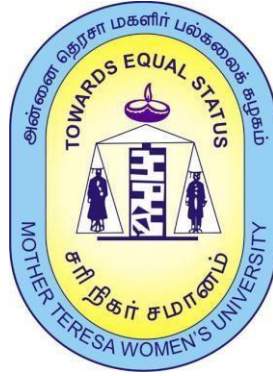


**MOTHER TERESA WOMEN'S UNIVERSITY**  
**KODAIKANAL – 624102**



**DEPARTMENT OF GEOGRAPHY**  
**M.Sc. GEOGRAPHY**

**Curriculum Framework, Syllabus and Regulations**

**(Based on TANSCHÉ Syllabus under Choice Based Credit System - CBCS)**

**(For the Candidates to be Admitted from the Academic Year 2023 – 2024)**

**M.Sc.,  
GEOGRAPHY**

**MODEL SYLLABUS**

**2023-2024**

**TAMILNADU STATE COUNCIL FOR HIGHER EDUCATION,  
CHENNAI – 600 005**

<b>M.Sc., GEOGRAPHY</b>	
<b>Programme:</b>	<b>M.Sc., Geography</b>
<b>Duration:</b>	<b>Two Years</b>
<b>Programme Objectives:</b>	<ol style="list-style-type: none"> <li>1. Orient the students towards identifying and analysing different geographical processes and features.</li> <li>2. Developing the students' ability to acquire basic skills for conducting field research.</li> <li>3. Intended to help students in learning the science and art of collecting, processing, and interpreting data.</li> <li>4. Analyze various problems and resolve them through proper management, planning, and sustainability</li> <li>5. To expose the students to the new technologies of Remote Sensing, GNSS, Geographical Information System (GIS) and GIS Science.</li> </ol>
<b>Programme Outcomes:</b>	<ol style="list-style-type: none"> <li>1. Students will be oriented towards, learning, understanding, and analyzing geographical processes and provide spatial solutions.</li> <li>2. To expose students to the use of recent advancements in the field of Geospatial technologies and its application in geographical areas.</li> <li>3. Development of ethical aptitudes and dispositions necessary to obtain and hold leadership positions within industry, government, and professional organizations.</li> <li>4. Capability to undertake research in interdisciplinary studies or on issues or problems beyond the purview of geography.</li> <li>5. Empowering students with knowledge and skills for spatial thinking and analysis, to navigate real world problems, and contribute to society in a meaningful way.</li> </ol>
<b>Programme Specific Outcomes:</b>	<ol style="list-style-type: none"> <li>1. Understand the major bio physical and social patterns in the planet, and the key drivers that give rise to those patterns.</li> <li>2. Demonstrate profound knowledge of theories, concepts, techniques, and technologies in human and physical geography and in geographic information science and technology using real-world applications at the local, regional, and global levels.</li> <li>3. Apply systems thinking and critical thinking in socio-economic-ecological systems on the human-environment interface to analyze problems and potential solutions.</li> </ol>

	<p>4. Practice to obtain, analyze, interpret complex geographic data and develop ethical aptitudes, dispositions necessary to acquire and hold leadership positions in industry, government, and professional organizations.</p> <p>5. Capability to work with the latest geospatial technologies and handle modern instruments like drones, total stations, GPS and other field devices and also work effectively in interdisciplinary and multicultural real-world contexts to combine theory and practice in responding to local to global issues.</p>
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- **Question paper pattern for External examination for Core and Elective papers:**

**WRITTEN EXAMINATION QUESTION PAPER PATTERN**

**Theory Paper (Bloom’s Taxonomy based)**

(Common for UG, PG, Certificate, Diploma and P.G.Diploma Programmes)

<b>Intended Learning Skills</b>	<b>Maximum 75 Marks Passing Minimum: 50% Duration: Three Hours</b>
Memory Recall/Example/ Counter Example / Knowledge about the Concepts/Understanding	<b>Part–A (10x2=20Marks)</b> Answer ALL questions <b>Each Question carries 2 marks</b>
	Two questions from each Unit
	<b>Question 1 to Question 10</b>
Descriptions/Application (problems)	<b>Part–B (5x5=25Marks) Answer ALL questions Each question carries 5 Marks</b>
	<b>Either - or Type</b> Both parts of each question from the same Unit
	<b>Question 11 (a) or 11(b)</b> to <b>Question 15(a) or 15(b)</b>
Analysis/Synthesis / Evaluation	<b>Part-C (3x 10 = 30 Marks)</b> <b>Answer any THREE questions</b> <b>Each question carries 10 Marks</b>
	There shall be FIVE questions covering all the five units
	<b>Question 16 to Question 20</b>

**\*Minimum credits required to pass: 91**

<b>SEMESTER - I</b>							
<b>No.</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Credits</b>	<b>Hours</b>	<b>CIA</b>	<b>ESE</b>	<b>Total Marks</b>
I	P23GET11	Core1 - Principles of Cartography	5	7	25	75	100
II	P23GET12	Core2 - Applied Geomorphology	5	7	25	75	100
III	P23GEP11	Core3 - Practical-I Techniques of Mapping and Map Analysis	4	6	25	75	100
IV	P23GEE11	Elective-1 (Discipline Specific) - Population and settlement Geography	3	5	25	75	100
VI	P23WSG11	Elective-2 (Generic Elective) – Women Empowerment	3	5	25	75	100
<b>Total</b>			20	30			
<b>SEMESTER-II</b>							
<b>No.</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Credits</b>	<b>Hours</b>	<b>CIA</b>	<b>ESE</b>	<b>Total Marks</b>
I	P23GET23	Core 4 - Applied Climatology	5	6	25	75	100
II	P23GET24	Core 5 - Hydrology and Oceanography	5	6	25	75	100
III	P23GEP22	Core 6 - Practical– II: Geospatial lab	4	6	25	75	100
IV	P23GEE2A / P23GEE2B	Elective-3 Fieldwork and mapping (or) Geospatial Statistics	3	4	25	75	100
V	P23CSEG22	Elective-4 (Generic Elective) – Cyber Security	3	4	25	75	100
VI	P23GES11	SEC-1: Remote Sensing and GNSS	2	4	25	75	100
<b>Total</b>			22	30			

# **SEMESTER – I**

**SEMESTER – I**

Course code:	P23GET11	PRINCIPLES OF CARTOGRAPHY			
		L	T	P	C
<b>Core/Elective</b>	Core				
<b>Pre-requisite</b>	Basic knowledge in Cartography				
<b>Course Objectives: Objectives:</b>					
<ol style="list-style-type: none"> <li>1. Exploring and defining principles of cartography, emerging trends in cartography and information age</li> <li>2. Understanding the basics of geodesy and map projections</li> <li>3. Gaining skills in map symbols, cartographic design, representation and production of maps, and map composition</li> <li>4. Critically assessing online resources, software and its uses for interactive mapping</li> <li>5. Discussing the importance of web mapping and geospatial data policy</li> </ol>					
<b>Unit - 1</b>	<b>FUNDAMENTALS OF CARTOGRAPHY</b>				
History and future of cartography - Information age and mapping, Cartography as language and communication -visual thinking and visual communication-spatial information system.					
<b>Unit - 2</b>	<b>MAP PROJECTIONS AND COORDINATE SYSTEMS</b>				
Geodesy, coordinate systems, and map projections- geographical data – spatial objects and attributes – map scale and accuracy					
<b>Unit - 3</b>	<b>MAP DESIGN AND LAYOUT</b>				
Map compilation - levels of data measurement, generalization, cartographic design principles - map symbolization- Qualitative and Quantitative symbols - graphic communication – map elements and layout					
<b>Unit - 4</b>	<b>TERRAIN AND SURFACE ANALYSIS</b>				
Production and Map output - Typography & Labelling - Thematic Map Forms - Animation – Isarithmic, choropleth & Surface mapping-map reproduction, Publishing, & Sharing – cartographic products					
<b>Unit - 5</b>	<b>ONLINE MAPPING AND WEB SERVICES</b>				
e-mapping, online map data sources - Geospatial web services- Dynamic/Interactive Mapping-cartography and spatial information policy					
<b>Unit - 6</b>	<b>CONTEMPORARY ISSUES</b>				
Cartography: Possibilities and issues in contemporary mapping					
<b>Expected Course Outcomes:</b>					
On the successful completion of the course, student will be able to:					
1.	Understand the cartographic concepts, recent trends and the use of information technology	K1, K2			

2.	Explain the fundamental importance of map scale and benefits and limitations of map projections	<b>K2, K3</b>
3.	Demonstrate cartographic techniques, generalisation regarding map design and layout, graphical and visual variables	<b>K3, K6</b>
4.	Obtain the skills in creating reference and thematic maps using hard copies and web maps	<b>K4, K5</b>
5.	Able to generate digital maps from opensource data, analyse and interpret the interactive maps	<b>K4, K6</b>
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create		
<b>Text Book(s)</b>		
1.	Kraak, M.J. and F.J. Ormeling (1996). Cartography: Visualisation of Spatial data, Longman Ltd., England.	
2.	Robinson, A.H., J.L.Morrison, P.C., Muehrcke, A.J.Kimerling and S.C.Guptill (1995). Elements of Cartography, 6th Edition. New York. John Wiley & Sons. USA.	
<b>Reference Book(s)</b>		
1.	Tyner, J. (1992). Introduction to Thematic Cartography, Prentice-Hall, Englewood Cliff, New Jersey.	
2.	Tyner, J.A. (2014) Principles of Map Design. New York, NY: Guilford Press.	
3.	Misra, R.P. and A. Ramesh (1989). Fundamentals of Cartography, Concepts Publishing Company, New Delhi.	
4.	Monkhouse, F.J. and Wilkinson, H.R., (1971). Maps and diagrams: their compilation and construction. Methuen.	
5.	Brewer, C.A. (2005). Designing Better Maps. Redlands, CA: ESRI Press. (ISBN 1-58948-089-9)	
6.	Dent, B.D., Torguson, J.S. and Hodler, T.W. (2009). Cartography: Thematic Map Design. Boston: McGraw-Hill. 6th edition. (ISBN: 978-0-07-294382-5)	
7.	Jennings, Ken. (2011). Map head: Charting the Wide, Weird World of Geography Wonks. New York: Scribner	
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>		
1.	<a href="http://www.fes.uwaterloo.ca/crs/geog165/cart.htm">http://www.fes.uwaterloo.ca/crs/geog165/cart.htm</a>	
2.	<a href="http://www.colorado.edu/geography/gcraft/notes/cartocom/cartocom_ftoc.html#3.0">http://www.colorado.edu/geography/gcraft/notes/cartocom/cartocom_ftoc.html#3.0</a>	
3.	<a href="http://www.earthsensing.com/cart/resources/carthelp.html">http://www.earthsensing.com/cart/resources/carthelp.html</a>	
4.	<a href="http://www.esri.com">www.esri.com</a>	



<b>Mapping with Programme Outcomes (MPO)*</b>					
<b>MPO</b>	<b>PSO 1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
<b>CO1</b>	1	1	1	1	2
<b>CO2</b>	1	1	3	1	1
<b>CO3</b>	2	1	1	2	2
<b>CO4</b>	1	1	2	1	1
<b>CO5</b>	1	2	1	1	1
Map <b>Course Outcomes (CO)</b> for each Course with <b>Programme Specific Outcomes (PSO)</b> in the 3-Point scale of <b>1,2, 3 (Strong, Medium and Low)</b>					

Course code: P23GET12		APPLIED GEOMORPHOLOGY			
		L	T	P	C
<b>Core/Elective</b>	<b>Core</b>				
<b>Pre-requisite</b>	Basic knowledge in Physical Geography				
<b>Course Objectives:</b>					
<ol style="list-style-type: none"> <li>To introduce the concepts in Geomorphology in adequate manner, many facets of surface relief features and to understand various aspects of their growth and evolution on the Earth.</li> <li>To understand landscape evolution through time and space</li> <li>To understand the processes that shapes the landforms around us.</li> <li>To apply geomorphologic concepts to identify and analyze the environmental and resources issues for sustainable development</li> <li>To suggest the tools for reading in the landscape the signs of geomorphologic hazards and risks, human interference and geomorphologic resources</li> </ol>					
<b>Unit - 1</b>	<b>SCOPE OF APPLIED GEOMORPHOLOGY</b>				
Definition – Nature and scope of applied geomorphology – Fundamental concepts in geomorphology – Geosynclines and mountain building process – Hill slope evolution - Geomorphic ideas of Davis, Penk and King					
<b>Unit - 2</b>	<b>ENERGY FLOW IN GEOMORPHIC SYSTEM</b>				
System concepts in geomorphologic studies – Structure and composition of earth – Theories of Continental Drift – Plate Tectonics and Isostasy Seismicity and Volcanism- climatic and tectonic changes and impacts					
<b>Unit - 3</b>	<b>WEATHERING, MASS WASTING AND DEVELOPMENT OF HILL SLOPES</b>				
Weathering : Mechanical, Chemical and Biological weathering- structure, process and time in weathering- Soil: Soil formation – Types of soils – Soil conservation practices - Mass wasting : causes and classes of mass wasting – Planning and control measures					
<b>Unit - 4</b>	<b>PROCESS GEOMORPHOLOGY</b>				
Drainage: Drainage Basin – Basin morphometry – Fluvial system : erosion, sedimentation and structural adjustments in the fluvial system; Waves : Waves dynamics - evolution of shores and construction and destruction of coastal region; Arid landforms and its evolution- Karst and speleology; Glacial process, erosion and depositional landforms.					
<b>Unit - 5</b>	<b>APPLICATIONS OF GEOMORPHOLOGY</b>				
Mapping and statistical analysis : Landscape and land evaluation - Hazard analysis – application of geoinformatics in geomorphological mapping and modelling – Geomorphology and its applications in Agriculture, Water resources, hazard, urban and mineral exploration.					
<b>Unit - 6</b>	<b>CONTEMPORARY ISSUES</b>				
Expert lectures - online seminars – webinars – group discussions related to current issues in various landforms and landscapes.					
<b>Expected Course Outcomes:</b>					
1	A clear understanding of the key concepts of geomorphology and dynamic aspects of landform development	<b>K1, K2</b>			
2	Understand the relationship between geomorphologic processes, natural resources and environmental impacts	<b>K2, K5</b>			

<b>Mapping with Programme Outcomes (MPO)*</b>					
<b>MPO</b>	<b>PSO 1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
<b>CO1</b>	1	1	2	1	1
<b>CO2</b>	2	1	1	2	2
<b>CO3</b>	1	2	1	1	1
<b>CO4</b>	1	1	1	1	2
<b>CO5</b>	1	2	2	1	1

Map **Course Outcomes (CO)** for each Course with **Programme Specific Outcomes (PSO)** in the 3-Point scale of **1,2, 3 (Strong, Medium and Low)**

Course code: P23GET12		PRACTICAL-I: TECHNIQUES OF MAPPING AND MAP ANALYSIS		L	T	P	C
Core/Elective	Core						
Pre-requisite	Basic knowledge for mapping and interpretation						
<b>Course Objectives:</b>							
<ol style="list-style-type: none"> <li>To introduce the concepts practically in mapping and map analysis</li> <li>To understand the various aspects of map reading, interpretation and representation of various data through maps.</li> <li>To provide a basic understanding in the field of interpretation and interpolation.</li> <li>To understand the theoretical and practical methods pertaining to map making.</li> <li>To understand the concepts and importance of various analysis used in mapping.</li> </ol>							
<b>Unit - 1</b>	<b>MAP AND INTERPRETATION</b>						
Map appreciation and interpretation: thematic, topographic and atlas maps- mapping and analysis: Relative relief and slope maps; height and hypsometric curves; stream Analysis							
<b>Unit - 2</b>	<b>CLIMATE AND HYDROLOGY</b>						
Climate and Hydrology: climograph and climatograph; rainfall variability, intensity maps temperature and rainfall profiles; deviation and dispersion graph; aridity and water balance graphs							
<b>Unit - 3</b>	<b>POPULATION AND ECONOMIC DATA MAPPING</b>						
Population and economic data mapping: dot maps, density maps - colour and grey scale patterns; index of concentration and diversification; crop combination technique, spatial interaction, measures of transport network analysis							
<b>Unit - 4</b>	<b>QUANTITATIVE SYMBOLISATION AND LOCATION MAP</b>						
Quantitative symbolisation and location Maps: located representation of tourism and facilities; point and line pattern analysis; cartograms and 3D maps							
<b>Unit - 5</b>	<b>MAPPING AND INTERPOLATION</b>						
Choropleth and isorhythm maps - class interval selection methods – unipolar and bipolar graphs and colour patterns – interpolation methods							
<b>Unit-6</b>	<b>CONTEMPORARY ISSUES AND CHALLENGES</b>						
Contemporary Issues related to latest techniques of mapping and map analysis							
<b>Expected Course Outcomes:</b>							
1	Understanding the importance of various mapping techniques in geographical study					<b>K1, K2</b>	
2	Understand the procedures and steps involved in the interpretation of thematic, topographic and atlas maps etc.					<b>K2, K3</b>	
3	Learn the quantitative applications involved in mapping and interpolation.					<b>K3, K6</b>	
4	Ability to analyze and perform analysis like network analysis, stream analysis, point and line pattern analysis.					<b>K4, K5</b>	
5	Capable of creating maps based on appropriate cartographic knowledge.					<b>K5, K6</b>	

<b>K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create</b>	
<b>Text Book(s)</b>	
1.	Tamaskar, B. G., Deshmukh, V. M. (1974): Geographical Interpretation of Indian Topographical Maps, Orient Longman Ltd., Bombay
2.	Lawrence, G.R.P. (1971). Cartographic Methods, Methuen & Co., Canada
3.	Worthington, B.D.R. and Robert Gent (1975): Techniques in Map Analysis, Ebenzer Baylis and Sons, USA.
4.	Singh, R.L., Singh, R.P.B. 2008. Elements of Practical Geography, Kalyani Publishers.
5.	Ramamurthy, K. (1982): Map Interpretation, Rex Printers, Madras
6.	Understanding Map Projection (2003-2004): GIS by ESRI, Redlands
7.	Chrisman, N. (1997): Exploring Geographic Information systems, John Wiley & Sons., New York
8.	<i>The ESRI Guide to GIS Analysis</i> , by Andy Mitchell, ESRI Press, 1999, 188 pp.
<b>Reference Book(s)</b>	
1.	Monkhouse, F.J., and Wilkinson, H.R. (1976): Maps and Diagrams, Methuen & Co., London.
2.	Miller, Austin (1953): The skin of the Earth, Methuen & Co. Ltd. London
3.	Pearson II, F. 1990. Map Projections: Theory and Applications 2nd ed, CRC Press.
4.	Kimerling, A.J., Buckley, A.R., Muehrcke, P.C., Muehrcke, J.O. 2011. Map Use: Reading, Analysis, Interpretation, 7th ed, Esri Press.
5.	Sarkar, A. 2015. Practical Geography: A Systematic Approach, 3rd ed, Orient Blackswan Private Ltd.
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>	
1	<a href="http://www.sevenoaks.wa.edu.au/linkpage/geog/copy.html">www.sevenoaks.wa.edu.au/linkpage/geog/copy.html</a>
2	<a href="http://www.esri.com/">http://www.esri.com/</a>
3	<a href="http://www.gisdevelopment.net/books/mapping/bmap0010.html">www.gisdevelopment.net/books/mapping/bmap0010.html</a>

<b>Mapping with Programme Outcomes (MPO)*</b>					
<b>MPO</b>	<b>PSO 1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
<b>CO1</b>	1	1	2	1	1
<b>CO2</b>	1	1	1	1	2
<b>CO3</b>	1	1	1	1	2
<b>CO4</b>	2	1	1	1	1
<b>CO5</b>	1	2	3	1	1
Map <b>Course Outcomes (CO)</b> for each Course with <b>Programme Specific Outcomes (PSO)</b> in the 3-Point scale of <b>1,2, 3 (Strong, Medium and Low)</b>					

Coursecode: P23GEE11	POPULATION AND SETTLEMENT GEOGRAPHY	L	T	P	C
<b>Core/Elective</b>	<b>Elective</b>				
<b>Pre-requisite</b>	Basic knowledge in population and settlement geography				
<b>Course Objectives:</b>					
<ol style="list-style-type: none"> <li>1. To explain the arguments and assumptions of dominant theories of population change in time and space</li> <li>2. understanding of nature, scope and evolution of population geography through spatial and temporal</li> <li>3. It also helpful in knowing various kinds of demographic problems.</li> <li>4. Study of population is an essential component in planning of P23GEE11 human related issues.</li> <li>5. Population Geography also deals in population policies in developed &amp; developing countries.</li> </ol>					
<b>Unit - 1</b>	<b>SCOPE OF POPULATION GEOGRAPHY</b>				
Concepts, scope and methodology of population geography, Sources of population data (census, sample surveys and vital statistics, data reliability and errors). World Population Distribution (measures, patterns and determinants), World Population Growth (prehistoric to modern period). Demographic Transition, Theories of Population Growth (Malthus, Sadler, and Ricardo).					
<b>Unit - 2</b>	<b>WORLD DISTRIBUTION OF POPULATION</b>				
World distribution of population – overpopulation, underpopulation and optimum population – growth of population – theories of population – migration: Internal and international - Rural settlements – types of patterns – Urban settlements – Functional classification of towns and cities.					
<b>Unit - 3</b>	<b>POPULATION COMPOSITION AND CHARACTERISTICS</b>				
Fertility and Mortality Analysis (indices, determinants and world patterns). Migration (types, causes and consequences and models), Population Composition and Characteristics (age, sex, rural-urban, occupational structure and educational levels), Population Policies in Developed and Developing Countries.					
<b>Unit - 4</b>	<b>MORPHOLOGY OF RURAL AND URBAN SETTLEMENTS</b>				
Types, patterns and morphology of rural settlements; Urban developments; Morphology of Indian cities; Functional classification of Indian cities; Conurbations and metropolitan regions; Urban sprawl; Slums and associated problems; Town planning; Problems of urbanisation and remedies.					
<b>Unit - 5</b>	<b>THEORIES OF ORIGIN OF TOWNS</b>				
Theories of Origin of Towns (Gordon Childe, Henri Pirenne, Lewis Mumford), Characteristics and Processes of Urbanization in Developed and Developing Countries (factors of urban growth, trends of urbanisation, size, structure and functions of urban areas).					
<b>Unit - 6</b>	<b>CONTEMPORARY ISSUES</b>				
Contemporary Problems of Rural Settlements (rural-urban migration; land use changes; land acquisition and transactions),					

<b>Expected Course Outcomes:</b>		
On the successful completion of the course, student will be able to:		
1	Understand population policies & its importance, Population distribution and its problems.	<b>K1, K2</b>
2	Assessment of vital statistics of population data	<b>K2, K3</b>
3	Acquire and interweave theoretical foundation for addressing research issues related to population dynamics in the real world	<b>K3, K6</b>
4	Acquiring, handling and analysing population data both at the grassroots level and secondary sources	<b>K4, K5</b>
5	Recollect types and patterns of urban and rural settlement	<b>K4, K6</b>
<b>K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create</b>		
<b>Text Book(s)</b>		
1	Beaujeu-Garnier, J. (1966). Geography of Population (Translated by Beaver, S.H.) Longmans, London.	
2	Census of India (2001). Series-I India Provisional Population Totals. Published by Registrar General & Census Commissioner, India.	
3	Census of India, (1991). India: A State Profile Published by office of the Registrar General of India, Census Operations, New Delhi	
4	Chandna, R.C. (2000). Geography of Population: Concepts, Determinants and Patterns, Kalyani Publishers, New Delhi.	
5	Clark J.1 (1965). Population Geography, Permagon Press, New York, 1965.	
<b>Reference Book(s)</b>		
1.	Mohammad Izhar Hassan (2020). Population Geography: A Systematic Exposition, Routledge, India.	
2.	Mohammed I. Hassan (2006). Population Geography. Rawat; New title edition.	
3.	Peters: G.L. and Larkim R.P (1979). Population Geography: Problems, Concepts and Prospects Kendele-Hunt Iowa.	
4.	Sundram K.V. & Nangia Sudesh, (editors) (1986). Population Geography, Heritage Publishers, Delhi.	
5.	Trewartha, G.T. (1969). A Geography of Population: World Patterns, John Wiley & Sons, Inc., New York.	



Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	<a href="https://ncert.nic.in/ncerts/l/legy201.pdf">https://ncert.nic.in/ncerts/l/legy201.pdf</a>
2	<a href="https://www.amyglenn.com/geog-regional/geog1303population.htm">https://www.amyglenn.com/geog-regional/geog1303population.htm</a>
3	<a href="https://www.bdu.ac.in/cde/slm/slm_sample/msc-geography.pdf">https://www.bdu.ac.in/cde/slm/slm_sample/msc-geography.pdf</a>
4	<a href="https://mu.ac.in/wp-content/uploads/2021/04/t.y.b.a.-paper-7-population-and-economic-geography-e.pdf">https://mu.ac.in/wp-content/uploads/2021/04/t.y.b.a.-paper-7-population-and-economic-geography-e.pdf</a>
5	<a href="https://ncert.nic.in/ncerts/l/legy201.pdf">https://ncert.nic.in/ncerts/l/legy201.pdf</a>

Mapping with Programme Outcomes (MPO)*					
MPO	PSO 1	PSO2	PSO3	PSO4	PSO5
CO1	1	1	2	1	2
CO2	1	1	3	1	1
CO3	1	2	1	1	1
CO4	1	1	1	1	1
CO5	1	1	1	2	2
Map Course Outcomes (CO) for each Course with Programme Specific Outcomes (PSO) in the 3-Point scale of 1,2, 3 (Strong, Medium and Low)					

## **P23WSG11 - WOMEN EMPOWERMENT**

**(Generic Elective - Common Paper for all PG Programmes in I Semester)**

### **Unit 1: Fundamentals of Women's Studies**

Meaning and Definition of the concept of Women's studies - Need and Scope - Women's studies as an academic discipline - Women's Studies – International Women's Year 1975 - International Women's Decade 1975 - 1985; Towards Equal Status 1976 – Current trends- Importance of women's education –Life Skill Education to build capacity - Education as a tool of Women Empowerment - Obstacles to Women Education – Social, Economic, Cultural and other factors, limitations of Formal system of education.

### **Unit 2: Issues of Women**

Girl Children and Women in Society: Social Networking- impact and consequences of networking - NCW: Initiatives to overcome Women's issues - Ministry of Home Affairs and Networking with State Women Commissions: Cyber Crime Prevention against Women and Children (CCPWC)-challenges - efforts & effective measures to prevent crime against women and children - Motherhood - Single Parent - Widows – Multiple Roles of Women - Role conflict, Role change - Social Responsibility and Gender Empowerment.

### **Unit 3: Achievement and Rights of Women**

Gender Equality: Achievement of Women - Educational, Political, Economic, Social - Panchayat Raj - Political role and participation - National and International Levels; Women's Rights - Property Rights - Redressal mechanism at different levels - Rights of Women with Disability: Case Studies on Women Achievers in the field of politics, education, arts science, law etc.

### **Unit 4: Empowerment of Women**

Empowerment of Women: Alternative approaches - Women in Development (WID) - Women and Development (WAD) – Women's Development- Definition, Meaning and Scope, Gender and Development (GAD), Human Development Index (HDI) vs Gender Development Index (GDI). -Role of Govt. and NGOs - Help line numbers in promoting women's empowerment - National and International Funding Agencies in promoting research on women.

### **Unit 5: Women Entrepreneurship**

Women Entrepreneurship:– Types of Entrepreneurs Opportunities and Risk – Micro finance- Entrepreneurship Skill and Competencies - Women Entrepreneurship Development in India: TRYSEM –NABARD – NMEW - Support to STEP – TREAD – Rural Entrepreneurship Development Programme –Gramia Bank –Mahila bank and supportive measures- Industrial Development Bank of India (IDBI) – Small Industries Development Bank of India-SHG and Entrepreneurship opportunities -

**References**

1. Rani Sandhya, “Development of Women – Issues and Challenges”, Discover Publishing House Pvt Ltd, New Delhi, 2012.
2. Anil Kumar Jha, “Gender Inequality and Women Empowerment”, Axis Books, New Delhi, 2012.
3. NandalSantosh , “Women and Development”, A Mittal Publications, New Delhi, 2012
4. RaoPulla, “Political Empowerment of Women in India – Challenges and Strategies”, ABD Publishers, New Delhi, 2012.
5. Jenny Edwards, Andrea Cornwall, et al., “Feminisms, Empowerment and Development: Changing Women’s Lives”, Kindle Edition, 2014.
6. Elson Diane, et al. “Gender Equality and Inclusive Growth: Economic Policies to Achieve Sustainable Development”, UN Women, 2019
7. Priyanka Sharma Gurnani, “Women Entrepreneurship – Emerging Dimension of Entrepreneurship in India” Educreation Publishing House, New Delhi, 2016.

**Course Outcomes**

On successful completion of the course teacher educators will be able to CO1:  
Gain knowledge about the concept, need and scope of women’s studies.CO2:  
Acquaint and analyze issues of women in various contexts.  
CO3: Understand changing role of women in society and issues related to it.  
CO4: Understand the importance of women's education.  
CO5: Comprehend empowerment of women and their achievement.

# **SEMESTER II**

Course code: P23GET23		APPLIED CLIMATOLOGY				L	T	P	C
<b>Core/Elective</b>	<b>Core</b>								
<b>Pre-requisite</b>	Basic knowledge in Physical Geography								
<b>Course Objectives:</b>									
<ol style="list-style-type: none"> <li>1. Gaining basic knowledge about weather elements</li> <li>2. Learning patterns of global wind circulation</li> <li>3. Understanding world climatic classification, climate change and global warming</li> <li>4. Acquiring skills in micro level climate, weather forecasting methods and weather measurement techniques</li> <li>5. Demonstrate applicable solutions for climate change</li> </ol>									
<b>Unit-1</b>	<b>NATURE AND SCOPE OF APPLIED CLIMATOLOGY</b>								
Nature and scope of applied Climatology- the development of applied climatology Atmosphere: Its composition (gaseous) and structure; Insolation and Radiation, heating of land and water; temperature and pressure: variations in temperature and pressure; temperature zones, heat balance, and pressure belts									
<b>Unit-2</b>	<b>GLOBAL WIND SYSTEMS</b>								
Global wind circulation: Tricellular meridional circulation; trade winds, easterlies and westerlies and polar winds; Air masses: continental and maritime; fronts and their types; clouds; precipitation: thunderstorms, cyclones (tropical and temperate) and anti-cyclones									
<b>Unit-3</b>	<b>CLIMATE CHANGE AND GLOBAL WARMING</b>								
Climatic classifications; Indian climates and climatic zones; micro climates, agro-climates and urban climates; urban air pollution problems- global climate change; global warming and their likely impacts on human life- El Nino, La Nino									
<b>Unit-4</b>	<b>URBAN CLIMATE</b>								
Urban climate and global environment change - the nature of the global environmental change, urban climates, impact of the urban climate on GEC									
<b>Unit-5</b>	<b>WEATHER FORECASTING</b>								
Weather forecasting: short range and long-range forecasting – weather satellites and sensors – sounding techniques – weather maps – field instruments in forecasts									
<b>Unit-6</b>	<b>CONTEMPORARY CHALLENGES</b>								

Contemporary Issues Regarding Climate Change and Solutions: Challenges to Sustainable Development

Expected Course Outcomes:		
1	To recall weather elements and its importance	K1, K2
2	Discuss various wind around the world	K5, K3
3	To compare climatic classification for global and regional level	K3, K4
4	Apply various weather forecasting methods	K4, K5
5	Analysing the Characteristics of Urban Heat Island	K5, K6
<b>K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create</b>		

Text Book(s)	
1	Perry, Allen, and Russell Thompson. Applied climatology: principles and practice. Routledge, 2013. Thompson, R. (1997). Applied climatology: principles and practice. Psychology Press.
2	Hobbs, John E. Applied climatology: a study of atmospheric resources. Elsevier, 2016.
3	Rohli, Robert V., and Anthony J. Vega. Climatology. Jones & Bartlett Learning, 2017.
4	Khan, A., Chatterjee, S., & Wang, Y. (2020). Urban Heat Island Modeling for Tropical Climates. Elsevier.
5	Hartmann, D. L. (2015). Global physical climatology (Vol. 103). Newnes.
Reference Book(s)	
1	Ahrens, C. D. (2011). Essentials of meteorology: an invitation to the atmosphere. Cengage Learning.
2	Ahrens, C. D. (2012). Meteorology today: an introduction to weather, climate, and the environment. Cengage Learning.
3	Collins, M., An, S. I., Cai, W., Ganachaud, A., Guilyardi, E., Jin, F. F., ... & Wittenberg, A. (2010). The impact of global warming on the tropical Pacific Ocean and El Niño. Nature Geoscience, 3(6), 391-397.
4	Elizabeth Kolbert, (2006) Field Notes from A Catastrophe: Man, Nature and Climate Change, Bloomsbury Publishing Plc.
5	Howard J. Critch field (1995); General Climatology; Prentice, Hall of India Pvt. Ltd., New Delhi.

6	Huang, P., Xie, S. P., Hu, K., Huang, G., & Huang, R. (2013). Patterns of the seasonal response of tropical rainfall to global warming. Nature Geoscience
7	Kelkar, R. R. (2007). Satellite meteorology. BS Publications.
8	Kidder, S. Q., Kidder, R. M., & Haar, T. H. V. (1995). Satellite meteorology: an introduction. Gulf Professional Publishing.
9	Lisa F. Schipper and Ian Burton (Ed.) (2008) Adaptation to climate Change, Earthscan Reader Series,
10	Mather, J. R. (1974): Climatology: Fundamentals and Applications, Mc Graw Hill, New York.
11	Oliver, John E. (1973): Climate and Man's Environment: An Introduction to Applied Climatology, John Wiley & Sons, New York, London.
12	Thompson, R. D. and Allen, P. (1997): Applied Climatology: Principles and Practice, Routledge, London and New York.
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>	
1	<a href="https://public.wmo.int/en/resources/training">https://public.wmo.int/en/resources/training</a>
2	<a href="https://metnet.imd.gov.in/phps/imdweb_imdnews.php">https://metnet.imd.gov.in/phps/imdweb_imdnews.php</a>
3	<a href="https://www.un.org/en/climatechange/speeches">https://www.un.org/en/climatechange/speeches</a>
4	<a href="https://www.ipcc.ch/data/">https://www.ipcc.ch/data/</a>
5	<a href="https://www.greenclimate.fund/publications">https://www.greenclimate.fund/publications</a>
6	<a href="https://mausam.imd.gov.in/imd_latest/contents/satellite.php">https://mausam.imd.gov.in/imd_latest/contents/satellite.php</a>

<b>Mapping with Programme Outcomes (MPO)*</b>					
<b>MPO</b>	<b>PSO 1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
<b>CO1</b>	1	1	2	1	1
<b>CO2</b>	1	1	1	1	2
<b>CO3</b>	3	1	1	1	1
<b>CO4</b>	1	2	2	1	2
<b>CO5</b>	1	1	1	2	1
Map <b>Course Outcomes (CO)</b> for each Course with <b>Programme Specific Outcomes (PSO)</b> in the 3-Point scale of <b>1,2, 3 (Strong, Medium and Low)</b>					

Course Code: P23GET24		HYDROLOGY AND OCEANOGRAPHY		L	T	P	C
Core/Elective	Core	3	1	0	4		
Pre-requisite	Basic knowledge in Physical Geography						
<b>Course Objectives:</b>							
<ol style="list-style-type: none"> <li>To Understand the stages of Hydrological cycle</li> <li>To introduce a sound scientific knowledge of how water cycles through the Earth's atmosphere, surface and groundwater systems.</li> <li>To Understand Significance of oceanography and hydrology in earth and atmospheric science, Configuration of the ocean floor and variation of temperature and salinity of oceans and seas.</li> </ol>							
<b>UNIT-1</b>	<b>HYDROLOGIC CYCLE</b>						
Hydrological cycle and its sub-cycle; Man's interference on hydrological cycle - elements of hydrological cycle: precipitation - intensity and duration; evaporation; infiltration, surface runoff, urban flooding.							
<b>UNIT-2</b>	<b>CHARACTERISTICS AND FUNCTIONS OF FLUVIAL MORPHOLOGY</b>						
Drainage basin characteristics: human impact on hydrological system - morphometric analysis – fluvial process and analysis							
<b>UNIT-3</b>	<b>AQUIFERS AND GROUNDWATER</b>						
Ground water - occurrence and types: movement - quality and quantity measures - Principles of water balance and their application, - its relevance in crop geography; water pollution, need for water management.							
<b>UNIT-4</b>	<b>MORPHOLOGY OF OCEAN FLOOR</b>						
Relevance of oceanography in earth and atmospheric sciences: Surface configuration of the ocean floor, continental shelf, continental slope, abyssal plain, mid-oceanic and oceanic trenches - relief of Atlantic, Pacific and Indian oceans - distribution of temperature and salinity of oceans and seas.							
<b>UNIT-5</b>	<b>MOVEMENT OF OCEAN WATER</b>						
Circulation of oceanic waters: waves, tides and currents; currents of the Atlantic, Pacific and Indian oceans. Marine deposits and coral reefs; coastal environment - Oceans as storehouse of resources for the future.							
<b>UNIT-6</b>	<b>CONTEMPORARY CHALLENGES</b>						
Current challenges and emerging issues of ocean							
<b>Expected Course Outcomes:</b>							



1	Recall hydrological cycle, surface runoff and urban flooding	<b>K1, K2</b>
2	Knowledge on fluvial process and morphometry of drainage basin	<b>K2, K5</b>
3	Explain groundwater occurrence, types, movement, pollution and need for water management	<b>K3, K5</b>
4	Recall ocean waters movements, ocean deposits, coastal environment and coral reefs and discuss the global warming and Sea level rising	<b>K5, K6</b>
<b>K1 - Remember; K2 - Understand; K3 - Apply; K4 -Analyse; K5 -Evaluate; K6 - Create</b>		

<b>Text Book(s)</b>		
1	Thurman, H. V. (2019). Essentials of oceanography.	
2	Talley, L. D. (2011). Descriptive physical oceanography: an introduction. Academic press.	
3	Donnet, S., & Canadian Science Advisory Secretariat. (2018). Coast of bays metrics: Geography, hydrology and physical oceanography of an aquaculture area of the South Coast of Newfoundland. Canadian Science Advisory Secretariat (CSAS).	
4	Cracknell, A. P. (1981). Remote sensing in meteorology, oceanography and hydrology.	
5	Park, S. K., & Xu, L. (Eds.). (2013). Data Assimilation for Atmospheric, Oceanic and Hydrologic Applications (Vol. II) (Vol. 2). Springer Science & Business Media.	
6	Diaz, H. F. (2000). El Niño and the Southern Oscillation: multiscale variability and global and regional impacts. Cambridge University Press.	
<b>Reference Book(s)</b>		
1	Manheim, F. T. (1966). Soviet Books and Publications on Geological and Chemical Oceanography, Hydrology, and Other Subjects Acquired During the Second International Oceanographic Congress, Moscow, June 1966: Titles and Some Translated Contents and Notes. Woods Hole Oceanographic Institution.	
2	Addison, H. (1961). Land Water and Flood, Chapman and Hall, London.	
3	Anikouchine, W.A. and Sternberg, R.W. (1973). The World Oceans - An Introduction to Oceanography, Englewood Cliffs, N.J.	
4	Chorley, R.J. (ed) (1969). Introduction to Physical Hydrology, Methuen, London.	
5	Chorley,R.J. (1967). Water, Earth and Man, methuen, London.	
6	Grald, S. (1980). General Oceanography - An Introduction, John Wiley & Sons, New York.	

7	Sharma, R.C. Vatel M (1970). Oceanography for Geographers, Chetnya Publishing House, Allahabad
8	Singh, R.A. and Singh, S.R. (1972). Water Management: Principles and Practices. Tara Publication, Varanasi.
9	Thurman, H.B. (1984). Introductory Oceanography, Charles Webber E. Merril Publishing Co.
10	Todd, D.K. (1959). Ground Water Hydrology, John Wiley, New York.
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>	
1	<a href="https://online-learning.tudelft.nl/courses/introduction-to-water-and-climate/">https://online-learning.tudelft.nl/courses/introduction-to-water-and-climate/</a>
2	<a href="https://www.mooc-list.com/tags/hydrology">https://www.mooc-list.com/tags/hydrology</a>
3	<a href="https://www.usgs.gov/special-topic/water-science-school/science/what-hydrology">https://www.usgs.gov/special-topic/water-science-school/science/what-hydrology</a>
4	<a href="https://www.nationalgeographic.org/encyclopedia/hydrology/">https://www.nationalgeographic.org/encyclopedia/hydrology/</a>
5	<a href="https://www.sciencedirect.com/topics/earth-and-planetary-sciences/hydrology">https://www.sciencedirect.com/topics/earth-and-planetary-sciences/hydrology</a>

<b>Mapping with Programme Outcomes (MPO)*</b>					
<b>MPO</b>	<b>PSO 1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
<b>CO1</b>	1	1	1	1	2
<b>CO2</b>	1	2	1	1	1
<b>CO3</b>	1	1	2	1	1
<b>CO4</b>	1	1	1	1	1
<b>CO5</b>	1	1	3	2	2
Map <b>Course Outcomes (CO)</b> for each Course with <b>Programme Specific Outcomes (PSO)</b> in the 3-Point scale of <b>1,2, 3 (Strong, Medium and Low)</b>					

Course code: P23GEP22		PRACTICAL– II: Geospatial Lab			L	T	P	C	
Core/Elective	Core								
Pre-requisite	Prior knowledge in Geography								
<b>Course Objectives:</b>									
<ol style="list-style-type: none"> <li>To introduce the concepts of Geographic Information Systems practically and to understand the various aspects of map reading, design and evaluation of digital maps.</li> <li>To understand the theoretical and practical concepts pertaining to map making.</li> <li>To obtain a comprehensive understanding of the spatial models, applications and tools currently available in the field of GIS.</li> <li>To apply the GIS concepts to create, analyse and interpret the spatial maps in the field of geospatial technology.</li> <li>To suggest tools and techniques for execution of spatial operations.</li> </ol>									
<b>Unit - 1</b>	<b>Fundamentals of Mapping and Exploration</b>								
Map exploration - Georeferencing – map projection and transformation – spatial entity creation – digitization – symbolization - attribute data editing – labelling and annotation – map design and layout - editing and topology: building topology, topology error rectification – edge matching – rubber sheeting.									
<b>Unit - 2</b>	<b>Spatial Data Editing and Analysis</b>								
Attribute data management and thematic mapping: quantitative and qualitative mapping, dot map, located pie chart and bar chart – proximity analysis – overlay analysis.									
<b>Unit - 3</b>	<b>Spatial Analysis and Spatial Statistics</b>								
Network analysis – geocoding - location and allocation models; spatial statistics: measurement- mean center, median center, standard distance									
<b>Unit - 4</b>	<b>Terrain and Surface Analysis</b>								
Surface analysis and Interpolation techniques: creation of contours, slope, aspect, kriging, spline, inverse distance weighted (IDW) – 3D visualization: DEM, TIN and visibility analysis.									
<b>Unit - 5</b>	<b>Spatial applications and Modelling</b>								
Multi criteria analysis and Ground truth support: GPS with field data attributes - geotagged photographs - Suitability analysis and modelling: habitat suitability – house hunting – noise pollution modelling – hydrological modelling									
<b>Unit - 6</b>	<b>Contemporary Issues</b>								
Local field observations - Group Discussions related to current issues and challenges in Geographic Information System (GIS) applications									
<b>Expected Course Outcomes:</b>									
1	A clear understanding in key concepts of cartography, GIS and the aspects in						<b>K1, K2</b>		

	reading, designing, and evaluating digital cartographic maps	
2	Understand the relationship between map projections, coordinate systems and geospatial layers including map algebra and spatial statistics.	<b>K2, K3</b>
3	Learn the skills in data collection, storage, analysis and interpretation of spatial data in GIS interface.	<b>K3, K6</b>
4	Ability to analyse and evaluate the maps and perform spatial operations like overlay analysis, landscape analysis, terrain analysis, suitability analysis and spatial modelling.	<b>K4, K5</b>
5	Create tools and models for developing and solving complex geospatial problems in GIS	<b>K4, K6</b>
<b>K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create</b>		

<b>TEXT BOOKS</b>		
1	Aronoff, S. (1991). Geographic Information Systems: A Management Perspective, WDL Publications, Ottawa, Canada.	
2	Bernhardsen, T. (2002). Geographic information systems: an introduction. John Wiley & Sons	
3	Chrisman, N. (1997). Exploring Geographic Information systems, New York: John Wiley & Sons., Inc.	
4	Ian Heywood, Sarah Cornelius and Steve Carver (2000). An Introduction to Geographical Information Systems, Addison Wesley Longman Limited, New York.	
5	Kang-tsung Chang (2002). Introduction to Geographical Information Systems, Tata McGraw-Hill Publishing Company Limited, New Delhi.	
6	Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. (2005). Geographic information systems and science. John Wiley & Sons.	
<b>Reference Book</b>		
1	Ballas, D., Clarke, G., Franklin, R. S., & Newing, A. (2017). GIS and the social sciences: Theory and applications. Routledge.	
2	Zhu, X. (2016). GIS for environmental applications: a practical approach. Routledge.	
3	Whyatt, D., Clark, G., & Davies, G. (2011). Teaching geographical information systems in geography degrees: A critical reassessment of vocationalism. Journal of Geography in Higher Education, 35(2), 233-244	

4	Argles, T. (2017). Teaching practical science online using GIS: a cautionary tale of coping strategies. <i>Journal of GeoGraphy in higher education</i> , 41(3), 341-352.
5	Gould, M. (2018). Tailoring GIS courses for employment. In <i>GIS</i> (pp. 189-195). CRC Press
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>	
1	<a href="http://www.ncgia.ucsb.edu/education/curricula/giscc">www.ncgia.ucsb.edu/education/curricula/giscc</a>
2	<a href="http://www.esri.com/">http://www.esri.com/</a>
3	<a href="https://www.le.ac.uk/ar/arcgis">https://www.le.ac.uk/ar/arcgis</a>

<b>Mapping with Programme Outcomes (MPO)*</b>					
<b>MPO</b>	<b>PSO 1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
<b>CO1</b>	2	1	1	2	1
<b>CO2</b>	1	2	1	1	1
<b>CO3</b>	1	1	1	1	2
<b>CO4</b>	2	1	1	1	1
<b>CO5</b>	1	1	3	1	1
Map <b>Course Outcomes (CO)</b> for each Course with <b>Programme Specific Outcomes (PSO)</b> in the 3-Point scale of <b>1,2, 3 (Strong, Medium and Low)</b>					

Course code: P23GEE2A		FIELD WORK AND MAPPING		L	T	P	C
<b>Elective</b>	Elective						
<b>Pre-requisite</b>	Basic knowledge in Field work						
<b>Course Objectives:</b>							
5. To impart knowledge about basic principles of field surveying procedures and practices. 6. Geospatial applications and also to impart knowledge on advanced surveying, photogrammetry, remote sensing, and Geographic Information Systems (GIS). 7. The purpose of fieldwork is to prepare students for a professional career by providing them with a "real world" experience. 8. Writing report papers on the structure demonstrated analytical and research talents.							
<b>Unit - 1</b>	<b>PLAN AND SCHEDULE</b>						
This course work contains - Plan and schedule of the work carried out and comprehensive report on the field work.							
<b>Unit - 2</b>	<b>FIELD DATA COLLECTION</b>						
The Student should prepare an individual report based on primary and secondary data collected during field work. Field and digital techniques for map making including use of GIS, GPS, and digital tablets.							
<b>Unit - 3</b>	<b>REPORT WRITING</b>						
The maximum length of the report should not exceed 12000 words, excluding figures, tables, photographs, maps, references and appendices.							
<b>Unit - 4</b>	<b>FIELD WORK</b>						
The students will go for a field work in the Second and Fourth semester, which is compulsory and on the basis of that, each student has to submit a field work report as part of the second and fourth semester course work							
<b>Unit - 5</b>	<b>SUBMISSION</b>						
Each report must be accompanied by field notebook, a fair copy of map, related cross sections and other relevant documents.							
<b>Expected Course Outcomes:</b>							
1	Understand various methods of Geospatial surveying					K1, K2	
2	Estimate the observation outcomes based on field truth verification and getting exposure in field work documentation.					K2, K5	
3	Calculate area and volume and to generate various cartographic techniques.					K3, K4	
4	Adopt appropriate survey method to address various field problems.					K5, K6	
5	In this course, students will perform credible and original geographical research.					K4, K6	
<b>K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create</b>							
<b>Text Book(s)</b>							

1	Arora, K.R., Surveying, Vol-I, II and III, Standard Book House.
2	Punmia C et al: Surveying Vol. I, II, Laxmi Publication
3	Manoj, . Arora and Badjatia, Geomatics Engineering, New Age International & Bros 2011
4	Chandra, A.M., Higher Surveying, Third Edition, New Age International (P) Limited, 2002
5	Caton, D. "Real world learning through geographical fieldwork" in Balderstone, D. (ed) (2006) Secondary Geography Handbook. Sheffield: Geographical Association.

**Reference Book(s)**

1	Andersen, D. E. (2007). Survey techniques. Raptor research and management techniques. Hancock House Publishers, Blaine, WA USA, 89-100.
2	Roelfsema, C. M., Phinn, S. R., & Joyce, K. E. (2006, June). Evaluating benthic survey techniques for validating maps of coral reefs derived from remotely sensed images. In Proc 10th Int Coral Reef Symp (Vol. 1, pp. 1771-1780).
3	Demers, J. (2004). Depth of field: A survey of techniques. Gpu Gems, 1(375), U390.
4	A. M. Chandra, Plane Surveying, New Age International.
5	S. K. Duggal, Surveying Vol. I, Tata Mcgraw-Hill.

**Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]**

1	<a href="https://flapflap.ep.mk16.de/rrmt/Chapter-5.pdf">https://flapflap.ep.mk16.de/rrmt/Chapter-5.pdf</a>
	<a href="https://ascelibrary.org/doi/abs/10.1061/(ASCE)0733-9453(2004)130:2(56)">https://ascelibrary.org/doi/abs/10.1061/(ASCE)0733-9453(2004)130:2(56)</a>
2	<a href="https://onlinelibrary.wiley.com/doi/book/10.1002/9781119147770">https://onlinelibrary.wiley.com/doi/book/10.1002/9781119147770</a>
3	<a href="https://cdnsiencepub.com/doi/abs/10.5623/geomat-1996-0046">https://cdnsiencepub.com/doi/abs/10.5623/geomat-1996-0046</a>
4	<a href="https://ui.adsabs.harvard.edu/abs/2016EGUGA..18.7033M/abstract">https://ui.adsabs.harvard.edu/abs/2016EGUGA..18.7033M/abstract</a>
5	<a href="https://flapflap.ep.mk16.de/rrmt/Chapter-5.pdf">https://flapflap.ep.mk16.de/rrmt/Chapter-5.pdf</a>

**Mapping with Programme Outcomes (MPO)\***

MPO	PSO 1	PSO2	PSO3	PSO4	PSO5
CO1	2	1	1	1	2
CO2	1	2	1	1	1
CO3	2	3	1	1	1
CO4	1	1	2	2	3
CO5	1	2	1	1	1

Map Course Outcomes (CO) for each Course with Programme Specific Outcomes (PSO) in the 3-Point scale of 1,2, 3 (Strong, Medium and Low)

<b>Core/Elective</b>	<b>Elective</b>				
<b>P23GEE2B</b>	<b>GeoSpatial Statistics</b>				
<b>Pre-requisite</b>	Prior knowledge in statistics				
<b>Course Objectives:</b>					
<ol style="list-style-type: none"> <li>1. To introduce basic statistical procedures to the students</li> <li>2. To indicate the assumptions, limitations and interpretation of these procedures and results</li> <li>3. To train the students to handle these statistics towards analysing the geographical problems.</li> <li>4. To understand the Statistical Techniques, Numerical data in Geography</li> <li>5. To familiarize about Probabilistic Treatment, Parametric Statistics and Regression Analysis</li> </ol>					
<b>Unit - 1</b>	<b>Statistics, Geography and Statistics</b>				
Significance of Statistics in geographical studies; Types of Data; levels of data measurement. Sampling: basic concepts, sample UNITs and design, sampling frame and procedures, standard error and sample size, testing the adequacy of samples					
<b>Unit - 2</b>	<b>Measures of Central Tendency and their significance</b>				
Centro graphic techniques: mean centre, median centre and standard distance. Measures of dispersion and concentration: Range, quartile deviation, mean deviation, standard deviation; coefficient of variation, Lorenz Curve and Gini's Coefficient; location Quotient.					
<b>Unit - 3</b>	<b>Bivariate Analysis</b>				
Forms of relation and measuring the strength of association and relation-construction and meanings of scatter diagram; Spearman's Rank Difference and Karl Pearson's Product Moment Correlation Coefficients					
<b>Unit - 4</b>	<b>Regression analysis</b>				
Regression equations, construction of regression line interpolation, prediction, explanation; residual-statistical tests of significance of the estimates; computation of residuals and mapping.					
<b>Unit - 5</b>	<b>Hypothesis Testing</b>				
Needs and types of hypotheses-goodness of fit and significance and confidence levels-parametric and non-parametric procedures: contingency tables, Chi-square test, t -test, Mann-Whitney U test, Analysis of Variance (ANOVA).					
<b>Unit - 6</b>	<b>CONTEMPORARY ISSUES</b>				
Multivariate statistical method applications to spatial problems. Linear and non-linear correlation; regression, factor analysis, cluster analysis; spatial statistics including: trend surfaces, sequences, point distributions.					

**Expected Course Outcomes:**



1	Explain the role of quantitative information in geographic research and applications.	<b>K2, K1</b>
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2	Demonstrate an understanding of basic descriptive statistics and regression methods as they apply to problem solving in Geography.	<b>K2, K4</b>
3	Evaluate the roles of probability theory and sampling distributions in drawing inferences about populations based on samples	<b>K3, K5</b>
4	Perform basic data manipulation, statistical calculations and graphical presentation by hand, and using computer spreadsheets or statistical software (e.g., Excel, SPSS).	<b>K4, K6</b>
5	Acquired skills to assemble, collect and manage big data resources so that they facilitate both statistical as well as geographical studies.	<b>K3, K6</b>
<b>K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create</b>		
<b>Reference Book(s)</b>		
1	David M. Smith (1975), Patterns in Human Geography, Penguin, Harmons worth.	
2	David U (1981), Introductory Spatial Analysis, Methuen, London.	
3	Ebdon, D. (1983), Statistics in Geography: A Practical Approach, Blackwell, London.	
4	Gupta, S.P. (2010), Statistical Methods, Sultan Chand and Sons, Latest Edition.	
5	Hammond, R. and McCullagh, P.S. (1974), Quantitative Techniques in Geography: An Introduction, Clarendan Press, Oxford.	
6	Peter a. Rogerson (2015), statistical methods for geography: a student's guide, sage publications ltd, London, United Kingdom.	
7	Mathews, J.A. (1987), Quantitative and Statistical Approaches to Geography	
8	Haggett, P., Andrew D. C., & Allan F. (1977), Location Methods, Vols. I and II, Edward Arnold, London	
9	Ashis sarkar, (2013), quantitative geography: tech. & presentations orient blackswan private	
<b>Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]</b>		
1	<a href="https://swayam.gov.in/course/266-quantitative-methods">https://swayam.gov.in/course/266-quantitative-methods</a>	
2	<a href="http://www.sethspielman.org/courses/geog5023/">http://www.sethspielman.org/courses/geog5023/</a>	
3	<a href="https://www.colorado.edu/geography/class_homepages/geog_4023_s08/">https://www.colorado.edu/geography/class_homepages/geog_4023_s08/</a>	

4	<a href="http://www.oxfordbibliographies.com/view/document/obo-9780199874002/obo-9780199874002-0053.xml">http://www.oxfordbibliographies.com/view/document/obo-9780199874002/obo-9780199874002-0053.xml</a>
5	<a href="https://searchworks.stanford.edu/view/923805">https://searchworks.stanford.edu/view/923805</a>

<b>Mapping with Programme Outcomes (MPO)*</b>					
<b>MPO</b>	<b>PSO 1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
<b>CO1</b>	1	1	2	1	2
<b>CO2</b>	1	1	3	1	1
<b>CO3</b>	1	2	1	1	1
<b>CO4</b>	1	1	1	1	1
<b>CO5</b>	1	1	1	2	2

Map **Course Outcomes (CO)** for each Course with **Programme Specific Outcomes (PSO)** in the 3-Point scale of **1,2, 3 (Strong, Medium and Low)**

<b>Course code:</b>	<b>P23GES11</b>	<b>REMOTE SENSING, AND GNSS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>SEC/AEC</b>	<b>Skill enhancement course-1</b>					

<b>Pre-requisite</b>	Basic knowledge in Remote sensing
<b>Course Objectives:</b>	
<ol style="list-style-type: none"> <li>1. Understand the purpose and importance of RS, GIS &amp; GNSS</li> <li>2. To provide background knowledge and understanding of principles of RS and GNSS Systems</li> <li>3. To enhance student's capacity to interpret images and extract information on the earth surface from multi-resolution imagery at multi-scale level.</li> </ol>	
<b>Unit - 1</b>	<b>Introduction to Remote Sensing</b>
Remote Sensing Process - Analog to Digital data – Digital image data formats - Image processing system characteristics - Initial statistical extraction: histograms, univariate and multivariate statistics – Scientific visualization – Image Pre-processing: calculating radiance from DNs - atmospheric, radiometric and geometric correction.	
<b>Unit- 2</b>	<b>Image Enhancement</b>
Contrast enhancement: linear, non-linear and level slicing – Spatial feature enhancement: spatial filtering, edge enhancement and Fourier and wavelet transform – multi-image enhancement – band ratioing, principal component analysis, vegetation indices, IHS and texture transformations and image fusion	
<b>Unit- 3</b>	<b>Image Classification:</b>
Supervised classification: classification algorithm and training site selection - Unsupervised classification – Hybrid classification – Classification of mixed pixels: spectral mixture analysis and fuzzy classification – Post classification smoothing – Ancillary data - Classification accuracy assessment - Artificial Neural Networks – Contextual Classification – Object-Oriented Classification	
<b>Unit - 4</b>	<b>BASICS OF GNSS</b>
Introducing Global Navigation Satellite System: GNSS Components, Satellite Orbit, Satellite Position on Orbital Plane, Signals, Reference System and Observation Techniques.	
<b>Unit - 5</b>	<b>Aerial &amp; Satellite Remote Sensing</b>
Aerial Remote Sensing: Aerial photographs: Classifications based on Camera, Film and Orientation –Photo scale - Parallax – Stereo model - Flight planning - Marginal information – Interpretation keys - LIDAR – Drone Satellite Remote Sensing: Satellite – Types, Orbits and Sensors – Resolution: types - aspects of LANDSAT, SPOT, IRS, IKONOS, QUIKBIRD and recent satellites – Marginal information and Interpretation – Applications of Microwave and Thermal Remote Sensing.	
<b>Unit - 6</b>	<b>Remote Sensing Image processing &amp; Applications in Geography</b>
Pre-processing: Rectification and Enhancements – Manipulation - Classification methods: Supervised and Unsupervised - Ground truth verification – Accuracy assessment -Vegetation Indices: VI and NDVI, Software: ERDA and ENVIS. Applications of Remote Sensing in Geography: Geomorphology, Water Resources, Disaster studies, Forestry, Agriculture, Land use and Land cover and Urban planning.	

	geometric properties of remotely sensed	
3	Developing data processing automation skills necessary to analyze high level remote sensing and GIS Products.	<b>K3, K6</b>
4	Familiarize with principles and methods of multi-resolutions and multi-spectral data fusion, multi- temporal processing and accuracy assessment.	<b>K1, K6</b>

**K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create**

**References**

1	Peter A. Burrough and Rachael A. McDonnell, 2011, Principles of Geographic Information Systems, Oxford University Press.
2	Ian Heywood, Sarah Cornelius and Steve Carver, An Introduction to Geographic Information System, 2010, third edition, Pearson Education Ltd.
3	David O' Sullivan and David J. Unwin, 2010, Geographic Information analysis, second edition, John Wiley & Sons.
4	Kang – Tsung Chang, 2018, Introduction to Geographical Information System, New York: McGraw-Hill Education, ISBN 9781259929649
5	Stephen R. Galati, 2006, Geographic Information Systems Demystified, ARTECH HOUSE, INC., ISBN-13: 978-1-58053-533-5.
6	Michael N. DeMers, 2009, GIS For Dummies, Wiley Publishing, Inc., ISBN: 978-0-470- 23682-6
7	Bhatta, Basudeb. Remote Sensing and GIS. India, OUP India, 2011.
8	Campbell, James B. Introduction to Remote Sensing. United Kingdom, Taylor & Francis, 2002. Joseph, George. Fundamentals of Remote Sensing. India, Universities Press, 2005.
9	Digital Image Processing. India, Tata McGraw Hill Education, 2009.
10	Jain, Anil K. Fundamentals of digital image processing. India, Prentice Hall, 1989.

**Expected Course Outcomes:**

1	Understand the basics of spatial structure of transportation network	<b>K2, K6</b>
2	Gain insights on processing methods and techniques for handling radiometric and	<b>K4, K5</b>

<b>Mapping with Programme Outcomes (MPO)*</b>					
<b>MPO</b>	<b>PSO 1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
<b>CO1</b>	1	1	2	1	2
<b>CO2</b>	1	1	3	1	1
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<b>CO4</b>	1	1	1	1	1
<b>CO5</b>	1	1	1	2	2
Map <b>Course Outcomes (CO)</b> for each Course with <b>Programme Specific Outcomes (PSO)</b> in the 3-Point scale of <b>1,2, 3 (Strong, Medium and Low)</b>					

