

PERIYAR UNIVERSITY

Periyar Palkalai Nagar

SALEM – 636011



DEGREE OF BACHELOR OF SCIENCE

(Choice Based Credit System)

Syllabus for
B.Sc., GEOGRAPHY
Semester Pattern

(For Candidates admitted in the Colleges affiliated to Periyar University from 2026–2027 onwards)

CONTENTS

I. INTRODUCTION

II. REGULATIONS

- 1. Condition for Admission*
- 2. Duration of the Programme*
- 3. Programme Structure*
- 4. Examination Scheme*
- 5. Attendance and Credits Requirement*
- 6. Passing Minimum*
- 7. Question Paper Pattern*
- 8. Classification of Successful Candidates*
- 9. Grading System*
- 10. Computation of Grade Point Average (GPA)*
- 11. Computation of Cumulative Grade Point Average (CGPA)*
- 12. Classification of Successful Candidates Based on CGPA*
- 13. University Ranking*
- 14. Maximum Duration for Completion of the Programme*
- 15. Commencement of Regulations*

III. PROGRAMME OUTCOMES (POS) FOR B.SC. GEOGRAPHY PROGRAMME

IV. COURSE STRUCTURE WITH LEARNING OUTCOMES

MEMBERS OF BOARD OF STUDIES

Sl.No	Name & Address	Designation
1	Dr. S. Moorthy, Associate Professor, Department of Geography, Govt. Arts College (Autonomous), Thanthonimalai, Karur – 5	Chairman
2	Dr. P. Arul, Associate Professor, Department of Geography, Govt. Arts College (Autonomous), Salem – 7	Member
3	Dr. A. Ilanthirayan, Associate Professor, Department of Geography, Govt. Arts College (Autonomous), Salem – 07	Member
4	Mrs. S. Bharathi, Assistant Professor, Department of Geography, J.K.K. Nataraja College of Arts & Science, Komarapalayam – 83	Member
5	Dr.R.Sunil Kumar, Associate Professor, Department of Geography, Govt. Arts College (Autonomous), Coimbatore -18	External Member
6	Dr.K.Sumesh, Assistant Professor, Department of Geography, Govt. Arts College (Autonomous), Coimbatore - 18	External Member
7	Dr. P. Thangaraj, Geo Exploration and Mining Solutions (GEMS), 17, Advaita Ashram Road, Fairlands, Salem – 636004	Industrial Personnel
8	Dr. M. Vijay Prabhu, M.Sc., M.Phil., Ph.D., UGC Post Doctoral Fellow, Pachanampatty, Omalur Taluk, Salem District	Alumni

I. INTRODUCTION

B.Sc. Geography

Geography is the study of the Earth's physical features, human activities, environmental processes, and their interrelationships across space and time. As an interdisciplinary science, Geography plays a vital role in understanding natural systems, resource management, regional development, urban planning, disaster mitigation, and environmental sustainability. A Bachelor's degree in Geography provides comprehensive knowledge of Physical Geography, Human Geography, Economic Geography, Geomorphology, Climatology, Biogeography, Geographic Information Systems (GIS), Remote Sensing, Cartography, and Regional Planning.

The programme equips learners with a strong foundation in geographical concepts, theories, techniques, and spatial analysis. Through field surveys, map interpretation, laboratory exercises, and geospatial technologies, students develop the ability to analyze geographical phenomena and address real-world challenges. The curriculum fosters critical thinking, problem-solving abilities, environmental awareness, and research aptitude through fieldwork, project studies, and practical training.

Students completing this programme will be able to interpret and analyze spatial patterns, evaluate environmental and socio-economic issues, utilize modern geospatial technologies for decision-making, and communicate geographical knowledge effectively. They will be prepared for higher studies, research, teaching, planning, environmental management, disaster risk reduction, and careers in government, private, and non-governmental organizations. The programme also nurtures leadership qualities, teamwork, and entrepreneurial skills, enabling graduates to contribute meaningfully to sustainable development and societal well-being.

II. REGULATIONS

1. Condition for Admission

Candidates who have successfully passed the Higher Secondary Examination (Academic or Vocational Stream) conducted by the Higher Secondary Board of Examination, Tamil Nadu, or any other examination recognized as equivalent thereto by the Syndicate of the University, are eligible for admission to the B.Sc. Degree Programme. Admission shall be subject to the rules and regulations of the University and any other conditions prescribed from time to time. The programme shall extend over a period of three academic years, and candidates

must successfully complete the prescribed course of study and examinations to qualify for the award of the B.Sc. Degree.

2. Duration of the Programme

The B.Sc. Geography Programme shall extend over a period of three academic years, comprising six semesters, with two semesters in each academic year.

3. Programme Structure

The B.Sc. Geography Programme shall consist of the following components:

Part I

- Tamil / Other Languages

Part II

- English

Part III

- Core Courses
- Allied Courses
- Elective Courses
- Practical Courses

Part IV

- Skill Enhancement Courses (SEC)
- Non-Major Elective (NME)
- Environmental Studies
- Value Education
- Disaster Management
- Internship / Industrial Visit / Field Visit

Part V

Students shall participate in extension and co-curricular activities such as:

- National Service Scheme (NSS)
- National Cadet Corps (NCC)
- Youth Red Cross (YRC)
- Sports and Games
- Other approved co-curricular activities

4. Examination Scheme

The Programme shall follow a semester pattern, with examinations conducted at the end of each semester. Theory examinations shall be conducted for Semesters I, III and V during

November/December, while Theory and Practical examinations for Semesters II, IV and VI shall be conducted during **April/May**, as per the regulations of the University.

During the three-year programme, students shall appear for six semester examinations as follows:

Academic Year	Semester	Examination Session
First Year	Semester I	November / December
	Semester II	April / May
Second Year	Semester III	November / December
	Semester IV	April / May
Third Year	Semester V	November / December
	Semester VI	April / May

5. Attendance and Credits Requirement

A candidate shall be eligible to appear for the University Examinations only if he/she has secured a **minimum of 75% attendance** in each course, subject to the norms and regulations of the University.

Credits

Under the Choice Based Credit System (CBCS), each course is assigned credits based on its syllabus content, contact hours, and academic workload. To qualify for the award of the **B.Sc. Geography Degree**, a student shall successfully earn the prescribed **152 credits** of the programme.

6. Passing Minimum

A candidate shall be declared to have passed a course if he/she secures:

- Not less than 40% of marks in the University (End Semester) Examination, and
- Not less than 40% of marks in the aggregate of Internal Assessment and University Examination marks combined.

For Practical Courses, the marks awarded for the **Record Notebook** shall form part of the total practical marks as prescribed in the scheme of examination.

DISTRIBUTION OF MARKS – THEORY AND PRACTICAL

	Internal	External	Pass %	Internal Pass Mark	External Pass Mark
Theory	25	75	40	10	30
Practical	40	60	40	16	24

Theory - Classification of Internal Assessment Structure – Marks

Tests	: 15 Marks
Assignment	: 05 Marks
Attendance	: 05 Marks

Total Marks	: 25 Marks
--------------------	-------------------

Practical - Classification of Internal Assessment Structure - Marks

Record	: 10 Marks
Test	: 10 Marks
Attendance	: 10 Marks
Continuous Assessment in Practical Class	: 10 Marks

Total Marks	: 40 Marks
--------------------	-------------------

A candidate shall be declared to have passed a theory course if he/she secures a minimum of **30 marks out of 75** in the University Examination (External Assessment) and **10 marks out of 25** in the Internal Assessment, with an aggregate of **not less than 40 marks out of 100**. For practical courses, a candidate shall secure a minimum of **24 marks out of 60** in the University Examination (including Record Notebook marks) and **16 marks out of 40** in the Internal Assessment, with an aggregate of **not less than 40 marks out of 100**.

There shall be **no separate minimum pass mark for the Record Notebook**. However, submission of the Record Notebook is mandatory for appearing in the Practical Examination.

7. Question Paper Pattern

THEORY QUESTION PAPER PATTERN

Time: 3hours.

Maxi. Marks: 75

Part –A (15 x 1 = 15) Answer ALL Questions

Each Unit Carry 3 Multiple Choice Question

Part – B (2 x 5 = 10) Answer Any TWO Questions (out of five)

One Question should be in Each Unit

Part –C (5 x 10 = 50) Answer ALL Questions (either or type)

One Question should be in Each Unit

PRACTICAL QUESTION PAPER PATTERN

Time: 3hours.

Maxi. Marks: 60

Part –A (4 x 15 = 60) Answer ALL Questions

Each Units carry two Question (a and b)

a. Question carries 5 Mark and **b.** question 10 Marks

8. Classification of Successful Candidates

Candidates who successfully complete the programme shall be classified based on the aggregate marks obtained in Part III courses, as follows:

Classification	Percentage of Marks
First Class with Distinction	75% and above, and passing all examinations in the first appearance
First Class	60% and above but below 75%
Second Class	40% and above but below 60%

The classification shall be awarded in accordance with the regulations and norms prescribed by the University from time to time.

9. Grading System

The performance of students in each course shall be evaluated based on a **10-point grading system**. The grades and corresponding grade points are as follows:

Range of Marks (%)	Grade Point	Letter Grade	Performance Level
90 – 100	9.0 – 10.0	O	Outstanding
80 – 89	8.0 – 8.9	D+	Excellent
75 – 79	7.5 – 7.9	D	Distinction
70 – 74	7.0 – 7.4	A+	Very Good
60 – 69	6.0 – 6.9	A	Good
50 – 59	5.0 – 5.9	B	Average
40 – 49	4.0 – 4.9	C	Satisfactory
00 – 39	0.0	U	Re-appear
Absent	0.0	AAA	Absent

A candidate securing a grade of U shall be deemed to have failed in the course and shall be required to reappear for the examination in accordance with the regulations of the University.

10. Computation of Grade Point Average (GPA)

The **Grade Point Average (GPA)** for a semester shall be calculated using the following formula:

$$\text{GPA} = \frac{\sum(C_i \times G_i)}{\sum C_i}$$

Where:

- **C_i** = Number of credits assigned to a course
- **G_i** = Grade Point obtained in that course

The GPA shall be calculated for each semester and rounded off to two decimal places.

11. Computation of Cumulative Grade Point Average (CGPA)

The **Cumulative Grade Point Average (CGPA)** shall be calculated by considering the grades obtained in all courses completed during the programme.

$$\text{CGPA} = \frac{\sum(n_i \times C_i \times G_i)}{\sum(n_i \times C_i)}$$

Where:

- **C_i** = Credits assigned to a course
- **G_i** = Grade Point obtained in the course
- **n_i** = Number of times the course is considered in the programme structure

The CGPA shall be the overall indicator of the academic performance of the candidate throughout the programme.

12. Classification of Successful Candidates Based on CGPA

The final classification of candidates shall be awarded on the basis of the CGPA obtained at the completion of the programme, as shown below:

CGPA Range	Grade	Classification
9.50 – 10.00	O+	First Class – Exemplary
9.00 – 9.49	O	First Class – Exemplary
8.50 – 8.99	D++	First Class with Distinction
8.00 – 8.49	D+	First Class with Distinction
7.50 – 7.99	D	First Class
7.00 – 7.49	A++	First Class
6.50 – 6.99	A+	First Class
6.00 – 6.49	A	Second Class
5.50 – 5.99	B+	Second Class
5.00 – 5.49	B	Second Class
4.50 – 4.99	C+	Third Class
4.00 – 4.49	C	Third Class

Candidates securing a CGPA below **4.00** shall not be declared successful.

13. University Ranking

Candidates who satisfy the following conditions shall be eligible for the award of **University Rank**:

- Shall have passed all the examinations prescribed for the programme in the **first appearance**;

- Shall have completed the programme within the stipulated **three academic years (six semesters)**;
- Shall not have any break in the course of study; and
- Shall satisfy all other conditions prescribed by the University from time to time.

14. Maximum Duration for Completion of the Programme

A candidate shall complete all the requirements for the award of the B.Sc. Geography Degree within a maximum period of **twelve semesters (six academic years)** from the date of admission to the programme.

Failure to complete the programme within the prescribed maximum duration shall render the candidate ineligible for the award of the degree, subject to the regulations of the University.

15. Commencement of Regulations

The foregoing regulations shall come into force with effect from the **Academic Year 2026–2027** and shall apply to all students admitted to the **B.Sc. Geography Programme** from the Academic Year 2026–2027 onwards.

III. Programme Outcomes (POs) for B.Sc. Geography Programme

Learning Outcomes-Based on Curriculum Framework Guidelines and Regulations For Undergraduate Programme

PO1: Disciplinary knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.

PO2: Communication Skills: Ability to express thoughts and ideas effectively in writing and orally; communicate with others using appropriate media; confidently share one's views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.

PO3: Critical thinking: Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.

PO4: Problem solving: Capacity to extrapolate from what has been learned and apply competencies to solve different kinds of non-familiar problems rather than replicate curriculum content knowledge; apply one's learning to real-life situations.

PO5: Analytical reasoning: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyse and synthesize data from a

variety of sources; draw valid conclusions and support them with evidence and examples; address opposing viewpoints.

PO6: Research-related skills: A sense of inquiry and capability for asking relevant questions, synthesizing and articulating problems; recognize cause-and-effect relationships; define problems; formulate hypotheses; test hypotheses; analyse, interpret and draw conclusions from data; establish hypotheses; predict cause-and-effect relationships; plan, execute and report results of experiments or investigations.

PO7: Cooperation/Teamwork: Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group; act together as a group or team in the interests of a common cause and work efficiently as a member of a team.

PO8: Scientific reasoning: Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.

PO9: Reflective thinking: Critical sensitivity to lived experiences, with self-awareness and reflexivity of both self and society.

PO10: Information/digital literacy: Capability to use ICT in a variety of learning situations; demonstrate ability to access, evaluate and use a variety of relevant information sources; use appropriate software for analysis of data.

PO11: Self-directed learning: Ability to work independently; identify appropriate resources required for practical work completion.

PO12: Multicultural competence: Possess knowledge of the values and beliefs of multiple cultures and a global perspective; capability to effectively engage in a multicultural society and interact respectfully with diverse groups.

PO13: Moral and ethical awareness/reasoning: Ability to embrace moral/ethical values in conducting one's life; formulate a position/argument about an ethical issue from multiple perspectives; use ethical practices in all work; identify ethical issues related to one's work; avoid unethical behaviour such as fabrication, falsification or misrepresentation of data, plagiarism, and violation of intellectual property rights; appreciate environmental and sustainability issues; adopt objective, unbiased and truthful actions in all aspects of work.

PO14: Leadership readiness/qualities: Capability for mapping out the tasks of a team or organization; setting direction; formulating an inspiring vision; building a team to achieve the vision; motivating and inspiring team members; using management skills to guide people to the right destination smoothly and efficiently.

PO15: Lifelong learning: Ability to acquire knowledge and skills, including learning how to learn, necessary for participating in learning activities throughout life through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing workplace demands through knowledge/skill development and reskilling.

Programme Specific Outcomes (PSO)

PSO1 – Communication Skill

Develop effective communication abilities through language learning, enabling students to express ideas clearly in oral and written forms, participate confidently in presentations and discussions, and enhance employability in national and global contexts.

PSO2 – Disciplinary Knowledge

Acquire comprehensive knowledge of scientific concepts and principles within the discipline and demonstrate the ability to apply, explain, and integrate subject-specific knowledge through continuous learning and specialized coursework.

PSO3 – Critical Thinking

Develop critical thinking skills through field studies and academic activities by observing, analyzing, interpreting data, and evaluating evidence to formulate logical conclusions and informed judgments.

PSO4 – Analytical Reasoning

Strengthen analytical abilities through critical reading, knowledge assessment, problem identification, and scientific inquiry, leading to the development and synthesis of innovative ideas.

PSO5 – Scientific Reasoning

Apply scientific principles, methodologies, and techniques in experimental design, data interpretation, and the effective use of scientific instruments to investigate and solve discipline-specific problems.

PSO6 – Self-directed Learning

Demonstrate the ability to learn independently, organize information, and prepare professional reports, thereby enhancing academic growth and career readiness.

PSO7 – Reflective Thinking

Apply reflective thinking through exposure to practical and research-oriented activities, enabling the evaluation of methods, outcomes, and applications within the discipline.

PSO8 – Problem Solving

Utilize logical reasoning, quantitative skills, and scientific approaches to analyze data, solve discipline-related problems, and derive meaningful conclusions.

PSO9 – Research-related Skills

Develop research competencies through project work, internships, and investigations by designing studies, collecting data, applying research methodologies, and interpreting results effectively.

PSO10 – Lifelong Learning

Recognize the importance of continuous learning, adapt to technological and professional advancements, and engage in self-directed learning for personal and career development.

Highlights of the Revamped Geography Curriculum

- ✓ Student-centric and Outcome-Based Curriculum.
- ✓ Fieldwork, surveys, and experiential learning.
- ✓ Training in GIS, Remote Sensing, and GPS.
- ✓ Skill enhancement through practical and application-oriented courses.
- ✓ Field visits, study tours, and geographical investigations.
- ✓ Exposure to environmental and disaster management issues.
- ✓ Research, project work, and spatial data analysis.
- ✓ Internship opportunities in GIS, planning, and environmental sectors.
- ✓ Preparation for competitive examinations.
- ✓ Strong academia–industry and institutional linkages.
- ✓ Multidisciplinary and interdisciplinary elective courses.
- ✓ Focus on sustainability and Sustainable Development Goals (SDGs).
- ✓ Employability and entrepreneurship development.
- ✓ Integration of contemporary geographical concepts and technologies.

CURRICULAM DESIGN AND CREDIT DISTRIBUTION FOR B.Sc., GEOGRAPHY

For the candidates admitted from the year 2026 - 27

SEMESTERS	PART	COURSE GROUP	SUBJECTS	WEEKLY HOURS	CREDITS	EXAM HOURS	CIA	EA	TOTAL
I	I	LAUNGUAGE	TAMIL	6	3	3	25	75	100
	II	LAUNGUAGE	ENGLISH	6	3	3	25	75	100
	III	CORE - THEORY	CLIMATOLOGY	5	5	3	25	75	100
	III	CORE - THEORY	CARTOGRAPHY	5	5	3	25	75	100
	III	ALLIED - THEORY	STATISTICS - I	5	4	3	25	75	100
	IV	NME - OTHER DEPT	PHYSICAL GEOGRAPHY FOR COMPETITIVE EXAMINATION	2	2	3	25	75	100
	IV		VALUE EDUCATION	1	1	3	25	75	100
				30	23				
II	I	LAUNGAGE	TAMIL	6	3	3	25	75	100
	II	LAUNGAGE	ENGLISH	6	3	3	25	75	100
	III	CORE - THEORY	GEOMORPHOLOGY	4	5	3	25	75	100
	III	CORE - PRACTICAL	SCALES, RELIEF AND CLIMATIC DIAGRAMS	4	5	3	40	60	100
	III	ALLIED - PRACTICAL	STATISTICS - I	4	4	3	40	60	100
	IV	NME - OTHER DEPT	HUMAN GEOGRAPHY FOR COMPETITIVE EXAMINATION	2	2	3	25	75	100
	IV		DISASTER MANAGEMENT	2	1	3	25	75	100
		NMSDC	** GEOGRAPHY OF ASIA (For Nan Muthalvan)	2	2	3	25	75	100
				30	25				

III	I	LAUNGUAGE	TAMIL	6	3	3	25	75	100
	II	LAUNGUAGE	ENGLISH	6	3	3	25	75	100
	III	CORE - THEORY	OCEANOGRAPHY	5	5	3	25	75	100
	III	ALLIED - THEORY	BOTANY	5	4	3	25	75	100
	III	ELECTIVE - I	POPULATION GEOGRAPHY	4	3	3	25	75	100
	IV	SEC	TRENDS IN GEOGRAPHY	1	2	3	25	75	100
	IV		HEALTH AND WELLNESS	1	1	3	25	75	100
		NMSDC	** BASICS OF NATURAL DISASTER (For Nan Muthalvan)	2	2	3	25	75	100
				30	23				
IV	I	LAUNGAGE	TAMIL	6	3	3	25	75	100
	II	LAUNGAGE	ENGLISH	6	3	3	25	75	100
	III	CORE - THEORY	SETTLEMENT GEOGRAPHY	4	5	3	25	75	100
	III	CORE - PRACTICAL	MAP APPRECIATION AND INTERPRETATION	4	5	3	40	60	100
	III	ALLIED - PRACTICAL	BOTANY	4	4	3	40	60	100
	III	ELECTIIVE - II	NATURAL REGIONS OF THE WORLD	2	3	3	25	75	100
	IV	SEC	GEOGRAPHY OF TOURISM	2	2	3	25	75	100
		NMSDC	** DISASTER STUDIES (For Nan Muthalvan)	2	2	3	25	75	100
				30	27				
V	III	CORE - THEORY	GEOGRAPHY OF INDIA	5	5	3	25	75	100
	III	CORE - THEORY	BASICS OF GIS	5	5	3	25	75	100
	III	CORE - THEORY	HUMAN GEOGRAPHY	5	5	3	25	75	100
	III	ELECTIVE - III	ECONOMIC GEOGRAPHY	5	3	3	25	75	100
	IV	SEC	BIO-GEOGRAPHY	5	2	3	25	75	100
	IV		SUMMER INTERSHIP / INDUSTRIAL TRAINING	1	2	3	25	75	100
	IV	EVS	ENVIRONMENTAL STUDIES	2	2	3	25	75	100

		NMSDC	** GEOGRAPHY OF AFRICA (For Nan Muthalvan)	2	2	3	25	75	100
				30	26				
VI	III	CORE - THEORY	GEOGRAPHY OF TAMIL NADU	5	5	3	25	75	100
	III	CORE - THEORY	REMOTE SENSING AND GNSS	5	5	3	25	75	100
	III	CORE - THEORY	GEOGRAPHY OF RESOURCES	5	5	3	25	75	100
	III	CORE - PRACTICAL	MAP PROJECTIONS	5	5	3	40	60	100
	III	CORE - PRACTICAL	SURVEYING	6	5	3	40	60	100
	IV		EXTENSION ACTIVITY	2	1	3	25	75	100
		NMSDC	** GEOGRAPHY OF NORTH AMERICA (For Nan Muthalvan)	2	2	3	25	75	100
				30	28				
			TOTAL	180	152				

**** Students who fail the Naan Mudhalvan examination shall appear for this paper instead**

Core Theory – CLIMATOLOGY

Course Objectives

- To understand the concept of climate, distinguish weather from climate, and explain the composition and structure of the atmosphere.
- To examine insolation, heat budget, and the factors controlling temperature and its distribution.
- To study atmospheric pressure, pressure belts, winds, monsoons, and jet streams.
- To understand atmospheric moisture, condensation, precipitation, and cloud formation.
- To analyze cyclones, anticyclones, associated weather, and Köppen's climatic classification.

Unit – I Climate: Definition – Weather and Climate – Components of Climate — Composition and Structure of Atmosphere.

Unit – II Insolation: Controlling Factors – Distribution - Heat Budget of the Earth and Atmosphere; Temperature: Controlling Factors – Horizontal Distribution - Vertical Distribution - Inversion of Temperature.

Unit - III Atmospheric Pressure: Horizontal Distribution - Major Pressure Belts of the World – Shifting of Pressure Belts: Winds – Planetary Winds – Monsoons – Local Winds – Jet streams.

Unit -IV Atmospheric Moisture: Humidity - Definition – Ways of Expressing Humidity, Condensation – Precipitation –Forms and Types; Cloud and its Major Types.

Unit - V Cyclone and Anticyclone: Origin and Associated Weather - Koppens Climatic Classification.

Reference

1. Lal, D.S. (2010): *Fundamentals of Climatology*, Chaitanya Publishing House, Allahabad.
2. Critchfield, H.J. (2002): *General Climatology*, Prentice Hall of India, New Delhi.
3. Trewartha, G.T. (1980): *An Introduction to Climate*, McGraw Hill, New York.
4. Barry, R.G. and Chorley, R.J. (2009): *Atmosphere, Weather and Climate*, Routledge, London.
5. Lutgens, F.K. and Tarbuck, E.J. (2013): *The Atmosphere*, Pearson Education, New Delhi.
6. Singh, S. (2011): *Climatology*, Prayag Pustak Bhavan, Allahabad.

Learning Outcomes	
CO1	Recall the fundamental concepts of climatology, atmospheric composition and structure, weather and climate, insolation, temperature, atmospheric pressure, winds, humidity, clouds, precipitation, cyclones, anticyclones, and climatic classification systems.
CO2	Apply climatological principles and atmospheric processes to explain heat balance, temperature distribution, pressure systems, wind circulation, monsoon mechanisms, cloud formation, precipitation processes, and climatic variations across different regions.
CO3	Compare and evaluate the influence of atmospheric factors on weather and climate, assess climatic classifications, and judge the impacts of climatic phenomena such as cyclones, anticyclones, and monsoon variability on human and environmental systems.
CO4	Demonstrate self-directed and lifelong learning by critically exploring climatic processes, climate variability, environmental change, and sustainable resource management while promoting climate awareness and supporting Sustainable Development Goals (SDGs).
CO5	Communicate climatological concepts, atmospheric phenomena, weather observations, and climate-related issues effectively through oral, written, graphical, and scientific presentations using appropriate geographical terminology.
CO6	Analyze and interpret climatological data through critical thinking and scientific reasoning, undertake investigations of weather and climate patterns, and evaluate their implications for environmental planning and sustainability.

Mapping of PO with CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	-	3	1	-	2	-	-	-	-	-
CO2	-	3	2	2	3	-	-	2	-	-
CO3	-	2	3	3	2	-	1	2	-	-
CO4	-	1	-	-	1	3	2	-	-	3
CO5	3	2	-	-	-	1	2	-	-	-
CO6	1	2	3	3	3	1	1	3	3	1

Core Theory – CARTOGRAPHY

Course Objectives

- To introduce the meaning, nature, types, uses of maps, and methods of map scale representation.
- To develop knowledge of map design, lettering, toponomy, drawing tools, and reproduction processes.
- To explain map symbolization, quantitative and qualitative representation, compilation, and generalization.
- To understand geographic coordinates and directions used in map reading and preparation.
- To study map projections, their classification, characteristics, and recent developments in cartography.

Unit- I Meaning and Nature of Cartography – Maps and its Types – Uses – Methods of Representation of Map scales.

Unit- II Map design and layout – lettering and toponomy – Tools and techniques for map drawing – map reproduction processes

Unit-III Map Symbolization: Point, Line and Area Symbols – Quantitative and Qualitative Representation. Map Compilation and Generalization.

Unit-IV Geographic Coordinates: Latitudes – Longitudes – International Date Line; Direction: True, Magnetic and Grid North.

Unit-V Map projections – classification – major types of map projections-characteristics and use – choice of projection – recent developments in cartography – computer cartography – digital cartography.

Reference

1. Singh, R.L. and Singh, R.P.B. (2010): *Elements of Practical Geography*, Kalyani Publishers, New Delhi.
2. Monkhouse, F.J. and Wilkinson, H.R. (2005): *Maps and Diagrams*, Methuen, London.
3. Robinson, A.H. (1995): *Elements of Cartography*, John Wiley and Sons, New York.
4. Misra, R.P. and Ramesh, A. (2002): *Fundamentals of Cartography*, Concept Publishing, New Delhi.
5. Raisz, E. (1962): *General Cartography*, McGraw Hill, New York.
6. Anson, R.W. and Ormeling, F.J. (1994): *Basic Cartography for Students and Technicians*, Elsevier, London.
7. Sarkar, A. (2015): *Practical Geography: A Systematic Approach*, Orient BlackSwan, Hyderabad.

Learning Outcomes	
CO1	Define the fundamental concepts of cartography, map types, scales, map design principles, symbolization techniques, geographic coordinates, directions, and map projection systems used in geographical representation.
CO2	Employ cartographic principles and mapping techniques to prepare, compile, generalize, and represent geographical information using appropriate scales, symbols, coordinates, and projections.
CO3	Asses and evaluate different methods of map representation, projection systems, and cartographic techniques for their suitability in depicting spatial information and geographical phenomena.
CO4	Demonstrate self-directed and lifelong learning by exploring advancements in digital and computer cartography and applying cartographic knowledge to contemporary spatial challenges.
CO5	Communicate spatial information effectively through maps, symbols, coordinates, and cartographic presentations using appropriate geographical terminology and visualization technique
CO6	Analyze and interpret cartographic data through critical thinking and scientific reasoning while undertaking map-based investigations and spatial research activities.

Mapping of PO with CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	-	3	-	2	2	-	-	-	-	-
CO2	-	3	2	3	3	-	-	3	1	-
CO3	-	2	2	3	3	-	1	3	2	-
CO4	-	1	-	1	2	3	1	1	1	3
CO5	3	2	-	1	1	-	-	-	-	-
CO6	1	2	3	3	3	1	1	3	3	1

Non-Major Elective (NME)
PHYSICAL GEOGRAPHY FOR COMPETITIVE EXAMINATION

Course Objectives

- To provide basic understanding of the solar system, earth movements, eclipses, and geographic coordinates.
- To explain endogenetic forces and major landforms such as mountains, plateaus, plains, earthquakes, and volcanoes.
- To introduce climatology through weather, climate, and the atmosphere.
- To study major ocean floor relief features.
- To understand ecosystem, biodiversity, and biodiversity hotspots.

Unit- I	General Geography: Solar System – Rotation and Revolution of the Earth, Eclipses, Latitudes and Longitudes
Unit- II	Geomorphology: Endogenetic forces – Fold, Fault – Earthquakes, Volcanoes - Continental Drift – Order of Landforms: Mountains, Hill, Plateaus and Plains
Unit-III	Climatology: Weather and Climate - Component of Climate - Composition & Structure of Atmosphere.
Unit-IV	Oceanography: Land and Sea Distribution: Relief features of Oceans: Continental Shelf, Slope, Deep sea plains, Trenches and Deeps.
Unit-V	Bio-geography : Meaning, Types and Functions of Ecosystem; Biodiversity – Elements and Types of Biodiversity –Biodiversity Hot Spots.

Reference

1. Strahler, A.N. and Strahler, A.H. (2005): *Physical Geography*, Wiley, New York.
2. Singh, S. (2013): *Physical Geography*, Prayag Pustak Bhavan, Allahabad.
3. Monkhouse, F.J. (2009): *Principles of Physical Geography*, University of London Press, London.
4. Savindra Singh (2012): *Geomorphology*, Prayag Pustak Bhavan, Allahabad.
5. Lal, D.S. (2010): *Oceanography*, Chaitanya Publishing House, Allahabad.
6. Goh Cheng Leong (2011): *Certificate Physical and Human Geography*, Oxford University Press, New Delhi.
7. Husain, M. (2014): *Fundamentals of Physical Geography*, Rawat Publications, Jaipur.

Learning Outcomes	
CO1	Outline the fundamental concepts of physical geography including the solar system, earth movements, geomorphic processes, atmosphere, oceans, ecosystems, and biodiversity.
CO2	Apply physical geographical concepts to explain earth processes, landform development, atmospheric phenomena, oceanic features, and ecological interactions occurring on the Earth's surface.
CO3	Examine and evaluate different physical environments, geomorphic processes, climatic conditions, oceanic features, and biodiversity patterns across the world.
CO4	Demonstrate lifelong learning by exploring environmental issues, ecosystem conservation, biodiversity protection, and sustainable resource utilization in a changing world.
CO5	Communicate physical geographical concepts, environmental issues, and ecological relationships effectively through scientific discussions, reports, and presentations.
CO6	Analyze physical geographical phenomena using scientific reasoning, interpret environmental data, and undertake investigations related to earth systems and biodiversity conservation.

Mapping of PO with CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	-	3	1	-	2	-	-	-	-	-
CO2	-	3	2	2	3	-	-	2	-	-
CO3	-	2	3	3	2	-	1	2	-	-
CO4	-	1	-	-	1	3	2	-	-	3
CO5	3	2	-	-	-	1	2	-	-	-
CO6	1	2	3	3	3	1	1	3	3	1

Core Theory – GEOMORPHOLOGY

Course Objectives

- To introduce geomorphology, the origin of the earth, and its internal structure.
- To classify rocks and explain weathering and mass wasting processes.
- To study earth movements, continental drift, plate tectonics, earthquakes, and volcanoes.
- To analyze river work, depositional and erosional landforms, groundwater, and karst topography.
- To examine glacial, aeolian, and coastal landforms.

Unit – I Geomorphology: Meaning, Nature and Scope - Solar System – Origin of the Earth – Nebular Hypothesis – Internal Structure of the Earth

Unit- II Rocks: Igneous – Sedimentary – Metamorphic; Weathering – Mass Wasting and its Types.

Unit-III Earth Movements: Endogenetic Forces Fold, Fault – Earthquakes, Volcanoes – Continental Drift – Plate Tectonics.

Unit-IV Exogenetic Process: Geomorphic Work of Rivers – Erosional and Depositional landforms; Under Ground Water – Karst Topography.

Unit-V Glaciers: Types – Erosional and Depositional landforms; Aeolian landforms. Sea Waves and Coastal landforms.

Reference

1. Thornbury, W.D. (2004): *Principles of Geomorphology*, Wiley Eastern, New Delhi.
2. Savindra Singh (2012): *Geomorphology*, Prayag Pustak Bhavan, Allahabad.
3. Bloom, A.L. (2003): *Geomorphology*, Prentice Hall, New Delhi.
4. Kale, V.S. and Gupta, A. (2001): *Introduction to Geomorphology*, Orient Longman, Hyderabad.
5. Chorley, R.J., Schumm, S.A. and Sugden, D.E. (2002): *Geomorphology*, Methuen, London.
6. Dayal, P. (1996): *A Text Book of Geomorphology*, Shukla Book Depot, Patna.
7. Rice, R.J. (1986): *Fundamentals of Geomorphology*, Longman, London.

Learning Outcomes	
CO1	Recall the concepts of geomorphology, earth origin theories, internal earth structure, rocks, weathering processes, mass wasting, tectonic activities, and geomorphic agents.
CO2	Apply geomorphological concepts to explain landform development through endogenic and exogenic processes, including fluvial, glacial, aeolian, karst, and coastal actions.
CO3	Appraise and evaluate the role of geomorphic processes in landscape evolution and assess the impacts of earthquakes, volcanoes, and tectonic movements on the Earth's surface.
CO4	Demonstrate lifelong learning by examining environmental changes, land degradation, natural hazards, and sustainable land management practices from a geomorphological perspective.
CO5	Communicate geomorphic processes, landform characteristics, and geological hazards effectively through scientific descriptions, diagrams, and presentations.
CO6	Analyze geomorphic data and landform patterns through critical thinking, scientific reasoning, and field-based research approaches.

Mapping of PO with CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	-	3	1	-	2	-	-	-	-	-
CO2	-	3	2	3	3	-	-	2	-	-
CO3	-	2	3	3	2	-	1	2	-	-
CO4	-	1	-	-	1	3	2	-	-	3
CO5	3	2	-	-	-	1	2	-	-	-
CO6	1	2	3	3	3	1	2	3	3	1

Core Practical –SCALES, RELIEF & CLIMATIC DIAGRAMS

Course Objectives

- To understand map scales, their types, and construction methods.
- To measure distance and area on maps using standard methods.
- To learn enlargement and reduction techniques for maps.
- To represent relief features using contours and interpret landforms.
- To prepare and interpret climatic diagrams such as climograph and wind rose.

Unit - I **Scales:** Definition – Types – Conversion; **Construction of** Plain, Linear, Comparative and Diagonal scales

Unit- II **Measurements and Bearings on Maps:** Measurement of Distance on maps (Rotometer and Thread Methods) – Measurement of Areas (Graph Paper and Strip Methods). **Enlargement and Reduction of maps:** Similar square and similar triangle methods

Unit-III **Representation of Relief features on Maps:** Methods of Depiction of landforms by Contours – Conical hill, ‘U’ Shaped valley, Plateau, Meander, Gorge, Cliff, Knoll, Fiord coast.

Unit- IV **Representation of Climatic Data:** Climograph, Hythergraph, Ergograph and Wind Rose diagrams.

Reference

1. Singh, R.L. and Singh, R.P.B. (2010): *Elements of Practical Geography*, Kalyani Publishers, New Delhi.
2. Gopal Singh (2010): *Map Work and Practical Geography*, Vikas Publishing, New Delhi.
3. Monkhouse, F.J. and Wilkinson, H.R. (2005): *Maps and Diagrams*, Methuen, London.
4. Sarkar, A. (2015): *Practical Geography: A Systematic Approach*, Orient BlackSwan, Hyderabad.
5. Singh, L.R. (2006): *Fundamentals of Practical Geography*, Sharda Pustak Bhawan, Allahabad.
6. Khan, Z.A. (2012): *Text Book of Practical Geography*, Concept Publishing, New Delhi.
7. Mishra, R.P. (2007): *Fundamentals of Cartography*, Concept Publishing, New Delhi.

Learning Outcomes	
CO1	Summarize the concepts of map scales, measurements, relief representation methods, contour interpretation techniques, and climatic diagrams used in practical geography.
CO2	Use scale construction methods, distance and area measurement techniques, contour mapping procedures, and climatic data representation techniques in geographical analysis.
CO3	Investigate and evaluate different methods of map enlargement, relief depiction, contour interpretation, and climatic diagram preparation for geographical applications.
CO4	Demonstrate independent learning by utilizing practical geographical techniques and climatic analysis methods for environmental assessment and planning activities.
CO5	Communicate geographical information through maps, contours, climographs, hythergraphs, ergographs, and wind rose diagrams using accepted cartographic standards.
CO6	Analyze topographic and climatic data critically, solve practical geographical problems, and undertake map-based investigations to support research activities.

Mapping of PO with CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	-	3	-	-	2	-	-	-	-	-
CO2	-	3	2	2	3	-	-	3	-	-
CO3	-	2	3	3	3	-	1	2	-	-
CO4	-	1	-	-	1	3	2	-	-	3
CO5	3	2	-	-	2	1	2	-	-	-
CO6	2	2	3	3	3	1	2	3	3	1

Non-Major Elective (NME)
HUMAN GEOGRAPHY FOR COMPETITIVE EXAMINATION

Course Objectives

- To introduce economic geography and major economic activities.
- To understand population geography, migration, and demographic factors.
- To study rural and urban settlements and their functional patterns.
- To examine the relationship between humans and environment and major environmental issues.
- To identify major natural resources and power resources.

Unit- I Economic Geography: Introduction - Economic Activities: Primary, Secondary, Tertiary, Quaternary and Quinary

Unit- II Population Geography: Fertility - Mortality - World Population Distribution, Density and Growth – Factors Affecting them - Types of Migration - Causes and Consequences

Unit-III Settlement Geography: Rural and Urban Settlements – Rural Settlement: Definition – Functions of Rural Settlements – Patterns of Rural Settlements. Urban Settlements – Site and Situation – Functional Classification of Towns.

Unit-IV Environmental Geography : Meaning - Relation Between Man and Environment. Pollutions: Land, Air, Water, Noise - Global Warming and Ozone Depletion.

Unit-V Geography of Resource: Meaning and Types. **Minerals:** Iron Ore, Mica, Coal, Petroleum and Gold. **Power Station:** Hydro, Thermal and Nuclear.

Reference

1. Husain, M. (2012): *Human Geography*, Rawat Publications, Jaipur.
2. Singh, R.Y. (2009): *Geography of Settlements*, Rawat Publications, Jaipur.
3. Chandna, R.C. (2010): *Population Geography*, Kalyani Publishers, New Delhi.
4. Alexander, J.W. (1998): *Economic Geography*, Prentice Hall, New Delhi.
5. De Blij, H.J. (2008): *Human Geography: Culture, Society and Space*, Wiley, New York.
6. Johnston, R.J. (2000): *Geography and Geographers*, Edward Arnold, London.

Learning Outcomes	
CO1	List the fundamental concepts of economic geography, population geography, settlement geography, environmental geography, and resource geography.
CO2	Use human geographical concepts to explain economic activities, population characteristics, migration patterns, settlement structures, environmental issues, and resource utilization.
CO3	Compare and evaluate demographic trends, settlement systems, environmental challenges, and resource distribution patterns across different regions.
CO4	Demonstrate lifelong learning by exploring sustainable resource management, environmental conservation, and human-environment interactions in contemporary society.
CO5	Communicate human geographical concepts, population issues, settlement characteristics, and environmental concerns effectively through scientific discussions and presentations.
CO6	Analyze socio-economic and environmental problems critically, interpret demographic and resource data, and undertake investigations relevant to human geography.

Mapping of PO with CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	1	3	-	-	-	-	-	-	-	-
CO2	1	3	2	1	1	-	-	2	-	-
CO3	1	2	3	2	1	-	2	2	-	-
CO4	-	1	-	-	-	3	3	-	-	3
CO5	3	2	-	-	-	2	2	-	-	-
CO6	2	2	3	2	1	1	2	3	3	1

GEOGRAPHY OF ASIA

Course Objectives

- To understand Asia's location, physical divisions, climate, and monsoon pattern.
- To study drainage, soils, natural vegetation, and their distribution.
- To examine agriculture and major crops of Asia.
- To analyze mineral resources and industrial development.
- To study population distribution and transport systems in Asia.

Unit- I Geographic Location and Extent – Locational Significance – Physical Divisions; Climate: Seasonal Pattern of Monsoons - Climatic Regions.

Unit- II Drainage System – Soil – Natural Vegetation – Types and distribution

Unit-III Agriculture: Farming Types – Major crops: Rice, Wheat, Cotton, Jute, Tea, Coffee and Rubber

Unit-IV Mineral Resources – Distribution and Production of Iron ore, Manganese, Copper and Gold; Industries: Locational Factors – Sugar – Iron and Steel.

Unit-V Population: Controlling Factors – Growth- Distribution and Density, Transport: Roadways – Railways- Airways – Waterways.

Reference

1. de Blij, H.J. & Muller, P.O. (2019). *Geography: Realms, Regions and Concepts*. Wiley India Pvt. Ltd., New Delhi.
2. Spencer, J.E. & Thomas, W.L. (2014). *Asia, East by South*. John Wiley & Sons, New York.
3. Husain, M. (2020). *Regional Geography of Asia*. Rawat Publications, Jaipur.
4. Tirtha, R. (2016). *Geography of Asia*. Concept Publishing Company, New Delhi.
5. Singh, R.L. (2018). *Regional Geography of the World*. Sharda Pustak Bhawan, Allahabad.
6. Stamp, L.D. (2015). *Asia: A Regional and Economic Geography*. Routledge, London.

Learning Outcomes	
CO1	Identify the geographical setting of Asia including its physical divisions, climate, drainage systems, natural vegetation, agriculture, resources, population, and transport networks.
CO2	Apply regional geographical concepts to explain the spatial distribution of climate, soils, agriculture, mineral resources, industries, population, and transportation systems in Asia.
CO3	Distinguish and evaluate the regional variations in physical environment, agricultural practices, industrial development, and population characteristics across Asia.
CO4	Demonstrate lifelong learning by examining sustainable resource utilization, environmental challenges, and developmental issues affecting Asian countries.
CO5	Express geographical information related to Asia effectively through maps, reports, presentations, and regional analyses using appropriate geographical terminology.
CO6	Explore regional geographical patterns, interpret socio-economic and environmental data, and undertake research-oriented studies concerning Asia.

Mapping of PO with CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	1	3	-	-	-	-	-	-	-	-
CO2	1	3	2	1	1	-	-	2	-	-
CO3	1	2	3	2	1	-	2	2	-	-
CO4	-	1	-	-	-	3	3	-	-	3
CO5	3	2	-	-	-	2	2	-	-	-
CO6	2	2	3	2	1	1	2	3	3	1

Core Theory – OCEANOGRAPHY

Course Objectives

- To introduce oceanography and the major relief features of the ocean floor.
- To study the major relief features of the Atlantic, Pacific, and Indian oceans.
- To understand ocean temperature, salinity, and density distribution.
- To explain waves, tides, and ocean currents.
- To study marine deposits, coral reefs, marine resources, and related organizations.

Unit - I **Oceanography:** Definition, Nature, Scope and Significance – Extent and Distribution of Land and Oceans – Relief features of the Ocean Floor: Continental Shelf, Continental Slope, Deep Sea Plains and Oceanic Deeps.

Unit - II **Major Relief Features of the Oceans:** Atlantic, Pacific and Indian.

Unit - III **Temperature and salinity:** Temperature Controlling Factors - Horizontal and Vertical Distribution of Temperature; Salinity: Definition - Controlling Factors – Horizontal - Vertical Distribution – Density of Sea Water.

Unit - IV **Dynamics of ocean water:** Waves: Origin – Types. Tides: Origin – Types and Effects. Currents: Controlling factors – Currents in the Pacific, Atlantic and Indian oceans.

Unit - V **Marine deposits:** Types and distribution. Classification and distribution of Resources: Coral Reef - Conditions Favorable for Growth, Types and Distribution; Food and Mineral Resources – Marine Resource Organizations

Reference

1. Lal, D.S. (2010): *Oceanography*, Chaitanya Publishing House, Allahabad.
2. Sharma, R.C. and Vatal, M. (1980): *Oceanography for Geographers*, Chaitanya Publishing House, Allahabad.
3. King, C.A.M. (2005): *Oceanography for Geographers*, Edward Arnold, London.
4. Thurman, H.V. (2007): *Introductory Oceanography*, Pearson Education, New Delhi.
5. Gross, M.G. (1996): *Oceanography*, Prentice Hall, New Delhi.
6. Pinet, P.R. (2009): *Invitation to Oceanography*, Jones and Bartlett, London.

	Learning Outcome
CO1	Recognize the fundamental concepts of oceanography, ocean floor relief features, ocean basins, marine deposits, ocean dynamics, coral reefs, and marine resources.
CO2	Apply oceanographic principles to explain the distribution of ocean floor features, temperature, salinity, density, waves, tides, currents, and marine ecosystems.
CO3	Compare and evaluate the characteristics of major oceans, oceanic processes, marine deposits, and resource distribution patterns across the world oceans.
CO4	Demonstrate self-directed and lifelong learning by examining marine environmental issues, ocean resource management, and sustainable utilization of ocean resources.
CO5	Communicate oceanographic concepts, marine processes, and resource management issues effectively through maps, diagrams, reports, and scientific presentations.
CO6	Analyze oceanographic phenomena using scientific reasoning, interpret marine data, and undertake research-oriented studies related to oceans and coastal environments.

Mapping of PO with CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	-	3	1	-	2	-	-	-	-	-
CO2	-	3	2	2	3	-	-	2	-	-
CO3	-	2	3	3	2	-	1	2	-	-
CO4	-	1	-	-	1	3	2	-	-	3
CO5	3	2	-	-	-	1	2	-	-	-
CO6	1	2	3	3	3	1	2	3	3	1

Elective - I – POPULATION GEOGRAPHY

Course Objectives

- To introduce population geography, demography, and population data sources.
- To explain fertility, mortality, and demographic transition theory.
- To study age-sex structure and social composition of population.
- To analyze population distribution, density, growth, and migration.
- To examine population theories, population-resource relations, and India's population policy.

- Unit - I** Nature and scope of Population Geography – Demography - Sources of Population Data: Census, Sample Survey and Vital Registration System.
- Unit - II** Demographic Structure: Determinants of Fertility and Mortality - Demographic Transition Theory of Notestein..
- Unit - III** Age and Sex Composition and its Determinants - Cultural Characteristics of Population: Religious, Linguistic and Educational Composition - Characteristics of Rural and Urban Population.
- Unit - IV** Distribution and Density of Population - Factors Affecting the Growth and Distribution of Population - Types of Migration - Causes and Consequences.
- Unit - V** Population Growth and Resource Development - Theories of Population: Robert Malthus, Theory of Optimum Population by Dalton - Population Policy of India - Family Planning Programmes in India. .

Reference

1. Chandna, R.C. (2010): *Population Geography*, Kalyani Publishers, New Delhi.
2. Clarke, J.I. (2002): *Population Geography*, Pergamon Press, Oxford.
3. Garnier, B.J. (1992): *Geography of Population*, Longman, London.
4. Zelinsky, W. (1966): *A Prologue to Population Geography*, Prentice Hall, New Jersey.
5. Beaujeu-Garnier, J. (1978): *Geography of Population*, Longman, London.
6. Woods, R. (2005): *Population Analysis in Geography*, Longman, London.
7. Hassan, M.I. (2005): *Population Geography*, Rawat Publications, Jaipur.

	Learning Outcome
CO1	Recall the concepts of population geography, demography, fertility, mortality, migration, population theories, and population policies.
CO2	Employ demographic concepts and population data to explain population growth, distribution, density, migration, and demographic transition processes.
CO3	Examine and evaluate demographic characteristics, migration patterns, population theories, and population-resource relationships at regional and global levels.
CO4	Demonstrate lifelong learning by examining contemporary population issues, family welfare programmes, and sustainable population management strategies.
CO5	Convey demographic information, population trends, and migration issues effectively through statistical interpretation, reports, and presentations.
CO6	Examine population data critically, interpret demographic indicators, and undertake population-based investigations for geographical research.

Mapping of PO with CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	1	3	-	-	-	-	-	-	-	-
CO2	1	3	2	1	1	-	-	2	-	-
CO3	1	2	3	2	1	-	2	2	-	-
CO4	-	1	-	-	-	3	3	-	-	3
CO5	3	2	-	-	-	2	2	-	-	-
CO6	2	2	3	2	1	1	2	3	3	1

Skill Enhancement Course (SEC)
TRENDS IN GEOGRAPHY

Course Objectives

- To understand the basics of remote sensing and digital data.
- To study aerial remote sensing and air photograph characteristics.
- To learn satellite remote sensing and sensor resolution.
- To understand Web GIS, software, and open-source GIS platforms.
- To introduce image processing and classification methods.

- | | |
|-------------------|--|
| Unit - I | Remote sensing: Components of remote sensing – Digital Data: Basic Characteristics of digital image - data type and file format. |
| Unit - II | Aerial remote sensing: Types of aerial photographs – Scales – Films – Filters – Cameras |
| Unit - III | Satellite remote sensing: - Sensor and resolution characteristics of IRS and LANDSAT satellites |
| Unit - IV | Web GIS: components of Web GIS - concept of maps and software -Open source Software— GRASS – ILWIS. |
| Unit - V | Image processing: - Image rectification – Image enhancement - Supervised and unsupervised classification |

Reference

1. Lillesand, T.M. and Kiefer, R.W. (2015): *Remote Sensing and Image Interpretation*, Wiley, New York.
2. Burrough, P.A. and McDonnell, R.A. (2004): *Principles of Geographical Information Systems*, Oxford University Press, Oxford.
3. Campbell, J.B. (2007): *Introduction to Remote Sensing*, Guilford Press, New York.
4. Chang, K.T. (2018): *Introduction to Geographic Information Systems*, McGraw Hill, New York.
5. Lo, C.P. and Yeung, A.K.W. (2007): *Concepts and Techniques of Geographic Information Systems*, Pearson Education, New Delhi.
6. Jensen, J.R. (2009): *Remote Sensing of the Environment*, Pearson Education, New Delhi.

	Learning Outcome
CO1	Define the fundamental concepts of remote sensing, digital data, aerial photography, satellite systems, Web GIS, and image processing techniques.
CO2	Apply remote sensing and GIS techniques to acquire, process, classify, and interpret spatial information for geographical applications.
CO3	Examine and evaluate various remote sensing platforms, sensors, resolutions, GIS software, and image classification methods.
CO4	Cultivate self-directed learning by exploring emerging geospatial technologies and their applications in sustainable development and resource management.
CO5	Express geospatial information effectively through digital maps, satellite images, GIS outputs, and technical reports.
CO6	Analyze spatial data using scientific reasoning and geospatial techniques to solve geographical problems and undertake research investigations.

Mapping of PO with CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	-	3	-	2	2	-	-	-	-	-
CO2	-	3	2	3	3	-	-	3	2	-
CO3	-	2	2	3	3	-	1	3	2	-
CO4	-	1	-	1	2	3	1	1	1	3
CO5	3	2	-	1	1	-	-	-	-	-
CO6	1	2	3	3	3	1	1	3	3	1

BASICS OF NATURAL DISASTERS

Course Objectives

- To define disaster and hazard and understand vulnerability and mitigation.
- To study geological hazards and their consequences.
- To examine hydro-climatic hazards and risk reduction measures.
- To understand environmental hazards and their impacts.
- To study disaster management institutions and early warning systems.

Unit I Natural Disasters: Meaning of Disaster and Hazard – Classification - Vulnerability: Physical and Socio Economic - Preparedness and Mitigation.

Unit II Geological Hazards: Causes, Distribution Pattern - Consequences and Mitigation Measures of Volcano – Earthquake - Tsunami and Landslides.

Unit III Hydro-Climatic Hazards: Nature - Distribution and Impacts of Tropical and Temperate Cyclone - Flood and Drought - Risk reduction measures.

Unit IV Environment Hazards: Air and Water Pollutants and its Impacts - Cause and Consequences Toxic and Nuclear Wastes.

Unit V Disaster Management: Disaster Management: Global, National and Tamil Nadu State Disaster Management Authority - Early Warning and Prediction Systems in India.

Reference

1. Bryant, E. (2008): *Natural Hazards*, Cambridge University Press, Cambridge.
2. Smith, K. (2013): *Environmental Hazards*, Routledge, London.
3. Singh, R.B. (2005): *Disaster Management*, Rawat Publications, Jaipur.
4. Gupta, H.K. (2003): *Disaster Management*, Universities Press, Hyderabad.
5. Keller, E.A. and Blodgett, R.H. (2008): *Natural Hazards*, Pearson Education, New Delhi.
6. Coppola, D.P. (2011): *Introduction to International Disaster Management*, Elsevier, New York.

	Learning Outcome
CO1	Outline the concepts of disasters, hazards, vulnerability, preparedness, mitigation measures, and disaster management institutions.
CO2	Apply disaster management principles to explain geological, hydro-climatic, and environmental hazards and their risk reduction measures.
CO3	Compare and evaluate the causes, impacts, and mitigation strategies of earthquakes, volcanoes, tsunamis, cyclones, floods, droughts, and environmental hazards.
CO4	Demonstrate lifelong learning by understanding disaster resilience, community preparedness, and sustainable disaster risk reduction approaches.
CO5	Communicate hazard information, disaster preparedness measures, and emergency response strategies effectively through scientific and public communication channels.
CO6	Analyse disaster-related data critically, assess vulnerability conditions, and undertake hazard investigations for disaster management planning.

Mapping of PO with CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	1	3	-	-	1	-	-	-	-	-
CO2	1	2	2	2	3	-	-	3	-	-
CO3	1	2	3	2	2	-	2	2	-	-
CO4	-	1	-	-	-	3	3	-	-	3
CO5	3	2	-	-	-	2	2	-	-	-
CO6	2	2	3	3	2	1	2	3	2	1

Core Theory - SETTLEMENT GEOGRAPHY

Course Objectives

- To introduce settlement geography and factors influencing settlement location.
- To study rural settlement growth, characteristics, patterns, and functions.
- To examine urban settlement origin, growth, and classification.
- To understand urban morphology and major theories of urban form.
- To analyze urbanization trends, smart cities, and urban problems.

Unit I Settlement Geography: Meaning, nature and scope - Types of settlements: Rural and Urban - Factors influencing settlement location: physical, economic, social, cultural.

Unit II Rural Settlement: – Growth and Development, Characteristics site and Situation of settlement, Distribution: Cluster and Dispersed- Function Classification - Patterns: – Rectangular, Linear, Circular, Semicircle, Star, Triangular, Nebular.

Unit III Urban Settlement: – Origin and Growth of towns and cities - site and situation - classification of urban settlements: functional and hierarchical classification of Urban settlements.

Unit IV Morphology and Theories: Concentric, sector, Multinuclei and Christaller's central Place theory

Unit V Urbanization: world urbanization – Indian urbanization - Trends of urbanization - Smart cities and sustainable settlements - Problems of urban areas: slums, pollution, traffic, housing Government schemes and policies

Reference

1. Singh, R.Y. (2009): *Geography of Settlements*, Rawat Publications, Jaipur.
2. Carter, H. (2004): *The Study of Urban Geography*, Arnold Heinemann, London.
3. Ramachandran, R. (2010): *Urbanization and Urban Systems in India*, Oxford University Press, New Delhi.
4. Hudson, F.S. (1970): *Geography of Settlements*, Macdonald and Evans, London.
5. Mayer, H.M. and Kohn, C.F. (2007): *Readings in Urban Geography*, University of Chicago Press, Chicago.
6. Alam, S.M. (1983): *Urban Geography*, Rawat Publications, Jaipur.

	Learning Outcome
CO1	Identify the concepts, types, patterns, morphology, theories, and processes of rural and urban settlements.
CO2	Use settlement geographical principles to explain settlement location, growth, distribution, morphology, and urbanization processes.
CO3	Appraise and evaluate different settlement patterns, urban theories, functional classifications, and urban development models.
CO4	Validate self-directed learning by examining sustainable settlement planning, smart city initiatives, and urban environmental management.
CO5	Express settlement characteristics, urban issues, and planning concepts effectively through maps, diagrams, reports, and presentations.
CO6	Analyze settlement patterns and urbanization trends critically, interpret settlement data, and undertake research-oriented geographical investigations.

Mapping of PO with CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	1	3	-	-	-	-	-	-	-	-
CO2	1	3	2	1	1	-	-	2	-	-
CO3	1	2	3	2	1	-	2	2	-	-
CO4	-	1	-	-	-	3	3	-	-	3
CO5	3	2	-	-	-	2	2	-	-	-
CO6	2	2	3	2	1	1	2	3	3	1

Core Practical – MAP APPRECIATION AND INTERPRETATION

Course Objectives

- To study topographical maps, conventional signs, and SOI map interpretation.
- To interpret weather maps using meteorological symbols.
- To understand aerial photo interpretation using visual keys.
- To interpret satellite imagery and marginal information.

Unit - I Topographical Maps: Study of Conventional Signs and Symbols and Appreciation of SOI maps (Intra, Extra and Inner Information) – Interpretation of SOI maps

Unit- II Weather Maps: Study of Meteorological Signs and Symbols - Interpretation of Weather Maps of India (Different Seasons).

Unit - III Aerial Photos: Stereoscopic Vision - Marginal Information - Visual Interpretation Keys - Interpretation of Aerial Photos.

Unit-IV Satellite Imageries: Marginal Information - Interpretation of satellite Images.

Reference

1. Singh, L.R. (2006): *Fundamentals of Practical Geography*, Sharda Pustak Bhawan, Allahabad.
2. Sarkar, A. (2015): *Practical Geography: A Systematic Approach*, Orient BlackSwan, Hyderabad.
3. Monkhouse, F.J. and Wilkinson, H.R. (2005): *Maps and Diagrams*, Methuen, London.
4. Khan, Z.A. (2012): *Text Book of Practical Geography*, Concept Publishing, New Delhi.
5. Singh, R.L. and Singh, R.P.B. (2010): *Elements of Practical Geography*, Kalyani Publishers, New Delhi.
6. Mishra, R.P. (2007): *Fundamentals of Cartography*, Concept Publishing, New Delhi.

	Learning Outcome
CO1	Recall the concepts of topographical maps, weather maps, aerial photographs, satellite imagery, and interpretation techniques.
CO2	Employ map interpretation techniques to identify physical, cultural, and environmental features represented in different geographical documents.
CO3	Compare and evaluate topographical, meteorological, aerial photographic, and satellite information for geographical analysis.
CO4	Demonstrate independent learning by utilizing geospatial interpretation skills for environmental assessment and planning purposes.
CO5	Communicate geographical information effectively through map interpretation reports, graphical representations, and visual presentations.
CO6	Investigate spatial patterns critically, interpret geospatial datasets, and undertake map-based investigations to support geographical research.

Mapping of PO with CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	-	3	-	-	2	-	-	-	-	-
CO2	-	3	2	2	3	-	-	3	-	-
CO3	-	2	3	3	3	-	1	2	-	-
CO4	-	1	-	-	1	3	2	-	-	3
CO5	3	2	-	-	2	1	2	-	-	-
CO6	2	2	3	3	3	1	2	3	3	1

Elective - II – NATURAL REGIONS OF THE WORLD

Course Objectives

- To understand the concept and characteristics of the equatorial region.
- To study the hot desert region and its physical and human features.
- To examine the monsoon region and its environment.
- To analyze the Mediterranean region and its geographical character.
- To study the tundra region and its natural and economic conditions.

- Unit - I Natural Region:** Definition - Natural Regions of the World: **Equatorial Region:** Location and Extent - Climate, Soil, Natural Vegetation, Animal Life, Human Life - Agriculture and Industrial Activities.
- Unit- II Hot Desert Region:** Location and Extent - Climate, Soil, Natural Vegetation, Animal Life, Human Life - Agriculture and Industrial Activities.
- Unit - III Monsoon Region:** Location and Extent - Climate, Soil, Natural Vegetation, Animal Life, Human Life - Agriculture and Industrial Activities.
- Unit-IV Mediterranean Region:** Location and Extent - Climate, Soil, Natural Vegetation, Animal Life, Human Life - Agriculture and Industrial Activities.
- Unit – V Tundra Region:** Location and Extent - Climate, Soil, Natural Vegetation, Animal Life, Human Life - Agriculture and Industrial Activities

Reference

1. Stamp, L.D. and Morgan, W.B. (2005): *The Earth and Man*, Longman, London.
2. Husain, M. (2011): *Regional Geography of the World*, Rawat Publications, Jaipur.
3. Trewartha, G.T. (1980): *An Introduction to Climate*, McGraw Hill, New York.
4. Singh, Gopal (2012): *Geography of the World*, Atma Ram and Sons, Delhi.
5. Dickinson, J.P. (1975): *The Makers of Modern Geography*, Routledge, London.
6. Lal, D.S. (2010): *Climatology*, Chaitanya Publishing House, Allahabad.

	Learning Outcome
CO1	Outline the characteristics of major natural regions of the world including equatorial, desert, monsoon, Mediterranean, and tundra regions.
CO2	Put on geographical concepts to explain the relationship between climate, soil, vegetation, animal life, and human activities in different natural regions.
CO3	Distinguish and evaluate regional variations in environmental conditions and economic activities across major natural regions of the world.
CO4	Practice lifelong learning by understanding environmental sustainability and resource utilization practices in different ecological regions.
CO5	Communicate regional geographical characteristics through maps, reports, presentations, and comparative regional studies.
CO6	Explore environmental and socio-economic interactions within natural regions and undertake regional geographical investigations.

Mapping of PO with CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	1	3	-	-	-	-	-	-	-	-
CO2	1	3	2	1	1	-	-	2	-	-
CO3	1	2	3	2	1	-	2	2	-	-
CO4	-	1	-	-	-	3	3	-	-	3
CO5	3	2	-	-	-	2	2	-	-	-
CO6	2	2	3	2	1	1	2	3	3	1

Skill Enhancement Course (SEC)
GEOGRAPHY OF TOURISM

Course Objectives

- To understand tourism, its types, and factors controlling tourism.
- To study travel agencies, tourist documents, and financial instruments used in travel.
- To examine the elements of tourism and tourism development.
- To understand major international tourism organizations.
- To identify major tourism places in India and Tamil Nadu.

- Unit - I** Meaning & Nature of Tourism –Types of Tourism – Hotel and Types – Classification of Tourist Travelers: Factors Controlling Tourism.
- Unit- II** Travel Agency and Tourist Documents – Functions and Role of Travel Agencies; Passport – Visa and its Types; Travelers Cheque – Credit and debit Cards.
- Unit - III** Elements of Tourism – Attraction, accessibility and amenities – classification of tourist spots. Hospitality and Transport in Tourism Development.
- Unit-IV** International Tourism Organizations: International Union of Official Travel Organization – World Tourism Organization – Pacific Asia Travel Association (PATA).
- Unit – V** Tourism Places in India: Delhi, Mumbai, Kolkatta, Bangalore and Chennai. Tourism Places in Tamilnadu: Climate Centre (Nilgiris and Kodaikkanal), Cultural Centre (Thanjavur and Mahabalipuram) and Sancturries.

Reference

1. Bhatia, A.K. (2011): *Tourism Development: Principles and Practices*, Sterling Publishers, New Delhi.
2. Negi, J.M. (2004): *Geography of Tourism*, Kanishka Publishers, New Delhi.
3. Kaul, R.N. (2001): *Dynamics of Tourism*, Sterling Publishers, New Delhi.
4. Hall, C.M. and Page, S.J. (2006): *The Geography of Tourism and Recreation*, Routledge, London.
5. Singh, S. (2008): *Tourism Geography*, Rawat Publications, Jaipur.
6. Boniface, B. and Cooper, C. (2009): *Worldwide Destinations*, Butterworth Heinemann, Oxford.

	Learning Outcome
CO1	Summarise the concepts, types, components, organizations, and destinations associated with tourism geography.
CO2	Apply tourism geographical concepts to explain tourism development, tourist movement, hospitality services, and tourism infrastructure.
CO3	Evaluate tourism resources, tourism organizations, and destination development strategies at national and international levels.
CO4	Exhibit self-directed learning by exploring sustainable tourism practices and their contribution to economic and cultural development.
CO5	Communicate tourism-related information effectively through reports, travel documentation, destination analysis, and tourism promotion activities.
CO6	Analyze tourism patterns, visitor behaviour, and tourism development issues critically through research-based investigations.

Mapping of PO with CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2	3	-	-	-	-	-	-	-	-
CO2	2	3	1	-	-	1	-	1	-	-
CO3	2	2	2	1	-	1	2	-	-	-
CO4	-	1	-	-	-	3	3	-	-	3
CO5	3	2	-	-	-	2	2	-	-	-
CO6	2	2	2	1	-	1	2	2	2	1

DISASTER STUDIES

Course Objectives

- To understand flood hazards and flood management.
- To study cyclone zones and environmental effects of cyclones.
- To examine tsunami causes and management aspects.
- To understand mass wasting and its effects.
- To study man-induced hazards and disaster reduction measures.

Unit- I Floods hazards – Effects of floods – Flood hazards in India –Management.

Unit- II Cyclones – cyclone zones – Environmental effects of cyclone.

Unit-III Sea-Surface earth quakes – Tsunami and its causes – Managementaspects.

Unit-IV Mass Wasting and their effects – Mass wasting in India.

Unit-V Man-Induced hazards – Social response to hazards – Natural Disaster reduction and Management.

Reference

1. Singh, R.B. (2005): *Disaster Management*, Rawat Publications, Jaipur.
2. Smith, K. (2013): *Environmental Hazards*, Routledge, London.
3. Keller, E.A. and Blodgett, R.H. (2008): *Natural Hazards*, Pearson Education, New Delhi.
4. Kapur, A. (2010): *Vulnerable India: A Geographical Study of Disasters*, Sage Publications, New Delhi.
5. Coppola, D.P. (2011): *Introduction to International Disaster Management*, Elsevier, New York.
6. Murthy, D.B.N. (2012): *Disaster Management: Text and Case Studies*, Deep and Deep Publications, New Delhi.

	Learning Outcome
CO1	Outline the causes, characteristics, impacts, and management aspects of floods, cyclones, tsunamis, mass wasting, and man-induced hazards.
CO2	Use disaster management concepts to explain hazard occurrence, environmental impacts, and mitigation strategies.
CO3	Investigate and evaluate different disaster types and management approaches used to reduce disaster risks and losses.
CO4	Demonstrate lifelong learning by understanding disaster preparedness, resilience-building, and sustainable disaster management practices.
CO5	Present disaster awareness, mitigation measures, and emergency response strategies effectively to various stakeholders.
CO6	Analyze disaster events critically, assess vulnerability conditions, and undertake investigations for disaster risk reduction planning.

Mapping of PO with CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	1	3	-	-	1	-	-	-	-	-
CO2	1	2	2	2	3	-	-	3	-	-
CO3	1	2	3	2	2	-	2	2	-	-
CO4	-	1	-	-	-	3	3	-	-	3
CO5	3	2	-	-	-	2	2	-	-	-
CO6	2	2	3	3	2	1	2	3	2	1

Core Theory – GEOGRAPHY OF INDIA

Course Objectives

- To study India's location, physical divisions, drainage, and climate.
- To understand Indian soils, vegetation, and conservation measures.
- To examine agriculture, cropping patterns, and major crops.
- To study mineral resources, power resources, and industries.
- To analyze population, transport, and trade in India.

Unit- I India: Geographical location and extent – India as a Sub-Continent – Major Physical Divisions - Drainage Systems, Major Multipurpose River Valley Projects, Climate: Controlling Factors – Seasons.

Unit- II Soil: Types and Distribution – Soil Erosion and Conservation – Natural Vegetation: Forest types and distribution – Forest Products and Uses.

Unit-III Agriculture: Problems – Cropping seasons – Farming types – Green Revolution – Food Crops – Rice, Wheat; Commercial Crops: Sugarcane, Cotton, Jute; Plantation Crops: Tea, Coffee and Rubber.

Unit-IV Mineral resources – Iron ore, Manganese, Bauxite, Coal and Oil. Power Resources – Hydel, Thermal and Atomic; Industries – Cotton Textiles, Iron and Steel, Shipbuilding and Automobiles.

Unit-V Population – Distribution and Density. Transport: Roadways – Railways – Waterways – Air ways - Trade: Volume and Various Items

Reference

1. Khullar, D.R. (2019): *India: A Comprehensive Geography*, Kalyani Publishers, New Delhi.
2. Spate, O.H.K. and Learmonth, A.T.A. (2008): *India and Pakistan*, B.I. Publications, New Delhi.
3. Sharma, T.C. and Coutinho, O. (2011): *Economic and Commercial Geography of India*, Vikas Publishing, New Delhi.
4. Singh, Gopal (2015): *Geography of India*, Atma Ram and Sons, Delhi.
5. Hussain, M. (2014): *Geography of India*, McGraw Hill, New Delhi.
6. Nag, P. and Sengupta, S. (2007): *Geography of India*, Concept Publishing, New Delhi.

	Learning Outcome
CO1	List the geographical location, physical divisions, drainage systems, climate, soils, vegetation, agriculture, minerals, industries, population, transport, and trade characteristics of India.
CO2	Utilize geographical concepts to explain the spatial distribution of natural resources, agricultural activities, industrial development, population patterns, and transport networks in India.
CO3	Compare and evaluate regional variations in physical environment, resource utilization, agricultural productivity, industrial growth, and demographic characteristics across India.
CO4	Promote self-directed and lifelong learning by examining contemporary environmental, developmental, and resource management issues affecting sustainable growth in India.
CO5	Communicate geographical information related to India through maps, statistical data, reports, and presentations using appropriate geographical terminology.
CO6	Evaluate regional development patterns, interpret socio-economic and environmental data, and undertake geographical investigations related to India's development.

Mapping of PO with CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	1	3	-	-	-	-	-	-	-	-
CO2	1	3	2	1	1	-	-	2	-	-
CO3	1	2	3	2	1	-	2	2	-	-
CO4	-	1	-	-	-	3	3	-	-	3
CO5	3	2	-	-	-	2	2	-	-	-
CO6	2	2	3	2	1	1	2	3	3	1

Core Theory – BASICS OF GIS

Course Objectives

- To introduce GIS, its history, components, and data handling.
- To understand spatial and non-spatial data, raster and vector formats, and UTM.
- To learn geo-referencing, digitization, projection, and geodatabase concepts.
- To study GIS analysis techniques such as buffer, overlay, and network analysis.
- To explore GIS applications in land use, urban sprawl, agriculture, and environment.

Unit- I Geographical Information System: Definition –Historical Development - Components of GIS - Data Storage and Manipulation – Data Transformation – Data Output Devices

Unit- II Spatial and Non- Spatial Data, Raster and Vector Data Structure. Comparison of Raster and Vector Data - Geographical Coordinate Systems of Earth: UTM.

Unit-III Geo-referencing – GCP – Assigning Projection – Shapefile Creation – Geodatabase – Digitization and its errors.

Unit-IV GIS Analysis: Single Layer Analysis: Buffer – Interpolation, Multilayer Analysis: Overlay Analysis, Network Analysis, WebGIS (A Basic Introduction).

Unit-V Application of GIS: Landuse/Land Cover, Urban Sprawl, Agriculture and Environment

Reference

1. Burrough, P.A. and McDonnell, R.A. (2004): *Principles of Geographical Information Systems*, Oxford University Press, Oxford.
2. Chang, K.T. (2018): *Introduction to Geographic Information Systems*, McGraw Hill, New York.
3. Lo, C.P. and Yeung, A.K.W. (2007): *Concepts and Techniques of Geographic Information Systems*, Pearson Education, New Delhi.
4. Heywood, I., Cornelius, S. and Carver, S. (2011): *An Introduction to Geographical Information Systems*, Pearson Education, New Delhi.
5. DeMers, M.N. (2008): *Fundamentals of Geographic Information Systems*, Wiley, New York.
6. Star, J. and Estes, J. (1990): *Geographic Information Systems: An Introduction*, Prentice Hall, New Jersey.

	Learning Outcome
CO1	Recognise the concepts, components, historical development, spatial data structures, coordinate systems, and analytical capabilities of Geographic Information Systems.
CO2	Apply GIS techniques including geo-referencing, digitization, database creation, buffering, overlay analysis, interpolation, and network analysis to spatial problems.
CO3	Asses and evaluate raster and vector data models, GIS analytical techniques, and geospatial databases for geographical applications.
CO4	Establish lifelong learning by exploring modern GIS technologies and their applications in sustainable resource management and planning.
CO5	Communicate spatial information effectively through thematic maps, GIS outputs, geodatabases, and geospatial reports.
CO6	Interpret spatial datasets critically, solve geographical problems using GIS tools, and undertake research-oriented geospatial investigations.

Mapping of PO with CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	-	3	-	2	2	-	-	-	-	-
CO2	-	3	2	3	3	-	-	3	2	-
CO3	-	2	2	3	3	-	-	3	2	-
CO4	-	1	-	1	2	3	1	1	1	3
CO5	3	2	-	1	1	-	-	-	-	-
CO6	1	2	3	3	3	1	-	3	3	1

Core Theory – HUMAN GEOGRAPHY

Course Objectives

- To introduce human geography and major schools of thought.
- To study human races and major tribal communities.
- To understand world population growth, density, and migration.
- To examine world religions and languages.
- To analyze human impact on the environment.

Unit- I	Human Geography - Nature and Scope; Historical Perspectives, Schools of Human Geography: Determinism – Possibilism – Neo - Determinism – Social Determinism
Unit - II	World Human Races and Distribution; major tribes: Eskimos, pygmies. Bushmans, Gonds and Irulas.
Unit -III	World Population: Growth – Distribution and Density- Controlling Factors – Migration: Push and Pull factors – Types - Effects of Migration
Unit -IV	World Major Religions and languages: Distribution of Christianity - Islam- Hinduism – Buddhism – Jainism. Languages: Chinese, English, Hindi, Arabic, and Tamil.
Unit -V	Impact of Man on Environment: Deforestation – Soil Erosion – Urbanization – Climate Change – Ozone Depletion – Acid Rain

Reference

1. Husain, M. (2012): *Human Geography*, Rawat Publications, Jaipur.
2. Johnston, R.J. (2000): *Geography and Geographers*, Edward Arnold, London.
3. De Blij, H.J. (2008): *Human Geography: Culture, Society and Space*, Wiley, New York.
4. Haggett, P. (2001): *Geography: A Modern Synthesis*, Harper and Row, New York.
5. Rubenstein, J.M. (2011): *The Cultural Landscape: An Introduction to Human Geography*, Pearson Education, New Delhi.
6. Fellmann, J.D. (2009): *Human Geography: Landscapes of Human Activities*, McGraw Hill, New York.

	Learning Outcome
CO1	Recall the concepts, scope, perspectives, races, tribes, population characteristics, religions, languages, and environmental interactions associated with human geography.
CO2	Examine human geographical concepts to explain population distribution, migration processes, cultural patterns, and human-environment relationships.
CO3	Appraise and evaluate various schools of human geography, demographic patterns, cultural characteristics, and environmental impacts of human activities.
CO4	Promote self-directed learning by exploring contemporary human-environment issues and sustainable development challenges.
CO5	Articulate human geographical concepts, cultural diversity, demographic issues, and environmental concerns effectively through scientific discussions and presentations.
CO6	Analyze socio-cultural and environmental phenomena critically, interpret population data, and undertake research investigations related to human geography.

Mapping of PO with CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	1	3	-	-	-	-	-	-	-	-
CO2	1	3	2	1	1	-	-	2	-	-
CO3	1	2	3	2	1	-	2	2	-	-
CO4	-	1	-	-	-	3	3	-	-	3
CO5	3	2	-	-	-	2	2	-	-	-
CO6	2	2	3	2	1	1	2	3	3	1

Core Theory – ECONOMIC GEOGRAPHY

Course Objectives

- To understand the nature, scope, and sectors of economic geography.
- To study agricultural and industrial regions and major location theories.
- To examine patterns of economic development and energy resources.
- To understand transport, trade, and globalization.
- To study major regional economic blocs and international organizations.

Unit- I Nature, Scope and importance of Economic Geography- Economic Sectors Activities: Primary, Secondary, Tertiary, Quaternary and Quinary; Regional Pattern of Economic Development.

Unit - II Agricultural Resources: Major Agricultural Regions and Factors; Industrial Resources: Major Industrial Regions and Factors; Location theories: Weber, Losch, Christaller, Ullman and Krugman;.

Unit -III Pattern of Economic Development: Developed, Developing and under Developed; Characteristics of Economies; Agglomeration Economies; Energy Resources: Production and Consumption pattern

Unit -IV Transport and Trade- Transport and Economic Development; Impact of Globalization on International Trade; Trends and Pattern of International Trade.

Unit -V Major Regional Blocks of the World - WTO – EU – ASEAN

Reference

1. Alexander, J.W. (1998): *Economic Geography*, Prentice Hall, New Delhi.
2. Coe, N., Kelly, P. and Yeung, H.W.C. (2007): *Economic Geography: A Contemporary Introduction*, Wiley Blackwell, Oxford.
3. Hartshorne, T.A. and Alexander, J.W. (1988): *Economic Geography*, Prentice Hall, New Delhi.
4. Wheeler, J.O. (1998): *Economic Geography*, Wiley, New York.
5. Knox, P. and Agnew, J. (2003): *The Geography of the World Economy*, Arnold, London.
6. Hussain, M. (2010): *Economic Geography*, Rawat Publications, Jaipur.

	Learning Outcome
CO1	Define the concepts, scope, sectors, theories, resources, trade systems, globalization processes, and economic blocs associated with economic geography.
CO2	Apply economic geographical principles to explain agricultural activities, industrial development, resource utilization, transport systems, and international trade patterns.
CO3	Compare and evaluate economic development models, industrial location theories, trade patterns, globalization processes, and regional economic organizations.
CO4	Cultivate lifelong learning by examining sustainable economic development, resource management, and global economic transformations.
CO5	Convey economic geographical information effectively through statistical analysis, reports, maps, and presentations.
CO6	Explore economic patterns critically, interpret resource and trade data, and undertake geographical investigations related to economic development.

Mapping of PO with CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	-	3	-	1	1	-	-	-	-	-
CO2	-	3	2	3	3	-	-	2	-	-
CO3	-	2	3	3	2	-	1	2	-	-
CO4	-	1	-	-	1	3	2	-	-	3
CO5	3	2	-	-	-	1	2	-	-	-
CO6	1	2	3	3	3	1	1	3	3	1

Core Theory – BIO - GEOGRAPHY

Course Objectives

- To introduce biogeography and the evolution of flora and fauna.
- To understand biodiversity, hotspots, and its importance.
- To study major world biomes.
- To examine biodiversity problems and extinction.
- To understand biodiversity conservation, laws, and sustainable development.

Unit- I Bio Geography- Nature, Scope and Content – branches of Biogeography - Evolution of flora and fauna with geological time scale.

Unit - II Biodiversity – Elements and Types of Biodiversity –Biodiversity Hot Spots – Importance of Biodiversity.

Unit -III World Major Biomes: Equatorial – Tropical Forest – Temperate Grassland – Tropical Grassland and Tropical Desert

Unit -IV Bio-Diversity Problems: Species Extinction - Nature of extinction, endangered species, IUCN red list: objectives and conservation plan

Unit -V Bio diversity management and conservation: causes of depletion – conservative measures - Treaties and laws to protect endangered species - Bio diversity and Sustainable Development

Reference

1. Singh, Savindra (2011): *Biogeography*, Prayag Pustak Bhavan, Allahabad.
2. Cox, C.B. and Moore, P.D. (2010): *Biogeography: An Ecological and Evolutionary Approach*, Wiley, New York.
3. Huggett, R.J. (2004): *Fundamentals of Biogeography*, Routledge, London.
4. Mackay, D.A. (2001): *Principles of Biogeography*, Pearson Education, New Delhi.
5. Odum, E.P. (2005): *Fundamentals of Ecology*, Thomson Brooks, California.
6. Singh, R.B. (2009): *Biogeography and Biodiversity*, Rawat Publications, Jaipur.

	Learning Outcome
CO1	Outline the concepts, scope, biodiversity elements, hotspots, biomes, species extinction, conservation measures, and sustainable development principles of biogeography.
CO2	Use biogeographical concepts to explain biodiversity distribution, ecosystem functioning, biome characteristics, and conservation strategies.
CO3	Investigate biodiversity patterns, ecosystem characteristics, extinction processes, and conservation programmes across different regions.
CO4	Exhibit self-directed and lifelong learning by promoting biodiversity conservation and sustainable environmental management practices.
CO5	Express biodiversity issues, conservation measures, ecological processes, and sustainability concerns effectively through scientific communication.
CO6	Analyze ecological and biodiversity data critically, assess conservation challenges, and undertake research investigations in biogeography.

Mapping of PO with CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	-	3	1	-	2	-	-	-	-	-
CO2	-	3	2	2	3	-	-	2	-	-
CO3	-	2	3	3	2	-	1	2	-	-
CO4	-	1	-	-	1	3	2	-	-	3
CO5	3	2	-	-	-	1	2	-	-	-
CO6	1	2	3	3	3	1	2	3	3	1

Course Objectives

- To study Africa's location, relief, drainage, climate, vegetation, and resources.
- To examine population, settlements, migration, and urbanization.
- To understand agriculture and resource distribution in Africa.
- To analyze industrial development, transport, and trade.
- To study environmental issues and sustainable development in Africa.

Unit- I Introduction to Africa: Location and extent - Physiographic divisions - Drainage systems - Climate and natural vegetation - Soils and natural resources.

Unit- II Population and Settlements: Distribution and density of population - Major ethnic groups and languages - Rural and urban settlements - Migration and urbanization - Population problems and development

Unit-III Agriculture and Resources: Agriculture: subsistence and commercial farming - Plantation agriculture - Mineral resources -Energy resources -Fisheries and forestry.

Unit-IV Industries and Transport: Industrial development in Africa - Major industries - Transport and communication -Trade and commerce -Regional economic cooperation.

Unit-V Contemporary Issues in Africa: Environmental problems - Desertification and drought - Climate change impacts - Sustainable development -Africa in the global economy

Reference

1. Tirtha, R. (2010): *Geography of Africa*, Rawat Publications, Jaipur.
2. Grove, A.T. (1993): *Africa: The Physical Geography of the Continent*, Oxford University Press, Oxford.
3. Gopal Singh (2012): *Geography of Africa*, Atma Ram and Sons, Delhi.
4. Stock, R. (2013): *Africa South of the Sahara: A Geographical Interpretation*, Guilford Press, New York.
5. Hussain, M. (2011): *Regional Geography of the World*, Rawat Publications, Jaipur.
6. Pryor, F.L. (1990): *The Geography of Africa*, Oxford University Press, Oxford.

	Learning Outcome
CO1	List the physical, economic, social, and environmental characteristics of the African continent.
CO2	Employ regional geographical concepts to explain Africa's climate, resources, agriculture, industries, transport systems, and population characteristics.
CO3	Compare and evaluate the developmental patterns, resource distribution, environmental issues, and economic cooperation initiatives within Africa.
CO4	Demonstrate lifelong learning by examining sustainable development challenges and environmental issues affecting African nations.
CO5	Communicate regional geographical information related to Africa through maps, reports, presentations, and analytical discussions.
CO6	Analyze socio-economic and environmental data critically and undertake regional investigations concerning African development.

Mapping of PO with CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	1	3	-	-	-	-	-	-	-	-
CO2	1	3	2	1	1	-	-	2	-	-
CO3	1	2	3	2	1	-	2	2	-	-
CO4	-	1	-	-	-	3	3	-	-	3
CO5	3	2	-	-	-	2	2	-	-	-
CO6	2	2	3	2	1	1	2	3	3	1

Core Theory - GEOGRAPHY OF TAMIL NADU
<u>Course Objectives</u>

- To study Tamil Nadu's location, relief, rivers, climate, and seasons.
- To understand soils, vegetation, and irrigation sources.
- To examine agriculture, crops, livestock, and fisheries.
- To analyze mineral resources, power resources, and industries.
- To study population, transport, and trade in Tamil Nadu.

Unit- I Geographical Location – Administrative divisions – Major Relief features – Major Rivers – Climate - Controlling factors – Seasons and characteristics.

Unit- II Soils and Natural Vegetation: Types and distribution; Sources of irrigation: canals, Tanks and Wells

Unit-III **Irrigation – types and distribution:** Agriculture - Cropping seasons -Major Crops: Rice, Millets, Pulses, Groundnut, Cotton, Sugarcane, Tea, Coffee and Rubber – livestock: cattle, sheep dairying and fisheries.

Unit-IV Mineral Resources: Iron ore, Bauxite and Coal. Power Resources: Thermal, Hydel, Atomic, Solar and Wind; Industries: Cotton, Sugarcane, Iron & Steel and Automobiles.

Unit-V Population – Distribution and Density; Transport: Roadways, Railways, Airways and Water ways. Trade – Inland and Foreign.

Reference

1. Ramasamy, S.M. (2015): *Geography of Tamil Nadu*, New Century Book House, Chennai.
2. Ayyar, P.V. Jagadisa (2009): *Tamil Nadu Geography*, S. Viswanathan Publishers, Chennai.
3. Singh, Gopal (2012): *Geography of Tamil Nadu*, Atma Ram and Sons, Delhi.
4. Rajalakshmi, R. (2011): *Regional Geography of Tamil Nadu*, Rawat Publications, Jaipur.
5. Khullar, D.R. (2019): *India: A Comprehensive Geography*, Kalyani Publishers, New Delhi.
6. Hussain, M. (2014): *Geography of India*, McGraw Hill, New Delhi.

	Learning Outcome
CO1	Recall the physical, climatic, agricultural, industrial, demographic, transport, and trade characteristics of Tamil Nadu.
CO2	Utilize geographical concepts to explain the distribution of natural resources, agricultural systems, industries, population, and transport networks in Tamil Nadu.
CO3	Compare and evaluate regional variations in resource utilization, agricultural production, industrial development, and population distribution within Tamil Nadu.
CO4	Demonstrate lifelong learning by examining sustainable resource management and developmental challenges affecting Tamil Nadu.
CO5	Communicate geographical information about Tamil Nadu through maps, reports, presentations, and regional analyses.
CO6	Analyze geographical patterns and developmental issues critically and undertake research-oriented studies concerning Tamil Nadu.

Mapping of PO with CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	1	3	-	-	-	-	-	-	-	-
CO2	1	3	2	1	1	-	-	2	-	-
CO3	1	2	3	2	1	-	2	2	-	-
CO4	-	1	-	-	-	3	3	-	-	3
CO5	3	2	-	-	-	2	2	-	-	-
CO6	2	2	3	2	1	1	2	3	3	1

Core Theory – REMOTE SENSING AND GNSS

Course Objectives

- To introduce remote sensing, electromagnetic energy, and spectrum.
- To understand aerial remote sensing and photo interpretation.
- To study satellite remote sensing, platforms, sensors, and resolution.
- To learn applications of remote sensing in geography.
- To understand GNSS, GPS, IRNSS, DGPS, and their applications.

Unit – I- Remote Sensing: Meaning - Development – Types - Electromagnetic Energy– Electromagnetic Spectrum – Energy Interactions – Ideal Remote Sensing System.

Unit- II Fundamentals of Aerial Remote Sensing: Components of Aerial Camera - Types of Aerial Photographs - Marginal Information of Aerial Photographs - Elements of Air Photo Interpretation

Unit-III Fundamentals of Satellite Remote Sensing: Types of Satellites: Geo-Stationary and Sun-Synchronous Satellites: Sensors – Platforms – Resolution: Spatial, Spectral, Radiometric and temporal; Ideal RemoteSensing System.

Unit-IV Application of Remote Sensing in Geography: Land use/ Land cover/ Urban Sprawl - Agriculture and Environment

Unit-V Global Navigation Satellite System: Segments: space segment – GPS Satellite systems – IRNSS; Control segment – Satellite tracking; user segment – error sources – Satellite augmented systems – DGPS – GNSS applications.

Reference

1. Lillesand, T.M. and Kiefer, R.W. (2015): *Remote Sensing and Image Interpretation*, Wiley, New York.
2. Jensen, J.R. (2009): *Remote Sensing of the Environment*, Pearson Education, New Delhi.
3. Campbell, J.B. (2007): *Introduction to Remote Sensing*, Guilford Press, New York.
4. Joseph, G. (2005): *Fundamentals of Remote Sensing*, Universities Press, Hyderabad.
5. Sabins, F.F. (2007): *Remote Sensing: Principles and Interpretation*, Waveland Press, Illinois.
6. Chang, K.T. (2018): *Introduction to Geographic Information Systems*, McGraw Hill, New York.

	Learning Outcome
CO1	Define the concepts, principles, components, sensors, platforms, electromagnetic spectrum, GNSS, GPS, and IRNSS systems.
CO2	Employ remote sensing and GNSS techniques to acquire, interpret, and utilize spatial information for geographical applications.
CO3	Compare and evaluate aerial photographs, satellite imagery, sensors, resolutions, and navigation systems for spatial analysis.
CO4	Demonstrate self-directed learning by exploring emerging geospatial technologies and their role in sustainable resource management.
CO5	Communicate geospatial information effectively through satellite imagery interpretation, digital maps, and technical reports.
CO6	Analyze remote sensing datasets critically, solve spatial problems, and undertake geospatial research investigations using GNSS technologies.

Mapping of PO with CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	-	3	-	2	2	-	-	-	-	-
CO2	-	3	2	3	3	-	-	3	2	-
CO3	-	2	2	3	3	-	1	3	2	-
CO4	-	1	-	1	2	3	1	1	1	3
CO5	3	2	-	1	1	-	-	-	-	-
CO6	1	2	3	3	3	1	1	3	3	1

Core Theory – GEOGRAPHY OF RESOURCES

Course Objectives

- To understand the concept, classification, and conservation of resources.
- To study water resources, their distribution, and issues.
- To examine biotic resources such as forests, livestock, and fisheries.
- To study mineral and energy resources and major industrial zones.
- To understand transport, trade, and major trade organizations.

Unit- I Resources: Meaning – Nature and Significance – Classification and Types – Need For Conservation and Sustainable Development.

Unit- II Water Resources – Importance – Surface and Ground Water – Continent Wise Distribution and Utilization of Water Resources – Problems and Issues

Unit-III Biotic Resources – Major forest types and Distribution – Livestock – Fisheries – Major Fishing Grounds of the World.

Unit-IV Minerals Resources – Classification and Distribution of Major Minerals: Iron and Copper – Energy Resources – Coal, Petroleum, Hydro, Thermal and Atomic Power – Major Industrial Zones of the World.

Unit-V Transportation and trade – Different modes of transport - Economic Importance – Trade: types, factors affecting trade – Major trade blocks – GATT- ITO – WCO - UNCTAD.

Reference

1. Zimmermann, E.W. (1951): *World Resources and Industries*, Harper and Brothers, New York.
2. Owen, S. and Owens, P.L. (1991): *Environment, Resources and Conservation*, Cambridge University Press, Cambridge.
3. Singh, Jagdish (2011): *Geography of Resources and Environment*, Tata McGraw Hill, New Delhi.
4. Chandna, R.C. (2010): *Geography of Resources*, Kalyani Publishers, New Delhi.
5. Hussain, M. (2010): *Economic Geography*, Rawat Publications, Jaipur.
6. Singh, Savindra (2011): *Environmental Geography*, Prayag Pustak Bhavan, Allahabad

	Learning Outcome
CO1	Recall the concepts, classification, distribution, utilization, conservation, and sustainable management of natural resources.
CO2	Apply resource geographical principles to explain the distribution and utilization of water, forests, fisheries, minerals, energy resources, transport, and trade.
CO3	Compare and evaluate resource distribution patterns, conservation measures, trade systems, and sustainable development strategies.
CO4	Demonstrate lifelong learning by examining resource conservation, environmental sustainability, and responsible resource utilization practices.
CO5	Communicate resource-related information effectively through reports, maps, presentations, and statistical analyses.
CO6	Analyze resource management issues critically, interpret resource data, and undertake investigations related to sustainable development.

Mapping of PO with CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	-	3	-	1	1	-	-	-	-	-
CO2	-	3	2	3	3	-	-	2	-	-
CO3	-	2	3	3	2	-	1	2	-	-
CO4	-	1	-	-	1	3	2	-	-	3
CO5	3	2	-	-	-	1	2	-	-	-
CO6	1	2	3	3	3	1	1	3	3	1

Core Practical – MAP PROJECTIONS

Course Objectives

- To study cylindrical projections and their types.
- To understand conical projections and their use.
- To examine zenithal projections and polar cases.
- To learn conventional projections such as sinusoidal and Mollweide's.

Unit-I Cylindrical Projections: Equal Area Projection - Equidistant Projection - Orthomophic Projection - Mercators Projection.

Unit- II Conical Projections: One Standard - Two Standard - Bonne's – Polygonic Projection

Unit-III Zenithal Projection: Equidistant - Equal Area – Polar Cases Only – Orthographic – Stereographic – Gnomonic Projections

Unit-IV Conventional Projections: Sinusoidal - Mollweide's – Normal Cases Only - Sinusoidal interrupted - Mollweide interrupted Projections

Reference

1. Monkhouse, F.J. and Wilkinson, H.R. (2005): *Maps and Diagrams*, Methuen, London.
2. Robinson, A.H. (1995): *Elements of Cartography*, John Wiley and Sons, New York.
3. Singh, R.L. and Singh, R.P.B. (2010): *Elements of Practical Geography*, Kalyani Publishers, New Delhi.
4. Mishra, R.P. (2007): *Fundamentals of Cartography*, Concept Publishing, New Delhi.
5. Sarkar, A. (2015): *Practical Geography: A Systematic Approach*, Orient BlackSwan, Hyderabad.
6. Raisz, E. (1962): *General Cartography*, McGraw Hill, New York.

Learning Outcome

CO1	Recognise the principles, classifications, properties, and characteristics of cylindrical, conical, zenithal, and conventional map projections.
CO2	Examine projection techniques for constructing various map projections suitable for representing geographical information accurately.
CO3	Compare and evaluate different map projections based on their properties, distortions, and geographical applications.
CO4	Demonstrate independent learning by utilizing projection techniques in cartographic and geospatial applications.
CO5	Communicate spatial information effectively through accurately constructed map projections and cartographic presentations.
CO6	Analyze projection-related problems critically and undertake practical cartographic investigations using suitable projection systems.

Mapping of PO with CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	-	3	-	-	2	-	-	-	-	-
CO2	-	3	2	2	3	-	-	3	-	-
CO3	-	2	3	3	3	-	1	2	-	-
CO4	-	1	-	-	1	3	2	-	-	3
CO5	3	2	-	-	2	1	2	-	-	-
CO6	2	2	3	3	3	1	2	3	3	1

Core Practical – SURVEYING

Course Objectives

- To understand chain surveying and traverses.
- To study prismatic compass surveying.
- To learn plane table surveying.
- To understand Abney level and Indian clinometer methods.

Unit- I Chain Survey – Open and Closed Traverses.

Unit- II Prismatic Compass Survey - Open and Closed Traverses

Unit-III Plane Table Survey - Open and Closed Traverses

Unit-IV Abney level and Indian Clinometer – Accessible and Inaccessible Methods

Reference

1. Kanetkar, T.P. and Kulkarni, S.V. (2008): *Surveying and Levelling*, Pune Vidyarthi Griha Prakashan, Pune.
2. Basak, N.N. (2007): *Surveying and Levelling*, Tata McGraw Hill, New Delhi.
3. Punmia, B.C. (2010): *Surveying*, Laxmi Publications, New Delhi.
4. Singh, R.L. and Singh, R.P.B. (2010): *Elements of Practical Geography*, Kalyani Publishers, New Delhi.
5. Khan, Z.A. (2012): *Text Book of Practical Geography*, Concept Publishing, New Delhi.
6. Gopi, S. (2014): *Advanced Surveying*, Pearson Education, New Delhi.

Learning Outcome

CO1	Recall the principles, instruments, methods, and procedures involved in chain surveying, compass surveying, plane table surveying, and clinometer surveys.
CO2	Apply surveying techniques to conduct field measurements, prepare traverses, and collect spatial data accurately.
CO3	Compare and evaluate various surveying methods, instruments, and field procedures used in geographical investigations.
CO4	Demonstrate self-directed learning by applying modern surveying techniques for mapping and field-based geographical studies.
CO5	Communicate survey results effectively through field records, maps, sketches, diagrams, and technical reports.
CO6	Analyze field survey data critically, solve measurement-related problems, and undertake practical geographical investigations using surveying techniques.

Mapping of PO with CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	-	3	-	-	2	-	-	-	-	-
CO2	-	3	2	2	3	-	-	3	-	-
CO3	-	2	3	3	3	-	1	2	-	-
CO4	-	1	-	-	1	3	2	-	-	3
CO5	3	2	-	-	2	1	2	-	-	-
CO6	2	2	3	3	3	1	2	3	3	1

GEOGRAPHY OF NORTH AMERICA

Course Objectives

- To understand the physical geography of North America, including landforms, drainage, and vegetation.
- To Examine natural resources and their contribution to economic activities.
- To Analyze population distribution, migration, cultural diversity, and urbanization.
- To Evaluate the geographical characteristics of Canada, the USA, and Mexico.
- To Assess environmental issues and sustainable resource management practices.

[Unit I: Introduction and Physical Setting: Location – extent - Physiographic divisions- Drainage systems and natural vegetation

Unit II: Resources and Economic Activities: Natural resources: Minerals, forests, water resources, and energy resources; Agriculture: Wheat belt, Corn belt, Dairy farming and Ranching.

Unit III: Population and Cultural Geography: Population distribution and density
Migration and settlement patterns - Indigenous peoples and cultural diversity
Urbanization and major metropolitan regions

Unit IV: Regional Geography of North America: Canada: Physical and economic geography: United States of America: Regional development and economy; Mexico: Physical features, population, and economic activities

Unit V: Contemporary Issues and Sustainable Development - Environmental concerns: Climate change, pollution, deforestation, and resource depletion - Natural hazards: Hurricanes, droughts, wildfires, and earthquakes - Sustainable resource management

Reference

1. De Blij, H. J. & Muller, P. O. *Geography: Realms, Regions and Concepts*. John Wiley & Sons.
2. Fellmann, J. D., Getis, A. & Getis, J. *Human Geography: Landscapes of Human Activities*. McGraw-Hill Education.
3. Hudson, J. C. *Across This Land: A Regional Geography of the United States and Canada*. Johns Hopkins University Press.
4. Rubenstein, J. M. *The Cultural Landscape: An Introduction to Human Geography*. Pearson Education.
5. Hardwick, S. W., Shelley, F. M. & Holtgrieve, D. G. *North America: Geography, Resources, Environment and Population*. Prentice Hall.
6. *National Geographic Society. National Geographic Atlas of the World*. National Geographic Publications.

	Learning Outcome
CO1	Recall the physical setting of North America, including location, physiographic divisions, drainage systems, and natural vegetation.
CO2	Explain the distribution of natural resources and analyze major economic activities such as agriculture, mining, forestry, and energy production in North America.
CO3	Compare and evaluate population distribution, migration patterns, cultural diversity, and urbanization across North America.
CO4	Demonstrate self-directed learning by examining the regional geography and developmental characteristics of Canada, the USA, and Mexico.
CO5	Communicate geographical information effectively through maps, diagrams, reports, and presentations related to North American geography.
CO6	Analyze contemporary environmental issues, natural hazards, and sustainable resource management practices in North America.

Mapping of PO with CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2	3	-	-	2	-	-	-	-	-
CO2	2	3	2	2	3	-	-	2	-	-
CO3	2	2	3	3	2	-	1	2	-	-
CO4	1	2	-	-	1	3	2	-	-	3
CO5	3	2	-	-	2	1	2	-	-	2
CO6	2	3	3	3	3	2	3	2	3	1

Students who do not pass the Naan Mudhalvan examination will be required to appear for this paper in lieu of the Naan Mudhalvan course

1. Geography of Asia
2. Basics of Natural Disasters
3. Disaster Studies
4. Geography of Africa
5. Geography of North America

Model Exam Question Paper – Theory
PRINCIPLES OF REMOTE SENSING

Time: 3 Hrs

Max: 75 Marks
(15x1=15)

SECTION – A

Choose the Correct Answer

1. The primary source used for remote sensing is _____
- | | |
|---------------------------|-----------------------|
| a. Scattering energy | b. Solar Light |
| c. Electromagnetic energy | d. All the above |

தொலையுணர்தலுக்கு பயன்படுத்தப்படும் முதன்மை ஆதாரம் _____

- | | |
|---------------------|------------------------|
| a. சிதறல் ஆற்றல் | b. சூரிய ஒளி |
| c. மின்காந்த ஆற்றல் | d. மேலே உள்ள அனைத்தும் |

2. The city which was first photographed by Gaspard-Félix _____
- | | |
|-----------------|-------------|
| a. Paris | b. New York |
| c. Germany | d. France |

காஸ்பார்ட்-ஃபெலிக்ஸ் மூலம் முதலில் புகைப்படம் எடுக்கப்பட்ட நகரம் _____

- | | |
|------------|---------------|
| a. பாரிஸ் | b. நியூயார்க் |
| c. ஜெர்மனி | d. பிரான்ஸ் |

3. In remote sensing _____ types of platforms are used
- | | |
|-------------|------|
| a. 4 | b. 2 |
| c. 3 | d. 1 |

தொலையுணர்வில் _____ வகையான மேடைகள் பயன்படுத்தப்படுகின்றன.

- | | |
|-------------|------|
| a. 4 | b. 2 |
| c. 3 | d. 1 |

4. The wavelength 0.4 – 0.7 micro meter is
- | | |
|-----------------------------|-----------------------|
| a. Micro wave radiation | b. Infrared radiation |
| c. Visible radiation | d. Radio waves |

அலைநீளம் 0.4 – 0.7 மைக்ரோ மீட்டர் _____

- | | |
|---------------------------|----------------------------|
| a. நுண் அலைக் கதிர்வீச்சு | b. அகச்சிவப்பு கதிர்வீச்சு |
| c. காணக்கூடிய கதிர்வீச்சு | d. ரேடியோ அலைகள் |

5. The first aerial photograph was taken on
- | | |
|---------|----------------|
| a. 1968 | b. 1858 |
| c. 1978 | d. 1898 |

முதல் வான்வழி புகைப்படம் எடுக்கப்பட்டது

- | | |
|---------|----------------|
| b. 1968 | b. 1858 |
| c. 1978 | d. 1898 |

6. The Aerial photo which has 30 - 60 degree camera axis is
- a. Vertical
 - b. Oblique
 - c. Low Oblique
 - d. High Oblique

30 - 60 டிகிரி கேமரா அச்சைக் கொண்ட வான்வழி புகைப்படம் _____ புகைப்படம்

- a. செங்குத்து
- b. சாய்ந்த
- c. குறைந்த சாய்வுடை
- d. அதிக சாய்வுடை

7. The smoothness or roughness in aerial photograph is identified by
- a. Tone
 - b. Texture
 - c. Size
 - d. Shape

வான்வழி புகைப்படத்தில் உள்ள வழுவழுப்பு அல்லது கரடுமுரடான தன்மை _____ ஆல் அடையாளம் காணப்படுகிறது

- a. நிறம்
- b. அமைப்பு
- c. உருவம்
- d. வடிவம்

8. The process of Combining multiple images together is
- a. Overlay
 - b. Image processing
 - c. Image classification
 - d. Mosaic

பல படங்களை ஒன்றாக இணைக்கும் செயல்முறை _____

- a. மேலடுக்கு
- b. பட செயலாக்கம்
- c. பட வகைப்பாடு
- d. மொசைக்

9. The term used to describe the difference in radiant energy is _____ resolution
- a. Spatial
 - b. Spectral
 - c. Temporal
 - d. Radiometric

9. கதிரியக்க ஆற்றலில் உள்ள வேறுபாட்டை குறிப்பிட பயன்படுத்தப்படும் சொல் _____ தெளிவுத்திறன்

- a. இடஞ்சார்ந்த
- b. நிறமாலை
- c. கால
- d. ரேடியோமெட்ரிக்

10. Geostationary orbit refers the altitude approximately
- a. 25000 km
 - b. 36000 km
 - c. 10000 km
 - d. 5000 km

புவி நிகழ்வொத்த சுற்றுவட்டப்பாதை தோராயமாக _____ உயரத்தைக் குறிக்கிறது

- a. 25000 கி.மீ
- b. 36000 கி.மீ
- c. 10000 கி.மீ
- d. 5000 கி.மீ

11. Forest appears _____ in color in satellite images
- a. Green
 - b. Blue
 - c. Red
 - d. Black

செயற்கைக்கோள் படங்களில் காடு _____ நிறத்தில் தோன்றுகிறது

- a. பச்சை
- b. நீலம்
- c. சிவப்பு
- d. கருப்பு

12. _____ refers the area imaged by the sensor

- a. Swath
- b. Principle Point
- c. Spatial Resolution
- d. All the above

_____ உணர்வுகளால் படம்பிடிக்கப்பட்ட பகுதியைக் குறிக்கிறது

- a. ஸ்வாத்
- b. கொள்கை புள்ளி
- c. ஸ்பேஷியல் ரெசல்யூஷன்
- d. மேலே உள்ள அனைத்தும்

13. Which one of the following is not associated with a digital image

- a. Raster format
- b. Pixels
- c. Geo-reference
- d. None of the above

பின்வருவனவற்றில் எது எண்ணிலக்க படிமத்துடன் தொடர்பற்றது

- a. ராஸ்டர் வடிவம்
- b. படக்குறி
- c. புவி-குறிப்பு
- d. எதுவும் இல்லை

14. The range of digital number is

- a. 1 - 255
- b. 0 - 265
- c. 0 - 250
- d. 0 - 255

எண்ணிலக்க படிமத்தில் எண்ணின் வரம்பு

- a. 1 - 255
- b. 0 - 265
- c. 0 - 250
- d. 0 - 255

15. Which one of the following refers extraction of information from an image

- a. Image analysis
- b. Image acquisition
- c. Image rectification
- d. Image segmentation

பின்வருவனவற்றில் எது ஒரு படத்திலிருந்து தகவலைப் பிரித்தெடுப்பதைக் குறிக்கிறது

- a. பட பகுப்பாய்வு
- b. படமெடுத்தல்
- c. படிம சீரமைப்பு
- d. படிம பிரிப்பு

Section - B (2 x 5 = 10)

Answer any TWO questions

16. Write an essay on the history and development of remote sensing

தொலையுணர்தலின் வரலாறு மற்றும் வளர்ச்சி குறித்து ஒரு கட்டுரை எழுதுக

17. Illustrate about the aerial triangulation and its importance

வான்வழி முப்பரிமாண ஒருங்கமைப்பு மற்றும் அதன் முக்கியத்துவம் பற்றி விளக்கு

18. Give a detailed account on the different types of resolutions

பல்வேறு வகையான பகுதிறன்கள் பற்றி விரிவான தொகுப்பு தருக

19. Explain the application of image classification techniques on land use change
நில பயன்பாட்டு மாற்றத்தில் படிம வகைப்பாடு நுட்பங்களின் பயன்பாடு பற்றி விளக்கு
20. Give a detailed account on the different types of RADARS
பல்வேறு வகையான RADARS பற்றி விரிவான தொகுப்பு தருக

Section - C (5 x 10 = 50)

Answer ALL questions

21. a. Classify and explain the different types of scattering (or)
பல்வேறு வகையான சிதறல்களை வகைப்படுத்தி விளக்கு
- a. What are remote sensing platforms? Explain about them
தொலையுணர்வு மேடைகள் என்றால் என்ன? அவைகளை பற்றி விளக்கு
22. a. Write a note on photogrammetry and its uses (or)
புகைப்படவியல் மற்றும் அதன் பயன்பாடுகள் பற்றி குறிப்பு எழுது
- b. Differentiate the vertical and oblique aerial photograph
செங்குத்து மற்றும் சாய்ந்த வான்வழி புகைப்படத்தை வேறுபடுத்துக
23. a. What is Orbit? Explain about their different types (or)
சுற்றுவட்டப்பாதை என்றால் என்ன? அவற்றின் வெவ்வேறு வகைகளைப் பற்றி விளக்குக
- b. What is swath? Explain the swath of GEO
படப்பகுதி என்றால் என்ன? GEO இன் படப்பகுதி பற்றி விளக்குக
24. a. Illustrate about the structure of satellite images (or)
செயற்கைக்கோள் படிமத்தின் அமைப்பு பற்றி விளக்குக
- b. Compare and contrast about geometric and radiometric corrections
புவிவடிவ பிழை மற்றும் உணர்வி பிழை திருத்தங்களை ஒப்பிட்டுப் வேறுபடுத்து
25. a. Compare and contrast about RADAR and LIDAR, write their advantages (or)
ரேடார் மற்றும் லிடார் பற்றி ஒப்பிட்டு வேறுபடுத்தி, அவற்றின் நன்மைகளை எழுதுக
- b. Explain the basic principle and components of RADAR
RADAR இன் அடிப்படைக் கொள்கை மற்றும் கூறுகளை விளக்குக

Model Exam Question Paper – Practical
REPRESENTATION OF RELIEF FEATURES

1. a. What is meant by Bench Marks? (5)
மட்டக்குறிகள் என்றால் என்ன?
- b. Give a detailed account on hachuring and hill shading. (10)
மலைக்குறிக்கோடுகள் மற்றும் நிழல் முறை பற்றி ஒரு விரிவான தொகுப்பு தருக.
2. a. Write about Uniform Slope. (5)
சீரான சரிவு பற்றி எழுதுக.
- b. Draw the following relief features for the given contour diagram. (10)
கொடுக்கப்பட்டுள்ள சம உயரக்கோட்டு படங்களுக்கு கீழ்க்காணும் நிலத்தோற்றங்களை வரைக.
 - i) Hill - குன்று
 - ii) Cliff - ஓங்கல்
 - iii) Ridge - தொடர் குன்று
 - iv) Gorge - மலையிடுக்கு
3. a. Define the term Profile. (5)
வெட்டுத்தோற்றம் என்ற சொல்லை வரையறு.
- b. Draw a superimposed profile for the given contour. (10)
கொடுக்கப்பட்டுள்ள சம உயர கோட்டிற்கு மேற்படிந்த வெட்டு தோற்றம் ஒன்று வரைக.
4. a. Write few lines about longitudinal profile. (5)
நீள் வெட்டு தோற்றம் பற்றி சில வரிகள் எழுதுக.
- b. Draw a longitudinal profile for the given river map. (10)
கொடுக்கப்பட்டுள்ள ஆற்றிற்கு ஒரு நீள் தொடர் வெட்டு தோற்றம் வரைக.
5. a. What is Hypsometric Curve? (5)
உயர் தாழ் வளைவு என்றால் என்ன?
- b. Draw a frequency graph for the given data. (10)
கொடுக்கப்பட்டுள்ள புள்ளி விவரத்திற்கு நிகழ்வெண் வரைபடம் வரைக.