arabic and Islamic Studies	Aliah University Compulsory Course	PGAUC01		Non-Credit	-
Total				**20**	250

Semester II

Course Name	Course Type	Course Code	L-T-P	Course Credit	Marks
Hydrology and Oceanography	Core Course-VI	GEOPGCCT05	3+1+0	4	50
Geography of Pedosphere and Biosphere	Core Course-VII	GEOPGCCT06	3+1+0	4	50
Social and Well-Being Geography	Core Course-VIII	GEOPGCCT07	3+1+0	4	50
Demography and Ekistics	Core Course-IX	GEOPGCCT08	3+1+0	4	50
Cartography	Core Course-X	GEOPGCCP02	0+1+3	4	50
Disaster Management/Human Rights & Value Education/ Yoga & Life Skills (Any one of the above)	Ability Enhancement Compulsory Course	PGAEC01		Non-Credit	-
Total				**20**	250

Semester III

Course Name	Course Type	Paper code	L-T-P	Course Credit	Marks
Historical and Political Geography	Core Course-XI	GEOPGCCT09	3+1+0	4	50
Geoinformatics	Core Course-XII	GEOPGCCP03	0+1+3	4	50
Advanced Geomorphology- I	Discipline Specific Elective – I (Opt. any one)	GEOPGDET01	3+1+0	4	50
Urban and Regional Planning- I		GEOPGDET02	3+1+0		
Population Geography- I		GEOPGDET03	3+1+0		
Agriculture and Rural Development-I		GEOPGDET04	3+1+0		
Field Work Methodology in Advanced Geomorphology	Discipline Specific Elective – II (Opt. one as per the DSC -I)	GEOPGDEP01	0+1+3	4	50
Field Work Methodology in Urban and Regional Planning		GEOPGDEP02	0+1+3		
Field Work Methodology in Population Geography		GEOPGDEP03	0+1+3		
Field Work Methodology in Agriculture and Rural Development		GEOPGDEP04	0+1+3		
Principles of Physical Geography	General Elective Course (GEC)	GEOPGGEC01	3+1+0	4	50
Total				20	250

Semester IV

Course Name	Course Type	Paper code	L-T-P	Course Credit	Marks
India: Regional Problems and Development Issues	Core Course-XIII	GEOPGCCT10	3+1+0	4	50
Advanced Geomorphology-II	Discipline Specific Elective – III	GEOPGDET05	3+1+0	4	50
Urban and Regional Planning- II		GEOPGDET06	3+1+0		
Population Geography- II		GEOPGDET07	3+1+0		
Agriculture and Rural Development- II		GEOPGDET08	3+1+0		
Advanced Geomorphology-III	Discipline Specific Elective – IV (as opted in Semester III)	GEOPGDEP05	0+1+3	4	50
Urban and Regional Planning- III		GEOPGDEP06	0+1+3		
Population Geography- III		GEOPGDEP07	0+1+3		
Agriculture and Rural Development- III		GEOPGDEP08	0+1+3		
Project and Dissertation	Discipline Specific Elective – V (as opted in Semester III)	GEOPGPRJ01	0+1+3	4	50
Principles of Human Geography	General Elective Course (GEC)	GEOPGGEC02	3+1+0	4	50
Total				20	250

Summary of syllabus:

Attribute	Core Course (T+P)	DSE Course (T+P)	GE Course	Total	Remark
Number of courses	13	5	2	20	
Credit allotted	13*4= 52	5*4=20	2*4=8	80	
Marks allotted	13*50=650	5*50=250	2*50=100	1000	
Non-credit course				2	

Detailed Course Syllabus

Course Name: **Philosophy of Geography**
Course Code: **GEOPGCCT01**
L+T+P: 3+1+0 per week

Course Outcome:

By the time students complete this course they will be able to:

1. Develop an idea about the evolution of Geography as a distinct discipline
2. Understand the concept on philosophical and methodological issues in the development of the discipline of geography
3. Critically examine the contemporary issues in the field of Geography
4. Understand the process of paradigm shift in the approaches to study geography
5. Elucidate the recent trends in Geography

Unit 1: Nature of Geography

1.1. Classification of knowledge and the place of Geography; Evolution of Geography as a scientific discipline; Models in Geography
1.2. Geography as science of relationships and distributions; Chorological versus Chronological Principles
1.3. Concepts of Space and Place; Changing trajectories: Geometric Space, Material space, Social Space
1.4. Evolution of spatiality and spatial integration in Geography

Unit 2: Evolution of Geographical Thought

2.1 Geography in the 20th century-I (1900-1950): prior to post Geographies: Neo-determinism; Locational and Ecological School
2.2 Geography in the 20th century-I (1950-2000): regional differentiation and spatial organization; Quantitative Revolution, Positivism, Structuralism and Orientalism
2.3 Emergence of Critical Geography: Behavioral-Humanistic, and Post-Structuralism,
2.4 Radical and Welfare Geography

Unit 3: Contemporary Issues in Geography

3.1. Landscape morphology and Landscape Ecology
3.2. Cultural turn and its impact: Revival of Cultural Geography
3.3. Geography of Inequality
3.4. Feminist and Gender Geography

Unit 4: Recent Trends in Geography

4.1. Critique of Modernism; Post-Modernism in Geography
4.2. Neo-Imperialism and Neo-Colonialism in Geography
4.3. Geography of Power and uneven development
4.4. Commodification of Nature as an environmental principle

Suggested Readings

1. Abler, R., Adams, J.S. and Gould, P.: Spatial Organization – The Geographer's View of the World, Englewood Cliffs, Prentice Hall, New Jersery, 1971
2. Adhikary, S.: Fundamentals of Geographical Thought, Chaitanya Publishing House, Allahabad, 1999 Ali, S.M.: The Geography of Puranas, Peoples Publishing House, New Delhi, 1966
3. Amedeo, D.: An Introduction to Scientific Reasoning in Geography, John Wiley, USA, 1971
4. Dikshit, R.D. (ed.): The Art and Science of Geography: Selected Readings, Prentice Hall India Ltd., New Delhi, 1994 Hartshore, R.: Perspectives on Nature of Geography, Rand Mcnally & Co., 1959
5. Harvey, D.: Explanations in Geography, Edward Arnold, London, 1969
6. Hussain, M.: Evolution of Geographical thought, 3rd edition, Rawat Publications Co., New Delhi, 1995 Johnston, R.J.: Philosophy and Human Geography, Edward Arnold, London, 1983
7. Johnston, R.J.: The Future of Geography, Methuen, London, 1988
8. Minshull, R.: The Changing Nature of Geography, Hutchinson University Library, London, 1970 Taylor, G. (ed.): Geography in the Twentieth Century, New York, 195
9. Peet Richard: Modern Geographical Thought

Course Name: **Geomorphology**
Course Code: **GEOPGCCT02**
L+T+P: 3+1+0 per week

Course Outcome:

By the time students complete this course they will be able to:

1. Develop a critical outlook on how landforms originate, develop and changes with time. The beautiful merging of the pure and applied geomophology in this paper will help the students comprehending the interdisciplinary holistic nature of the subject.
2. Grasp the knowledge of system approach in geomorphology
3. Develop an understanding on tectonic geomorphology and quaternary evolution of landforms
4. Gain basic knowledge of geochronology and dating techniques
5. Apply the principles of sediment budgeting to comprehend delta building processes
6. Comprehend river metamorphosis in the light of palaeo-flood studies
7. To understand glacial retreat and estuarine morph- dynamics in the Anthropocene
8. Integrate the understanding of pure geomorphology to the regional planning and development
9. Find some opportunities both in the private and government sectors including the positions of geomorphologist, landscape planner, and environmental monitoring analyst. This course will also help to the fields of river basin management and EIA.

Unit 1: Concepts

1.1 Systems approach in Geomorphology: Feedback mechanisms, Equilibrium, Geomorphic thresholds, Landscape sensitivity

1.2 Tectonic Geomorphology: Principles, Geomorphic markers, Methods of measuring rates of landscape uplift and erosion

1.3 Linkages between Quaternary climate change, tectonics and landscape evolution; Impacts/signatures of past glacial advances and sea level changes

1.4 Geochronology: Concepts related to absolute and relative dating of landscapes and events; Dendrochrological methods and applications

Unit 2: Fluvial Process in Geomorphology

2.1 Runoff generation and channel initiation models; Sediment budgets: Hillslope-channel connectivity and sediment delivery factors and mechanisms; Mean sediment residence time

2.2 River metamorphosis: Concepts, mechanisms and planform changes; Geomorphology of large floods and palaeo flood studies

2.3 Large River Deltas: evolutionary models, sediment facies and delta architecture; depositional dynamics and relations with offshore morphology; Case study of GBM delta

2.4 Case studies of basin morphology and discharge-sediment regimes- (a) Brahmaputra (b) Kosi, and (c) Narmada

Unit 3: Other Geomorphic Processes

3.1 Geochemical processes: Methods of rock transformation and determination of weathering rates; Regolith geomorphology; Laterite formation: profile development and distribution

3.2 Mountain Geomorphology: uplift and erosion rates in Tertiary Fold Mountains, Mass movement processes in mountains; Glacial retreat and GLOFs, Himalayan case studies

3.3 Tors and inselberges: Formation processes and theories; Planation surfaces: development, tectonic deformation and palaeoclimate imprints

3.4 Estuarine environments and morphodynamics: tidal creeks, mudflats, salt marshes and lagoons, Water mixing and sediment flux; Estuarine habitats and mangrove development: climatic and regional controls

Unit 4: Applied Geomorphology

4.1 Principles of Applied Geomorphology; Classification of anthropogenic landforms; Critical Zone Processes and case studies

4.2 Principles of River Restoration: hard and soft techniques; Riparian quality and stream health evaluation frameworks; Riverbank erosion: factors, mechanisms and mitigation

4.3 Urban Geomorphology: runoff and channelisation concepts, geotechnical engineering principles; urban weathering

4.4 Geodiversity and Geoheritage: Concepts and measurements, Geoconservation and Geotourism Principles; Terrain Analysis methods and EIA

Suggested Readings:

1. Bloom, A.L. 1992: *Geomorphology- Systematic Analysis*, Prentice Hall India, New Delhi. Chorley, R.J., Schumm, S. A. and Sugden, D.E. 1984: *Geomorphology*, Methuen, London. Cooke, R.U. and Warren, 1973: *Geomorphology in Deserts*, Batsford, London.
2. Dayal, P. 1996: Textbook of Geomorphology, Shukla Book Depot, Patna.
3. Kale, V. and Gupta, A. 2001*: Introduction to Geomorphology*, Orient Longman, Kolkata. Morisowa, M. 1968: *Streams, their Dynamics and Morphology*, McGraw Hill, New York. Ollier, C.D. 1975: *Weathering*, Longman, London
4. Selby, M. J. 1991: *Earth's Changing Surface*, Clarendon Press, London
5. Small, R.J. 1978: *The Study of Landforms*, Cambridge University Press, Cambridge
6. Strahler, A.N. and Strahler, A.H. 1984: *Elements of Physical Geography*, John Wiley, New York. Sing. S 2005: *Physical Geography*, Prayag Pub. Allahabad.
7. Singh. S 2004: *Geomorphology*, Prayag Pub. Allahabad
8. Summerfield, M.A. 1992: *Global tectonics and Landforms* Tikkha, R. N. 2002: *Physical geography*
9. Thornbury, W.D. 1954: *Principles of Geomorphology*, John Wiley, New York.
10. Wooldridge, S.W. and Morgan, R.S. 1959: *The Physical basis of Geography- An Outline of Geomorphology*, Longman, London
11. Anderson, R.S. and Anderson, S.P. (2010): Geomorphology: The Mechanics and Chemistry of Landscapes, Cambridge University Press, Cambridge.
12. Bierman, P.R. and Montgomery, D.R. (2014): Key Concepts in Geomorphology, W.H. Freeman and Company Publishers, New York.
13. Bloom, A.L. (2002): Geomorphology: A Systematic Analysis of Late Cenozoic Landforms, Prentice Hall, Upper Saddle River, New Jersey

14. Bull, W.B. (1991): Geomorphic Responses to Climatic Change, Oxford University Press, New York.
15. Bull, W.B. (2007): Tectonic Geomorphology of Mountains: A New Approach to Paleoseismology, Blackwell Publishing Ltd., USA
16. Burbank, D.W. and Anderson, R.S. (2001): Tectonic Geomorphology, Blackwell Publishing, USA.
17. Frisch, W., Meschede, M. and Blakey, R.C. (2011): Plate Tectonics: Continental Drift and Mountain Building, Springer.
18. Fryirs, K.A. and Brierley, G.J. (2012): Geomorphic Analysis of River Systems: An Approach to Reading the Landscape, Wiley, New York.
19. Gregory, K.J. and Lewin, J. (2014): The Basics of Geomorphology: Key Concepts, Sage.
20. Gutierrez, M. (2013): Geomorphology, CRC Press, Boca Ranton, Florida.
21. Harvey, A. (2012): Introducing Geomorphology: A Guide to Landforms and Processes, Dunedin Academic Press.
22. Huggett, R.J. (2011): Fundamentals of Geomorphology, Routledge, New York
23. Gregory, K.J. and Goudie, A.S. (2011) The SAGE Handbook of Geomorphology. Sage, UK.
24. Butler, DR., Hupp, CR (2013.): Treatise on fluvial geomorphology. In: Shroder, J. (Editor in Chief), Wohl, E. (Ed.), Treatise on Geomorphology. Academic Press, San Diego, CA, vol. 12.
25. Gupta. A. (ed.) (2007): Large Rivers: Geomorphology and Management. John Wiley & Sons Ltd.
26. Boggs, S. Jr. (2006): Principles of Sedimentology and Stratigraphy, Prentice Hall, Upper Saddle River, New Jersey
27. Knighton, D. (1998): Fluvial Forms and Processes- A New Perspective, Routledge, London
28. Perry, C. and Taylor, K. (2007): Environmental Sedimentology, Blackwell Publishing, Oxford
29. Culver H.E. (2015): The Formation of Laterite. Palala Press
30. Jackson, NL. (2013): Estuaries. In: John F. Shroder (ed.) Treatise on Geomorphology, Vol 10, pp. 308-327. San Diego: Academic Press.
31. Kennish, M.J. (ed.) (2016): Encyclopedia of Estuaries. Springer, Dordrecht.
32. Wilson, J.P. and Gallant, J.C. (ed.) (2000): Terrain Analysis- Principles and Applications, Wiley, New York, pp. 479
33. Stoffel, M., Marston, R.A. (2013): Mountain and hillslope geomorphology: an introduction. In: Shroder, J. (editor in chief), Marston, R.A., Stoffel, M. (Eds.), Treatise on Geomorphology. Academic Press, San Diego, CA, vol.7
34. Bridge, J. and Demico, R. (2008): Earth Surface Processes, Landforms and Sediment Deposits, Cambridge University Press
35. Sear, D.A., Newson, M.D. and Thorne, C.R. (2003): Guidebook of Applied Fluvial Geomorphology, (Tech. Rep. FD1914), DEFRA, London

Course Name: **Climatology**
Course Code: **GEOPGCCT03**
L+T+P: 3+1+0 per week

Course Outcome:

By the time students complete this course they will be able to:

1. Critically analyse the interactions between the atmosphere and the surface (topography, vegetation, built structures), and apply this understanding in an environmental decision-making context.
2. Use different instruments to collect meteorological data for application to solve the problems related to meteorology.
3. Learn map science and art behind representation of climatic data.
4. Make visualization of climatic maps and charts and Synoptic charts for users.
5. May know policy making, better equipped with agro-meteorological, agro-irrigation and other uses.
6. Select and correctly reference literature to equip them for writing research reports.
7. Develop to handle projects of their own from designing to implementation.
8. Create an original piece of research on a self-selected topic, and communicate their results in oral and written formats.
9. Make them employable for the contemporary job markets in different government and private sectors.
10. With knowledge of weather and hydrological instruments the learners will have ample opportunities for the Department of Meteorology, Agriculture, Navigation and Aviation, Irrigation, Relief and Rehabilitation, Disaster Management and some other relevant departments.

Unit 1: Climate System

1.1. Scales in climatology: Micro, Meso and Macro; Atmospheric interactions with other environmental systems; Sources and management of climate data

1.2. Energy in the atmosphere: Heat transport, Radiation Laws, and energy balance

1.3. Atmospheric Moisture: Humidity, evaporation, condensation and precipitation-theories and forms; Adiabatic temperature change and atmospheric instability

1.4. Atmospheric circulation: Principles of atmospheric motions; Primary, Secondary and Tertiary circulations; General circulation in vertical and horizontal planes.

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Unit 2: Tropical Climates and Weather Hazards

2.1 Tropical circulations: Hadley and Walker circulations; El Nino, La Nina and ENSO phenomena

2.2 Tropical air mass; Effects of Convergence and divergence

2.3 The Asian Monsoon: Origin, characteristics, Importance, and prediction

2.4 Extreme weather phenomenon: Heat and cold waves, thunderstorm, tornado and cyclone-distribution, significance and forecasting

Unit 3: Climate Change

3.1 Theories of climate change; Prediction of future climates
3.2 Scientific evidences of climate change; Reconstruction of past climates
3.3 The climate cycle; Climate trends in the Holocene period
3.4 Recent trends of global climates: Implications and arguments

Unit 4: Applied Climatology

4.1 Techniques of weather forecasting with reference to the tropics: short, medium and long range
4.2 Climate and agriculture: Agro-climatology – Water budget and Crop Weather Calendar
4.3 Climate and settlements: Urban climatology – Urban Heat Island and Architecture
4.4 Climate and health: Bio-climatology – Human Comfort and morbidity

Suggested Readings

1. Barry, R.G. and Chorley R.J. 2009(9th edition). Atmosphere Weather and climate, Routledge.
2. Barret, E.C. 1974. Climatology from Satellites. Methuen London.
3. Critchfield, J.H. 1983(4th edition). General Climatology. Phi Learning Pub.
4. Davis, R.J.A. 1986. Oceanography-An Introduction of the Marine Environment. Win C. Brown, Lowa.
5. Griffiths, J.F. 1976. Applied climatology. Oxford press, New York.
6. Hobbs, J.E. 1996. Applied Climatology. Oxford University Press.
7. Huntington, E. and S.S. Visher. 1922. Climatic Changes. Yale University Press. 17
8. Hussain, T. and Tahir, M. 2012. Climatology. Jawahar, New Delhi.
9. Hussain, T. and Tahir, M. 2012. Oceanography. Jawahar, New Delhi.
10. Kings, C.A.M. 1969. An Introduction to Oceanography. McGraw, New York.
11. Lamb, H.H. 1991. Climate : Present, Past and Future. Vol.1&2. Routledge.
12. Lutgens, Frederic K. & Tarbuck, Edward J. (2010). The Atmosphere: An Introduction to Meteorology. New Jersey: Pearson Prentice Hall.
13. Oliver, John E. &Hidore, John J. (2003). Climatology: An Atmospheric Science. Delhi: Pearson Education.
14. Trewartha, G.T. and Horn, L.A., 1980(5th edition). Introduction to Climate, International Studies.
15. Trujillo, A.P., Thurnman, H.V. 2016. Essentials of Oceanography, Prentice Hall.
16. Trujillo, A.P., Thurnman, H.V. 2010(10th Edition). Introductory Oceanography. Prentice Hall.
17. Weyl, P.K. 1970. Oceanography-An Introduction of the Marine Environment, John Wiley and Sons, London.
18. Das, P. K. (2005): "Monsoons", National Book Trust, New Delhi.
19. Fein, J.S. and Stephens, P.N. (1987): "Monsoons", Wiley Interscience.
20. India Meteorological Department (2011): "Climatological Tables of Observatories in India", Government of India.
21. Indian Weather Reports, Official Web Site of India Meteorological Department (IMD), Pune (imdpune.gov.in)
22. Arthurn: Introductory Physical Geography, 4th Edition, John Wiley, Hoboken, 2006.

23. Arthurnm, Physical Geography: Science and System of Human Environment. 3rd Edition, John Wiley, Hoboken, 2005.
24. Lydolph, P.E.: The Climate of the Earth, Rowman NadAllanheld, Totowa, New Jersey, 1985.
25. Rumney, G.R.: Climatology and the World Climates, Macmillan, London, 1968.
26. Thompson R.D.: Applied Climatology - Principles & Practice, John Wiley, New York, 1997.
27. Ahrens, C. D. and Henson, R.: Meteorology Today: An Introduction to Weather, Climate and the Environment, 12th Edition, Cengage Learning, USA, 2018.
28. Schneider, S. H., Root, T. L., and Mastrandrea, M. D. (eds.): Encyclopedia of Climate and Weather, 2nd Edition, Oxford University Press, New York, 2011.
29. Lamb, H. H.: Climate, History and the Modern World, 2nd Edition, Routledge, New York, 1997.
30. Robinson, P. J. and Henderson- Sellers, A.: Contemporary climatology, 2nd edition, Pearson Education Ltd., Harlow, UK, 1999.
31. Rohli, R. V. and Vega, A. J.: Climatology, 4th Edition, Jones and Bartlett Learnings, Burlington, 2017.

Course Name: **Economic Geography**
Course Code: **GEOPGCCT04**
L+T+P: 3+1+0 per week

Course Outcome:

On completion of the course, students will be able to:

1. Understand the resource creating factors and problems of resource distribution, use and conservation.
2. Study the classification of economic activities, sectors of economy and ranking of world economies.
3. Understand the Ricardian Rent Theory and Von Thunen's model and their present day relevance.
4. Assess the technological innovations in agriculture and its environmental consequences with reference to Green Revolution, Bio-engineering and GM Seeds.
5. Evaluate the status of Agrarian Reforms and Agrarian Crisis in India.
6. Understand the classical theories of industrial location.
7. Analyse the characteristics of major industrial regions of India.
8. Understand the role of Liberalisation, Privatisation, and Globalisation in regional inequality.
9. Evaluate the impact of transport on economic development.
10. Know the significance of World Trade Organization, and regional blocks in international trade and significance of international trade on Indian economy.

Unit 1: Resource and Economy

1.1 Resource-creating factors: 'nature-man–culture' to Knowledge; Problems of Resource distribution, use and conservation
1.2 Concept and classification of economic activities; Sectors of Economy and ranking of World Economies
1.3 World System Theory and Its present-day relevance
1.4 Global energy crisis and importance of green energy in the present-day society.

Unit 2: Agricultural Economy

2.1 Agricultural Land Use: Ricardian Rent theory and Von Thunen's agricultural model with contemporary relevance
2.2 Technological innovations in agriculture and its environmental consequences (Green Revolution, Bio-engineering and GM Seeds)
2.3 Agrarian Reforms: Issues and Consequences
2.4 Agrarian Crisis in India.

Unit 3: Industrial Economy

3.1 Concept of Firm and Industry, Critics of classical theories of industrial location: Weber/Losch, Hoover/Isard and Pred/Smith
3.2 Characteristics of Major industrial regions of India. Spatial distribution of Petroleum and Mineral Oil, and cotton textile industry in India, Initial centralization and later decentralization of industries in India

3.3 Concept of Liberalisation, Privatisation and Globalisation; Impact of Globalization and Regional Inequality

3.4 Emerging industries in India with special reference to food processing industry and tourism industry, information technology industry.

Unit 4: Transport and Trade/Service Economy

4.1 Concept of distance, accessibility and connectivity; Comparative transport costs: Personalise and mass transit system

4.2 Models of Transport Development – Taaffe, Morill and Gould, Transport and Economic Development

4.3 New dimensions of trade and exchange and E-commerce

4.4 Institutions and Trade: World Trade Organization, Regional blocks in international trade; Significance of international trade on Indian economy.

Suggested Readings:

1. Aoyama, Y., Murphy, J., and Hanson, S. (2010): Key Concepts in Economic Geography, London: Sage Pub.
2. Bagchi-Sen S. and Smith H. L., (2006): Economic Geography: Past, Present and Future, Taylor and Francis.
3. Berry, B.J.L., Conklin, E.C. and Ray, M.D. (1976): The Geography of Economic Systems, Prentice Hall, New Jersey.
4. Bradford, M.G. and Kent, W.A. (1977): Human Geography, Theories and Applications, Oxford University Press, Oxford.
5. Coe, N., Kelly, P., and Yeung, H. (2007): Economic Geography: A Contemporary Introduction, London: John Wiley & Sons.
6. Fujita M., Krugman P. and Venebles A.J. (2001): The Spatial Economy: Cities, Regions and International Trade. MIT Press.
7. Gautam, A. (2015): Geography of Resources: Exploitation Conservation and Management. Sharda Pustak Bhawan.
8. Gautam, A. (2010): Advanced Economic Geography, Sharda Pustak Bhawan, Allahabad.
9. Guha, J .L. and Chattoraj, P.R.(1998): A New Approach to Economic Geography: A Study of Resources, 15th edition, World Press, Calcutta.
10. Hartshorne and Alexander (1988): Economic Geography, 3rd edition, Prentice- Hall India Ltd., New Delhi.
11. Husain, M. (2009): Systematic Agricultural Geography, Rawat Publications, Jaipur.
12. Khusro, A.M (1973): The Economics of Land Reform and Farm Size in India, MacMillan, Madras.
13. Leong, G.C. and Morgan, G.C. (1982): Human and Economic Geography, 2nd edition, Oxford University Press, Oxford.
14. Mamoria, C.B. (1996): Economic and Commercial Geography of India, Revised edition, Shivalal Aggarwala and Co., Agra.
15. Roy, P. (2009): Economic Geography: A Study of Resources, New Central Book Agency (P), Ltd., Kolkata.

Course Name: **Quantitative Methods in Geography**
Course Code: **GEOPGCCP01**
L+T+P: 0+1+3 per week

Course Outcome:

By the time students complete this course they will be able to:

1. The course will allow students to learn and develop skills in the use of quantitative methods and statistical techniques.
2. Collect, tabulate and analyses quantitative data independently.
3. Use quantitative data in the spatial context to identify spatial patterns explain geospatial features.
4. Use spatial data to solve geographical problems of distribution and its association with geographical features.
5. Use spatial data to build, test and validate spatial models, theories, hypothesis and law.
6. To learn to use statistical soft wares to analyse data for getting meaningful results.
7. Equiping learners for jobs in the govt and private establishments at administrative and managerial positions.
8. Mapping with data and correlating it with the geographical spatiality make learners equipped for employment NATMO and Census organization.
9. To make learners employable in the Census Organization of India, NSSO, NHFS, Social Backward and Social Development Department of state and national government.
10. The CSSO and similar organization such as Bureau of Statistics and Applied economics and Ministry of Statistics and planning employ such youths having skill to handle quantitative data.

Unit 1: Common Quantitative analysis in Geography

1.1 Measure of inequality and concentration: Gini-coefficient and Lorenz curve

1.2 Measures the spread: Nearest Neighbour Analysis; Use of Ternary diagram to identify Distinctive Functions-Ashok Mitra & Nelson's Method

1.3 Measuring Regional Concentration & Disparity: Location quotient, Sopher Index, Kundu-Rao Disparity Index, & Normalized Herfindahl Index

1.4 Measures of dispersion & of entropy: Williamson Index (WI), Theil's Index (TI), Hoover Coefficient (HC), & Coulter Coefficient (CC)

Unit 2: Methods of Quantitative Mapping

2.1 Mean centre of population and its shift; Concentration of population about mean centre; Median Centre

2.2 Cluster Analysis & Outlier Analysis: Hot spots, cold spots, & spatial outliers

2.3 Residual mapping: Crop combination analysis using Weaver & Rafiullah Methods, Crop Diversification using Bhatia's Method & Entropy Index

2.4 Population potential (Gravity Model); Accessibility Map (Distance/ Centrality Matrix/ MAT)

Unit 3: Parametric analysis for decision making

3.1 Pearson's product moment correlation and level of significance test

3.2 Linear and curvilinear Regression, Standard Error of Estimate

3.3 Trend analysis and its application- Exponential Curve and Quadratic trend
3.4 Analysis of Mean test: Z-test, T-test and ANOVA

Unit 4: Non-Parametric analysis for decision making and Sampling theory

4.1 Spearman's rank correlation
4.2 Chi-square test- Goodness of fit test, Independence test and Association test
4.3 Median test: Kruskal-Wallis test and Mann-Whitney test
4.4 Sampling techniques: Purposive, Random, Stratified and Multi-staged; Sampling distribution and Sampling distribution of means; Standard Error of Mean

Suggested Readings:

1. Burt, J.E., G.M. Barber and D.L. Rigby: Elementary Statistics for Geographers, Guilford Press, New York, 2009.
2. Clark, W.A.V. and P.L. Hosking: Statistical Methods for Geographers, Wiley, New York, 1986.
3. Cole, J.P. and King, C.A.M.: Quantitative Geography, John Wiley, London, 1968
4. David M. Smith: Patterns in Human Geography, Pengiun, Harmondsworth, 1975.
5. Ebdon, D.: Statistics in Geography, Blackwell Publishers, New York, 1985. 4. Elhance, D.N.: Fundamentals of Statistics, Kitab Mehal, Allahabad, 1976.
6. Gupta, C.B.: An Introduction to Statistical Methods, Ram Prasad and Sons, Agra, 1971.
7. Gupta, S. P.: Statistical Methods, Sultan Chand and Sons, 2014.
8. Haggett, P., Cliff, A.D. and Frey, A.: Location Methods, Vol. I and II, Edward Arnold, London, 1977
9. Hammond, R. and McCullagh, P.S.: Quantitative Techniques in Geography – An Introduction, Clarendan Press, Oxford, 1974
10. Hammond, R. and P. McCullagh: Quantitative Methods in Geography, Clarendon Press, Oxford, 1974.
11. Montello, D.R. and Sutton, P.C.: An Introduction to Scientific Research Methods In Geography, Sage Publication Inc., California, 2006.
12. Ott, R. Lyman and Michael Longnecker: An Introduction to Statistical Methods and Data Analysis, Brooks/Cole, USA, 2010.
13. Pal S. K.: Statistical Techniques - A Basic Approach to Geography, Tata McGraw Hill, New Delhi, 1982.
14. Peter Haggett, Andrew D. Cliff and Allan Frey: Locational Models, Vols. I and II, Arnold Heinemann, New Delhi, 1977.
15. Peter, J. Taylor: Quantitative Methods in Geography, Houghton Mifflin Company, Boston, 1977.
16. Rogerson, Peter. A.: Statistical Methods for Geography: A Student's Guide, Sage Publications, London, 2015.
17. Sarkar, Ashis: Quantitative Geography: Techniques and Presentations, Orient Blackswan, United States, 2013.
18. Yeats, M.: An Introduction to Quantitative Analysis in Human Geography, McGraw Hill, New York, 1974.

Course Name: **Hydrology and Oceanography**

Course Code: **GEOPGCCT05**
L+T+P: 3+1+0 per week

Course Outcome:

By the time students complete this course they will be able to:

1. Develops a holistic understanding of fundamentals of hydrology and oceanography and their applications to solve the real life problems. This study has a focus on sustainable development and development of the hydrosphere.
2. Understand hydrological system and water budgeting.
3. Identify the factors governing the hydrological system especially run-off, infiltration and groundwater movements.
4. Understand the application areas of hydrograph, and artificial rainmaking
5. Comprehend the integrated watershed management and rainwater harvesting.
6. Apply the principles of groundwater budgeting to solve the problems of groundwater fall
7. Monitoring groundwater quality and its sustainable management
8. Understand the distribution of ocean resources and its geopolitical issues
9. Identify the issues and challenges of sea level rise
10. Help the learners to find their positions in various hydrological institutes as hydrologist or resource manager, in oceanographic institute as physical oceanographer, marine biologists, and resource manager etc.

Unit 1: Fundamentals of Hydrology

1.1 Hydrological Systems; Hydrological Cycle: Components and Basin Approaches. Estimation of Water Balance
1.2 Drainage Basin as a hydrological unit: Linear, Relief and Areal Aspects of Drainage Basin. Runoff and infiltration: Components, controlling factors; Hoyt's run off Cycle
1.3 Hydrology of Lake water: Vertical stratification of lake water; lake heat budget; lake sediments
1.4 Sub-surface water: Factors, Processes and Darcy's Law related to ground water circulation and storages

Unit 2: Applied Hydrology

2.1 Hydrograph: Concept of Base flow and Storm flow separation from Annual Hydrograph; Unit Hydrograph
2.2 Modern Methods of estimating Precipitation, Evaporation, Evapotranspiration, Infiltration and Soil Moisture
2.3 Rain water harvesting: Traditional and modern methods
2.4 Water Management in Tropical Farmlands; Integrated Watershed Management; Agricultural strategies in drought prone areas; Modern irrigation techniques and related issues

Unit 3: Groundwater Hydrology

3.1 Ground water level: Assessment of GWL and piezometric level fluctuations, depletion of Groundwater and its consequences
3.2 Groundwater quality: Chemical and physical properties, water quality criteria, Water quality Index
3.3 Groundwater contamination: Municipal, Industrial and Agricultural sources of Contaminants, Monitoring ground water quality
3.4 Ground water management: Hydrological equilibrium, collection of data, groundwater budgeting, Groundwater pricing

Unit 4: Ocean Resources and Issues

4.1 Geo-political aspects of the Oceans, Strategic controls over the oceans for Trade and Military activities; UNCLOS
4.2 Ocean resources and their present trend of utilization: Organic and Inorganic; Classification of Marine Deposits
4.3 Implications of EEZ and CRZ for coastal management; Costal Regulation Zone, 2011 & 2018
4.4 Sea level change and marine pollution: Causes and consequences.

Suggested Readings:

1. Brooks, Kenneth N., et al. *Hydrology and the management of watersheds*. No. Ed. 3. Iowa State University Press, 2003.
2. C.Brown, Iowa, 1986 Duxbury, C.A. and Duxbury, B.: An Introduction to the World's Oceans, 2nd edition C. Brown, Iowa, 1996
3. Chow, Ven Te. "Handbook of applied hydrology: a compendium of water-resources technology." (1964).
4. Davie, Tim, and Nevil Wyndham Quinn. *Fundamentals of hydrology*. Routledge, 2019.
5. Davis, R.J.A.: Oceanography – An Introduction to the Marine Environment
6. Garrison, T.: Oceanography – An Introduction to Marine Science, Books / Cole, Pacific Grove, 2001
7. Gross, M.G.: Oceanography – A View of the Earth, Prentice Hall, Englewood Cliffs, New Jersey, 1987
8. Han, Dawei. *Concise hydrology*. Bookboon, 2010.
9. Hendriks, Martin. *Introduction to physical hydrology*. Oxford University Press, 2010.
10. King, C.A.M., Oceanography for Geographers, 1962
11. Reddy, P. Jaya Rami. *A text book of hydrology*. Firewall Media, 2005.
12. Rushton, Kenneth R. *Groundwater hydrology: conceptual and computational models*. John Wiley & Sons, 2004.
13. Sharma, R.C., The Oceans, Rajesh Publications, New Delhi, 1985
14. Sharp, James J., and Peter G. Sawden. *BASIC hydrology*. Elsevier, 2013.
15. Strahler, Arthur N. "Part II. Quantitative geomorphology of drainage basins and channel networks." *Handbook of Applied Hydrology: McGraw-Hill, New York* (1964): 4-39.
16. Te Chow, Ven. *Applied hydrology*. Tata McGraw-Hill Education, 2010.
17. Todd, David Keith, and Larry W. Mays. *Groundwater hydrology*. John Wiley & Sons, 2004.

Course Name: **Geography of Pedosphere and Biosphere**
Course Code: **GGEOPGCCT06**
L+T+P: 3+1+0 per week

Course Outcome:

On completion of the course, students are able to:

1. Understand the relationship among the Plant, Water and Soil.
2. Know different processes of Soil Formation including Laterisation, Podsolisation, Calcification, Salinization and Alkanization.
3. Study the concepts of Land and Land Use including Landscape Ecology.
4. Evaluate principles of Land Use Planning after Stamp, Lewis and Graham
5. Classify land after UK Land Classification System and USDA Land Classification System.
6. Understand Plant Ecology including Habitat Factors, Adaptation, Succession and Climax
7. Know the causes and consequences of deforestation including some conservation policies of forest conservation including Agro-forestry, Social Forestry and Participatory Management of Forest.
8. Critically assess the Darwin's Theory of evolution of species.
9. Learn distribution of animals in different Geological Periods of Palaeozoic, Mesozoic and Cainozoic.
10. Analyse the relevance of Sanctuaries, National Parks, Biosphere Reserves and Bio-diversity Hot Spots in India.

Unit 1: Soil Geography

1.1 Plant-Water-Soil Relationship; Concept of Soil Profile; Pedon and Polypedon
1.2 Processes of Soil Formation: Laterisation, Podsolisation, Calcification, Salinization and Alkanization
1.3 Soil Geomorphology: Soil Catena under different environmental conditions; Soil landform relationship- Dalrymple's nine-unit model
1.4 Soil Taxonomic classification

UNIT 2: Principles of Land use Planning

2.1 Concept of Land and Land Use; Concept of Landscape Ecology
2.2 Principles of Land Use Planning after Stamp, Lewis and Graham
2.3 Land Use Planning: Basic principles with special reference to Urban and Rural areas; Ecological impact of land reclamation
2.4 Land Classification System: UK and USDA

UNIT 3: Plant Geography

3.1 Plant Ecology: Habitat Factors; Adaptation, Succession and Climax; Concept of Plant Species, Family and Genera; Phyto-geographical Regions

3.2 Causes and consequences of deforestation; Forest conservation; Agro-forestry, Social Forestry and Participatory Management of Forest. Environmental Ethics and Deep Ecology
3.3 Biodiversity: Controlling factors and its depletion, Bio-piracy and significance of its conservation in humid tropics
3.4 Major phyto-geographical realms

UNIT 4: Zoo Geography

4.1 Evolution of Species: Critical Appreciation of Darwin's Theory
4.2 Distribution of animals in different Geological Periods: Palaeozoic, Mesozoic and Cainozoic changes
4.3 Terrestrial and Marine fauna; Dispersal and Migration of animals; Means and Barriers
4.4 Animal Ecology and Human Ecology; Wild Life Management; Relevance of Sanctuaries, National Parks, Biosphere Reserves and Bio-diversity Hot Spots in India

Suggested Readings:

1. Biswas, T.D. and Mukherjee, S.K.: *Textbook of Soil Science*, Tata-McGraw-Hill, 1987
2. Brady, N.C. and Weil, R.R.: *The Nature and Properties of Soil*, 11th edition, Longman, London, 1996
3. Chapman J.L. and Reiss, M.J.: *Ecology: Principles and Applications*, Cambridge University Press, Cambridge, 1993
4. Dash, M.C., 2001. *Fundamentals of Ecology*, 2nd edition, Tata McGraw-Hill, New Delhi, 2001
5. Dobson, A.P.: *Conservation and Biodiversity*, Scientific American Library, New York, 1996
6. Floth, H.D.: *Fundamentals of Soil Science*, 8th edition, John Wiley and Sons, New York, 1990
7. Kormondy, E.J.: *Concepts of Ecology*, 4th edition, Prentice-Hall, India, New Delhi, 1996
8. Myers, A.A. and Giller, P.S. (ed.): *Analytical Biogeography: An Integrated Approach to the Study of Animal and Plant Distributions*, Chapman and Hall, London, 1988
9. Odum, E.P.: *Ecology: Fundamentals of Ecology*, 3rd edition ;Nataraj Publishers, Dehradun, 1997
10. Odum, E.P.: *Ecology: The Link between the Natural and Social Sciences*: Oxford and IBH Publishing Co. Pvt. Ltd., 1997
11. Sharma. P.D.: *Ecology and Environment*, 7th edition, Rastogi Publications, Mirat, 1996
12. Simmons I.J: *Ecology of Natural Resource*.
13. Simmons, I. G.: *Biogeographical Processes*, George Alien and Unwin, London, 1980
14. Spellerberg, I.F and Sawyer, J.W.D.: *An Introduction to Applied Biogeography*, Cambridge University Press, Cambridge, 1999.

Course Name: **Social and Well-Being Geography**
Course Code: **GEOPGCCT07**
L+T+P: 3+1+0 per week

Course Outcome:

On completion of the course, students are able to:

1. Understand evolution of Indian urban society and rural society.
2. Assess Stratification and Occupational Divergence in urban society as well as Urban sprawl, New Urbanism and Gated Communities.
3. Study Racial groups along with biological divergence-blending-process of assimilation and behavioural and structural- acculturation.
4. Evaluate evolution of language, evolution of linguistic provinces, relevant issues, language as basis of nation and states and Linguistic division in India.
5. Recognize spatial pattern of major religions.
6. Study evolution of the Concept of Well-Being and the Emergence of Welfare Geography
7. Recognise the different indicators of economic and social Well-Being.
8. Understand health Care Systems (Public and Private) In India, Disparity in Healthcare Provision in India and Poverty and Health in India.
9. Assess the role of education in Human Resource Development
10. Find out the changes of education and Occupation, including the Employment and Un-Employment in India Education and Social Change.

Unit 1: Dynamics of societies

1.1 Industrial revolution and rise of urban society; Role of Technology and Network Society
1.2 Contemporary Indian Rural Society: Caste Hierarchy and Segregation
1.3 Urban Society: Stratification and Occupational Divergence; Urban sprawl and New Urbanism; Gated Communities
1.4 Residential Segregation; Patterns of Dominance-Dependence

Unit 2: Interaction of Human Societies-Socio-Cultural Identities- Patterns and Landscapes

2.1 Racial groups: biological divergence-blending-process of assimilation – behavioural and structural- acculturation
2.2 Evolution of language – diffusion over space – evolution of linguistic provinces –relevant issues – language as basis of nation and states- Linguistic division in India
2.3 Religion– contemporary dynamics – spatial pattern of major religions- Role of religion in the formation of nation-states
2.4 Ethnicity: Ethnic Diversity and Segregation; ethnic clusters; Shifting Ethnic Concentrations; Cultural Transformation

Unit 3: Concepts of Well-Being Geography

3.1 Definition and Scope; Nature and Approaches
3.2 Evolution of the Concept of Well-Being; Emergence of Welfare Geography
3.3 Economic Vs Social Indicators of Well-Being
3.4 Approaches to Well Being - Social, Human and Economic

Unit 4: Well-Being: Health and Education

4.1 Health and Social Wellbeing
4.2 Health Care Systems (Public and Private) In India; Disparity in Healthcare Provision in India; Poverty and Health in India
4.3 Education and Human Resource Development; Education and Enlarging Choices
4.4 Education and Occupational Changes, Employment and Un-Employment in India Education and Social Change

Suggested Readings:

1. Ahmed, A.: Social Geography, Rawat Publications, Jaipur
2. Gregory D. and Walford, R. (ed.): Horizons in Human Geography, Macmillan, London, 1988
3. Haddon, A.C.: The Races of Man and Their Distribution, New York, 1925
4. Hussain, M.: Human Geography, Rawat Pub. Co., New Delhi, 2009
5. Jackson, J.A.: Migration, University Press, Cambridge
6. Jones, H.R.: A Geography of Population, Progress Publishers, Moscow
7. Lowry, J.H.: World Population and Food Supply, Edward Arnold Publications, London
8. Kochhar, R.: The Vedic People – Their History and Geography, Orient Longman Ltd., New Delhi, 2000
9. Raw, M.: Understanding Human Geography: A Practical Approach, Bell and Hyman, London, 1986
10. Raza, M. and Ahmad, A.: An Atlas of Tribal India, Concept Publishing Co.: New Delhi, 1995
11. Rubenstein, J.M.: The Cultural Landscape, Prentice hall, London, 1983
12. Sill, D.L. (ed.): International Encyclopaedia of Social Sciences, Vol. 13, McMillan Company and Free Press, New York, 1968
13. Sopher, D.E.: The Geography of Religions, Prentice Hall Inc., New Jersey, 1967
14. Spencer, J.E. and Thomas, W.L.: Introducing Cultural Geography, John Wiley and Sons, New York
15. United Nations Development Programme: Human Development Report, Oxford University Press, Oxford, 2000

Course Name: **Demography and Ekistics**
Course Code: **GEOPGCCT08**
L+T+P: 3+1+0 per week

Course Outcome:

At the end of the Demography and Ekistics students will

1. Obtain information regarding various demographic and settlement issues.
2. Be able to gain knowledge related to many theories, models and laws of population. demography and settlement pertinent in the era of population explosion,
3. Know about various factors, effects on growth of population, demography and development of urban sectors and proximate determinants of fertility.
4. Learn some policies, programmes and schemes, and housing as well as habitat planning for better development settlement and built environment.
5. Learn the demographic profile and composition and spatial information related to settlements.
6. Study the various aspects of rural and urban development relevant to planning.

Unit 1: Dynamic Demography

1.1 Differentiating Population Geography and Demography; Demography and Politics; Trends and recent developments in Population Geography in India
1.2 Conventional and Nonconventional sources of population data - Census, NSS, NFHS, DLHS VRS, and CRS; NPR, NRC, UIDAI and Big data
1.3 Demographic Dynamics & Population Structure; Demographic Dividend – India and some selected countries (Japan, China, Korea)
1.4 Demography of difficult territories – enclave, frontier provinces, borderland and *charlands* (river island)

Unit 2: Theories of population

2.1 Theories of Population Growth: Ehlrich and Spencer
2.2 Theories of migration: Mobility Transition Theory of Zelinsky and Cumulative Causation Theory of migration by Massey
2.3 Epidemiology and Demographic Transition, Problem Ageing of population
2.4 Optimum Population Theory; Tragedy of Commons by Hardin

Unit 3: Rural Settlement

3.1 Histogenesis, Spatio-temporal Dimensions and Morphogenesis of Rural Settlement
3.2 Spatial and Ecological Approaches of Rural Settlement; Rural House Type; Rural Service Centres and Planning of Rural Settlement
3.3 Social segregation in rural areas; Cause of Rural Urban Nexus; Rural-Urban Dichotomy
3.4 Rural Morphology; Rural-Urban Continuum

Unit 4: Urban Settlement

4.1 Geography of urban settlement; Urbanization in India as multi-dimensional process; Industrial growth and urban expansion
4.2 City and its Physical Environment: Terrain, Climate, Hydrology and Green Belt
4.3 Urban hierarchy and urban morphology: Models of Burgess, Hoyt, Harris and Ullman
4.4 Functional classification of cities: Schemes of Harris, Nelson and McKenzie; contemporary changes in urban functions

Suggested Readings:

1. Barret, H.R.: Population Geography, Oxford & Boyd, Oxford, 1997.
2. Beaujeu Garnier, J.: Geography of Population, Longman, London, 1966.
3. Chandna, R.C.: Geography of Population (10th Edition) Kalyani Publishers, Ludhiana, 2016.
4. Clarke, J. I. (ed.): Geography of Population: Approaches & Applications, Pergamon Press, Oxford, 1984.
5. Demko, G.J. et. al: Population Geography: A Reader, McGraw Hill Books Co., New York, 2002.
6. Ghosh, B.N.: Fundamentals of Population Geography, Sterling Publication, 2005.
7. Hussain, M.: Population Geography, Rawat Publication, 2005.
8. Hussain, M.: Human Geography, Jaipur, Rawat Publication, 2006.
9. Jones, H.R.: A Population Geography, Harper and Row Publishers, London, 1990.
10. Maurya, S.D.: Population Geography, Pravalika Publication, Allahabad, 2018
11. Newbold, K. Bruce, Population Geography, Rawat Publications, 2017.
12. Quazi, S.A.: Population Geography, APH Publishing Corporation, 2012.
13. Trewartha, G.T.: The Less Developed Realm: A Geography of its Population, John Wiley & Sons, Inc., New York, 1972.
14. Trewartha, G.T.: The More Developed Realm: A Geography of its Population, Pergamon Press, New York, 1978.
15. Weeks, R. John: Population: An Introduction to Concepts and Issues, Wadsworth Thomson Learning, Toronto, Canada, 11th Edition, 2012.
16. Zelinsky, Wilbur: A Prologue to Population Geography, Prentice Hall, New Jersey, 1966.
17. Newbold, K.B.: Six Billion Plus: World Population in the Twenty-First Century, Rowman and Littlefield Publishers, Inc., Lanham, 2007.
18. www.prb.org
19. Boyle, P.: Population Geography: Migration and Inequalities in Mortality and Morbidity, Progress in Human Geography, Sage Publications, 2004, http:// phg.sagepub.com
20. Brooks, S.: The World Population Today (Ethnodemographic Processes), U.S.S.R. Academy of Sciences, Moscow, 1977.
21. Chandna, R.C.: Environmental Awareness, Kalyani Publishers, New Delhi, 1998.
22. Crook, Nigel: Principles of Population and Development, edited by Ian, M. Timacus, Oxford University Press, Oxford, 1997.
23. Hugo, G.: Population Geography Progress in Human Geography, Sage Publications, 2007.
24. Peters, L. Gary: Population Geography: Problem, Concepts and Prospects, Kendeall/Hent Publishing Company, 2008.
25. Premi, M.K.: India's Changing Population Profile, National Book Trust India, New Delhi, 2009.
26. Robinson. W.C.: Population & Development Planning, The Population Council, New York, 1976.
27. U.N.D.P.: Human Development Report, Oxford University Press, Oxford, 1997.
28. United Nations: World Population Situation in 1983, U.N. Publications, New York, 1984.
29. Wood, Robert: Theoretical Population Geography, Longman Inc., New York, 1982.
30. Woods, R.: Population Analysis in Geography, Longman, London, 1979.

Course Name: **Cartography**
Course Code: **GEOPGCCP02**
L+T+P: 0+1+3 per week

Course Outcome:

At the end of the Cartography students will -

1. Get hands on training to use different instruments to collect base level data for cartographic map production.
2. Learn scientific interpretation of maps and using map as medium of communication.
3. Learn map science and art behind design and production of maps.
4. Make visualize space and place for users in the language of cartographer.
5. Make policy makers better equipped with location, availability and accessibility resources on spatial scales.
6. Work in a collaborative setting with experience of work in the field.
7. Select and correctly reference literature to equip them for writing research reports.
8. Make the learners equipped to handle and manage spatial and network data for the global village.
9. Make them employable for the contemporary job markets needing knowledge of cartographic tools.
10. Develop to handle projects of their own from designing to implementation.

Unit 1: Fundamentals of Cartography

1.1 Maps and their significance; Classification of maps; Theory of communication; Elements of maps; Techniques of mapping: dot, choropleth, isopleths and diagrammatic; Principles of map designing

1.2 Compilation process- Generalization- Map Design, Symbolization: Map content, design and implementation- Pattern creation; feature attributes, point, line and area; Qualitative and Quantitative symbols

1.3 Thematic Mapping-Layout and Display-Map elements- typography and lettering; portraying land surface form and Cultural Elements

1.4 Web mapping: resources and mapping, spatial Visualization; cartography and spatial information policy

Unit 2: Coordinate System and Map Projection for base map

2.1 Map projections: Need, Classification, Choice and suitability of map projection

2.2 Selected Projections-I: – Conical (Two-standard Parallel), Polar Zenithal Gnomonic, Sinusoidal and Mollweide projection

2.3 Selected Projections-II: Polyconic, International, Mercator and UTM

2.4 Plane and spherical co-ordinates, UTM and UPS grid systems

Unit 3 Surveying and Leveling for mapping data collection

3.1 Traversing: Prismatic Compass and Theodolite Traversing

3.2 Leveling & Contouring: Dumpy level and Plane Table

3.3 Triangulation: Theodolite

3.4 Use of Total Station and Drone Survey

Unit 4 Modern digital devices as mapping aids

4.1 DGPS
4.2 GPS
4.3 Drone
4.4 Mobile

Suggested Readings:

1. Bolstad, P.: GIS Fundamentals: A First Text on Geographic Information Systems, Second Edition, White Bear Lake, MN: Eider Press, 2005.
2. Crampton, W. C.: Mapping : A Critical Introduction to Cartography and GIS, John Willy & Sons, New York, 2010.
3. Field, Kenneth, Cartography, Esri Press, 2018
4. Harvey, Francis: A Primer of GIS, Fundamental Geographic and Cartographic Concepts, The Guilford Press, 2008.
5. Heywood, I., Cornelius, S., and Carver, S.: An Introduction to Geographical Information Systems, Prentice Hall, 3rd Edition, 2006.
6. John Krygier and Denis Wood: Making Maps: A Visual Guide to Map Design for GIS, Guilford Publications, 2013.
7. Keates, J.S.: Cartographic Design and Production, Longman, London, 1998.
8. Misra, R.P. and Ramesh, A.: Fundamental of Cartography, Concept Publishing Company, New Delhi, 2014
9. Robinson, A.H. and Others: Elements of Cartography, John Wiley & Sons, New York, 6th Edition, 1992.
10. Sinha, M.M.P. & Bala, Seema: Advanced Cartography and Practical Geography, Rajesh Publication, New Delhi, 2021
11. Kavanagh, B. F. & Mastin, T B: Surveying Principles and Applications (9^{th} edition), Pearson, New York, 2006
12. Robert M. Groves, Floyd J. Fowler, Jr. Mick P. Couper, James M. Lepkowski, Eleanor Singer & Roger Tourangeau: Survey Methodology (2^{nd} edition), Wiley- John Wiley & Sons, Inc., Hoboken, New Jersey. Published simultaneously in Canada, 2009
13. Monkhouse, F.J.: Maps and Diagrams, Methuen and Co., London, 1994.
14. Raisz, Erwin: Principles of Cartography, McGraw Hill, New York, 1962.
15. Singh, R. L. and Singh, R.P.B.: Elements of Practical Geography, Kalyani Publishers, New Delhi, 2005.

Course Name: **Historical and Political Geography**
Course Code: **GEOPGCCT09**
L+T+P: 3+1+0 per week

Course Outcome:

By the time students complete this course they will be able to:

1. know the historical evolution, approaches, development, study material sources and evaluation of map of historical Geography.
2. they will be study about the development of historical geography of India during different era including ancient period, medieval Period, colonial Period and post-Colonial Period.
3. Political geography will explain to students with a comprehensive understanding of the concepts, theories, methods, principles and models of geographic thought appropriate for analysing politics and political relations.
4. It will provide the knowledge about political attributes that evolved with territorial structure and geographic influence like state, nation, boundary, elections, and Buffer States, Land-locked States, Enclave and Exclave
5. It will help to understand about theoretical models related to geopolitics and geo-strategy views of Mackinder, Spykman and Mahanand Cohen to know the changing perspectives of world power:
6. Students will learn about Politics of world resources like politics of water and petroleum resources at world level.
7. From India perspective, it will help to learn about changing Political Map, Geopolitics of the Indian Ocean and Geo-political Problems of Border States,
8. Students will learn the about Electoral Geography and Electoral System in context of India.

Unit 1: Concept and Source Materials

1.1. Nature, scope and content of Historical Geography; Different approaches to the study of Historical Geography: old and new historicism

1.2. Relationship between History and Geography; Development of historical geography as a discipline

1.3. Source materials for the study of Historical Geography – Religious texts, Epics & Literary sources; travel accounts, archival sources, chronicles, old maps and revenue records, archaeological evidence, Census of India

1.4. Evolution of maps and its role in Historical Geography

Unit 2: Historical Geography of India

2.1 Ancient period- Development and destruction of ancient civilizations in India; territorial organization of Janapadas in India; Initiation of urbanization

2.2 Medieval Period: Spatial organization of administration and its limitations; Cultural transformation and new orientation in agriculture, cottage industry and handicrafts, trade and urbanization with special reference to Mughal period

2.3 Colonial Period: New trends in agriculture, industrialization, urbanization and trade; development of 'gateway cities' and port orientation of transport network

2.4 Post-Colonial Period: urban-industrial development, Sub-altern development

Unit 3: Political Geography and Geo-politics

3.1 Definition and historical development in political geography; Approaches to the study of Political Geography: Whittlesey's law-landscape Approach, Hartshrone's Functional Approach

3.2 Changing perspectives of world power: views of Mackinder, Spykman and Mahanand Cohen

3.3 Concepts, characteristics and geopolitical perspective of Nation, State, Nation-State and nationalism; Buffer States, Land-locked States, Enclave and Exclave

3.4 Distinction between Geo-Politics and Political Geography; Politics of World Resource with special reference to water and petroleum

Unit 4: Political Geography of Indian Subcontinent

4.1 Changing Political Map of India since Independence; Recent trends in Unity in Diversity

4.2 Geopolitics of the Indian Ocean; International water dispute with reference to Indo-China and Indo-Pak; Cauvery water dispute

4.3 Emergence of Small States in India and Geo-political Problems of Border States

4.4 Concept and Definition Electoral Geography and Federalism; manipulation of electoral results- Electoral System in India; Regional Stability and Re-alignments of regional political power

Suggested Readings:

1. Agnew, J., (2002): Making Political Geography, Arnold, London
2. Agnew, J., Mitchell, K. and Toal, G. (eds.) (2003): A Companion to Political Geography, Blackwell, OxfordCox, K.R., Low, M. and Robinson, J. (2008): The SAGE Handbook of Political Geography, SAGE Publications Ltd.,
3. Cox, K.R., (2002): Political Geography: Territory, State and Society, Wiley-Blackwell, Chichester
4. de Blij, H.J. and Glassner, M. (1968): Systematic Political Geography, John Wiley & Sons, New York
5. Dikshit, R.D. (1987): Political Geography and Geopolitics, Tata McGraw Hill, New Delhi
6. Dikshit, R.D. (2000): Political Geography: A Contemporary Perspective, Prentice-Hall, New DelhiGeography: Key Concepts in Political Geography, SAGE Publications Ltd., London
7. Glassner, M., (1993): Political Geography, John Wiley & Sons, New York
8. Jones, M., (2004): An Introduction to Political Geography: Space, Place and Politics, Routledge, London
9. Experience, Vikas Publishing House Ltd., New DelhiPrescott, J.R.V. (1972): The Political Geography, Methuen, London
10. Taylor, P. and Flint, C. (2000): Political Geography, Pearson Education, Harlow, Esse

Course Name: **Geoinformatics**
Course Code: **GEOPGCCP03**
L+T+P: 0+1+3 per week

Course Outcome:

By the time students complete this course they will be able to:

1. Acquire the fundamental knowledge of remote sensing, GPS and GIS for sustainable natural resource management
2. Enable the learners to understand pre-processing of images, and its classification
3. Apply the LPS to comprehend the basics of digital photogrammetry and arial photo interpretation
4. Prepare and process the DEM for topographic analysis
5. GPS and its applications to resource appraisal
6. Integration of GPS into GIS and regional planning
7. Apply buffering, overlaying and change detection techniques for spatial analysis
8. The course will allow students to learn and develop skills in the use of quantitative methods and statistical techniques.
9. Equip learners for jobs in the govt. and private establishments at administrative and managerial positions in the era digitalization and spread of remote sensing
10. Impart skill for getting engaged for employment in organizations like NATMO, IITs, Planning offices, District nodal centres, Panchayat offices etc.

Unit 1: Fundamentals of Remote Sensing

1.1. Satellite data (Landsat and IRS) and their Resolutions
1.2. Extraction of Spectral Signature of Different Land Use / Land Cover Features from Satellite Data
1.3. Image Georeferencing, Preparation of Colour Composites using different Band Combinations, Image Rectification, Image Enhancement and Spatial Filtering
1.4. Image Classification using Different Algorithms – Supervised and Unsupervised; Accuracy Assessment of Classified Image

Unit 2: Digital Photogrammetry and Processing of Elevation Data

2.1 Digital Photogrammetry using LPS: transforming raw imagery into reliable data layers required for all digital mapping, raster processing, GIS raster analysis, and 3D visualization
2.2 DEM Preparation and Stream Extraction from Topographical Maps
2.3 DEM Preparation and Stream Extraction from SRTM and/or other Satellite derived Elevation Data
2.4 Construction of Digital Elevation Models (DEM), Triangulated Irregular Network (TIN) from Digital Data and their Interpretation

Unit 3: Global Positioning System

3.1 Fundamentals of Global Positioning System (GPS), Segments of GPS
3.2 Limitations of GPS Positioning, Sources of Error in GPS positioning
3.3 Application of GPS
3.4 GPS Surveying and Mapping: Field Exercises using Hand Held GPS

Unit 4: Geographical Information System

4.1 Generation and Overlaying of Vector Layers and Buffers from Maps
4.2 Exporting GPS vectors to GIS Programme
4.3 Attaching and Editing Attribute Tables
4.4 Change Detection of River Courses / Coastlines and Land Use / Land Cover Facets using Multi-Dated Maps and Images

Suggested Readings:

1. American Society of Photogrammetry: *Manual of Remote Sensing*, ASP, Falls Church, V.A., 1983
2. Aronoff, S.: *Geographic Information Systems – A Management Perspective*, DDL Publication, Ottawa, 1989
3. Barrett, E.C. and L.F. Curtis: *Fundamentals of Remote Sensing and Air Photo Interpretation*, McMillan, New York, 1992
4. Burrough, P.A.: *Principles of Geographic Information Systems for Land Resource Assessment*, Oxford University Press, New York, 1986
5. Campbell, J .B.: *Introduction to Remote Sensing*, 2nd edition, Taylor & Francis, London, 1996
6. Campbell, J.: *Introduction to Remote Sensing*, Guilford, New York, 1989
7. Curran, P.J.: *Principles of Remote Sensing*, Longman, London, 1985
8. Fraser Taylor, D.R.: *Geographic Information Systems*, Pergaman Press, Oxford, 1991
9. Hord, R.M.: *Digital Image Processing of Remotely Sensed Data*, Academic, New York, 1989
10. Lillesand, T.M. and Kiefer, R. W.: *Remote Sensing and Image Interpretation*, 3rd edition, John Wiley and Sons, New York, 1994
11. Luder, D.: *Aerial photography Interpretation – Principles and Application*, McGraw Hill, New York, 1959
12. Maguire, D.J., Goodchild, M.F. and Rhind D.W. (ed.): *Geographic Information Systems – Principles and Application*, Taylor and Francis, Washington, 1991
13. Monmonier, M.S.: *Computer-assisted Cartography*, Prentice-Hall, Englewood Cliff, New Jersey, 1982
14. Peuquet, D.J. and Marble, D.F.: *Introductory Reading in Geographic Information Systems*, Taylor and Francis, Washington, 1990
15. Pratt, W.K.: *Digital Image Processing*, Wiley, New York, 1978
16. Rao, D.P. (ed.): *Remote Sensing for Earth Resources*, Association of Exploration Geophysicist, Hyderabad, 1998
17. Sabins, F.F.: *Remote Sensing: Principles and Applications*, 3rd edition, W.H. Freeman & Company, New York, 1997

Course Name: **Advanced Geomorphology- I**
Course Code: **GEOPGDET01**
L+T+P: 3+1+0 per week

Course Outcome:

By the time students complete this course they will be able to:

1. Develop an advanced level of learning on various approaches to geomorphology with a critical outlook.
2. Understand the changing nature of geomorphology and its relation with other disciplines of physical and social sciences
3. Grasp the knowledge of quantitative geomorphology and the application of geo-informatics in geomorphic analysis
4. Learn how to deal with the sensitive geomorphic system in the era of anthropocene – especially river decay, river basin management and coastal management.
5. Comprehend the nature, mechanism and mitigation of geomorphic hazards such as landslide, avalanches, flood, river bank erosion, and urban geomorphic hazards
6. Gain an understanding of the regional geomorphology of India with special reference to deltaic, estuarine, plateau and Himalayan region
7. Find some opportunities both in the private and govt. sectors including the positions of geomorphologist, landscape planner and designer, and environmental monitoring analyst.

Unit 1: Approaches to Geomorphology

1.1 Interdisciplinary approaches to Geomorphology: Physical and Social Sciences
1.2 Climatic and Climatogenetic approaches to Geomorphology: Concept and relevance
1.3 Quantitative Geomorphology: methods, applications and relevance
1.4 Application of geo-informatics for geomorphic analysis: classification, change detection and hazard management

Unit 2: Applied Geomorphology

2.1 Types of check dam and their importance in Integrated River Basin Management
2.2 Geomorphic consequences of sea level change in coasts and estuaries
2.3 Application of geomorphology in Terrain Evaluation, EIA and EMP
2.4 Principles of Integrated Coastal Zone Management with reference to Coastal Regulation Zones

Unit 3: Geomorphic Hazards and Management

3.1 Concept and classification of Geomorphic hazards and disasters; Modelling of geomorphic hazards
3.2 Coastal and River Bank Erosion: Changes over space and time
3.3 Hazards associated with decaying of river with particular reference to Mathabhanga-Churni, and Jalangi; Concept of Environmental flow
3.4 Urban geomorphic hazards and their reappraisal: ground water budgeting and changes in piezometric level with special reference to Kolkata and surrounding areas

Unit 4: Regional Geomorphology of India

4.1 Delta Environments: Evolution of Bengal Delta in the light of hinterland receiving basin characteristics, and front development, progradation; Delta abandonment processes and characteristics of moribund channels

4.2 Estuarine and Coastal Environments: Geomorphic classification of estuaries with respect to Ganga estuary; Geomorphic personality of Digha-Kanthi Coastal Plain and Kankon Region

4.3 Plateau and Plateau Fringe Environments: Plateau formation mechanisms; Plateau types: Stratigraphy; Case studies of Chotonagpur and Deccan Trap.

4.4 Himalayan Environment: Glacial traces and periglacial features. Evidences of GLOF in the Himalayas. Structure and related landforms of the Eastern Himalayas

Suggested Readings:

1. Aleshire, A.: *The Extreme Earth: Ocean Ridges and Trenches*, Infobase Publishing, New York, 2007
2. Anderson, R.S. and Anderson, S.P.: *Geomorphology: The Mechanics and Chemistry of Landscapes*, Cambridge University Press, 2010
3. Bloom, A.L.: *Geomorphology: A Systematic Analysis of Late Cenozoic Landforms*, Prentice Hall, Upper Saddle River, New Jersey, 2002
4. Condie, K.C.: *Plate Tectonics and Crustal Evolution*, Butterworth-Heinemann, Oxford, Burlington, 2003
5. Firsch, W., Meschede, M. and Blakey, R.: *Plate Tectonics, Continental Drift and Mountain Building*, Springer-Verlag, Berlin 2011
6. Goudie, A.S. and Viles, H.: *Landscapes and Geomorphology: A Very Short Introduction*, Oxford University Press, Oxford, 2010
7. Goudie, A. S. (Eds.). *Encyclopedia of Geomorphology*. Routledge, London, 2004
8. Gutierrez, M.: *Geomorphology*, CRC Press, Boca Ranton, Florida, 2013
9. Hamblin, W.K. and Christiansen, E.: *Earth's Dynamic Systems*, Prentice Hall, Upper Saddle River, New Jersey, 2003
10. Huggett, R.J.: *Fundamentals of Geomorphology*, Routledge, New York, 2011
11. Hugget, R. J.: Fundamentals of Geomorphology, Routledge, London, 2003
12. Kale, V.S. and Gupta, A.: *Introduction to Geomorphology*, Orient Longman, Kolkata, 2001
13. Leopold, L. B., Wolman, M. G. and Miller, J. P.: *Fluvial Processes in Geomorphology*, W.H. Freman, San Franscisco, 1964
14. Ollier, C.D.: *Tectonics and Landforms*, Longman Group Ltd., London, 1981
15. Richards, K. : *Rivers: Form and processes in alluvial channels*, Methuen, London, 1982
16. Schumm, S.A. : *Fluvial Systems*, Wiley, New York, 1977
17. Selby, M.J. : *Earth's Changing Surface: An Introduction to Geomorphology*, Clarendon Press, Oxford, 1985

Course Name: **Urban and Regional Planning- I**
Course Code: **GEOPGDET02**
L+T+P: 3+1+0 per week

Course Outcome:

By the time students complete this course they will be able to:

1. Theorizing and conceptualizing the urban and regional planning and its needs for shaping the city for better living of urban residents.
2. Comprehend the concept of region and its use in regional planning practice.
3. Learn various forms of planning and their critical analysis along with a deliberation on suitability
4. Make knowledge of some cases of urban and regional planning practice in India.
5. Study the approaches of urban and regional planning.
6. Make knowledge of various theories of urban and regional planning as furnished by different scholars.
7. Comprehend the past knowledge of urban and regional planning practice in India.
8. Develop knowledge upon the programmes and policies as adopted by the Government of India.
9. With knowledge of urban and regional planning practices in India and abroad, learners will theorise suitable model(s) for urban and regional planning as future development of the country.

Unit 1: Concepts in Urban and Regional Planning

1.1 Concept of region, urban planning and regional planning
1.2 Rationale and objectives of planning; Principles of regional and urban planning; Need for regional planning; Intra and Inter regional planning
1.3 Types of planning- Short-term and long-term, Imperative and indicative, Normative and Systematic, Sectoral and Spatial, Single-level and multi-level, Allocative and Indicative planning
1.4 Levels and models of planning- National, Regional and Micro-level planning; Russian model of Planning and UK model of Planning

Unit 2: The Region and the Planning Process

2.1 Types of region; Delineation of regions - formal and functional
2.2 Concept of Planning Region; Characteristics of planning regions; Hierarchy of planning regions
2.3 Planning regions of India (Schemes of V. Nath, Sen Gupta) Role of TCPO in regional and urban planning.
2.4. Case studies: TVA (USA); NCR, Kolkata Metropolitan Region, DVC (India)

Unit 3: Approaches and theories of Urban and Regional Planning

3.1 Approaches of Urban and Regional planning-Rational-Comprehensive; the Incremental; the Transactive, the Communicative, the Advocacy, the Radical and Equity
3.2 Theories of Urban Planning – Normative; Formative Modern - Postmodern

3.3 Chicago and Baltimore schools of urban ecology; Los Angeles School
3.4 Applicability of land use models in urban planning- Burgess, Hoyt and Harris-Ullman models

Unit 4: Urban and Regional Planning in India

4.1 History of Urban and Regional planning in India
4.2 Decentralised planning in India: Panchayati Raj, 73rd and 74th Constitutional Amendment Acts and its implementation
4.3 Participatory planning: Meaning, purpose, origin, salient features; Principles and methods of participatory planning
4.4 Policies for Urban and Regional Planning: National Urbanization Policy, IDMST, Smart City Mission; Urban Transport Policy, JNNURM, AMRUT, HRIDAY.

Suggested Readings:

1. Abdul Aziz, Urban Poor and Urban Informal sector, New Delhi, Sage Publications, 1993.
2. Adrian, Charles R.; State and local Governments: A study in the political process; New York, McGraw-Hill Book 1960
3. Ahmad, A.: Social Structure and Regional Development, Rawat Pub. Co., New Delhi, 1993
4. Andrews, Richard B.; Urban growth and development: A problem approach; New York, Simmons-Boardman 1962
5. Baleshwar Thakur, George Pomeroy, Chris Cusak, Sudhir K. Thakur, City, society and Planning, New Delhi, Concept, 2007
6. Bardhan, Pranab; Mookherjee, Dilip; Decentralization and local governance in developing countries a comparative perspective; New Delhi
7. Bhat, L.S. et. al.: Micro-Level Planning – A Case Study of Karnal Area, Haryana, K.B. Publications, New Delhi, 1976
8. Bhat, L.S.: Regional Planning in India, Statistical Publishing Society, Calcutta, 1973
9. Bombay, Civic Trust; National Policy for an orderly development of Indian cities; Bombay, Civic Trust 1968
10. Cheema, G. Shabbir Ed., Reaching the Urban poor: Project implementation in developing countries, Boulder, Westview Press, 1986.
11. Christaller, W.: Central Places in Southern Germany, Translated by C.W. Baskin, Prentice Hall, New Jersey, 1966
12. Desai, Community Participation and Slum housing-A study of Bombay, Bombay, Popular Prakashan, 2006
13. Friedmann, J. and Alonso, W.: Regional Development and Planning – A Reader, M.I.T. Press, , 1967
14. Friedmann, J. and Alonso, W.: Regional Development Policy – A Case Study of Venezuela, M.I.T. Press, Cambridge, Massachusetts, 1966
15. Glikson, A.: Regional Planning and Development, Netherlands Universities Foundation for International Co-operation, London, 1955
16. Gosal, G.S. and Krishan, G.: Regional Disparities in Levels of Socio-Economic Development in Punjab, Vishal Publications, Kurushetra, 1984
17. Hans Schenk, Living in Indian's slums, New Delhi, Manohar, 2001
18. Housing and Urban Development Corporation, HUDCO and housing the urban poor of India, HUDC, 2001

19. Humes, Samuel; Structure of local governments throughout the world; Hague, Martinus Nijhoff 1976
20. Jain, A.K., Inclusive planning and social infrastructure, New Delhi, Wiley Eastern, 2010
21. Kuklinski, A.R. (ed.): Growth Poles and Growth Centres in Regional Planning, Mouton, The Hague, 1972
22. Kundu, A. and Raza, M.: Indian Economy – The Regional Dimension, Spectrum Publishers, New Delhi, 1982
23. Losch, A.: The Economics of Location, University Press, Yale, New Haven, 1954
24. Misra, R.P. et. al.: Multi-Level Planning, Heritage Publishers, New Delhi, 1980
25. Misra, R.P.: Regional Planning – Concepts, Techniques and Policies, University of Mysore, Mysore, 1969

Course Name: **Population Geography-I**
Course Code: **GEOPGDET03**
L+T+P: 3+1+0 per week

Course Outcome:

At the end of the Population Geography-I students will -

1. Will develop in depth knowledge in population resource relation and nature and causes of inequality.
2. Learn the principles of sustainable development in a population scenario.
3. Learn the causes of unequal distribution of population and the nature of North-South and Core-Periphery dichotomy.
4. Make good understanding of population composition and it's relation to societal condition.
5. Will learn to understand the significance of demographic dividend (DD) and how to harvest the fruits if DD.
6. Will learn the population-workforce and employment scenario.
7. Will learn the causes of population growth and it's regional dimention.
8. Make an understanding of relationship between population growth and health condition.

Unit 1: Population as Resource

1.1 Population as resource; Quality of Human Resource and Population as development deterrent
1.2 Population centric Sustainable Development Goals; India's position
1.3 Measures of quality of human life: HDI & PQLI
1.4 Population growth and Sustainable development

Unit 2: Population Distribution

2.1 Natural growth Vs Migration, Fertility Differential: Religion Vs Regional
2.2 North-South Divide: Indian and Global, Core-Periphery in population concentration
2.3 Demographic Transition – Indian Scenario; regional pattern in India
2.4 Population concentration and social tension: Indian cases and of some selected countries

Unit 3: Population Composition

3.1 Age-Sex composition: measures, determinants and regional pattern in India; Importance of general sex-ratio and child sex-ratio
3.2 Life Expectancy at birth; Regional pattern in India; Problems of Ageing in India and in developing countries
3.3 Occupational structure: determinants and regional variation in India; Recent marginalization of workforce
3.4 Demographic Dividend: India vs selected developed and developing countries; India's missing opportunity and regional pattern of demographic dividend

Unit 4: Issues related to population growth in India

4.1 Manpower, employment and work participation
4.2 Educational planning and Human Resource Development
4.3 Basic needs: food, housing, water supply and sanitation
4.4 Health and family planning – Indian experience

Suggested Readings:

1. Agarwal, S.N.; India's Population Problem; Tata McGraw Hill Book Co., Mumbai.
2. Agarwala, S. N., 1962, Age at Marriage in India**,** KitabMahal Private Limited, Allahabad.
3. Bhai, L. Thara, 2001, Ageing: Indian Perspective**,** Decent Books, New Delhi.
4. Bhatia, H. S., Ageing and Society, The Arya's Book Centre Publishers, Udaipur.
5. Bhende, A. and T. Kanitkar: Principles of Population Studies, Himalaya Publishing House, Mumbai.
6. Bose, A., Desai, P.B., and Jain, S.P., 1970, Studies in Demography, George Allen and Uwin Ltd.
7. Bouge, D. J., 1969, Principles of Demography, John Wiley & Sons, New York.
8. Chandna, R.C., 2010 Geography of Population – Concept, Determinants and Patterns, Kalyani Publishers, New Delhi.
9. Misra, B. D., 1995, An Introduction to the Study of Population,South Asian Publishers Pvt. Ltd., New Delhi.
10. Sharma, K. 1999, Understanding Adolescence, National Book Trust, New Delhi.
11. Sinha, V.C. and Zacharia, E., 2009, Elements of Demography, Allied Publishers Pvt. Ltd., New Delhi.
12. Srivastava, O.S.: Demography and Population Studies, Vikas Publishing House, New Delhi, 1994
13. Sullivan, D. F., A Single Index of Mortality and Morbidity, Health Reports, Vol- 86.
14. Swamy, V. S., 1982, Sources of Demographic Data, in Population of India, Country Monograph Series No: 10. New York: UN-ESCAP.
15. Trewartha, G.T., A Geography of Population – World Pattern, John Willey Publication, New York
16. United Nations Development Programme, 2000, *Human Development Report*, Oxford University Press, Oxford.
17. Weeks, J.R., 2002, *Population: An Introduction to Concepts and Issues*, Wordsworth, Singapore.
18. Woods, R., 1979, *Population Analysis in Geography*, Longman, London.

Course Name: **Agriculture and Rural Development- I**
Course Code: **GEOPGDET04**
L+T+P: 3+1+0 per week

Course Outcome:

By the time students complete this course they will be able to:

1. know the evolution, approaches and development of Agriculture Geography.
2. It will explain to students with a comprehensive understanding of the concepts, theories, methods, principles and models of agriculture geography for delineating and understanding the agriculture region and agriculture system.
3. Students will understand the agricultural system its meaning and concept, whittlesey‟s classification of agricultural system and about Hoovers Model and Sinclair's model of Peri-urban agriculture.
4. It will provide the knowledge about agriculture attributes and components like Soil, Moisture and Drainage, Land capability classification and Land Suitability Classification
5. Students will learn about principles of Land use with special reference to Graham and Stamp and will know to new green revolution also.
6. It will help to understand the Concept, approaches, elements and indicators for measuring levels of rural development.
7. Students will learn about various rural development programme in India and West Bengal
8. From India perspective, it will help to learn Rural demography, economy, rural poverty and sustainable rural development.
9. It will explain the Rural development and Governance like Panchayat Raj and Democratic Decentralization and strengthening Rural Urban Linkages

Unit 1: Agriculture System and Approaches

1.1 Evolution of the subject matter of agriculture geography with reference to allied disciplines.
1.2 Approaches to Agricultural Geography: Regional and Systematic approach, Ecological and Commodity approach
1.3 Theoretical Framework: Agriculture system and agriculture- location: Whittlessey's Classification of the world agriculture system, Hoovers Model and Sinclair's model of Peri-urban agriculture
1.4 Agriculture region: concept, techniques of delineation.

Unit 2: Agriculture Development and Land Use Survey

2.1 World pattern of agricultural production and food security, implications of the Determinants of agricultural development: physical, technological, institutional.
2.2 Components and classification of Land and Land use: Soil, Moisture and Drainage, Land capability classification (USDA) and Land Suitability Classification (FAO)
2.3 Principles of Land use with special reference to Graham and Stamp
2.4 new green revolution

Unit 3: Rural Development: Concepts and Issues

3.1 Rural Development: Concept, elements, indicators for measuring levels of rural development

3.2 Approaches to Rural Development: Gandhi and Tagore; Community Development Block Approach

3.3 Rural Development Programmes in India: Overview of rural development programmes in Post Independent India with special reference to MGNREGA, PMGSY and NRHM

3.4 Rural Development Programmes in West Bengal: - *Jal Dharo Jal Bharo, Nijo Griha Nijo Bhumi*, *Anandhara* (WBSRLM), ISG and WBCADC

Unit 4: Contemporary Issues of Rural Development in India

4.1 Rural demography and economy: Structure and composition of rural population, Rural employment distress and labour migration (trends and factors)

4.2 Rural poverty: Concepts, measurement approach (per capita income and per capita calorie intake); rural poverty alleviation programmes in BADP, TADP, DPADP and TSP

4.3 Sustainable Rural development: Determinants, Barriers and way forward; Participatory Rural Development

4.4 Rural development and Governance: Panchayat Raj and Democratic Decentralization, strengthening R-U Linkages -PURA

Suggested Readings:

1. Duckhan, A.N. and Masfield, G.B., Farming Systems of the World, London, 1970.
2. Griggs, D.G., An Introduction to Agricultural Geography, 1964.
3. Husain, Majid., Agricultural Geography, New Delhi.
4. John, R, Tarrant., Agricultural Geography.
5. Mohammad, A., Food Production and Food Problem in India, New Delhi.
6. Mohammad, N., Perspectives in Agricultural Geography, New Delhi.
7. Morgan, W.B. and Munton, P.J.C. Agricultural Geography, London, 1971.
8. Shafi, M., Agricultural Geography of South Asia, Macmillon, New Delhi 2000.
9. Shafi, M., Agricultural Geography, Dorling Kindersley, New Delhi, 2006
10. Singh, J. and Dhillon, S.S., Agricultural Geography, 1970.
11. Symons, L., Agricultural Geography, London, 1967.
12. Wrigley, G., Tropical Agriculture, 1979
13. De, N.K., Jana, N.C. 1997. The Land Multifaceted Appraisal and Management, Sribhumi publishing.
14. Mohammad N. 1992, New Dimension in Agriculture Geography, Concept pub.
15. Vaidya, B.C, 1997. Agricultural Land Use in India, Manak pub.

Field Work Methodology in Advanced Geomorphology

Course Code: **GEOPGDEP01**

L+T+P: 0+1+3 per week

Course Outcome:

On completion of the course, students are able to:

1. Understand the need and significance of field work in Geomorphology.
2. Know the nature of hydro-geomorphic data and their measurements
3. Study the types of field survey and techniques used for that.
4. Know the different types of surveying methods.
5. To use different instruments to gather hydrologic and geomorphic data.
6. Understand the basics of qualitative methods and its significance in applied geomorphology.
7. Learn to handle the research tools and instruments for field survey.
8. Know to identify a small research problem in rural/urban unit.
9. Learn about pre-field work preparations, conduct of the field work, post-field work based analysis and interpretation.
10. Know the requirements of the writing of a field work report.

10. Submit a field report using suitable research methodology and try to answer their research questions.

Unit 1: Basics of Field Work Methodology

1.1 Field survey: Need and Significance; Data, Variable and Indicator; making indicator scale free; Scale of measurements: Nominal, Ordinal, Interval & Ratio

1.2 Survey types: Sample & Population/universal, merits and demerits; Sample techniques used for survey

1.3 Survey methods: Observation, measurement, interview, survey, focused group discussion

1.4 Instruments for survey: Questionnaire, Schedule, instruments for measurement, Questionnaire & Survey Schedule - merits and demerits

Note:

1. Units-II, III and IV will comprise designing survey schedules; participation in the field work and data collection using survey schedules and instruments; and preparation of field report.
2. **Distribution of marks**:
   a) Oral test- 5 marks
   b) Survey schedule designing - 5 marks
   c) Active participation in the field - 10
   d) Field report - 20
   e) Viva-voce - 10

   Total = 50 marks
3. **Specifications of filed report:**
   a) Field should be within/outside West Bengal
   b) Area to be studied: Rural (Mouza)/Urban (Ward)
   c) Duration in the field: not more than 4 days (Excluding journey)
   d) Length: word limit: 15,000 words; page limit: 80 pages (Excluding list of reference, bibliography and appendices)
   e) Content must contain minimum 80 per cent primary data

Course Name: **Field Work Methodology in Urban and Regional Planning**

Course Code: **GEOPGDEP02**
L+T+P: 1+0+3 per week

Course Outcome:

By the time students complete this course they will be able to:

1. Understand the basics of field investigation, data collection and the types of field data
2. Know the different scales of data measurement for preparation of a field report.
3. Learn the scientific procedures of handling data, data analysis and interpretation of result.
4. Make visualization of climatic maps and charts and Synoptic charts for users.
5. Design a specific survey schedule for studying specific urban and/or regional problems
6. Make knowledge of handling instruments for physical survey of urban and/or region.
7. Prepare a field report on the field investigation and use of instruments.

Unit 1: Basics of Field Work Methodology

1.1 Field survey: Need and Significance; Data, Variable and Indicator; making indicator scale free; Scale of measurements: Nominal, Ordinal, Interval & Ratio
1.2 Survey types: Sample & Population/universal, merits and demerits; Sample techniques used for survey
1.3 Survey methods: Observation, measurement, interview, survey, focused group discussion
1.4 Instruments for survey: Questionnaire, Schedule, instruments for measurement, Questionnaire & Survey Schedule - merits and demerits

Note:
1. Units-II, III and IV will comprise designing survey schedules; participation in the field work and data collection using survey schedules and instruments; and preparation of field report.

2. Distribution of marks:

a) Oral test- 5 marks
b) Survey schedule designing - 5 marks
c) Active participation in the field - 10
d) Field report - 20
e) Viva-voce - 10

Total = 50 marks

3. Specifications of filed report:

f) Field should be within/outside West Bengal
g) Area to be studied: Rural (Mouza)/Urban (Ward)
h) Duration in the field: not more than 4 days (Excluding journey)
i) Length: word limit: 15,000 words; page limit: 80 pages (Excluding list of reference, bibliography and appendices)
j) Content must contain minimum 80 per cent primary data

Course Name: **Field Work Methodology in Population Geography**

Course Code: **GEOPGDEP03**

L+T+P: 0+1+3 per week

Course Outcome:

On completion of the course, students are able to:

1. Understand the need and significance of field work in population Geography.
1. Know the nature of demographic and non-demographic data and making of variable and indicator scale free.
2. Study the types of field survey and techniques used for that.
3. Know the different types of surveying methods.
4. Understand the basics of qualitative research and its significance.
5. Learn to handle the research tools and instruments for field survey.
6. Know to identify a small research problem in rural/urban unit.
7. Learn about pre-field work preparations, conduct of the field work, post-field work based analysis and interpretation.
8. Know the requirements of the writing of a field work report.
9. Submit a field report using suitable research methodology and try to answer their research questions.

Unit 1: Basics of Field Work Methodology

1.1 Field survey: Need and Significance; Data, Variable and Indicator; making indicator scale free; Scale of measurements: Nominal, Ordinal, Interval & Ratio

1.2 Survey types: Sample & Population/universal, merits and demerits; Sample techniques used for survey

1.3 Survey methods: Observation, measurement, interview, survey, focused group discussion

1.4 Instruments for survey: Questionnaire, Schedule, instruments for measurement, Questionnaire & Survey Schedule - merits and demerits

Note:

1. Units-II, III and IV will comprise designing survey schedules; participation in the field work and data collection using survey schedules and instruments; and preparation of field report.
2. **Distribution of marks**:
    f) Oral test- 5 marks
    g) Survey schedule designing - 5 marks
    h) Active participation in the field - 10
    i) Field report - 20
    j) Viva-voce - 10

    Total = 50 marks
3. **Specifications of filed report:**
    f) Field should be within/outside West Bengal
    g) Area to be studied: Rural (Mouza)/Urban (Ward)
    h) Duration in the field: not more than 4 days (Excluding journey)
    i) Length: word limit: 15,000 words; page limit: 80 pages (Excluding list of reference, bibliography and appendices)
    j) Content must contain minimum 80 per cent primary data

Course Name: **Field Work Methodology in Agriculture and Rural Development**

Course Code: **GEOPGDEP04**
L+T+P: 0+1+3 per week

Course Outcome:

By the time students complete this course they will be able to:

1. Select suitable data according to the requirement of the research issues
2. Conduct field survey at micro level
3. Adopt suitable approach and instrument for the survey
4. Produce a good piece of field report with collected data from field

Unit 1: Basics of Field Work Methodology

1.1 Field survey: Need and Significance; Data, Variable and Indicator; making indicator scale free; Scale of measurements: Nominal, Ordinal, Interval & Ratio
1.2 Survey types: Sample & Population/universal, merits and demerits; Sample techniques used for survey
1.3 Survey methods: Observation, measurement, interview, survey, focused group discussion
1.4 Instruments for survey: Questionnaire, Schedule, instruments for measurement, Questionnaire & Survey Schedule - merits and demerits

Note:

1. Units-II, III and IV will comprise designing survey schedules; participation in the field work and data collection using survey schedules and instruments; and preparation of field report.

2. Distribution of marks:
   a) Oral test - 5 marks
   b) Survey schedule designing - 5 marks
   c) Active participation in the field - 10
   d) Field report - 20
   e) Viva-voce - 10

   Total = 50 marks

3. Specifications of field report:
   a) Field should be within/outside West Bengal
   b) Area to be studied: Rural (Mouza)/Urban (Ward)
   c) Duration in the field: not more than 4 days (Excluding journey)
   d) Length: word limit: 15,000 words; page limit: 80 pages (Excluding list of reference, bibliography and appendices)
   e) Content must contain minimum 80 per cent primary data

Course Name: India: **Principles of Physical Geography**
Course Code: **GEOPGGEC01**

L+T+P: 3+1+0 per week

Course Outcome:

By the time students complete this course they will be able to:

1. Understand the fundamental processes governing the evolution of geomorphic landforms in different environment.

2. Distinguish the cyclic and non-cyclic evolutionary processes.

3. Identify the similarity and dissimilarity among the different branches concerned with the atmospheric sciences

4. Comprehend the basic laws controlling the atmospheric circulations.

5. Understand the nature of insolation and their spatio-temporal variations

6. Gain knowledge in airmass characterization

7. Distinguish land from soil and acquire knowledge about various branches of soil sciences

8. Understand soil properties and soil formation

9. Comprehend soil erosion and degradation

10. Understand ecosystem structure and ecological processes

11. Comprehend the significance of bio-geochemical cycles and biodiversity in environmental sustainability

Unit 1: Geomorphology

1.1 Fundamental concepts in geomorphology
1.2 Weathering, mass wasting and resultant landforms
1.3 Development of landforms under Fluvial, Coastal, Glacial and Aeolian processes
1.4 Cyclic (Davis and Penck) and non-cyclic (Hack) concepts in geomorphology

Unit 2: Climatology

2.1 Nature and scope of Climatology and its relation with Meteorology; Nature, composition and layering of the atmosphere
2.2 Air motion: Forces and laws
2.3 Insolation: Controlling factors. Inversion of temperature: types, causes and consequences
2.4 Air mass: Typology, origin, characteristics and modification. Weather: Stability and instability

Unit 3: Soil Geography

3.1 Land and soil: Soil sciences-Pedology, Edaphology and Soil Geography; Soil as natural dynamic Body
3.2 Soil Properties and classification: Texture, structure, moisture, bulk density, soil reaction, organic matter, cation exchange capacity; Macro and micro elements; Genetic classification of soil

3.3 Factors of Soil formation; Pedogenic Process: General (addition, loss, transformations, translocations); Processes of zonal soil formation: Laterisation, Podsolisation, Calcification
3.4 Soil erosion and degradation- Factors, mechanisms and management

Unit 4: Biogeography

4.1 Ecosystem structure and organization- Components, Trophic Structure, Food Chain and Food Web, Keystone Species
4.2 Ecological Pyramids: Energy and Biomass
4.3 Bio-geochemical cycles and significance
4.4 Biodiversity: Definition, types, threats and conservation with special reference to India

Suggested Readings:

Dayal, P. 1996: Textbook of Geomorphology, Shukla Book Depot, Patna. Geomorphology, Longman, London
Biswas, T.D. and Mukherjee, S.K.: Textbook of Soil Science, Tata-McGraw-Hill, 1987
Brady, N.C. and Weil, R.R.: The Nature and Properties of Soil, 11th edition, Longman, London, 1996
Chapman J.L. and Reiss, M.J.: Ecology: Principles and Applications, Cambridge University Press, Cambridge, 1993
Daji, J. A.: A textbook of soil science, Asia Pub. House, 1970
Dash, M.C..Fundamentals of Ecology, 2nd Edition, Tata McGraw-Hill, New Delhi, 2001
Foth, H.D.: Fundamentals of Soil Science, 8th edition, John Wiley and Sons, New York, 1990
Kormondy, E.J.: Concepts of Ecology, 4th edition, Prentice-Hall, India, New Delhi, 1996
Monkhouse, F.J., Wilkinson, H.R. 1971. Maps and Diagrams: Their Compilation and Construction, 3rd Ed (2017 reprint), Alphaneumera-Kolkata.
Odum, E.P.: Ecology: A Bridge between Science and Society, Sinaur Associates Inc. Publishers, Sunderland, 1997
Sharma. P.D.: Ecology and Environment, 7th edition, Rastogi Publications, Mirat, 1996
Barry, R.G, Chorley R.J. 2009. Atmosphere Weather and Climate. 9th Ed, Routledge.
Critchfield, H. J. 1983. General Climatology. Prentice Hall India Ltd (2010 Reprint)

Course Name: India: **Regional Problems and Development Issues**
Course Code: **GEOPGCCT10**

L+T+P: 3+1+0 per week

Course Outcome:

By the time students complete this course they will be able to:

1. Understand the diversity of physical regions of India.
2. Make know about the regional problems associated with regional physical resources as well as environmental issues.
3. Learn about the diversity of regional economic bases and also the learner will assess diverse socio-economic problems associated with the local resources.
4. Understand the regional social problems and their causes and mitigations.
5. Know in detail about the physical regional units of West Bengal and their resource potential.
6. Create knowledge of social and economic problems and prospects of regional units of West Bengal.
7. Learn about the regional diversity and disparities of growth and development in India.
8. Comprehend the developmental strategies, policies and programmes for target group and target regions of India.
9. With knowledge of regional resource potential and problems, diversity and disparities of development, the learners will be capable of preparing suggestive model of balanced regional as well as sustainable development of the country.

Unit 1: India: Regional Problems and Their Mitigation

1.1 Regional Problems of Himalayan Belt: Terrain Character, Availability of Water, Seismic Activity and Landslides
1.2 Problems of Arid Regions: Desertification and Salinization
1.3 Problems of Great Plains and Plateaus: Flood, Drought, Share of River Water,
1.4 Problems of Coastal Belts: Erosion, Cyclone and storm surge

Unit 2: India: Socio-Economic Issues

2.1 Changing Nature of India's Economic Base with reference to Agriculture, Industry, Trade and Transport
2.2. Issues in urban regions: Slum, Juvenile delinquency, Crime; Migrant labour
2.3 Big Dams and Reservoirs: Displacement and relocation, Compensation, Loss of land
3.1 Issues of forest resource: Forest depletion, forest fire, forest conservation and Loss of livelihood

Unit 3: West Bengal: A Regional Study

3.1 Himalayas region: Evolution, Characteristics, Problem of landslides and management, Tourism and development
3.2 Coastal region: Characteristics, Management of problems, Tourism and development
3.3 Ganga Delta: Evolution, Hydro-morphological Characteristics and Geomorphic Units
3.4 Sundarbans: Characteristics, Reclamation and Management of Problems, Tourism and development

Unit 4: Planning Strategy for Development

4.1 Regional Disparities: Nature, Causes and remedial measures
4.2 Target area planning: Metropolitan Region, Hill area (Western & Eastern Ghats) Tribal area, Drought prone area, Desert area;
4.3 Target group planning: Weaker section and Tribal sub-plan
4.4 Strategies for sustainable forest management; Planning strategies for development in Sundarban; Watershed management programmes

Suggested Readings

1. Agarwal, A. and Narain, S. (1997): *Fourth Citizen's Report - Dying Wisdom [SOE-4]: Floods, Floodplains and Environmental* Myths,Centre for Science and Environment, New Delhi
2. Deshpande, C.D. (1992): *India: A Regional Interpretation*, Northern Book Centre, New Delhi
3. Husain, M. (2014): *Geography of India*, Tata McGraw-Hill Education, New Delhi
4. Khullar, D.R. (2011): *India: A Comprehensive Geography*, Kalyani Publishers, New Delhi
5. Krishnan, M.S. (1949): *Geology of India and Burma*, The Madras Law Journal Press, Chennai
6. Mamoria, C.B. (1995): *Economic and Commercial Geography of India*, Shiv Lal Agarwal & Co., Agra
7. Pal, S.K. (1998): *Physical Geography of India*, Sangam Books Ltd., New Delhi
8. Sharma, T.C. and Coutinho, O. (1992): *Economic Geography of India*, Vikas Publications, New Delhi
9. Singh, J. and Dhillon, S.S. (2004): *Agricultural Geography*, Tata McGrawHill Education, New Delhi
10. Singh, R.L. (1993): *India: A Regional Geography*, UBS Publishers Distributors, New Delhi
11. Spate, O.H.K. and Learmonth, A.T.A. (1962): *India and Pakistan*, Methuen and Co., London
12. Tirtha, R. (2002): *Geography of India*, Rawat Publications, Jaipur
13. Valdiya, K.S. (2010): *The Making of India - Geodynamic Evolution*, Macmillan Publishers India Ltd., New Delhi
14. Valdiya, K.S. (2013): *Environmental Geology: Indian Context*, Tata McGraw-Hill, New Delhi
15. Wadia, D.N. (1919): *Geology of India*, Macmillan & Co. Ltd., London

Course Name: **Advanced Geomorphology- II**
Course Code: **GEOPGDET05**

L+T+P: 3+1+0 per week

Course Outcome:

By the time students complete this course they will be able to:

1. Develop an advanced level of learning on geomorphic models to account for the development of the various forms and processes in various climatic regimes. A special emphasis is given on the fluvial and coastal processes.
2. Understand the complex geomorphic system of the humid tropics.
3. Develop a critical outlook on the models of the plantation surfaces, model of channel initiation, development of catena and duricrust
4. Develop an understanding of the fluvial hydraulics and regimes in different climatic regions
5. Understand the nature of river load, fluvial sediments, and channel stability and equilibrium
6. Comprehend the tectonic controls over the fluvial systems
7. Explore the integrated nature of the coastal system and the human interventions changing the coastal forms and processes.
8. Find some opportunities both in the private and govt. sectors including the positions of geomorphologist, landscape planner and designer, and environmental monitoring analyst.

Unit 1: Perspectives in Geomorphology

1.1 Evolution of Geomorphological thoughts and ideas: Pre-Davisian, Davisian and Post-Davisian periods
1.2 Principles of landform classification: genetic and hierarchical
1.3 Approaches to Geomorphology: structural and systems approach
1.4 Humid tropical geomorphology: processes and landforms

Unit 2: Models and Concepts in Geomorphology

2.1 Flume study in geomorphology; Models of channel initiation and network development; Concept of palaeo-channel
2.2 Morphological properties of channels: Profiles, Planforms and Patterns; Effect of flood in channel modification and characterisation
2.3 Concept of pedo-geomorphology: catena and duricrust
2.4 Models and concepts of planation Surface and residual landforms: Peneplanation, Pediplanation, Etchplanation, Cryoplanation, inselberg and bornhardts

Unit 3: Fluvial Geomorphology

3.1 River load, stream power and channel efficiency with reference to Ganga-Brahmaputra River system; Flow continuity with special reference to St. Venant and Bernouilli equations
3.2 Structural and tectonic controls over fluvial channels and landforms, Geomorphic markers, Neotectonic movements and Channel evolution in the context of Bengal Basin
3.3 Fluvial sediments: types, characterization; cratonic and Himalayan sediments; Mechanism of sediment dispersion: fan formation
3.4 Channel stability and equilibrium: Planform, cross-section and longitudinal profile adjustments; River metamorphosis factors: hydrological, climatological, geomorphic and engineering

Unit 4: Coastal processes and anthropogenic impact

4.1 Coastal morpho-dynamics: factors, characteristics and relative dominance of wave, tidal and fluvial processes in coasts
4.2 Processes and effects of bioturbation, bio-tidal accretion, storm surge and tsunamis
4.3 Formation, system of change and classification of coastal landforms with special reference to rhythmic beach topography, coastal dunes and deltas
4.4 Human being as geomorphic agents: Effects of river control, coastal modification and land use change; Identification of Coastal Geomorphosites

Suggested Readings:

1. Ahmad, E.: Geography of the Himalayas, Kalyani Pub. Ludhiana, 1992
2. Ahmad, E.: *Geomorphology*, Kalyani Publishers, New Delhi. 2001
3. Ahmad, E. : *Physical Geography* (Reprint), Kalyani Publishers, New Delhi, 2001
4. Bose, S. C.: Geography of the Himalayas, National Book Trust, New Delhi, 1972
5. Bird, E. C.: *Coastal Geomorphology. An Introduction*. John Wiley and Sons, Chichester, 2000
6. Cooke, R.U. and Warren*: Geomorphology in Deserts*, Batsford, London, 1973
7. Chorely, R. J., Schumm, S. A., Sugden, D. E. : *Geomorphology*, Methuen, London 1984
8. Faniran, A. and Jeje, L. K.: *Humid Tropical Geomorphology*, Longman, London. 1983
9. Hart, M. G.: *Geomorphology, Pure and Applied*. George Allen and Unwin, London, 1986
10. Hugget, R. J.: *Physical Geography*: *The Key Concepts*, Taylor and Francis, USA, 2009
11. King, C. A. M : *Beaches & Coasts*, Edward Arnold, London, 1972
12. Leopold, L. B.: Wolman, M. G. and Miller, J. P.: *Fluvial Processes in Geomorphology*, W.H. Freman, San Franscisco, 1964
13. Morisawa, M. (Ed.) : *Geomorphology and Natural Hazards*, Elsevier, Amsterdam,1994
14. Mukhopadhyaya, S. C. and Dasgupta, A.: River Dynamics of West Bengal, Prayas Pub. Kolkata, Vol. I and II, 2010
15. Ollier, C.D.: *Weathering*, Longman, London, 1975
16. Savindra Singh : *Geomorphology*, Prayag Pustak Bhawan, Allahabad, 2002
17. Schumm, S. A.: *Fluvial Systems*, Wiley, New York. 1977
18. Strahler, A.H and Strahler A.N : *Modern Physical Geography*, John Wiley and Sons (Asia) Pvt. Ltd. 1992
19. Sparks, B.W. : *Geomorphology*, Longman, London, 1972
20. Thomas, M. F. : *Geomorphology in the Tropics: a study of weathering and denudation in low latitudes*. John Wiley, 1994
21. Young, A.: *Slopes*, Oliver and Boyd, Edinburgh, 1972

Course Name: **Urban and Regional Planning- II**
Course Code: **GEOPGDET06**
L+T+P: 3+1+0 per week

Course Outcome:

By the time students complete this course they will be able to:

1. Grasp a knowledge of urban public administrative system in India.
2. Critically analyse the Acts, laws and urban legislation for understanding the ways of urban planning practices.
3. Prepare models of future planning for optimum utilization of urban spaces for healthier city living.
4. Critically assess the models and theories of urban and regional development, and learners will be independent to formulate planning proposal for solving urban and regional problems.
5. Understand the urban environmental as well as housing problems of Indian cities.
6. Make a broader knowledge on the process of urban transformation and its implications on the city living.
7. Understand the evolution of new settlement pattern due to the implication of policy for new town development.
8. With knowledge of urban and regional planning practices the learners will theorise suitable model(s) for urban and regional planning as future development of the country.

Unit 1: Governance and Legislation for planning

1.1 Urban and Rural Governance: Stakeholders in urban governance, good urban governance; Hierarchal system of governance and planning- Central, State, ULBs and Gram Panchayat

1.2 Urban legislation and planning- relevance of Land Ceiling Act, FAR laws, Land Use Development Control Regulations. Land Acquisition Act of 1894- Application and consequences; Modifications and present scenario

1.3 Neighbourhood planning; Public Space and Open space- Types, Use and accessibility, Policy and Planning

1.4 Partnerships in Governance: NGO, Industry, Corporate Responsibility, PPP involvement: examples from City- Regions, Watersheds, Social and Community Planning

Unit 2: Theoretical Framework of Urban and Regional Development

2.1 Development: Indicators of regional development; Perspectives on the interrelationship between city and region; Economic base of cities and regions; Role of cities in regional and national development; Global city-regions

2.2 Disparities in development: Dichotomy of North-South, Rich-Poor, Metropolitan Dominance; Regional disparities- Planning for balanced regional development

2.3 Theories of Growth and Development: Cumulative Causation Theory (Myrdal), Theory of unbalanced growth (Hirschman), Theory of Divergence and Convergence (Williamson); Stages of Growth Theory (Rostow)

2.4 Application of Growth Pole theories (Perroux) and Central Place theory- (Christaller) in urban and regional planning

Unit 3: Urban problems and Resilient Cities

3.1 Urban housing problem: Slums and squatters, night shelters, Homelessness

3.2 Environmental Issues: Pollution- and Degradation: Land, Water, Air

3.3 Transportation issues: Accessibility, Traffic and accidents
3.4 Resilient Cities: Concept and implications, Climate change and city resilience- USAID's CityLink Climate Partnership Programme

Unit 4: Modes of City Planning

4.1 Evolution of New Towns and Satellite Towns: Garden City movement by Ebnezer Howard, and its implications. Newtown movement in India: Chandigarh, Durgapur, New Town Kolkata
4.2 Process of urban transformation: Gentrification- Definition, characteristics, Causes and consequences; Examples of Gentrified Neighbourhoods; Urban Village- Concept and emergence of urban village, planning strategy for urban villages
4.3 Urban renewal, redevelopment and Revitalization: Concept, characteristics and issues
4.4 Planning for the Urban Quality of Life: Role of urban forestry in Conservation of Green and blue components, Urban Liveability: indicators and factors

Suggested Readings

1. Abdul Aziz, Urban Poor and Urban Informal sector, New Delhi, Sage Publications, 1993.
2. Adrian, Charles R.; State and local Governments: A study in the political process; New York, McGraw-Hill Book 1960
3. Ahmad, A.: Social Structure and Regional Development, Rawat Pub. Co., New Delhi, 1993
4. Andrews, Richard B.; Urban growth and development: A problem approach; New York, Simmons-Boardman 1962
5. Baleshwar Thakur, George Pomeroy, Chris Cusak, Sudhir K. Thakur, City, society and Planning, New Delhi, Concept, 2007
6. Bardhan, Pranab; Mookherjee, Dilip; Decentralization and local governance in developing countries a comparative perspective; New Delhi
7. Bhat, L.S. et. al.: Micro-Level Planning – A Case Study of Karnal Area, Haryana, K.B. Publications, New Delhi, 1976
8. Bhat, L.S.: Regional Planning in India, Statistical Publishing Society, Calcutta, 1973
9. Bombay, Civic Trust; National Policy for an orderly development of Indian cities; Bombay, Civic Trust 1968
10. Cheema, G. Shabbir Ed., Reaching the Urban poor: Project implementation in developing countries, Boulder, Westview Press, 1986.
11. Christaller, W.: Central Places in Southern Germany, Translated by C.W. Baskin, Prentice Hall, New Jersey, 1966
12. Desai, Community Participation and Slum housing-A study of Bombay, Bombay, Popular Prakashan, 2006
13. Friedmann, J. and Alonso, W.: Regional Development and Planning – A Reader, M.I.T. Press, , 1967
14. Friedmann, J. and Alonso, W.: Regional Development Policy – A Case Study of Venezuela, M.I.T. Press, Cambridge, Massachusetts, 1966
15. Glikson, A.: Regional Planning and Development, Netherlands Universities Foundation for International Co-operation, London, 1955
16. Gosal, G.S. and Krishan, G.: Regional Disparities in Levels of Socio-Economic Development in Punjab, Vishal Publications, Kurushetra, 1984
17. Hans Schenk, Living in Indian's slums, New Delhi, Manohar, 2001

18. Housing and Urban Development Corporation, HUDCO and housing the urban poor of India, HUDC, 2001
19. Humes, Samuel; Structure of local governments throughout the world; Hague, Martinus Nijhoff 1976
20. Jain, A.K., Inclusive planning and social infrastructure, New Delhi, Wiley Eastern, 2010
21. Kuklinski, A.R. (ed.): Growth Poles and Growth Centres in Regional Planning, Mouton, The Hague, 1972
22. Kundu, A. and Raza, M.: Indian Economy – The Regional Dimension, Spectrum Publishers, New Delhi, 1982
23. Losch, A.: The Economics of Location, University Press, Yale, New Haven, 1954
24. Misra, R.P. et. al.: Multi-Level Planning, Heritage Publishers, New Delhi, 1980
25. Misra, R.P.: Regional Planning – Concepts, Techniques and Policies, University of Mysore, Mysore, 1969
26. Mrydal, G.: Economic Theory and Under-Development Regions, Gerald Duckworth, London, 1957

Course Name: **Population Geography - II**
Course Code: **GEOPGDET07**

L+T+P: 3+1+0 per week

Course Outcome:

On completion of the course, students will be able to:

1. Analyse the scale and nature of relationship between population growth, food and nutritional security at national level.
2. Understand the extent of population growth and economic development.
3. Study the achievements of human development and millennium development goals with special reference to India.
4. Evaluate the socio-economic issues namely, child labour, unemployment, dependency ratio, poverty, gender bias in Indian context.
5. Understand the infrastructure problems i.e. health and education, housing, sanitation, water supply, and transport.
6. Assessing the impact of population growth on environment.
7. Recognize the development led displacement in geographical perspectives.
8. Understand the concept and nature of population policy and, role and intervention of UN in population policy formulation.
9. Know the components of population policies related to fertility, mortality and migration.
10. Understand the politics and demography with reference to India.

Unit 1: Population and Development

1.1 Population growth, food and nutritional security at national level, national Food Security Act (NFSA)
1.2 Population Growth and Economic Development, Physical Quality of Life Index (PQLI): concept, basic indicators and spatial patterns in India
1.3 Human Development Index (HDI), Gender Development Index (GDI) and Gender Empowerment Measure (GEM): Concept, Basic Indicators and Regional Patterns in India
1.4 Millennium development goals and achievements with special reference to India

Unit 2: Population and Socio-economic Inequalities with Special Reference to India

2.1 Child labour, distress employment and forced labour: concept, factors responsible and related problems
2.2 Gender inequalities and issues related to SC/ST and minority communities
2.3 Unemployment, work participation rate, dependency ratio and poverty: concept, causes and regional variation
2.4 Infrastructure problems: Social—health and education, Soft—banking and insurance, Hard—housing, sanitation, water supply, and transport

Unit 3: Population, Development and Environment

3.1 Concept of human ecology and ecological footprint; displacement and environmental refugee

3.2 Changing man-environment relationship with change in mode of production technology, over exploitation of resources and degradation of environment
3.3 Impact of population growth on environment: Geosphere, Hydrosphere, Biosphere and Atmosphere
3.4 Development led displacement: SSP/Tehri-Garhwal/East Kolkata Wetland

Unit 4: Population Policies

4.1 Population policy; perspectives of developed and developing countries; Role and intervention of UN in population policy formulation
4.2 Components of Population policies: Fertility, mortality and migration
4.3 Overview of Population Policies with special focus on the following countries: Canada and Japan (Developed Countries), and India and China (Developing Countries)
4.4 Politics of demography

Suggested Readings:

1. Agarwal, S.N., India's Population Problem; Tata McGraw Hill, Mumbai.
2. Barabara, Hariss et. al., 1990, Poverty in India: Research and Policy, Oxford University Press, Bombay.
3. Chandana, R. C., 2010, Geography of Population, Kalyani Publishers, Delhi.
4. Das Gupta, Monica, C. Chen Lincoln and T.N. Krishnan, 1998, Health, Poverty and Development in India, Oxford University Press, Delhi.
5. Dash, M.C. Mishra P.C., 2001, Man and Environment, Macmillan India, New Delhi.
6. Dreze Jean and Amartya Sen (eds.), 1988, Indian Development – Selected Regional Perspectives, Oxford University Press, Delhi.
7. Hussain, M., 2010, Human Geography, Rawat Publication, New Delhi.
8. Kanitkar, T; Verma, R; Evaluation of National Population Education Project, IIPS, Mumbai.
9. Lowry, J.H.: World Population and Food Supply, Edward Arnold Publications, London
10. Mahajan, A., P.N. Pimpley and K.P. Singh, 1989, Social Development Process and Consequences, Rawat Publication, Jaipur.
11. Ministry of Health and Family Welfare (MoHFW), 2002, National Health Policy 2002 (India).
12. Mishra, R. S., 1973, Economics of Development, Somaya Publications Pvt. Ltd., Bombay.
13. Sharma, R.C.; Population Resources, Environment and Quality of Life: A Handbook on Population Education.
14. Srinivasan, K. and Vlassoff, M., 2001, Population Development Nexus in India – Challenges for the New Millennium, Tata McGraw Hill, New Delhi.
15. Swaminathan, M., 1977, Handbook of Food and Nutrition, Ganesh & Co., Madras.

Course Name: **Agriculture and Rural Development- II**
Course Code: **GEOPGDET08**
L+T+P: 3+1+0 per week

Course Outcome:

By the time students complete this course they will be able to:

1. Understand the types, techniques, system of irrigation in India and use of groundwater and surface water in agriculture.
2. Students will be familiar with the various methods of irrigation and know about crop diversification, development and Measurement of Agricultural Efficiency and Productivity
3. It will provide the knowledge about contemporary issues in agriculture such as Hunger and Nutritional Deprivation Food Security, marketing Regulation, Agricultural Indebtedness and Famer suicide.
4. Students will understand about the introduction to Sustainable Rural Livelihoods, Types of livelihoods their strength and weakness.
5. It will help to explain to students about Land access, entitlement, policies and gender issues
6. It will provide the knowledge of Diversification, strategies, barriers and challenges of Rural Livelihood.
7. They will learn the role of Governance and Institutions in developing resilience in rural livelihoods in India.
8. They will know about the role and engagement of Women in Rural Development, agriculture and nonfarm sector.
9. The will able to gain knowledge about various approaches to empowerment and Development in India.

Unit 1: Technological Development in Agriculture

1.1 The status of types of Irrigation system in India; Use of Groundwater and surface water in agriculture; Advances in Irrigation techniques general and Dry Farming

1.2 Methods of irrigation: Well irrigation, Canals, and RLI; Irrigation techniques: Flooding, intermittent, Dripped and Sprinkler irrigation

1.3 Technological advancement for agricultural productivity in India; Introduction of GM Crops

1.4 Diversification and Development: Cropping pattern, Crop combination, Intensity of Cropping, Degree of Commercialization, Measurement of Agricultural Efficiency and Productivity

Unit 2: Contemporary Issues in Agriculture

2.1 Hunger and Nutritional Deprivation Food Security and Food Aid Programmes

2.2 Issues of Agricultural marketing Regulation, Pricing Rationale, efficiency, ed market committee, agricultural *mandi*, Agricultural Indebtedness. and Famer suicide.

2.3 New Farming and Product Marketing Trends: Contract farming and corporate agriculture, Agri-Business and agro-industry

2.4 Application of geospatial technology in Agriculture: estimation of crop productivity, monitoring of crop health and crop vulnerability

Unit 3: Livelihoods Perspective of Rural Development

3.1 Concept and Framework of Sustainable Rural Livelihoods, Types of livelihood and their strength and weakness

3.2 Land: access, entitlement, policies and gender issues

3.3 Issues of Diversification of Rural Livelihood; Strategies for livelihood and Alternative livelihood; Livelihood Promotion by different agencies, Barriers and Challenges

3.4 Role of Governance and Institutions in developing resilience in rural livelihoods in India

Unit 4: Gender Perspectives of Rural Development

4.1 Role of Women in Rural Development; Myth and reality of work participation and representation

4.2 Women and agriculture, impact of technological change, impact of globalization

4.3 Women in rural non-farm sector: Micro finance- SHG and women entrepreneurship

4.4 Empowerment and development in India; Approaches to empowerment and Development: WID, WAD, GAD

Suggested Readings:

1. Bhalla, G.S. &Alagh, Y.K., Performance of Indian Agriculture, Sterling Pub., New Delhi
2. Duckhan, A.N. and Masfield, G.B., Farming Systems of the World, London.
3. Griggs, D. An Introduction to Agricultural Geography, Routledge, London.
4. Haque, T. Agrarian Distress in India: Causes & Remedies, Concept Publishers, New Delhi
5. Husain, Majid. Agricultural Geography, New Delhi.
6. John, R, Tarrant. Agricultural Geography.
7. Mohammad, A. Food Production and Food Problem in India, New Delhi.
8. Mohammad, A. Environment, Agriculture & Poverty, Concept Publishers.
9. Mohammad, N. Perspectives in Agricultural Geography, New Delhi.
10. Morgan, W.B. and Munton, P.J.C. Agricultural Geography, London.
11. Panda, S.C. Mechanization of Agriculture, Kalyani Publishers.
12. Shafi, M. Agricultural Geography of South Asia, Macmillon, New Delhi.
13. Shafi, M., Agricultural Geography, Dorling Kindersley, New Delhi.
14. Singh, J. and Dhillon, S.S. Agricultural Geography. Tata McGraw Hill
15. Symons, L. Agricultural Geography, London.
16. Acharya, S.S & Agarwal, N.L (1987) Agricultural Marketing in India, Oxford & IHB Publishing Co, New Delhi.
17. Singh, G.N. (1987) Agricultural Marketing in India. Hugh Publication, Allahbad.
18. Garnier, B, J and Delobez. A (1977) Geography of Marketing, Longman, London.
19. Khan.N (1991) Agriculture development and Marketing, H.K. Publisher, New Delhi

Course Name: **Advanced Geomorphology- III**

Course Code: **GEOPGDEP05**

L+T+P: 0+1+3 per week

Course Outcome:

By the time students complete this course they will be able to:

1. Develop an advanced level of learning on drainage basin morphometry, fluvial hydraulics and sedimentology based on the field survey, instrumental record, and laboratory analysis.
2. Apply the SPSS/Excel to analyse the dynamics of drainage basin using multi-variate perspectives
3. Use auto level for slope profiling, current meter for measuring velocity, clinometers for dip measurement
4. Measure meander geometry and river profiles
5. Collect the samples of water and sediment especially for measuring the sediment concentration and D50.
6. Analyse shape, and size of the pebbles to understand fluvial dynamics
7. Prepare panel diagram based on field data
8. Extract geomorphic features from the FCC and overlay analysis.
9. Interpret coastal forms and processes using wave refraction, wave breaker analysis, coastal dune asymmetry and coastline shifting
10. Find some opportunities both in the private and govt. sectors including the positions of Field guide, geomorphologist, landscape planner and designer, and environmental monitoring analyst, laboratory staff

Unit 1: Drainage Basin Morphometry and Multivariate Analysis

1.1 Stream order after Horton, Strahler, Scheidegger and Shreve; Laws of Stream Number, Length, Bi-furcation Ratio
1.2 Areal and Relief aspects of drainage basins: hypsometric curve, stream frequency and drainage density
1.3 Linkage systems of Drainage Basins – CIS Links, Trans Links and concept of TDCN
1.4 Application of SPSS/Excel in multivariate analysis in geomorphology

Unit 2: Fluvial Measurement Techniques

2.1 Braiding Index, Sinuosity Index and Meander Wavelength and Radius of Curvature
2.2 Construction of Long, and Cross Profiles based on geospatial/field data; Regression analysis of river profiles
2.3 Measurement of hill slope profiles with abney's level and drawing of profiles maintaining slope forms, use of clinometer
2.4 Measurement of velocity using Current Meter and Float method; Gauge height and discharge of river water

Unit 3: Geomorphic Maps, Diagrams and Sediment Analysis

3.1 Collection and analysis of coastal or riverine sediments using □-Graded sieves and Chemical / Electronic Balance / D-50 analysis
3.2 Analysis of pebble-grade fluvial and coastal sediments for shape, size and materials
3.3 Preparation of geomorphic maps from field data using standard symbols and colours; Panel diagrams and litholog analysis

3.4 Extraction of geomorphic features from satellite FCCs in overlays.

Unit 4: Quantification and Interpretation of Coastal Forms and Processes

4.1 Preparation of wave refraction diagram.
4.2 Determination of breaker types by empirical equations.
4.3 Quantification of asymmetry of coastal dunes
4.4 Quantification of Coastal erosion using DSAS tool

Suggested Readings:

1. Birch, T.W.: Maps: Topographical and Statistical, Clarendon Press, Oxford. 1968
2. Dackombe, R. V. and Gardiner, V.: Geomorphological Field Manual. George Allen and Unwin, London. 1983
3. Goudie, A.: Geomorphological Techniques. Unwin Hyman, London. 1990
4. Goudie, A.S.: Geomorphological Techniques, Unwin Hyman, London, 1990
5. Morisawa, M.E. (ed.): Quantitative Geomorphology: Some Aspects and Applications, State University of New York (Binghamton), New York, 1971
6. Morisawa, M.E. (ed.): Fluvial Geomorphology, State University of New York (Binghamton), New York, 1977
7. Pal, S.K.: A classification of morphometric methods, Geographical Review of India, Vol. 34, No. 1, 1972
8. Richards, K.: Fluvial Geomorphology, Blackwell, London, 1978
9. Saha, S. K. and Barrow, C. J.: River Basin Planning: Theory and Practice, Wiley, Chichester, 1981
10. Sen, P.K.: Geomorphological Analysis of Drainage Basins, The University of Burdwan, Burdwan, 1993
11. Strahler, A.: Quantitative analysis of watershed geomorphology, Transactions of the American Geophysical Union., Vol. 38, No. 6, 1957
12. Wilson, J.P. and Gallant, J.C. (ed.): Terrain Analysis – Principles and Applications, Wiley, New York, 2000
13. Cooke, R. U. and Doornkamp, J. C.: Geomorphology in Environment Management. Clarendon Press, London, 1974

Course Name: **Urban and Regional Planning- III**
Course Code: **GEOPGDEP06**
L+T+P: 0+1+3 per week

Course Outcome:

By the time students complete this course they will be able to:

1. Make quantitative analysis of urban settlement patterns, growth and spatial organization.
2. Collect data from urban stakeholders for analysis of environmental impact assessment, which will guide learners for preparation of future developmental planning.
3. With practical knowledge learners will be equipped with handling the statistical tools for assessment of differential importance of urban settlements and their spatial hierarchal system.
4. Analyse the spatial interaction pattern of urban settlements and their impact upon hinterland, which will guide for formulating urban and regional developmental planning.
5. Use the computer based geoinformatics for urban and regional problem assessment.
6. Handle the geocoding devices for mapping of urban land features.
7. Make geospatial land use maps for urban transformation assessment.
8. Make an empirical study of urban and regional contemporary issues and also the learners will be able to prepare diagnostic plan for urban development and redevelopment.

Unit 1: Analysis of Urban System

1.1. Rank-Size Rule, Primate City
1.2. Urban Growth Differentials, Urban Concentration
1.3. Environmental Impact analysis for Urban Projects: Leopold Matrix
1.4. Index of diversification, Mather's model of mean spacing

Unit 2: Analysis of Functional Importance of Towns

2.1 Threshold Population by Reed-Muench Method, Centrality of Towns, Estimation of Hierarchy of Towns
2.2 Sphere of Influence after V.L.S. Prakash Rao and Reilly's Breaking Point Method
2.3 Identification of Spatio-functional gaps (Mathematical and Graphical) and estimation of Required Number of facilities to fill the gaps
2.4 Factor Analysis (PCA based) for regional synthesis; SWOT analysis;

Unit 3: Geoinformatics in Urban and Regional Planning

3.1 Image processing of cities- Geo-referencing, digitization, scales, layers, layout, topology creation
3.2 Urban Spatial analysis- buffer, overlay, 3D analysis and modelling
3.3 Environmental analysis- NDVI, NDWI, Land Surface Temperature
3.4 Urban growth modelling; LULC analysis; Site suitability analysis

Unit 4: Field Application of Planning Techniques

4.1 Delineation of City Region (Flow of people/goods/services)
4.2 Rural-urban fringe: Peri-urban Area and Conurbation
4.3 Urban Functional Analysis; City Structure
4.4 Planning – Master Plan, Structure Plan and Action Plan – Neighbourhood Planning

Suggested Readings

1. Connor, L R and Morreu, A J H, Statistics in Theory and Practice, Pitman, London, 1964
2. Willams, Ken (ed): Statistics and Urban Planning, Charles Knight & Co. Ltd, London, 1975
3. Mahmood, A., Statistical Techniques in Geography

Course Name: **Population Geography- III**
Course Code: **GEOPGDEP07**
L+T+P: 0+1+3 per week

Course Outcome:

On completion of the course, students are able to:

1. Compute the growth rate of population and projected population by arithmetic, geometric and exponential methods and also understand the doubling time of population.
2. Understand the construction of columns and life table and its significance in geographical study.
3. Work out the different measures of fertility, mortality, morbidity and migration.
4. Know the construction of age-sex pyramid, sex ratio, masculinity ratio, feminity ratio and their interpretations.
5. Calculate the measures of displacement with the help of index of dissimilarity and index of ageing.
6. Compute the measures of inequality by using Lorenz curve and Gini's coefficient.
7. Compute Poverty Index, Headcount Index, MDPI & GDI.
8. Understand the Population potential by gravity model and functional gap area analysis by Residual Method.
9. Know the concept and computation of Principal Component Analysis (PCA), Factor Analysis, and Path Analysis and measurement model by using SPSS Statistics/ R statistical programming.
10. Assess the quality of age data in census by Whipple's index.

Unit 1: Measures of Population Growth and Distribution

1.1 Population growth: computation of linear, geometric, and exponential growth rates of population; Methods of population projection: arithmetic, geometric, exponential and ratio methods, doubling time
1.2 Methods of population projection: arithmetic, geometric, exponential and ratio methods, doubling time
1.3 Measures of population concentration and dependency ratio
1.4 Life table: constructions of columns and life tables; Lexis diagram

Unit 2: Measures of Population Change

2.1 Measures of Fertility: GFR, TFR, ASFR, CBR
2.2 Measures of Mortality: GDR, ASDR, SDR
2.3 Measures of Morbidity: Incident rate, Prevalence rate, Case fatality rate
2.4 Measures of Migration: Immigration rate, Out migration rate, Net migration rate, Gross migration rate

Unit 3: Measures of Disparity and Inequality

3.1 Construction of age-sex pyramid, sex ratio, masculinity ratio, feminity ratio
3.2 Measures of displacement: index of dissimilarity, index of ageing
3.3 Measures of inequality: Lorenz curve and Gini's coefficient
3.4 Computation of Poverty Index, Headcount Index, MDPI & GDI

Unit 4: Demographic Data analysis Techniques

4.1 Population potential by gravity model, functional gap area analysis by Residual Method
4.2 Principal Component Analysis (PCA) and Factor Analysis using SPSS Statistics
4.3 Structural Equation Modeling (SEM): path analysis and measurement model using SPSS Statistics/R statistical programming
4.4 Assessing quality of age data in census: Whipple's index

Suggested Readings:

1. Ahuja, Ram, (2001): Research Methods, Rawat Publications, New Delhi.
2. Byrne, B. M., (2001): Structural equation modeling with AMOS: Basic concepts, applications, and programming. Mahwah, NJ: Lawrence Erlbaum Associates.
3. Craig, J., (1987): Population potential and some related measures, Area 19 (2) (1987), pp. 141–146. [Web of Science @], [Google Scholar].
4. Gaur. S. Ajai and Gaur. S. Sanjaya, (1977): Statistical Methods for Practice and Research: A Guide to Data Analysis Using SPSS, Sage Publications, New Delhi.
5. Hoyle, R. H. (Ed.).(1995): Structural equation modeling: Concepts, issues, and applications. Thousand Oaks, CA: Sage Publications.
6. Kline, R. B., (2005): Principles and practice of structural equation modeling (2nd ed.). New York: Guilford Press.
7. Kothari, C.R., (2010): Research Methodology, Methods and Techniques Second Edition), New Age Publishers.
8. Mahmood, A., (1998): Statistical Methods in Geographical Studies, Rajesh Publications, New Delhi.
9. Pathak, K.B. and Ram, F., (2016): Techniques of Demographic Analysis, Himalaya Publishing House, Mumbai.
10. Rich, (1980): Potential models in human geography. Concepts and Techniques in Modern Geography, 26. University of East Anglia, Norwich. [Google Scholar].
11. Sinha, V.C. and Zacharia, E., (2009): Elements of Demography, Allied Publishers Pvt. Ltd., New Delhi.
12. Srinivasan, K., (1998): Basic Demographic Techniques and Applications, Sage Publications, New Delhi.
13. United Nations Development Programme, (2000): Human Development Report, Oxford University Press, Oxford.

Course Name: **Agriculture and Rural Development- III**
Course Code: **GEOPGDEP08**
L+T+P: 0+1+3 per week

Course Outcome:

By the time students complete this course they will be able to:

5. Measure agriculture development in any region across the world with suitable data
6. Assess the quality of soil and predict the soil-crop relationship
7. Utilise the modern techniques to access the crop heath and detect the crop diseases
8. Execute the PRA for field survey at household level or community level.
9. Apply Sustainable Livelihood Approach Framework for vulnerability/sustainability assessment

Unit 1: Measuring Agricultural Development

1.1 Measurement of crop productivity (W.M. Yang, Shafi) Nutritional Index:
1.2 Measurement of agricultural efficiency (Shafi and Enayedi)
1.3 Crop-combination regions (Weaver's method) and crop-diversification (Herfindahl index)
1.4 Multivariate analysis for agricultural development index: Factor analysis- Principal component analysis

Unit 2: Mapping and Data Analysis in Agriculture

2.1 Multivariate estimate of Soil; Soil-Crop Relationship
2.2 Preparation and interpretation of Crop calendar using Ergograph;
2.3 Mapping Land Use Change Detection using Remote Sensing and GIS
2.4 Crop Health Estimation Using NDVI

Unit 3: Rural Development with PRA Tools

3.1 Wealth raking and mapping, Income and expenditure matrix
3.2 Venn diagram on institution, FGD
3.3 Semi Structured Interview: Household case study, SWOT analysis
3.4 Resource map, Social map

Unit 4: Rural Development: Measurement of Sustainable Livelihood and Indices

4.1 Vulnerability Index: Environmental, Social and Cultural
4.2 Livelihood Assets/Capital Index: Human capital, Physical capital, Social capital, Natural capital, Financial Capital
4.3 Sustainable Livelihood Index
4.4 HDI, HPI, MDPI and GDI

Suggested Readings

1. Chandra Shekara, P., & et al (2016): Farmer's Handbook on Basic Agriculture, Desai Fruits & Vegetables Pvt. Ltd. Navsari, Gujarat
2. Crop Production Guide (2005): Directorate of Agriculture, Govt. Of West Bengal
3. Alvi, Z.: Statistical Geography: Methods and Applications, Rawat Publications, New Delhi, 1995
4. ICAR. (2006): Handbook of Agriculture. Indian Council of Agricultural Research, New Delhi.
5. Kahlon A.S. and S.D. Tyagi, (2000): Agricultural Price Policy in India, Allied Publishers Pvt. Ltd., Bombay.
6. Kundu, A. (1980): Measurement of urban processes: A study in Regionalization, Popular Prakashan, New Delhi
7. Rogerson, P. (2001): Statistical Methods for Geography, Sage Publications, London
8. Sadanandan S., Natarajan P., et al (2007): Data Tools: Participatory Rural Appraisal Techniques, Cochin.
9. FAO/UNESCO (1974): Soil Map of the World, Vol. I Legend, UNESCO, Paris
10. FAO, (1981): A Framework for Land Evaluation, FAO, Rome
11. FAO, (1995): Planning for Sustainable Use of Land Resources- towards a New Approach, Land and Water Bulletin 2, FAO, Rome
12. Gregory, S.: Statistical Methods and the Geographer, Longman, London, 1978
13. Johnston, R.J.: Multivariate Statistical Analysis in Geography, Longman, London, 1973
14. Lillesand, T.M. and Kiefer, R. W.: Remote Sensing and Image Interpretation, 3rd edition, John Wiley and Sons, New York, 1994
15. Rao, D.P. (ed.): Remote Sensing for Earth Resources, Association of Exploration Geophysicist, Hyderabad, 1998
16. Sabins, F.F.: Remote Sensing: Principles and Applications, 3rd edition, W.H. Freeman & Company, New York, 1997
17. Jha, M.M. and Singh, R.B. (2008) Land Use: Reflection on Spatial Informatics Agriculture and Development, New Delhi: Concept.

Course Name: **Project and Dissertation**
Course Code: **GEOPGPRJ01**
L+T+P: 0+1+3 per week

Course Outcome:

By the time students complete this course they will be able to:

1. Learn to plan for studying geographical problem/issue of a given area.
2. Learn to select appropriate tools and techniques to observe/measure the features of his/her interest to collect data.
3. Be able frame suitable survey schedule for collection of data.
4. Will be able to design and apply appropriate sample suitable for the study.
5. Will learn to conduct survey/measurement and observation to collect data and information under the supervison of a faculty member.
6. Acquire skill to data tabulation, manipulation and screening as required.
7. Will learn to apply appropriate and suitable quantitative and geospatial techniques and methods required for data analysis and data presentation.
8. Will learn the art of designing and writing a dissertation under the guidance of a faculty member.
9. Gain a hands-on training of preparing a plan for urban and/or regional development.
10. Use different instruments for geospatial analysis of urban and regional features.
11. Understand about how to deal with specific urban and/ or regional issue and how to make an in-depth study in research perspective.
12. Conduct physical survey, household survey, formal group discussion and target group discussion as primary step of plan preparation.
13. Address the urban and regional problems and resource potential and finally the learner will be able to prepare suggestive plan with highlighting a road map for future development.

Project and Dissertation Guidelines

1. Individual student will prepare a PROJECT/DISSERTATION REPORT on a topic under the guidance of a supervisor. Student will select a topic for the project work from their special paper. Supervisor for guiding the Project and Dissertation will be allotted as soon as the special paper is allotted to the students in the 3rd Semester.

2. Preparation of dissertation report will be based on primary data and/ or secondary data. Primary data will be collected using survey schedules and/or instruments and /or laboratory analysis. Area of study/survey as applicable will be decided by the supervisor. Preferably the study area should be within West Bengal.

3. Distribution of marks:
   a. Teacher's assessment- 10 marks
   b. Evaluation of Project Report- 20 Marks
   c. Seminar Presentation- 10 Marks
   d. Viva-voce- 10 Marks
   Total = 50 marks

4. Specifications of Dissertation Report:
    a. Area to be studied: Any feasible spatial unit (e.g., Rural and/or Urban; reach of a river/any feasible geomorphic unit of study)
    b. Duration of survey and area of study: As decided by the respective supervisor as per the requirement
    c. Length: word limit: 25,000 words; page limit: up to 100 pages excluding the bibliography/references and appendices.
    d. Report certification: The project report should be certified by the concerned supervisor/guide that the project work is done under his/her supervision and it is an original work of the student. The students will also declare that this is his/her original work.
    e. Students will submit two hard copies of the report – one for the supervisor and another for the department. Moreover, they will submit a soft copy (pdf) to the dept. in CD and/or Google Drive.
    f. The report will contain basic sections of a research like Research problem, literature review, research gaps, objectives, materials and methods, study area, data analysis, presentation of results, discussion, conclusions and references.
    g. Students are expected to produce a quality work that can base further research

Course Name: **Principles of Human Geography**
Course Code: **GEOPGGEC02**
L+T+P: 3+1+0 per week

Course outcomes:

On completion of the course, students will able to:

1. Study the growth and distribution of population in world perspective.
2. Understand the concept and indicators of socio-economic development.
3. Know the population-resource relationship after Ackerman.
4. Study the concept of society, social groups and social processes.
5. Know the concept and spatial distribution of caste, religion, race and gender.
6. Understand the concept, problems and conservation of resources.
7. Study the sectors of the economy and their characteristics.
8. Understand the locational models in economic geography and their present-day applicability.
9. Know the types of agriculture and agricultural regions of the world.
10. Understand the industrial regions of the world, models of transport and their characteristics and the international agreements and trade blocs.

Unit 1: Elements of Human Geography

1.1 Nature and Scope of Human Geography
1.2 Growth and Distribution of world population
1.3 Economic and social Development, Indicators of Socio-economic Development
1.4 Population-resource region after Ackerman

Unit 2: Society and Culture

2.1 Concept of society and social groups; Social processes
2.2 Social categories: Caste, religion, race, gender, and their spatial distribution
2.3 Cultural regions and cultural realms, concept of Cultural landscape
2.4 Cultural hearth and Cultural Diffusion

Unit 3: Resource and Economic Activity

3.1 Concept of Resource; Types and conservation
3.2 Sectors of the economy: Primary, Secondary, Tertiary and Quaternary
3.3 World economic order and their characteristics
3.4 Location of economic activities: Theories of Von Thünen and Weber

Unit 4: Agriculture, Industry and Trade

4.1 Types of agriculture; Agricultural regions of the world
4.2 Industrial regions of the world; Industries with special reference to India: Cotton, Iron and Steel, and IT
4.3 Modes of Transport and their characteristics
4.4 International agreements and trade blocs: GATT and OPEC

Suggested Readings:

1. Alexander J. W., 1963: Economic Geography, Prentice-Hall Inc., Englewood Cliffs, New Jersey.
2. Aoyama, Y., Murphy, J., and Hanson, S. (2010) Key Concepts in Economic Geography, London: Sage.
3. Bagchi-Sen S. and Smith H. L., 2006: Economic Geography: Past, Present and Future, Taylor and Francis.
4. Bergman, E.F (1995): Human Geography-Culture, Connections and Landscape, Prentice Hall, New Jersey
5. Berry, B.J.L., Conklin, E.C. and Ray, M.D. (1976): The Geography of Economic Systems, Prentice Hall, New Jersey.
6. Bradford, M.G. and Kent, W.A. (1977): Human Geography, Theories and Applications, Oxford University Press, Oxford.
7. Chisholm. (1975): Human Geography, Penguin Books, Hermondsworth.
8. Coe, N., Kelly, P., and Yeung, H. (2007) Economic Geography: A Contemporary Introduction, London: John Wiley & Sons.
9. Daniel, P.A. and Hopkinson, M.F. (1989) The Geography of Settlement, Oliver & Boyd, London.
10. Hodder B. W. and Lee Roger, 1974: Economic Geography, Taylor and Francis.
11. Johnston R; Gregory D, Pratt G. et al. (2008) The Dictionary of Human Geography, Blackwell Publication.
12. Jones, C.F. and Darkenwald, G.G. (1954): Economic Geography, Macmillan, New York.
13. Jordan-Bychkov et al. (2006) The Human Mosaic: A Thematic Introduction to Cultural Geography. W. H. Freeman and Company, New York.
14. Leong. G.C. and Morgan, G.C. (1975): Human and Economic Geography, Oxford University Press, Hong Kong.
15. Morgan, W.B. and Munton, R.J.C. (1971): Agricultural Geography, Methuen, London.
16. Norton. W. (2001): Human Geography, 4th Edition Oxford University press, Oxford
17. Pearce D. (1995): Tourism Today: A Geographical Analysis, 2nd edition, Longman Scientific & Technical, London
18. Pickering K. and Owen A. A. (1997): An Introduction to Global Environmental Issues, 2nd Edition Rutledge, London.
19. Raw, M. (1986): Understanding Human Geography: A Practical Approach, Bell and Hyman. London
20. Rubenstein, J.M. (2002), The Cultural Landscape, 7th Edition, Prentice Hall, Englewood Cliffs
21. Singh, J. (1974): An Agricultural Atlas of India: A Geographical Analysis, Vishal Publications, Kurukshetra.
22. Smith D M (1982): Human Geography: A Welfare Approach, Edward Arnold, London
23. Thomas, R.S. and Corbin, P.B. (1968): Geography of Economic Activity, McGraw Hill, New York.