

SYLLABUS

FOUR YEARS UNDERGRADUATE PROGRAMME IN GEOGRAPHY



'সমানো মন্ত সমিতি সমানী'

**UNIVERSITY OF NORTH BENGAL
RAJA RAMMOHUNPUR**

W.E.F: ACADEMIC SESSION 2023-24

Semester: 1

PAPER: MAJOR

Paper Description: Geotectonic

This paper deals with topics in Geotectonic, Scale and Diagrammatic data presentation. In particular, the theoretical part of the course will cover internal structure of the earth, rocks, isostasy, earth movements, mountain building, continental drift theory, sea-floor spreading, plate tectonics and volcanicity; while the practical part will cover construction of linear and comparative scale and diagrammatic data presentation using line, bar and circle.

Paper Code: UGEOMAJ11001

Paper Type: Theory + Practical Lab Based-PLB

Credit: 3 credit theory and 1 credit practical.

Class hours: 3 theory classes per week and 2 practical classes per week. Total 5 classes per week.

Duration of the Examinations: 2 hrs. Theoretical and 2 hrs. Practical Examinations.

Syllabus:

Paper Objectives

Knowledge acquired:

1. Concept of geotectonic and earth's interior.
2. Theories of mountain building.
3. Continental drift, plate movements and volcanicity.

Skills gained:

1. Develop skills in constructing linear and comparative scale.
2. Graphical representation of data using line, bar and circle diagrams.

Competency developed:

1. Developing skills in questioning, reasoning, and drawing logical conclusions based on evidence and scientific principles of various theories and concepts related to geotectonic.
2. Enable students to interpret and visually communicate data effectively.

Syllabus Overview

Theory

Unit	Content	Hours/Week
1	Geological time scale; Internal structure of the earth; Classification of rocks: Igneous, Sedimentary and Metamorphic; Theory of isostasy: Views of Airy and Pratt.	3
2	Earth movements, processes and topographic effects of folding and faulting; Classification of mountains; Theories of mountain building: Geosynclinal theory of Kober, Thermal contraction theory of Jeffreys, Thermal convection current theory of Holmes.	
3	Continental drift theory of Alfred Wegener; Concept of sea-floor spreading; Plate tectonics, plate boundaries and subduction zones; Concept of volcanicity; Classification of volcanoes; Volcanic landforms; World distribution of volcanoes.	

Practical

Unit	Content	Hours/Week
1	Scale: Definition and types; Construction of linear and comparative scale.	2
2	Diagrammatic data presentation: Line, bar (simple, compound and composite) and circle (pie graph, proportional circle and proportional divided circle).	

Suggested reading

Monkhouse, F. J. (1974). *Principles of Physical Geography* (2009-reprint). Platinum Publishers.

Strahler, A. (2016). *Introducing Physical Geography*, 6th ed. Wiley.

Khullar, D. R. (2012). *Physical Geography*. New Delhi, India: Kalyani Publishers.

Mohan, K. (2018). *GES PERIODOS VOL 1, An Ultimate Guide to Physical Geography*. Oak Bridge Publication, New Delhi.

Kearey, P., Klepeis, K. A., & Vine, F. J. (2011). *Global Tectonics*, 3rd ed. Wiley-India.

Singh, S. (2022). *Physical Geography*. Pravalika Publications, Prayagraj.

Christopherson, R. W., & Birkeland, G. H. (2012). *Geosystems: An Introduction to Physical Geography* (8th edition). Pearson Education, New Jersey.

Das Gupta, A., & Kapoor, A. N. (2001). *Principles of Physical Geography*. S.C. Chand & Company Ltd. New Delhi.

Skinner, B. J., & Porter, S. C. (2000). *The Dynamic Earth: An Introduction to Physical Geology*, 4th Edition. John Wiley and Sons.

Singh, R. L., & Singh, R. P. B. (1999). *Elements of Practical Geography*. Kalyani Publishers.

Sarkar, A. (2015). *Practical geography: A systematic approach*. Orient Black Swan Private Ltd., New Delhi.

Mishra, R. P., & Ramesh, A. (1989). *Fundamentals of Cartography*. Concept, New Del

Practical guidelines: Students will prepare a laboratory notebook covering all the practical units duly signed by the internal faculty members. Viva-voce is compulsory at the time of practical examination.

Question pattern

Type	Marks	Total
Theoretical	1: 5 out of 5 5: 3 out of 5 10: 2 out of 4	40
Practical	15 : 1 out of 1 5: Laboratory notebook and viva-voce.	20
CE	10: Mid-term test, class test, seminar presentation, term paper (Any one to be decided by the respective departmental faculty members)	10
Attendance	5	5
Full marks		75

Semester: 1

PAPER: SEC

Paper Description: Disaster Management

This paper provides an overview of hazards and disasters, focusing on their definition, classification, and impacts. It examines the concepts of vulnerability and risk and explores various types of natural and human-induced disasters, including floods, droughts, landslides, earthquakes, cyclones, industrial hazards and pandemics. The course also introduces the principles and strategies of disaster management, including identification and risk assessment, risk reduction and preparedness and disaster response and recovery. In the practical part of the course, students work on a project report related to a specific hazard or disaster using secondary sources of data.

Paper Code: UGEOSEC11001

Paper Type: Theory + Practical Lab Based-PLB

Credit: 2 credit theory and 1 credit practical.

Class hours: 2 theory classes per week and 2 practical classes per week. Total 4 classes per week.

Duration of the Examinations: 2 hrs. Theoretical and 2 hrs. Practical Examinations.

Syllabus:

Paper Objectives:

Knowledge acquired:

1. Definition, concept and classification of hazards and disasters.
2. Economic, social and environmental impacts of disasters.
3. Concept and strategies of disaster management.

Skills gained:

1. Students will learn how to effectively organize and write a project report incorporating appropriate maps, diagrams, charts and tables.
2. By working in groups under the supervision of faculty members, students will develop skills required for teamwork; including collaboration, coordination, and task allocation.

Competency developed:

1. Develop a comprehensive understanding of hazards and disasters, enabling them to recognize and assess potential risks and vulnerabilities in different contexts.
2. Equipped with the knowledge and skills necessary to contribute to the development of effective disaster management plans and strategies.
3. Enhance critical thinking abilities by examining the causes, impacts and management strategies associated with hazards and disasters.

Syllabus Overview:

Theory

Unit	Content	Hours/Week
1	Definition and concept of hazards and disasters; Definition of vulnerability and risk; Classification of hazards and disasters; Economic, social and environmental impacts of disasters; Natural and human induced	2

	disasters like flood, drought, landslide, earthquake, cyclone, industrial hazards and pandemics.	
2	Concept of disaster management; Strategies of disaster management: Identification and risk assessment, risk reduction and preparedness, disaster response and recovery.	

Practical

Unit	Content	Hours/Week
1	A project report will be prepared by the students in consultation with their respective college teachers on any types or individual cases of hazard and disaster. The report will be prepared based on available sources of secondary data only. Report should be limited within 20-25 pages, handwritten and may include maps, diagrams, charts and tables. The report will be examined externally and marks will be separately allotted for report and viva-voce taken individually. Students will be divided into groups so that in each college at least 4 groups are formed and each group will prepare their report taking different topics under the supervision of the faculty members.	2

Suggested reading

Pandey, M. (Year of publication). *Disaster Management*. Wiley India Pvt. Ltd.

Bhattacharya, T. (Year of publication). *Disaster Science and Management*. McGraw Hill Education (India) Pvt. Ltd.

Singh, J. (Year of publication). *Disaster Management: Future Challenges and Opportunities*. K W Publishers Pvt. Ltd.

Singhal, J. P. (Year of publication). *Disaster Management*. Laxmi Publications.

Pandharinath, N., & Rajan, C. K. (Year of publication). *Earth and Atmospheric Disaster Management: Natural and Man-made*. B S Publications.

Singh, R. B. (2005). *Risk Assessment and Vulnerability Analysis* (Chapters 1-3). IGNOU, New Delhi.

Singh, R. B. (Ed.). (2006). *Natural Hazards and Disaster Management: Vulnerability and Mitigation*. Rawat Publications, New Delhi.

Practical guidelines: Although the work on project report will be done in group, but the students will have to carry their individual copy duly signed by their supervising teacher at the time of viva-voce.

Question pattern

Type	Marks			Total
Theoretical	1: 5 out of 5	5: 3 out of 5	10: 2 out of 4	40
Practical	15 : Project Report	5: Viva-voce.		20
CE	10: Mid-term test, class test, seminar presentation, term paper (Any one to be decided by the respective departmental faculty members)			10
Attendance	5			5
Full marks				75

Semester: 1

PAPER: MINOR

Paper Description: Physical Geography

This paper provides an overview of earth's physical systems and their dynamic processes. The theoretical part covers topics such as the interior of the earth, plate tectonics, weathering, erosion, and landforms. Additionally, it explores the composition and structure of the atmosphere, climate patterns, and climate change. The course also delves into oceanography, including temperature and salinity distribution, ocean currents, coral reefs, and sea level changes. The practical part focuses on construction of scale and map projection techniques. Overall, this course offers a comprehensive understanding of earth's geomorphological, atmospheric and oceanographic processes, enabling students to analyze and interpret various natural phenomena.

Paper Code: UGEOMIN10001

Paper Type: Theory + Practical Lab Based-PLB

Credit: 3 credit theory and 1 credit practical.

Class hours: 3 theory classes per week and 2 practical classes per week. Total 5 classes per week.

Duration of the Examinations: 2 hrs. Theoretical and 2 hrs. Practical Examinations.

Syllabus:

Paper Objectives

Knowledge acquired:

1. Understanding of the interior of the Earth, including its composition and structure.
2. Familiarity with the Continental Drift Theory proposed by Wegener and the concept of plate tectonics.
3. Knowledge of various geological phenomena such as folds, faults, weathering, and mass movement.
4. Understanding of erosional and depositional landforms formed by fluvial (river), glacial, and aeolian (wind) processes.
5. Knowledge of the composition and structure of the atmosphere, including insolation and the heat budget.
6. Understanding of temperature distribution, pressure belts, wind systems and different types of precipitation.
7. Knowledge about cyclones, anti-cyclones and climate change.
8. Understanding of the distribution of temperature and salinity in ocean water and the factors influencing ocean currents.
9. Knowledge of coral reefs and theories of reef formation, including the contributions of Darwin and Daly.
10. Awareness of sea level change and its implications.

Skills gained:

1. Students will develop the ability to analyse geological processes, atmospheric phenomena and oceanic systems.
2. They will learn to interpret maps, diagrams and data related to earth science.

- Students will acquire skills in constructing different types of map projections, including polar zenithal gnomonic, simple conical and cylindrical equal area projection.
- They will develop the ability to observe and identify geological and climatic features.

Competency developed:

- Students will develop critical thinking skills by analyzing and evaluating complex geological and atmospheric processes.
- Students will develop an understanding of the earth's natural systems and the impact of human activities on the environment.
- They will learn to interpret and analyse scientific data, including maps, charts and graphs, to draw conclusions and make informed decisions.
- Students will develop the ability to adapt to changes in the earth's systems and understand the dynamic nature of the planet.

Syllabus Overview

Theory

Unit	Content	Hours/Week
1	Interior of the earth; Continental drift theory by Wegener; Plate tectonics; Folds and faults; Weathering and mass movement; Erosional and depositional landforms: Fluvial, Glacial and Aeolian.	3
2	Composition and structure of atmosphere; Insolation and heat budget; Temperature distribution, pressure belts, wind systems and precipitation types; Cyclones and anti-cyclones; Climate change.	
3	Distribution of temperature and salinity of ocean water; Ocean currents: Causes, types and their distribution over the Indian Ocean; Coral reefs and theories of reef formation after Darwin and Daly; Sea level change.	

Practical

Unit	Content	Hours/Week
1	Scale: Definition and types; Construction of linear, comparative and diagonal scale.	2
2	Map projection: Definition, classification, properties and uses; Mathematical / graphical construction of Polar Zenithal Gnomonic Projection, Simple Conical Projection with one standard parallel, Cylindrical Equal Area Projection.	

Suggested reading

- Ahmed, E. (1985). *Geomorphology*. Kalyani Publishers, New Delhi.
- Khullar, D.R. (2012). *Physical Geography*. New Delhi, India: Kalyani Publishers.
- Mohan, K. (2018). *GES PERIODOS VOL 1, An Ultimate Guide to Physical Geography*. OakBridge Publication, New Delhi.
- Chorley, R.J., Schumm, S.A., & Sugden, D.E. (1984). *Geomorphology*. Methuen, London.
- Dayal, P. (1996). *Textbook of Geomorphology*. Shukla Book Depot, Patna.
- Thornbury, W.D. (2004). *Principles of Geomorphology*. New York, U.S.A.: Wiley.

- Strahler, A.N. (1968). *The Earth Sciences*. Harper & Row Intl. Edn, New York.
- Siddhartha, K. (2020). *Climatology, Atmosphere, Weather and Climate*. Kitaba Mahal Publication, New Delhi.
- Lal, D.S. (1998). *Climatology*. Allahabad: Chaitanya Publishing House.
- Singh, S. (2005). *Climatology*. Allahabad: Prayag Pustak Bhawan.
- Barry, R.G., & Chorley, R.J. (2003). *Atmosphere, Weather and Climate*. Psychology Press, Hove; East Sussex.
- Critchfield, H.J. (1975). *General Climatology*. Prentice Hall, New Jersey.
- Garrison, T. (1998). *Oceanography*. Wordsworth Company, Belmont.
- Kershaw, S. (2000). *Oceanography: An Earth Science Perspective*. Stanley Thornes, UK.
- Sharma, R.C., & Vatal, M. (1980). *Oceanography for Geographers*. Chaitanya Publishing House, Allahabad.
- Sverdrup, K.A., & Armbrust, E.V. (2008). *An Introduction to the World Ocean*. McGraw Hill, Boston.
- Singh, R.L., & Singh, R.P.B. (1999). *Elements of Practical Geography*. Kalyani Publishers, New Delhi.
- Sarkar, A. (2015). *Practical Geography: A Systematic Approach*. Orient Black Swan Private Ltd., New Delhi.

Practical guidelines: Students will prepare a laboratory notebook covering all the practical units duly signed by the internal faculty members. Viva-voce is compulsory at the time of practical examination.

Question pattern

Type	Marks			Total
Theoretical	1: 5 out of 5	5: 3 out of 5	10: 2 out of 4	40
Practical	15 : 1 out of 1	5: Laboratory notebook and viva-voce.		20
CE	10: Mid-term test, class test, seminar presentation, term paper (Any one to be decided by the respective departmental faculty members)			10
Attendance	5			5
Full marks				75

Semester: 2

PAPER: MAJOR

Paper Description: Settlement Geography

This paper deals with topics in settlement geography, scale and map projection. In particular, the theoretical part of the course will cover concept of site and situation, morphology of rural and urban settlements, types, patterns, and distribution of rural settlements, theories of the origin of towns, theories of urban land use, primate cities, rank-size rule, and central place theory. The practical part will cover construction of diagonal and vernier scale and map projections.

Paper Code: UGEOMAJ12002

Paper Type: Theory + Practical Lab Based-PLB

Credit: 3 credit theory and 1 credit practical.

Class hours: 3 theory classes per week and 2 practical classes per week. Total 5 classes per week.

Duration of the Examinations: 2 hrs. Theoretical and 2 hrs. Practical Examinations.

Syllabus:

Paper Objectives

Knowledge acquired:

1. Concept of site and situation, origin and growth of rural and urban settlements, as well as the types, patterns and distribution of rural settlements,
2. Physical layout, structure, and form of rural and urban settlements,
3. Theories of the origin of towns and urban land use and morphology.

Skills gained:

1. Develop skills in constructing diagonal and Vernier scales,
2. Expertise in the mathematical/graphical construction and properties of map projections,

Competency Developed:

1. Analyzing the suitability of different locations for settlements and understanding the factors that contribute to their success or decline.
2. Understanding the morphological patterns will enable students to identify and analyse the characteristics of different settlement
3. Students will develop competency in constructing diagonal and vernier scales and equip with practical skills in map reading, interpretation, and cartographic analysis.

Syllabus Overview:

Theory

Unit	Content	Hours/Week
1	Definition, nature, scope and content of settlement geography; Concept of site and situation; Origin and growth of rural and urban settlements.	3
2	Types, patterns and distribution of rural settlements; Morphology of rural settlements; Theories of origin of towns after Childe and Mumford;	

	Functional classification of urban settlements: A.Mitra; Urban landuse and morphology: Concentric zone theory, Sector theory and Multiple nuclei theory.	
3	Settlement hierarchies; Concept of Primate city and Rank size rule; Central place theory by W. Christaller and A. Losch.	

Practical

Unit	Content	Hours/Week
1	Scale: Construction of Diagonal and Vernier scale.	
2	Map projection: Definition, nature, properties, classification and uses; Mathematical / graphical construction of Polar Zenithal Gnomonic Projection, Polar Zenithal Stereographic Projection, Polar Zenithal Orthographic Projection, Cylindrical Equal Area Projection, Mercator Projection.	2

Suggested reading

Ghosh, S. (2006). *Introduction to Settlement Geography*. Orient Longman.

Singh, R.Y. (2002). *Geography of Settlements*. Rawat Publications.

Pacione, M. (2009). *Urban Geography: A Global Perspective*. Routledge.

Tiwari, R.C. (2020). *Settlement Geography: Rural and Urban Settlements*. Pravalika Publication.

Maurya, S.D. (2015). *Settlement Geography*. Sharda Pustak Bhawan.

Hussain, J. (2021). *Settlement Geography*. Notion Press.

Childe, V.G. (1950). *The Urban Revolution*. University of Chicago Press.

Johnston, R., Gregory, D., Pratt, G., et al. (2008). *The Dictionary of Human Geography*. Blackwell Publication.

Daniel, P.A., Hopkinson, M.F. (1989). *The Geography of Settlement*. Oliver & Boyd, London.

Singh, R.L., & Singh, R.P.B. (1999). *Elements of Practical Geography*. Kalyani Publishers.

Sarkar, A. (2015). *Practical Geography: A Systematic Approach*. Orient Black Swan Private Ltd., New Delhi.

Practical guidelines: Students will prepare a laboratory notebook covering all the practical units duly signed by the internal faculty members. Viva-voce is compulsory at the time of practical examination.

Question pattern

Type	Marks			Total
Theoretical	1: 5 out of 5	5: 3 out of 5	10: 2 out of 4	40
Practical	15 : 1 out of 1	5: Laboratory notebook and viva-voce.		20
CE	10: Mid-term test, class test, seminar presentation, term paper (Any one to be decided by the respective departmental faculty members)			10
Attendance	5			5
Full marks				75

Semester: 2

Paper: SEC

Paper Description: Sustainable Development

This paper provides a comprehensive understanding of sustainable development, focusing on its definition, concepts, and various elements such as social, economic, and environmental sustainability. It explores global issues related to sustainable development, including deforestation and soil erosion and examines key global initiatives in sustainable development, along with the Millennium Development Goals. In the practical part of the course, students work on a project report related to any topic or issue on sustainable development using secondary sources of data.

Paper Code: UGEOSEC12002

Paper Type: Theory + Practical Lab Based-PLB

Credit: 2 credit theory and 1 credit practical.

Class hours: 2 theory classes per week and 2 practical classes per week. Total 4 classes per week.

Duration of the Examinations: 2 hrs. Theoretical and 2 hrs. Practical Examinations.

Syllabus:

Paper objectives

Knowledge acquired:

1. Definition, concept and elements of sustainable development.
2. Global challenges such as deforestation and soil erosion, their causes, impacts, and potential solutions.
3. Key global initiatives and agreements aimed at promoting sustainable development.
4. India's progress in achieving millennium development goals.
5. Challenges and obstacles faced in implementing sustainable development strategies.

Skills gained:

1. Students will learn how to effectively organize and write a project report incorporating appropriate maps, diagrams, charts and tables.
2. By working in groups under the supervision of faculty members, students will develop skills required for teamwork; including collaboration, coordination, and task allocation.

Competency developed:

1. Develop the ability to analyze complex sustainability issues critically, evaluate different perspectives and propose informed solutions
2. Foster a sense of responsibility and awareness among students towards environmental conservation and protection.
3. Students will cultivate a sense of global citizenship and understand the interconnectedness of various regions and societies.

Syllabus Overview:

Theory

Unit	Content	Hours/Week
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1	Definition and concept of sustainable development; Elements of sustainable development: Social sustainability, economic sustainability and environmental sustainability; Global issues related to sustainable development like deforestation and soil erosion.	2
2	Global initiatives in sustainable development like Ramsar convention, Stockholm conference and Earth Summit (Rio 1992); Millennium Development Goals; India's progress with respect to MDGs; Future trends and challenges of sustainable development.	

Practical

Unit	Content	Hours/Week
1	A project report will be prepared by the students in consultation with their respective college teachers on any issues or topics related to sustainable development. The report will be prepared based on available sources of secondary data only. Report should be limited within 20-25 pages, handwritten and may include maps, diagrams, charts and tables. The report will be examined externally and marks will be separately allotted for report and viva-voce taken individually. Students will be divided into groups so that in each college at least 4 groups are formed and each group will prepare their report taking different topics under the supervision of the faculty members.	2

Suggested reading

World Commission on Environment and Development. (1987). *Our Common Future* (Brundtland Report).

Baker, S. (2006). *Sustainable Development*. New York, N.Y.: Routledge.

Singh, R.B. (Ed.) (2001). *Urban Sustainability in the Context of Global Change*. Science Pub., Inc., New Delhi, India: Enfield (NH), USA and Oxford & IBH Pub.

Osorio, L., et al. (2005). Debates on sustainable development: Towards a holistic view of reality. *Environment, Development and Sustainability*, 7(4), 501-518.

Muni, S.D., Chaturvedi, S. (Year). *India and the Millennium Development Goals: Progress and Challenges*.

Robertson, M. (Year). *Sustainable Development: Principles, Policies, and Practices*.

Mega, V.P. (Year). *Sustainable Development: Concepts, Rationalities and Strategies*.

Practical guidelines: Although the work on project report will be done in group, but the students will have to carry their individual copy duly signed by their supervising teacher at the time of viva-voce.

Question pattern

Type	Marks			Total
Theoretical	1: 5 out of 5	5: 3 out of 5	10: 2 out of 4	40
Practical	15 : Project Report	5: Viva-voce.		20
CE	10: Mid-term test, class test, seminar presentation, term paper (Any one to be decided by the respective departmental faculty members)			10
Attendance	5			5
Full marks				75

Semester: 2

PAPER: MINOR

Paper Description: Physical Geography

This paper provides an overview of earth's physical systems and their dynamic processes. The theoretical part covers topics such as the interior of the earth, plate tectonics, weathering, erosion, and landforms. Additionally, it explores the composition and structure of the atmosphere, climate patterns, and climate change. The course also delves into oceanography, including temperature and salinity distribution, ocean currents, coral reefs, and sea level changes. The practical part focuses on construction of scale and map projection techniques. Overall, this course offers a comprehensive understanding of earth's geomorphological, atmospheric and oceanographic processes, enabling students to analyze and interpret various natural phenomena.

Paper Code: UGEOMIN10001

Paper Type: Theory + Practical Lab Based-PLB

Credit: 3 credit theory and 1 credit practical.

Class hours: 3 theory classes per week and 2 practical classes per week. Total 5 classes per week.

Duration of the Examinations: 2 hrs. Theoretical and 2 hrs. Practical Examinations.

Syllabus:

Paper Objectives

Knowledge acquired:

1. Understanding of the interior of the Earth, including its composition and structure.
2. Familiarity with the Continental Drift Theory proposed by Wegener and the concept of plate tectonics.
3. Knowledge of various geological phenomena such as folds, faults, weathering, and mass movement.
4. Understanding of erosional and depositional landforms formed by fluvial (river), glacial, and aeolian (wind) processes.
5. Knowledge of the composition and structure of the atmosphere, including insolation and the heat budget.
6. Understanding of temperature distribution, pressure belts, wind systems and different types of precipitation.
7. Knowledge about cyclones, anti-cyclones and climate change.
8. Understanding of the distribution of temperature and salinity in ocean water and the factors influencing ocean currents.
9. Knowledge of coral reefs and theories of reef formation, including the contributions of Darwin and Daly.
10. Awareness of sea level change and its implications.

Skills gained:

1. Students will develop the ability to analyse geological processes, atmospheric phenomena and oceanic systems.
2. They will learn to interpret maps, diagrams and data related to earth science.

- Students will acquire skills in constructing different types of map projections, including polar zenithal gnomonic, simple conical and cylindrical equal area projection.
- They will develop the ability to observe and identify geological and climatic features.

Competency developed:

- Students will develop critical thinking skills by analyzing and evaluating complex geological and atmospheric processes.
- Students will develop an understanding of the earth's natural systems and the impact of human activities on the environment.
- They will learn to interpret and analyse scientific data, including maps, charts and graphs, to draw conclusions and make informed decisions.
- Students will develop the ability to adapt to changes in the earth's systems and understand the dynamic nature of the planet.

Syllabus Overview

Theory

Unit	Content	Hours/Week
1	Interior of the earth; Continental drift theory by Wegener; Plate tectonics; Folds and faults; Weathering and mass movement; Erosional and depositional landforms: Fluvial, Glacial and Aeolian.	3
2	Composition and structure of atmosphere; Insolation and heat budget; Temperature distribution, pressure belts, wind systems and precipitation types; Cyclones and anti-cyclones; Climate change.	
3	Distribution of temperature and salinity of ocean water; Ocean currents: Causes, types and their distribution over the Indian Ocean; Coral reefs and theories of reef formation after Darwin and Daly; Sea level change.	

Practical

Unit	Content	Hours/Week
1	Scale: Definition and types; Construction of linear, comparative and diagonal scale.	2
2	Map projection: Definition, classification, properties and uses; Mathematical / graphical construction of Polar Zenithal Gnomonic Projection, Simple Conical Projection with one standard parallel, Cylindrical Equal Area Projection.	

Suggested reading

Ahmed, E. (1985). *Geomorphology*. New Delhi: Kalyani Publishers.

Khullar, D.R. (2012). *Physical Geography*. New Delhi, India: Kalyani Publishers.

Mohan, K. (2018). *GES PERIODOS VOL 1, An Ultimate Guide to Physical Geography*. New Delhi: OakBridge Publication.

Chorley, R.J., Schumm, S.A., & Sugden, D.E. (1984). *Geomorphology*. London: Methuen.

Dayal, P. (1996). *Textbook of Geomorphology*. Patna: Shukla Book Depot.

Thornbury, W.D. (2004). *Principles of Geomorphology*. New York, U.S.A.: Wiley.

- Strahler, A.N. (1968). *The Earth Sciences*. New York: Harper & Row Intl. Edn.
- Siddhartha, K. (2020). *Climatology, Atmosphere, Weather and Climate*. New Delhi: Kitaba Mahal Publication.
- Lal, D.S. (1998). *Climatology*. Allahabad: Chaitanya Publishing House.
- Singh, S. (2005). *Climatology*. Allahabad: Prayag Pustak Bhawan.
- Barry, R.G., & Chorley, R.J. (2003). *Atmosphere, Weather and Climate*. Hove; East Sussex: Psychology Press.
- Critchfield, H.J. (1975). *General Climatology*. New Jersey: Prentice Hall.
- Garrison, T. (1998). *Oceanography*. Belmont: Wordsworth Company.
- Kershaw, S. (2000). *Oceanography: An Earth Science Perspective*. UK: Stanley Thornes.
- Sharma, R.C., & Vatal, M. (1980). *Oceanography for Geographers*. Allahabad: Chaitanya Publishing House.
- Sverdrup, K.A., & Armbrust, E.V. (2008). *An Introduction to the World Ocean*. Boston: McGraw Hill.
- Singh, R.L., & Singh, R.P.B. (1999). *Elements of Practical Geography*. New Delhi: Kalyani Publishers.
- Sarkar, A. (2015). *Practical Geography: A Systematic Approach*. New Delhi: Orient Black Swan Private Ltd.

Practical guidelines: Students will prepare a laboratory notebook covering all the practical units duly signed by the internal faculty members. Viva-voce is compulsory at the time of practical examination.

Question pattern

Type	Marks			Total
Theoretical	1: 5 out of 5	5: 3 out of 5	10: 2 out of 4	40
Practical	15 : 1 out of 1	5: Laboratory notebook and viva-voce.		20
CE	10: Mid-term test, class test, seminar presentation, term paper (Any one to be decided by the respective departmental faculty members)			10
Attendance	5			5
Full marks				75

Semester: 3

PAPER: MAJOR

Paper Description: Geomorphology

This paper provides an in-depth exploration of geomorphology, focusing on the nature, scope, and fundamental concepts of the field. It covers a range of topics, including the concept of morphogenetic regions, topographical expressions in various geological structures, weathering processes and resulting landforms, mass wasting phenomena, and the theories behind slope development. Additionally, the course delves into the evolution of landforms through erosional and depositional processes, examining various landforms created by fluvial, karst, aeolian, glacial and coastal dynamics. The practical part will deal with understanding the fundamentals of topographic maps and their interpretation.

Paper Code: UGEOMAJ23003

Paper Type: Theory + Practical Lab Based-PLB

Credit: 3 credit theory and 1 credit practical.

Class hours: 3 theory classes per week and 2 practical classes per week. Total 5 classes per week.

Duration of the Examinations: 2 hrs. Theoretical and 2 hrs. Practical Examinations.

Syllabus:

Paper Objectives

Knowledge Acquired:

1. The students will acquire knowledge about the nature and scope of geomorphology, including fundamental concepts in this field. This knowledge will allow the students to comprehend the processes and features shaping the Earth's surface.
2. Students will learn about the evolution of landforms through erosional and depositional processes in various environments, such as fluvial, karst, aeolian, glacial and coastal. This knowledge will equip them to recognize and explain the formation of different landforms.
3. The students will acquire knowledge about weathering processes, their controlling factors, types, and the resulting landforms. Additionally, the students will understand mass wasting, its definitions, the factors influencing it, and the different types. This knowledge will enable them to identify and analyze landforms resulting from weathering and mass wasting.

Skill Development:

1. The students will develop the skill to interpret physical and cultural features on topographical maps, particularly in plateau/mountain areas. This skill helps them analyze landscapes and recognize the spatial distribution of landforms.
2. The students will master skills related to geospatial analysis by learning methods such as slope analysis (Wentworth's method), relative relief (Smith's method), and dissection index (Dov Nir's method). These skills will allow them to quantify and assess the terrain's characteristics and relief.

Competency Gained:

1. Students will gain competency to recognize and differentiate various landforms in different geomorphic settings. This skill is essential for geographers, and environmental professionals who need to understand and assess landscapes.

- The students will develop competency to analyze landscapes using tools like drainage density, drainage frequency, watershed delineation, and stream ordering. This analytical ability is crucial for studying natural processes and landform evolution.
- The students will acquire the competency to apply theories and concepts such as Davis', Penck's, and King's slope development theories to understand the morphogenetic processes that shape landscapes. This competency enhances their ability to explain the formation and evolution of landforms.

Syllabus Overview

Theory

Unit	Content	Hours/Week
1	Nature and scope of geomorphology; Fundamental concepts in geomorphology; Concept of morphogenetic regions by Peltier; Drainage development on folded and uniclinal structure.	3
2	Weathering: Definition, controlling factors, types and resulting landforms; Mass wasting: Definition, factors affecting mass wasting, types; Cycle of erosion and slope development theories by Davis, Penck and King.	
3	Evolution of landforms (erosional and depositional): Fluvial, Karst, Aeolian, Glacial and Coastal.	

Practical

Unit	Content	Hours/Week
1	Topographical Map: Interpretation of physical and cultural features of a topographical map (plateau/mountain area); Interpretation of landforms with the help of serial, superimposed, projected and composite profiles.	2
2	Topographical Map: Slope Analysis (Wentworth's method); Relative relief (Smith's method); Dissection index (Dov Nir's method); Drainage density; Stream Ordering (Strahler Method); Settlement Density; Transect chart.	

Suggested reading

Bloom, A. L. (2003). *Geomorphology: A Systematic Analysis of Late Cenozoic Landforms*. New Delhi: Prentice-Hall of India.

Bridges, E. M. (1990). *World Geomorphology*. Cambridge: Cambridge University Press.

Christopherson, R. W. (2011). *Geosystems: An Introduction to Physical Geography*, 8th ed. Macmillan Publishing Company.

Kale, V. S., & Gupta, A. (2001). *Introduction to Geomorphology*. Hyderabad: Orient Longman.

Knighton, A. D. (1984). *Fluvial Forms and Processes*. London: Edward Arnold Publishers.

Richards, K. S. (1982). *Rivers: Form and Processes in Alluvial Channels*. London: Methuen.

Selby, M. J. (2005). *Earth's Changing Surface*. Indian Edition. OUP.

Skinner, B. J., & Porter, S. C. (2000). *The Dynamic Earth: An Introduction to Physical Geology*, 4th Edition. John Wiley and Sons.

Thornbury, W. D. (1968). *Principles of Geomorphology*. Wiley.

Anson, R., & Ormelling, F. J. (1994). *International Cartographic Association: Basic Cartographic Vol.* Pregmen Press.

Gupta, K. K., & Tyagi, V. C. (1992). *Working with Map.* New Delhi: Survey of India, DST.

Mishra, R. P., & Ramesh, A. (1989). *Fundamentals of Cartography.* New Delhi: Concept.

Monkhouse, F. J., & Wilkinson, H. R. (1973). *Maps and Diagrams.* London: Methuen.

Rhind, D. W., & Taylor, D. R. F. (Eds.). (1989). *Cartography: Past, Present and Future.* Elsevier, International Cartographic Association.

Robinson, A. H. (2009). *Elements of Cartography.* New York: John Wiley and Sons.

Singh, R. L., & Singh, R. P. B. (1999). *Elements of Practical Geography.* New Delhi: Kalyani Publishers.

Sarkar, A. (2015). *Practical Geography: A Systematic Approach.* New Delhi.

Practical guidelines: Students will prepare a laboratory notebook covering all the practical units duly signed by the internal faculty members. Viva-voce is compulsory at the time of practical examination.

Question pattern

Type	Marks			Total
Theoretical	1: 5 out of 5	5: 3 out of 5	10: 2 out of 4	40
Practical	15 : 1 out of 1	5: Laboratory notebook and viva-voce.		20
CE	10: Mid-term test, class test, seminar presentation, term paper (Any one to be decided by the respective departmental faculty members)			10
Attendance	5			5
Full marks				75

Semester: 3

PAPER: MAJOR

Paper Description: Geography of Resources

This course provides an in-depth understanding of the meaning and significance of resources, their creation and distribution, and the various factors influencing them, such as nature, human activities, and culture. Students will explore the classification of resources based on factors like exhaustibility, distribution, ownership, and development status, with a special focus on resources in India. Additionally, the course covers resource exploitation and degradation, emphasizing the importance of resource conservation from ecological, economic, and ethnological perspectives.

Paper Code: UGEOMAJ23004

Paper Type: Theory + Practical Lab Based-PLB

Credit: 3 credit theory and 1 credit practical.

Class hours: 3 theory classes per week and 2 practical classes per week. Total 5 classes per week.

Duration of the Examinations: 2 hrs. Theoretical and 2 hrs. Practical Examinations.

Syllabus:

Paper Objectives

Knowledge Acquired:

1. Students will gain a clear comprehension of the concept of resources, their creation, and the factors influencing them. They will learn to classify resources based on various criteria, enabling them to appreciate the diverse nature of resources.
2. This paper equips students with knowledge about the distribution of various resources in India, including forests, marine resources, energy sources, and minerals. They gain insights into the geographic and socio-economic factors influencing resource distribution in the country.
3. Students will acquire knowledge about resource conservation strategies, including those related to forests, soil, water, minerals, and energy resources. They will develop an understanding of ecological, economic, and ethnological approaches to resource management, recognizing the importance of sustainable practices.

Skill Development:

1. Students develop practical skills in identifying a wide range of rocks and minerals, including granite, limestone, quartz, and more. This skill is essential for professionals in geology, environmental science, and resource management.
2. Through the use of various diagrammatic techniques such as choropleth maps, chorochromatic maps, dot and sphere plots, and proportional cubes, students enhance their data presentation and visualization skills. These skills are crucial for effectively communicating resource-related information.

Competency Gained:

1. Students of this course are competent in assessing the availability and distribution of resources, particularly in the context of India. They can analyze the factors influencing resource availability and propose strategies for resource management.
2. Students become advocates for resource conservation, capable of applying ecological, economic, and ethnological approaches to real-world resource management challenges. They are well-equipped to contribute to sustainable resource use and environmental protection.

3. Students will develop proficiency in data analysis and communication through diagrammatic representations. They can effectively present resource-related data to diverse audiences, aiding informed decision-making and policy development.

Syllabus Overview

Theory

Unit	Content	Hours/Week
1	Meaning and definition of resource; Resource-creating factors: Nature, Man and Culture; Functional and dynamic concept of resource; Classification of resources: On the basis of exhaustibility, distribution, ownership and status of development.	3
2	Distribution of resources with special reference to India: Forest, Solar, Wind, Nuclear, Petroleum, Coal and Iron ore.	
3	Concept of resource exploitation and degradation; Resource conservation: Forest, Soil, Water, Mineral and Energy; Ecological, economic and ethnological approach to resource management.	

Practical

Unit	Content	Hours/Week
1	Megascopic identification of rocks and minerals: Granite, Basalt, Limestone, Shale, Sandstone, Phyllite, Slate, Marble, Schist, Quartzite, Bauxite, Calcite, Chalcopyrite, Feldspar, Galena, Haematite, Magnetite, Mica, Quartz and Talc.	2
2	Diagrammatic data presentation: Choropleth, chorochromatic, dot and sphere, proportional cubes.	

Suggested reading

- Blanco, E., & Razzaque, J. (2011). *Globalization and National Resources: Law, Challenges, Key Issues and Perspective*. Edward Elgar Publ., U.K.
- Brundtland, G.H. (1987). *Our Common Future: UNCED Report*. Geneva.
- Leong, G.C. (1995). *Certificate Physical and Human Geography*. Oxford Univ., Press, Oxford.
- Coe, N., Kelly, P., & Yeung, H.W.C. (2007). *Economic Geography: A Contemporary Introduction*. John Wiley and Sons, New York.
- Dicken, P. (2007). *Global Shift: Mapping the Changing Contours of the World Economy*. Sage Publ., New York.
- Mackinnon, D., & Cumbers, A. (2007). *An Introduction to Economic Geography: Globalization, Uneven Development and Place*. Prentice Hall, New Jersey.
- Parman, S.S. (2002). *Geography, Economics and Economic Geography*. ASD Publication, Pune.
- Roy, P. (2005). *Economic Geography: A Study of Resources*. New Central Book Agency, Kolkata.
- Simmons, I.G. (1980). *The Ecology of Natural Resources*. Edward Arnold, London.
- Simmons, I.G. (1991). *Earth, Air and Water: Resources and Environment in the 20th Century*. Edward Arnold, London.

Wiebe, K. (2003). *Land Quality Agricultural Productivity and Food Security*. Edward Elgar Publication, U.K.

Gadgil, M., & Guha, R. (2005). *The Use and Abuse of Nature: Incorporating This Fissured Land: An Ecological History of India and Ecology and Equity*. Oxford University Press, USA.

Holechek, J.L.C., Fisher, R.A., & Valdez, J.T. (2003). *Natural Resources: Ecology, Economics and Policy*. Prentice Hall, New Jersey.

Mather, A.S., & Chapman, K. (1995). *Environmental Resources*. John Wiley and Sons, New York.

Mitchell, B. (1997). *Resource and Environmental Management*. Longman Harlow, England.

Practical guidelines: Students will prepare a laboratory notebook covering all the practical units duly signed by the internal faculty members. Viva-voce is compulsory at the time of practical examination.

Question pattern

Type	Marks			Total
Theoretical	1: 5 out of 5	5: 3 out of 5	10: 2 out of 4	40
Practical	15 : 1 out of 1	5: Laboratory notebook and viva-voce.		20
CE	10: Mid-term test, class test, seminar presentation, term paper (Any one to be decided by the respective departmental faculty members)			10
Attendance	5			5
Full marks				75

Semester: 3

PAPER: MAJOR

Paper Description: Population Geography

This course provides students with a comprehensive understanding of population dynamics, demographic theories, and the practical skills required for data analysis. It equips students with the knowledge and tools to explore and interpret demographic trends and patterns, making it a valuable asset for anyone interested in the field of geography, demography or data analysis.

Paper Code: UGEOMAJ23005

Paper Type: Theory + Practical Lab Based-PLB

Credit: 3 credit theory and 1 credit practical.

Class hours: 3 theory classes per week and 2 practical classes per week. Total 5 classes per week.

Duration of the Examinations: 2 hrs. Theoretical and 2 hrs. Practical Examinations.

Syllabus:

Paper Objectives

Knowledge Acquired:

1. Students will gain insight into the fundamental concepts of population geography, including the nature and scope of the field, sources of population data, and the various types of population density. They will also learn about the factors contributing to population growth and distribution, both globally and in the context of India.
2. The course delves into two pivotal theories of population growth – the Malthusian theory and the demographic transition theory. Students will acquire a deep understanding of how these theories have shaped our understanding of population dynamics and the implications they hold for society.
3. Students will explore the composition of the Indian population, with a focus on rural-urban divides, age, gender, and literacy. They will also gain insights into the concepts of ageing populations and demographic dividends. Furthermore, they will learn about important policies like the National Population Policy of 2000 in India.

Skill Development:

1. Students will develop essential data analysis skills using Microsoft Excel. They will also learn to navigate the Excel interface, perform data entry, editing, and formatting, work with various data types and gain proficiency in sorting, filtering, and creating tables for efficient data organization.
2. The course will equip students with the ability to create a wide range of charts, including column, bar, line, pie, and scatter plots. They will learn to customize chart elements like titles, legends, and labels, making data visualization a powerful tool for conveying demographic trends and insights.

Competency Gained:

1. Students will acquire the competency to project population figures using various methods such as arithmetical increase, geometrical progression, and incremental increase. This skill is crucial for making informed demographic predictions.
2. Through the construction and interpretation of age-sex pyramids, students will become proficient in analyzing demographic data visually, enabling them to draw meaningful conclusions about population structures.

3. The paper will enhance students' competency in data analysis and interpretation, a valuable skill applicable across various disciplines. They can also apply these skills to real-world situations, including assessing migration trends and understanding the implications of fertility and mortality measures.

Syllabus Overview

Theory

Unit	Content	Hours/Week
1	Nature and scope of population geography and its relation to demography; Sources of population data and its relevance (India); Density of population: Meaning and types (Arithmetic density, Physiological density, Man-land ratio); Population pyramid; The concept of overpopulation, underpopulation, optimum population, population explosion.	3
2	Population growth and distribution: Determinants and patterns (World and India); Theories of population growth: Malthusian Theory and Demographic Transition Theory; Concept of ageing population and demographic dividend.	
3	Population dynamics: Fertility and mortality: Measures and determinants; Types of migration, causes and its consequences; Ravenstein's laws of migration; Population-resource regions: Ackerman; National Population Policy, 2000 in India.	

Practical

Unit	Content	Hours/Week
1	Population projection by arithmetical increase method, geometrical progression method and incremental increase method; Measures of fertility (Crude Birth Rate, General Fertility Rate, Age-specific Fertility Rate, Total Fertility Rate); Measures of mortality (Crude Death Rate, Age-specific Death Rate, Infant Mortality Rate); Construction and interpretation of Age-Sex Pyramids.	2
2	Basic Computer Skills (Data Representation with Excel): Overview of Excel interface and functionalities; Basic knowledge of workbook, worksheet, cell and range; Data entry, data editing, data formatting and data types (numbers, dates, text); Sorting and filtering of data; Formulas and functions for data manipulation; Construction of tables for data organization; Creating different types of charts (e.g., column, bar, line, pie, scatter); Customizing chart elements (titles, legends, labels); Creating pivot tables and analyzing data.	

Suggested reading

- Barrett, H. R. (1995). *Population Geography*. Oliver and Boyd.
- Bhende, A., & Kanitkar, T. (2000). *Principles of Population Studies*. Himalaya Publishing House.
- Chandna, R. C., & Sidhu, M. S. (1980). *An Introduction to Population Geography*. Kalyani Publishers.
- Clarke, J. I. (1965). *Population Geography*. Pergamon Press, Oxford.
- Jones, H. R. (2000). *Population Geography*, 3rd ed. Paul Chapman, London.
- Lutz, W., Warren, C. S., & Scherbov, S. (2004). *The End of the World Population Growth in the 21st Century*. Earthscan.

Newbold, K. B. (2009). *Population Geography: Tools and Issues*. Rowman and Littlefield Publishers.

Pacione, M. (1986). *Population Geography: Progress and Prospect*. Taylor and Francis.

Wilson, M. G. A. (1968). *Population Geography*. Nelson.

Practical guidelines: Students will prepare a laboratory notebook covering all the practical units duly signed by the internal faculty members. Viva-voce is compulsory at the time of practical examination.

Question pattern

Type	Marks			Total
Theoretical	1: 5 out of 5	5: 3 out of 5	10: 2 out of 4	40
Practical	15 : 1 out of 1	5: Laboratory notebook and viva-voce.		20
CE	10: Mid-term test, class test, seminar presentation, term paper (Any one to be decided by the respective departmental faculty members)			10
Attendance	5			5
Full marks				75

Semester: 3

Paper: SEC

Paper Description: Environmental Geography

The paper provides students with a comprehensive understanding of environmental studies, covering various aspects of the environment, environmental pollution, management, laws, and ethics. Additionally, it includes a practical component where students engage in a project related to environmental issues.

Paper Code: UGEOSEC23003

Paper Type: Theory + Practical Lab Based-PLB

Credit: 2 credit theory and 1 credit practical.

Class hours: 2 theory classes per week and 2 practical classes per week. Total 4 classes per week.

Duration of the Examinations: 2 hrs. Theoretical and 2 hrs. Practical Examinations.

Syllabus:

Paper objectives

Knowledge Acquired:

1. Students will gain a solid foundation in environmental concepts, including the definition and components of the environment. They will understand the sources, effects, and remedies of environmental pollution in air, water, soil, and noise.
2. Learners will comprehend how agricultural development, industrial development, and urbanization contribute to environmental degradation. They will analyze the impact of these factors on the environment.
3. Students will become familiar with key environmental laws and policies in India, such as the Wildlife Protection Act, Water (Prevention and Control of Pollution) Act, Forest Conservation Act, and Environmental Protection Act. They will understand the importance of these legal frameworks in environmental conservation.

Skill Development:

1. Through the practical project, students will develop research skills as they gather and analyze secondary data on environmental topics. They will also enhance their report-writing skills, which are crucial for effective communication in the field of environmental studies.
2. The study of environmental ethics and the analysis of environmental movements will encourage critical thinking and ethical reflection among students. They will learn to evaluate the ethical dimensions of environmental issues and movements.

Competency Gained:

1. Students will acquire a heightened awareness of environmental issues and their consequences. They will be able to identify sources of pollution and propose potential remedies.
2. Understanding the significance of Environmental Impact Assessment and the management of solid wastes will equip students with the knowledge and skills required for effective environmental planning and management.
3. Familiarity with environmental laws and policies will enable students to appreciate the importance of legal compliance in environmental protection. They will understand how these regulations contribute to sustainable development and conservation.

Syllabus Overview

Theory

Unit	Content	Hours/Week
1	Definition and component of environment; Environmental pollution (Air, Water and Noise): Sources, effects and remedies; Environmental degradation due to agricultural development, industrial development and urbanization; Solid wastes: Types, sources and their management.	2
2	Environmental planning and management: Meaning, importance and needs of Environmental Impact Assessment; Environmental ethics; Environmental movements in India: Chipko and Narmada Bachao Andolan; Environmental laws and policies in India: Water (Prevention and Control of Pollution) Act: 1974, Forest Conservation Act: 1980, Air (Prevention and Control of Pollution) Act: 1981, Environmental Protection Act: 1986, Noise Pollution (Regulation and Control) Rules: 2000, Municipal Solid Waste (Management and Handling) Rules: 2000.	

Practical

Unit	Content	Hours/Week
1	A project report will be prepared by the students in consultation with their respective college teachers on any issues or topics related to environment. The report will be prepared based on available sources of secondary data only. Report should be limited within 20-25 pages, handwritten and may include maps, diagrams, charts and tables. The report will be examined externally and marks will be separately allotted for report and viva-voce taken individually. Students will be divided into groups so that in each college at least 4 groups are formed and each group will prepare their report taking different topics under the supervision of the faculty members.	2

Suggested reading

Chandna, R. C. (2002). *Environmental Geography*. Ludhiana: Kalyani.

Cunningham, W. P., & Cunningham, M. A. (2004). *Principals of Environmental Science: Inquiry and Applications*. New Delhi: Tata Macgraw Hill.

Goudie, A. (2001). *The Nature of the Environment*. Oxford: Blackwell.

Singh, R.B. (Eds.) (2009). *Biogeography and Biodiversity*. Jaipur: Rawat Publication.

Miller, G. T. (2004). *Environmental Science: Working with the Earth*. Singapore: Thomson Brooks Cole.

MoEF. (2006). *National Environmental Policy-2006*. Ministry of Environment and Forests, Government of India.

Singh, R.B., & Hietala, R. (Eds.) (2014). *Livelihood Security in Northwestern Himalaya: Case Studies from Changing Socio-economic Environments in Himachal Pradesh, India*. Advances in Geographical and Environmental Studies. Springer.

Odum, E. P., et al. (2005). *Fundamentals of Ecology*. Ceneage Learning India.

Singh, S. (1997). *Environmental Geography*. Allahabad: Prayag Pustak Bhawan.

UNEP. (2007). *Global Environment Outlook: GEO4: Environment for Development*. United Nations Environment Programme.

Singh, M., Singh, R.B., & Hassan, M.I. (Eds.) (2014). *Climate Change and Biodiversity: Proceedings of IGU Rohtak Conference, Volume 1*. Advances in Geographical and Environmental Studies. Springer.

Singh, R.B. (1998). *Ecological Techniques and Approaches to Vulnerable Environment*. New Delhi: Oxford & IBH Pub.

Practical guidelines: Although the work on the project report will be done in groups, but the students will have to carry their individual copies duly signed by their supervising teacher at the time of viva voce.

Question pattern

Type	Marks			Total
Theoretical	1: 5 out of 5	5: 3 out of 5	10: 2 out of 4	40
Practical	15 : Project Report	5: Viva-voce.		20
CE	10: Mid-term test, class test, seminar presentation, term paper (Any one to be decided by the respective departmental faculty members)			10
Attendance	5			5
Full marks				75

Semester: 3

PAPER: MINOR

Paper Description: Human Geography

This paper delves into the fundamental aspects of human geography with a specific focus on India. It comprehensively explores the nature, scope, and branches of human geography, shedding light on the theories that have shaped our understanding of population growth and urban development. Through practical exercises, it equips students with the skills to interpret topographical maps and present data diagrammatically.

Paper Code: UGEOMIN20002

Paper Type: Theory + Practical Lab Based-PLB

Credit: 3 credit theory and 1 credit practical.

Class hours: 3 theory classes per week and 2 practical classes per week. Total 5 classes per week.

Duration of the Examinations: 2 hrs. Theoretical and 2 hrs. Practical Examinations.

Syllabus:

Paper Objectives

Knowledge acquired:

1. Students gain a solid grasp of key theories such as Environmental Determinism, Possibilism, Neo-determinism, and the Quantitative Revolution. They understand how these theories have contributed to the study of human geography.
2. Learners acquire in-depth knowledge of population growth theories, including the Malthusian theory and demographic transition theory. They also understand the intricacies of population composition, fertility, mortality, and migration patterns in the Indian context.
3. Students explore urban settlement classifications, theories like the Central Place Theory, and the evolving patterns of urbanization in India. They develop a nuanced understanding of the dynamics shaping urban areas.

Skills gained:

1. Students develop the ability to interpret topographical maps, identify physical and cultural features, and analyze landforms, slopes, and drainage patterns. This skill enhances their spatial analysis capabilities.
2. Through diagrammatic data presentation techniques, such as line, bar, circle, dot, and choropleth maps, students acquire proficiency in effectively conveying geographic information. They learn how to choose appropriate visualizations for different types of data.

Competency developed:

1. Students become adept at critically analyzing geographic phenomena and understanding the underlying factors driving population growth, settlement patterns, and urbanization. They can evaluate the strengths and limitations of various theories.
2. The practical exercises equip students with the competence to collect, interpret, and present geographical data, enhancing their ability to conduct research and contribute to the field.

- By focusing on India, students gain a contextual understanding of human geography, enabling them to apply their knowledge and skills to real-world issues related to population, settlement, and urban development within the country.

Syllabus Overview

Theory

Unit	Content	Hours/Week
1	Nature, scope and branches of human geography; Determinism and Possibilism; Neo-determinism; Systematic and Regional Geography.	3
2	Growth and distribution of population in India; Theories of population growth: Malthusian Theory and Demographic Transition Theory; Population composition (India): Rural-urban and age-sex; Migration: Types, causes and consequences.	
3	Factors affecting the growth of the rural settlement; Types and patterns of rural settlements; Urban landuse and morphology: Concentric Zone Theory, Sector Theory, Multiple Nuclei Theory; Trends and patterns of urbanization in India.	

Practical

Unit	Content	Hours/Week
1	Topographical Map: Interpretation of physical and cultural features of a topographical map (plateau/mountain area); Interpretation of landforms with the help of serial, superimposed, projected and composite profiles; Relative relief (Smith's method); Transect chart.	2
2	Diagrammatic data presentation: Line, bar (simple, compound and composite), proportional circle, choropleth.	

Suggested reading

Chandna, R.C. (2010). *Population Geography*. Kalyani Publisher.

Hassan, M.I. (2005). *Population Geography*. Jaipur: Rawat Publications.

Daniel, P.A., & Hopkinson, M.F. (1989). *The Geography of Settlement*. London: Oliver & Boyd.

Johnston, R., Gregory, D., Pratt, G., et al. (2008). *The Dictionary of Human Geography*. Blackwell Publication.

Jordan-Bychkov, T., et al. (2006). *The Human Mosaic: A Thematic Introduction to Cultural Geography*. New York: W. H. Freeman and Company.

Cuff, J.D., & Mattson, M.T. (1982). *Thematic Maps: Their Design and Production*. Methuen Young Books.

Dent, B.D., Torguson, J.S., & Holder, T.W. (2008). *Cartography: Thematic Map Design* (6th Edition). McGraw-Hill Higher Education.

Gupta, K.K., & Tyagi, V.C. (1992). *Working with Maps*. New Delhi: Survey of India, DST.

Kraak, M.-J., & Ormeling, F. (2003). *Cartography: Visualization of Geo-Spatial Data*. Prentice-Hall.

Mishra, R.P., & Ramesh, A. (1989). *Fundamentals of Cartography*. New Delhi: Concept.

Singh, R.L., & Singh, R.P.B. (1999). *Elements of Practical Geography*. Kalyani Publishers.

Slocum, T.A., McMaster, R.B., & Kessler, F.C. (2008). *Thematic Cartography and Geo-visualization* (3rd Edition). Prentice Hall.

Tyner, J.A. (2010). *Principles of Map Design*. The Guilford Press.

Sarkar, A. (2015). *Practical Geography: A Systematic Approach*. New Delhi: Orient Black Swan Private Ltd.

Practical guidelines: Students will prepare a laboratory notebook covering all the practical units duly signed by the internal faculty members. Viva voce is compulsory at the time of the practical examination.

Question pattern

Type	Marks			Total
Theoretical	1: 5 out of 5	5: 3 out of 5	10: 2 out of 4	40
Practical	15 : 1 out of 1	5: Laboratory notebook and viva-voce.		20
CE	10: Mid-term test, class test, seminar presentation, term paper (Any one to be decided by the respective departmental faculty members)			10
Attendance	5			5
Full marks				75

Semester: 4

PAPER: MAJOR

Paper Description: Climatology

The paper provides a comprehensive overview of key concepts in climatology, focusing on the fundamental theories and principles that govern weather and climate patterns. It covers a wide range of topics related to the Earth's atmosphere, including its composition and structure, heat budget, temperature distribution, atmospheric pressure, wind patterns, precipitation formation, weather phenomena, climate classifications, and the critical issues of climate change, ozone depletion, and acid precipitation. This paper aims to provide a foundational understanding of climatology and its real-world applications, making it a valuable resource for students and professionals in the fields of environmental science, meteorology, and related disciplines.

Paper Code: UGEOMAJ24006

Paper Type: Theory + Practical Lab Based-PLB

Credit: 3 credit theory and 1 credit practical.

Class hours: 3 theory classes per week and 2 practical classes per week. Total 5 classes per week.

Duration of the Examinations: 2 hrs. Theoretical and 2 hrs. Practical Examinations.

Syllabus:

Paper Objectives

Knowledge Acquired:

1. The paper will impart knowledge about the intricate workings of Earth's climate systems, including the factors that influence climate and weather patterns. This includes insights into the composition of the atmosphere, heat transfer mechanisms, and the intricate interactions that drive global atmospheric circulation.
2. Students will gain insights into the two predominant theories governing cloud and precipitation formation: The Bergeron-Findeisen theory and the Collision-Coalescence theory. It will allow them to comprehend the complex processes that underlie weather phenomena and precipitation types.
3. The paper will equip the students with the tools to classify world climates using systems like Koppen and Thornthwaite. Additionally, they will acquire knowledge about pressing contemporary issues, such as climate change, ozone depletion, and acid precipitation, deepening our awareness of environmental challenges.

Skills Developed:

1. Through studying the composition and structure of the atmosphere, heat budgets, and circulation patterns, students will develop the ability to analyze complex environmental data and draw conclusions about climate dynamics.
2. Learning about climate theories and their practical applications will enhance student's research skills and their capacity to interpret meteorological data, which is essential for understanding and addressing climate-related issues. The interpretation of daily weather reports, both for summer and winter conditions, hones the ability to analyze and make sense of complex meteorological data.
3. Through hands-on experience with meteorological instruments like the Max and Min Thermometer, Hygrometer, and Fortin's Barometer, students will develop essential skills in data collection and instrument operation.

- Usage of Climographs and Hythergraphs, shall enable students to present climatic data graphically, enhancing their ability to communicate complex information effectively.

Competencies Gained:

- Acquiring knowledge of climate patterns, wind circulation, and atmospheric processes will equip the students with the competency to adapt to different climate conditions and make informed decisions in various contexts, from agriculture to urban planning.
- Understanding climate change, ozone depletion, and acid precipitation fosters a sense of responsibility for the environment. They become better equipped to engage in discussions and actions that promote environmental sustainability and conservation.
- The paper's insights into atmospheric stability, precipitation, and cyclones shall enable the students to better understand and predict weather events, which is crucial for disaster preparedness and mitigation efforts in regions vulnerable to extreme weather conditions.

Syllabus Overview

Theory

Unit	Content	Hours/Week
1	Weather and Climate; Composition and structure of the atmosphere; Insolation and heat budget; Latitudinal heat balance; Mechanism of energy/heat transfer; Distribution of temperature: Horizontal and vertical; Inversion of temperature.	3
2	Vertical and horizontal distribution of atmospheric pressure and pressure belts; Factors affecting wind direction and speed; Global wind belts and general atmospheric circulation; Local wind; Geostrophic wind; Jet stream; El Nino and La Nina.	
3	Humidity: Measurement; Atmospheric stability and instability; Condensation; Mechanism of precipitation: Bergeron-Findeisen and Collision-Coalescence theory; Precipitation types; Airmass and fronts; Thunderstorm; Cyclone and anti-cyclone; Classification of world climate: Koppen & Thornthwaite; Climate change: Evidence and causes, Ozone depletion and Acid rain.	

Practical

Unit	Content	Hours/Week
1	Meteorological Instruments: Max and Min Thermometer, Hygrometer, Fortin's Barometer.	2
2	Interpretation of Indian daily weather report (summer and winter); Representation of climatic data using Climograph (G. Taylor) and Hythergraph.	

Suggested reading

Barry, R. G., & Carleton, A. M. (2001). *Synoptic and Dynamic Climatology*. Routledge, UK.

Barry, R. G., & Corley, R. J. (1998). *Atmosphere, Weather and Climate*. Routledge, New York.

Critchfield, H. J. (1987). *General Climatology*. New Delhi: Prentice-Hall of India.

Lutgens, F. K., Tarbuck, E. J., & Tasa, D. (2009). *The Atmosphere: An Introduction to Meteorology*. Englewood Cliffs, New Jersey: Prentice-Hall.

Oliver, J. E., & Hidore, J. J. (2002). *Climatology: An Atmospheric Science*. New Delhi: Pearson Education.

Trewartha, G. T., & Horne, L. H. (1980). *An Introduction to Climate*. McGraw-Hill.

Lal, D. S. (1998). *Climatology*. Allahabad: Chaitanya Publishing House.

Singh, S. (2005). *Climatology*. Allahabad: Prayag Pustak Bhawan.

Practical guidelines: Students will prepare a laboratory notebook covering all the practical units duly signed by the internal faculty members. Viva-voce is compulsory at the time of practical examination.

Question pattern

Type	Marks			Total
Theoretical	1: 5 out of 5	5: 3 out of 5	10: 2 out of 4	40
Practical	15 : 1 out of 1	5: Laboratory notebook and viva-voce.		20
CE	10: Mid-term test, class test, seminar presentation, term paper (Any one to be decided by the respective departmental faculty members)			10
Attendance	5			5
Full marks				75

Semester: 4

PAPER: MAJOR

Paper Description: Geography of India

This paper aims to cover a wide range of topics related to the physical, social, and economic aspects of geography and regional development in India. Overall, the paper provides a comprehensive understanding of the physical, environmental, social, and economic aspects of the country, preparing students for careers in geography, regional planning, environmental assessment, and related fields.

Paper Code: UGEOMAJ24007

Paper Type: Theory + Practical Lab Based-PLB

Credit: 3 credit theory and 1 credit practical.

Class hours: 3 theory classes per week and 2 practical classes per week. Total 5 classes per week.

Duration of the Examinations: 2 hrs. Theoretical and 2 hrs. Practical Examinations.

Syllabus:

Paper Objectives

Knowledge Acquired:

1. Students will acquire in-depth knowledge about the physical geography of India, including its location, physiographic divisions, drainage patterns, soil types, and natural vegetation.
2. Understanding the salient features of India's climate and the Indian Monsoon system, including its origin, characteristics, and mechanisms.
3. Knowledge about the distribution of the population in terms of caste, religion, language, and occupation, as well as an understanding of the salient features of Indian agriculture and the production and distribution of major crops.

Skills Developed:

1. Students will develop the ability to analyze geographical and climatic data to understand patterns and trends.
2. The study of population distribution, including caste, religion, and language, will develop students' cultural and societal awareness.
3. Analyzing major crop production and agro-climatic regions will enhance students' skills in economic and agricultural analysis.

Competency Gained:

1. Students will be competent in assessing the impact of climatic phenomena like the Indian Monsoon and El Nino on various aspects of life, including agriculture and society.
2. The study of the spatial pattern of industrial development and transport networks will equip students with the competency to understand and contribute to regional development and planning initiatives.
3. The practical unit involving field reports will enhance students' ability to conduct field research, collect data, and communicate their findings effectively, which is a valuable skill for geography professionals.

Syllabus Overview

Theory

Unit	Content	Hours/Week
1	Physical: Location, physiographic division; drainage, soil, natural vegetation; Indian Monsoon: Origin, characteristics and mechanism; Effect of El Nino on Indian monsoon; Climatic regions: L D Stamp and Trewartha.	3
2	Distribution of population: Caste, religion, language and tribes; Population composition: Rural-urban, gender and literacy; Salient features of Indian agriculture; Production and distribution of major crops: Rice, wheat, cotton and tea; Agro-climatic regions (Planning Commission of India).	
3	Spatial pattern of industrial development: Iron and Steel, Cotton textile, Petro-chemical, Automobile, Information technology; Development and pattern of transport network: Railways, roadways and waterways.	

Practical

Unit	Content	Hours/Week
1	A field report will be prepared by the students in consultation with their respective college teachers on any topic related to physical or human geography. The report will be prepared based on primary and secondary data collected during field visit which is compulsory. Report should be limited within 50-60 pages, handwritten and may include maps, diagrams, charts and tables. The report will be examined externally and marks will be separately allotted for report and viva-voce taken individually.	2

Suggested reading

Deshpande, C. D. (1992). *India: A Regional Interpretation*. ICSSR, New Delhi.

Johnson, B. L. C. (Ed.). (2001). *Geographical Dictionary of India*. Vision Books, New Delhi.

Mandal, R. B. (Ed.). (1990). *Patterns of Regional Geography – An International Perspective. 16 Vol. 3 – Indian Perspective*.

Sdyasuk, Galina, & Sengupta, P. (1967). *Economic Regionalization of India, Census of India*.

Sharma, T. C. (2003). *India - Economic and Commercial Geography*. New Delhi: Vikas Publ.

Singh, R. L. (1971). *India: A Regional Geography*. National Geographical Society of India.

Singh, Jagdish. (2003). *India; A Comprehensive & Systematic Geography*. Gorakhpur: Gyanodaya Prakashan.

Spate, O. H. K., & Learmonth, A. T. A. (1967). *India and Pakistan: A General and Regional Geography*. Methuen.

Tirtha, Ranjit. (2002). *Geography of India*. Jaipur & New Delhi: Rawat Publishers.

Pathak, C. R. (2003). *Spatial Structure and Processes of Development in India*. Kolkata: Regional Science Assoc.

Tiwari, R.C. (2007). *Geography of India*. Allahabad: Prayag Pustak Bhawan.

Sharma, T.C. (2013). *Economic Geography of India*. Jaipur: Rawat Publication.

Practical guidelines: Students will prepare a laboratory notebook covering all the practical units duly signed by the internal faculty members. Viva-voce is compulsory at the time of practical examination.

Question pattern

Type	Marks			Total
Theoretical	1: 5 out of 5	5: 3 out of 5	10: 2 out of 4	40
Practical	15 : Field Report	5: Viva-voce.		20
CE	10: Mid-term test, class test, seminar presentation, term paper (Any one to be decided by the respective departmental faculty members)			10
Attendance	5			5
Full marks				75

Semester: 4

PAPER: MAJOR

Paper Description: Geographical Information System

The paper on GIS (Geographic Information Systems) provides a comprehensive overview of this powerful technology that integrates spatial data and attribute information to support decision-making and problem-solving across various domains. It covers the fundamentals of GIS, data types, applications, and practical skills for working with GIS software.

Paper Code: UGEOMAJ24008

Paper Type: Theory + Practical Lab Based-PLB

Credit: 3 credit theory and 1 credit practical.

Class hours: 3 theory classes per week and 2 practical classes per week. Total 5 classes per week.

Duration of the Examinations: 2 hrs. Theoretical and 2 hrs. Practical Examinations.

Syllabus:

Paper Objectives

Knowledge Acquired:

1. The paper will equip the students with a solid foundation in GIS, including the definition and evolution of GIS, components, and the distinction between digital and analogue maps.
2. Students shall gain knowledge about spatial and attribute data, raster and vector data models, and database management systems (DBMS) in GIS applications.
3. The paper will explore a wide range of GIS applications, such as urban planning, environmental management, health care systems, and defence, enabling students to comprehend the versatility and significance of GIS technology.

Skills Developed:

1. Students will acquire practical skills in handling spatial data, including geo-referencing topo sheets, digitizing point, line, and polygon features, and working with raster and vector data.
2. The paper will also enable the students to work with GIS software i.e. QGIS, teaching them how to add, format, and export vector and raster layers and create thematic maps.
3. Students shall develop competencies in data management and analysis by exploring raster styling and mosaicking, attribute data manipulation, and importing external data sources.

Competency Gained:

1. Students will develop competency to address real-world challenges by applying GIS technology to various domains, translating theoretical knowledge into practical solutions.
2. students will be proficient in managing and analyzing spatial and attribute data, ensuring data quality, and minimizing errors in GIS projects.
3. The paper will also cultivate the ability to think spatially and make informed decisions using GIS tools, which is invaluable for a wide range of professional and research applications.

Syllabus Overview:

Theory

Unit	Content	Hours/Week
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1	Definitions and evolution of GIS; Components of GIS; Functional requirements of GIS; Advantages and limitations of GIS; Coordinate system and map projection in GIS.	3
2	GIS data types: Spatial and attribute data; Raster and vector data model; File Formats of spatial data; Concept, functions, components and advantages of DBMS; Database models: Object-based data model; Components of data quality; Sources of error in GIS, Concept of Web-GIS.	
3	Application of GIS: Urban Planning, Environmental Management, Agriculture, Disaster Management, Health Care System, Transport Planning, Defense and Military, Decentralized Planning, Tourism, Natural Resource Management.	

Practical

Unit	Content	Hours/Week
1	Geo-referencing of scanned topographical sheets and maps; Digitizing using point, line and polygon features; Exploring and managing raster data: Adding raster layers, raster styling and analysis, raster mosaicking and clipping; Creating and managing vector data: Adding vector layers, setting properties, merging, formatting and exporting of data (all using QGIS).	2
2	Making a map; Working with attribute data; Importing spreadsheets or CSV files using plug-in tools; Creating thematic maps (all using QGIS).	

Suggested reading

Heywood, I. (2011). *An Introduction to Geographical Information Systems*.

Aronoff, S. (1989). *Geographic Information Systems: A Management Perspective*.

Elangovan, K. (2006). *GIS - Fundamentals, Applications, and Implementations*.

Chang, K. T. (2015). *Introduction to Geographical Information Systems*.

Bhatta, B. (2011). *Remote Sensing and GIS*.

Sharma, H. S. (2006). *Mathematical Modelling in Geographical Information System, Global Positioning System and Digital Cartography*.

Ghosh, A., & Rushton, G. (1987). *Spatial Analysis and Location-Allocation Models*.

Tomlin, C. D. (1990). *Geographic Information Systems and Cartographic Modelling*.

Longley, P. A., et al. (2015). *Geographic Information Systems and Science*.

Clarke, C. K. (2002). *Geographic Information Systems and Environmental Modelling*.

Practical guidelines: Students will prepare a laboratory notebook covering all the practical units duly signed by the internal faculty members. Viva-voce is compulsory at the time of practical examination.

Question pattern

Type	Marks			Total
Theoretical	1: 5 out of 5	5: 3 out of 5	10: 2 out of 4	40
Practical	15 : 1 out of 1	5: Laboratory notebook and viva-voce.		20

CE	10: Mid-term test, class test, seminar presentation, term paper (Any one to be decided by the respective departmental faculty members)	10
Attendance	5	5
Full marks		75

Semester: 4

PAPER: MINOR

Paper Description: Human Geography

This paper delves into the fundamental aspects of human geography with a specific focus on India. It comprehensively explores the nature, scope, and branches of human geography, shedding light on the theories that have shaped our understanding of population growth and urban development. Through practical exercises, it equips students with the skills to interpret topographical maps and present data diagrammatically.

Paper Code: UGEOMIN20002

Paper Type: Theory + Practical Lab Based-PLB

Credit: 3 credit theory and 1 credit practical.

Class hours: 3 theory classes per week and 2 practical classes per week. Total 5 classes per week.

Duration of the Examinations: 2 hrs. Theoretical and 2 hrs. Practical Examinations.

Syllabus:

Paper Objectives

Knowledge acquired:

1. Students gain a solid grasp of key theories such as Environmental Determinism, Possibilism, Neo-determinism, and the Quantitative Revolution. They understand how these theories have contributed to the study of human geography.
2. Learners acquire in-depth knowledge of population growth theories, including the Malthusian theory and demographic transition theory. They also understand the intricacies of population composition, fertility, mortality, and migration patterns in the Indian context.
3. Students explore urban settlement classifications, theories like the Central Place Theory, and the evolving patterns of urbanization in India. They develop a nuanced understanding of the dynamics shaping urban areas.

Skills gained:

1. Students develop the ability to interpret topographical maps, identify physical and cultural features, and analyze landforms, slopes, and drainage patterns. This skill enhances their spatial analysis capabilities.
2. Through diagrammatic data presentation techniques, such as line, bar, circle, dot, and choropleth maps, students acquire proficiency in effectively conveying geographic information. They learn how to choose appropriate visualizations for different types of data.

Competency developed:

1. Students become adept at critically analyzing geographic phenomena and understanding the underlying factors driving population growth, settlement patterns, and urbanization. They can evaluate the strengths and limitations of various theories.
2. The practical exercises equip students with the competence to collect, interpret, and present geographical data, enhancing their ability to conduct research and contribute to the field.

3. By focusing on India, students gain a contextual understanding of human geography, enabling them to apply their knowledge and skills to real-world issues related to population, settlement, and urban development within the country.

Syllabus Overview

Theory

Unit	Content	Hours/Week
1	Nature, scope and branches of human geography; Determinism and Possibilism; Neo-determinism; Systematic and Regional Geography.	3
2	Growth and distribution of population in India; Theories of population growth: Malthusian Theory and Demographic Transition Theory; Population composition (India): Rural-urban and age-sex; Migration: Types, causes and consequences.	
3	Factors affecting the growth of the rural settlement; Types and patterns of rural settlements; Urban landuse and morphology: Concentric Zone Theory, Sector Theory, Multiple Nuclei Theory; Trends and patterns of urbanization in India.	

Practical

Unit	Content	Hours/Week
1	Topographical Map: Interpretation of physical and cultural features of a topographical map (plateau/mountain area); Interpretation of landforms with the help of serial, superimposed, projected and composite profiles; Relative relief (Smith's method); Transect chart.	2
2	Diagrammatic data presentation: Line, bar (simple, compound and composite), proportional circle, choropleth.	

Suggested reading

Chandna, R.C. (2010). *Population Geography*. Kalyani Publisher.

Hassan, M.I. (2005). *Population Geography*. Jaipur: Rawat Publications.

Daniel, P.A., & Hopkinson, M.F. (1989). *The Geography of Settlement*. London: Oliver & Boyd.

Johnston, R., Gregory, D., Pratt, G., et al. (2008). *The Dictionary of Human Geography*. Blackwell Publication.

Jordan-Bychkov, T., et al. (2006). *The Human Mosaic: A Thematic Introduction to Cultural Geography*. New York: W. H. Freeman and Company.

Cuff, J.D., & Mattson, M.T. (1982). *Thematic Maps: Their Design and Production*. Methuen Young Books.

Dent, B.D., Torguson, J.S., & Holder, T.W. (2008). *Cartography: Thematic Map Design* (6th Edition). Mcgraw-Hill Higher Education.

Gupta, K.K., & Tyagi, V.C. (1992). *Working with Maps*. New Delhi: Survey of India, DST.

Kraak, M.-J., & Ormeling, F. (2003). *Cartography: Visualization of Geo-Spatial Data*. Prentice-Hall.

Mishra, R.P., & Ramesh, A. (1989). *Fundamentals of Cartography*. New Delhi: Concept.

Singh, R.L., & Singh, R.P.B. (1999). *Elements of Practical Geography*. Kalyani Publishers.

Slocum, T.A., McMaster, R.B., & Kessler, F.C. (2008). *Thematic Cartography and Geo-visualization* (3rd Edition). Prentice Hall.

Tyner, J.A. (2010). *Principles of Map Design*. The Guilford Press.

Sarkar, A. (2015). *Practical Geography: A Systematic Approach*. New Delhi: Orient Black Swan Private Ltd.

Practical guidelines: Students will prepare a laboratory notebook covering all the practical units duly signed by the internal faculty members. Viva voce is compulsory at the time of the practical examination.

Question pattern

Type	Marks			Total
Theoretical	1: 5 out of 5	5: 3 out of 5	10: 2 out of 4	40
Practical	15 : 1 out of 1	5: Laboratory notebook and viva-voce.		20
CE	10: Mid-term test, class test, seminar presentation, term paper (Any one to be decided by the respective departmental faculty members)			10
Attendance	5			5
Full marks				75