

SYLLABUS

FOUR YEARS UNDERGRADUATE PROGRAMME IN GEOGRAPHY



**UNIVERSITY OF NORTH BENGAL
RAJA RAMMOHUNPUR**

W.E.F: ACADEMIC SESSION 2024-25

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Semester: 1

PAPER: MAJOR

Paper Description: GEOTECTONIC

This paper deals with geotectonic, scale, and diagrammatic data presentation topics. In particular, the theoretical part of the course will cover the 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 the construction of linear and comparative scale and diagrammatic data presentation using line, bar and circle.

Paper Code: GEOGMAJ101

Paper Type: Theory + Practical Lab Based [L]

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: Theoretical – 2hrs 30 minutes; Practical – 2hrs

Syllabus:

Paper Objectives

Knowledge Acquired:

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

Skills Gained:

- Develop skills in constructing linear and comparative scales.
- Graphical representation of data using line, bar and circle diagrams.

Competency Developed:

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

Syllabus Overview

Theory

Unit	Content	Hours/Week
1	Geological time scale (USGS, 2023); Internal structure of the earth; Classification of rocks: Igneous, sedimentary and metamorphic; Theory of isostasy: Views of Airy, Pratt and Vening Meneisz.	3
2	Earth movements: Types, processes and topographic effects of folding and faulting; Classification of mountains; Theories of mountain building: Geosynclinal Theory (Kober), Thermal Contraction Theory (Jeffreys) and Thermal Convection Current Theory (Holmes).	
3	Continental Drift Theory (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, multiple and compound) and circle (proportional circle and proportional pie graphs).	

Suggested Reading

Brown, G.C., & Mussett, A.E. (1993). *The Inaccessible Earth (An integrated view to its structure and composition)*. London: Chapman & Hall.

Condie, K.C. (2003). *Plate Tectonics and Crustal Evolution*. Oxford, Burlington: Butterworth-Heinemann.

Cox, A., & Hart, R.B. (1986). *Plate Tectonics: How it Works*. Oxford: Blackwell Scientific Publications.

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

Erickson, J. (2001). *Plate Tectonics: Unravelling the Mysteries of the Earth*. New York: Checkmark Books.

Farndon, J. (2012). *The Illustrated Guide to Rocks & Minerals*. Southwater.

Frisch, W., Meschede, M., & Blakey, R.C. (2011). *Plate Tectonics: Continental Drift and Mountain Building*. Springer.

Gerrard, A.J. (1988). *Rocks and Landforms*. London: Unwin Hyman.

Gilbert, G.K. (1914). *The Transportation of Debris by Running Water*. United States Geological Survey, Denver: USGS Professional Paper No. 86.

Husain M. (2002). *Fundamentals of Physical Geography*. Jaipur: Rawat Publications.

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

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

Mohan, K. (2018). *An Ultimate Guide to Physical Geography (Ges Periodos Vol. 1)*. New Delhi: Oak Bridge Publication.

Monkhouse, F. J. (2009). *Principles of Physical Geography*. Kolkata: Platinum Publishers.

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

Saha, P.K., & Basu, P. (2009). *Advanced Practical Geography*. Kolkata: Books and Allied (P) Ltd.

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

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

Siddhartha, K. (2001). *The Earth's Dynamic Surface*. New Delhi: Kisalaya Publications.

Singh, S. (2011). *Geography*. New Delhi: Tata Mc-graw Hill Publishing Co. Ltd.

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

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

Sorrell, C.A., & Sandström, G.F. (2001). *Rocks and Minerals: A Guide to Field Identification*. St. Martin's Press.

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	2: 5 out of 8	5: 4 out of 6	10: 3 out of 5	60
Practical	15: 1 out of 1	5: Laboratory notebook and Viva-voce		20
Full marks				80

Semester: 1

PAPER: MAJOR

Paper Description: SETTLEMENT GEOGRAPHY

This paper deals with topics such as settlement geography, scale, and map projection. In particular, the theoretical part of the course will cover the concept of site and situation, the 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 the diagonal and vernier scale construction and map projections.

Paper Code: GEOGMAJ102

Paper Type: Theory + Practical Lab Based [L]

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: Theoretical – 2hrs 30 minutes; Practical – 2hrs

Syllabus:

Paper Objectives

Knowledge Acquired:

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

Skills Gained:

- Develop skills in constructing diagonal and vernier scales.
- Expertise in the mathematical/graphical construction and properties of map projections.

Competency Developed:

- Analysing the suitability of different locations for settlements and understand the factors that contribute to their success or decline.
- Understanding the morphological patterns will enable students to identify and analyse the characteristics of different settlement.
- 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 (Nelson and Mitra); Urban land use and morphology: Concentric Zone Theory, Sector Theory and Multiple Nuclei Theory.	

3	Settlement hierarchy; Concept of primate city and rank size rule; Central place theory (Christaller and Losch).	
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Practical

Unit	Content	Hours/Week
1	Scale: Construction of diagonal and vernier scale.	2
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 and Mercator Projection.	

Suggested Reading

- Daniel, P.A., & Hopkinson, M.F. (1989). *The Geography of Settlement*. London: Oliver & Boyd.
- Ghosh, S. (1998). *Settlement Geography*. Kolkata: Orient Longman Ltd.
- Gregory, D., & Urry, J. (1985). *Social Relation and Spatial Structure*. MacMillan.
- Herbert, D.T., & Johnston, R.J. (1982). *Geography and Urban Environment*. John Wiley & Sons.
- Hudson, F.S. (1977). *A Geography of Settlements*. Plymouth: Macdonald & Evans Ltd.
- Hussain, J. (2021). *Settlement Geography*. Notion Press.
- Hussain, M. (2007). *Models in Geography*. Rawat Publication.
- Johnston R., Gregory D., Pratt G., et al. (2008). *The Dictionary of Human Geography*. Blackwell Publication.
- Majumdar, P.K. (2013). *India's Demography: Changing Demographic Scenario in India*. Rawat Publications.
- Mandal, R.B. (2001). *Introduction to Rural Settlements*. New Delhi: Concept Publishing Company.
- Maurya, S.D. (2015). *Settlement Geography*. Sharda Pustak Bhawan.
- Misra, R.P., & Sundaram, K.V. (1979). *Rural Area Development: Perspectives and Approaches*. Sterling Publishers.
- Monkhouse, F.J., & Wilkinson, H.R. (1971). *Maps and Diagrams: Their Compilation and Construction* (3rd eds.). Kolkata: Alphaneumera.
- Ramachandran, R. (2010). *Urbanisation and Urban Systems of India*. New Delhi: Oxford University Press.
- Sarkar, A. (2015). *Practical Geography: A Systematic Approach*. New Delhi: Orient Black Swan Private Ltd.
- Singh, R.L., & Singh, R.P.B. (1999). *Elements of Practical Geography*. Kalyani Publishers.
- Singh, R.Y. (1994). *Geography of Settlement*. Jaipur: Rawat Publications.
- Smith D.M. (1982). *Human Geography: A Welfare Approach*. London: Edward Arnold.
- Tiwari, R.C. (2020). *Settlement Geography: Rural and Urban Settlements*. Pravalika Publication.

Verma, L.N. (2006). *Urban Geography*. Jaipur: Rawat Publications.

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	2: 5 out of 8	5: 4 out of 6	10: 3 out of 5	60
Practical	15: 1 out of 1	5: Laboratory notebook and Viva-voce		20
Full marks				80

Semester: 1

PAPER: MINOR

Paper Description: GEOMORPHOLOGY

This paper in Geomorphology offers a comprehensive examination of Earth's surface processes and landform evolution. The theoretical portion covers fundamental concepts including the nature and scope of geomorphology, the Earth's interior, Continental Drift Theory, Plate Tectonics, and structural features such as folds and faults. It further explores weathering processes, mass wasting, drainage classifications, and the Cycle of Erosion and Slope Development Theories. The evolution of landforms shaped by fluvial, aeolian, glacial, and karst processes is also studied. The practical part focuses on construction of scale and map projection techniques.

Paper Code: GEOGMIN101

Paper Type: Theory + Practical Lab Based [L]

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: Theoretical - 2 hrs 30 minutes; Practical – 2 hrs.

Syllabus:

Paper Objectives

Knowledge Acquired:

- Students will understand the concept of resources, their creation, and the factors influencing them. They will also learn to classify resources based on various criteria, enabling a deeper appreciation of their diverse nature.
- Students will be familiar with the distribution of various resources in India, including forests, coal, iron ore, petroleum, atomic minerals, solar, wind, and hydropower. They will gain insights into the geographic and socio-economic factors that shape resource distribution in the country.
- Students will develop knowledge of resource conservation strategies, encompassing forests, soil, water, minerals, and energy resources. They will gain an understanding of ecological, economic, and ethnological approaches to resource management, emphasizing the importance of sustainable practices.

Skills Gained:

- Students will develop practical skills in identifying a wide range of rocks and minerals, such as granite, gneiss, basalt, limestone, marble, shale, and sandstone, essential for professionals in geology, environmental science, and resource management.
- They will enhance skills of data presentation and visualization through the use of diagrammatic techniques, including chorochromatic maps, dot and sphere plots, choropleth maps, proportional squares, and cubes, which are critical for effectively communicating resource-related information.

Competency Developed:

- Competency in assessing the availability and distribution of resources, particularly within the context of India will be developed. They will be able to analyze the factors affecting resource availability and propose effective management strategies.
- Students will advocate for resource conservation, with the ability to apply ecological, economic, and ethnological approaches to real-world challenges in resource management. They will also be well-prepared to contribute to sustainable resource use and environmental protection.

- Proficiency in data analysis and communication through diagrammatic representation will be gained, enabling the effective presentation of resource-related data to diverse audiences, which will support informed decision-making and policy development.

Syllabus Overview

Theory

Unit	Content	Hours/Week
1	Nature and scope of geomorphology; Interior of the earth; Continental Drift Theory (Wegener); Plate Tectonics; Folds and faults.	3
2	Weathering: Definition, controlling factors, types and resulting landforms; Mass wasting: Definition, factors affecting mass wasting and types; Classification of drainage and drainage patterns; Cycle of Erosion and Slope Development Theories (Davis and Penck).	
3	Evolution of landforms (erosional and depositional): Fluvial, aeolian, glacial and karst.	

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

- Bloom, A. L. (2003). *Geomorphology: A Systematic Analysis of Late Cenozoic Landforms*. New Delhi: Prentice-Hall of India.
- Goudie, A.S. (2004). *Encyclopaedia of Geomorphology* (vol. 1 & 2). Routledge.
- Gupta, K. K., & Tyagi, V. C. (1992). *Working with Map*. New Delhi: Survey of India, DST.
- Huggett, R.J. (2007). *Fundamentals of Geomorphology*. New York: Routledge.
- Khan, Md. Z.A. (1998). *Text Book of Practical Geography*. New Delhi: Concept Publishing Company.
- Kihullar, D.R. (2012). *Physical Geography*. New Delhi: Kalyani Publishers.
- Mishra, R.P., & Ramesh, A. (1989). *Fundamentals of Cartography*. New Delhi: Concept.
- Robinson, A. H. (2009). *Elements of Cartography*. New York: John Wiley and Sons.
- Saha, P.K., & Basu, P. (2009). *Advanced Practical Geography*. Kolkata: Books and Allied (P) Ltd.
- Sarkar, A. (2015). *Practical geography: A systematic approach*. New Delhi: Orient Black Swan Private Ltd.
- Selby, M.J. (1986). *Earth's Changing Surface*. Oxford University Press.
- Siddhartha, K. (2001). *The Earth's Dynamic Surface*. New Delhi: Kisalaya Publications.
- Singh, R. L., & Singh, R. P. B. (1999). *Elements of Practical Geography*. New Delhi: Kalyani Publishers.

Singh, S. (2000). *Geomorphology*. Allahabad: Prayag Pustak Bhavan.

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

Strahler, A. H., & Strahler, A. N. (2006). *Physical Geography*. Spain: Wiley.

Summerfield, M.A. (2003). *Global Geomorphology: An Introduction to the Study of landforms*. Longman.

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

Vaidyanadhan, R., & Subbarao, K.V. (2014). *Landforms of India from Topomaps and Images*. Geological Society of India.

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	2: 5 out of 8	5: 4 out of 6	10: 3 out of 5	60
Practical	15: 1 out of 1	5: Laboratory notebook and Viva-voce		20
Full marks				80

Semester: 1

PAPER: DSC

Paper Description: GEOMORPHOLOGY

This paper in Geomorphology offers a comprehensive examination of Earth's surface processes and landform evolution. The theoretical portion covers fundamental concepts including the nature and scope of geomorphology, the Earth's interior, Continental Drift Theory, Plate Tectonics, and structural features such as folds and faults. It further explores weathering processes, mass wasting, drainage classifications, and the Cycle of Erosion and Slope Development Theories. The evolution of landforms shaped by fluvial, aeolian, glacial, and karst processes is also studied. The practical part focuses on construction of scale and map projection techniques.

Paper Code: GEOGDSC101

Paper Type: Theory + Practical Lab Based [L]

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: Theoretical - 2 hrs 30 minutes; Practical – 2 hrs.

Syllabus:

Paper Objectives

Knowledge Acquired:

- Understand the foundational principles of geomorphology, including key theories such as Continental Drift and Plate Tectonics, and the structure of the Earth's interior.
- Comprehend the processes of weathering and mass wasting, including their types, controlling factors, and their impact on landform creation.
- Grasp the evolution of landforms through different geomorphic processes such as fluvial, aeolian, glacial, and karst activities.

Skill Gained:

- Perform construction of scales, such as linear, comparative and diagonal scale.
- Students will acquire skills in constructing different types of map projections, including polar zenithally gnomonic, simple conical and cylindrical equal area projection.

Competency Development:

- Apply theoretical geomorphological knowledge to practical map analysis, linking theoretical concepts with real-world topographical data.
- Integrate and synthesize geomorphological data to provide comprehensive insights into landform evolution and landscape analysis.
- Solve practical geomorphological problems using both theoretical understanding and practical mapping techniques to analyze and interpret physical landscapes effectively.

Syllabus Overview

Theory

Unit	Content	Hours/Week
1	Nature and scope of geomorphology; Interior of the earth; Continental Drift Theory (Wegener); Plate Tectonics; Folds and faults.	3

2	Weathering: Definition, controlling factors, types and resulting landforms; Mass wasting: Definition, factors affecting mass wasting and types; Classification of drainage and drainage patterns; Cycle of Erosion and Slope Development Theories (Davis and Penck).	
3	Evolution of landforms (erosional and depositional): Fluvial, aeolian, glacial and karst.	

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

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

Goudie, A.S. (2004). *Encyclopaedia of Geomorphology* (vol. 1 & 2). Routledge.

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

Huggett, R.J. (2007). *Fundamentals of Geomorphology*. New York: Routledge.

Khan, Md. Z.A. (1998). *Text Book of Practical Geography*. New Delhi: Concept Publishing Company.

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

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

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

Saha, P.K., & Basu, P. (2009). *Advanced Practical Geography*. Kolkata: Books and Allied (P) Ltd.

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

Selby, M.J. (1986). *Earth's Changing Surface*. Oxford University Press.

Siddhartha, K. (2001). *The Earth's Dynamic Surface*. New Delhi: Kisalaya Publications.

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

Singh, S. (2000). *Geomorphology*. Allahabad: Prayag Pustak Bhavan.

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

Strahler, A. H., & Strahler, A. N. (2006). *Physical Geography*. Spain: Wiley.

Summerfield, M.A. (2003). *Global Geomorphology: An Introduction to the Study of landforms*. Longman.

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

Vaidyanadhan, R., & Subbarao, K.V. (2014). *Landforms of India from Topomaps and Images*. Geological Society of India.

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	2: 5 out of 8	5: 4 out of 6	10: 3 out of 5	60
Practical	15: 1 out of 1	5: Laboratory notebook and Viva-voce		20
Full marks				80

Semester: 2

PAPER: MAJOR

Paper Description: GEOMORPHOLOGY

This course provides a comprehensive study of geomorphology, focusing on the field's nature, scope, and fundamental concepts. It explores a variety of topics, including morphogenetic regions, topographical features of different geological structures, weathering processes and the landforms they produce, mass wasting phenomena, and theories of 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: GEOGMAJ203

Paper Type: Theory + Practical Lab Based [L]

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: Theoretical – 2hrs 30 minutes; Practical – 2hrs

Syllabus:

Paper Objectives

Knowledge Acquired:

- Explore the nature and scope of geomorphology, including its fundamental concepts, will equip students with an understanding of the processes and features that shape the Earth's surface.
- Examine weathering processes, their controlling factors, types, and resulting landforms will help students grasp mass wasting, including its definitions, influencing factors, and various types. This knowledge will enable them to identify and analyze landforms shaped by weathering and mass wasting.
- Study landforms developed through erosional and depositional processes in various environments such as fluvial, karst, aeolian, glacial, and coastal—will equip students to recognize and explain the formation of different landforms.

Skill Gained:

- 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.
- Master skills related to geospatial analysis by learning methods such as slope analysis (Wentworth), relative relief (Smith), dissection index (Dov Nir) and so on. These skills will allow them to quantify and assess the terrain's characteristics and relief.

Competency Development:

- 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.
- Develop competency to analyze landscapes using tools like drainage density, stream frequency, watershed delineation, stream ordering and settlement frequency. This analytical ability is crucial for studying natural processes and landform evolution.

- 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; Classification of drainage and drainage patterns; Drainage development on folded and uniclinal structure.	3
2	Weathering: Definition, controlling factors, types and resulting landforms; Mass wasting: Definition, factors affecting mass wasting and types; Cycle of Erosion and Slope Development Theories (Davis, Penck and King).	
3	Evolution of landforms (erosional and depositional): Fluvial, aeolian, glacial, coastal and karst.	

Practical

Unit	Content	Hours/Week
1	Topographical Map: Interpretation of physical and cultural features of a topographical map (plateau/mountain area); Interpretation of topography/landforms with the help of serial, superimposed, projected and composite profiles; Drawing of long and cross profile of a river.	2
2	Topographical Map: Average slope (Wentworth); Relative relief (Smith); Dissection index (Dov Nir); Ruggedness index (Schumann); Drainage density; Stream frequency; Watershed: Delineation and calculation of area using graph paper; Stream ordering (Strahler); Settlement frequency; Transect chart.	

Suggested Reading

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

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.

Goudie, A.S. (2004). *Encyclopaedia of Geomorphology (vol. 1 & 2)*. Routledge.

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

Huggett, R.J. (2007). *Fundamentals of Geomorphology*. New York: Routledge.

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

Khan, Md. Z.A. (1998). *Text Book of Practical Geography*. New Delhi: Concept Publishing Company.

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

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

- Mishra, R. P., & Ramesh, A. (1989). *Fundamentals of Cartography*. New Delhi: Concept Publishing Company.
- Monkhouse, F. J., & Wilkinson, H. R. (1973). *Maps and Diagrams*. London: Methuen.
- Richards, K. S. (1982). *Rivers: Form and Processes in Alluvial Channels*. London: Methuen.
- Robinson, A. H. (2009). *Elements of Cartography*. New York: John Wiley and Sons.
- Saha, P.K. and Basu, P. (2009). *Advanced Practical Geography*. Kolkata: Books and Allied (P) Ltd.
- Sarkar, A. (2015). *Practical geography: A systematic approach*. New Delhi: Orient Black Swan Pvt. Ltd.
- Selby, M. J. (2005). *Earth's Changing Surface*. Indian Edition. OUP.
- Siddhartha, K. (2001). *The Earth's Dynamic Surface*. New Delhi: Kisalaya Publications.
- Singh, R. L., & Singh, R. P. B. (1999). *Elements of Practical Geography*. New Delhi: Kalyani Publishers.
- Singh, S. (2000). *Geomorphology*. Allahabad: Prayag Pustak Bhavan.
- Skinner, B. J., & Porter, S. C. (2000). *The Dynamic Earth: An Introduction to Physical Geology* (4th eds.). John Wiley and Sons.
- Strahler, A. H., & Strahler, A. N. (2006). *Physical Geography*. Spain: Wiley.
- Summerfield, M.A. (2003). *Global Geomorphology: An Introduction to the Study of landforms*. Longman.
- Thornbury, W. D. (1968). *Principles of Geomorphology*. John Wiley and Sons.
- Vaidyanadhan, R., & Subbarao, K.V. (2014). *Landforms of India from Topomaps and Images*. Geological Society of India.

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	2: 5 out of 8	5: 4 out of 6	10: 3 out of 5	60
Practical	15: 1 out of 1	5: Laboratory notebook and Viva-voce		20
Full marks				80

Semester: 2

PAPER: MAJOR

Paper Description: GEOGRAPHY OF RESOURCES

This course provides a thorough understanding of the meaning and significance of resources, including their creation, distribution, and the various factors that influence them, such as natural processes, human activities, and cultural influences. Students will analyze the classification of resources based on criteria such as exhaustibility, distribution, ownership, and development status, with a specific focus on resources in India. Additionally, students will explore resource exploitation and degradation, emphasizing the importance of conservation from ecological, economic, and ethnological perspectives. The practical component will develop students' skills in identifying rocks and minerals using megascopic methods and presenting data in diagrammatic form.

Paper Code: GEOGMAJ204

Paper Type: Theory + Practical Lab Based [L]

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: Theoretical - 2hrs 30 minutes Practical – 2hrs

Syllabus:

Paper Objectives

Knowledge Acquired:

- Exploring the concept of resources, their creation, and the factors influencing them will enable students to classify resources based on various criteria, allowing them to appreciate the diverse nature of resources.
- Examining the distribution of various resources in India—including forest, coal, iron ore, petroleum, atomic minerals, solar, wind, and hydel power—will provide students with insights into the geographic and socio-economic factors influencing resource distribution in the country.
- Studying the resource conservation strategies related to forests, soil, water, minerals, and energy resources will help students develop an understanding of ecological, economic, and ethnological approaches to resource management, highlighting the importance of sustainable practices.

Skill Gained:

- Develop practical skills in identifying a wide range of rocks and minerals, including Granite, Gneiss, Basalt, Limestone, Marble, Shale, Sandstone and so on. This skill is essential for geology, environmental science, and resource management professionals.
- Enhance their data presentation and visualisation skills by using various diagrammatic techniques such as, chorochromatic maps, dot and sphere plots, choropleth maps, proportional squares and cubes. These skills are crucial for effectively communicating resource-related information.

Competency Developed:

- 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.
- Advocate for resource conservation, capable of applying ecological, economic, and ethnological approaches to real-world resource management challenges. They will be well-equipped to contribute to sustainable resource use and environmental protection.

- 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	Resource: Nature and definition; Resource-creating factors: Nature, man and culture; Functional and dynamic concept of resources; Classification of resources based on exhaustibility, distribution, ownership and status of development.	3
2	Distribution of resources with special reference to India: Forest, coal, iron ore, petroleum, atomic minerals, solar, wind and hydel power.	
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, Gneiss, Basalt, Limestone, Marble, Shale, Sandstone, Conglomerate, Bauxite, Slate, Quartzite, Schist, Phyllite, Calcite, Chalcopryrite, Feldspar, Galena, Haematite, Magnetite, Mica, Quartz, Tourmaline, and Talc.	2
2	Diagrammatic data presentation: Chorochromatic map, dot and sphere map, choropleth map, diagrammatic map (proportional square and cubes).	

Suggested Reading

- Blanco, E., & Razzaque, J. (2011). *Globalization and National Resources: Law, Challenges, Key Issues and Perspective*. U.K: Edward Elgar Publications.
- Brundtland, G.H. (1987). *Our Common Future: UNCED Report*. Geneva.
- Coe, N., Kelly, P., & Yeung, H.W.C. (2007). *Economic Geography: A Contemporary Introduction*. New York: John Wiley and Sons.
- Dicken, P. (2007). *Global Shift: Mapping the Changing Contours of the World Economy*. New York: Sage Publications.
- Fouberg, E. H., Murphy, A. B., & de Blij, H. J. (2016). *Human geography: People, place, and culture* (11th eds.). John Wiley and Sons.
- Gadgil, M., & Guha, R. (2005). *The Use and Abuse of Nature: Incorporating This Fissured Land: An Ecological History of India and Ecology and Equity*. USA: Oxford University Press.
- Gautam, A. (2018). *Geography of Resources: Exploitation, Conservation and Management* (2nd ed.). Allahabad: Sharda Pustak Bhawan.
- Holechek, J.L.C., Fisher, R.A., & Valdez, J.T. (2003). *Natural Resources: Ecology, Economics and Policy*. New Jersey: Prentice Hall.
- Hussain, M. (2019). *Geography of India* (8th ed.). McGraw Hill.

- Leong, G.C. (1995). *Certificate Physical and Human Geography*. Oxford: Oxford University Press.
- Mackinnon, D., & Cumbers, A. (2007). *An Introduction to Economic Geography: Globalization, Uneven Development and Place*. New Jersey: Prentice Hall.
- Mather, A.S., & Chapman, K. (1995). *Environmental Resources*. New York: John Wiley and Sons.
- Maurya, S. D. (2022). *Resource Geography*. Prayagraj: Pravalika Publications.
- Mitchell, B. (1997). *Resource and Environmental Management*. England: Longman Harlow.
- Parman, S.S. (2002). *Geography, Economics and Economic Geography*. Pune: ASD Publication.
- Pearce, D. W., & Turner, R. K. (1990). *The economics of natural resources and the environment*. Harvester Wheatsheaf.
- Roy, P. (2005). *Economic Geography: A Study of Resources*. Kolkata: New Central Book Agency.
- Sarkar, A. (2015). *Practical geography: A systematic approach*. New Delhi: Orient Black Swan Pvt. Ltd.
- Saxena, H. M. (2018). *Economic Geography* (2nd ed.). Rawat Publications.
- Simmons, I.G. (1980). *The Ecology of Natural Resources*. London: Edward Arnold.
- Simmons, I.G. (1991). *Earth, Air and Water: Resources and Environment in the 20th Century*. London: Edward Arnold.
- Singh, R. L., & Singh, R. P. B. (1999). *Elements of Practical Geography*. Kalyani Publishers.
- Wiebe, K. (2003). *Land Quality Agricultural Productivity and Food Security*. U.K: Edward Elgar 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	2: 5 out of 8	5: 4 out of 6	10: 3 out of 5	60
Practical	15: 1 out of 1	5: Laboratory notebook and Viva-voce		20
Full marks				80

Semester: 2

PAPER: MINOR

Paper Description: SETTLEMENT GEOGRAPHY

The paper offers students a thorough understanding of nature and scope of settlement geography. It provides an overview of key concepts of site and situation and definitions of hamlet, village, town, city, metropolis and megalopolis. Students will also gain knowledge about types and patterns of rural settlements, trends and patterns of urbanization in India. Many urban land use models like Concentric Zone Theory, Sector Theory and Multiple Nuclei Theory, Central Place Theory by W. Christaller and also the concept of primate city and rank size rule will help students knowing the land use patterns according to the need. Through a multidisciplinary approach, it aims to elucidate the complex interplay of interdependency between rural and students will gain insight into the challenges faced by both rural and urban areas, with a focus on economic, social, and infrastructural issues. In the practical portion students will understand various graphical and cartographic methods for visually presenting data, allowing them to interpret quantitative and spatial information more effectively.

Paper Code: GEOGMIN202

Paper Type: Theory + Practical Lab Based [L]

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: Theoretical - 2 hrs 30 minutes; Practical – 2 hrs.

Syllabus:

Paper Objectives

Knowledge Acquired:

- Acquire a solid grasp of the nature and scope of settlement geography and difference between site and situation. Students will classify settlements by size, population, and function, understanding the hierarchy from hamlets to megalopolis and also the types and patterns of rural settlements.
- Students will explore the fast-paced urbanization in India as well as its impacts such as the rise of slums and pressure on infrastructure. They will also study patterns like city expansion, the emergence of megacities, and the difficulties posed by urban sprawl.
- Studying different urban land use models like Concentric Zone Theory, Sector Theory, Multiple Nuclei Theory and Concept of primate city and rank size rule, Central Place Theory by W. Christaller will develop their insights into the structural aspects of settlements, both rural and urban and they will be able to critically analyze settlement patterns and understand the forces shaping human habitats.

Skills Gained:

- Diagrammatic data presentation through line graph, bar graph and proportional circle will allow them to effectively interpret statistical data and present it clearly in visual formats, essential for both geographical and general data analysis.
- Through the mapping techniques, students will gain the ability to represent and analyze geographical data spatially, enhancing their understanding of how different factors are distributed across regions.

Competency Developed:

- Become adept at critically analysing settlement patterns and understand the forces shaping human habitats.

- Students will gain a comprehensive understanding of the distinct problems faced by rural and urban areas. They will also appreciate the interconnectedness of these issues, recognizing how urban growth impacts rural regions and how challenges in both areas require different but complementary solutions.
- Develop critical skills in both the creation and interpretation of graphical and spatial data, which are fundamental tools in geography will help them for communicating complex information.

Syllabus Overview:

Theory

Unit	Content	Hours/Week
1	Nature and scope of settlement geography; Concept of site and situation; Definition of hamlet, village, town, city, metropolis and megalopolis; Types and patterns of rural settlements; Trends and patterns of urbanization in India.	3
2	Morphology of rural settlements; Urban land use models: Concentric Zone Theory, Sector Theory and Multiple Nuclei Theory; Concept of primate city and rank size rule; Central Place Theory by W. Christaller.	
3	Concept of rural-urban fringe; Rural problems: Low productivity in agriculture, unemployment and poverty; Urban problems: Slums, transportation and water supply.	

Practical

Unit	Content	Hours/Week
1	Diagrammatic data presentation: Line graph, bar graph (simple, compound and multiple) and proportional circle.	2
2	Diagrammatic data presentation: Chorochromatic map, dot & sphere map and choropleth map.	

Suggested Reading

- Daniel, P.A., & Hopkinson, M.F. (1989). *The Geography of Settlement*. London: Oliver & Boyd.
- Ghosh, S. (1998). *Settlement Geography*. Kolkata: Orient Longman Ltd.
- Gregory, D., & Urry, J. (1985). *Social Relation and Spatial Structure*. MacMillan.
- Herbert, D.T., & Johnston, R.J. (1982). *Geography and Urban Environment*. John Wiley & Sons.
- Hudson, F.S. (1977). *A Geography of Settlements*. Plymouth: Macdonald & Evans Ltd.
- Hussain, J. (2021). *Settlement Geography*. Notion Press.
- Hussain, M. (2007). *Models in Geography*. Rawat Publication.
- Johnston R., Gregory D., Pratt G., et al. (2008). *The Dictionary of Human Geography*. Blackwell Publication.
- Majumdar, P.K. (2013). *India's Demography: Changing Demographic Scenario in India*. Rawat Publications.
- Mandal, R.B. (2001). *Introduction to Rural Settlements*. New Delhi: Concept Publishing Company.
- Maurya, S.D. (2015). *Settlement Geography*. Sharda Pustak Bhawan.
- Misra, R.P., & Sundaram, K.V. (1979). *Rural Area Development: Perspectives and Approaches*. Sterling Publishers.

Monkhouse, F.J., & Wilkinson, H.R. (1971). *Maps and Diagrams: Their Compilation and Construction* (3rd eds.). Kolkata: Alphaneumera.

Ramachandran, R. (2010). *Urbanisation and Urban Systems of India*. New Delhi: Oxford University Press.

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

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

Singh, R.Y. (1994). *Geography of Settlement*. Jaipur: Rawat Publications.

Smith D.M. (1982). *Human Geography: A Welfare Approach*. London: Edward Arnold.

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

Verma, L.N. (2006). *Urban Geography*. Jaipur: Rawat Publications.

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	2: 5 out of 8	5: 4 out of 6	10: 3 out of 5	60
Practical	15: 1 out of 1	5: Laboratory notebook and Viva-voce		20
Full marks				80

Semester: 2

PAPER: DSC

Paper Description: SETTLEMENT GEOGRAPHY

The paper offers students a thorough understanding of nature and scope of settlement geography. It provides an overview of key concepts of site and situation and definitions of hamlet, village, town, city, metropolis and megalopolis. Students will also gain knowledge about types and patterns of rural settlements, trends and patterns of urbanization in India. Many urban land use models like Concentric Zone Theory, Sector Theory and Multiple Nuclei Theory, Central Place Theory by W. Christaller and also the concept of primate city and rank size rule will help students knowing the land use patterns according to the need. Through a multidisciplinary approach, it aims to elucidate the complex interplay of interdependency between rural and students will gain insight into the challenges faced by both rural and urban areas, with a focus on economic, social, and infrastructural issues. In the practical portion students will understand various graphical and cartographic methods for visually presenting data, allowing them to interpret quantitative and spatial information more effectively.

Paper Code: GEOGDSC202

Paper Type: Theory + Practical Lab Based [L]

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: Theoretical - 2 hrs 30 minutes; Practical – 2 hrs.

Syllabus:

Paper Objectives

Knowledge Acquired:

- Acquire a solid grasp of the nature and scope of settlement geography and difference between site and situation. Students will classify settlements by size, population, and function, understanding the hierarchy from hamlets to megalopolis and also the types and patterns of rural settlements.
- Students will explore the fast-paced urbanization in India as well as its impacts such as the rise of slums and pressure on infrastructure. They will also study patterns like city expansion, the emergence of megacities, and the difficulties posed by urban sprawl.
- Studying different urban land use models like Concentric Zone Theory, Sector Theory, Multiple Nuclei Theory and Concept of primate city and rank size rule, Central Place Theory by W. Christaller will develop their insights into the structural aspects of settlements, both rural and urban and they will be able to critically analyze settlement patterns and understand the forces shaping human habitats.

Skills Gained:

- Diagrammatic data presentation through line graph, bar graph and proportional circle will allow them to effectively interpret statistical data and present it clearly in visual formats, essential for both geographical and general data analysis.
- Through the mapping techniques, students will gain the ability to represent and analyze geographical data spatially, enhancing their understanding of how different factors are distributed across regions.

Competency Developed:

- Become adept at critically analysing settlement patterns and understand the forces shaping human habitats.

- Students will gain a comprehensive understanding of the distinct problems faced by rural and urban areas. They will also appreciate the interconnectedness of these issues, recognizing how urban growth impacts rural regions and how challenges in both areas require different but complementary solutions.
- Develop critical skills in both the creation and interpretation of graphical and spatial data, which are fundamental tools in geography will help them for communicating complex information.

Syllabus Overview:

Theory

Unit	Content	Hours/Week
1	Nature and scope of settlement geography; Concept of site and situation; Definition of hamlet, village, town, city, metropolis and megalopolis; Types and patterns of rural settlements; Trends and patterns of urbanization in India.	3
2	Morphology of rural settlements; Urban land use models: Concentric Zone Theory, Sector Theory and Multiple Nuclei Theory; Concept of primate city and rank size rule; Central Place Theory by W. Christaller.	
3	Concept of rural-urban fringe; Rural problems: Low productivity in agriculture, unemployment and poverty; Urban problems: Slums, transportation and water supply.	

Practical

Unit	Content	Hours/Week
1	Diagrammatic data presentation: Line graph, bar graph (simple, compound and multiple) and proportional circle.	2
2	Diagrammatic data presentation: Chorochromatic map, dot & sphere map and choropleth map.	

Suggested Reading

- Daniel, P.A., & Hopkins, M.F. (1989). *The Geography of Settlement*. London: Oliver & Boyd.
- Ghosh, S. (1998). *Settlement Geography*. Kolkata: Orient Longman Ltd.
- Gregory, D., & Urry, J. (1985). *Social Relation and Spatial Structure*. MacMillan.
- Herbert, D.T., & Johnston, R.J. (1982). *Geography and Urban Environment*. John Wiley & Sons.
- Hudson, F.S. (1977). *A Geography of Settlements*. Plymouth: Macdonald & Evans Ltd.
- Hussain, J. (2021). *Settlement Geography*. Notion Press.
- Hussain, M. (2007). *Models in Geography*. Rawat Publication.
- Johnston R., Gregory D., Pratt G., et al. (2008). *The Dictionary of Human Geography*. Blackwell Publication.
- Majumdar, P.K. (2013). *India's Demography: Changing Demographic Scenario in India*. Rawat Publications.
- Mandal, R.B. (2001). *Introduction to Rural Settlements*. New Delhi: Concept Publishing Company.
- Maurya, S.D. (2015). *Settlement Geography*. Sharda Pustak Bhawan.
- Misra, R.P., & Sundaram, K.V. (1979). *Rural Area Development: Perspectives and Approaches*. Sterling Publishers.

Monkhouse, F.J., & Wilkinson, H.R. (1971). *Maps and Diagrams: Their Compilation and Construction* (3rd eds.). Kolkata: Alphaneumera.

Ramachandran, R. (2010). *Urbanisation and Urban Systems of India*. New Delhi: Oxford University Press.

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

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

Singh, R.Y. (1994). *Geography of Settlement*. Jaipur: Rawat Publications.

Smith D.M. (1982). *Human Geography: A Welfare Approach*. London: Edward Arnold.

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

Verma, L.N. (2006). *Urban Geography*. Jaipur: Rawat Publications.

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	2: 5 out of 8	5: 4 out of 6	10: 3 out of 5	60
Practical	15: 1 out of 1	5: Laboratory notebook and Viva-voce		20
Full marks				80

Semester: 3

PAPER: MAJOR

Paper Description: CLIMATOLOGY

The paper offers a comprehensive overview of key concepts in climatology, focusing on the fundamental theories and principles that govern weather and climate patterns. It addresses a broad 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 critical issues such as climate change, ozone depletion, and acid rain. This paper aims to provide a foundational understanding of climatology and its practical applications, serving as a valuable resource for students and professionals in environmental science, meteorology, and related fields. The practical component will include the use of meteorological instruments, interpretation of Indian daily weather reports, and analysis of Climographs and Hythergraphs.

Paper Code: GEOGMAJ305

Paper Type: Theory + Practical Lab Based [L]

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: Theoretical - 2hrs 30 minutes Practical – 2hrs

Syllabus:

Paper Objectives

Knowledge Acquired:

- Exploring Earth's climate systems, including the factors that influence climate and weather patterns, will offer insights into the composition of the atmosphere, heat transfer mechanisms, and the intricate interactions that drive global atmospheric circulation.
- Examine the predominant theories governing cloud and precipitation formation, such as the Bergeron-Findeisen and Collision-Coalescence theories, will allow students to comprehend the complex processes underlying weather phenomena and precipitation types.
- Learn about the Köppen and Thornthwaite climatic classifications. Additionally, they will gain knowledge of pressing contemporary issues such as climate change, ozone depletion, and acid precipitation, thereby deepening their awareness of environmental challenges.

Skill Gained:

- Studying the composition and structure of the atmosphere, heat budgets, and circulation patterns will enable students to analyze complex environmental data and draw conclusions about climate dynamics.
- Enhancing students' research skills and capacity to interpret meteorological data will deepen their understanding of climate theories and their practical applications, which are crucial for addressing climate-related issues. Interpreting daily weather reports, whether for summer or winter conditions, sharpens their ability to analyze and make sense of complex meteorological data.
- Hands-on experience with meteorological instruments such as the Max and Min Thermometer, Hygrometer, and Fortin's Barometer allows students to develop essential skills in data collection and instrument operation.
- Enable students to present climatic data graphically utilizing Climographs and hythergraphs, and enhancing their ability to communicate complex information effectively.

Competencies Developed:

- 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.
- Exploring the paper's insights into atmospheric stability, precipitation, and cyclones will enable students to better understand and predict weather events. This understanding is crucial for disaster preparedness and mitigation efforts in regions vulnerable to extreme weather conditions.

Syllabus Overview

Theory

<i>Unit</i>	<i>Content</i>	<i>Hours/Week</i>
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 circulation; Local wind; Geostrophic wind; Jet stream; El Nino and La Nina.	
3	Humidity: Types and measurement; Atmospheric stability and instability; Condensation and nucleation; Mechanism of precipitation: Bergeron-Findeisen and Collision-Coalescence Theory; Precipitation types; Airmass and fronts; Thunderstorms; Cyclone and anti-cyclone; Classification of world climate: Koppen & Thornthwaite; Climate change: Evidence and causes, ozone depletion and acid rain.	

Practical

<i>Unit</i>	<i>Content</i>	<i>Hours/Week</i>
1	Meteorological instruments: Maximum and Minimum Thermometer, Hygrometer, Fortin's Barometer.	2
2	Interpretation of Indian daily weather report ((hot weather season, southwest monsoon season, northeast monsoon season and winter season); Representation of weather/ climate data: Climograph (Taylor) and Hythergraph (Taylor).	

Suggested Reading

- Barry, R. G., & Carleton, A. M. (2001). *Synoptic and Dynamic Climatology*. New York: Routledge.
- Barry, R. G., & Corley, R. J. (1998). *Atmosphere, Weather and Climate*. New York: Routledge.
- Chatterjee, I. (2018). *Jalabayu Bigyan* (7th ed.). Paschimbongo Rajya Pustak Parshad.
- Critchfield, H. J. (1987). *General Climatology*. New Delhi: Prentice-Hall of India.
- Hazra, J., & Banik, G. C. (2020). *Adhunik Abohawa O Jolobayu Bigyan*. Nabodaya Publication.
- Lal, D. S. (1998). *Climatology*. Allahabad: Chaitanya Publishing House.

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

Majumder, S. (2022). *Adhunik Abohawa O Jalabayu Bigyan*. Sandhya Prakashani.

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

Rafik Ahamed (2015). *Abohawa o Jalbayu Bigyan*. Gyankosh Publishers.

Saha, P., & Bhattacharyya, P. K. (2018). *Adhunik Jalabayu Bidya* (6th eds.). Paschimbongo Rajya Pustak Parshad.

Saha, P.K. & Basu P. (2004). *Advanced Practical Geography*. Books and Allied Kolkata.

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

Siddharth, K (2016). *A Climatology Atmosphere, Weather & Climate*. Kitab Mahal.

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

Singh, S. (2013). *Climatology*. Allahabad: Prayag Pustak Bhawan.

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

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	2: 5 out of 8	5: 4 out of 6	10: 3 out of 5	60
Practical	15: 1 out of 1	5: Laboratory notebook and Viva-voce		20
Full marks				80

Semester: 3

PAPER: MAJOR

Paper Description: POPULATION GEOGRAPHY

This course offers students a thorough understanding of population dynamics, including various types of population density, population pyramids, and concepts such as over-population, under-population, optimum population, and population explosion. Students will study demographic theories, the global population composition based on religion and language, and migration aspects. The course will also help students acquire practical skills in data analysis. It equips them with the knowledge and tools necessary to explore and interpret demographic trends and patterns, making it a valuable asset for those interested in geography, demography, or data analysis.

Paper Code: GEOGMAJ306

Paper Type: Theory + Practical Lab Based [L]

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: Theoretical - 2hrs 30 minutes Practical – 2hrs

Syllabus:

Paper Objectives

Knowledge Acquired:

- Understanding fundamental concepts of population geography, including the nature and scope of the field, sources of population data, and various types of population density, enables students to learn about the factors contributing to population growth and distribution globally and in the context of India.
- Examining pivotal theories of population growth, such as the Malthusian theory and the demographic transition model, allows students to gain a deeper understanding of how these theories have shaped our knowledge of population dynamics and their implications for society.
- Composition of the world population, with a focus on religion and language. They will also gain insights into the concepts of ageing populations and demographic dividends. They will also gain knowledge about the concept, types, causes and consequences of Migration. Furthermore, they will learn about important policies like the National Population Policy of 2000 in India.

Skill Gained:

- 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.
- 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 Developed:

- 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.
- By constructing and interpreting age-sex pyramids, students will become proficient in analysing demographic data visually, allowing them to draw meaningful conclusions about population structures.

- Enhance students' data analysis and interpretation competency, a valuable skill applicable across various disciplines. They can also apply these skills to real life 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, nutritional density, habitational density, agricultural density and man-land ratio); Population pyramid; The concept of over-population, under-population, 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 Model; Concept of ageing population and demographic dividend.	
3	Population composition of the world (religion and language); Age-cohort; Population dynamics: Fertility and mortality (measures and determinants); Fecundity and morbidity; Migration: Types, causes and consequences; Laws of migration (Ravenstein, Lee and Todaro); Population-resource regions (Ackerman); National Population Policy (2000) India.	

Practical

Unit	Content	Hours/Week
1	Population projection: Arithmetical increase method, geometrical progression method and incremental increase method; Measures of fertility (crude birth rate, general fertility rate, age-specific fertility rate and total fertility rate); Measures of mortality (crude death rate, age-specific death rate and infant mortality rate); Construction and interpretation of age-sex pyramids; Flow diagram showing migration trends.	2
2	Basic computer skills (data representation with MS 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 (column, bar, line, pie and scatter); Customizing chart elements (titles, legends and labels); Creating pivot tables and analysing 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.
- Chauhan, S.; Chauhan, A. & Gupta, K. (2006). *Fundamental of Computer*. Firewall Media.

- Clarke, J. I. (1965). *Population Geography*. Oxford: Pergamon Press.
- Das, N.G. (2009). *Statistical Methods*. McGraw Hill Education (India) Private Limited.
- Dhara, S. (2013). *Janasankha O Bosati Bhugol*. Nabodaya Publications.
- Hussain, M. (1994). *Human Geography*. Rawat publications.
- Jones, H. R. (2000). *Population Geography* (3rd ed.). London: Paul Chapman.
- Lutz, W., Warren, C. S., & Scherbov, S. (2004). *The End of the World Population Growth in the 21st Century*. Earthscan.
- Maurya, S. D. (2018). *Population Geography*. Allahabad: Pravalika Publications.
- Mukherji, S. (2013). *Migration in India: Links to Urbanization, Regional Disparities and Development*.
- Nag, P., & Debnath, G. C. (2021). *Population Geography*. Bharati Prakashan.
- Newbold, K.B. (2017). *Population Geography: Tools & Issues* (3rd ed.). Rowman & Littlefield Publishers.
- Pacione, M. (2012). *Population Geography: Progress and Prospect*. Routledge: Rawat Publications.
- Rajaraman, V. (2008). *Computer Primer*. Prentice Hall of India Pvt. Ltd.
- Sarkar, A. & Gupta, S.K. (2002). *Elements of computer Science*. New Delhi: S Chand and Company.
- Sarkar, A. (2015). *Practical geography: A systematic approach*. New Delhi: Orient Black Swan Private Ltd.
- Sen, J. (2021). *Janasankhya Bhugol* (5th ed.). Book & Allied Private Ltd.
- Singh, R. L., & Singh, R. P. B. (1999). *Elements of Practical Geography*. Kalyani Publishers.
- 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	2: 5 out of 8	5: 4 out of 6	10: 3 out of 5	60
Practical	15: 1 out of 1	5: Laboratory notebook and Viva-voce		20
Full marks				80

Semester: 3

PAPER: MINOR

Paper Description: CLIMATOLOGY

Climatology paper will help in expanding students' knowledge as they gain a deeper comprehension of the Earth's climatic systems and how they interact with both natural and human processes. Understanding of the weather and climate, the various layers of the atmosphere, a balance between solar radiation entering the atmosphere and terrestrial radiation leaving it, and temperature distribution and inversion are all covered in this course. Students will learn how pressure belts, local wind, geostrophic wind, Jet stream, El Nino and La Nina affects human activity and the environment. Additionally, types of humidity and precipitation, cyclone and anti-cyclone, evidence and causes of climate change are added in this paper. In the practical section the ability of students to represent and interpret climate data visually through Climograph and hythergraph will be developed and they will learn to identify physical features as well as cultural features on a topographical map. This will strengthen their data interpretation and map reading skills.

Paper Code: GEOGMIN303

Paper Type: Theory + Practical Lab Based [L]

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: Theoretical - 2 hrs 30 minutes; Practical – 2 hrs.

Syllabus:

Paper Objectives

Knowledge Acquired:

- Study of atmospheric composition, heat budget and temperature distribution will help students to learn how these processes maintain the Earth's energy balance, influencing global temperature and climate.
- Knowledge of pressure belts, global wind belts, local wind, geostrophic wind, jet stream, El Nino and La Nina will develop a deeper understanding of atmospheric dynamics, wind patterns, and large-scale climate phenomena, preparing them to analyze weather and climate systems and apply this knowledge to environmental challenges.

Skills Gained:

- Using instruments like hygrometers, students will learn how to measure and interpret various forms of humidity, developing practical abilities in assessing atmospheric moisture and its effects on weather patterns.
- Students will learn to interpret relative relief maps, which show variations in elevation within a region. This gives them a deeper understanding of terrain types and the impact of elevation on aspects like drainage patterns, vegetation, and human settlement.
- Gain proficiency in drawing transect chart offers a cross-sectional view of a landscape, helping students visualize how different physical and cultural features are distributed across space.

Competency Developed:

- Become adept at critically analysing and interpreting of real-world topography allows them to break down complex geographical data into understandable components enabling students to mentally reconstruct three-dimensional landscapes from two-dimensional representations.

- Enhancing their analytical reasoning with the application of their theoretical knowledge of Koppen's climatic categorization to real-world scenarios will bridge the gap between scientific theory and practical understanding.

Syllabus Overview:

Theory

Unit	Content	Hours/Week
1	Weather and climate; Composition and structure of the atmosphere; Insolation and heat budget; Distribution of temperature: Horizontal and vertical; Inversion of temperature.	3
2	Vertical and horizontal distribution of atmospheric pressure and pressure belts; Global wind belts and general circulation; Local wind; Geostrophic wind; Jet stream; El Nino and La Nina.	
3	Types and measurement of humidity; Types of precipitation; Cyclone and anti-cyclone; Classification of world climate: Koppen; Climate change: Evidence and causes.	

Practical

Unit	Content	Hours/Week
1	Representation of weather/ climate data: Climograph (Taylor) and Hythergraph (Taylor).	2
2	Topographical map: Interpretation of physical and cultural features of a topographical map (plateau/mountain area); Interpretation of topography/ landforms with the help of serial, superimposed, projected and composite profiles; Relative relief map (Smith); Transect chart: : Drawing and interpretation.	

Suggested Reading

- Barry, R. G., & Carleton, A. M. (2001). *Synoptic and Dynamic Climatology*. New York: Routledge.
- Barry, R. G., & Corley, R. J. (1998). *Atmosphere, Weather and Climate*. New York: Routledge.
- Chatterjee, I. (2018). *Jalabayu Bigyan* (7th ed.). Paschimbongo Rajya Pustak Parshad.
- Critchfield, H. J. (1987). *General Climatology*. New Delhi: Prentice-Hall of India.
- Das, C., & Pramanik, T. K. (2021). *Abohaoya O Jalobayu* (2nd eds.). Enova Publication.
- Hazra, J., & Banik, G. C. (2020). *Adhunik Abohawa O Jolobayu Bigyan*. Nabodaya Publication.
- Kayal, S., & Mondal, M. (eds.). (2023). *Jalobayu Poriborton*. Bhugol Chakra Publication.
- Lal, D. S. (1998). *Climatology*. Allahabad: Chaitanya Publishing House.
- Lutgens, F. K., Tarbuck, E. J., & Tasa, D. (2009). *The Atmosphere: An Introduction to Meteorology*. Englewood Cliffs, New Jersey: Prentice-Hall.
- Majumder, S. (2022). *Adhunik Abohawa O Jalabayu Bigyan*. Sandhya Prakashani.
- Maurya, S. K. (). *Climatology: Unveiling the Earth's Climate System: A Journey Through Atmospheric Dynamics and Global Patterns*. Blue Duck Publication.
- Oliver, J. E., & Hidore, J. J. (2002). *Climatology: An Atmospheric Science*. New Delhi: Pearson Education.

Rafik Ahamed (2015). *Abohawa o Jalbayu Bigyan*. Gyankosh Publishers.

Saha, P., & Bhattacharyya, P. K. (2018). *Adhunik Jalabayu Bidya* (6th eds.). Paschimbongo Rajya Pustak Parshad.

Saha, P.K. & Basu P. (2004). *Advanced Practical Geography*. Books and Allied Kolkata.

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

Siddharth, K. (2016). *Climatology: Atmosphere, Weather & Climate*. Kitab Mahal.

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

Singh, S. (2013). *Climatology*. Allahabad: Prayag Pustak Bhawan.

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

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	2: 5 out of 8	5: 4 out of 6	10: 3 out of 5	60
Practical	15: 1 out of 1	5: Laboratory notebook and Viva-voce		20
Full marks				80

Semester: 3

PAPER: DSC

Paper Description: CLIMATOLOGY

Climatology paper will help in expanding students' knowledge as they gain a deeper comprehension of the Earth's climatic systems and how they interact with both natural and human processes. Understanding of the weather and climate, the various layers of the atmosphere, a balance between solar radiation entering the atmosphere and terrestrial radiation leaving it, and temperature distribution and inversion are all covered in this course. Students will learn how pressure belts, local wind, geostrophic wind, Jet stream, El Nino and La Nina affects human activity and the environment. Additionally, types of humidity and precipitation, cyclone and anti-cyclone, evidence and causes of climate change are added in this paper. In the practical section the ability of students to represent and interpret climate data visually through Climograph and hythergraph will be developed and they will learn to identify physical features as well as cultural features on a topographical map. This will strengthen their data interpretation and map reading skills.

Paper Code: GEOGDSC303

Paper Type: Theory + Practical Lab Based [L]

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: Theoretical - 2 hrs 30 minutes; Practical – 2 hrs.

Syllabus:

Paper Objectives

Knowledge Acquired:

- Study of atmospheric composition, heat budget and temperature distribution will help students to learn how these processes maintain the Earth's energy balance, influencing global temperature and climate.
- Knowledge of pressure belts, global wind belts, local wind, geostrophic wind, jet stream, El Nino and La Nina will develop a deeper understanding of atmospheric dynamics, wind patterns, and large-scale climate phenomena, preparing them to analyze weather and climate systems and apply this knowledge to environmental challenges.

Skills Gained:

- Using instruments like hygrometers, students will learn how to measure and interpret various forms of humidity, developing practical abilities in assessing atmospheric moisture and its effects on weather patterns.
- Students will learn to interpret relative relief maps, which show variations in elevation within a region. This gives them a deeper understanding of terrain types and the impact of elevation on aspects like drainage patterns, vegetation, and human settlement.
- Gain proficiency in drawing transect chart offers a cross-sectional view of a landscape, helping students visualize how different physical and cultural features are distributed across space.

Competency Developed:

- Become adept at critically analysing and interpreting of real-world topography allows them to break down complex geographical data into understandable components enabling students to mentally reconstruct three-dimensional landscapes from two-dimensional representations.

- Enhancing their analytical reasoning with the application of their theoretical knowledge of Koppen's climatic categorization to real-world scenarios will bridge the gap between scientific theory and practical understanding.

Syllabus Overview:

Theory

Unit	Content	Hours/Week
1	Weather and climate; Composition and structure of the atmosphere; Insolation and heat budget; Distribution of temperature: Horizontal and vertical; Inversion of temperature.	3
2	Vertical and horizontal distribution of atmospheric pressure and pressure belts; Global wind belts and general circulation; Local wind; Geostrophic wind; Jet stream; El Nino and La Nina.	
3	Types and measurement of humidity; Types of precipitation; Cyclone and anti-cyclone; Classification of world climate: Koppen; Climate change: Evidence and causes.	

Practical

Unit	Content	Hours/Week
1	Representation of weather/ climate data: Climograph (Taylor) and Hythergraph (Taylor).	2
2	Topographical map: Interpretation of physical and cultural features of a topographical map (plateau/mountain area); Interpretation of topography/ landforms with the help of serial, superimposed, projected and composite profiles; Relative relief map (Smith); Transect chart: Drawing and interpretation.	

Suggested Reading

- Barry, R. G., & Carleton, A. M. (2001). *Synoptic and Dynamic Climatology*. New York: Routledge.
- Barry, R. G., & Corley, R. J. (1998). *Atmosphere, Weather and Climate*. New York: Routledge.
- Chatterjee, I. (2018). *Jalabayu Bigyan* (7th ed.). Paschimbongo Rajya Pustak Parshad.
- Critchfield, H. J. (1987). *General Climatology*. New Delhi: Prentice-Hall of India.
- Das, C., & Pramanik, T. K. (2021). *Abohaoya O Jalobayu* (2nd eds.). Enova Publication.
- Hazra, J., & Banik, G. C. (2020). *Adhunik Abohawa O Jolobayu Bigyan*. Nabodaya Publication.
- Kayal, S., & Mondal, M. (eds.). (2023). *Jalobayu Poriborton*. Bhugol Chakra Publication.
- Lal, D. S. (1998). *Climatology*. Allahabad: Chaitanya Publishing House.
- Lutgens, F. K., Tarbuck, E. J., & Tasa, D. (2009). *The Atmosphere: An Introduction to Meteorology*. Englewood Cliffs, New Jersey: Prentice-Hall.
- Majumder, S. (2022). *Adhunik Abohawa O Jalabayu Bigyan*. Sandhya Prakashani.
- Maurya, S. K. (). *Climatology: Unveiling the Earth's Climate System: A Journey Through Atmospheric Dynamics and Global Patterns*. Blue Duck Publication.
- Oliver, J. E., & Hidore, J. J. (2002). *Climatology: An Atmospheric Science*. New Delhi: Pearson Education.

Rafik Ahamed (2015). *Abohawa o Jalbayu Bigyan*. Gyankosh Publishers.

Saha, P., & Bhattacharyya, P. K. (2018). *Adhunik Jalabayu Bidya* (6th eds.). Paschimbongo Rajya Pustak Parshad.

Saha, P.K. & Basu P. (2004). *Advanced Practical Geography*. Books and Allied Kolkata.

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

Siddharth, K. (2016). *Climatology: Atmosphere, Weather & Climate*. Kitab Mahal.

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

Singh, S. (2013). *Climatology*. Allahabad: Prayag Pustak Bhawan.

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

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	2: 5 out of 8	5: 4 out of 6	10: 3 out of 5	60
Practical	15: 1 out of 1	5: Laboratory notebook and Viva-voce		20
Full marks				80

Semester: 4

PAPER: MAJOR

Paper Description: GEOGRAPHICAL INFORMATION SYSTEM

The paper on Geographic Information Systems (GIS) offers a comprehensive overview of this powerful technology, which integrates spatial data with attribute information to support decision-making and problem-solving across various domains. It covers the fundamentals of GIS, including data types, applications, and practical skills for working with GIS software. The practical component will enhance students' efficiency by focusing on tasks such as geo-referencing scanned topographical sheets and maps, digitizing, exploring and managing raster data, creating and managing vector data, and thematic mapping using QGIS 3.22.

Paper Code: GEOGMAJ407

Paper Type: Theory + Practical Lab Based [L]

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: Theoretical - 2hrs 30 minutes Practical – 2hrs

Syllabus:

Paper Objectives

Knowledge Acquired:

- Acquire a solid foundation in GIS, encompassing the definition and evolution of GIS, its components, as well as its advantages and limitations. They will also gain an understanding of coordinate systems and map projections in the context of GIS.
- In GIS applications, students will learn about spatial and attribute data, as well as raster and vector data models. They will also study database management systems (DBMS) relevant to GIS.
- A wide range of GIS applications, such as urban planning, environmental management, health care systems, and defence, enable students to comprehend the versatility and significance of GIS technology.

Skills Gained:

- Develop practical skills in handling spatial data, including geo-referencing topo sheets, digitizing point, line, and polygon features, and working with raster and vector data.
- 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.
- Enhance their data management and analysis competencies by exploring raster styling and mosaicking, manipulating attribute data, and importing external data sources.

Competency Developed:

- Develop competency to address real-world challenges by applying GIS technology to various domains, translating theoretical knowledge into practical solutions.
- Proficient in managing and analysing spatial and attribute data, ensuring data quality, and minimizing errors in GIS projects.
- Cultivate the ability to think spatially and make informed decisions using GIS tools, a skill that is invaluable for a wide range of professional and research applications.

Syllabus Overview:

Theory

Unit	Content	Hours/Week
1	Nature, 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; Database models: Raster and vector; File formats of spatial data; Concept, functions, components and advantages of DBMS; Elements 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 and 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 3.22).	2
2	Thematic mapping; Working with attribute data; Importing spreadsheets or CSV files using plug-in tools; Creating thematic maps (all using QGIS 3.22).	

Suggested Reading

Adhikary, S. (2023). *Honours Byaboharik Bhugol: Geospatial Technology – Remote Sensing and GIS (vol. 3)*. Dove Publishing House.

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

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

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

Clarke, C. K. (2002). *Geographic Information Systems and Environmental Modelling*. Prentice Hall India Learning Private Limited.

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

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

Heywood, I. (2011). *An Introduction to Geographical Information Systems* (4th ed.). Pearson Education.

Kumar, S. (2005). *Basics of Remote Sensing and GIS*. Laxmi Publications.

Kundu, R. (2021). *Remote Sensing and GIS* (7th ed.). Tapoti Publishers.

Lillesand T. M., Kiefer R. W. & Chipman J. W. (2004). *Remote Sensing and Image Interpretation* (5th eds.). Wiley & Sons.

Longley, P. A., et al. (2015). *Geographic Information Systems and Science* (4th eds.). Wiley & Sons.

Nag P. & Kudra, M. (1998). *Digital Remote Sensing*. New Delhi: Concept.

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

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

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

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

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	2: 5 out of 8	5: 4 out of 6	10: 3 out of 5	60
Practical	15: 1 out of 1	5: Laboratory notebook and Viva-voce		20
Full marks				80

Semester: 4

PAPER: MAJOR

Paper Description: GEOGRAPHY OF INDIA

This paper aims to cover a broad spectrum of topics related to the physical, social, and economic aspects of geography and regional development in India. It offers a comprehensive understanding of the country's physical, environmental, social, and economic dimensions, thereby preparing students for careers in geography, regional planning, environmental assessment, and related fields. In the practical component of the course, students will prepare a field report, involving the development of a project report relevant to the topics covered in this paper.

Paper Code: GEOGMAJ408

Paper Type: Theory + Practical Lab Based [L]

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: Theoretical - 2hrs 30 minutes Practical – 2hrs

Syllabus:

Paper Objectives

Knowledge Acquired:

- Acquaint with Physical geography of India, including its location, physiographic divisions, drainage patterns, soil types, and natural vegetation.
- Know about the salient features of India's climate and the Indian Monsoon system, including its origin, characteristics, and mechanisms.
- Understand the distribution of the population in terms of caste, religion, language, and tribes, as well as an understanding of the salient features of Indian agriculture, the production and distribution of major crops and Agro-climatic regions as per the Planning Commission of India.

Skills Gained:

- Develop the ability to analyze geographical and climatic data will help students understand the patterns and trends.
- Enhance their cultural and societal awareness through the study of population distribution, including density, religion, language, and tribes.
- Analyze major crop production and agro-climatic regions will enhance students' economic and agricultural analysis skills.

Competency Developed:

- Assess the impact of climatic phenomena like the Indian Monsoon, El Nino and La Nina on various aspects of life, including agriculture and society.
- Analyze the spatial patterns of industrial development and transport networks to equip students with the competency to understand and contribute to regional development and planning initiatives.
- Conducting field reports in the practical unit will enhance students' ability to perform field research, collect data, and communicate their findings effectively, which is a valuable skill for geography professionals.

Syllabus Overview

Theory

<i>Unit</i>	<i>Content</i>	<i>Hours/Week</i>
1	Location and physiographic divisions; Drainage, soil and natural vegetation; Seasonal features of Indian climate; Indian monsoon: Origin, characteristics and mechanism; El Nino, La Nina and Indian monsoon; Climatic regions: Stamp and Trewartha.	3
2	Growth of population; Distribution of population (density, 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 and information technology; Nature, pattern and development of transport network: Railways, roadways and waterways.	

Practical

<i>Unit</i>	<i>Content</i>	<i>Hours/Week</i>
1	A field report will be prepared by the students in consultation with their respective college teachers on any topic related to human geography. The report will be prepared based on primary and secondary data collected during field visits, which is compulsory. The report should be limited to 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 the report and viva-voce taken individually.	2

Suggested Reading

- Basu, S. (2021). *Bharotiyo Bhugol* (1st ed.). Paschimbongo Rajya Pustak Parshad.
- Deshpande, C. D. (1992). *India: A Regional Interpretation*. New Delhi: ICSSR.
- Dutta, R., & Sundaram, K. P. M. (1999). *Indian Economy*. New Delhi: S. Chand and Company Limited.
- Johnson, B. L. C. (2001). *Geographical Dictionary of India*. New Delhi: Vision Books.
- Khullar, D. R. (2014). *India: A Comprehensive Geography*. Kalyani publishers.
- Majumder, S. (2019). *Bharater Bhugol* (1st ed.). Sandhya Prakashani.
- Mandal, R. B. (1990). *Patterns of Regional Geography – An International Perspective*. Concept Publishing Company.
- Pathak, C. R. (2003). *Spatial Structure and Processes of Development in India*. Kolkata: Regional Science Assoc.
- Sarkar, A. (2015). *Practical geography: A systematic approach*. New Delhi: Orient Black Swan Private Ltd.
- Sdyasuk, G., & Sengupta, P. (1967). *Economic Regionalization of India*. Census of India.
- Sen, J., Mitra, K., & Sengupta, P. (2018). *Bharater Bhugal*. Ludhiana: Kalyani Publication.
- Sharma, T. C. (2003). *India - Economic and Commercial Geography*. New Delhi: Vikas Publication.
- Sharma, T.C. (2013). *Economic Geography of India*. Jaipur: Rawat Publication.
- Singh, J. (2003). *India; A Comprehensive & Systematic Geography*. Gorakhpur: Gyanodaya Prakashan.

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

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

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

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

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

Practical guidelines: Although the work on the field report will be done in groups, 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	2: 5 out of 8	5: 4 out of 6	10: 3 out of 5	60
Practical	15: Field report	5: Viva-voce		20
Full marks				80

Semester: 4

PAPER: MINOR

Paper Description: ECONOMIC GEOGRAPHY

Economic Geography is a field of study that explores the spatial, specifically focusing on activities, resources, and their impacts on regional development. This paper provides an overview of key concepts such as location theory, industrial organization, crop distribution and regional economic disparities. It examines how geographical factors influence economic processes, including the role of transportation, urbanization, and natural resources. Through a multidisciplinary approach, it aims to elucidate the complex interplay between geography, economy, and society. The practical part will allow students to enrich their knowledge through data organizing, statistical tools and techniques.

Paper Code: GEOGMIN404

Paper Type: Theory + Practical Lab Based [L]

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: Theoretical - 2 hrs 30 minutes; Practical – 2 hrs.

Syllabus:

Paper Objectives

Knowledge Acquired:

- Acquire a solid grasp of the nature and scope of economic geography, the Concept and classification of economic activities, the definition and classification of resources, and economic theories, including Von Thunen's agriculture theory and the Industry theory of Weber & Losch.
- Learner in-depth knowledge of conditions of growth and world distribution of various crops, including wheat, rice, cotton, tea and coffee, major fishing grounds of the world, and characteristics of lumbering in tropical and temperate forests.
- Explore the production and world distribution of Iron-steel, cotton textile and paper industry, modes of transport, Geographical factors of transport development, and factors affecting international trade.

Skills Gained:

- Gain the ability to organize data, which includes frequency distribution tables, histograms, frequency polygons, frequency curves and cumulative frequency distribution; measure mean, median and mode; measure range, mean deviation, variance, standard deviation and coefficient of variation.
- Develop proficiency in measures of inequality and traffic flow diagram.

Competency Developed:

- Become adept at critically analysing economic geography and understanding the economic theories.
- Make students more competent by enriching their knowledge regarding conditions of growth and world distribution of crops, major fishing grounds of the world, production and world distribution of Iron-steel, cotton textile and paper industry.
- Develop understanding about modes of transport, geographical factors of transport development, factors affecting international trade.
- The practical exercises equip students with the competence to organize data effectively.

Syllabus Overview:

Theory

Unit	Content	Hours/Week
1	Nature and scope of economic geography; Concept and classification of economic activities; Definition and classification of resources; Economic theories: Agriculture (Von Thunen) and industry (Weber & Losch).	3
2	Conditions of growth and world distribution of wheat, rice, cotton, tea and coffee; Major fishing grounds of the world; Characteristics of lumbering in tropical and temperate forests.	
3	Production and world distribution of iron-steel, cotton textile and paper industry; Modes of transport; Geographical factors of transport development; Factors affecting international trade.	

Practical

Unit	Content	Hours/Week
1	Organizing data: Frequency distribution tables, histograms, frequency polygons, frequency curves and cumulative frequency distribution; Measures of central tendency: Mean, median and mode; Partition values: Quartiles, deciles and percentiles.	2
2	Measures of dispersion: Range, mean deviation, variance, standard deviation and coefficient of variation.	

Suggested Reading

- Alexander, J. W. (1963). *Economic Geography*. Prentice-Hall Inc., Englewood Cliffs, New Jersey.
- Bagchi-Sen, S., & Smith, H. L. (2006). *Economic Geography: Past, Present and Future*. Taylor and Francis.
- Chatterjee, A. (2020). *Arthanoitik Bhugol O Sampadarshakher Porichoy* (1st ed.). Tee Dee Publications.
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- Coe, N. M., Kelly, P. F., & Yeung, H. W. (2007). *Economic Geography: A Contemporary Introduction*. Wiley-Blackwell.
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- Hodder, B. W., & Lee, R. (1974). *Economic Geography*. Taylor and Francis.
- Husain, A. (2020). *Economic Geography*. Delhi: Vishwa Bharati Publications.
- Mackinnon, D., & Cumbers, A. (2007). *An Introduction to Economic Geography: Globalization, Uneven Development and Place*. New Jersey: Prentice Hall.
- Maurya, S. D. (2022). *Economic Geography*. Prayagraj: Pravalika Publications.
- Pradhan, N. (2022). *Adhunik Arthanoitik Bhu Biggan* (1st ed.). Central Publisher.
- Roy, P. (2005). *Economic Geography: A Study of Resources*. Kolkata: New Central Book Agency.

Saha, S., & Roy. T. (2022). *Adhunik Arthonyitick Bhugol*. Kalyani Publishers.

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

Saxena, H. M. (2018). *Economic Geography* (2nd ed.). Rawat Publications.

Siddhartha, K. (2016). *Economic Geography*. Kitab Mahal.

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

Wheeler, J. O. (1998). *Economic Geography*. Wiley.

Willington, D. E. (2008). *Economic Geography*. Husband Press.

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	2: 5 out of 8	5: 4 out of 6	10: 3 out of 5	60
Practical	15: 1 out of 1	5: Laboratory notebook and Viva-voce		20
Full marks				80

Semester: 4

PAPER: DSC

Paper Description: ECONOMIC GEOGRAPHY

Economic Geography is a field of study that explores the spatial, specifically focusing on activities, resources, and their impacts on regional development. This paper provides an overview of key concepts such as location theory, industrial organization, crop distribution and regional economic disparities. It examines how geographical factors influence economic processes, including the role of transportation, urbanization, and natural resources. Through a multidisciplinary approach, it aims to elucidate the complex interplay between geography, economy, and society. The practical part will allow students to enrich their knowledge through data organizing, statistical tools and techniques.

Paper Code: GEOGDSC404

Paper Type: Theory + Practical Lab Based [L]

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: Theoretical - 2 hrs 30 minutes; Practical – 2 hrs.

Syllabus:

Paper Objectives

Knowledge Acquired:

- Acquire a solid grasp of the nature and scope of economic geography, the Concept and classification of economic activities, the definition and classification of resources, and economic theories, including Von Thunen's agriculture theory and the Industry theory of Weber & Losch.
- Learner in-depth knowledge of conditions of growth and world distribution of various crops, including wheat, rice, cotton, tea and coffee, major fishing grounds of the world, and characteristics of lumbering in tropical and temperate forests.
- Explore the production and world distribution of Iron-steel, cotton textile and paper industry, modes of transport, Geographical factors of transport development, and factors affecting international trade.

Skills Gained:

- Gain the ability to organize data, which includes frequency distribution tables, histograms, frequency polygons, frequency curves and cumulative frequency distribution; measure mean, median and mode; measure range, mean deviation, variance, standard deviation and coefficient of variation.
- Develop proficiency in measures of inequality and traffic flow diagram.

Competency Developed:

- Become adept at critically analysing economic geography and understanding the economic theories.
- Make students more competent by enriching their knowledge regarding conditions of growth and world distribution of crops, major fishing grounds of the world, production and world distribution of Iron-steel, cotton textile and paper industry.
- Develop understanding about modes of transport, geographical factors of transport development, factors affecting international trade.
- The practical exercises equip students with the competence to organize data effectively.

Syllabus Overview:

Theory

Unit	Content	Hours/Week
1	Nature and scope of economic geography; Concept and classification of economic activities; Definition and classification of resources; Economic theories: Agriculture (Von Thunen) and industry (Weber & Losch).	3
2	Conditions of growth and world distribution of wheat, rice, cotton, tea and coffee; Major fishing grounds of the world; Characteristics of lumbering in tropical and temperate forests.	
3	Production and world distribution of iron-steel, cotton textile and paper industry; Modes of transport; Geographical factors of transport development; Factors affecting international trade.	

Practical

Unit	Content	Hours/Week
1	Organizing data: Frequency distribution tables, histograms, frequency polygons, frequency curves and cumulative frequency distribution; Measures of central tendency: Mean, median and mode; Partition values: Quartiles, deciles and percentiles.	2
2	Measures of dispersion: Range, mean deviation, variance, standard deviation and coefficient of variation.	

Suggested Reading

- Alexander, J. W. (1963). *Economic Geography*. Prentice-Hall Inc., Englewood Cliffs, New Jersey.
- Bagchi-Sen, S., & Smith, H. L. (2006). *Economic Geography: Past, Present and Future*. Taylor and Francis.
- Chatterjee, A. (2020). *Arthanoitik Bhugol O Sampadarshakher Porichoy* (1st ed.). Tee Dee Publications.
- Clark, G. L., Feldman, M. P., & Gertler, M. S. (Eds.). (2000). *The Oxford Handbook of Economic Geography*. Oxford University Press.
- Coe, N. M., Kelly, P. F., & Yeung, H. W. (2007). *Economic Geography: A Contemporary Introduction*. Wiley-Blackwell.
- Combes, P., Mayer, T., & Thisse, J. F. (2008). *Economic Geography: The Integration of Regions and Nations*. Princeton University Press.
- Durand, L. (1961). *Economic Geography*. Crowell.
- Hodder, B. W., & Lee, R. (1974). *Economic Geography*. Taylor and Francis.
- Husain, A. (2020). *Economic Geography*. Delhi: Vishwa Bharati Publications.
- Mackinnon, D., & Cumbers, A. (2007). *An Introduction to Economic Geography: Globalization, Uneven Development and Place*. New Jersey: Prentice Hall.
- Maurya, S. D. (2022). *Economic Geography*. Prayagraj: Pravalika Publications.
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- Saha, S., & Roy, T. (2022). *Adhunik Arthonyitick Bhugol*. Kalyani Publishers.

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

Wheeler, J. O. (1998). *Economic Geography*. Wiley.

Willington, D. E. (2008). *Economic Geography*. Husband Press.

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	2: 5 out of 8	5: 4 out of 6	10: 3 out of 5	60
Practical	15: 1 out of 1	5: Laboratory notebook and Viva-voce		20
Full marks				80

Semester: 5

Paper: MAJOR

Paper Description: ENVIRONMENTAL GEOGRAPHY

The paper offers students a thorough understanding of environmental studies, encompassing various aspects such as environmental pollution, environmental degradation, types, sources and management of solid waste, importance of EIA, and environmental movements in India. This paper covers global issues like deforestation and soil erosion which are related to sustainable development and global initiatives in sustainable development like Ramsar Convention, Stockholm Conference and Earth Summit (Rio 1992). Along with Millennium Development Goal, students will also learn about natural and human induced disasters like flood, drought, landslide, cyclone, industrial hazards and pandemics and also the strategies of disaster management. Additionally, it features a practical component in which students undertake a project related to environmental issues.

Paper Code: GEOGMAJ509

Paper Type: Theory + Practical Lab Based [L]

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: Theoretical - 2hrs 30 minutes Practical – 2hrs

Syllabus:

Paper Objectives

Knowledge Acquired:

- Establish a solid foundation in environmental concepts, including the definition and components of the environment. Students will understand the sources, effects, and remedies of environmental pollution in air and water.
- Analyze the impact of agricultural development, industrial development, and urbanization on environmental degradation. Students will evaluate how these factors contribute to environmental harm.
- Explore environmental movements in India, such as the Chipko and Narmada Bachao Andolan, as well as global initiatives in sustainable development, including the Ramsar Convention, the Stockholm Conference, the Earth Summit (Rio 1992), and the Millennium Development Goals. This will help students understand the importance of environmental conservation.

Skill Gained:

- Develop research skills through the practical project by gathering and analysing secondary data on environmental topics. Additionally, enhance report-writing skills, which are crucial for effective communication in the field of environmental studies.
- Encourage critical thinking and ethical reflection by studying environmental ethics and analysing environmental movements. Students will learn to evaluate the ethical dimensions of environmental issues and movements.

Competency Developed:

- Heighten awareness of environmental issues and their consequences. Students will identify sources of pollution and propose potential remedies.
- Understand the significance of Environmental Impact Assessment and the management of solid wastes to equip students with the knowledge and skills required for effective environmental planning and management.

- Grasp the importance of environmental laws and policies to enable students to appreciate the role of legal compliance in environmental protection. Students 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 and water): Sources, effects and remedies; Environmental degradation due to agricultural development, industrial development and urbanization; Solid wastes: Types, sources and their management; Meaning and importance of Environmental Impact Assessment; Environmental movements in India: Chipko and Narmada Bachao Andolan.	3
2	Definition and concept of sustainable development; Issues related to sustainable development: Deforestation and soil erosion; Global initiatives in sustainable development: Ramsar Convention, Stockholm Conference and Earth Summit (Rio 1992); Millennium Development Goals.	
3	Definition, concept and classification of hazards and disasters; Natural and human induced disasters like flood, drought, landslide, cyclone, industrial hazards and pandemics; Concept and strategies of disaster management.	

Practical

Unit	Content	Hours/Week
1	Determination of plant-species diversity by matrix method (Shannon-Weiner and Simpson); Identification of Xeric Period by Ombothemic graphs (five weather stations); Hyetograph.	2
2	Map projections: Mathematical/Graphical construction of Simple Conical Projection with One Standard Parallel, Simple Conical Projection with Two Standard Parallel, Bonne's Projection, Sinusoidal Projection, Polyconic Projection, Mollweide's Projection.	

Suggested Reading

- Bhattacharya, T. (2011). *Disaster Science and Management*. McGraw Hill Education (India) Pvt. Ltd.
- 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.
- Gautam, A. (2021). *Environmental Geography* (1st ed.). Sharda Pustak Bhawan.
- Gilpin, A. (1994). *Environmental Impact Assessment: Cutting Edge for the 21st Century*. EIA: Cutting Edge for the Twenty-First Century. Cambridge University Press.
- Goudie, A. (2001). *The Nature of the Environment*. Oxford: Blackwell.
- 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.

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

Pandey, M. (2008). *Disaster Management*. Wiley India Pvt. Ltd.

Pandharinath, N., & Rajan, C. K. (2009). *Earth and Atmospheric Disaster Management: Natural and Man-made*. B S Publications.

Saha, P.K. & Basu, P. (2009). *Advanced Practical Geography*. Kolkata: Books and Allied (P) Ltd.

Saha, S., Roy, A., Dhar, B. S., & Mandal, B. (2022). *Parivesh Bhugoler Ruprekha* (1st eds.). Kalyani Publishers.

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Shil, A. K. (2020). *Poribesh Bhugol* (1st ed.). The Himalayan Books.

Singh, J. (2012). *Disaster Management: Future Challenges and Opportunities*. K W Publishers Pvt. Ltd.

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

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

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

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

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

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

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

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

Singh, S. (2015). *Environmental Geography* (1st ed.). Allahabad: Pravalika Publications.

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

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	2: 5 out of 8	5: 4 out of 6	10: 3 out of 5	60
Practical	15: 1 out of 1	5: Laboratory notebook and Viva-voce		20
Full marks				80

Semester: 5

PAPER: MAJOR

Paper Description: RURAL DEVELOPMENT

This paper offers an in-depth exploration of rural development and its importance in promoting sustainable livelihoods, alleviating poverty, and achieving equitable growth. The theoretical section covers various topics including the concept of rural development, the necessity for rural development, the Gandhian model of rural development, the Panchayati Raj system, the Big Push theory, the Lewis economic development model, Myrdal's spread and backwash effects theory, rural poverty, the concept and significance of the non-farm sector in rural development, approaches to rural development, and major rural development programs. The practical section includes topics such as data organization, measures of central tendency, partition values, measures of dispersion, the coefficient of variation, and measures of inequality.

Paper Code: GEOGMAJ510

Paper Type: Theory + Practical Lab Based [L]

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: Theoretical - 2hrs 30 minutes Practical – 2hrs

Syllabus:

Paper Objectives

Knowledge Acquired:

- Examine the Gandhian model and Panchayati Raj System, and students will understand the need of rural development and rural governance.
- Analyze the Big Push Theory, the Lewis model of economic development, and Myrdal's Theory of Spread and Backwash Effects. These theories will equip students with the knowledge of paradigms of rural development.
- Explore the concept of rural poverty and the role of the non-farm sector in rural development.
- Examine major rural development programs, including SGSY, MGNREGA, PMJDY, PMJAY, PMGSY, PURA, PMAY, and SBM. Knowledge of these programs will help them to identify the development trend in India.

Skills Gained:

- Cultivate skills in organizing data will allow students to become capable in solving statistical problems.
- Master skills in statistics, including measures of central tendency, partition values, measures of dispersion, and coefficient of variation. Additionally, after understanding Lorenz curve and Gini's coefficient students can gain proficiency in measuring of inequality.

Competency Developed:

- Foster a thorough understanding of rural development and rural governance among students.
- Develop students' skills in understanding paradigms of rural development, rural poverty, and the importance of the non-farm sector in rural development. These will further make students aware of major Indian rural development programmes.
- Equip students to interpret and visually communicate data using statistics. This will enhance students' data analysis competency, a valuable skill applicable across various disciplines.

Syllabus Overview

Theory

<i>Unit</i>	<i>Content</i>	<i>Hours/Week</i>
1	Rural development: Concept, elements and need; Gandhian Model of Rural Development; Rural Governance: Panchayati Raj System.	3
2	Paradigms of rural development: Big Push Theory, Lewis Model of Economic Development, Myrdal's theory of Spread and Backwash Effects. Rural poverty: Causes and consequences; Concept and importance of non-farm sector in rural development.	
3	Approaches to rural development; Major rural development programmes in India: SGSY, MGNREGA, PMJDY, PMJAY, PMGSY, PURA, PMAY and SBM.	

Practical

<i>Unit</i>	<i>Content</i>	<i>Hours/Week</i>
1	Organizing data: Frequency distribution tables, histograms, frequency polygons, frequency curves and cumulative frequency distribution; Measures of central tendency: Mean, median and mode; Partition values: Quartiles, deciles and percentiles; Measures of dispersion: Range, mean deviation, variance, standard deviation, quartile deviation and coefficient of variation.	2
2	Measures of inequality: Lorenz curve and Gini's co-efficient.	

Suggested Reading

- Das, N.G. (2009). *Statistical Methods*. McGraw Hill Education (India) Private Limited.
- Ghorai, S., & Adak, S. (2020). *Anchol O Ancholik Porikalpana*. Tapati Publisher.
- Gilg, A.W. (1985). *An Introduction to Rural Geography*. London: Edwin Arnold.
- Hoggart, K., & Buller, H. (1987). *Rural Development: A Geographical Perspective*. Routledge Kegan & Paul.
- Krishnamurthy, J. (2000). *Rural Development: Problems and Prospects*. Jaipur: Rawat Publications.
- Lee, D.A., & Chaudhri, D.P. (1983). *Rural Development and State*. Methuen Publishing.
- Mandal, G. C. (1992). *Rural Development: Retrospect and Prospect*. Concept Publishing Co.
- Misra, R.P. (1985). *Rural Development: Capitalist and Socialist Paths (Vol. 1)*. New Delhi: Concept.
- Misra, R.P., & Sundaram, K.V. (1979). *Rural Area Development: Perspectives and Approaches*. New Delhi: Sterling Publishers.
- Pandey, B. K. (2005). *Rural Development: Towards Sustainability*. Isha books.
- Roy, S., & Roy, A. (2023). *Gramin Unnoyon*. Hornbill Books.
- Sarkar, A. (2015). *Practical geography: A systematic approach*. New Delhi: Orient Black Swan Private Ltd.
- Sen, J. (2014). *Ancholik Porikolpona O Ancholik Bhugol*. Nabodaya Publications.
- Singh, K., & Shishodia, A. (2016). *Rural Development: Principles, Policies, and Management* (4th eds.). Sage.
- Singh, R.L., & Singh, R.P.B. (1999). *Elements of Practical Geography*. Kalyani Publishers.

Yugandhar, B. N. & Mukherjee, N. (1991). *Studies in Village India: Issues in Rural Development*. New Delhi: Concept Publishing Co.

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	2: 5 out of 8	5: 4 out of 6	10: 3 out of 5	60
Practical	15: 1 out of 1	5: Laboratory notebook and Viva-voce		20
Full marks				80

Semester: 5

PAPER: MAJOR

Paper Description: GEOGRAPHICAL THOUGHT

This paper provides a comprehensive examination of geographic thought, exploring the evolution, theories, philosophies, and methodologies that have shaped the field of geography over time. The theoretical component of the course addresses the development of geography from the ancient period through the medieval era, the age of voyages and exploration, and into the modern age. It also covers Dualism in geography, Positivism and the quantitative revolution, and Welfare geography. The practical component focuses on techniques such as levelling and surveying, including the use of a Prismatic Compass, Dumpy Level, and Theodolite. Additionally, it covers plane table surveying and the graphical representation of data.

Paper Code: GEOGMAJ511

Paper Type: Theory + Practical Lab Based [L]

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: Theoretical - 2hrs 30 minutes Practical – 2hrs

Syllabus:

Paper Objectives

Knowledge Acquired:

- Examine geography from the ancient period through the medieval period and into the age of voyages and exploration. This will develop understanding on how global explorations escalated the geographical evolution.
- Familiarity with contemporary geographical theories including positivism, quantitative revolution, spatial and temporal concepts, behaviouralism, radical geography, and welfare geography.
- Examine the development of geography in the modern age and the concept of dualism in geography. Students will gain insight into the dualistic nature of geography. This will help them grasp how different perspectives and methodologies address the complexity of geographic phenomena.
- Analyze positivism and the quantitative revolution, as well as behaviouralism and welfare geography. Understand how geography evolved from scientific, empirical data collection and statistical methods to how geography can contribute to improving human well-being, focusing on spatial aspects of social services, quality of life, and equitable access to resources.

Skills Gained:

- Develop skills in surveying using a Prismatic Compass, levelling by Dumpy Level, and determining height using Theodolite and Plane table survey. Knowledge of these instruments will help the students in measuring elevations, accurate horizontal angles and bearings and field mapping.
- Utilize box plots, scatter plots, and band graphs for graphical representation of data. Students will be able to make distribution summary, show relationships between variables, and visualize data ranges and trends. It will enhance their ability to interpret and present data effectively.

Competency Developed:

- Acquire competency in the evolution of geography from the ancient and medieval periods, through voyages and exploration, and into the modern age.
- Enrich students with knowledge of dualism in geography.
- Enable students to be aware of the concept of levelling and surveying, making them efficient by graphical representation of data.

Syllabus Overview

Theory

Unit	Content	Hours/Week
1	Evolution of geography in ancient period: Contribution of the Greek, Roman and Indian philosophers; Development of geography in medieval period: Dark age, contribution of Arab geographers, development in the age of voyages and exploration.	3
2	Development of geography in modern age: Contribution of German, French, American and British schools of thoughts; Dualism in geography: Physical and human geography, determinism and possibilism, regional and systematic geography.	
3	Positivism and quantitative revolution; Concept of space and time in geography; Behaviouralism; Radical geography; Welfare geography.	

Practical

Unit	Content	Hours/Week
1	Concept of levelling and surveying; Surveying by Prismatic Compass (closed traverse); Levelling by Dumpy Level along a given line and computation of reduced level by rise and fall and collimation methods; Determination of height of an object with accessible and inaccessible base in the same vertical plane by Theodolite (transit); Plane table survey: Radiation and intersection method.	2
2	Graphical representation of data: Box plots, scatter plots and band graphs.	

Suggested Reading

- Adhikari, S. (2015). *Fundamentals of Geographical Thought*. Orient Blackswan.
- Chorley, R.J. & Hagget, P. (1965). *Frontiers in Geographical Teaching*. OUP. Oxford.
- Couper, P. (2015). *A Student's Introduction to Geographical Thought: Theories, Philosophies, Methodologies*. Sage.
- Cresswell, T. (2013). *Geographic Thought: A Critical Introduction*. Wiley-Blackwell.
- Dikshit, R. D. (2004). *Geographical Thought: A Contextual History of Ideas*. Prentice Hall India.
- Hartshorne, R. (1959). *Perspectives of Nature of Geography*. Rand MacNally and Co.
- Harvey, D. (1969). *Explanations in Geography*. Rawat Publications.
- Holt-Jensen, A. (1980). *Geography: Its History and Concepts*. London: Harper and Row Publishers.
- Hussain, M. (2015). *Evolution of Geographical Thought* (6th ed.). Rawat Publications, Jaipur.
- Johnston, R., Gregory, D., Pratt, G., Watts, M., & Whatmore, S. (2003). *The Dictionary of Human Geography* (5th eds.). Oxford: Blackwell Publishers.
- Maiti, R., & Maiti, M. (2018). *Development Of Geographical Thought*. Nabodaya Publications.
- Martin, G. J. (2005). *All Possible Worlds: A History of Geographical Ideas*. Oxford.
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- Peet, R. (1999). *Modern Geographical Thought*. Wiley-Blackwell.

Rana, L. (2014). *Geographical Thought Classical to Contemporary*. Concept Publishing Company Pvt. Ltd.

Rawling, E., & Daugherty, R. (2005). *Geography into the Twenty-first Century* (2nd ed.). Chichester: John Wiley and Sons.

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

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

Singh, R. S. (2009). *Indian Geography: Perspectives, Concerns and Issues*. Jaipur: Rawat Publications.

Soja, E. (1989). *Post-modern Geographies*. London: Verso.

Taylor, G. (1953). *Geography in the Twentieth Century*. London: Methuen and Company.

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	2: 5 out of 8	5: 4 out of 6	10: 3 out of 5	60
Practical	15: 1 out of 1	5: Laboratory notebook and Viva-voce		20
Full marks				80

Semester: 5

PAPER: MAJOR

Paper Description: AGRICULTURAL GEOGRAPHY

This paper explores the complex interactions between human societies and the environment, focusing on the dynamics of food production and distribution. It addresses a range of topics, including the factors influencing agriculture, types of farming, conditions for growth, and the global distribution and production of crops. The paper also examines theories of agricultural location, Whittlesey's classification of world agricultural regions, agricultural regionalization in India, and the causes and solutions for low productivity in Indian agriculture. Additionally, it covers agricultural revolutions in India, various agricultural schemes, and the impact of climate change on agriculture. The practical component involves understanding methods for delineating crop combination regions, measuring agricultural efficiency, calculating crop concentration indices, and assessing crop diversification.

Paper Code: GEOGMAJ512

Paper Type: Theory + Practical Lab Based [L]

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: Theoretical – 2hrs 30 minutes Practical – 2hrs

Syllabus:

Paper Objectives

Knowledge Acquired:

- Examine types of farming and the world distribution and production of crops. Students will gain insights into the growth conditions and production levels of major crops like wheat, paddy, maize, tobacco, cotton, jute and oil seeds in India as well as in the world.
- Analyze theories of agricultural location, Whittlesey's classification of world agricultural regions, and agricultural regionalization in India. Studying these theories will help students understand land use patterns, peri-urban agriculture, global farming regions and agricultural regionalization in India, offering insights into spatial, economic, and regional agricultural dynamics.
- Investigate agricultural revolutions in India, various agricultural schemes, the impact of climate change on agriculture, and the concept of Climate Smart Agriculture. This knowledge will help them to assess sustainability in agricultural practices.

Skills Gained:

- Develop skills in methods of delineating crop combination regions proposed and evaluate agricultural efficiency, the crop concentration index, and crop diversification. All these will enhance their abilities in spatial analysis, regional planning, and optimizing farming practices.

Competency Developed:

- Develop an understanding of agriculture and world distribution and production of crops.
- Develop an analysis of theories of agricultural location, regionalization in India, agricultural revolutions, and various agricultural schemes in India.
- Facilitate the interpretation and analysis of methods for delineating crop combination regions, measuring agricultural efficiency, calculating the crop concentration index, and assessing crop diversification.

Syllabus Overview

Theory

Unit	Content	Hours/Week
1	Factors affecting agriculture; Types of farming: Intensive subsistence, extensive commercial, plantation and dairy; Condition of growth, world distribution and production of crops: Wheat, paddy, maize, tobacco, cotton, jute and oil seeds.	3
2	Theories of agricultural land use: Von-Thunen, Olof Jonasson and Sinclair (peri-urban agriculture); World agriculture regions (Whittlesey); Agricultural regionalisation in India: Randhawa, Sengupta and ICAR.	
3	Low productivity in Indian agriculture: Causes and solutions; Agricultural revolutions in India: Green, white and blue; Agricultural schemes in India: NFSM, PMKSY, PMFBY; Impact of climate change on agriculture; Concept of climate smart agriculture.	

Practical

Unit	Content	Hours/Week
1	Delineating crop combination regions after Weaver and Rafiullah.	2
2	Measuring agricultural efficiency (Bhatia), crop concentration index (Bhatia) and crop diversification (Gibbs-Martin Index).	

Suggested Reading

- Basu, D.N., & Guha, G.S. (1996). *Agro-Climatic Regional Planning in India (Vol.I & II)*. New Delhi: Concept Publication.
- Burger, A. (1994). *Agriculture of the World*. Avebury: Aldershot.
- Gregor, H.P. (1970). *Geography of Agriculture*. New York: Prentice-Hall.
- Grigg, D.B. (1995). *Introduction to Agricultural Geography* (2nd ed.). Routledge.
- Husain, M. (1996). *Systematic Agricultural Geography*. Jaipur: Rawat Publication.
- Hussain, M. (1978). *Agricultural Geography*. Jaipur: Rawat Publication.
- Ilbery, B.W. (1985). *Agricultural Geography: A Social and Economic Analysis*. Oxford University Press.
- Mohammad, A. (1978). *Studies in Agricultural Geography*. New Delhi: Rajesh Publications.
- Mohammad, N. (1992). *New Dimension in Agriculture Geography (Vol. I to VIII)*. New Delhi: Concept Publication.
- Morgan, W.B., & Norton, R.J.C. (1971). *Agricultural Geography*. London: Methuen.
- Sarkar, A. (2015). *Practical Geography: A Systematic Approach* (3rd ed.). Orient Blackswan Pvt. Ltd.
- Sauer, O.C. (1969). *Agricultural Origins and Dispersals*. Cambridge: MIT Press.
- Sen, S. (1975). *Reaping the Green Revolution*. New Delhi: Tata McGraw-Hill.
- Shafi, M. (2006). *Agricultural Geography*. New Delhi: Pearson Education.
- Singh, J., & Dhillon, S.S. (2000). *Agricultural Geography*. New Delhi: Tata McGraw Hill.
- Singh, S. (1994). *Agricultural Development in India: A Regional Analysis*. Shillong: Kaushal Publications.

Symons, L. (1967). *Agricultural Geography*. London: George Bell and Sons.

Tarrant, J.R. (1974). *Agricultural Geography*. New York: John Wiley and Sons.

Vaidya, B.C. (1997). *Agricultural Land Use in India*. Manak Publications.

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	2: 5 out of 8	5: 4 out of 6	10: 3 out of 5	60
Practical	15: 1 out of 1	5: Laboratory notebook and Viva-voce		20
Full marks				80

Semester: 5

PAPER: MINOR

Paper Description: POPULATION GEOGRAPHY

A branch of human geography called population geography is concerned with the features, dynamics, and spatial distribution of populations. This paper offers understanding about nature and extent of population geography, concept of population density, man-land ratio, over-population, under-population, optimum population and population explosion. Students will learn about the determinants and patterns of population growth and distribution in India. They will also gain valuable insights into population dynamics, socioeconomic issues, and cultural variety by studying several theories of population expansion, such as the Demographic Transition Theory and the Malthusian Theory. The ideas of fertility and mortality, as well as the kinds, reasons, and effects of migration, Lee's rules of migration, and the National Population Policy of India (2000) are also covered in this course. Furthermore, the practical section will allow students to enrich their knowledge through a complete understanding of the measures of fertility, mortality, age-sex pyramids, and flow diagrams. These topics offer students vital insights into population dynamics, which are crucial for analyzing demographic trends, policy making, and societal impacts.

Paper Code: GEOGMIN505

Paper Type: Theory + Practical Lab Based [L]

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: Theoretical - 2 hrs 30 minutes; Practical – 2 hrs.

Syllabus:

Paper Objectives

Knowledge Acquired:

- Gain a strong understanding of the nature and scope of population geography, its relationship to demography, the concepts of over-population, under-population, optimal population, and population explosion, as well as the concepts of population density and man-land ratio.
- Detailed knowledge on population growth and its spatial distribution throughout India, including the identification of high and low population density areas, theories related to population growth, and the country's racial and religious composition, will be delivered to the students.
- Obtain a complete overview of India's population trends. Students will understand the policies and procedures in place to deal with population growth and associated issues, as well as how migration, mortality, and fertility affect population size and distribution.

Skills Gained:

- Measures related to mortality and fertility they will be able to evaluate social well-being, health trends, and population growth patterns by interpreting these data.
- Acquire the ability to visually arrange demographic data by creating age-sex pyramids utilizing population data that is broken down by gender and age. Students will be able to decipher the many forms of age-sex pyramids and comprehend the implications of these forms for population trends, including high birth rates, aging populations, and population decrease.
- Become adept in analyzing movement patterns, understanding their causes and effects, and applying this knowledge to address real-world problems by studying flow diagrams that illustrate traffic and migration trends.

Competency Developed:

- Sharpen the ability to critically analyze population geography and gain a grasp of India's population distribution and growth.
- Make students more competent by enriching their knowledge regarding the push and pull factors of migration and apply Lee's Laws of Migration to real-world examples, assessing how factors like intervening obstacles and personal motivations shape migration patterns.
- Through practical activities, students gain the capacity to analyze traffic flow graphs and comprehend elements like peak travel hours, clogged roads, and the movement of products and services across areas.

Syllabus Overview:

Theory

Unit	Content	Hours/Week
1	Nature and scope of population geography and its relation to demography; Concept of population density and man-land ratio; Concept of over-population, under-population, optimum population and population explosion.	3
2	Population growth and distribution in India: Determinants and patterns; Theories of population growth: Malthusian Theory and Demographic Transition Theory; Population composition in India (race and religion).	
3	Fertility and mortality (measures and determinants); Migration: Types, causes and consequences; Laws of migration (Lee); National Population Policy (2000) India.	

Practical

Unit	Content	Hours/Week
1	Measures of fertility (crude birth rate, general fertility rate, age-specific fertility rate and total fertility rate); Measures of mortality (crude death rate, age-specific death rate and infant mortality rate); Construction and interpretation of age-sex pyramids.	2
2	Flow diagram showing traffic and migration trends.	

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.
- Chauhan, S.; Chauhan, A. & Gupta, K. (2006). *Fundamental of Computer*. Firewall Media.
- Clarke, J. I. (1965). *Population Geography*. Oxford: Pergamon Press.
- Das, N.G. (2009). *Statistical Methods*. McGraw Hill Education (India) Private Limited.
- Dhara, S. (2013). *Janasankha O Bosati Bhugol*. Nabodaya Publications.
- Hussain, M. (1994). *Human Geography*. Rawat publications.
- Jones, H. R. (2000). *Population Geography* (3rd ed.). London: Paul Chapman.
- Lutz, W., Warren, C. S., & Scherbov, S. (2004). *The End of the World Population Growth in the 21st Century*. Earthscan.
- Maurya, S. D. (2018). *Population Geography*. Allahabad: Pravalika Publications.

Mukherji, S. (2013). *Migration in India: Links to Urbanization, Regional Disparities and Development*.

Nag, P., & Debnath, G. C. (2021). *Population Geography*. Bharati Prakashan.

Newbold, K.B. (2017). *Population Geography: Tools & Issues* (3rd ed.). Rowman & Littlefield Publishers.

Pacione, M. (2012). *Population Geography: Progress and Prospect*. Routledge: Rawat Publications.

Rajaraman, V. (2008). *Computer Primer*. Prentice Hall of India Pvt. Ltd.

Sarkar, A. & Gupta, S.K. (2002). *Elements of computer Science*. New Delhi: S Chand and Company.

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

Sen, J. (2021). *Janasankhya Bhugol* (5th ed.). Book & Allied Private Ltd.

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

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 the practical examination.

Question Pattern

Type	Marks			Total
Theoretical	2: 5 out of 8	5: 4 out of 6	10: 3 out of 5	60
Practical	15: 1 out of 1	5: Laboratory notebook and Viva-voce		20
Full marks				80

Semester: 5

PAPER: DSC

Paper Description: POPULATION GEOGRAPHY

A branch of human geography called population geography is concerned with the features, dynamics, and spatial distribution of populations. This paper offers understanding about nature and extent of population geography, concept of population density, man-land ratio, over-population, under-population, optimum population and population explosion. Students will learn about the determinants and patterns of population growth and distribution in India. They will also gain valuable insights into population dynamics, socioeconomic issues, and cultural variety by studying several theories of population expansion, such as the Demographic Transition Theory and the Malthusian Theory. The ideas of fertility and mortality, as well as the kinds, reasons, and effects of migration, Lee's rules of migration, and the National Population Policy of India (2000) are also covered in this course. Furthermore, the practical section will allow students to enrich their knowledge through a complete understanding of the measures of fertility, mortality, age-sex pyramids, and flow diagrams. These topics offer students vital insights into population dynamics, which are crucial for analyzing demographic trends, policy making, and societal impacts.

Paper Code: GEOGDSC505

Paper Type: Theory + Practical Lab Based [L]

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: Theoretical - 2 hrs 30 minutes; Practical – 2 hrs.

Syllabus:

Paper Objectives

Knowledge Acquired:

- Gain a strong understanding of the nature and scope of population geography, its relationship to demography, the concepts of over-population, under-population, optimal population, and population explosion, as well as the concepts of population density and man-land ratio.
- Detailed knowledge on population growth and its spatial distribution throughout India, including the identification of high and low population density areas, theories related to population growth, and the country's racial and religious composition, will be delivered to the students.
- Obtain a complete overview of India's population trends. Students will understand the policies and procedures in place to deal with population growth and associated issues, as well as how migration, mortality, and fertility affect population size and distribution.

Skills Gained:

- Measures related to mortality and fertility they will be able to evaluate social well-being, health trends, and population growth patterns by interpreting these data.
- Acquire the ability to visually arrange demographic data by creating age-sex pyramids utilizing population data that is broken down by gender and age. Students will be able to decipher the many forms of age-sex pyramids and comprehend the implications of these forms for population trends, including high birth rates, aging populations, and population decrease.
- Become adept in analyzing movement patterns, understanding their causes and effects, and applying this knowledge to address real-world problems by studying flow diagrams that illustrate traffic and migration trends.

Competency Developed:

- Sharpen the ability to critically analyze population geography and gain a grasp of India's population distribution and growth.
- Make students more competent by enriching their knowledge regarding the push and pull factors of migration and apply Lee's Laws of Migration to real-world examples, assessing how factors like intervening obstacles and personal motivations shape migration patterns.
- Through practical activities, students gain the capacity to analyze traffic flow graphs and comprehend elements like peak travel hours, clogged roads, and the movement of products and services across areas.

Syllabus Overview:

Theory

Unit	Content	Hours/Week
1	Nature and scope of population geography and its relation to demography; Concept of population density and man-land ratio; Concept of over-population, under-population, optimum population and population explosion.	3
2	Population growth and distribution in India: Determinants and patterns; Theories of population growth: Malthusian Theory and Demographic Transition Theory; Population composition in India (race and religion).	
3	Fertility and mortality (measures and determinants); Migration: Types, causes and consequences; Laws of migration (Lee); National Population Policy (2000) India.	

Practical

Unit	Content	Hours/Week
1	Measures of fertility (crude birth rate, general fertility rate, age-specific fertility rate and total fertility rate); Measures of mortality (crude death rate, age-specific death rate and infant mortality rate); Construction and interpretation of age-sex pyramids.	2
2	Flow diagram showing traffic and migration trends.	

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.
- Chauhan, S.; Chauhan, A. & Gupta, K. (2006). *Fundamental of Computer*. Firewall Media.
- Clarke, J. I. (1965). *Population Geography*. Oxford: Pergamon Press.
- Das, N.G. (2009). *Statistical Methods*. McGraw Hill Education (India) Private Limited.
- Dhara, S. (2013). *Janasankha O Bosati Bhugol*. Nabodaya Publications.
- Hussain, M. (1994). *Human Geography*. Rawat publications.
- Jones, H. R. (2000). *Population Geography* (3rd ed.). London: Paul Chapman.
- Lutz, W., Warren, C. S., & Scherbov, S. (2004). *The End of the World Population Growth in the 21st Century*. Earthscan.
- Maurya, S. D. (2018). *Population Geography*. Allahabad: Pravalika Publications.

Mukherji, S. (2013). *Migration in India: Links to Urbanization, Regional Disparities and Development*.

Nag, P., & Debnath, G. C. (2021). *Population Geography*. Bharati Prakashan.

Newbold, K.B. (2017). *Population Geography: Tools & Issues* (3rd ed.). Rowman & Littlefield Publishers.

Pacione, M. (2012). *Population Geography: Progress and Prospect*. Routledge: Rawat Publications.

Rajaraman, V. (2008). *Computer Primer*. Prentice Hall of India Pvt. Ltd.

Sarkar, A. & Gupta, S.K. (2002). *Elements of computer Science*. New Delhi: S Chand and Company.

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

Sen, J. (2021). *Janasankhya Bhugol* (5th ed.). Book & Allied Private Ltd.

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

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 the practical examination.

Question Pattern

Type	Marks			Total
Theoretical	2: 5 out of 8	5: 4 out of 6	10: 3 out of 5	60
Practical	15: 1 out of 1	5: Laboratory notebook and Viva-voce		20
Full marks				80

Semester: 5

PAPER: DSC

Paper Description: ENVIRONMENTAL GEOGRAPHY

Environmental geography provides insights into the reciprocal relationships between people and the environment, emphasizing the importance of understanding these interactions for sustainable development. This paper provides a comprehensive overview of environment, defining it as the sum of all living and non-living things that interact within a specific area. Students will acquire knowledge about environmental pollution, environmental degradation, the types sources and management of solid wastes. The significance of environmental impact assessments, various environmental movements in India, and Indian laws and policies pertaining to the environment are all included for students. In addition, this course explores worldwide initiatives in sustainable development, such as the Earth Summit (Rio 1992), as well as global concerns relating to sustainable development, such as deforestation and soil erosion. The practical section includes measures of inequality using the Lorenz curve and Gini's coefficient as well as graphical data representation using box plots, scatter plots, and band graphs.

Paper Code: GEOGDSC506

Paper Type: Theory + Practical Lab Based [L]

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: Theoretical - 2 hrs 30 minutes; Practical – 2 hrs.

Syllabus:

Paper Objectives

Knowledge Acquired:

- Examine the sources of air and water pollution, environmental degradation and solid waste management.
- Different environmental movements will help students gain insights into grassroots activism, the role of communities in environmental protection, and the intersection of environmental justice and social equity.
- Explore global issues like deforestation and soil erosion are interconnected and contribute to broader issues such as climate change, loss of biodiversity, and food insecurity. Students will learn to see these issues not in isolation but as part of a complex web of environmental challenges.

Skills Gained:

- Calculate and interpret the Lorenz curve and Gini coefficient are the key tools for measuring income and wealth inequality within a population, thereby enhancing their quantitative analysis skills.
- Using graphical representations, students will identify trends, outliers, and relationships within data sets.

Competency Developed:

- Strengthen their ability to comprehend environmental theories and critically analyze environmental geography.
- Expand students' understanding of how resource recovery, waste reduction, and segregation are examples of environmentally responsible waste management strategies to help them become more competent.
- Develop understanding about inequality measurements.

Syllabus Overview:

Theory

<i>Unit</i>	<i>Content</i>	<i>Hours/Week</i>
1	Definition and component of environment; Environmental pollution (air and water): Sources, effects and remedies; Environmental degradation due to agricultural development, industrial development and urbanization; Solid wastes: Types, sources and their management.	3
2	Meaning, importance and needs of Environmental Impact Assessment; Environmental movements in India: Chipko and Narmada Bachao Andolan; Environmental laws and policies in India: Water (Prevention and Control of Pollution) Act: 1974, Air (Prevention and Control of Pollution) Act: 1981, Municipal Solid Waste (Management and Handling) Rules: 2000.	
3	Definition and concept of sustainable development; Issues related to sustainable development: Deforestation and soil erosion; Global initiatives in sustainable development: Earth Summit (Rio 1992).	

Practical

<i>Unit</i>	<i>Content</i>	<i>Hours/Week</i>
1	Measures of inequality: Lorenz curve and Gini's co-efficient.	2
2	Graphical representation of data: Box plots, scatter plots and band graphs.	

Suggested Reading

- Bhattacharya, T. (2011). Disaster Science and Management. McGraw Hill Education (India) Pvt. Ltd.
- 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.
- Gautam, A. (2021). Environmental Geography (1st ed.). Sharda Pustak Bhawan.
- Gilpin, A. (1994). Environmental Impact Assessment: Cutting Edge for the 21st Century. EIA: Cutting Edge for the Twenty-First Century. Cambridge University Press.
- Goudie, A. (2001). The Nature of the Environment. Oxford: Blackwell.
- 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.
- Odum, E. P., et al. (2005). Fundamentals of Ecology. Ceneage Learning India.
- Pandey, M. (2008). Disaster Management. Wiley India Pvt. Ltd.
- Pandharinath, N., & Rajan, C. K. (2009). Earth and Atmospheric Disaster Management: Natural and Man-made. B S Publications.
- Saha, P.K. & Basu, P. (2009). Advanced Practical Geography. Kolkata: Books and Allied (P) Ltd.
- Saha, S., Roy, A., Dhar, B. S., & Mandal, B. (2022). Parivesh Bhugoler Ruprekha (1st eds.). Kalyani Publishers.

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

Saxena, H. M. (2017). Environmental Geography (3rd ed.). Rawat Publications.

Shil, A. K. (2020). Poribesh Bhugol (1st ed.). The Himalayan Books.

Singh, J. (2012). Disaster Management: Future Challenges and Opportunities. K W Publishers Pvt. Ltd.

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

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

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

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

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

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

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

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

Singh, S. (2015). Environmental Geography (1st ed.). Allahabad: Pravalika Publications.

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

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	2: 5 out of 8	5: 4 out of 6	10: 3 out of 5	60
Practical	15: 1 out of 1	5: Laboratory notebook and Viva-voce		20
Full marks				80

Semester: 6

PAPER: MAJOR

Paper Description: SOIL AND BIOGEOGRAPHY

This paper offers comprehensive insights into soil science and ecology. It covers the definition of soil, factors and processes of soil formation, the development and characteristics of an ideal soil profile, and the profiles of Laterite, Podzol, and Chernozem soils. Additionally, it examines the physical and chemical properties of soil. The paper also delves into the biosphere, exploring its nature and components, the concept of ecology, and the dynamics of species, populations, communities, ecological niches, and succession. Key topics include trophic structures, food chains, food webs, energy flow in ecosystems, and the biogeochemical cycles of oxygen, carbon, nitrogen, and phosphorus. Further, it addresses the classification of world biomes according to Holdridge and Whittaker, floristic realms, zoogeographical regions, and the types, threats, and conservation measures for biodiversity. The practical component equips students with skills to determine soil types using ternary diagrams, ergographs, and geological map interpretation.

Paper Code: GEOGMAJ613

Paper Type: Theory + Practical Lab Based [L]

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: Theoretical - 2hrs 30 minutes Practical – 2hrs

Syllabus:

Paper Objectives

Knowledge Acquired:

- Examine the concept of soil, the characteristics of an ideal soil profile, and the profile development of Laterite, Podzol, and Chernozem soils. Studying all these students will gain a foundational understanding of soil, including its formation and environmental role for better land use and management.
- Analyze the physical and chemical properties of soil. These will help students to understand the soil health and plant growth.

Skills Gained:

- Utilize Ternary Diagram textural plotting to develop skills in determining soil types and construct Ergographs to enhance practical skills in soil analysis.
- Interpret geological map drawings to analyze geological sections of uniclinal and folded structures. These skills will improve their ability to analyze and understand soil and geological data effectively.

Competency Developed:

- Cultivate the ability to question, reason, and draw logical conclusions based on concepts, theories, and classifications related to soil.
- Equip students with the skills to determine soil type and construct an Ergograph.
- Facilitate students' ability to interpret Geological Maps to understand geological structures effectively.

Syllabus Overview

Theory

Unit	Content	Hours/Week
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1	Soil: Definition, factors and processes of formation; Concept of pedon, eluviation and illuviation; Development and characteristics of an ideal soil profile; Profile development of laterite, podzol and chernozem soil; Physical properties of soil: Texture, structure, moisture and colour; Chemical properties of soil: pH, organic matter and plant nutrients.	3
2	Biosphere: Nature and components; Concepts of ecology, species, population, community, habitat, ecological niche and succession; Concepts of trophic structure, food chain and food web; Energy flow in ecosystems; Bio-geochemical cycles with reference to oxygen, carbon, nitrogen and phosphorous.	
3	Classification of world biomes (Holdridge and Whittaker); Geographical extent and characteristics of tropical rain forest, taiga, tundra, hot desert, savanna and temperate grassland biomes; Floristic realms and zoogeographical regions of the world; Biodiversity: Definition, types, threats and conservation measures.	

Practical

Unit	Content	Hours/Week
1	Identification of soil type by textural plotting (Ternary Diagram); Ergograph.	2
2	Geological Map interpretation: Drawing of geological sections on uniclinal and folded structures (simple series and multiple series formation).	

Suggested Reading

- Bera, B., Bhattacharya, S., & Sengupta, N. (2016). *Jib Bhugol O Poribesh*. Nabodaya Publication.
- Biswas, T.D., & Mukherjee, S.K. (1997). *Textbook of Soil Science*. Tata McGraw Hill.
- Daji, J.A., Kadam, J.R., & Patil, N.D. (1996). *A Textbook of Soil Science*. Media Promoters and Publishers.
- Das, N.G. (2009). *Statistical Methods*. McGraw Hill Education (India) Pvt. Ltd.
- De, N. K., & Ghosh, P. (1993). *India: A Study in Soil Geography*. Sribhumi Publishing Company.
- Hazra, Y., & Banik, G.C. (2023). *Mrittika O Jibbhugoler Ruprekha*. Santra Publication Pvt Ltd.
- Joffe, J.S. (1949). *The ABC of Soils*. Pedology Publications.
- Mishra, R.P., & Ramesh, A. (1989). *Fundamentals of Cartography*. New Delhi: Concept.
- Morgan, R.P.C. (1995). *Soil Erosion and Conservation* (2nd ed.). London: Longman.
- Myers, A.A., & Giller, P.S. (1988). *Analytical Biogeography: An Integrated Approach to the study of Animal and Plant Distributions*. London: Chapman and Hall.
- Odum, E.P. (1997). *Ecology: A Bridge between Science and Society*. Sunderland: Sinaur Associates Inc. Publishers.
- Ray, S.K., & et al., (2023). *Fundamentals of Soil Science*. ICAR. New Delhi.
- Santra. A. (2006). *Handbook on Wild and Zoo Animals*. International Book Distributing Co.
- Sarkar, A. (2015). *Practical geography: A systematic approach*. New Delhi: Orient Black Swan Pvt. Ltd.

- Sen, J., & Sengupta, P. (2022). *Mrittika Biggan O Jib Bhugol*. Kalyani Publishers.
- Sharma P.D. (1996). *Ecology and Environment* (7th ed.). Mirat: Rastogi Publications.
- Shukla, R.S., & Chandel, P.S. (1930). *Plant Ecology and Soil Science*. New Delhi: S Chand Publication.
- Singer, M., & Munns, D.N. (2005). *Soils: An Introduction* (6th eds.). Pearson.
- Singh, R.L., & Singh, R.P.B. (1999). *Elements of Practical Geography*. Kalyani Publishers.
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- Weil, R.R., & Brady, N.C. (2016). *The Nature and Properties of Soil* (15th eds.). Pearson.
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- Whittaker, R.H. (1975). *Communities and Ecosystems*. MacMillan.
- Xiao, M. (2009). *Soil Testing Laboratory Manual*. Bent Tree Press.

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	2: 5 out of 8	5: 4 out of 6	10: 3 out of 5	60
Practical	15: 1 out of 1	5: Laboratory notebook and Viva-voce		20
Full marks				80

Semester: 6

PAPER: MAJOR

Paper Description: URBAN GEOGRAPHY

Urban Geography is a specialized branch of geography that investigates the spatial organization and dynamics of cities and urban areas. This paper offers a comprehensive overview of key themes and theories in urban geography, including urbanization processes, urban morphology, socio-spatial inequalities, and urban planning. It examines how cities evolve, expand, and operate as complex systems influenced by demographic trends, economic activities, cultural diversity, and governance structures. The paper addresses urban challenges such as urban poverty, transportation issues, and the proliferation of slums. It also aims to enhance understanding of urban development schemes in India, such as the Jawaharlal Nehru National Urban Renewal Mission (JNNURM), Atal Mission for Rejuvenation and Urban Transformation (AMRUT), and the Smart Cities Mission. The practical component involves analyzing the hierarchy of urban settlements, constructing ternary diagrams, conducting nearest neighbor analysis for clustering and regularity, and performing correlation and regression analyses.

Paper Code: GEOGMAJ614

Paper Type: Theory + Practical Lab Based [L]

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: Theoretical - 2hrs 30 minutes Practical – 2hrs

Syllabus:

Paper Objectives

Knowledge Acquired:

- Define the scope and content of urban geography, classify cities, and analyze urban morphology and the central business district. Examine concepts such as urban growth, urbanization, suburbanization, counter-urbanization, re-urbanization, and urban renewal. All these will provide students insights into how cities evolve and transform over time.
- Examine trends in urbanization, including levels, patterns, and specific trends in India. Investigate concepts such as conurbation, megacity, million-city, global city, rural-urban fringe, urban corridor, satellite towns, and urban gentrification. Students will be able to identify various urban forms and processes.
- Define the master plan and explore the contributions of E. Howard, P. Geddes, and Le Corbusier to urban planning. Additionally, they will address the problems of urbanization in India and examine major urban development schemes such as JNNURM, AMRUT, and the Smart Cities Mission.

Skills Gained:

- Develop skills in creating a hierarchy of urban settlements by applying the rank-size rule, ternary diagram, and nearest neighbour analysis. These skills are valuable in quantitative analysis, critical thinking, geospatial visualisation, data interpretation and urban planning insight.
- Master statistical methods, including correlation and regression analysis, and gain proficiency in simple bi-variate linear regression.

Competency Developed:

- Enhance students' understanding of urban morphology, urbanization trends in both developed and developing countries, urban gentrification, the concept of the Master Plan, and the contributions of

E. Howard, P. Geddes, and Le Corbusier in urban planning. Address problems of urbanization in India and major urban development schemes such as JNNURM, AMRUT, and the Smart Cities Mission.

- Cultivate skills in students for performing and interpreting the rank-size rule, ternary diagrams, nearest neighbour analysis, as well as correlation and regression techniques. These skills are essential for conducting geographic research and fieldwork, where understanding correlations and making predictions based on spatial data are often crucial.

Syllabus Overview:

Theory

Unit	Content	Hours/Week
1	Definition, scope and content of urban geography; Classification of city: Harris and Taylor; Urban morphology and central business district; Concept of urban growth, urbanization, suburbanization, counter-urbanization, re-urbanization, urbanism and urban renewal.	3
2	Trends of urbanization: Developed and developing countries; Level, trends and patterns of urbanization in India; Concept of conurbation, megacity, million city and global city; Concept of rural-urban fringe, urban corridor, satellite towns, new town and urban gentrification.	
3	Definition and concept of master plan: A case study of Chandigarh city, Delhi NCR and Salt Lake (Kolkata); Contribution of E. Howard, P. Geddes and Le Corbusier in urban planning; Problems of urbanization in India: Urban poverty, transportation and proliferation of slums; Major urban development schemes in India: JNNURM, AMRUT and Smart Cities Mission.	

Practical

Unit	Content	Hours/Week
1	Hierarchy of urban settlements: Rank-size rule (Zipf); Ternary diagram (Mitra); Nearest neighbour analysis for clustering and regularity.	2
2	Correlation and regression: Pearson's product-moment and Spearman's rank correlation, simple bi-variate linear regression.	

Suggested Reading

- Carter, H. (2002). *The Study of Urban Geography* (4th ed.). Jaipur and New Delhi: Rawat Publications.
- Hall, P. (1992). *Urban and Regional Planning*. London: Routledge.
- Hall, T. (2001). *Urban Geography* (2nd ed.). London: Routledge.
- Johnson, J. H. (1981). *Urban Geography*. Oxford: Pergamon Press.
- Kaplan, D. H., Wheeler, J. O., & Holloway, S. R. (2008). *Urban Geography*. John Wiley.
- Knox, P. L., & McCarthy, L. (2005). *Urbanization: An Introduction to Urban Geography*. New York: Pearson Prentice Hall.
- Knox, P. L., & Pinch, S. (2006). *Urban Social Geography: An Introduction*. Prentice-Hall.
- Mandal, R.B. (2008). *Urban Geography: A Text Book*. Concept Publishing Company.
- Maurya, S.D. (2022). *Urban Geography* (2nd ed.). Sharda Pustak Bhawan.

- Mehta, M. N. (ed.). (2018). *Urban Geography- Rural and Urban Development*. Delhi: Writers World.
- Pacione, M. (2005). *Urban Geography: A Global Perspective*. London and New York: Routledge.
- Ramachandran, R. (1989). *Urbanisation and Urban Systems of India*. New Delhi: Oxford University Press.
- Ramachandran, R. (1992). *The Study of Urbanisation*. Delhi: Oxford University Press.
- Sarkar, A. (2015). *Practical geography: A systematic approach*. New Delhi: Orient Black Swan Private Ltd.
- Sassen, S. (2001). *The Global City: New York, London and Tokyo*. Princeton University Press.
- Sing, A. K. (2018). *Fundamentals of Urban Geography*. KK Publications.
- Singh, R. B. (2001). *Urban Sustainability in the Context of Global Change*. New Delhi: Oxford & IBH Pub.
- Singh, R. B. (2015). *Urban Development, Challenges, Risks and Resilience in Asian Megacities*. Springer.
- Singh, R. L., & Singh, R. P. B. (1999). *Elements of Practical Geography*. Kalyani Publishers.
- Singh, S. B. (1996). *New Perspectives in Urban Geography*. New Delhi: M.D. Publications.
- Stanley, B., Jack, W., & Donald, Z. (2003). *Cities of the World*. New York and Oxford: Rowman and Littlefield.
- Singh, S., & Saroha, J. (2021). *Urban Geography* (1st eds.). Pearson Education.

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	2: 5 out of 8	5: 4 out of 6	10: 3 out of 5	60
Practical	15: 1 out of 1	5: Laboratory notebook and Viva-voce		20
Full marks				80

Semester: 6

PAPER: MAJOR

Paper Description: FUNDAMENTALS OF REMOTE SENSING

The study of Fundamentals of Remote Sensing provides a comprehensive introduction to the principles, technologies, and applications of remote sensing within environmental science, geography, and related fields. This paper explores essential concepts, including electromagnetic radiation, remote sensing satellites, photogrammetry, LiDAR, radargrammetry, image interpretation, and digital image classification techniques. It aims to illustrate the utility of remote sensing in monitoring atmospheric conditions, managing disasters, assessing land use and land cover changes, and supporting agriculture, forestry, hydrology, and urban planning. Additionally, the paper examines Indian space programs. The practical component of this course is designed to reinforce students' understanding of remote sensing through hands-on experience.

Paper Code: GEOGMAJ615

Paper Type: Theory + Practical Lab Based [L]

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: Theoretical - 2hrs 30 minutes Practical – 2hrs

Syllabus:

Paper Objectives

Knowledge Acquired:

- Define and explore the scope and evolution of remote sensing, including the various processes involved and sources of energy. Examine electromagnetic radiation (EMR), the typology of remote sensing, remote sensing satellites, and sensor resolutions.
- Examine the concept, classification, and processes of photogrammetry, LiDAR, and radargrammetry. Address the limitations of photogrammetry, and analyze the elements of visual image interpretation. Explore pre-processing and image enhancement techniques for digital images, as well as methods for digital image classification.
- Explore the applications of remote sensing and analyze Indian space programs. All this knowledge will help students to apply remote sensing technologies and techniques to a variety of geographic and environmental challenges.

Skills Gained:

- Develop skills in interpreting aerial photographs using pocket stereoscopes and analyzing satellite images.
- Enhance efficiency in image processing and classification, and in the preparation of thematic maps using QGIS 3.22 software. This will enable them to categorize and analyze different land cover types and features from remote sensing data.

Competency Developed:

- Foster understanding among learners regarding remote sensing principles, remote sensing satellites and sensor resolutions, photogrammetry, supervised and unsupervised digital image classification, applications of remote sensing, and Indian space programs.
- Enable students to interpret Aerial Photographs using a pocket stereoscope and Satellite Images.
- Enable students to effectively analyze and understand different remote sensing indices using Landsat imagery with QGIS 3.22 software.

Syllabus Overview:

Theory

Unit	Content	Hours/Week
1	Definition, scope and evolution of remote sensing; Process of remote sensing and sources of energy; EMR and its interaction with atmosphere and earth surface features; Types of remote sensing; Remote sensing satellites and sensor resolutions.	3
2	Concept, classification and process of photogrammetry; LiDAR and Radargrammetry; Limitations of photogrammetry; Elements of visual image interpretation; Pre-processing and image enhancement of digital image; Digital image classification: supervised and unsupervised.	
3	Applications of remote sensing: Monitoring of atmospheric conditions, disaster management, land use and land cover changes, agriculture, forestry, hydrology and urban planning; Indian space programmes: DOS and ISRO, IIRS, NRSC and Indian launch programs.	

Practical

Unit	Content	Hours/Week
1	Interpretation of aerial photographs (using pocket stereoscope) and satellite images (visual).	2
2	Image processing and classification (supervised and unsupervised); Preparation of thematic maps of selected areas based on different remote sensing indices using Landsat imagery: NDVI, NDWI, NDBI and SAVI. (all using QGIS 3.22 software)	

Suggested Reading

- Bhatta, B. (2008). *Remote Sensing and GIS*. New Delhi: Oxford University Press.
- Campbell, J. B. (2007). *Introduction to Remote Sensing*. Guildford Press.
- Cracknell, A., & Hayes, L. (1990). *Remote Sensing Year Book*. Taylor and Francis.
- Curran, P. J. (1985). *Principles of Remote Sensing*. Longman.
- Guha, P.K. (2003). *Remote Sensing for the Beginner*. Hyderabad: Affiliated East-West Press Pvt. Ltd.
- Harvey, F. (2015). *A Primer of GIS: Fundamental Geographic and Cartographic Concepts* (2nd ed.). Guilford Press.
- Jensen, J. R. (2004). *Introductory Digital Image Processing: A Remote Sensing Perspective*. Prentice Hall.
- Joseph, G. (2005). *Fundamentals of Remote Sensing*. United Press India.
- Li, Z., Chen, J., & Batsavias, E. (2008). *Advances in Photogrammetry, Remote Sensing and Spatial Information Sciences*. London: Taylor and Francis.
- Lillesand, T. M., Kiefer, R. W., & Chipman, J. W. (2004). *Remote Sensing and Image Interpretation*. Wiley & Sons.
- Mukherjee, S., (2004). *Textbook of Environmental Remote Sensing*. Delhi: Macmillan.
- Nag, P. (1992). *Thematic Cartography and Remote Sensing*. Concept Publishing Company.
- Nag, P., & Kudra, M. (1998). *Digital Remote Sensing*. New Delhi: Concept Publishing Company.

- Narayan, L.R.A. (1999). *Remote Sensing and Its Application*. Universities Press (India) Ltd.
- Rees, W. G. (2001). *Physical Principles of Remote Sensing*. Cambridge University Press.
- Reeves, R. G. (1983). *Manual of Remote Sensing*. American Society of Photogrammetry and Remote Sensing.
- Sabins, F.F. (2008). *Remote Sensing: Principles and Interpretation*. Illinois: Waveland Press Inc.
- Sahu, K.C. (2007). *Textbook of Remote Sensing and Geographical Information Systems*. New Delhi: Atlantic Publishers.
- Sarkar, A. (2015). *Practical geography: A systematic approach*. New Delhi: Orient Black Swan Private Ltd.
- Singh R. B., & Murai S. (1998). *Space-informatics for Sustainable Development*. Oxford and IBH Pub.
- Singh, R. L., & Singh, R. P. B. (1999). *Elements of Practical Geography*. Kalyani Publishers.
- Spurr, R. (1960). *Photogrammetry and Photo Interpretation*. The Roland Press Company.
- Survey of India. (1973). *Photogrammetry*. Survey of India.
- Wolf, P. R., & Dewitt, B. A. (2000). *Elements of Photogrammetry: With Applications in GIS*. McGraw-Hill.

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	2: 5 out of 8	5: 4 out of 6	10: 3 out of 5	60
Practical	15: 1 out of 1	5: Laboratory notebook and Viva-voce		20
Full marks				80

Semester: 6

PAPER: MAJOR

Paper Description: INDUSTRIAL GEOGRAPHY

Industrial Geography investigates the spatial distribution, organization, and dynamics of industrial activities on both regional and global scales. This paper provides a comprehensive overview of fundamental concepts and theories in industrial geography, including the theories of Weber, Losch, Hoover, Palandar, Smith, and Isard. It addresses the world distribution and production of key industries such as iron and steel, cotton textiles, automobiles, and shipbuilding. Additionally, it examines the global distribution, challenges, and prospects of the paper and heavy chemical industries. The paper also explores major industrial regions in India, the USA, Russia, Germany, Japan, and China, as well as India's Industrial Policy of 1991 and the Make in India initiative of 2014. In the practical component of the course, students will prepare a field report.

Paper Code: GEOGMAJ616

Paper Type: Theory + Practical Lab Based [L]

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: Theoretical - 2hrs 30 minutes Practical – 2hrs

Syllabus:

Paper Objectives

Knowledge Acquired:

- Examine the nature and scope of industrial geography, including the types and classifications of manufacturing industries, factors influencing industrial location, and various theories of industrial location. This knowledge is essential for careers in urban planning, economic development, and regional studies.
- Analyze the location, production, and global distribution of the iron-steel and cotton textile industries, assess the production and world distribution of the automobile and ship-building industries and evaluate the world distribution, challenges, and prospects of the paper and heavy chemical industries. Students will be equipped with the knowledge to analyze industrial patterns and their implications for regional and global economies.
- Examine the industrial regions in various countries, including India, review the Industrial Policy of India (1991) and assess the Make in India scheme (2014). Students will gain knowledge to evaluate the effects of industrial policies and schemes on economic growth and compare strategies across countries.

Skills Gained:

- Develop skills and efficiency in conducting fieldwork and preparing a comprehensive field report.

Competency Developed:

- Acquire skills in understanding the types of manufacturing industries and the theories of industrial location.
- Develop competency in exploration regarding location, production, and world distribution of iron-steel and cotton textile industry, production and world distribution of automobile and ship-building industry, world distribution, problems, and prospects of paper and heavy chemical industry.
- Enhance knowledge of industrial regions, the Industrial Policy of India (1991), and the Make in India scheme (2014).

- Foster research qualities among students through the creation of a scientific field report on a specific project.

Syllabus Overview:

Theory

Unit	Content	Hours/Week
1	Nature and scope of industrial geography; Types and classification of manufacturing industries; Factors of industrial location; Theories of industrial location by Weber, Losch, Hoover, Palandar, Smith and Isard.	3
2	Location, production and world distribution of iron-steel and cotton textile industry; Production and world distribution of automobile and ship-building industry; World distribution, problems and prospects of paper and heavy chemical industry.	
3	Industrial regions of India, USA, Russia, Germany, Japan and China; Industrial Policy of India, 1991; Make in India scheme, 2014.	

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 geography. The report will be prepared based on primary and secondary data collected during field visit which is compulsory. Report should be limited within 40-50 pages, typed in Microsoft word (font: Times New Roman, size: 12 and line spacing 1.5) 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

- Alexanderson, G. (1967). *Geography of Manufacturing*. Prentice Hall, New Jersey.
- Alexander, J. W. (1973). *Economic Geography*. Prentice Hall, New Jersey.
- Bhagla, S. (2017). *Industrial Geography* (1st ed.). Book Enclave.
- Chattopadhyay, A. (2020). *Arthanaitik Bhugol O Sampadarshakher Porichoy*. Tee Dee Publications.
- Clark, G. L., Feldman, M. P., & Gertler, M. S. (2018). *The Oxford Handbook of Economic Geography*. Oxford University Press.
- Estall, C. R., & Buchanan, O. R. (1969). *Industrial Activity and Economic Geography*. Hutchinson.
- Hayter, R. (2013). *Industrial Geography: An Economic Geography Perspective*. Routledge.
- Markusen, A. R., & Venables, A. J. (1999). *Firms' Location and Regional Development*. Routledge.
- Maurya, S. D. (2022). *Industrial Geography*. Prayagraj: Pravalika Publications.
- Mishra, R. P., & Ramesh, A. (1989). *Fundamentals of Cartography*. New Delhi: Concept Publishing Company.
- Sarkar, A. (2015). *Practical geography: A systematic approach*. New Delhi: Orient Black Swan Private Ltd.

Scott, A. J. (2013). *The New Global Economy*. SAGE Publications.

Shil, A. K. (2022). *Arthanaitik Bhugol*. The Himalayan Books.

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

Singh, S. (2011). *Industrial geography*. Abd Publishers.

Storper, M., & Scott, A. J. (2016). *Pathways to Industrialization and Regional Development*. Routledge.

Practical guidelines: Although the work on the field report will be done in groups, 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	2: 5 out of 8	5: 4 out of 6	10: 3 out of 5	60
Practical	15: Field report	5: Viva-voce		20
Full marks				80

Semester: 6

PAPER: MINOR

Paper Description: GEOGRAPHY OF INDIA

This paper aims to provide a comprehensive understanding of India's physical geography, natural resources, agriculture, and industrial landscape. It covers a broad spectrum of topics related to physiographic divisions of India, major drainage systems and seasonal characteristics of climate. Students will examine geographical distribution of different soil types and the classification of natural vegetation of India after Champion and Seth. This paper also covers production and distribution of natural resources and major agricultural crops in India. Additionally, students will gain knowledge about spatial patterns of industrial development in India which includes iron-steel, cotton textile and automobile. In the practical component of the course, students will prepare a field report, involving the development of a project report relevant to the topics covered in this paper.

Paper Code: GEOGMIN606

Paper Type: Theory + Practical Lab Based [L]

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: Theoretical - 2 hrs 30 minutes; Practical – 2 hrs.

Syllabus:

Paper Objectives

Knowledge Acquired:

- Acquire a solid grasp of the physical landscape of India, divided into distinct regions based on geological features. Students will explore the characteristics, formation, and significance of each division in terms of natural resources, climate, and biodiversity.
- Learner in-depth knowledge of the major drainage system of India (Himalayan and Peninsular) will help them in analysing the river systems, their patterns, and their role in agriculture, water resources, and settlement patterns.
- Explore how the production and distribution of natural resources contribute to the economy, industry, and energy security of the country, as well as the challenges of sustainable extraction and distribution.

Skills Gained:

- Gain the ability to classify major soil types and their distribution. Develop skills in crop selection, land use planning, enabling them to make informed agricultural and environmental decisions based on soil fertility and regional conditions.
- Acquire proficiency in ecological identification, biodiversity assessment, and habitat conservation by studying the classification of natural vegetation. This knowledge helps in understanding forest types, their distribution, and the role they play in supporting diverse ecosystems.

Competency Developed:

- Make students more competent by enriching their knowledge regarding the locations of major iron-ore mines, coal fields, and petroleum reserves and importance of these resources for India's economy and industrial sector, learning how they contribute to energy production, manufacturing, and exports.

- Students will develop an awareness of the environmental impacts of large-scale agriculture, such as water consumption, soil degradation, and pesticide use, and the importance of sustainable farming practices.

Syllabus Overview:

Theory

Unit	Content	Hours/Week
1	Physiographic divisions of India; Major drainage system: Himalayan and Peninsular; Climate and its seasonal characteristics.	3
2	Soil types and distribution in India; Classification of natural vegetation of India after Champion and Seth; Production and distribution of Iron-ore, coal, petroleum and bauxite in India.	
3	Production of rice, wheat, cotton and tea in India; Spatial patterns of industrial development in India: Iron-steel, cotton textile and automobile.	

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/ 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 40-50 pages, handwritten and may include maps, diagrams, charts and tables. The report will be examined internally/ externally and marks will be separately allotted for report and viva-voce taken individually.	2

Suggested Reading

- Basu, S. (2021). *Bharotiyo Bhugol* (1st ed.). Paschimbongo Rajya Pustak Parshad.
- Deshpande, C. D. (1992). *India: A Regional Interpretation*. New Delhi: ICSSR.
- Dutta, R., & Sundaram, K. P. M. (1999). *Indian Economy*. New Delhi: S. Chand and Company Limited.
- Johnson, B. L. C. (2001). *Geographical Dictionary of India*. New Delhi: Vision Books.
- Khullar, D. R. (2014). *India: A Comprehensive Geography*. Kalyani publishers.
- Majumder, S. (2019). *Bharater Bhugol* (1st ed.). Sandhya Prakashani.
- Mandal, R. B. (1990). *Patterns of Regional Geography – An International Perspective*. Concept Publishing Company.
- Pathak, C. R. (2003). *Spatial Structure and Processes of Development in India*. Kolkata: Regional Science Assoc.
- Sarkar, A. (2015). *Practical geography: A systematic approach*. New Delhi: Orient Black Swan Private Ltd.
- Sdyasuk, G., & Sengupta, P. (1967). *Economic Regionalization of India*. Census of India.
- Sen, J., Mitra, K., & Sengupta, P. (2018). *Bharater Bhugal*. Ludhiana: Kalyani Publication.
- Sharma, T. C. (2003). *India - Economic and Commercial Geography*. New Delhi: Vikas Publication.
- Sharma, T.C. (2013). *Economic Geography of India*. Jaipur: Rawat Publication.

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

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

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

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

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

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

Practical guidelines: Although the work on the field 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	2: 5 out of 8	5: 4 out of 6	10: 3 out of 5	60
Practical	15: Field Report	5: Viva-voce		20
Full marks				80

Semester: 6

PAPER: DSC

Paper Description: GEOGRAPHY OF INDIA

This paper aims to provide a comprehensive understanding of India's physical geography, natural resources, agriculture, and industrial landscape. It covers a broad spectrum of topics related to physiographic divisions of India, major drainage systems and seasonal characteristics of climate. Students will examine geographical distribution of different soil types and the classification of natural vegetation of India after Champion and Seth. This paper also covers production and distribution of natural resources and major agricultural crops in India. Additionally, students will gain knowledge about spatial patterns of industrial development in India which includes iron-steel, cotton textile and automobile. In the practical component of the course, students will prepare a field report, involving the development of a project report relevant to the topics covered in this paper.

Paper Code: GEOGDSC607

Paper Type: Theory + Practical Lab Based [L]

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: Theoretical - 2 hrs 30 minutes; Practical – 2 hrs.

Syllabus:

Paper Objectives

Knowledge Acquired:

- Acquire a solid grasp of the physical landscape of India, divided into distinct regions based on geological features. Students will explore the characteristics, formation, and significance of each division in terms of natural resources, climate, and biodiversity.
- Learner in-depth knowledge of the major drainage system of India (Himalayan and Peninsular) will help them in analysing the river systems, their patterns, and their role in agriculture, water resources, and settlement patterns.
- Explore how the production and distribution of natural resources contribute to the economy, industry, and energy security of the country, as well as the challenges of sustainable extraction and distribution.

Skills Gained:

- Gain the ability to classify major soil types and their distribution. Develop skills in crop selection, land use planning, enabling them to make informed agricultural and environmental decisions based on soil fertility and regional conditions.
- Acquire proficiency in ecological identification, biodiversity assessment, and habitat conservation by studying the classification of natural vegetation. This knowledge helps in understanding forest types, their distribution, and the role they play in supporting diverse ecosystems.

Competency Developed:

- Make students more competent by enriching their knowledge regarding the locations of major iron-ore mines, coal fields, and petroleum reserves and importance of these resources for India's economy and industrial sector, learning how they contribute to energy production, manufacturing, and exports.

- Students will develop an awareness of the environmental impacts of large-scale agriculture, such as water consumption, soil degradation, and pesticide use, and the importance of sustainable farming practices.

Syllabus Overview:

Theory

Unit	Content	Hours/Week
1	Physiographic divisions of India; Major drainage system: Himalayan and Peninsular; Climate and its seasonal characteristics.	3
2	Soil types and distribution in India; Classification of natural vegetation of India after Champion and Seth; Production and distribution of Iron-ore, coal, petroleum and bauxite in India.	
3	Production of rice, wheat, cotton and tea in India; Spatial patterns of industrial development in India: Iron-steel, cotton textile and automobile.	

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/ 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 40-50 pages, handwritten and may include maps, diagrams, charts and tables. The report will be examined internally/ externally and marks will be separately allotted for report and viva-voce taken individually.	2

Suggested Reading

- Basu, S. (2021). *Bharotiyo Bhugol* (1st ed.). Paschimbongo Rajya Pustak Parshad.
- Deshpande, C. D. (1992). *India: A Regional Interpretation*. New Delhi: ICSSR.
- Dutta, R., & Sundaram, K. P. M. (1999). *Indian Economy*. New Delhi: S. Chand and Company Limited.
- Johnson, B. L. C. (2001). *Geographical Dictionary of India*. New Delhi: Vision Books.
- Khullar, D. R. (2014). *India: A Comprehensive Geography*. Kalyani publishers.
- Majumder, S. (2019). *Bharater Bhugol* (1st ed.). Sandhya Prakashani.
- Mandal, R. B. (1990). *Patterns of Regional Geography – An International Perspective*. Concept Publishing Company.
- Pathak, C. R. (2003). *Spatial Structure and Processes of Development in India*. Kolkata: Regional Science Assoc.
- Sarkar, A. (2015). *Practical geography: A systematic approach*. New Delhi: Orient Black Swan Private Ltd.
- Sdyasuk, G., & Sengupta, P. (1967). *Economic Regionalization of India*. Census of India.
- Sen, J., Mitra, K., & Sengupta, P. (2018). *Bharater Bhugal*. Ludhiana: Kalyani Publication.
- Sharma, T. C. (2003). *India - Economic and Commercial Geography*. New Delhi: Vikas Publication.
- Sharma, T.C. (2013). *Economic Geography of India*. Jaipur: Rawat Publication.

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

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

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

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

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

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

Practical guidelines: Although the work on the field 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	2: 5 out of 8	5: 4 out of 6	10: 3 out of 5	60
Practical	15: Field Report	5: Viva-voce		20
Full marks				80

Semester: 6

PAPER: DSC

Paper Description: OCEANOGRAPHY, SOIL & BIOGEOGRAPHY

The oceanography, soil, and biogeography study build a comprehensive overview of physical geography expertise. The paper explores the distribution of ocean water's temperature and salinity, ideas around the formation of coral reefs, the creation of an ideal soil profile, and the physical and chemical characteristics of soil. Students will gain a thorough understanding of the trophic structure, food chain, food web, biodiversity, and energy flow in ecosystems, as well as the nature and components of the biosphere. The practical part integrates geological map interpretation, identification of Xeric Period by Ombothermic graphs (five weather stations) and Hyetograph. This will help students in geological and climatic data interpretation, fostering a deeper understanding of Earth processes, weather patterns, and their real-world applications in environmental management and resource planning.

Paper Code: GEOGDSC608

Paper Type: Theory + Practical Lab Based [L]

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: Theoretical - 2 hrs 30 minutes; Practical – 2 hrs.

Syllabus:

Paper Objectives

Knowledge Acquired:

- Acquaint with distribution of temperature and salinity of ocean water and ocean currents over the Atlantic and Indian Ocean. This topic equips students with a comprehensive understanding of oceanographic processes with an emphasis on the connections between temperature, salinity, and ocean currents.
- Explore soil forming factors and processes, ideal soil profile, development of podzol soil and also physical and chemical properties of soil.
- Develop knowledge of conditions of growth and world distribution of various crops, including wheat, rice, cotton, tea and coffee, major fishing grounds of the world, and characteristics of lumbering in tropical and temperate forests.

Skills Gained:

- Develop skills to interpret geological maps by drawing geological sections on uniclinal structures.
- Improve proficiency in identification of Xeric Period by Ombothermic graphs and Hyetograph from five weather stations.

Competency Developed:

- Sharpen the ability to critically analyze soil properties and gain a grasp of knowledge necessary for careers in environmental science, agriculture, and land management.
- Enhance students' proficiency by gaining a deeper comprehension of the roles that different species performs in ecosystems. This will enhance their ability to assess biodiversity and its importance for maintaining ecological equilibrium.
- The practical exercises equip students with the competence to interpret geological maps which enhances their ability to visualize and understand rock formations in three dimensions.

Syllabus Overview:

Theory

Unit	Content	Hours/Week
1	Distribution of temperature and salinity of ocean water; Ocean currents: Causes, types and their distribution over the Atlantic and Indian Ocean; Coral reefs and theories of reef formation: Darwin; Sea level change.	3
2	Soil: Definition, factors and processes of formation; Development and characteristics of an ideal soil profile; Profile development of podzol soil; Physical properties of soil: Texture and structure; Chemical properties of soil: pH and organic matter.	
3	Biosphere: Nature and components; Concepts of ecology, species, habitat, ecological niche and succession; Concepts of trophic structure, food chain and food web; Energy flow in ecosystems; Biodiversity: Definition, types, threats and conservation measures.	

Practical

Unit	Content	Hours/Week
1	Geological Map interpretation: Drawing of geological sections on uniclinal structures (simple series formation).	2
2	Identification of Xeric Period by Ombothermic graphs (five weather stations); Hyetograph.	

Suggested Reading

- Adak, S., Munda, S. N., & Adak, S. (2021). *Bhu Jalobidya O Samudra Bidya* (1st eds.). Tapati Publisher.
- Bera, B., Bhattacharya, S., & Sengupta, N. (2016). *Jib Bhugol O Poribesh*. Nabodaya Publication.
- Biswas, T.D., & Mukherjee, S.K. (1997). *Textbook of Soil Science*. Tata McGraw Hill.
- Daji, J.A., Kadam, J.R., & Patil, N.D. (1996). *A Textbook of Soil Science*. Media Promoters and Publishers.
- Das, N.G. (2009). *Statistical Methods*. McGraw Hill Education (India) Pvt. Ltd.
- De, N. K., & Ghosh, P. (1993). *India: A Study in Soil Geography*. Sribhumi Publishing Company.
- Hazra, Y., & Banik, G.C. (2023). *Mrittika O Jibbhugoler Ruprekha*. Santra Publication Pvt Ltd.
- Joffe, J.S. (1949). *The ABC of Soils*. Pedology Publications.
- Lal, D. S. (2022). *Climatology and Oceanography* (1st ed.). Sharda Pustak Bhawan.
- Mishra, R.P., & Ramesh, A. (1989). *Fundamentals of Cartography*. New Delhi: Concept.
- Morgan, R.P.C. (1995). *Soil Erosion and Conservation* (2nd ed.). London: Longman.
- Myers, A.A., & Giller, P.S. (1988). *Analytical Biogeography: An Integrated Approach to the study of Animal and Plant Distributions*. London: Chapman and Hall.
- Odum, E.P. (1997). *Ecology: A Bridge between Science and Society*. Sunderland: Sinaur Associates Inc. Publishers.
- Ray, S.K., & et al., (2023). *Fundamentals of Soil Science*. ICAR. New Delhi.
- Santra. A. (2006). *Handbook on Wild and Zoo Animals*. International Book Distributing Co.

Sarkar, A. (2013). *Quantitative Geography: Techniques and Presentations*. New Delhi: Orient Blackswan Pvt. Ltd.

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

Sen, J., & Sengupta, P. (2022). *Mrittika Biggan O Jib Bhugol*. Kalyani Publishers.

Sharma P.D. (1996). *Ecology and Environment* (7th ed.). Mirat: Rastogi Publications.

Sharma, R. C., & Vatal, M. (2018). *Oceanography for Geographers*. Surjeet Publications.

Shil, A. K. (2021). *Samudrabidya* (1st ed.). Himalayan Books.

Shukla, R.S., & Chandel, P.S. (1930). *Plant Ecology and Soil Science*. New Delhi: S Chand Publication.

Siddhartha, K. (2016). *Oceanography* (4th ed.). Kitab Mahal.

Singer, M., & Munns, D.N. (2005). *Soils: An Introduction* (6th eds.). Pearson.

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

Singh, S. (eds.). (2021). *Oceanography*. Allahabad: Pravalika Publications.

USDA: United States Department of Agriculture. (2014). *Soil Survey and Laboratory Methods Manual*, Soil Survey Investigations Report No. 51.

Weil, R.R., & Brady, N.C. (2016). *The Nature and Properties of Soil* (15th eds.). Pearson.

White, R. (2006). *Principles and Practice of Soil Science: The Soil as a Natural Resource*. Blackwell.

Whittaker, R.H. (1975). *Communities and Ecosystems*. MacMillan.

Xiao, M. (2009). *Soil Testing Laboratory Manual*. Bent Tree Press.

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	2: 5 out of 8	5: 4 out of 6	10: 3 out of 5	60
Practical	15: 1 out of 1	5: Laboratory notebook and Viva-voce		20
Full marks				80