

# **SYLLABUS**

## **FOUR YEARS UNDERGRADUATE PROGRAMME IN GEOGRAPHY**



**UNIVERSITY OF NORTH BENGAL  
RAJA RAMMOHUNPUR**

**W.E.F: ACADEMIC SESSION 2023-24**

| SEMESTER                | PAPER TYPE | PAPER DESCRIPTION                                 | PAPER CODE   | PAGE NO. |
|-------------------------|------------|---------------------------------------------------|--------------|----------|
| <b>1</b>                | MAJOR      | <a href="#">Geotectonic</a>                       | UGEOMAJ11001 | 1        |
|                         | SEC        | <a href="#">Disaster Management</a>               | UGEOSEC11001 | 3        |
|                         | MINOR      | <a href="#">Physical Geography</a>                | UGEOMIN10001 | 5        |
| <b>2</b>                | MAJOR      | <a href="#">Settlement Geography</a>              | UGEOMAJ12002 | 8        |
|                         | SEC        | <a href="#">Sustainable Development</a>           | UGEOSEC12002 | 10       |
|                         | MINOR      | <a href="#">Physical Geography</a>                | UGEOMIN10001 | 12       |
| <b>3</b>                | MAJOR      | <a href="#">Geomorphology</a>                     | UGEOMAJ23003 | 15       |
|                         |            | <a href="#">Geography of Resources</a>            | UGEOMAJ23004 | 18       |
|                         |            | <a href="#">Population Geography</a>              | UGEOMAJ23005 | 21       |
|                         | SEC        | <a href="#">Environmental Geography</a>           | UGEOSEC23003 | 24       |
|                         | MINOR      | <a href="#">Human Geography</a>                   | UGEOMIN20002 | 27       |
|                         |            |                                                   |              |          |
| <b>4</b>                | MAJOR      | <a href="#">Climatology</a>                       | UGEOMAJ24006 | 30       |
|                         |            | <a href="#">Geography of India</a>                | UGEOMAJ24007 | 33       |
|                         |            | <a href="#">Geographical Information System</a>   | UGEOMAJ24008 | 36       |
|                         | MINOR      | <a href="#">Human Geography</a>                   | UGEOMIN20002 | 39       |
|                         |            |                                                   |              |          |
| <b>5</b>                | MAJOR      | <a href="#">Soil Geography</a>                    | UGEOMAJ35009 | 42       |
|                         |            | <a href="#">Rural Development</a>                 | UGEOMAJ35010 | 44       |
|                         |            | <a href="#">Agricultural Geography</a>            | UGEOMAJ35011 | 46       |
|                         |            | <a href="#">Geographical Thought</a>              | UGEOMAJ35012 | 49       |
|                         | MINOR      | <a href="#">Economic Geography</a>                | UGEOMIN30003 | 52       |
|                         |            |                                                   |              |          |
| <b>6</b>                | MAJOR      | <a href="#">Biogeography</a>                      | UGEOMAJ36013 | 55       |
|                         |            | <a href="#">Urban Geography</a>                   | UGEOMAJ36014 | 58       |
|                         |            | <a href="#">Industrial Geography</a>              | UGEOMAJ36015 | 61       |
|                         |            | <a href="#">Fundamentals of Remote Sensing</a>    | UGEOMAJ36016 | 63       |
|                         | MINOR      | <a href="#">Economic Geography</a>                | UGEOMIN30003 | 66       |
|                         |            |                                                   |              |          |
| <b>7</b>                | MAJOR      | <a href="#">Hydrology &amp; Oceanography</a>      | UGEOMAJ47017 | 69       |
|                         |            | <a href="#">Social And Political Geography</a>    | UGEOMAJ47018 | 72       |
|                         |            | <a href="#">Regional Planning and Development</a> | UGEOMAJ47019 | 75       |
|                         | MINOR      | <a href="#">Geography of India</a>                | UGEOMIN40004 | 78       |
| <b>8<br/>(FYUGHONS)</b> | MAJOR      | <a href="#">Tourism and Transport Geography</a>   | UGEOMAJ48020 | 81       |
|                         |            | <a href="#">Research Methodology</a>              | UGEOMAJ48021 | 84       |
|                         |            | <a href="#">Cartography</a>                       | UGEOMAJ48022 | 87       |
|                         |            | <a href="#">Continuous Evaluation</a>             | UGEOMAJ48023 | 90       |
|                         | MINOR      | <a href="#">Geography of India</a>                | UGEOMIN40004 | 92       |
|                         |            |                                                   |              |          |
| <b>8<br/>(FYUGHWRS)</b> | MAJOR      | <a href="#">Tourism and Transport Geography</a>   | UGEOMAJ48020 | 95       |
|                         |            | <a href="#">Research Project/Dissertation</a>     | UGEORES48001 | 98       |
|                         | MINOR      | <a href="#">Geography of India</a>                | UGEOMIN40004 | 101      |

## 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: **UGEOMAJ11001**

Paper Type: **Theory + Practical Lab Based-PLB**

Credit: **3 credit theory and 1 credit practical.**

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

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

### Syllabus:

#### Paper Objectives

##### Knowledge Acquired:

- 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; Internal structure of the earth; Classification of rocks: Igneous, sedimentary and metamorphic; Theory of isostasy: Views of Airy and Pratt.                                                                                        | 3          |
| 2    | Earth movements, processes and topographic effects of folding and faulting; Classification of mountains; Theories of mountain building: Geosynclinal Theory of Kober, Thermal Contraction Theory of Jeffreys, Thermal Convection Current Theory of Holmes. |            |
| 3    | Continental Drift Theory of Alfred Wegener; Concept of sea-floor spreading; Plate tectonics, plate boundaries and subduction zones; Concept of volcanicity; Classification of volcanoes; Volcanic landforms; World distribution of volcanoes.              |            |

#### Practical

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

### Suggested Reading

- Monkhouse, F. J. (1974). *Principles of Physical Geography* (2009-reprint). Platinum Publishers.
- Strahler, A. (2016). *Introducing Physical Geography*, 6th ed. Wiley.
- Khullar, D. R. (2012). *Physical Geography*. New Delhi, India: Kalyani Publishers.
- Mohan, K. (2018). *GES PERIODOS VOL 1, An Ultimate Guide to Physical Geography*. Oak Bridge Publication, New Delhi.
- Kearey, P., Klepeis, K. A., & Vine, F. J. (2011). *Global Tectonics*, 3rd ed. Wiley-India.
- Singh, S. (2022). *Physical Geography*. Pravalika Publications, Prayagraj.
- Christopherson, R. W., & Birkeland, G. H. (2012). *Geosystems: An Introduction to Physical Geography* (8th edition). Pearson Education, New Jersey.
- Das Gupta, A., & Kapoor, A. N. (2001). *Principles of Physical Geography*. S.C. Chand & Company Ltd. New Delhi.
- Skinner, B. J., & Porter, S. C. (2000). *The Dynamic Earth: An Introduction to Physical Geology*, 4th Edition. John Wiley and Sons.
- Singh, R. L., & Singh, R. P. B. (1999). *Elements of Practical Geography*. Kalyani Publishers.
- Sarkar, A. (2015). *Practical geography: A systematic approach*. Orient Black Swan Private Ltd., New Delhi.
- Mishra, R. P., & Ramesh, A. (1989). *Fundamentals of Cartography*. Concept, New Del

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

### Question Pattern

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

## Semester: 1

PAPER: SEC

### Paper Description: DISASTER MANAGEMENT

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

Paper Code: UGEOSEC11001

Paper Type: Theory + Practical Lab Based-PLB

Credit: 2 credit theory and 1 credit practical.

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

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

### Syllabus:

#### Paper Objectives

##### Knowledge Acquired:

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

##### Skills Gained:

- Learn how to effectively organize and write a project report incorporating appropriate maps, diagrams, charts and tables.
- Develop skills required for teamwork, including collaboration, coordination, and task allocation, by working in groups under faculty members' supervision.

##### Competency Developed:

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

### Syllabus Overview:

#### Theory

| Unit | Content                                                                                                                                                                                                                                                                                                             | Hours/Week |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 1    | Definition and concept of hazards and disasters; Definition of vulnerability and risk; Classification of hazards and disasters; Economic, social and environmental impacts of disasters; Natural and human induced disasters like flood, drought, landslide, earthquake, cyclone, industrial hazards and pandemics. | 2          |

|   |                                                                                                                                                                         |  |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| 2 | Concept of disaster management; Strategies of disaster management: Identification and risk assessment, risk reduction and preparedness, disaster response and recovery. |  |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

### Practical

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

### Suggested Reading

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

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

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

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

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

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

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

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

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

**Practical guidelines:** Although the work on the project 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 |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------|-------|
| <b>Theoretical</b> | 1: 5 out of 5                                                                                                                          | 5: 3 out of 5 | 10: 2 out of 4 | 40    |
| <b>Practical</b>   | 15: Project Report                                                                                                                     | 5: Viva-voce  |                | 20    |
| <b>CE</b>          | 10: Mid-term test, class test, seminar presentation, term paper (Any one to be decided by the respective departmental faculty members) |               |                | 10    |
| <b>Attendance</b>  | 5                                                                                                                                      |               |                | 5     |
| <b>Full marks</b>  |                                                                                                                                        |               |                | 75    |

## Semester: 1

### PAPER: MINOR

#### Paper Description: PHYSICAL GEOGRAPHY

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

**Paper Code: UGEOMIN10001**

**Paper Type: Theory + Practical Lab Based-PLB**

**Credit: 3 credit theory and 1 credit practical.**

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

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

#### Syllabus:

##### Paper Objectives

##### Knowledge Acquired:

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

##### Skills gained:

- Students will develop the ability to analyse geological processes, atmospheric phenomena and oceanic systems.
- They will learn to interpret maps, diagrams and data related to earth science.
- Students will acquire skills in constructing different types of map projections, including polar zenithal gnomonic, simple conical and cylindrical equal area projection.
- They will develop the ability to observe and identify geological and climatic features.

### Competency developed:

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

## **Syllabus Overview**

### **Theory**

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

### **Practical**

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

### **Suggested Reading**

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

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

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

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

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

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

Strahler, A.N. (1968). *The Earth Sciences*. Harper & Row Intl. Edn, New York.

Siddhartha, K. (2020). *Climatology, Atmosphere, Weather and Climate*. Kitaba Mahal Publication, New Delhi.

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

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

Barry, R.G., & Chorley, R.J. (2003). *Atmosphere, Weather and Climate*. Psychology Press, Hove; East Sussex.

Critchfield, H.J. (1975). *General Climatology*. Prentice Hall, New Jersey.

Garrison, T. (1998). *Oceanography*. Wordsworth Company, Belmont.

Kershaw, S. (2000). *Oceanography: An Earth Science Perspective*. Stanley Thornes, UK.

Sharma, R.C., & Vatal, M. (1980). *Oceanography for Geographers*. Chaitanya Publishing House, Allahabad.

Sverdrup, K.A., & Armbrust, E.V. (2008). *An Introduction to the World Ocean*. McGraw Hill, Boston.

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

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

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

#### Question Pattern

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

## Semester: 2

### PAPER: MAJOR

#### Paper Description: SETTLEMENT GEOGRAPHY

This paper deals with topics 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: UGEOMAJ12002**

**Paper Type: Theory + Practical Lab Based-PLB**

**Credit: 3 credit theory and 1 credit practical.**

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

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

#### Syllabus:

##### Paper Objectives

##### Knowledge Acquired:

- 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:

- Analyzing 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: A.Mitra; Urban landuse and morphology: Concentric Zone Theory, Sector Theory and Multiple Nuclei Theory. |            |

|   |                                                                                                                          |  |
|---|--------------------------------------------------------------------------------------------------------------------------|--|
| 3 | Settlement hierarchies; Concept of primate city and rank size rule; Central place theory by W. Christaller and A. Losch. |  |
|---|--------------------------------------------------------------------------------------------------------------------------|--|

### Practical

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

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

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

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

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

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

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

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

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

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

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

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

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

### Question Pattern

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

## Semester: 2

Paper: SEC

Paper Description: SUSTAINABLE DEVELOPMENT

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

Paper Code: UGEOSEC12002

Paper Type: Theory + Practical Lab Based-PLB

Credit: 2 credit theory and 1 credit practical.

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

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

Syllabus:

Paper Objectives

Knowledge Acquired:

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

Skills gained:

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

Competency developed:

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

Syllabus Overview:

Theory

| Unit | Content                                                                                                                                                                                                                                                        | Hours/Week |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 1    | Definition and concept of sustainable development; Elements of sustainable development: Social sustainability, economic sustainability and environmental sustainability; Global issues related to sustainable development like deforestation and soil erosion. | 2          |

|   |                                                                                                                                                                                                                                                       |  |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| 2 | Global initiatives in sustainable development like Ramsar Convention, Stockholm Conference and Earth Summit (Rio 1992); Millennium Development Goals; India's progress with respect to MDGs; Future trends and challenges of sustainable development. |  |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

### Practical

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

### Suggested Reading

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

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

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

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

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

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

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

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

**Practical guidelines: Although the work on the project 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 |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------|-------|
| <b>Theoretical</b> | 1: 5 out of 5                                                                                                                          | 5: 3 out of 5 | 10: 2 out of 4 | 40    |
| <b>Practical</b>   | 15: Project Report                                                                                                                     | 5: Viva-voce  |                | 20    |
| <b>CE</b>          | 10: Mid-term test, class test, seminar presentation, term paper (Any one to be decided by the respective departmental faculty members) |               |                | 10    |
| <b>Attendance</b>  | 5                                                                                                                                      |               |                | 5     |
| <b>Full marks</b>  |                                                                                                                                        |               |                | 75    |

## Semester: 2

### PAPER: MINOR

#### Paper Description: PHYSICAL GEOGRAPHY

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

**Paper Code: UGEOMIN10001**

**Paper Type: Theory + Practical Lab Based-PLB**

**Credit: 3 credit theory and 1 credit practical.**

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

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

#### Syllabus:

##### Paper Objectives

##### Knowledge Acquired:

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

##### Skills gained:

- Students will develop the ability to analyse geological processes, atmospheric phenomena and oceanic systems.
- They will learn to interpret maps, diagrams and data related to earth science.
- Students will acquire skills in constructing different types of map projections, including polar zenithal gnomonic, simple conical and cylindrical equal area projection.
- They will develop the ability to observe and identify geological and climatic features.

### Competency developed:

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

## Syllabus Overview

### Theory

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

### Practical

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

### Suggested Reading

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

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

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

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

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

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

Strahler, A.N. (1968). *The Earth Sciences*. Harper & Row Intl. Edn, New York.

Siddhartha, K. (2020). *Climatology, Atmosphere, Weather and Climate*. Kitaba Mahal Publication, New Delhi.

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

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

Barry, R.G., & Chorley, R.J. (2003). *Atmosphere, Weather and Climate*. Psychology Press, Hove; East Sussex.

Critchfield, H.J. (1975). *General Climatology*. Prentice Hall, New Jersey.

Garrison, T. (1998). *Oceanography*. Wordsworth Company, Belmont.

Kershaw, S. (2000). *Oceanography: An Earth Science Perspective*. Stanley Thornes, UK.

Sharma, R.C., & Vatal, M. (1980). *Oceanography for Geographers*. Chaitanya Publishing House, Allahabad.

Sverdrup, K.A., & Armbrust, E.V. (2008). *An Introduction to the World Ocean*. McGraw Hill, Boston.

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

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

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

#### Question Pattern

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

## Semester: 3

### PAPER: MAJOR

#### Paper Description: GEOMORPHOLOGY

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

#### Paper Code: UGEOMAJ23003

#### Paper Type: Theory + Practical Lab Based-PLB

#### Credit: 3 credit theory and 1 credit practical.

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

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

#### Syllabus:

##### Paper Objectives

##### Knowledge Acquired:

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

##### Skill 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), and dissection index (Dov Nir). 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, drainage frequency, watershed delineation, Stream frequency and stream ordering. 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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

#### Question Pattern

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

## Semester: 3

### PAPER: MAJOR

#### Paper Description: GEOGRAPHY OF RESOURCES

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

**Paper Code: UGEOMAJ23004**

**Paper Type: Theory + Practical Lab Based-PLB**

**Credit: 3 credit theory and 1 credit practical.**

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

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

#### Syllabus:

##### Paper Objectives

##### Knowledge Acquired:

- Concept of resources, their creation, and the factors influencing them. They will learn to classify resources based on various criteria, enabling them to appreciate the diverse nature of resources.
- Distribution of various resources in India, including forest, coal, iron ore, petroleum, atomic minerals, solar, wind and hydel power. They gain insights into the country's geographic and socio-economic factors influencing resource distribution.
- Resource conservation strategies, including those related to forests, soil, water, minerals, and energy resources. They will develop an understanding of ecological, economic, and ethnological approaches to resource management, recognizing the importance of sustainable practices.

##### Skill Gained:

- Develop practical skills in identifying a wide range of rocks and minerals, including Granite, Gneiss, Basalt, Limestone, Marble, Shale, Sandstone and more. 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 choropleth maps, chorochromatic maps, dot and sphere plots, and proportional 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 are 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*. Edward Elgar Publ., U.K.

Brundtland, G.H. (1987). *Our Common Future: UNCED Report*. Geneva.

Leong, G.C. (1995). *Certificate Physical and Human Geography*. Oxford Univ., Press, Oxford.

Coe, N., Kelly, P., & Yeung, H.W.C. (2007). *Economic Geography: A Contemporary Introduction*. John Wiley and Sons, New York.

Dicken, P. (2007). *Global Shift: Mapping the Changing Contours of the World Economy*. Sage Publ., New York.

Mackinnon, D., & Cumbers, A. (2007). *An Introduction to Economic Geography: Globalization, Uneven Development and Place*. Prentice Hall, New Jersey.

Parman, S.S. (2002). *Geography, Economics and Economic Geography*. ASD Publication, Pune.

Roy, P. (2005). *Economic Geography: A Study of Resources*. New Central Book Agency, Kolkata.

Simmons, I.G. (1980). *The Ecology of Natural Resources*. Edward Arnold, London.

Simmons, I.G. (1991). *Earth, Air and Water: Resources and Environment in the 20th Century*. Edward Arnold, London.

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

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

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

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

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

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

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

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

#### Question Pattern

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

## Semester: 3

### PAPER: MAJOR

#### Paper Description: POPULATION GEOGRAPHY

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

**Paper Code: UGEOMAJ23005**

**Paper Type: Theory + Practical Lab Based-PLB**

**Credit: 3 credit theory and 1 credit practical.**

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

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

#### Syllabus:

##### Paper Objectives

##### Knowledge Acquired:

- Fundamental concepts of population geography, including the nature and scope of the field, sources of population data, and the various types of population density. They will also learn about the factors contributing to population growth and distribution globally and in India's context.
- Pivotal theories of population growth – the Malthusian theory and the demographic transition Model. Students will understand deeply how these theories have shaped our understanding of population dynamics and their implications for society.
- Composition of the Indian population, with a focus on rural-urban divides, age, gender, and literacy. They will also gain insights into the concepts of ageing populations and demographic dividends. 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.
- Through constructing and interpreting age-sex pyramids, students will become proficient in analyzing demographic data visually, enabling 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-world situations, including assessing migration trends and understanding the implications of fertility and mortality measures.

## Syllabus Overview

### Theory

| Unit | Content                                                                                                                                                                                                                                                                                                                                                                                                                  | Hours/Week |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 1    | Nature and scope of population geography and its relation to demography; Sources of population data and its relevance (India); Density of population: Meaning and types (arithmetic density, physiological density, 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 analyzing data. |            |

### Suggested Reading

- Barrett, H. R. (1995). *Population Geography*. Oliver and Boyd.
- Bhende, A., & Kanitkar, T. (2000). *Principles of Population Studies*. Himalaya Publishing House.
- Chandna, R. C., & Sidhu, M. S. (1980). *An Introduction to Population Geography*. Kalyani Publishers.
- Clarke, J. I. (1965). *Population Geography*. Pergamon Press, Oxford.
- Jones, H. R. (2000). *Population Geography*, 3rd ed. Paul Chapman, London.
- Lutz, W., Warren, C. S., & Scherbov, S. (2004). *The End of the World Population Growth in the 21st Century*. Earthscan.
- Newbold, K. B. (2009). *Population Geography: Tools and Issues*. Rowman and Littlefield Publishers.

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

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

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

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

Das, N.G. (2009). *Statistical Methods*. McGraw Hill Education (India) Private Limited.

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

#### Question Pattern

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

## Semester: 3

Paper: SEC

Paper Description: ENVIRONMENTAL GEOGRAPHY

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

Paper Code: UGEOSEC23003

Paper Type: Theory + Practical Lab Based-PLB

Credit: 2 credit theory and 1 credit practical.

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

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

Syllabus:

Paper Objectives

Knowledge Acquired:

- A solid foundation in environmental concepts, including the definition and components of the environment. They will understand the sources, effects, and remedies of environmental pollution in air, water, soil, and noise.
- Agricultural development, industrial development, and urbanization contribute to environmental degradation. They will analyze the impact of these factors on the environment.
- Environmental laws and policies in India, such as the Wildlife Protection Act, Water (Prevention and Control of Pollution) Act, Forest Conservation Act, and Environmental Protection Act. They will understand the importance of these legal frameworks in environmental conservation.

Skill Gained:

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

Competency Developed:

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

Syllabus Overview

Theory

| Unit | Content | Hours/Week |
|------|---------|------------|
|------|---------|------------|

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

### Practical

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

### Suggested Reading

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

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

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

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

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

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

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

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

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

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

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

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

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

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

**Practical guidelines:** Although the work on the project 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 |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------|-------|
| <b>Theoretical</b> | 1: 5 out of 5                                                                                                                          | 5: 3 out of 5 | 10: 2 out of 4 | 40    |
| <b>Practical</b>   | 15: Project Report                                                                                                                     | 5: Viva-voce  |                | 20    |
| <b>CE</b>          | 10: Mid-term test, class test, seminar presentation, term paper (Any one to be decided by the respective departmental faculty members) |               |                | 10    |
| <b>Attendance</b>  | 5                                                                                                                                      |               |                | 5     |
| <b>Full marks</b>  |                                                                                                                                        |               |                | 75    |

## Semester: 3

PAPER: **MINOR**

Paper Description: **HUMAN GEOGRAPHY**

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

Paper Code: **UGEOMIN20002**

Paper Type: **Theory + Practical Lab Based-PLB**

Credit: **3 credit theory and 1 credit practical.**

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

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

### Syllabus:

#### Paper Objectives

##### Knowledge Acquired:

- Theories such as environmental determinism, possibilism, neo-determinism, and the quantitative revolution. They understand how these theories have contributed to the study of human geography.
- In-depth knowledge of population growth theories, including the Malthusian and demographic transition theories. They also understand the intricacies of population composition, fertility, mortality, and migration patterns in the Indian context.
- Urban settlement classifications, theories like the Central Place Theory, and the evolving patterns of urbanization in India. They develop a nuanced understanding of the dynamics shaping urban areas.

##### Skills Gained:

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

##### Competency Developed:

- Become adept at critically analyzing geographic phenomena and understanding the underlying factors driving population growth, settlement patterns, and urbanization. They can evaluate the strengths and limitations of various theories.
- The practical exercises equip students with the competence to collect, interpret, and present geographical data, enhancing their ability to conduct research and contribute to the field.
- By focusing on India, students gain a contextual understanding of human geography, enabling them to apply their knowledge and skills to real-world issues related to population, settlement, and urban development within the country.

### Syllabus Overview

## Theory

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

## Practical

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

## Suggested Reading

- Chandna, R.C. (2010). *Population Geography*. Kalyani Publisher.
- Hassan, M.I. (2005). *Population Geography*. Jaipur: Rawat Publications.
- Daniel, P.A., & Hopkinson, M.F. (1989). *The Geography of Settlement*. London: Oliver & Boyd.
- Johnston, R., Gregory, D., Pratt, G., et al. (2008). *The Dictionary of Human Geography*. Blackwell Publication.
- Jordan-Bychkov, T., et al. (2006). *The Human Mosaic: A Thematic Introduction to Cultural Geography*. New York: W. H. Freeman and Company.
- Cuff, J.D., & Mattson, M.T. (1982). *Thematic Maps: Their Design and Production*. Methuen Young Books.
- Dent, B.D., Torguson, J.S., & Holder, T.W. (2008). *Cartography: Thematic Map Design* (6th Edition). McGraw-Hill Higher Education.
- Gupta, K.K., & Tyagi, V.C. (1992). *Working with Maps*. New Delhi: Survey of India, DST.
- Kraak, M.-J., & Ormeling, F. (2003). *Cartography: Visualization of Geo-Spatial Data*. Prentice-Hall.
- Mishra, R.P., & Ramesh, A. (1989). *Fundamentals of Cartography*. New Delhi: Concept.
- Singh, R.L., & Singh, R.P.B. (1999). *Elements of Practical Geography*. Kalyani Publishers.
- Slocum, T.A., McMaster, R.B., & Kessler, F.C. (2008). *Thematic Cartography and Geo-visualization* (3rd Edition). Prentice Hall.
- Tyner, J.A. (2010). *Principles of Map Design*. The Guilford Press.
- Singh, R. L., & Singh, R. P. B. (1999). *Elements of Practical Geography*. Kalyani Publishers.

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

Das, N.G. (2009). *Statistical Methods*. McGraw Hill Education (India) Private Limited.

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

#### Question Pattern

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

## Semester: 4

### PAPER: MAJOR

#### Paper Description: CLIMATOLOGY

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

**Paper Code: UGEOMAJ24006**

**Paper Type: Theory + Practical Lab Based-PLB**

**Credit: 3 credit theory and 1 credit practical.**

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

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

#### Syllabus:

##### Paper Objectives

##### Knowledge Acquired:

- Earth's climate systems, including the factors that influence climate and weather patterns. This includes insights into the composition of the atmosphere, heat transfer mechanisms, and the intricate interactions that drive global atmospheric circulation.
- Predominant theories governing cloud and precipitation formation: The Bergeron-Findeisen and Collision-Coalescence theories. It will allow them to comprehend the complex processes that underlie weather phenomena and precipitation types.
- Koppen and Thornthwaite climatic classification. Additionally, they will acquire knowledge about pressing contemporary issues, such as climate change, ozone depletion, and acid precipitation, deepening our awareness of environmental challenges.

##### Skills Gained:

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

##### Competencies 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.
- The paper's insights into atmospheric stability, precipitation, and cyclones shall enable the students to better understand and predict weather events, which is crucial for disaster preparedness and mitigation efforts in regions vulnerable to extreme weather conditions.

## Syllabus Overview

### Theory

| Unit | Content                                                                                                                                                                                                                                                                                                                                                                                             | Hours/Week |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 1    | Weather and climate; Composition and structure of the atmosphere; Insolation and heat budget; Latitudinal heat balance; Mechanism of energy/ heat transfer; Distribution of temperature: Horizontal and vertical; Inversion of temperature.                                                                                                                                                         | 3          |
| 2    | Vertical and horizontal distribution of atmospheric pressure and pressure belts; Factors affecting wind direction and speed; Global wind belts and general 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

| Unit | Content                                                                                                                                                                                                                           | Hours/Week |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 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*. Routledge, UK.
- Barry, R. G., & Corley, R. J. (1998). *Atmosphere, Weather and Climate*. Routledge, New York.
- Critchfield, H. J. (1987). *General Climatology*. New Delhi: Prentice-Hall of India.
- Lutgens, F. K., Tarbuck, E. J., & Tasa, D. (2009). *The Atmosphere: An Introduction to Meteorology*. Englewood Cliffs, New Jersey: Prentice-Hall.
- Oliver, J. E., & Hidore, J. J. (2002). *Climatology: An Atmospheric Science*. New Delhi: Pearson Education.

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

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

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

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

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

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

#### Question Pattern

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

## Semester: 4

### PAPER: MAJOR

#### Paper Description: GEOGRAPHY OF INDIA

This paper aims to cover a wide range of topics related to the physical, social, and economic aspects of geography and regional development in India. Overall, the paper provides a comprehensive understanding of the country's physical, environmental, social, and economic aspects, preparing students for careers in geography, regional planning, environmental assessment, and related fields. The students will prepare a field report in the practical part of the course, where students will work on a project report related to this paper.

**Paper Code: UGEOMAJ24007**

**Paper Type: Theory + Practical Lab Based-PLB**

**Credit: 3 credit theory and 1 credit practical.**

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

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

#### Syllabus:

##### Paper Objectives

##### Knowledge Acquired:

- Physical geography of India, including its location, physiographic divisions, drainage patterns, soil types, and natural vegetation.
- Salient features of India's climate and the Indian Monsoon system, including its origin, characteristics, and mechanisms.
- Distribution of the population in terms of caste, religion, language, and occupation, 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 to understand patterns and trends.
- The study of population distribution, including caste, religion, and language, will develop students' cultural and societal awareness.
- 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 and El Nino on various aspects of life, including agriculture and society.
- The study of the spatial pattern of industrial development and transport networks will equip students with the competency to understand and contribute to regional development and planning initiatives.
- The practical unit involving field reports will enhance students' ability to conduct field research, collect data, and communicate their findings effectively, which is a valuable skill for geography professionals.

#### Syllabus Overview

##### Theory

| Unit | Content | Hours/Week |
|------|---------|------------|
|------|---------|------------|

|   |                                                                                                                                                                                                                                                                                                                             |   |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| 1 | 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

| 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 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

- Deshpande, C. D. (1992). *India: A Regional Interpretation*. ICSSR, New Delhi.
- Johnson, B. L. C. (Ed.). (2001). *Geographical Dictionary of India*. Vision Books, New Delhi.
- Mandal, R. B. (Ed.). (1990). *Patterns of Regional Geography – An International Perspective*. 16 Vol. 3 – *Indian Perspective*.
- Sdyasuk, Galina, & Sengupta, P. (1967). *Economic Regionalization of India, Census of India*.
- Sharma, T. C. (2003). *India - Economic and Commercial Geography*. New Delhi: Vikas Publ.
- Singh, R. L. (1971). *India: A Regional Geography*. National Geographical Society of India.
- Singh, Jagdish. (2003). *India; A Comprehensive & Systematic Geography*. Gorakhpur: Gyanodaya Prakashan.
- Spate, O. H. K., & Learmonth, A. T. A. (1967). *India and Pakistan: A General and Regional Geography*. Methuen.
- Tirtha, Ranjit. (2002). *Geography of India*. Jaipur & New Delhi: Rawat Publishers.
- Pathak, C. R. (2003). *Spatial Structure and Processes of Development in India*. Kolkata: Regional Science Assoc.
- Tiwari, R.C. (2007). *Geography of India*. Allahabad: Prayag Pustak Bhawan.
- Sharma, T.C. (2013). *Economic Geography of India*. Jaipur: Rawat Publication.
- Singh, R. L., & Singh, R. P. B. (1999). *Elements of Practical Geography*. Kalyani Publishers.

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

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

## Semester: 4

### PAPER: MAJOR

#### Paper Description: GEOGRAPHICAL INFORMATION SYSTEM

The paper on GIS (Geographic Information Systems) provides a comprehensive overview of this powerful technology that integrates spatial data and attribute information to support decision-making and problem-solving across various domains. It covers the fundamentals of GIS, data types, applications, and practical skills for working with GIS software. The practical part will increase the efficiency among students by covering geo-referencing of scanned topographical sheets and maps, digitizing, exploring and managing raster data, creating and managing vector data, thematic mapping, creating thematic maps all using QGIS 3.22.

#### Paper Code: UGEOMAJ24008

#### Paper Type: Theory + Practical Lab Based-PLB

#### Credit: 3 credit theory and 1 credit practical.

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

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

#### Syllabus:

##### Paper Objectives

##### Knowledge Acquired:

- A solid foundation in GIS, including the definition and evolution of GIS, components, and the distinction between digital and analogue maps.
- In GIS applications, Spatial and attribute data, raster and vector data models, and database management systems (DBMS).
- 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:

- Acquire practical skills in handling spatial data, including geo-referencing topo sheets, digitizing point, line, and polygon features, and working with raster and vector data.
- 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.
- Develop data management and analysis competencies by exploring raster styling and mosaicking, attribute data manipulation, 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.
- Proficiency in managing and analyzing 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, which 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

- Heywood, I. (2011). *An Introduction to Geographical Information Systems*.
- Aronoff, S. (1989). *Geographic Information Systems: A Management Perspective*.
- Elangovan, K. (2006). *GIS - Fundamentals, Applications, and Implementations*.
- Chang, K. T. (2015). *Introduction to Geographical Information Systems*.
- Bhatta, B. (2011). *Remote Sensing and GIS*.
- Sharma, H. S. (2006). *Mathematical Modelling in Geographical Information System, Global Positioning System and Digital Cartography*.
- Ghosh, A., & Rushton, G. (1987). *Spatial Analysis and Location-Allocation Models*.
- Tomlin, C. D. (1990). *Geographic Information Systems and Cartographic Modelling*.
- Longley, P. A., et al. (2015). *Geographic Information Systems and Science*.
- Clarke, C. K. (2002). *Geographic Information Systems and Environmental Modelling*.
- Singh, R. L., & Singh, R. P. B. (1999). *Elements of Practical Geography*. Kalyani Publishers.
- Sarkar, A. (2015). *Practical geography: A systematic approach*. Orient Black Swan Private Ltd., New Delhi.

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

### Question Pattern

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

## Semester: 4

### PAPER: MINOR

#### Paper Description: HUMAN GEOGRAPHY

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

**Paper Code: UGEOMIN20002**

**Paper Type: Theory + Practical Lab Based-PLB**

**Credit: 3 credit theory and 1 credit practical.**

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

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

#### Syllabus:

##### Paper Objectives

##### Knowledge Acquired:

- Theories such as environmental determinism, possibilism, neo-determinism, and the quantitative revolution. They understand how these theories have contributed to the study of human geography.
- In-depth knowledge of population growth theories, including the Malthusian and demographic transition theories. They also understand the intricacies of population composition, fertility, mortality, and migration patterns in the Indian context.
- Urban settlement classifications, theories like the Central Place Theory, and the evolving patterns of urbanization in India. They develop a nuanced understanding of the dynamics shaping urban areas.

##### Skills Gained:

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

##### Competency Developed:

- Become adept at critically analyzing geographic phenomena and understanding the underlying factors driving population growth, settlement patterns, and urbanization. They can evaluate the strengths and limitations of various theories.
- The practical exercises equip students with the competence to collect, interpret, and present geographical data, enhancing their ability to conduct research and contribute to the field.
- By focusing on India, students gain a contextual understanding of human geography, enabling them to apply their knowledge and skills to real-world issues related to population, settlement, and urban development within the country.

#### Syllabus Overview

## Theory

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

## Practical

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

## Suggested Reading

- Chandna, R.C. (2010). *Population Geography*. Kalyani Publisher.
- Hassan, M.I. (2005). *Population Geography*. Jaipur: Rawat Publications.
- Daniel, P.A., & Hopkinson, M.F. (1989). *The Geography of Settlement*. London: Oliver & Boyd.
- Johnston, R., Gregory, D., Pratt, G., et al. (2008). *The Dictionary of Human Geography*. Blackwell Publication.
- Jordan-Bychkov, T., et al. (2006). *The Human Mosaic: A Thematic Introduction to Cultural Geography*. New York: W. H. Freeman and Company.
- Cuff, J.D., & Mattson, M.T. (1982). *Thematic Maps: Their Design and Production*. Methuen Young Books.
- Dent, B.D., Torguson, J.S., & Holder, T.W. (2008). *Cartography: Thematic Map Design* (6th Edition). Mcgraw-Hill Higher Education.
- Gupta, K.K., & Tyagi, V.C. (1992). *Working with Maps*. New Delhi: Survey of India, DST.
- Kraak, M.-J., & Ormeling, F. (2003). *Cartography: Visualization of Geo-Spatial Data*. Prentice-Hall.
- Mishra, R.P., & Ramesh, A. (1989). *Fundamentals of Cartography*. New Delhi: Concept.
- Singh, R.L., & Singh, R.P.B. (1999). *Elements of Practical Geography*. Kalyani Publishers.
- Slocum, T.A., McMaster, R.B., & Kessler, F.C. (2008). *Thematic Cartography and Geo-visualization* (3rd Edition). Prentice Hall.
- Tyner, J.A. (2010). *Principles of Map Design*. The Guilford Press.
- Singh, R. L., & Singh, R. P. B. (1999). *Elements of Practical Geography*. Kalyani Publishers.

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

Das, N.G. (2009). *Statistical Methods*. McGraw Hill Education (India) Private Limited.

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

#### Question Pattern

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

## Semester: 5

### PAPER: MAJOR

#### Paper Description: SOIL GEOGRAPHY

This paper provides valuable insights into the relations between soils, landscapes, and human societies, contributing to informed decision-making and effective land use planning for sustainable development. It explores nature and scope, definition, factors and processes of forming soil, development and characteristics of an ideal soil profile, profiles development of laterite, Podzol, and Chernozem soil, physical and chemical properties of soil, soil colloid, and soil classification. Practical exercises provide the skills to determine soil type through ternary diagrams, textural plotting, Ergographs, and diagrammatic data presentation.

**Paper Code: UGEOMAJ35009**

**Paper Type: Theory + Practical Lab Based-PLB**

**Credit: 3 credit theory and 1 credit practical.**

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

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

#### Syllabus:

##### Paper Objectives

##### Knowledge Acquired:

- Concept of soil, an ideal soil profile and profile development of Laterite, Podzol and Chernozem soil.
- Physical and Chemical properties of soil and soil colloid.
- Dokuchaev's genetic classification, Marbut's morphogenetic classification, USDA classification of soil taxonomy and classification of Indian soil according to ICAR.

##### Skills Gained:

- Develop skills in determining soil type by Ternary Diagram textural plotting.
- Construction of Ergograph.
- Interpreting Geological Map drawings of geological sections on uniclinal and folded structures.

##### Competency Developed:

- Develop the ability to question, reason, and draw logical conclusions based on concepts, various theories, and classifications related to soil.
- Making students efficient in determining soil type to construct Ergograph.
- Enable students to interpret the Geological Map effectively.

#### Syllabus Overview

##### Theory

| Unit | Content                                                                                                                                                                                                                                                       | Hours/Week |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 1    | Nature and scope of soil geography; 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. | 3          |
| 2    | Physical properties of soil: Texture, structure, moisture, colour and temperature; Chemical properties of soil: pH, organic matter, cation                                                                                                                    |            |

|   |                                                                                                                                                                              |  |
|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|   | exchange capacity and plant nutrients; Soil colloid: Types, characteristics and influence on soil fertility.                                                                 |  |
| 3 | Soil classification: Genetic classification (Dokuchaev), morphogenetic classification (Marbut), USDA classification of soil taxonomy; Classification of Indian soils (ICAR). |  |

### 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

Daji, J.A., Kadam, J.R., & Patil, N.D. (1996). *A Textbook of Soil Science*. Media Promoters and Publishers.

Dey, N. K., & Ghosh, P. (1993). *India: A Study in Soil Geography*. Sribhumi Publishing Company.

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

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

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

Biswas, T.D., & Mukherjee, S.K. (1997). *Textbook of Soil Science*. Tata McGraw Hill.

Morgan, R.P.C. (1995). *Soil Erosion and Conservation* (2nd ed.). Longman, London.

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

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

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

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

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

Das, N.G. (2009). *Statistical Methods*. McGraw Hill Education (India) Private Limited.

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

### Question Pattern

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

## Semester: 5

### PAPER: MAJOR

#### Paper Description: RURAL DEVELOPMENT

This paper provides the concept of rural development and its significance in fostering sustainable livelihoods, alleviating poverty, and achieving equitable growth. The topics included in the theoretical part are the concept of rural development, the need 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, concept and importance of the non-farm sector in rural development, approaches to rural development and major rural development programs. The topics included in the practical part are organizing data, measures of central tendency, measures of dispersion, coefficient of variation and measures of inequality.

**Paper Code: UGEOMAJ35010**

**Paper Type: Theory + Practical Lab Based-PLB**

**Credit: 3 credit theory and 1 credit practical.**

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

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

#### Syllabus:

##### Paper Objectives

##### Knowledge Acquired:

- Concept of rural development, Gandhian rural development model and governance.
- Big Push Theory, the Lewis model of economic development, and Myrdal's Theory of Spread and Backwash Effects.
- Concept of Rural poverty and non-farm sector in rural development.
- Major rural development programmes include SGSY, MGNREGA, PMJDY, PMJAY, PMGSY, PURA, PMAY, and SBM.

##### Skills Gained:

- Develop skills in organizing data.
- Skills Gained in statistics include measures of central tendency, measures of dispersion and coefficient of variation, measures of inequality include the Lorenz curve and Gini's co-efficient.

##### Competency Developed:

- Develop a proper understanding regarding rural development and rural Governance among students.
- Cultivate skills in students regarding paradigms of rural development, rural poverty and importance of non-farm sector in rural development.
- Make student aware of major Indian rural development programmes.
- Enable students to interpret and visually communicate data using statistics.

#### Syllabus Overview

##### Theory

| Unit | Content                                                                                                                      | Hours/Week |
|------|------------------------------------------------------------------------------------------------------------------------------|------------|
| 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

| 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; 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

- Krishnamurthy, J. (2000). *Rural Development: Problems and Prospects*. Rawat Publications, Jaipur.
- Lee, D.A., & Chaudhri, D.P. (Eds.). (1983). *Rural Development and State*. Methuen Publishing.
- Misra, R.P., & Sundaram, K.V. (Eds.). (1979). *Rural Area Development: Perspectives and Approaches*. Sterling Publishers, New Delhi.
- Singh, K., & Shishodia, A. (2016). *Rural Development: Principles, Policies, and Management* (4th ed.). Sage.
- Gilg, A.W. (1985). *An Introduction to Rural Geography*. Edwin Arnold, London.
- Misra, R.P. (Ed.). (1985). *Rural Development: Capitalist and Socialist Paths, Vol. 1*. Concept, New Delhi.
- Das, N.G. (2009). *Statistical Methods*. McGraw Hill Education (India) Private Limited.
- Singh, R.L., & Singh, R.P.B. (1999). *Elements of Practical Geography*. Kalyani Publishers.
- Sarkar, A. (2015). *Practical geography: A systematic approach*. Orient Black Swan Private Ltd., New Delhi.
- Mishra, R.P., & Ramesh, A. (1989). *Fundamentals of Cartography*. Concept, New Delhi.

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

### Question Pattern

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

## Semester: 5

### PAPER: MAJOR

#### Paper Description: AGRICULTURAL GEOGRAPHY

This paper explains the complex interactions between human societies and the environment. It deals with understanding the dynamics of food production and distribution. It covers a variety of topics, including the concept of the factors affecting agriculture, types of farming, condition of growth, world distribution and production of crops, theories of agricultural location, Whittlesey classification of world agriculture region, agricultural regionalization in India, causes and solutions of low productivity in Indian agriculture, agricultural revolutions in India, various agricultural schemes in India and the impact of climate change on agriculture. The practical part deals with understanding the methods of delineating crop combination regions, measuring agricultural efficiency, measuring crop concentration index and crop diversification.

**Paper Code: UGEOMAJ35011**

**Paper Type: Theory + Practical Lab Based-PLB**

**Credit: 3 credit theory and 1 credit practical.**

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

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

#### Syllabus:

##### Paper Objectives

##### Knowledge Acquired:

- Types of farming, world distribution and production of crops.
- Theories of agricultural location, Whittlesey classification of world agriculture region and agricultural regionalisation in India.
- Agricultural revolutions in India, agricultural schemes in India, the impact of climate change on agriculture and the concept of Climate Smart Agriculture.

##### Skills Gained:

- Develop skills in methods of delineating crop combination regions proposed.
- Measuring agricultural efficiency, crop concentration index and crop diversification.

##### Competency Developed:

- Develop an understanding of agriculture and world distribution and production of crops.
- Evolving an analysis regarding theories of agricultural location, regionalisation in India, agricultural revolutions and various agricultural schemes in India.
- Enabling learning power to interpret and analyse methods of delineating crop combination regions, measuring agricultural efficiency, crop concentration index, and 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    | Measuring agricultural efficiency (Bhatia), crop concentration index (Bhatia) and crop diversification (Gibbs-Martin Index). | 2          |

### Suggested Reading

- Vaidya, B.C. (1997). *Agricultural Land Use in India*. Manak Publications.
- Gregor, H.P. (1970). *Geography of Agriculture*. Prentice-Hall, New York.
- Husain, M. (1996). *Systematic Agricultural Geography*. Rawat Publications, Jaipur.
- Mohammad, A. (1978). *Studies in Agricultural Geography*. Rajesh Publications, New Delhi.
- Morgan, W.B., & Norton, R.J.C. (1971). *Agricultural Geography*. Methuen, London.
- Sauer, O.C. (1969). *Agricultural Origins and Dispersals*. MIT Press, Cambridge.
- Shafi, M. (2006). *Agricultural Geography*. Pearson Education, New Delhi.
- Sen, Sudhir (1975). *Reaping the Green Revolution*. Tata McGraw-Hill, New Delhi.
- Singh, J., & Dhillon, S.S. (2000). *Agricultural Geography*. Tata McGraw Hill, New Delhi.
- Singh, S. (1994). *Agricultural Development in India: A Regional Analysis*. Kaushal Publications, Shillong.
- Symons, L. (1967). *Agricultural Geography*. George Bell and Sons, London.
- Tarrant, J.R. (1974). *Agricultural Geography*. John Wiley and Sons, New York.
- Basu, D.N., & Guha, G.S. (1996). *Agro-Climatic Regional Planning in India, Vol.I & II*. Concept Publication, New Delhi.
- Burger, A. (1994). *Agriculture of the World*. Aldershot, Avebury.
- Grigg, D.B. (1984). *Introduction to Agricultural Geography*. Hutchinson, London.
- Ilbery, B.W. (1985). *Agricultural Geography: A Social and Economic Analysis*. Oxford University Press.
- Mohammad, N. (1992). *New Dimension in Agriculture Geography, Vol. I to VIII*. Concept Pub., New Delhi.
- Hussain, M. (1978). *Agricultural Geography*. Rawat Publication, Jaipur.
- Sarkar, A. (2015). *Practical Geography: A Systematic Approach* (3rd ed.). Orient Blackswan Private Ltd.
- Shafi, M. (2005). *Agricultural Geography*. Pearson.

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

#### **Question Pattern**

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

## Semester: 5

### PAPER: MAJOR

#### Paper Description: GEOGRAPHICAL THOUGHT

This paper describes geographic thought and typically delves into the evolution, theories, philosophies, and methodologies that have shaped the field of geography over time. In particular, the theoretical part of the course covers the evolution of geography in the ancient period, the development of geography in the medieval period, the development of the age of voyages and exploration, the development of geography in the modern age, Dualism in geography, Positivism and quantitative revolution and Welfare geography. In contrast, the practical part covers the concept of levelling and surveying, surveying by Prismatic Compass, levelling by Dumpy Level, determining height by Theodolite, Plane table survey and graphical representation of data.

**Paper Code:** UGEOMAJ35012

**Paper Type:** Theory + Practical Lab Based-PLB

**Credit:** 3 credit theory and 1 credit practical.

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

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

#### Syllabus:

##### Paper Objectives

##### Knowledge Acquired:

- The evolution of geography in the ancient period, the development of geography in the medieval period, and the development of the age of voyages and exploration.
- Development of geography in the modern age and dualism in geography.
- Positivism and quantitative revolution, behaviouralism and welfare geography.

##### Skills Gained:

- Develop skills in surveying using a Prismatic Compass, levelling by Dumpy Level, and determining height using Theodolite and Plane table survey.
- Graphical representation of data using box plots, scatter plots and band graphs.

##### Competency Developed:

- Gain competency regarding the evolution of geography in ancient and medieval periods, both in voyages and exploration and in 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

- Taylor, G. (Ed.). (1953). *Geography in the Twentieth Century*. Methuen and Company, London.
- Soja, E. (1989). *Post-modern Geographies*. Verso, London.
- Singh, R. L., & Singh, R. P. B. (1999). *Elements of Practical Geography*. Kalyani Publishers.
- Singh, R. S. (Ed.). (2009). *Indian Geography: Perspectives, Concerns and Issues*. Rawat Publications, Jaipur/New Delhi.
- Sarkar, A. (2015). *Practical Geography: A Systematic Approach*. Orient Black Swan Private Ltd., New Delhi.
- Rawling, E., & Daugherty, R. (Eds.). (2005). *Geography into the Twenty-first Century* (2nd ed.). John Wiley and Sons, Chichester.
- Pete, P. (1998). *Modern Geographical Thought*. Wiley-Blackwell.
- Mishra, R. P., & Ramesh, A. (1989). *Fundamentals of Cartography*. Concept, New Delhi.
- Martin, G. J. (2005). *All Possible Worlds: A History of Geographical Ideas*. Oxford.
- Johnston, R., Gregory, D., Pratt, G., Watts, M., & Whatmore, S. (2003). *The Dictionary of Human Geography* (5th ed.). Blackwell Publishers, Oxford.
- Husain, M. (2015). *Evolution of Geographical Thought* (6th ed.). Rawat Publications, Jaipur.
- Holt-Jensen, A. (1980). *Geography: Its History and Concepts*. Harper and Row Publishers, London.
- Harvey, D. (1969). *Explanations in Geography*. Arnold, London.
- Hartshorne, R. (1959). *Perspectives of Nature of Geography*. Rand MacNally and Co.
- Dikshit, R. D. (2004). *Geographical Thought: A Contextual History of Ideas*. Prentice Hall India.
- Cresswell, T. (2013). *Geographic Thought: A Critical Introduction*. Wiley-Blackwell.
- Couper, P. (2015). *A Student's Introduction to Geographical Thought: Theories, Philosophies, Methodologies*. Sage.
- Adhikari, S. (2015). *Fundamentals of Geographical Thought*. Orient Blackswan.

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

#### Question Pattern

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

## Semester: 5

### 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: UGEOMIN30003**

**Paper Type: Theory + Practical Lab Based-PLB**

**Credit: 3 credit theory and 1 credit practical.**

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

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

#### Syllabus:

##### Paper Objectives

##### Knowledge Acquired:

- 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 analyzing 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; Measures of dispersion: Range, mean deviation, variance, standard deviation and coefficient of variation. | 2          |
| 2    | Measures of inequality: Lorenz curve and Gini's co-efficient; Traffic flow diagram.                                                                                                                                                                                                                    |            |

### Suggested Reading

Combes, P., Mayer, T., & Thisse, J. F. (2008). *Economic Geography: The Integration of Regions and Nations*. Princeton University Press.

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

Durand, L. (1961). *Economic Geography*. Crowell.

Bagchi-Sen, S., & Smith, H. L. (2006). *Economic Geography: Past, Present and Future*. Taylor and Francis.

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

Clark, G. L., Feldman, M. P., & Gertler, M. S. (Eds.). (2000). *The Oxford Handbook of Economic Geography*. Oxford University Press.

Alexander, J. W. (1963). *Economic Geography*. Prentice-Hall Inc., Englewood Cliffs, New Jersey.

Coe, N. M., Kelly, P. F., & Yeung, H. W. (2007). *Economic Geography: A Contemporary Introduction*. Wiley-Blackwell.

Hodder, B. W., & Lee, R. (1974). *Economic Geography*. Taylor and Francis.

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

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

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

### Question Pattern

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

## Semester: 6

### PAPER: MAJOR

#### Paper Description: BIOGEOGRAPHY

Biogeography is the study of the distribution of species and ecosystems in geographic space and through geological time. It involves understanding how physical and biological factors interact to shape the patterns of life on Earth. Key aspects of biogeography include examining the biosphere, energy flow in ecosystems, biogeochemical cycles, world biomes, floristic realms and zoogeographical regions of the world, biodiversity, and wildlife conservation projects in India. The practical part covers the determination of plant-species diversity by matrix method, identification of the Xeric Period, Hyetograph and Map projections.

**Paper Code: UGEOMAJ36013**

**Paper Type: Theory + Practical Lab Based-PLB**

**Credit: 3 credit theory and 1 credit practical.**

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

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

#### Syllabus:

##### Paper Objectives

##### Knowledge Acquired:

- Nature and scope of biogeography, biosphere, concepts of ecology, species, population, community, habitat, ecological niche and succession, concepts of trophic structure, food chain and food web and energy flow in ecosystems.
- Bio-geochemical cycles, classification of world biomes, 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, wildlife conservation projects in India include tiger, elephant, one-horn rhino, crocodile and Gangetic dolphin conservation.

##### Skills Gained:

- Develop skills in the determination of plant-species diversity using the matrix method, identification of xeric period using Ombothermic graphs (five weather stations), and hyetograph.
- Gain skills in mathematical/graphical construction of map projections.

##### Competency Developed:

- Evolving the knowledge within students with the critical thinking regarding various aspects of biogeography including bio-geochemical cycles, world biomes, floristic realms and zoogeographical regions of the world, Biodiversity etc.
- Make students aware regarding various wildlife conservation projects in India.
- Enable students' efficiency regarding matrix method, Ombothermic graphs, Hyetograph and map projections.

#### Syllabus Overview:

##### Theory

| Unit | Content                                                                                                                                    | Hours/Week |
|------|--------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 1    | Biogeography: Nature and scope; Biosphere: Nature and components; Concepts of ecology, species, population, community, habitat, ecological | 3          |

|   |                                                                                                                                                                                                                                                                                                                      |  |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|   | niche and succession; Concepts of trophic structure, food chain and food web; Energy flow in ecosystems.                                                                                                                                                                                                             |  |
| 2 | Bio-geochemical cycles with reference to oxygen, carbon, nitrogen and phosphorous; Classification of world biomes (Holdridge and Whittaker); Geographical extent and characteristics of tropical rain forest, taiga, tundra, hot desert, savanna and temperate grassland biomes.                                     |  |
| 3 | Floristic realms and zoogeographical regions of the world; Biodiversity: Definition, types, threats and conservation measures; Concept of Red Data Book, Green Data Book, endangered and extinct species; Wildlife conservation projects in India (tiger, elephant, one-horn rhino, crocodile and Gangetic dolphin). |  |

### Practical

| Unit | Content                                                                                                                                                                                                                                                      | Hours/Week |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 1    | Determination of plant-species diversity by matrix method (Shannon-Weiner and Simpson); Identification of Xeric Period by Ombothermic 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

Huggett, R. (1998). *Fundamentals of Biogeography*. Routledge, London.

Brown, J. H., & Lomolino, M. V. (2010). *Biogeography* (4th ed.). Sinauer Associates.

Cox, C. B., & Moore, P. D. (2010). *Biogeography: An Ecological and Evolutionary Approach* (8th ed.). Wiley-Blackwell.

Lomolino, M. V., Riddle, B. R., Whittaker, R. J., & Brown, J. H. (2017). *Biogeography* (5th ed.). Sinauer Associates.

Lomolino, M. V., & Heaney, L. R. (2004). *Frontiers of Biogeography: New Directions in the Geography of Nature*. Sinauer Associates.

Myers, N., Mittermeier, R. A., Mittermeier, C. G., da Fonseca, G. A., & Kent, J. (2000). *Biodiversity Hotspots for Conservation Priorities*. Nature Conservancy.

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

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

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

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

### Question Pattern

| Type               | Marks          |                                      |                | Total |
|--------------------|----------------|--------------------------------------|----------------|-------|
| <b>Theoretical</b> | 1: 5 out of 5  | 5: 3 out of 5                        | 10: 2 out of 4 | 40    |
| <b>Practical</b>   | 15: 1 out of 1 | 5: Laboratory notebook and Viva-voce |                | 20    |

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

## Semester: 6

### PAPER: MAJOR

#### Paper Description: URBAN GEOGRAPHY

Urban Geography is a specialized branch of geography that examines the spatial organization and dynamics of cities and urban areas. This paper provides an overview of key themes and theories in urban geography, including urbanization processes, urban morphology, socio-spatial inequalities, and urban planning. It explores how cities evolve, grow, and function as complex systems shaped by demographic trends, economic activities, cultural diversity, and governance structures. The paper discusses urban challenges such as housing affordability, transportation issues, environmental sustainability, and social exclusion. It aims to deepen understanding of urban environments' spatial, social, and economic dimensions. The practical part deals with the hierarchy of urban settlements, ternary diagram, nearest neighbour analysis for clustering and regularity, correlation, and regression.

**Paper Code: UGEOMAJ36014**

**Paper Type: Theory + Practical Lab Based-PLB**

**Credit: 3 credit theory and 1 credit practical.**

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

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

#### Syllabus:

##### Paper Objectives

##### Knowledge Acquired:

- Definition, scope and content of urban geography, classification of city, urban morphology and central business district, concept of urban growth, urbanization, suburbanization, counter-urbanization, re-urbanization and urban renewal.
- Trends of urbanization, level, trends and patterns of urbanization in India, the concept of conurbation, megacity, million city and global city, rural-urban fringe, urban corridor, satellite towns, urban gentrification.
- Definition and concept of the master plan, the contribution of E. Howard, P. Geddes and Le Corbusier in urban planning, problems of urbanization in India, major urban development schemes in India include JNNURM, AMRUT and Smart Cities Mission.

##### Skills Gained:

- Gain skill in creating a hierarchy of urban settlements using the rank-size rule, ternary diagram and nearest neighbour analysis.
- Develop skilled proficiency in statistical methods, including correlation and regression, as well as simple bi-variate linear regression.

##### Competency Developed:

- Deepening the knowledge of students regarding urban morphology, trends of urbanization in developed and developing countries, Urban gentrification, concept of Master Plan, contribution of E. Howard, P. Geddes and Le Corbusier in urban planning, problems of urbanization in India, major urban development schemes in India.
- Enriching skills among students in doing and interpreting rank-size rule, ternary diagram, nearest neighbour analysis and correlation and regression.

#### 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

- 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*. Pearson Prentice Hall, New York.
- Carter, H. (2002). *The Study of Urban Geography* (4th ed.). Jaipur and New Delhi: Rawat Publications. (Original work published 1995)
- Hall, P. (1992). *Urban and Regional Planning*. Routledge, London.
- Hall, T. (2001). *Urban Geography* (2nd ed.). Routledge, London.
- Johnson, J. H. (1981). *Urban Geography*. Pergamon Press, Oxford.
- Pacione, M. (2005). *Urban Geography: A Global Perspective*. Routledge, London and New York.
- Singh, S. B. (Ed.). (1996). *New Perspectives in Urban Geography*. M.D. Publications, New Delhi.
- Stanley, B., Jack, W., & Donald, Z. (Eds.). (2003). *Cities of the World*. Rowman and Littlefield, New York and Oxford.
- Knox, P. L., & Pinch, S. (2006). *Urban Social Geography: An Introduction*. Prentice-Hall.
- Sassen, S. (2001). *The Global City: New York, London and Tokyo*. Princeton University Press.
- Ramachandran, R. (1989). *Urbanisation and Urban Systems of India*. Oxford University Press, New Delhi.
- Ramachandran, R. (1992). *The Study of Urbanisation*. Oxford University Press, Delhi.

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

Singh, R. B. (Ed.). (2015). *Urban Development, Challenges, Risks and Resilience in Asian Megacities*.

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

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

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

### Question Pattern

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

## Semester: 6

### PAPER: MAJOR

#### Paper Description: INDUSTRIAL GEOGRAPHY

Industrial Geography examines industrial activities' spatial distribution, organization, and dynamics within regional and global contexts. This paper provides an overview of key concepts and theories in industrial geography, including location theory, agglomeration economies, industrial clusters, and global production networks. It explores how industrial sectors evolve and interact with geographic factors such as transportation networks, natural resources, and labour markets. Students will make a field report in the practical part.

**Paper Code: UGEOMAJ36015**

**Paper Type: Theory + Practical Lab Based-PLB**

**Credit: 3 credit theory and 1 credit practical.**

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

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

#### Syllabus:

##### Paper Objectives

##### Knowledge Acquired:

- Nature and scope of industrial geography, types and classification of manufacturing industries, factors of industrial location, and various theories of industrial location.
- 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.
- Industrial regions in several countries, including India, industrial policy of India, 1991, Make in India scheme, 2014.

##### Skills Gained:

- Producing skills and efficiency in doing fieldwork with a proper field report.

##### Competency Developed:

- Develop skills in understanding types of manufacturing industries and 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.
- Strengthened the knowledge of industrial regions, the industrial policy of India, 1991 and the Make in India scheme, 2014.
- Cultivating research qualities among students with 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, Palandt, 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

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

Hayter, R. (2013). *Industrial Geography: An Economic Geography Perspective*. Routledge.

Clark, G. L., Feldman, M. P., & Gertler, M. S. (2018). *The Oxford Handbook of Economic Geography*. Oxford University Press.

Scott, A. J. (2013). *The New Global Economy*. Princeton University Press.

Markusen, A. R., & Venables, A. J. (Eds.). (1999). *Firms' Location and Regional Development*. Routledge.

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

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

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

**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 |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------|-------|
| <b>Theoretical</b> | 1: 5 out of 5                                                                                                                          | 5: 3 out of 5 | 10: 2 out of 4 | 40    |
| <b>Practical</b>   | 15: Field report                                                                                                                       | 5: Viva-voce  |                | 20    |
| <b>CE</b>          | 10: Mid-term test, class test, seminar presentation, term paper (Any one to be decided by the respective departmental faculty members) |               |                | 10    |
| <b>Attendance</b>  | 5                                                                                                                                      |               |                | 5     |
| <b>Full marks</b>  |                                                                                                                                        |               |                | 75    |

## Semester: 6

### PAPER: MAJOR

#### Paper Description: FUNDAMENTALS OF REMOTE SENSING

Fundamentals of Remote Sensing is a foundational study that explores the principles, technologies, and applications of remote sensing in environmental science, geography, and related fields. This paper provides an introduction to key concepts such as electromagnetic radiation, sensor systems, image interpretation, and digital image processing techniques. It aims to demonstrate the utility of remote sensing for scientific research, resource management, and policy decision-making. The practical part of this paper is also related to remote sensing, which further strengthens the knowledge of students.

**Paper Code: UGEOMAJ36016**

**Paper Type: Theory + Practical Lab Based-PLB**

**Credit: 3 credit theory and 1 credit practical.**

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

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

#### Syllabus:

##### Paper Objectives

##### Knowledge Acquired:

- Definition, scope and evolution of remote sensing, various processes of remote sensing and sources of energy, EMR, typology of remote sensing, remote sensing satellites and sensor resolutions.
- 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.
- Applications of remote sensing, Indian space programmes.

##### Skills Gained:

- Construct skills in the interpretation of aerial photographs using pocket stereoscopes and satellite images.
- Develop efficiency in image processing and classifying and preparation of thematic maps using QGIS 3.22 software.

##### Competency Developed:

- Building understanding among learners regarding remote sensing, remote sensing satellites and sensor resolutions, photogrammetry, supervised and unsupervised digital images, applications of remote sensing and Indian space programmes.
- Enable students to interpret Aerial Photographs using a pocket stereoscope and Satellite Images.
- Effectively make students better understand different remote sensing indices using Landsat imagery using 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 | 3          |

|   |                                                                                                                                                                                                                                                                            |  |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|   | and earth surface features; Types of remote sensing; Remote sensing satellites and sensor resolutions.                                                                                                                                                                     |  |
| 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    | 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) | 2          |

### Suggested Reading

- Rees, W. G. (2001). *Physical Principles of Remote Sensing*. Cambridge University Press.
- Wolf, P. R., & Dewitt, B. A. (2000). *Elements of Photogrammetry: With Applications in GIS*. McGraw-Hill.
- Campbell, J. B. (2007). *Introduction to Remote Sensing*. Guildford 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.
- Lillesand, T. M., Kiefer, R. W., & Chipman, J. W. (2004). *Remote Sensing and Image Interpretation* (Wiley Student Edition). Wiley.
- Nag, P., & Kudra, M. (1998). *Digital Remote Sensing*. Concept, New Delhi.
- Singh, R. L., & Singh, R. P. B. (1999). *Elements of Practical Geography*. Kalyani Publishers.
- Sarkar, A. (2015). *Practical geography: A systematic approach*. Orient Black Swan Private Ltd., New Delhi.
- Cracknell, A., & Hayes, L. (1990). *Remote Sensing Year Book*. Taylor and Francis.
- Curran, P. J. (1985). *Principles of Remote Sensing*. Longman.
- Nag, P. (Ed.). (1992). *Thematic Cartography and Remote Sensing*. Concept Publishing Company.
- Reeves, R. G. (Ed.). (1983). *Manual of Remote Sensing* (Vols. 1 and 2). American Society of Photogrammetry and Remote Sensing.
- Spurr, R. (1960). *Photogrammetry and Photo Interpretation*. The Roland Press Company.
- Survey of India. (1973). *Photogrammetry*. Survey 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 | 1: 5 out of 5                                                                                                                          | 5: 3 out of 5                        | 10: 2 out of 4 | 40    |
| Practical   | 15: 1 out of 1                                                                                                                         | 5: Laboratory notebook and Viva-voce |                | 20    |
| CE          | 10: Mid-term test, class test, seminar presentation, term paper (Any one to be decided by the respective departmental faculty members) |                                      |                | 10    |
| Attendance  | 5                                                                                                                                      |                                      |                | 5     |
| Full marks  |                                                                                                                                        |                                      |                | 75    |

## Semester: 6

### 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: UGEOMIN30003**

**Paper Type: Theory + Practical Lab Based-PLB**

**Credit: 3 credit theory and 1 credit practical.**

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

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

#### Syllabus:

##### Paper Objectives

##### Knowledge Acquired:

- 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 analyzing 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; Measures of dispersion: Range, mean deviation, variance, standard deviation and coefficient of variation. | 2          |
| 2    | Measures of inequality: Lorenz curve and Gini's co-efficient; Traffic flow diagram.                                                                                                                                                                                                                    |            |

### Suggested Reading

Combes, P., Mayer, T., & Thisse, J. F. (2008). *Economic Geography: The Integration of Regions and Nations*. Princeton University Press.

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

Durand, L. (1961). *Economic Geography*. Crowell.

Bagchi-Sen, S., & Smith, H. L. (2006). *Economic Geography: Past, Present and Future*. Taylor and Francis.

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

Clark, G. L., Feldman, M. P., & Gertler, M. S. (Eds.). (2000). *The Oxford Handbook of Economic Geography*. Oxford University Press.

Alexander, J. W. (1963). *Economic Geography*. Prentice-Hall Inc., Englewood Cliffs, New Jersey.

Coe, N. M., Kelly, P. F., & Yeung, H. W. (2007). *Economic Geography: A Contemporary Introduction*. Wiley-Blackwell.

Hodder, B. W., & Lee, R. (1974). *Economic Geography*. Taylor and Francis.

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

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

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

### Question Pattern

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

## Semester: 7

### PAPER: MAJOR

#### Paper Description: **HYDROLOGY & OCEANOGRAPHY**

Hydrology and Oceanography focus on the study of water on earth, including its distribution, movement, characteristics, and environmental significance. The hydrology component examines the global and basin hydrological cycle, its major processes, and groundwater systems, including their occurrence, movement, storage, and depletion. The oceanography component explores ocean morphology, seawater properties such as salinity, temperature, and density, ocean waves and currents, marine sediments, coral reefs, marine resources, and sea-level changes. The practical component develops skills in plotting and interpreting rating curves, annual and unit hydrographs, climatic charts, rainfall dispersion diagrams, and assessing water quality through measurements of temperature, TDS, salinity, and pH. The course enhances understanding of hydrological and oceanographic processes and their applications in water resource and environmental management.

**Paper Code: UGEOMAJ47017**

**Paper Type: Theory + Practical Lab Based-PLB**

**Credit: 3 credit theory and 1 credit practical.**

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

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

#### Syllabus:

##### Paper Objectives

##### Knowledge Acquired:

- Understand the global and basin hydrological cycle, its major components, and the occurrence, movement, storage, and depletion of groundwater.
- Acquire knowledge of ocean morphology, seawater properties, ocean waves and currents, marine sediments, coral reefs, marine resources, and sea-level changes.

##### Skills Gained:

- Develop skills in plotting and interpreting rating curves, annual and unit hydrographs, climatic charts, and rainfall dispersion diagrams.
- Gain practical experience in assessing water quality using digital instruments for measuring temperature, TDS, salinity, and pH.

##### Competency Developed:

- Develop competency in understanding and analyzing hydrological and oceanographic processes and their environmental significance.
- Apply practical techniques for hydrological analysis, climatic data interpretation, and water quality assessment for effective water resource and environmental management.

#### Syllabus Overview:

##### Theory

| Unit | Content                                                                                                                                                                                                                                                                                                                                                 | Hours/Week |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 1    | Global and basin hydrological cycle; Components of the hydrological cycle: Evaporation, condensation, precipitation, interception, evapotranspiration, infiltration, run-off and overland flow; Groundwater: Nature, sources, types and controlling factors, groundwater storage and groundwater table, movement of groundwater; Groundwater depletion. | 3          |

|   |                                                                                                                                                                                                                                                                                                                                                                         |  |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| 2 | Ocean morphology: Continental shelves, slopes, submarine canyons and abyssal plain; Bottom reliefs of Atlantic, Pacific and Indian ocean; Salinity and temperature of ocean water: Factors and distribution; Density of ocean water; Ocean waves: Nature, geometry and types; Ocean currents: Causes and types; Surface currents of Atlantic, Pacific and Indian Ocean. |  |
| 3 | Marine sediments/deposits: Sources, origin and classification; Coral reef: Conditions of growth, types and theories of origin (Subsistence theory and Stand still theory); Marine resources: Importance, types and conservation; Sea level change: Causes and consequences.                                                                                             |  |

### Practical

| Unit | Content                                                                                                                                                                                                                               | Hours/Week |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 1    | Rating Curve, annual and unit hydrographs: Plotting and interpretations; Climatic charts showing the relation among rainfall, temperature, atmospheric pressure and relative humidity; Rainfall dispersion diagram (quartile method). | 2          |
| 2    | Assessment of water quality by digital tester: Temperature, TDS, salinity and pH.                                                                                                                                                     |            |

### Suggested Reading

- Abbott, M. R., & Morris, D. P. (2014). *Introduction to oceanography*. Jones & Bartlett Learning.
- Desai, B. N., & Jha, M. M. (Eds.). (2015). *Oceanography: New perspectives*. TERI Press.
- Dingman, S. L. (2002). *Physical Hydrology* (2nd ed.). Waveland Press.
- Garrison, T. (2019). *Oceanography: An invitation to marine science* (9th ed.). Cengage Learning.
- Karanth, K. R. (1988). *Ground Water: Exploration, Assessment and Development*. Tata-McGraw Hill, New Delhi.
- Knauss, J. A. (2018). *Introduction to physical oceanography* (3rd ed.). Waveland Press.
- Pinet, P. R. (2008). *Invitation to Oceanography* (5th ed.). Jones and Bartlett Publishers, USA, UK, and Canada.
- Rai, V. K. (1993). *Water Resource Planning and Development*. Deep and Deep Publications, New Delhi.
- Reddy, J. P. (1988). *A Textbook of Hydrology* (4th ed.). Laxmi Publications, New Delhi.
- Shaw, E. M., Beven, K. J., Chappell, N. A., & Lamb, R. (2011). *Hydrology in Practice* (4th ed.). CRC Press.
- Singh, M. B. (1999). *Climatology and Hydrology*. Tara Book Agency, Varanasi. (In Hindi).
- Singh, M. B. (2002). *Physical Geography*. Tara Book Agency, Varanasi. (In Hindi).
- Singh, V. P. (1992). *Elementary Hydrology*. Prentice Hall.
- Singh, Vijay P. (1995). *Environmental Hydrology*. Kluwer Academic Publications, the Netherlands.
- Stewart, R. H. (2017). *Introduction to physical oceanography* (2nd ed.). Texas A&M University Press.
- Sverdrup, K. A., Duxbury, A. B., & Duxbury, A. C. (2019). *An introduction to the world's oceans* (11th ed.). Cengage Learning.

Thurman, H. V., & Trujillo, A. P. (2021). *Essentials of oceanography* (13th ed.). Cengage Learning.

Tomczak, M., & Godfrey, J. S. (2016). *Regional oceanography: An introduction* (2nd ed.). Daya Publishing House.

Ward, R. C., & Robinson, M. (2000). *Principles of Hydrology*. McGraw Hill, New York.

Ward, R. C., & Trimble, S. W. (2003). *Environmental Hydrology* (2nd ed.). CRC Press.

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

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

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

#### Question Pattern

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

## Semester: 7

### PAPER: MAJOR

#### Paper Description: SOCIAL AND POLITICAL GEOGRAPHY

Social and Political Geography examines the spatial dimensions of society, culture, and political organization, focusing on the relationships between people, places, and power. The paper introduces key concepts of social geography, including society, social groups, communities, social well-being, social problems, culture, and cultural landscapes. It also explores major themes of political geography such as territoriality, state, nation, nation-state, boundaries, geopolitics, and global strategic theories. The practical component develops skills in the measurement and interpretation of social inequality and disparity, dominant and distinctive analysis, graphical representation of voting behaviour, and thematic mapping of social and demographic characteristics in India.

**Paper Code: UGEOMAJ47018**

**Paper Type: Theory + Practical Lab Based-PLB**

**Credit: 3 credit theory and 1 credit practical.**

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

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

#### Syllabus:

##### Paper Objectives

##### Knowledge Acquired:

- Nature and scope of social geography, characteristics and elements of society, social groups, community, and concepts regarding various terminologies related to social geography.
- Concept and indicators of social well-being, various social problems, nature and definition of culture, the concept of a cultural realm, cultural region and cultural hearth, cultural landscape and cultural diffusion.
- Nature and scope of political geography, concepts of territoriality, state, nation, nation-state, frontiers and boundaries, crucial concept of geopolitics, global strategic theories, geopolitical importance of G20, BRICS and Indian Ocean region.

##### Skills Gained:

- Gain skills in measurement and interpretation of inequality, disparity, and dominant and distinctive analysis.
- Graphical representation of data regarding voting behaviour in India using line, bar, and pie graphs, as well as thematic mapping with data relating to gender, caste, religion, and language of India.

##### Competency Developed:

- Develop competency in understanding and analyzing social and political processes, cultural patterns, social well-being, social problems, territoriality, geopolitics, and global strategic issues from a geographical perspective.
- Enable students to apply quantitative techniques and cartographic methods for the analysis, interpretation, and visual presentation of social and political data, including inequality, disparity, voting behaviour, and thematic mapping.

#### Syllabus Overview:

##### Theory

| Unit | Content                                                                                                                                                                                                                | Hours/Week |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 1    | Social geography: Nature and scope; Characteristics and elements of society; Social groups: Definition, characteristics and classification (C.H. Cooley); Community: Definition, elements and types (rural and urban); | 3          |

|   |                                                                                                                                                                                                                                                                                               |  |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|   | Concept of social space, social process, social pattern, social structure, social distance and social justice.                                                                                                                                                                                |  |
| 2 | Social well-being: Concept and indicators (Smith and Drewnowski); Social problems: Unemployment, child labour and dowry system; Culture: Nature and definition; Concept of cultural realm, cultural region and cultural hearth; Cultural landscape and cultural diffusion; Linguistic region. |  |
| 3 | Political geography: Nature and scope; Concepts of territoriality, state, and nation; Concept of Nation-State; Frontiers and boundaries; Concept of Geopolitics; Global strategic theories: Heartland and Rimland; Geopolitical importance of G20, BRICS and Indian Ocean Region.             |  |

### Practical

| Unit | Content                                                                                                                                                     | Hours/Week |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 1    | Measurement and interpretation: Inequality (Location Quotient), Disparity (Sopher's Index as modified by Kundu and Rao); Dominant and distinctive analysis. | 2          |
| 2    | Voting behaviour in India using line, bar and pie graphs; Thematic mapping with data relating to gender, caste, religion and language of India.             |            |

### Suggested Reading

Ahmed, A. (1999). *Social Geography*. Rawat Publications.

Casino, V. J. D., Jr. (2009). *Social Geography: A Critical Introduction*. Wiley Blackwell.

Carter, J., & Jones, T. (2000). *Social Geography: An Introduction to Contemporary Issues*. Hodder Arnold.

Panelli, R. (2004). *Social Geographies: From Difference to Action*. Sage.

Rachel, P., Burke, M., Fuller, D., Gough, J., Macfarlane, R., & Mowl, G. (2001). *Introducing Social Geographies*. Oxford University Press.

Agnew, J. (2016). *Global political geography: Territory, authority, and institutions*. Wiley-Blackwell.

Dodds, K., & Atkinson, D. (Eds.). (2000). *Geopolitical traditions: A century of geopolitical thought*. Routledge.

O'Loughlin, J., & Flint, C. (2017). *Political geography: An introduction to space and power*. Routledge.

Paasi, A. (2017). *Political geography: Territory, state and society*. John Wiley & Sons.

Sidaway, J. D. (2000). *Geographies of development in the 21st century: An introduction to the global south*. Routledge.

Yadav, B. D. (2018). *Political Geography*. Prayag Pustak Bhavan.

Das, N.G. (2009). *Statistical Methods*. McGraw Hill Education (India) Private Limited.

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

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

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

#### **Question Pattern**

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

## Semester: 7

### PAPER: MAJOR

#### Paper Description: REGIONAL PLANNING AND DEVELOPMENT

Regional Planning and Development focuses on the study of regions, their characteristics, and the principles and approaches used for balanced regional development. The paper introduces the concept and types of regions, regional planning, and the delineation of formal, functional, and planning regions. It examines major theories of regional planning, schemes of regionalization in India, regional disparities and their remedial measures, and target group and target area approaches through selected development programmes. The paper also highlights the concept of Human Development Index as an indicator of regional development. The practical component develops skills in delineating formal and functional regions and computing Human Development Index (HDI), Gender-related Development Index (GDI), and decadal population growth rates.

**Paper Code: UGEOMAJ47019**

**Paper Type: Theory + Practical Lab Based-PLB**

**Credit: 3 credit theory and 1 credit practical.**

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

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

#### Syllabus:

##### Paper Objectives

##### Knowledge Acquired:

- Understand the concept and types of regions, the need for regional planning, characteristics of an ideal planning region, and methods of delineating formal, functional, and planning regions.
- Acquire knowledge on major theories of regional planning, schemes of regionalization in India, regional disparities, target group and target area approaches, and indicators of human development.

##### Skills Gained:

- Develop skills in delineating formal regions using the weighted index method and functional regions using breaking point analysis.
- Gain proficiency in computing human development index (HDI), gender-related development index (GDI), and decadal population growth rates.

##### Competency Developed:

- Develop competency in analyzing regional planning concepts, theories, regionalization schemes, regional disparities, and development programmes from a geographical perspective.
- Apply quantitative techniques for delineation of regions and the measurement of human development and population growth.
- Interpret and evaluate regional development patterns using socio-economic indicators and planning approaches.

#### Syllabus Overview:

##### Theory

| Unit | Content                                                                                                                                                                                                                                             | Hours/Week |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 1    | Region: Definition and types (formal, functional and planning); Concept and needs of regional planning; Characteristics of an ideal planning region; Delineation of formal, functional and planning region; Metropolitan Area Development Planning. | 3          |
| 2    | Theories of regional planning: Growth Pole Theory (Perroux), Modified Growth Foci Concept (Mishra), Stages of Economic Development                                                                                                                  |            |

|   |                                                                                                                                                                                                                                                                                                                                                                                                                   |  |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|   | (Rostow), Core-Periphery Model (Friedmann), Unbalanced Growth Theory (Hirschman).                                                                                                                                                                                                                                                                                                                                 |  |
| 3 | Schemes of regionalization in India: S.P. Chatterjee and Bhat & Rao; Regional disparity in India: Causes, consequences and remedial measures; Target group and target area approach in regional planning: Shyama Prasad Mukherji Rurban Mission (SPMRM), Aspirational Districts Programme, Ayushman Bharat Yojana and Mahila Samridhi Yojana; Multi-level planning in India; NITI Aayog; Human Development Index. |  |

### Practical

| Unit | Content                                                                                                                                                 | Hours/Week |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 1    | Delineation of formal regions by weighted index method; Delineation of functional regions by breaking point analysis.                                   | 2          |
| 2    | Computation of human development index and gender related development index (both using UNDP Method); Computation of decadal growth rate of population. |            |

### Suggested Reading

- Deshpande, C. D. (1992). *India: A Regional Interpretation*. ICSSR, New Delhi.
- Mandal, R. B. (Ed.). (1990). *Patterns of Regional Geography – An International Perspective. Vol. 3 – Indian Perspective*.
- Galina, S., & Sengupta, P. (1967). *Economic Regionalisation of India*. Census of India.
- Pathak, C. R. (2003). *Spatial Structure and Processes of Development in India*. Regional Science Assoc., Kolkata.
- Tiwari, R. C. (2007). *Geography of India*. Prayag Pustak Bhawan, Allahabad.
- Sharma, T. C. (2013). *Economic Geography of India*. Rawat Publication, Jaipur.
- Singh, R. L. (1971). *India: A Regional Geography*. National Geographical Society of India.
- Spate, O. H. K., & Learmonth, A. T. A. (1967). *India and Pakistan: A General and Regional Geography*. Methuen.
- Singh, J. (2003). *India - A Comprehensive & Systematic Geography*. Gyanodaya Prakashan, Gorakhpur.
- Tirtha, R. (2002). *Geography of India*. Rawat Publication, Jaipur & New Delhi.
- Sharma, T. C. (2003). *India - Economic and Commercial Geography*. Vikas Publ., New Delhi.
- Singh, R. L., & Singh, R. P. B. (1999). *Elements of Practical Geography*. Kalyani Publishers.
- Sarkar, A. (2015). *Practical geography: A systematic approach*. Orient Black Swan Private Ltd., New Delhi.
- Glasson, J., & Marshall, T. (2007). *Regional Planning* (2nd ed.). Routledge.
- Friedmann, J. (1987). *Planning in the public domain: From knowledge to action*. Princeton University 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 | 1: 5 out of 5                                                                                                                          | 5: 3 out of 5                        | 10: 2 out of 4 | 40    |
| Practical   | 15: 1 out of 1                                                                                                                         | 5: Laboratory notebook and Viva-voce |                | 20    |
| CE          | 10: Mid-term test, class test, seminar presentation, term paper (Any one to be decided by the respective departmental faculty members) |                                      |                | 10    |
| Attendance  | 5                                                                                                                                      |                                      |                | 5     |
| Full marks  |                                                                                                                                        |                                      |                | 75    |

## Semester: 7

### PAPER: MINOR

#### Paper Description: GEOGRAPHY OF INDIA

This paper provides a comprehensive understanding of the physical and economic geography of India. It examines the physiographic divisions of India, major drainage systems, climate and its seasonal characteristics, soil types, and natural vegetation. The paper also explores the production and distribution of important mineral resources such as iron ore, coal, and petroleum, major agricultural crops including rice, wheat, cotton, and tea, and the spatial patterns of industrial development in India, with special reference to the iron-steel, cotton textile, and automobile industries. The practical component involves the preparation of a field report based on primary and secondary data collected during a compulsory field study, enabling students to apply geographical concepts and research techniques in real-world settings.

**Paper Code: UGEOMIN40004**

**Paper Type: Theory + Practical Lab Based-PLB**

**Credit: 3 credit theory and 1 credit practical.**

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

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

#### Syllabus:

##### Paper Objectives

##### Knowledge acquired:

- Understand the physiographic divisions of India, major drainage systems, climate, and seasonal climatic characteristics.
- Acquire knowledge of the distribution and characteristics of soils, natural vegetation, and major mineral resources of India.
- Understand the production and distribution of major agricultural crops and the spatial patterns of industrial development in India.

##### Skills gained:

- Develop skills in field-based geographical investigation, including the collection, analysis, interpretation, and presentation of primary and secondary data through scientific field report writing.

##### Competency developed:

- Develop a comprehensive understanding of India's physical, agricultural, mineral, and industrial geography and their regional variations.
- Acquire competency in conducting field-based geographical research and effectively communicating findings through maps, diagrams, charts, tables, and written reports.

#### 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 and petroleum 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 50-60 pages, handwritten and may include maps, diagrams, charts and tables. The report will be examined, and marks will be separately allotted for the report and viva-voce taken individually. | 2          |

### Suggested reading

- Deshpande, C. D. (1992). *India: A Regional Interpretation*. ICSSR, New Delhi.
- Johnson, B. L. C. (Ed.). (2001). *Geographical Dictionary of India*. Vision Books, New Delhi.
- Mandal, R. B. (Ed.). (1990). *Patterns of Regional Geography – An International Perspective. Vol. 3 – Indian Perspective*.
- Galina, S., & Sengupta, P. (1967). *Economic Regionalisation of India*. Census of India.
- Sharma, T. C. (2003). *India - Economic and Commercial Geography*. Vikas Publ., New Delhi.
- Singh, R. L. (1971). *India: A Regional Geography*. National Geographical Society of India.
- Champion, H. G., & Seth, S. K. (Eds.). (2017). *Geography of India* (8th ed.). National Geographic Society of India.
- Singh, R. L., & Singh, J. P. (2018). *India: A geographical perspective*. Prayag Pustak Bhavan.
- Menon, P. G. (2017). *India: A comprehensive geography*. Sterling Publishers Pvt. Ltd.
- Singh, J. (2003). *India - A Comprehensive & Systematic Geography*. Gyanodaya Prakashan, Gorakhpur.
- Spate, O. H. K., & Learmonth, A. T. A. (1967). *India and Pakistan: A General and Regional Geography*. Methuen.
- Tirtha, R. (2002). *Geography of India*. Rawat Publication, Jaipur & New Delhi.
- Pathak, C. R. (2003). *Spatial Structure and Processes of Development in India*. Regional Science Assoc., Kolkata.
- Tiwari, R. C. (2007). *Geography of India*. Prayag Pustak Bhawan, Allahabad.
- Sharma, T. C. (2013). *Economic Geography of India*. Rawat Publication, Jaipur.
- Das, N.G. (2009). *Statistical Methods*. McGraw Hill Education (India) Private Limited.
- Singh, R. L., & Singh, R. P. B. (1999). *Elements of Practical Geography*. Kalyani Publishers.
- Sarkar, A. (2015). *Practical geography: A systematic approach*. Orient Black Swan Private Ltd., New Delhi.

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

# Under Graduation with Honours (FYUGHONS)

## Semester: 8

### PAPER: MAJOR

#### Paper Description: TOURISM AND TRANSPORT GEOGRAPHY

Tourism and Transport Geography examine the spatial dimensions of tourism and transportation systems and their role in regional development. The tourism component focuses on the types and forms of tourism, tourist attractions, tourism infrastructure, factors influencing tourism development, tourist motivation, and the environmental, economic, and socio-cultural impacts of tourism. It also explores eco-tourism, agro-tourism, medical tourism, homestay tourism, Tourism Policy in India, and UNESCO World Heritage Sites in West Bengal. The transport component deals with modes of transport, transport networks, topology, transport development models, and major transportation projects in India. The practical component develops skills in traffic and tourist flow analysis, transport connectivity assessment, and transport accessibility mapping using quantitative techniques and indices.

**Paper Code: UGEOMAJ48020**

**Paper Type: Theory + Practical Lab Based-PLB**

**Credit: 3 credit theory and 1 credit practical.**

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

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

#### Syllabus:

##### Paper Objectives

##### Knowledge Acquired:

- Understand the types and forms of tourism, Peter's inventory of tourist attractions, geographical components of tourism, factors influencing tourism development, tourist motivation, and tourism infrastructure.
- Acquire knowledge of eco-tourism, agro-tourism, medical tourism, homestay tourism, the impacts of tourism, tourism policy in India, and UNESCO World Heritage Sites in West Bengal.
- Understand the concepts of transport geography, including transport networks, topology, transport development models, and the significance of major transport projects in India.

##### Skills Gained:

- Develop skills in preparing and interpreting traffic and tourist flow diagrams and conducting transport connectivity analysis using cyclomatic, alpha, beta, gamma, theta, and eta indices.
- Gain proficiency in transport accessibility mapping using detour index and Shimbel index techniques.

##### Competency Developed:

- Develop competency in analyzing tourism resources, tourism development, and the impacts of tourism from a geographical perspective.
- Apply concepts and models of transport geography to understand transport networks and regional connectivity.
- Acquire practical competence in transport network analysis, accessibility assessment, and the interpretation of tourism and transport data using quantitative techniques.

#### Syllabus Overview:

##### Theory

| Unit | Content                                                                                                                                                                                                                                                                                                   | Hours/Week |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 1    | Types and forms of tourism; Peter's inventory of tourist attractions; Geographical components of tourism; Factors influencing tourism development; Motivating factors and barriers of tourists; Importance of tourism infrastructure.                                                                     | 3          |
| 2    | Concepts of eco-tourism, agro-tourism, medical tourism and homestay tourism; Impact of tourism on physical, economic and socio-cultural environment; Tourism Policy in India; UNESCO World Heritage Sites in West Bengal: Sundarbans National Park, DHR and Santiniketan.                                 |            |
| 3    | Modes of transport; Basic components of transport network; Topology of network; Transport development models (TMG, Gould, Vance and Rimmer); Development and significance of Golden quadrilateral, East-West Corridor, Kolkata Suburban Railway Network, Delhi Metro Rail Corporation, Sagarmala Project. |            |

### Practical

| Unit | Content                                                                                                                                     | Hours/Week |
|------|---------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 1    | Traffic/ tourist flow diagram; Transport connectivity analysis (cyclomatic number, alpha, beta, gamma, theta and eta indices)               | 2          |
| 2    | Transport accessibility mapping using detour index and shimbel index (shortest path matrix and binary number matrix) and associated number. |            |

### Suggested reading

- Hall, C. M., & Page, S. J. (Eds.). (2014). *The geography of tourism and recreation: Environment, place and space* (4th ed.). Routledge.
- Williams, S., & Ponsford, I. (Eds.). (2016). *Tourism geography: A new synthesis* (4th ed.). Routledge.
- Lew, A. A., & McKercher, B. (Eds.). (2015). *Tourism geographies: Progress and prospects*. Routledge.
- Pearce, P. L., & Butler, R. W. (Eds.). (2019). *Tourism research*. Wiley.
- Page, S. J., & Connell, J. (2014). *Tourism: A modern synthesis* (4th ed.). Cengage Learning.
- Mathur, V. K., & Narain, H. (Eds.). (2017). *Tourism and sustainable development: Emerging trends*. Rawat Publications.
- Singh, S. (2016). *Geography of tourism: Concepts, paradigms and challenges*. Rawat Publications.
- Jamal, T., & Robinson, M. (Eds.). (2015). *The SAGE handbook of tourism studies*. Sage Publications.
- Goeldner, C. R., & Ritchie, J. R. B. (Eds.). (2012). *Tourism: Principles, practices, philosophies* (12th ed.). Wiley.
- Saarinen, J., & Rogerson, C. M. (Eds.). (2016). *Tourism and regional development: New pathways*. Routledge.
- Das, M. (2018). *Tourism geography of India*. New Century Publications.
- Singh, R. L., & Singh, R. P. B. (1999). *Elements of Practical Geography*. Kalyani Publishers.
- Sarkar, A. (2015). *Practical geography: A systematic approach*. Orient Black Swan Private Ltd., New Delhi.

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

### Question pattern

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

## Semester: 8

### PAPER: MAJOR

#### Paper Description: RESEARCH METHODOLOGY

This paper introduces the fundamental concepts, methods, and techniques of research, emphasizing the systematic process of conducting scientific investigations. It covers the meaning, objectives, and types of research, research design, sampling techniques, measurement scales, methods of data collection, case study methods, hypothesis formulation and testing, research questions, data interpretation, and report writing. The practical component develops quantitative analytical skills through the application of statistical techniques such as moments, skewness, kurtosis, dissimilarity index, time series analysis, chi-square tests, and one-way ANOVA. The paper equips students with the knowledge and skills required for conducting, analyzing, and communicating geographical research effectively.

**Paper Code: UGEOMAJ48021**

**Paper Type: Theory + Practical Lab Based-PLB**

**Credit: 3 credit theory and 1 credit practical.**

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

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

#### Syllabus:

##### Paper Objectives

##### Knowledge Acquired:

- Understand the meaning, objectives, significance, and types of research, research methods and methodology, research process, research problems, and research design.
- Acquire knowledge of sampling techniques, measurement scales, methods of primary and secondary data collection, and case study methods.
- Understand data preparation, hypothesis formulation and testing, research questions, interpretation of results, and report writing techniques.

##### Skills Gained:

- Develop skills in designing and conducting research, collecting and organizing data, and preparing research reports.
- Gain proficiency in applying statistical techniques, including moments, skewness, kurtosis, dissimilarity index, time series analysis, chi-square tests, and one-way ANOVA.

##### Competency Developed:

- Develop competency in planning, conducting, evaluating, and communicating research using appropriate research methods and techniques.
- Apply quantitative and statistical tools for data analysis, hypothesis testing, and interpretation of research findings.
- Acquire the ability to prepare scientifically structured research reports and undertake independent research in geography and related disciplines.

#### Syllabus Overview:

##### Theory

| Unit | Content                                                                                                                                       | Hours/Week |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 1    | Meaning and objectives of research; Types of research; Significance of research; Research methods and methodology; Research process; Criteria | 3          |

|   |                                                                                                                                                                                                                                                                                                           |  |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|   | of good research; Research problem; Meaning and significance of research design.                                                                                                                                                                                                                          |  |
| 2 | Definition and types of sampling; Classification and goodness of measurement scales; Methods of primary and secondary data collection; Characteristics, advantages and limitations of case study methods.                                                                                                 |  |
| 3 | Data preparation process; Meaning and characteristics of hypothesis; Basic concepts and procedure concerning testing of hypotheses; Limitations of the tests of hypotheses; Concepts of research questions; Meaning and techniques of interpretation; Significance and different steps of report writing. |  |

### Practical

| Unit | Content                                                                                                       | Hours/Week |
|------|---------------------------------------------------------------------------------------------------------------|------------|
| 1    | Computing moments, skewness and kurtosis of distribution; Dissimilarity Index.                                | 2          |
| 2    | Time series analysis (semi average, moving average and least square method); Chi-square tests; One way ANOVA. |            |

### Suggested reading

- Creswell, J. W. (1994). *Research design: Qualitative and quantitative approaches*. Sage Publications.
- Dikshit, R. D. (2003). *The art and science of geography: Integrated readings*. Prentice-Hall of India. New Delhi.
- Mukherjee, N. (2002). *Participatory learning and action: With 100 field methods*. Concept Publishing Company. New Delhi.
- Stoddard, R. H. (1982). *Field techniques and research methods in geography*. Kendall/Hunt.
- Wolcott, H. F. (1995). *The art of fieldwork*. Alta Mira Press. Walnut Creek, CA
- Neuman, W. L. (2014). *Social research methods: Qualitative and quantitative approaches* (7th ed.). Pearson.
- Babbie, E. R. (2016). *The basics of social research* (7th ed.). Cengage Learning.
- Silverman, D. (2013). *Doing qualitative research: A practical handbook* (4th ed.). Sage Publications.
- Bryman, A. (2016). *Social research methods* (5th ed.). Oxford University Press.
- Johnson, B., & Christensen, L. (2014). *Educational research: Quantitative, qualitative, and mixed approaches* (5th ed.). Sage Publications.
- Kothari, C. R., & Garg, G. (2019). *Research methodology: Methods and techniques* (4th ed.). New Age International Publishers.
- Marshall, C., & Rossman, G. B. (2016). *Designing qualitative research* (6th ed.). Sage Publications.
- Maxwell, J. A. (2013). *Qualitative research design: An interactive approach* (3rd ed.). Sage Publications.
- Yin, R. K. (2018). *Case study research and applications: Design and methods* (6th ed.). Sage Publications.
- Sarkar, A. (2015). *Practical geography: A systematic approach*. Orient Black Swan Private Ltd., New Delhi.

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

#### Question pattern

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

## Semester: 8

### PAPER: MAJOR

#### Paper Description: CARTOGRAPHY

Cartography is the science, art, and technology of map-making, interpretation, and communication of geographical information. This paper introduces the nature, development, principles, and branches of cartography, along with the elements, functions, and classification of maps. It covers fundamental cartographic concepts such as coordinate systems, bearings, map design, and map projections, emphasizing their principles, properties, and applications. The practical component develops skills in slope measurement using a clinometer, GPS-based location surveying, and the mathematical construction of selected map projections. The paper equips students with both theoretical understanding and practical competence in cartographic techniques and spatial representation.

**Paper Code: UGEOMAJ48022**

**Paper Type: Theory + Practical Lab Based-PLB**

**Credit: 3 credit theory and 1 credit practical.**

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

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

#### Syllabus:

##### Paper Objectives

##### Knowledge Acquired:

- Understand the nature, branches, development, and fundamental principles of cartography, along with the elements, functions, and classification of maps.
- Acquire knowledge of cartographic concepts including latitude and longitude, coordinate systems, bearings, map design principles, and constraints of map design.
- Understand the principles, properties, and mathematical derivation of major map projections and their applications in geographical representation.

##### Skills Gained:

- Develop skills in slope measurement using a clinometer and GPS-based surveying for determining location, altitude, accuracy, and waypoints.
- Gain proficiency in the mathematical construction of selected map projections and their practical applications.

##### Competency Developed:

- Develop competency in understanding and applying cartographic principles, coordinate systems, bearings, and map design techniques for spatial representation and analysis.
- Acquire practical competence in slope measurement, GPS surveying, and the construction and interpretation of map projections for geographical studies.

#### Syllabus Overview:

##### Theory

| Unit | Content                                                                                                                                                                                                                                     | Hours/Week |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 1    | Definition and nature of cartography; Branches and development of cartography; Fundamental principles of cartography; Maps: Elements, functions and usage; Classification of maps/ charts (based on scale, purpose and mapping techniques). | 3          |

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |
|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| 2 | Basic concept of: Parallels and meridians, latitude and longitude, generating globe, datum, spheroid, geoid, great circles, deformation, orthodrome, loxodrome and geodesic; Concept of bearing (Magnetic and true, whole circle and reduced); Location on earth: Coordinate systems (polar, rectangular, UTM, MGRS, WGS84); Principles and elements of map design; Constraints of map design: Cartographic, technical and resource restrictions. |  |
| 3 | Principles and properties of Polar Zenithal Equidistant Projection, Polar Zenithal Equal Area Projection, Simple Conical Projection with II Standard Parallels, Polyconic Projection, Parabolic Projection; Mercator's Projection and Mollweide's Projection.(mathematical derivation of all principles).                                                                                                                                         |  |

### Practical

| Unit | Content                                                                                                                                                                                                                                                   | Hours/Week |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 1    | Measurement of slope by Clinometer; GPS survey: Determination of latitude, longitude, altitude, level of accuracy and collection of waypoints.                                                                                                            |            |
| 2    | Mathematical construction of Polar Zenithal Equidistant Projection, Polar Zenithal Equal Area Projection, Conical Orthomorphic Projection (I standard parallel), Conical Equal Area Projection (I standard parallel) and Gall's Stereographic Projection. | 2          |

### Suggested reading

Tyner, J. A. (2017). *Principles of map design*. The Guilford Press.

Kraak, M. J., & Ormeling, F. (2019). *Cartography: Visualization of spatial data* (3rd ed.). Esri Press.

MacEachren, A. M. (Ed.). (2018). *How maps work: Representation, visualization, and design*. The Guilford Press.

Paine, R. W. (2014). *A student's guide to map projections*. University of Chicago Press.

Dent, B. D., & Torguson, J. S. (2018). *Cartography: Thematic map design* (7th ed.). McGraw-Hill Education.

Slocum, T. A., McMaster, R. B., Kessler, F. C., & Howard, H. H. (2009). *Thematic cartography and geovisualization* (3rd ed.). Pearson Prentice Hall.

Paine, R. W. (2014). *A student's guide to map projections*. University of Chicago Press.

Kline, K. D. (2017). *Mapping time: Illustrated by Minard's map of Napoleon's Russian campaign of 1812*. Esri Press.

Robinson, A. H., Sale, R. D., Morrison, J. L., & Muehrcke, P. C. (1995). *Elements of cartography* (6th ed.). John Wiley & Sons.

Harley, J. B. (2018). *The new nature of maps: Essays in the history of cartography* (3rd ed.). Johns Hopkins University Press.

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

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

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

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

#### Question pattern

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

## Semester: 8

### PAPER: MAJOR

#### Paper Description: CONTINUOUS EVALUATION

This paper is designed to assess students' ability to apply geographical concepts, research methods, and analytical skills through independent academic work. It comprises three components: a case study based on primary and secondary data, a term paper based on secondary data, and a seminar presentation on a topic selected from the undergraduate major syllabus. Under the guidance of a faculty member, students develop skills in data collection, analysis, interpretation, report writing, academic presentation, and scientific communication. The paper encourages independent learning, critical thinking, and the effective presentation of geographical knowledge through reports, maps, diagrams, charts, tables, and oral presentations.

**Paper Code: UGEOMAJ48023**

**Paper Type: Assignment**

**Credit: 4 credit.**

**Class hours: 3 classes per week.**

**Duration of the Examinations: N.A**

#### Syllabus:

##### Paper Objectives

##### Knowledge Acquired:

- Acquire in-depth knowledge of a selected geographical topic through case study, term paper preparation, and seminar presentation.
- Understand the procedures of data collection, analysis, interpretation, report writing, and academic presentation.
- Develop an understanding of geographical issues and their analysis using primary and secondary data sources.

##### Skills Gained:

- Develop skills in collecting, organizing, analyzing, and interpreting geographical data from primary and secondary sources.
- Gain proficiency in preparing case studies, term papers, and seminar presentations using appropriate academic and research techniques.
- Enhance communication, presentation, report-writing, and scientific documentation skills.

##### Competency Developed:

- Develop competency in conducting independent geographical research and presenting findings in a systematic and scientific manner.
- Acquire the ability to critically analyze geographical issues and communicate research outcomes through written reports and oral presentations.
- Strengthen problem-solving, analytical thinking, and professional presentation skills required for higher studies and research.

#### Syllabus Overview:

| Unit | Content                                                                                                                                                                  | Hours/Week | Marks | Credit |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-------|--------|
| 1    | <b>Case Study:</b> The case study will be done on any topic from the undergraduate major syllabus up to 8 <sup>th</sup> semester. The case study will be prepared by the | 1          | 25    | 4      |

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |   |    |  |
|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|----|--|
|   | student individually incorporating primary and secondary data under the guidance of a faculty member. The case study should be limited within 35-40 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 students will be examined externally and marks will be separately allotted for report and viva-voce taken individually.                                                                                                                                                                                                                                                                                                                       |   |    |  |
| 2 | <b>Term Paper:</b> The term paper will be prepared on any topic from the undergraduate major syllabus up to 8 <sup>th</sup> semester. It will be prepared by the student individually using secondary data under the guidance of a faculty member. The term paper should be limited within 20-25 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 students will be examined externally and marks will be separately allotted for term paper and viva-voce taken individually.                                                                                                                                                                      | 1 | 25 |  |
| 3 | <b>Seminar:</b> The students will present their seminar individually on any topic from the undergraduate major syllabus up to 8 <sup>th</sup> semester. Students will prepare a PowerPoint presentation on their topic using secondary data under the guidance of a faculty member. The presentation should be limited within 15-20 slides, and may include maps, diagrams, charts and tables. The maximum duration of presentation will be 8-10 minutes. The students will be examined externally and marks will be separately allotted for content and presentation followed by question-answer session taken individually. Students will also submit a printout of their slides duly signed by the supervising teacher before presentation. | 1 | 25 |  |

**Continuous evaluation guidelines:** Students will prepare their case study report, term paper and seminar as per the guideline provided above. The hard copy of case study report, term paper and seminar presentation will be duly signed by the internal faculty member.

#### Marks distribution

| Type              | Marks                      |                       | Total |
|-------------------|----------------------------|-----------------------|-------|
| <b>Case Study</b> | Report: 15                 | Viva-voce: 10         | 25    |
| <b>Term Paper</b> | Report: 15                 | Viva-voce:10          | 25    |
| <b>Seminar</b>    | Content & Presentation: 15 | Question & Answer: 10 | 25    |
| <b>Full marks</b> |                            |                       | 75    |

## Semester: 8

PAPER: **MINOR**

Paper Description: **GEOGRAPHY OF INDIA**

This paper provides a comprehensive understanding of the physical and economic geography of India. It examines the physiographic divisions of India, major drainage systems, climate and its seasonal characteristics, soil types, and natural vegetation. The paper also explores the production and distribution of important mineral resources such as iron ore, coal, and petroleum, major agricultural crops including rice, wheat, cotton, and tea, and the spatial patterns of industrial development in India, with special reference to the iron-steel, cotton textile, and automobile industries. The practical component involves the preparation of a field report based on primary and secondary data collected during a compulsory field study, enabling students to apply geographical concepts and research techniques in real-world settings.

Paper Code: **UGEOMIN40004**

Paper Type: **Theory + Practical Lab Based-PLB**

Credit: **3 credit theory and 1 credit practical.**

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

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

### Syllabus:

#### Paper Objectives

##### Knowledge acquired:

- Understand the physiographic divisions of India, major drainage systems, climate, and seasonal climatic characteristics.
- Acquire knowledge of the distribution and characteristics of soils, natural vegetation, and major mineral resources of India.
- Understand the production and distribution of major agricultural crops and the spatial patterns of industrial development in India.

##### Skills gained:

- Develop skills in field-based geographical investigation, including the collection, analysis, interpretation, and presentation of primary and secondary data through scientific field report writing.

##### Competency developed:

- Develop a comprehensive understanding of India's physical, agricultural, mineral, and industrial geography and their regional variations.
- Acquire competency in conducting field-based geographical research and effectively communicating findings through maps, diagrams, charts, tables, and written reports.

### 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 and petroleum 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 50-60 pages, handwritten and may include maps, diagrams, charts and tables. The report will be examined and marks will be separately allotted for report and viva-voce taken individually. | 2          |

### Suggested reading

- Deshpande, C. D. (1992). *India: A Regional Interpretation*. ICSSR, New Delhi.
- Johnson, B. L. C. (Ed.). (2001). *Geographical Dictionary of India*. Vision Books, New Delhi.
- Mandal, R. B. (Ed.). (1990). *Patterns of Regional Geography – An International Perspective. Vol. 3 – Indian Perspective*.
- Galina, S., & Sengupta, P. (1967). *Economic Regionalisation of India*. Census of India.
- Sharma, T. C. (2003). *India - Economic and Commercial Geography*. Vikas Publ., New Delhi.
- Singh, R. L. (1971). *India: A Regional Geography*. National Geographical Society of India.
- Champion, H. G., & Seth, S. K. (Eds.). (2017). *Geography of India* (8th ed.). National Geographic Society of India.
- Singh, R. L., & Singh, J. P. (2018). *India: A geographical perspective*. Prayag Pustak Bhavan.
- Menon, P. G. (2017). *India: A comprehensive geography*. Sterling Publishers Pvt. Ltd.
- Singh, J. (2003). *India - A Comprehensive & Systematic Geography*. Gyanodaya Prakashan, Gorakhpur.
- Spate, O. H. K., & Learmonth, A. T. A. (1967). *India and Pakistan: A General and Regional Geography*. Methuen.
- Tirtha, R. (2002). *Geography of India*. Rawat Publication, Jaipur & New Delhi.
- Pathak, C. R. (2003). *Spatial Structure and Processes of Development in India*. Regional Science Assoc., Kolkata.
- Tiwari, R. C. (2007). *Geography of India*. Prayag Pustak Bhawan, Allahabad.
- Sharma, T. C. (2013). *Economic Geography of India*. Rawat Publication, Jaipur.
- Das, N.G. (2009). *Statistical Methods*. McGraw Hill Education (India) Private Limited.
- Singh, R. L., & Singh, R. P. B. (1999). *Elements of Practical Geography*. Kalyani Publishers.
- Sarkar, A. (2015). *Practical geography: A systematic approach*. Orient Black Swan Private Ltd., New Delhi.

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

# Under Graduation with Honours with Research (FYUGHWRS)

## Semester: 8

### PAPER: MAJOR

#### Paper Description: TOURISM AND TRANSPORT GEOGRAPHY

Tourism and Transport Geography examine the spatial dimensions of tourism and transportation systems and their role in regional development. The tourism component focuses on the types and forms of tourism, tourist attractions, tourism infrastructure, factors influencing tourism development, tourist motivation, and the environmental, economic, and socio-cultural impacts of tourism. It also explores eco-tourism, agro-tourism, medical tourism, homestay tourism, Tourism Policy in India, and UNESCO World Heritage Sites in West Bengal. The transport component deals with modes of transport, transport networks, topology, transport development models, and major transportation projects in India. The practical component develops skills in traffic and tourist flow analysis, transport connectivity assessment, and transport accessibility mapping using quantitative techniques and indices.

**Paper Code: UGEOMAJ48020**

**Paper Type: Theory + Practical Lab Based-PLB**

**Credit: 3 credit theory and 1 credit practical.**

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

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

#### Syllabus:

##### Paper Objectives

##### Knowledge Acquired:

- Understand the types and forms of tourism, Peter's inventory of tourist attractions, geographical components of tourism, factors influencing tourism development, tourist motivation, and tourism infrastructure.
- Acquire knowledge of eco-tourism, agro-tourism, medical tourism, homestay tourism, the impacts of tourism, tourism policy in India, and UNESCO World Heritage Sites in West Bengal.
- Understand the concepts of transport geography, including transport networks, topology, transport development models, and the significance of major transport projects in India.

##### Skills Gained:

- Develop skills in preparing and interpreting traffic and tourist flow diagrams and conducting transport connectivity analysis using cyclomatic, alpha, beta, gamma, theta, and eta indices.
- Gain proficiency in transport accessibility mapping using detour index and Shimbel index techniques.

##### Competency Developed:

- Develop competency in analyzing tourism resources, tourism development, and the impacts of tourism from a geographical perspective.
- Apply concepts and models of transport geography to understand transport networks and regional connectivity.
- Acquire practical competence in transport network analysis, accessibility assessment, and the interpretation of tourism and transport data using quantitative techniques.

#### Syllabus Overview:

##### Theory

| Unit | Content                                                                                                                                                                                                                                                                                                   | Hours/Week |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 1    | Types and forms of tourism; Peter's inventory of tourist attractions; Geographical components of tourism; Factors influencing tourism development; Motivating factors and barriers of tourists; Importance of tourism infrastructure.                                                                     | 3          |
| 2    | Concepts of eco-tourism, agro-tourism, medical tourism and homestay tourism; Impact of tourism on physical, economic and socio-cultural environment; Tourism Policy in India; UNESCO World Heritage Sites in West Bengal: Sundarbans National Park, DHR and Santiniketan.                                 |            |
| 3    | Modes of transport; Basic components of transport network; Topology of network; Transport development models (TMG, Gould, Vance and Rimmer); Development and significance of Golden quadrilateral, East-West Corridor, Kolkata Suburban Railway Network, Delhi Metro Rail Corporation, Sagarmala Project. |            |

### Practical

| Unit | Content                                                                                                                                     | Hours/Week |
|------|---------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 1    | Traffic/ tourist flow diagram; Transport connectivity analysis (cyclomatic number, alpha, beta, gamma, theta and eta indices)               | 2          |
| 2    | Transport accessibility mapping using detour index and shimbel index (shortest path matrix and binary number matrix) and associated number. |            |

### Suggested reading

- Hall, C. M., & Page, S. J. (Eds.). (2014). *The geography of tourism and recreation: Environment, place and space* (4th ed.). Routledge.
- Williams, S., & Ponsford, I. (Eds.). (2016). *Tourism geography: A new synthesis* (4th ed.). Routledge.
- Lew, A. A., & McKercher, B. (Eds.). (2015). *Tourism geographies: Progress and prospects*. Routledge.
- Pearce, P. L., & Butler, R. W. (Eds.). (2019). *Tourism research*. Wiley.
- Page, S. J., & Connell, J. (2014). *Tourism: A modern synthesis* (4th ed.). Cengage Learning.
- Mathur, V. K., & Narain, H. (Eds.). (2017). *Tourism and sustainable development: Emerging trends*. Rawat Publications.
- Singh, S. (2016). *Geography of tourism: Concepts, paradigms and challenges*. Rawat Publications.
- Jamal, T., & Robinson, M. (Eds.). (2015). *The SAGE handbook of tourism studies*. Sage Publications.
- Goeldner, C. R., & Ritchie, J. R. B. (Eds.). (2012). *Tourism: Principles, practices, philosophies* (12th ed.). Wiley.
- Saarinen, J., & Rogerson, C. M. (Eds.). (2016). *Tourism and regional development: New pathways*. Routledge.
- Das, M. (2018). *Tourism geography of India*. New Century Publications.
- Singh, R. L., & Singh, R. P. B. (1999). *Elements of Practical Geography*. Kalyani Publishers.
- Sarkar, A. (2015). *Practical geography: A systematic approach*. Orient Black Swan Private Ltd., New Delhi.

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

### Question pattern

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

## Semester: 8

### PAPER: RESEARCH

#### Paper Description: RESEARCH PROJECT/DISSERTATION

This paper combines the study of research methodology with the practical application of independent geographical research. It introduces the fundamental concepts, methods, and techniques of scientific inquiry, including research design, sampling, data collection, hypothesis testing, data interpretation, report writing, and statistical analysis. The practical component develops quantitative analytical skills through the application of statistical techniques such as moments, skewness, kurtosis, dissimilarity index, time series analysis, chi-square tests, and one-way ANOVA. It also enables students to undertake an independent research study under faculty supervision, applying appropriate research methods and analytical tools to investigate geographical issues, integrate primary and secondary data, and present findings through a scientifically structured dissertation and open viva voce. The paper is divided into two sections: Part A: Research Methodology and Part B: Research Project/Dissertation.

**Paper Code: UGEORES48001**

**Paper Type: Theory + Practical Lab Based + Research PLB**

**Credit: 3 credit theory, 1 credit practical and 8 credit dissertation**

**Class hours: 3 theory classes per week, 2 practical classes per week and 5 dissertation classes per week. Total 10 classes per week.**

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

#### Syllabus:

##### Section Objectives

##### Knowledge Acquired:

- Understand the meaning, objectives, significance, and types of research, research methods and methodology, research process, research problems, research design, and scientific report writing.
- Acquire knowledge of sampling techniques, measurement scales, methods of primary and secondary data collection, case study methods, hypothesis formulation and testing, and data interpretation.
- Gain an understanding of dissertation planning, literature review, data collection, analysis, integration of primary and secondary data, and the application of research methods to geographical investigations.

##### Skills Gained:

- Develop skills in designing and conducting research, collecting, organizing, analyzing, and interpreting geographical data, and preparing research reports.
- Gain proficiency in applying statistical techniques, including moments, skewness, kurtosis, dissimilarity index, time series analysis, chi-square tests, and one-way ANOVA.
- Develop the ability to undertake independent research projects, prepare scientifically structured dissertations, and effectively communicate research findings through written reports and viva voce.

##### Competency Developed:

- Develop competency in planning, conducting, evaluating, and communicating research using appropriate research methods and techniques.
- Apply quantitative and statistical tools for data analysis, hypothesis testing, and interpretation of research findings.
- Acquire the ability to undertake independent geographical research, prepare and defend a dissertation, and generate evidence-based conclusions through scientific investigation.

- Strengthen critical thinking, analytical reasoning, academic writing, problem-solving, and presentation skills required for higher studies and professional research.

## Syllabus Overview:

### Part A: Research Methodology

#### Theory

| Unit | Content                                                                                                                                                                                                                                                                                                   | Hours/Week |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 1    | Meaning and objectives of research; Types of research; Significance of research; Research methods and methodology; Research process; Criteria of good research; Research problem; Meaning and significance of research design.                                                                            | 3          |
| 2    | Definition and types of sampling; Classification and goodness of measurement scales; Methods of primary and secondary data collection; Characteristics, advantages and limitations of case study methods.                                                                                                 |            |
| 3    | Data preparation process; Meaning and characteristics of hypothesis; Basic concepts and procedure concerning testing of hypotheses; Limitations of the tests of hypotheses; Concepts of research questions; Meaning and techniques of interpretation; Significance and different steps of report writing. |            |

#### Practical

| Unit | Content                                                                                                       | Hours/Week |
|------|---------------------------------------------------------------------------------------------------------------|------------|
| 1    | Computing moments, skewness and kurtosis of distribution; Dissimilarity Index.                                | 2          |
| 2    | Time series analysis (semi average, moving average and least square method); Chi-square tests; One way ANOVA. |            |

### Part B: Research Project/ Dissertation

#### Research Project/ Dissertation

| Unit | Content                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Hours/Week |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 1    | Research Project/ Dissertation: It will be an extensive, book-length academic research representing the culmination of the graduation programme with months of rigorous original research, data collection, and analysis to contribute fresh, evidence-based discoveries to your specific academic field. The dissertation will be prepared by the student individually incorporating primary and secondary data under the supervision of a faculty member*. The dissertation should be limited within 150-175 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 students will be examined externally and marks will be separately allotted for dissertation and open viva-voce. 4 credit will be allocated for dissertation and 4 credit for viva voce. The duration of open viva-voce will be 45-60 minutes.<br>*The faculty member must be a Ph.D. supervisor according to NBU Ph.D. Regulation 2022. | 5          |

#### Suggested reading

Creswell, J. W. (1994). *Research design: Qualitative and quantitative approaches*. Sage Publications.

Dikshit, R. D. (2003). *The art and science of geography: Integrated readings*. Prentice-Hall of India. New Delhi.

Mukherjee, N. (2002). *Participatory learning and action: With 100 field methods*. Concept Publishing Company. New Delhi.

Stoddard, R. H. (1982). *Field techniques and research methods in geography*. Kendall/Hunt.

Wolcott, H. F. (1995). *The art of fieldwork*. Alta Mira Press. Walnut Creek, CA

Neuman, W. L. (2014). *Social research methods: Qualitative and quantitative approaches* (7th ed.). Pearson.

Babbie, E. R. (2016). *The basics of social research* (7th ed.). Cengage Learning.

Silverman, D. (2013). *Doing qualitative research: A practical handbook* (4th ed.). Sage Publications.

Bryman, A. (2016). *Social research methods* (5th ed.). Oxford University Press.

Johnson, B., & Christensen, L. (2014). *Educational research: Quantitative, qualitative, and mixed approaches* (5th ed.). Sage Publications.

Marshall, C., & Rossman, G. B. (2016). *Designing qualitative research* (6th ed.). Sage Publications.

Maxwell, J. A. (2013). *Qualitative research design: An interactive approach* (3rd ed.). Sage Publications.

Yin, R. K. (2018). *Case study research and applications: Design and methods* (6th ed.). Sage Publications.

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

**Practical guidelines: For Part A 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. For Part B individual dissertation will be prepared by the student as per the given guideline.**

#### Question pattern

| Type                                   | Marks                                                                                                                                  |                                      |                | Total |
|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|----------------|-------|
| Part A: Research Methodology           |                                                                                                                                        |                                      |                |       |
| Theoretical                            | 1: 5 out of 5                                                                                                                          | 5: 3 out of 5                        | 10: 2 out of 4 | 40    |
| Practical                              | 15: 1 out of 1                                                                                                                         | 5: Laboratory notebook and Viva-voce |                | 20    |
| CE                                     | 10: Mid-term test, class test, seminar presentation, term paper (Any one to be decided by the respective departmental faculty members) |                                      |                | 10    |
| Attendance                             | 5                                                                                                                                      |                                      |                | 5     |
| Full marks                             |                                                                                                                                        |                                      |                | 75    |
| Part B: Research Project/ Dissertation |                                                                                                                                        |                                      |                |       |
| Dissertation                           | Report: 75                                                                                                                             | Open viva-voce:75                    |                | 150   |
| Grand Total                            |                                                                                                                                        |                                      |                | 225   |

## Semester: 8

### PAPER: MINOR

#### Paper Description: GEOGRAPHY OF INDIA

This paper provides a comprehensive understanding of the physical and economic geography of India. It examines the physiographic divisions of India, major drainage systems, climate and its seasonal characteristics, soil types, and natural vegetation. The paper also explores the production and distribution of important mineral resources such as iron ore, coal, and petroleum, major agricultural crops including rice, wheat, cotton, and tea, and the spatial patterns of industrial development in India, with special reference to the iron-steel, cotton textile, and automobile industries. The practical component involves the preparation of a field report based on primary and secondary data collected during a compulsory field study, enabling students to apply geographical concepts and research techniques in real-world settings.

**Paper Code: UGEOMIN40004**

**Paper Type: Theory + Practical Lab Based-PLB**

**Credit: 3 credit theory and 1 credit practical.**

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

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

#### Syllabus:

##### Paper Objectives

##### Knowledge acquired:

- Understand the physiographic divisions of India, major drainage systems, climate, and seasonal climatic characteristics.
- Acquire knowledge of the distribution and characteristics of soils, natural vegetation, and major mineral resources of India.
- Understand the production and distribution of major agricultural crops and the spatial patterns of industrial development in India.

##### Skills gained:

- Develop skills in field-based geographical investigation, including the collection, analysis, interpretation, and presentation of primary and secondary data through scientific field report writing.

##### Competency developed:

- Develop a comprehensive understanding of India's physical, agricultural, mineral, and industrial geography and their regional variations.
- Acquire competency in conducting field-based geographical research and effectively communicating findings through maps, diagrams, charts, tables, and written reports.

#### 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 and petroleum 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 the field visit which is compulsory. Report should be limited within 50-60 pages, handwritten and may include maps, diagrams, charts and tables. The report will be examined and marks will be separately allotted for report and viva-voce taken individually. | 2          |

### Suggested reading

- Deshpande, C. D. (1992). *India: A Regional Interpretation*. ICSSR, New Delhi.
- Johnson, B. L. C. (Ed.). (2001). *Geographical Dictionary of India*. Vision Books, New Delhi.
- Mandal, R. B. (Ed.). (1990). *Patterns of Regional Geography – An International Perspective. Vol. 3 – Indian Perspective*.
- Galina, S., & Sengupta, P. (1967). *Economic Regionalisation of India*. Census of India.
- Sharma, T. C. (2003). *India - Economic and Commercial Geography*. Vikas Publ., New Delhi.
- Singh, R. L. (1971). *India: A Regional Geography*. National Geographical Society of India.
- Champion, H. G., & Seth, S. K. (Eds.). (2017). *Geography of India* (8th ed.). National Geographic Society of India.
- Singh, R. L., & Singh, J. P. (2018). *India: A geographical perspective*. Prayag Pustak Bhavan.
- Menon, P. G. (2017). *India: A comprehensive geography*. Sterling Publishers Pvt. Ltd.
- Singh, J. (2003). *India - A Comprehensive & Systematic Geography*. Gyanodaya Prakashan, Gorakhpur.
- Spate, O. H. K., & Learmonth, A. T. A. (1967). *India and Pakistan: A General and Regional Geography*. Methuen.
- Tirtha, R. (2002). *Geography of India*. Rawat Publication, Jaipur & New Delhi.
- Pathak, C. R. (2003). *Spatial Structure and Processes of Development in India*. Regional Science Assoc., Kolkata.
- Tiwari, R. C. (2007). *Geography of India*. Prayag Pustak Bhawan, Allahabad.
- Sharma, T. C. (2013). *Economic Geography of India*. Rawat Publication, Jaipur.
- Das, N.G. (2009). *Statistical Methods*. McGraw Hill Education (India) Private Limited.
- Singh, R. L., & Singh, R. P. B. (1999). *Elements of Practical Geography*. Kalyani Publishers.
- Sarkar, A. (2015). *Practical geography: A systematic approach*. Orient Black Swan Private Ltd., New Delhi.

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