



**Anekant Education Society's
Tuljaram Chaturchand College, Baramati**

(Autonomous)

Two Year Degree Program in Geography

(Faculty of Science & Technology)

Revised Syllabus for

M.A. /M.Sc. (Geography) Part-II Semester -III

**For Tuljaram Chaturchand College, Baramati
Sem-III (2022 Pattern)**

Choice Based Credit System Syllabus (2022 Pattern)

To be implemented from Academic Year 2023-2024

Title of the Course: M.A. /M.Sc. (Geography)

Preamble

Introduction:

Tuljaram Chaturchand College has decided to change the syllabus of various faculties from June, 2022. Taking into consideration the rapid changes in science and technology and new approaches in different areas of Geography and related subjects, Board of Studies in Geography of Tuljaram Chaturchand College, Baramati - Pune has prepared the syllabus of M. A. /M.Sc. Geography Semester - III under the Choice Based Credit System (CBCS). The model curriculum as developed by U.G.C. is used as a guideline for the present syllabus.

A Master degree in geography will provide you the knowledge and skills you need to begin a variety of rewarding careers. Geographers work as urban planners, GIS technicians and analysts, disaster preparedness planners, teachers, environmental scientists, remote sensing analysts, transportation planners, demographers, hydrologists and in a variety of other areas. Students who complete Master degree in Geography, courses will examine the spatial organization of physical features and human activities at a variety of spatial scales from local to global. Students will be able to locate features on the surface of the earth, explain why they are located where they are, and describe how places are similar and/or different. Students will also examine human interactions with the environment and describe how physical and cultural landscapes change through time. Students completing physical geography courses will be able to describe the processes that drive earth's climate, create landforms, and govern the distribution of plants and animals. Students completing human geography will analyze and describe cultural phenomenon such as population, development, agriculture, language, and religion.

❖ **Aims and Objectives of the new curriculum:**

1. To maintain updated curriculum.
2. To take care of fast development in the knowledge of Geography.
3. To enhance the quality and standards of Geography Education.
4. To provide a broad common frame work, for exchange, mobility and free dialogue across the Indian Geography and associated community.
5. To create an aptitude for Geography in those students who show a promise for higher studies and creative work in Geography.
6. To create confidence in others, for equipping themselves with that part of
7. Geography which is needed for various branches of Sciences or Humanities in which they have aptitude for higher studies and original work.

Programme outcomes (Pos) (M.A. /M.Sc. Geography):

1. Ability of Problem Analysis: Student will be able to analyse the problems of physical as well as cultural environments of both rural and urban areas. Moreover, they will try to find out the possible measures to solve those problems.
2. Conduct Social Survey Project: They will be eligible for conducting social survey project, which is necessity for the assessment of development status of a particular group or section of the society.
3. Individual and teamwork: Works effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings.
4. Application of modern instruments: Students will be able to apply various modern instruments for data collection and field survey.
5. Application of GIS and modern Geographical Map Making Techniques: Students will learn how to prepare map based on GIS by using the modern geographical map-making techniques.
6. Critical Thinking: Students will able to understand and solve the critical problems of physical and cultural environment.
7. Development of Observation Power: As a student of Geography, they will be capable to develop their observation power through field experience and in future, they will be able to identify the socio-environmental problems of a locality.
8. Development of Communication Skill and Interaction Power: After the completion of the course, they will be efficient in their communication skill as well as power of social interaction.
9. Effective Citizenship: Demonstrate empathetic social concern and equity centred national development and the ability to act with an informed awareness of issues and participate in civic life through volunteering.
10. Enhancement of the ability of Management: Demonstrate knowledge and understanding of the management principles and apply these to their own work, as a member and leader in a team, to manage projects. They will perform effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
11. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions and accept responsibility for them.
12. Understand Environmental Ethics and Sustainability: Understand the impact of the acquired knowledge in societal and environmental contexts and demonstrate the knowledge of need for sustainable development.
13. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context social, environmental and technological changes.
14. Presentation Skill: Students are being able to understand and write effective reports and design credentials, make effective demonstrations, give and receive clear instruction

Anekant Education Society's
Tuljaram Chaturchand College,
Baramati

Autonomous
Board of Studies in Geography
 From 2022-23 to 2024-25

Sr.No.	Name	Designation
1.	Dr. Arun S. Magar	Chairman
2.	Dr. Asaram S. Jadhav	Member
3.	Mr. Vinayak D. Chavan	Member
4.	Mr.Sachin C. Memane	Member
5.	Ms. Akshta S. Raje	Member
6.	Dr. Santosh Lagad	Vice-Chancellor Nominee
7.	Dr. Pravin Kokane	Expert from other University
8.	Dr.T. P. Shinde	Expert from other University
9.	Dr. Babaji Maskare	Industry Expert
10.	Mr. Ganesh Ghanawat	Meritorious Alumni
11.	Ms. Aisha Tamboli	Student
12.	Mr. Sagar Lokhande	Student

M.A./M.Sc. GEOGRAPHY PROGRAMME CREDIT DISTRIBUTION PATTERN (110)

Class	Semester	Core Course	Elective Course			Ability Enhancement Compulsory Courses (AECC)		Total Credit
			Discipline Specific Elective	Dissertation Project	Generic Elective Course	Ability Enhancement Compulsory Courses	Skill Enhancement Courses	
M.Sc. I	I	4 papers 4 x 4= 16 Credits	-	-	HR – I 2 Credit CS – I 2 Credit	Communication Skill 2 Credit	2 Practical's = 8 Credits	30
	II	4 papers 4 x 4= 16 Credits	-	-	CS – II 2 Credit	-	2 Practical's = 8 Credits	26
M.Sc. II	III	3 papers 3 x 4= 12 Credits	Paper (A) 4 Credit <u>OR</u> Paper (B) 4 Credits	-	Introduction to Constitution 02 Credit	-	2 Practical's = 8 Credits Subject Related Skill Dev. Course 2 Credit	28
	IV	3 papers 3 x 4= 12 Credits	Paper (A) 4 Credit <u>OR</u> Paper (B) 4 Credits	1 Project = 4 Credits	-	-	1 Practical = 4 Credits Subject Related Skill Dev. Course 2 Credit	26
Total Credits		56	8	4	8	2	32	110

Mandatory 14 additional / add-on credits for Post Graduate Programmes**Note:**

1. 12credits from Group - 1 are compulsory
2. Choose minimum 2credits from Group - 2 to Group - 7

Group-1	Human Rights Awareness Course (Semester-I):		02 credit
	Cyber Security Awareness Course (Semester-I)		02 credit
	Cyber Security Awareness Course (Semester-II)		02 credit
	Introduction to Constitution (Semester –III)		02 credit
	Subject Related skill development courses (Sem III)		02 credit
	Subject Related skill development courses (Sem IV)		02 credit
Group-2 Skill Component Courses	1. Subject Related Certificate Course (Sem. II)		02 credits
Group-3	(a)	Representation in Sports at University Level	02 credits
	(b)	Representation in Sports at State Level / National level	02 credits
	(c)	Representation in Sports at International (overseas) Level	04 credits
Group-4	(a)	Selection in AVISHKAR at University Level	02 credits
Group-5	(a)	Research paper publication at National level	02 credits
	(b)	Research paper publication at International (overseas) level	02 credits
Group-6	(a)	Participation in Summer School/ Internship programme / Short term course (not less than 2 weeks duration)	02 credits
Group-7	(a)	Participation in cultural and co curricular activities/ extracurricular activities/competitions at University level / State Level	02 credit
	(b)	Participation in cultural and co curricular activities / extracurricular activities/ competitions at International (overseas) level	02 credits

Note:

1. One Credit = 15 Lectures.
2. The Project should be initiated at on the onset of III Semester and submitted during IV Semester.
3. Theory paper be covered with 70% actual teaching (3 actual lectures per week) and 30% Component (1 lecture per week) of self-study should be further evaluated through group discussion / Seminar / Open Book Test / MCQ / Essay writing / Assignment etc.

Structure of the Syllabus:**Semester – I**

Sr. No.	Course Code	Core Compulsory Theory Paper (CCTP)	Choice Based Optional Paper (CBOP)	Core Compulsory Practical Paper (CCPP)	Credit
1	PAGG111	Principles of Geomorphology	-	-	04
2	PAGG112	Principles of Climatology	-	-	04
3	PAGG113	Principles of Economic Geography	-	-	04
4	PAGG114	Principles of Population and Settlement Geography	-	-	04
5	PAGG115	-	-	Practical in Physical Geography	04
6	PAGG116	-	-	Practical in Human Geography	04
				Total Credits	24

Semester – II

Sr. No.	Course Code	Core Compulsory Theory Paper (CCTP)	Choice Based Optional Paper (CBOP)	Theory / Practical	Credit	Core Compulsory Practical Paper (CCPP)	Credit
1	PAGG 121	Geoinformatics – I					04
One of the following according to specialization from CCTP							
2	PAGG 122 (A)	Coastal Geomorphology	-	-	04	-	04
	PAGG 122 (B)	Synoptic Climatology	-	-	04	-	
	PAGG 122 (C)	Population Geography	-	-	04	-	
One of the following according to specialization from CCTP							
3	PAGG 123 (A)	Fluvial Geomorphology	-	-	04	-	04
	PAGG 123 (B)	Monsoon Climatology	-	-	04	-	
	PAGG 123 (C)	Geography of Rural Settlements	-	-	04	-	
Optional Paper (CBOP) (1 Theory + 1 Practical)							
4	PAGG 124			Geography of Disaster Management	04		08
	PAGG 125			Practical in Surveying	04		
Core Compulsory Practical Paper (CCPP)							
5	PAGG 126					Practical of Statistical Techniques for Geography	04
Total Credits of Semester – II							24

Semester – III

Course Code	Core Compulsory Theory Paper (CCTP)	Choice Based Optional Paper (CBOP)	Theory / Practical	Credit	Core Compulsory Practical Paper (CCPP)	Credit
PAGG 231	Geoinformatics-II	-	-	04	-	04
PAGG 232	Research Methodology	-	-	04	-	04
One of the following according to specialization from CCTP						
PAGG 233 (A)	Tropical Geomorphology	-	-	04	-	04
PAGG 233(B)	Agro-Meteorology	-	-	04	-	
PAGG 233(C)	Urban Geography			04		
Choice Based Optional Paper (CBOP) (1Theory + 1Practical)						
PAGG 234			Practical in GIS	04	-	08
PAGG 235			Watershed Management	04	-	
One of the following according to specialization from CCPP						
PAGG 236 (A)					Practical in Geomorphology	04
PAGG 236 (B)					Practical in Climatology	
PAGG 236(C)					Practical in Population and Settlement Geography	
Total Credits of Semester -III						24

Semester – IV

Course Code	Core Compulsory Theory Paper (CCTP)	Choice Based Optional Paper (CBOP)	Theory / Practical	Credit	Core Compulsory Practical Paper (CCPP)	Credit
PAGG 241	Geography of India	-	-	-	-	04
PAGG 242	Oceanography	-	-	-	-	04
PAGG 243	Geographical thoughts	-	-	-	-	04
Choice Based Optional Paper (CBOP) (1Theory + 1Practical)						
PAGG 244			Geography of Soils	04		04
PAGG 245			Practical in Remote Sensing	04		
Core Compulsory Practical Paper (CCPP)						
PAGG 246					Dissertation / Research Project	04
Total Credits of Semester - IV						24

Department of Geography
Course Structure for M.A / M.Sc. Geography
With effect from Academic Year 2022-2023

Sem.	Paper Code	Title	No. of Credits
I	PAGG 111	Principles of Geomorphology	04
	PAGG 112	Principles of Climatology	04
	PAGG 113	Principles of Economic Geography	04
	PAGG 114	Principles of Population and settlement Geography	04
	PAGG 115	Practical in Physical Geography	04
	PAGG 116	Practical in Human Geography	04
II	PAGG 121	Geoinformatics I	04
	PAGG 122 (A)	Coastal Geomorphology	04
	PAGG 122 (B)	Synoptic Climatology	04
	PAGG 122 (C)	Population Geography	04
	PAGG 123 (A)	Fluvial Geomorphology	04
	PAGG 123 (B)	Monsoon Climatology	04
	PAGG 123 (C)	Geography of Rural Settlement	04
	PAGG 124	Geography of Disaster Management	04
	PAGG 125	Practical In Surveying	04
	PAGG 126	Practical in Statistical Techniques for Geography	04
III	PAGG 231	Geoinformatics II	04
	PAGG 232	Research Methodology	04
	PAGG 233 (A)	Tropical Geomorphology	04
	PAGG 233 (B)	Agro-Meteorology	04
	PAGG 233 (C)	Urban Geography	04
	PAGG 234	Practical in GIS	04
	PAGG 235	Watershed Management	04
	PAGG 236 (A)	Practical in Geomorphology	04
	PAGG 236 (B)	Practical in Climatology	04
	PAGG 236 (C)	Practical in Population and Settlement Geography	04
PAGG SEC 01	Advanced Techniques in Google Earth	02	
IV	PAGG 241	Geography of India	04
	PAGG 242	Oceanography	04
	PAGG 243	Geographical Thoughts	04
	PAGG 244	Geography of Soils	04
	PAGG 245	Practical in Remote Sensing	04
	PAGG 246	Dissertation / Research Project	04
	PAGG SEC 02	Advanced Techniques in Google Map	02

M.A/M.Sc. Geography II SEM III**Subject: PAGG 231 Geoinformatics II**

No. of Credits: 04

Periods: 64

Learning Objectives:

1. Understand the basic concepts and principles of remote sensing, including its definition and historical development.
2. Explore electromagnetic radiation and spectrum, and how they interact with the atmosphere and Earth's surface.
3. Examine different remote sensing platforms and satellites, focusing on their types and characteristics.
4. To understand the concept and functioning of various sensors used in remote sensing.
5. Differentiate between across-track and along-track scanning systems, and their applications.
6. Study various types of Earth resources and meteorological satellites, including LANDSAT, IRS, and INSAT.
7. Learn the concepts of resolution and image interpretation techniques for analyzing remote sensing data.

Learning Outcomes:

By the end of the course, students will be able to:

1. Define remote sensing and explain its principles and history, with a focus on developments in India.
2. Explain the electromagnetic spectrum and describe how EM radiation interacts with the atmosphere and Earth's surface.
3. Identify and describe different types of remote sensing platforms and satellites, such as geo-stationary and sun-synchronous.
4. Understand and explain the basic principles and types of sensors used in remote sensing.
5. Differentiate between across-track (whiskbroom) and along-track (push broom) scanning systems.
6. Analyze Earth resource and meteorological satellites, and their applications in remote sensing.
7. Explain the concept of resolution in remote sensing and apply basic principles and techniques of image interpretation.

Topics and Learning points**Unit 1: Introduction to Remote Sensing****Lectures**

1. Remote Sensing: definition, concept
2. Principles of Remote sensing
3. History of Remote Sensing

12

4. Development of Remote Sensing in India

Unit 2: EMR and EMS

10

1. EM Radiation, EM Spectrum, Spectral Signature
2. Interaction of EMR with atmosphere
3. Interaction of EMR with Earth's surface
4. Black body radiation, Laws of radiation

Unit 3: Platforms and Satellites

1. Platform: Types and characteristics
2. Satellites: Geo-stationary and Sun synchronous
3. Earth Resources Satellites: LANDSAT, SPOT, IRS, IKONOS satellite series
4. Meteorological satellites: INSAT, NOAA, GOES

Unit 4: Sensors

14

1. Sensors: Concept and Basic Principles
2. Types of Sensors : Across track (whiskbroom) and Along track (push broom) scanning
3. Optical mechanical scanners: MSS, TM, LISS, WiFS, PAN

Unit 5: Resolution and Image Interpretation Techniques

14

1. Resolution concept and Principles
2. Types of Resolution – Spectral, Spatial, Radiometric
3. Basic principles, types, steps and elements of image interpretation
4. Techniques of visual interpretation and interpretation keys

Reference Books:

1. Anji Reddy, M. (2004): Geoinformatics for environmental management. B.S. Publications
2. Campbell, J.B. (2002): Introduction to Remote sensing. Taylor Publications.
3. Chang, T.K. (2002): Geographic Information Systems. Tata McGraw Hill
4. Drury, S.A. (1987): Image Interpretation in Geology. Allen and Unwin.
5. Francis Tar Bernhardsen. Geographical Information Systems. John Wiley.
6. Gupta, R.P. (1990): Remote Sensing Geology. Springer Verlag.
7. Heywood, I., Cornelius S, Crver Steve. (2003): An Introduction to Geographical Information Systems. Pearson Education
8. Jensen, J.R. (2000): RS of the Environment: An Earth resource Perspective Prentice Hall.
9. Joseph George (2003): Fundamentals of remote sensing. Universities Press.

Choice Based Credit System Syllabus (2022 Pattern)

Mapping of Program Outcomes with Course Outcomes**Class:** M.A./M.Sc. Geography I**Subject:** Geography**Course:** Geoinformatics II**Course Code:** PAGG 231**Weightage:** 1= Weak or low relation, 2= Moderate or partial relation, 3= Strong or direct relation

COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	1	2	3	2	2	2	2
CO2	3	1	2	3	2	2	3	3
CO3	3	1	2	3	2	2	3	3
CO4	3	1	2	3	2	2	2	3
CO5	3	1	2	3	2	2	3	3
CO6	3	1	2	3	3	2	3	3
CO7	3	1	2	3	3	2	3	3

Justification for the mapping

PO1 - Research-Related Skills: CO1, CO2, CO3, CO4, CO5, CO6, and CO7 involve scientific understanding, analysis, and research, showing a strong relation.

PO2 - Effective Citizenship and Ethics: CO1 has a weak relation due to the ethical aspects related to remote sensing technology, such as privacy.

PO3 - Social Competence and Communication Skills: CO1, CO2, and CO3 require explaining concepts and data communication, moderately linked to social competence.

PO4 - Disciplinary Knowledge: All COs are strongly related to the core knowledge and understanding of remote sensing and its applications.

PO5 - Personal and Professional Competence: CO1, CO3, and CO6 involve independent work and collaborative tasks, moderately linked to professional competence.

PO6 - Self-directed and Life-long Learning: CO1, CO2, and CO5 foster independent learning and adapting to new technology, encouraging life-long learning.

PO7 - Environment and Sustainability: CO2, CO3, CO6, and CO7 focus on environmental impacts and sustainability through remote sensing, showing strong relevance.

PO8 - Critical Thinking and Problem Solving: CO2, CO3, CO5, CO6, and CO7 involve critical thinking and problem-solving, particularly in analyzing satellite data and remote sensing applications.

Learning Objectives:

1. To provide an introduction to research methods and the research process.
2. To learn the principles of research design, data collection, data analysis, and interpretation.
3. To provide students with the skills necessary to design and conduct research studies.
4. To understand the methods of data collection and data analysis.
5. To aware the students with the research ethics and plagiarism.
6. To understand the importance of research ethics, plagiarism, and available research funding opportunities.
7. To develop skills for writing research reports, including dissertations, theses, and articles.

Learning Outcomes:

By the end of this course, students will be able to:

1. Understand the research process and different types of research designs
2. Identify research problems and formulate research questions
3. Choose appropriate research methods and data collection techniques
4. Analyze and interpret research data
5. Write research reports and communicate research findings effectively
6. Understand and apply research ethics, avoid plagiarism, and identify research funding opportunities.
7. Write structured research reports, including research papers, dissertations, and presentations.

Topics and Learning points**Unit 1: Introduction to Research Methodology****Lectures**

1. Meaning and objectives of research
2. Characteristics of Research
3. Types of Research
4. Various steps in Research Process
5. Research Methods versus Methodology

10**Unit 2: Research Problem and Research Design****12**

1. Definition and identification of the Research Problem

2. Technique involved in defining a problem
3. Definition and purpose of Research Design
4. Characteristics of Good Research Design

Unit 3: Sampling Design **12**

1. Sampling Design – Definition of Population, Sample and Sampling Design
2. Advantages and disadvantages of Sampling
3. Characteristics of a good sample
4. Types or method of sampling

Unit 4: Methods of data collection and data analysis **15**

1. Primary data: Questionnaire, Interview and Observation Method/Field Work Method
2. Sources of Secondary data
3. Hypothesis- definition and types
4. Measure for Central Tendency and Dispersion
5. Correlation and Regression and Time series Analysis
6. Parametric and non-parametric tests

Unit 5: Report writing and research ethics **15**

1. Dissertation and thesis, research paper, review article, short communication, conference presentation, meeting report, etc.
2. Structure and organization of research reports; literature review
3. Research ethics and plagiarism
4. Use of plagiarism detection software's
5. Research opportunities and funding agencies

Reference Books:

1. Gaum, Carl G., Graves, Harold F., and Hoffman, Lyne, S.S., (1950): Report Writing, 3rd ed., New York: Prentice-Hall.
2. Kothari, C.R. (2004): Research Methodology: Methods and Techniques, New Age International (P) Ltd., New Delhi – 110002.
3. Kothari, C.R., (1984): Quantitative Techniques, 2nd ed., New Delhi: Vikas Publishing House Pvt. Ltd.
4. Mishra Shanti Bhushan and Shashi A. (2011): Handbook of Research Methodology, Education Publishing, New Delhi – 110075.

5. Pandey, P. and Pandey, M.M. (2015): Research Methodology: Tools and Techniques, Bridge Center, Romania, European Union.
6. Tandon, B.C., (1979): Research Methodology in Social Sciences. Allahabad, Chaitanya Publishing House.
7. Ullman, Neil R. (1978): Elementary Statistics, New York: John Wiley & Sons, Inc.
8. Yamane, T., Statistics (1973): An Introductory Analysis, 3rd ed., New York: Harper and Row

Choice Based Credit System Syllabus (2022 Pattern)

Mapping of Program Outcomes with Course Outcomes**Class:** M.A./M.Sc. Geography I**Subject:** Geography**Course:** Research Methodology**Course Code:** PAGG 232**Weightage:** 1= Weak or low relation, 2= Moderate or partial relation, 3= Strong or direct relation

COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	1	2	3	2	2	2	3
CO2	3	1	2	3	2	2	2	3
CO3	3	1	2	3	2	2	2	3
CO4	3	1	2	3	2	2	2	3
CO5	3	1	3	3	2	2	2	3
CO6	3	3	2	3	2	2	2	3
CO7	3	2	3	3	2	2	2	3

Justification for the mapping

PO1 - Research-Related Skills: CO1 to CO7 are strongly related as they all focus on research, from understanding processes to writing structured research papers.

PO2 - Effective Citizenship and Ethics: CO6 shows a strong relation as it deals with research ethics and avoiding plagiarism. Other COs have a weak relation since they touch on ethics in research.

PO3 - Social Competence and Communication Skills: CO5 and CO7 are directly related to communication as they involve writing and presenting research findings. Other COs have a moderate relation to communication.

PO4 - Disciplinary Knowledge: All COs are strongly related, as they cover fundamental and applied research knowledge in various contexts.

PO5 - Personal and Professional Competence: COs show moderate relation as they involve professional skills in teamwork and collaboration during research activities.

PO6 - Self-directed and Life-long Learning: All COs promote independent learning, showing a moderate relation to life-long learning skills.

PO7 - Environment and Sustainability: The relation is moderate across COs as research may involve sustainable practices and environmental considerations depending on the research focus.

PO8 - Critical Thinking and Problem Solving: CO1 to CO7 all involve identifying research problems, selecting methods, and analyzing data, which shows a strong relation to problem-solving skills.

Learning Objectives:

1. To understand the tropical environment, its definition, peculiar climate, and classification.
2. To explore morphogenetic regions based on temperature, rainfall, humidity, and vegetation.
3. To study the formation and characteristics of tropical soils, with a focus on clay minerals and deep weathering profiles.
4. To understand duricrusts and laterites, their classification, properties, and distribution in the world and India.
5. To examine the development of landforms on laterites, and the theories of iron origin in laterites.
6. To analyze tropical landscapes, focusing on relief characteristics, slope, valley forms, and specific tropical landforms.
7. To study tropical planation surfaces, their formation, types, and morphology, including peneplains, pediplains, and etchplains.

Learning Outcomes:

By the end of the course, students will be able to:

1. Define the tropical environment and explain its climate peculiarities and classification.
2. Identify morphogenetic regions based on climatic factors like temperature and rainfall, and describe the vegetation found in these regions.
3. Analyze the factors affecting weathering in tropical regions, and explain the solubility and mobility of minerals.
4. Describe the process of soil formation in the tropics, focusing on tropical soils and the role of clay minerals.
5. Understand the definition, classification, and global distribution of duricrusts and laterites, including their properties.
6. Evaluate tropical landscapes, relief characteristics, and identify key landforms such as inselbergs, pediments, and tropical coasts.
7. Analyze the formation and morphology of planation surfaces, including peneplains, pediplains, and double surfaces of planation.

Topics and Learning points**Unit 1: Introduction to Tropics****Lectures**

1. Tropical Environment –Definition

12

2. Peculiarities of tropical climate

3. Classification of Tropics
4. Morphogenetic regions - Temperature, rainfall, humidity, vegetation

Unit 2: Tropical Weathering

12

1. Factors influencing the weathering
2. Solubility and Mobility of minerals in Tropics
3. Weathering profile: Deep weathering
4. Tropical Soils: Process of soil formation in Tropics, Clay minerals.

Unit 3: Duricrusts and Laterites**12**

1. Duricrusts and Laterites – Definition
2. Indurated laterites - Properties and world distribution
3. Classification by site, Morphology and chronology
4. A complete account of various divisions of Lateritic Profile
5. Landform development on laterites
6. Distribution of laterites in India
7. Theories of origin of iron in laterites

Unit 4: Tropical Landscape**14**

1. Tropical Terrain – Relief characteristics
2. Slope and valley forms
3. Domed and boulder inselbergs
4. Hill slopes and Pediments
5. Tropical coasts

Unit 6: Tropical Planation**14**

1. Formation and Types of planation surfaces
2. Morphology of planation surfaces
3. Peneplains, Pediplains, Etchplains
4. Double surface of planation

References Books:

1. Andrew Goudie, (1985): Duricrusts in tropical and subtropical landscapes, Allen Unwin, London.
2. Andrew Goudie, (1987): Environmental change.
3. Budel J. (1982) Climatic geomorphology, Princeton University Press.
4. Douglas J. & Spencer, (1985): Environmental change & Tropical geomorphology, George Allen & Unwin.
5. Feniran A. & Jeje L.K. (1983): Humid tropical geomorphology
6. Thomas, M. F. (1994): Geomorphology in the Tropics, John Wiley and Sons, Chichester
7. Thomas M.F. (1974): Tropical geomorphology, McMillan, London.
8. Tricart J. (1972): Landforms of the humid tropics, forests and Savanna, Longman, London.

Choice Based Credit System Syllabus (2022 Pattern)

Mapping of Program Outcomes with Course Outcomes

Class: M.A./M.Sc. Geography I**Subject:** Geography**Course:** Tropical Geomorphology**Course Code:** PAGG 233 (A)**Weightage:** 1= Weak or low relation, 2= Moderate or partial relation, 3= Strong or directrelation

COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	1	2	3	2	2	3	2
CO2	2	1	1	3	2	2	3	2
CO3	3	1	1	3	2	2	3	3
CO4	3	1	1	3	2	2	3	3
CO5	3	1	1	3	2	2	3	3
CO6	3	1	1	3	2	2	3	3
CO7	3	1	1	3	2	2	3	3

Justification for the mapping

PO1 - Research-Related Skills: CO3 to CO7 strongly align with research-related skills, such as analyzing tropical landscapes and landforms, weathering, and soil formation. These COs emphasize scientific enquiry, hypothesis formation, and literature-based research.

PO2 - Effective Citizenship and Ethics: All COs show a weak to moderate relationship with this PO, as they touch on understanding environmental issues and the ethical responsibility in preserving tropical environments.

PO3 - Social Competence and Communication Skills: CO1 to CO2 have a moderate link as these COs require presenting complex ideas on tropical climates and environments, though the emphasis is less on social aspects.

PO4 - Disciplinary Knowledge: All COs strongly relate to this PO, as they cover comprehensive knowledge of tropical environments, landforms, and geomorphological processes.

PO5 - Personal and Professional Competence: COs show a moderate relationship since independent analysis and teamwork are needed for field studies and interdisciplinary collaboration in understanding tropical regions.

PO6 - Self-directed and Life-long Learning: All COs demonstrate a moderate link with lifelong learning, as the study of tropical environments requires continuous learning, adapting to new research, and understanding environmental changes.

PO7 - Environment and Sustainability: COs strongly align with this PO, particularly CO1, CO3, and CO6, as they deal with tropical landscapes, weathering, soil formation, and environmental impacts that promote sustainable understanding.

PO8 - Critical Thinking and Problem-solving: COs 3 to 7 have a strong relation here since they involve analyzing and solving complex problems in tropical geomorphology, soil science, and landform studies.

Subject: PAGG 233 (B) Agro-Meteorology

No. of Credits: 04

Periods: 64

Learning Objectives:

1. This course covers the principles and applications of meteorology in agriculture.
2. Students will learn the fundamentals of climate, weather patterns, and their effects on crop growth and development.
3. The course also examines the use of weather information and forecasting techniques for agricultural decision-making.
4. Students will understand the impact of climate change on crop growth and development.
5. Apply RS and GIS techniques to monitor crop diseases and improve crop management.
6. Understand agro-climatic classifications, their importance, and regional distribution in India.
7. Analyze the impact of climate change on agriculture, with a focus on Indian agro-climatic regions.

Learning Outcomes:

By the end of the course, students will be able to:

1. Understand the fundamentals of meteorology and climatology
2. Describe the effects of climate and weather patterns on crop growth and development
3. Analyze the use of weather information in agricultural decision-making
4. Evaluate the role of agro-meteorology in sustainable agriculture
5. Explain the basic principles of RS and GIS and their relevance in agrometeorology.
6. Apply RS and GIS tools to detect crop diseases and enhance crop management practices.
7. Classify agro-climatic regions and describe their characteristics in the Indian context.

Topics and Learning points**Unit 1: Introduction to Agro meteorology****Lectures**

1. Meaning and definition
2. Nature and scope
3. Development of Agro meteorology
4. Importance of Agro meteorology

12**Unit 2: Plants: Energy and Moisture****16**

1. Plants and solar energy Factor affecting solar radiation within Plants
2. Factor affecting soil temperature
3. Importance of moisture for plants
4. Soil Moisture
5. Water stress and plant development

- Unit 3: Crop Growth and Development** **12**
1. Effects of weather on crop growth and development
 2. Relationship between weather and pests and diseases
 3. Mitigation strategies for weather related crops losses
 4. Impact of biological hazard on crops
- Unit 4: Application of RS and GIS in Agro Meteorology** **12**
1. Introduction to RS and GIS
 2. Use of RS and GIS in Agro Meteorology
 3. Application of RS and GIS in crop diseases
 4. Application of RS and GIS in crop management
- Unit 5 Agro Climatic Classification** **12**
1. Meaning and definition
 2. Agro Climatic region
 3. Agro Climatic region in India
 4. Impact of climate change on agriculture

References Books:

1. Climate and Agriculture: An Introductory Guide by Mark S. Rasmussen
2. Agro-meteorological Forecasting: Principles and Applications by Jyoti Prakash
3. Climate Change and Agriculture: An Introduction by Benjamin L. Allen.
4. Geiger, Rudolf (1966): The Climate near the Ground, Harward University Press.
5. Hobbs, John E. (1980): Applied Climatology, Dawson West View Press.
6. Lal, M. (ed.) (1993): Global Warming, Tata McGraw Hill, New York.
7. Mather, J.R. (1974): Climatology: Fundamentals and Applications, McGraw Hill, New York.
8. Oliver, John E. (1973): Climate and Man's Environment, John Wiley and Sons, New York.
9. Oliver, John E. (1981): Climatology, Selected Applications, V.H. Winston and Sons, London.

Choice Based Credit System Syllabus (2022 Pattern)

Mapping of Program Outcomes with Course Outcomes

Class: M.A./M.Sc. Geography I

Subject: Geography

Course: Agro-Meteorology

Course Code: PAGG 233 (B)

Weightage: 1= Weak or low relation, 2= Moderate or partial relation, 3= Strong or direct relation

COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	1	2	3	2	2	2	3
CO2	2	1	2	3	2	2	3	3
CO3	3	1	2	3	2	3	3	3
CO4	3	1	2	3	2	3	3	3
CO5	3	1	2	3	2	3	3	3
CO6	3	1	2	3	2	3	3	3
CO7	3	1	2	3	2	2	3	3

Justification for the mapping

PO1 - Research-Related Skills: CO1, CO3, and CO5-CO7 strongly align with this PO, as they involve understanding meteorology, agro-climatic regions, and using advanced tools like RS and GIS in research contexts.

PO2 - Effective Citizenship and Ethics: All COs have a weak to moderate relationship with this PO, as they touch on the role of sustainable agriculture, ethics in decision-making, and environmental awareness.

PO3 - Social Competence and Communication Skills: COs have a moderate link here as they require presenting complex information on climate and agricultural practices and using communication effectively to explain these concepts.

PO4 - Disciplinary Knowledge: All COs strongly align with this PO, particularly CO1-CO7, as they cover the fundamentals of meteorology, climatology, agro-meteorology, and related technologies.

PO5 - Personal and Professional Competence: COs have a moderate link to this PO since they require working in interdisciplinary fields and developing adaptability in agro-meteorological contexts.

PO6 - Self-directed and Life-long Learning: CO3-CO6 strongly relate to lifelong learning due to the evolving nature of weather forecasting, climate science, and the use of GIS in agriculture.

PO7 - Environment and Sustainability: COs 2, 4, and 7 have a strong alignment with this PO as they deal with sustainable agricultural practices and understanding the environmental impact of weather patterns and agro-climatic regions.

PO8 - Critical Thinking and Problem Solving: CO3-CO7 strongly relate to this PO since they involve critical analysis of weather patterns, soil conditions, and using technological tools to address agricultural challenges.

Subject: PAGG 233(C) Urban Geography

No. of Credits: 04

Periods: 64

Learning Objectives:

1. To enable the students to understand different urban definitions and concepts.
2. To acquaint the students different models related to urban and cities.
3. Students can learn classification of cities.
4. Students can understand morphology of cities.
5. Explore Christaller's Central Place Theory and understand the hierarchy of urban settlements.
6. Identify major urban issues such as housing, transport, and environmental problems.
7. Understand urban planning policies, including the role of GIS in city planning.

Learning Outcomes:

By the end of the course, students will be able to:

1. Know migration status in urban sector.
2. Acquaint the difference between rural and urban sector.
3. Familiarize with the classification of Towns and Cities.
4. Understand the demographical structure of cities in India and world.
5. To understand the rank-size relationship and hierarchy of urban areas.
6. Identify and explain key urban issues like land prices, slums, civic amenities, and pollution.
7. Evaluate urban development policies in India and the need for effective urban planning.

Topics and Learning points**Unit 1: Urbanization****Lectures**

1. Meaning of Urban settlement and urbanization.
2. Review of spatial- temporal variations in urbanization in the world
3. Urbanization curve
4. Contemporary factors of urbanization

12**Unit 2: Urban Morphology****12**

1. Models of urban structure:

2. Park and Burgess Model
3. Homer Hoyet Model
4. Harris and Ullman Model
5. Characteristics and demarcation of CBD

Unit – 3: Urban Characteristics and Classification **12**

1. Growth of Urban population
2. Density of population incites
3. Age, sex and occupational structure
4. Criteria used for classification
5. Functional classification of towns and cities

Unit – 4: Central Place **12**

1. Christaller's Central Place Theory
2. Rank-size relationship and rank- size rule
3. Hierarchy of urban settlements

Unit – 5: Urban issues, policies and planning **16**

1. Price of land and vertical and horizontal growth of cities
2. Scarcity of housing and growth of slums
3. Problems of civic amenities
4. Urban transport problem
5. Urban Environmental pollution
6. Urban development policy in India
7. Need &Element of city plan
8. Use of GIS in Urban Planning

References Books:

1. Bhattacharya: Urban Development in India, Shreepublication
2. Brian, R.K. (1996): Landscape of Settlement Prehistory to present, Routledge,London
3. Careter (1972): Fourth edition: The study of Urban Geography, Arnold,London
4. Hall P. (1992): Urban and Regional Planning, Routedge,London
5. K. Siddharth and S. Mukherji : Cities, Urbanization and UrbanSystems
6. Kundu, A. (1992): Urban Development and Urban Research in India, Khanna Publication

7. Mayer and Kohan: Readings in Geography
8. Northam: Urban Geography
9. Roy Turner: Indian's Urban Future
10. R.B Mandal-V.G A Textbook (Concept publishing Company)
11. Shah Manzoor Alam: Urbanization in Developing Countries
12. Singh.K.and Steinberg.F. (eds)(1998): Urban India in Crisis. New Age Interns
13. Urban Geography: Tim Hall
14. Verma: Urban Geography, Rawat, Jaipur

Choice Based Credit System Syllabus (2022 Pattern)

Mapping of Program Outcomes with Course Outcomes**Class:** M.A./M.Sc. Geography I**Subject:** Geography**Course:** Urban Geography**Course Code:** PAGG 233(C)**Weightage:** 1= Weak or low relation, 2= Moderate or partial relation, 3= Strong or directrelation

COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	2	3	2	2	2	3
CO2	2	2	2	3	2	2	2	3
CO3	3	1	2	3	2	2	2	3
CO4	3	2	2	3	2	2	2	3
CO5	2	2	2	3	2	2	2	3
CO6	3	2	2	3	2	2	3	3
CO7	3	3	2	3	2	2	3	3

Justification of CO-PO Mapping

PO1 - Research Skills: CO1, CO3, CO4, CO6, and CO7 strongly align as they involve investigating urban issues, policies, and migration patterns.

PO2 - Citizenship and Ethics: CO7 has a strong link due to its focus on urban policies, while CO1-CO6 moderately involve ethical aspects of urbanization.

PO3 - Communication Skills: COs moderately require communication and presentation of complex urban data.

PO4 - Disciplinary Knowledge: All COs, especially CO1-CO7, provide a strong theoretical grounding in urban studies.

PO5 - Personal Competence: COs have moderate links as they require teamwork and adaptability in urban planning.

PO6 - Life-long Learning: CO1-CO7 involve continuous learning due to evolving urban issues.

PO7 - Environment and Sustainability: CO6 and CO7 focus on sustainable urban development, making them strongly aligned.

PO8 - Critical Thinking and Problem Solving: CO1-CO7 involve analyzing urban issues and policies, requiring critical thinking and problem-solving skills.

Subject: PAGG 234 Practical in GIS

No. of Credits: 04

Periods: 64

Learning Objectives:

1. To understand aerial photography techniques, including scale, height measurement, and interpretation of single and stereo images.
2. To interpret satellite images from various sensors such as LISS, PAN, WiFS, and thermal and radar images.
3. To generate spatial database layers using raster and vector data structures.
4. To learn GIS data input techniques, including attribute and spatial data input, and linking them with geographic features.
5. To develop skills in spatial data analysis, including classification, reclassification, and overlay analysis.
6. To perform raster-based analysis, such as slope and aspect calculations, buffering, and cost-distance analysis.
7. To apply vector-based techniques, including map manipulation, buffering, overlay, and network analysis.

Learning Outcomes:

By the end of the course, students will be able to:

1. Measure scale and height using parallax bars and interpret aerial photographs using visual and stereoscopic techniques.
2. Visually interpret satellite images from sensors like LISS, PAN, IKONOS, and analyze thermal and radar images.
3. Create and manage spatial database layers using raster and vector data, ensuring accuracy and topology.
4. Input attribute and spatial data into GIS software, perform queries, and link data with geographical features for analysis.
5. Analyze spatial data using classification schemes for both raster and vector GIS operations.
6. Conduct raster-based analysis for slope, aspect, buffering, and cost-distance calculations to solve spatial problems.
7. Utilize vector-based GIS techniques for map manipulation, overlay, buffering, and network analysis for spatial insights.

Topics and Learning points**Unit 1: Aerial Photography Measurements and Interpretation****Lectures**

1. Scale and height (using parallax bar)
2. Visual Interpretation of single aerial photograph
3. Interpretation of stereo pair using Stereoscope

Unit 2: Satellite Images

10

1. Visual interpretation of LISS, PAN, WiFS
2. Cartosat Data, IKONOS and Quick Bird
3. Visual Interpretation of thermal and Radar image

Unit 3: Spatial Database Layer Generation **14**

1. Raster: Full Grid, Chain Codes and Run Length Codes
2. Vector: Manual Digitization, Digitization Errors and Topology Building

Unit 4: GIS data input **14**

1. Attribute data input creation of schema, tables data definition, data updating, queries on tables, simple –complex query with two or more tables using SQL.
2. Spatial data input – With AutoCAD map software scanning on screen digitization, editing, topography creation, linear and area measurements, linking of attribute data with geographical features.

Unit 5: Spatial data analysis techniques **14**

1. Classification Scheme of Vector-Based and Raster-Based GIS Operations
2. Raster-Based Techniques: Methods of Reclassification, Overlay Analysis, Slope and Aspects, Buffering, Cost-Distance Calculation
3. Vector-Based Techniques: Map Manipulation Techniques, Buffering, Overlay Analysis, Network Analysis
4. Digital Terrain Analyses and Modelling: TIN and DEM, Surface Representation & Analysis.

Reference Books:

1. Burrough, P.A. and R.A. McDonnell (2000): Principles of Geographical Information System, Oxford University Press.
2. Chang Kang-tsung. (2002): Introduction to GIS, Tata McGraw Hill, New Delhi.
3. C. P. Lo and Albert, K. W. Yeung (2002): Concepts and Techniques of Geographic Information System, 2002 Prentice –Hall, India.
4. George Joseph (2003): Fundamentals of Remote Sensing, Universities Press, Hyderabad
5. Kang – Tsung – Chang, (2002): Introduction to Geographical Information System, McGraw Hill.
6. J. R. Jensen, (2003) : Remote Sensing of Environment, An Earth Resource Perspective, Pearson Education Pvt. Ltd., New Delhi

7. P. A. Burrough and R. A. McDonnell, (2000): Principles of Geographical Information System, Oxford University Press.
8. Paul A. Lonfley, Michel F. Goodchild, D J. Maguire and D.W. Rhind (2002): Introduction to Geographic Information Systems and Science, John Wiley and Sons Ltd.
9. Vaidyanadhan, R. (1973): Index to a set of 70 aerial stereopairs, UGC, New Delhi.

Choice Based Credit System Syllabus (2022 Pattern)

Mapping of Program Outcomes with Course Outcomes**Class:** M.A./M.Sc. Geography I**Subject:** Geography**Course:** Practical in GIS**Course Code:** PAGG 234**Weightage:** 1= Weak or low relation, 2= Moderate or partial relation, 3= Strong or directrelation

COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	1	2	2	2	1	1	2
CO2	3	1	2	2	2	1	1	2
CO3	3	1	2	3	3	2	1	2
CO4	3	1	2	3	3	2	1	2
CO5	3	1	2	3	3	2	1	2
CO6	3	1	2	3	3	2	1	2
CO7	3	1	2	3	3	2	1	2

Justification of CO-PO Mapping

PO1 - Research Skills: All COs (CO1 to CO7) require strong research skills as they involve interpreting data, analyzing images, and creating databases, necessitating the ability to formulate and test hypotheses.

PO2 - Citizenship and Ethics: There is a weak relation here as ethical considerations in GIS applications exist but are not the main focus of the COs.

PO3 - Communication Skills: COs require moderate communication skills for presenting analyses and findings, especially in collaborative settings, hence the moderate ratings.

PO4 - Disciplinary Knowledge: COs 3 to 7 have a strong relation as they demonstrate comprehensive knowledge of GIS and spatial analysis techniques.

PO5 - Personal Competence: COs demonstrate the ability to work both independently and in teams, with a moderate level of interpersonal skills required.

PO6 - Life-long Learning: While not a primary focus, the need to stay updated with technological advancements in GIS links COs with life-long learning. Hence, the low ratings.

PO7 - Environment and Sustainability: The relevance of environmental impacts is acknowledged but not heavily emphasized in the COs.

PO8 - Critical Thinking and Problem Solving: All COs require strong critical thinking to analyze and solve spatial problems effectively, resulting in high ratings.

Learning Objectives:

1. To understand the basic concepts of watershed management and its importance.
2. To learn the principles of watershed management and recognize the problems associated with it.
3. To identify key characteristics of watersheds, including size, shape, climate, and land use.
4. To understand the hydrological processes in watersheds, such as precipitation, infiltration, and surface runoff.
5. To learn methods of water conservation in watersheds using techniques like nala bunding, check dams, and farm ponds.
6. To explore soil conservation practices such as contour bunding, gully plugging, and leveling.
7. To apply Remote Sensing (RS) and GIS technologies for effective watershed management.

Learning Outcomes:

By the end of this course, students will be able to:

1. Define watershed and watershed management, and explain the necessity of managing watersheds.
2. Analyze the principles and identify challenges in implementing watershed management.
3. Delineate watersheds and assess their characteristics, such as physiography, climate, and vegetation.
4. Explain the key hydrological processes in a watershed, including evaporation, infiltration, and the water budget.
5. Implement water conservation techniques like nala bunding, check dams, and artificial recharge systems.
6. Apply soil conservation strategies, including contour bunding and gully plugging, to prevent erosion.
7. Utilize Remote Sensing (RS) and GIS for planning and managing watersheds.

Topics and Learning points**Unit 1: Concept of watershed management****Lectures**

1. Definition, concepts of watershed; watershed management,
2. Principle of watershed management
3. Necessity of watershed management
4. Problems in watershed management

12**Unit 2: Characteristics of watershed****10**

1. Delineation of Watershed

2. Characteristics: Size , Shape , Physiography , Climate, Drainage,
Land use, Vegetation, Geology and Soils

Unit 3: Hydrological process in watershed **15**

1. Precipitation, interception, infiltration, evaporation, evapo-transpiration, Surface runoff, ground water-flow, water budget
2. Hydrological cycle

Unit 4: Water and soil conservation in watershed **15**

1. Water conservation:
Nala Bunding, Check dams, Farm ponds, Percolation tanks, Artificial recharge
2. Soil conservation-
Contour Bunding, Gullyplugging, Trench cum mound, Levelling

Unit 5: Watershed development **12**

1. Application of Remote Sensing and GIS in watershed management
2. Integrated watershed development plans
3. Importance of watershed management in national development

Reference Books:

1. Dhruvanarayana, V.V., Sastry, G., Patnaik, U.S.: Watershed Management
2. Kakde, B.K.: Watershed Manual – A Guide for Watershed Development Practitioners and Trainers, BAIF Development Research Foundation, Pune.
3. Murthy, JVS: Watershed Management, New age International Publishers.
4. Rajesh Rajora: Integrated Watershed Management- A Field Manual for Equitable, Productive and Sustainable Development, Rawat Publication, Jaipur.
5. Singh Rajvir: Watershed Planning and Management, 2nd Edition, Yash Publishing House, Bikaner, India.
6. Suresh,R.: Soil and Watershed Conversation Engineering, 2nd Edition, Standard Publication Distributors, Delhi.
7. Schwab,G.O. et al: Soil and Water Conservation Engineering, 4th Edition, John Wiley & Sons.

Choice Based Credit System Syllabus (2022 Pattern)

Mapping of Program Outcomes with Course Outcomes

Class: M.A./M.Sc. Geography I**Subject:** Geography**Course:** Watershed Management**Course Code:** PAGG 235**Weightage:** 1= Weak or low relation, 2= Moderate or partial relation, 3= Strong or directrelation

COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	2	3	2	1	3	2
CO2	3	2	2	3	2	1	3	2
CO3	3	2	2	3	2	1	3	2
CO4	3	2	2	3	2	1	3	2
CO5	3	2	2	3	3	1	3	2
CO6	3	2	2	3	3	1	3	2
CO7	3	2	2	3	3	1	3	2

Justification of CO-PO Mapping

PO1 - Research Skills: All COs (CO1 to CO7) require strong research skills to define, analyze, and Implement Watershed Management Techniques, Making It A Direct Relation.

Po2 - Effective Citizenship And Ethics: There Is A Moderate Relation Since Understanding And Managing Watersheds Involves Ethical Considerations, Especially In Addressing Community Needs And Environmental Impacts.

Po3 - Social Competence And Communication Skills: A Moderate Relationship Exists Because Communicating The Complexities Of Watershed Management And Engaging With Communities Are Essential Skills, Though Not The Primary Focus.

Po4 - Disciplinary Knowledge: There Is A Strong Relation As All Cos Demonstrate A Comprehensive Understanding Of Hydrology, Watershed Characteristics, And Conservation Techniques.

Po5 - Personal And Professional Competence: The Ability To Work Independently And Collaboratively Is Important For Implementing Watershed Management Practices, Leading To Moderate To Strong Relations Depending On The Specific Co.

Po6 - Self-Directed And Life-Long Learning: The Relation Is Weak As The Primary Focus Of The Cos Is On Applied Knowledge Rather Than Individual Learning Journeys.

Po7 - Environment And Sustainability: A Strong Relation Exists Because Effective Watershed Management Is Crucial For Sustainable Environmental Practices, Conservation, And Resource Management.

Po8 - Critical Thinking And Problem Solving: There Is A Moderate To Strong Relation As All Cos Involve Critical Analysis And Problem-Solving To Address Challenges In Watershed Management.

Subject: PAGG 236 (A) Practical in Geomorphology

No. of Credits: 04

Periods: 64

Learning Objectives:

1. To understand geomorphological mapping techniques.
2. To analyze hill slope characteristics using measurement tools.
3. To conduct field surveys to collect geomorphological data.
4. To collect and analyze soil and sediment samples.
5. To utilize GPS technology for geomorphological mapping.
6. To gain familiarity with topographical maps.
7. To apply laboratory techniques for sediment analysis.

Learning Outcomes:

By the end of the course, students will be able to:

1. Prepare geographic maps of small areas and interpret landforms and processes.
2. Use clinometers and topographic profiles to identify and analyze hill slope segments proficiently.
3. Survey and plot channel cross-sections, beach profiles, and hill slope profiles effectively.
4. Conduct soil and sediment analysis and interpret results, including grain size parameters competently.
5. Use GPS for field surveys and prepare geomorphological maps skillfully.
6. Identify landforms and interpret topographical maps using contour lines accurately.
7. Plot data on probability graphs and estimate sediment grain size parameters proficiently.

Topics and Learning points

Unit 1: Geomorphological mapping	Lectures
1. Chart showing symbols	14
2. Preparing a geographic map of a small area / basin –toposheets /field	
3. Interpretation of the map in terms of forms and processes	
Unit 2: Hill slope Analysis	16
1. Direct and indirect measurements	

2. Using clinometers / profiles from toposheets,
3. Identification of segments
4. Dalrymple et al's nine- unit landsurface model- Understanding nature of processes

Unit 3: Field Survey

14

1. Channel cross sections/ Beach/Hill slope profile Soil/sediment sample collection
2. Surveying and plotting of stream or gully channel cross-section or beach profile or slope profile.
3. Quadrat or Traverse survey of sediment size on river bed beach.
4. Analysis of shape and size of coarse sediment (Zingg's classification)
5. GPS survey
6. Preparation of beach, river channel map setc. using GPS

Unit 4: Laboratory work**14**

1. Soil/Sediment analysis
2. Analysis of 1 sandy and 1 Clayey sample
3. Plotting of data on probability graph paper
4. Estimation of grain size parameters
5. Interpretation of results

Unit 5: Topographical maps**06**

1. Introduction to topographical map
2. Identification of landforms using contour
3. Interpretation of topographical map

Reference Books:

1. Aackombe, R. V. and Gardiner, V. (1983): Geomorphological Field Manual
2. Chorley, R. J., Schumm, S. A. and Sugden, D.E. (1984) : Geomorphology, Methuen, London
3. Goudie, A. (1990): Geomorphological Techniques, Unwin Hyman, London
4. Hart, M. G. (1986): Geomorphology, Pune and Applied Geomorphology, George Allen and Unwin
5. Kale, V. S. and Gupta, A. (2001): Introduction to Geomorphology, Orient Longman, Calcutta
6. King, C.A.M. (1966): Techniques in Geomorphology, Edward Arnold, London George Allen and Unwin, London

Choice Based Credit System Syllabus (2022 Pattern)

Mapping of Program Outcomes with Course Outcomes

Class: M.A./M.Sc. Geography I**Subject:** Geography**Course:** Practical in Geomorphology**Course Code:** PAGG 236 (A)**Weightage:** 1= Weak or low relation, 2= Moderate or partial relation, 3= Strong or direct relation

COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	2	3	2	1	3	2
CO2	3	2	2	3	2	1	3	2
CO3	3	2	2	3	2	1	3	2
CO4	3	2	2	3	2	1	3	2
CO5	3	2	2	3	3	1	3	2
CO6	3	2	2	3	3	1	3	2
CO7	3	2	2	3	3	1	3	2

Justification of CO-PO Mapping

PO1 - Research Skills: All COs (CO1 to CO7) require strong research skills to define, analyze, and implement watershed management techniques, making it a direct relation.

PO2 - Effective Citizenship and Ethics: There is a moderate relation since understanding and managing watersheds involves ethical considerations, especially in addressing community needs and environmental impacts.

PO3 - Social Competence and Communication Skills: A moderate relationship exists because communicating the complexities of watershed management and engaging with communities are essential skills, though not the primary focus.

PO4 - Disciplinary Knowledge: There is a strong relation as all COs demonstrate a comprehensive understanding of hydrology, watershed characteristics, and conservation techniques.

PO5 - Personal and Professional Competence: The ability to work independently and collaboratively is important for implementing watershed management practices, leading to moderate to strong relations depending on the specific CO.

PO6 - Self-Directed and Life-Long Learning: The relation is weak as the primary focus of the COs is on applied knowledge rather than individual learning journeys.

PO7 - Environment and Sustainability: A strong relation exists because effective watershed management is crucial for sustainable environmental practices, conservation, and resource management.

PO8 - Critical Thinking and Problem Solving: There is a moderate to strong relation as all COs involve critical analysis and problem-solving to address challenges in watershed management.

Subject: PAGG 236 (B) Practical in Climatology

No. of Credits: 04

Periods: 64

Learning Objectives:

1. To understand instrumentation and measurement techniques for various weather elements.
2. To learn the signs and symbols used in station models and how to decode them.
3. To apply knowledge of lapse rates, including environmental, dry adiabatic, and wet adiabatic lapse rates.
4. To compute and interpret water balance in meteorological studies.
5. To gain familiarity with the structure and content of daily weather reports from the Indian Meteorological Department (IMD).
6. To interpret weather reports accurately using symbols and terminology.
7. To develop practical skills in measuring weather elements using various instruments.

Learning Outcomes:

By the end of the course, students will be able to:

1. Ability to measure temperature, pressure, precipitation, and humidity using appropriate techniques.
2. Proficient in decoding and interpreting station models to represent weather data visually.
3. Capability to calculate and analyze environmental, dry adiabatic, and wet adiabatic lapse rates.
4. Competence in computing and interpreting water balance for understanding hydrological processes.
5. Familiarity with daily weather reports from the IMD, including their structure and meaning.
6. Skill in interpreting weather reports by understanding the relevant signs and symbols.
7. Practical experience in using weather instrumentation for data collection.

Topics and Learning points**Unit 1: Weather Elements****Lectures**

- A. Instrumentation and measurement techniques of weather elements
1. Temperature measurement techniques
 2. Pressure measurement techniques
 3. Precipitation measurement techniques
 4. Humidity measurement techniques

16**Unit 2: Station Model****16**

1. Sign and Symbol

2. Rules for decoding
3. Exercise on Station model
4. Interpretation of station model

Unit 3: Lapse rate	12
1. Exercise on environmental lapse rate	
2. Exercise on dry adiabatic lapse rate	
3. Exercise on wet adiabatic lapse rate	
Unit 4: Water Balance	12
1. Computation of water balance	
2. Interpretation of water balance	
Unit 5: Interpretation of weather report of IMD	08
1. Introduction to daily weather report	
2. Sign and Symbol	
3. Interpretation of weather report	

Reference Books:

1. Indian Daily Weather Report, IMD, Pune.
2. Oliver, John E. (1973): Climate and Man's Environment, John Wiley and Sons, New York.
3. Thornthwaite, C. W. and Mather, J. R. (1957): Instructions and Tables for computing potential evapo-transpiration and water balance, Drexel Institute of Technology, Laboratory of Climatology.
4. WMO No. 8 (1983): Guide to Meteorological Instruments and Methods of Observation
5. Navarra, J. G. (1979): Atmosphere, Weather and Climate, W. B. Saunders Company, Philadelphia.

Choice Based Credit System Syllabus (2022 Pattern)

Mapping of Program Outcomes with Course Outcomes**Class:** M.A./M.Sc. Geography I**Subject:** Geography**Course:** Practical in Climatology**Course Code:** PAGG 236 (B)**Weightage:** 1= Weak or low relation, 2= Moderate or partial relation, 3= Strong or direct relation

COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	2	2	3	2	1	2
CO2	3	2	2	2	3	2	1	2
CO3	3	2	2	2	3	2	1	2
CO4	3	2	2	3	3	2	1	2
CO5	3	2	2	2	3	2	1	2
CO6	3	2	2	2	3	2	1	2
CO7	3	2	2	2	3	2	1	2

Justification of CO-PO Mapping

PO1 - Research Skills: All COs (CO1 to CO7) require strong research skills to measure, analyze, and interpret various meteorological data, making it a direct relation.

PO2 - Effective Citizenship and Ethics: There is a moderate relationship, as understanding weather data and reports contributes to informed decision-making and awareness of environmental issues.

PO3 - Social Competence and Communication Skills: The relationship is moderate, as the ability to decode and interpret weather information can enhance communication, but it is not the primary focus of the COs.

PO4 - Disciplinary Knowledge: A strong relationship exists, as all COs are centered on the application of meteorological principles, including understanding environmental processes and weather data.

PO5 - Personal and Professional Competence: There is a strong relation since proficiency in measuring and interpreting weather data is essential for professional competence in meteorology and related fields.

PO6 - Self-Directed and Life-Long Learning: The relation is moderate, as knowledge of weather and environmental principles promotes a habit of continuous learning and adaptation.

PO7 - Environment and Sustainability: The relation is weak, as while environmental considerations are important, the focus of the COs is primarily on technical skills rather than sustainability practices.

PO8 - Critical Thinking and Problem Solving: There is a moderate relationship since interpreting weather data and reports requires critical thinking and analytical skills to make sense of complex information.

Learning Objectives:

1. To understand demographic indices such as mean age at marriage, fertility, mortality rates, and dependency ratios.
2. To analyze the determinants of demographic transition, particularly in the context of Maharashtra.
3. To learn methods for population projection and the use of demographic indices like the Human Development Index and Gender Development Index.
4. To explore models in settlement geography, including gravity models and urbanization curves.
5. To apply indices for Central Business Districts (CBD) and rank-size rules in settlement analysis.
6. To develop skills in conducting village surveys and urban studies.
7. To prepare effective questionnaires and collect relevant population and settlement data.

Learning Outcomes:

By the end of the course, students will be able to:

1. Ability to calculate and interpret demographic indices, including mean age at marriage, measures of fertility and mortality, and dependency ratios.
2. Proficient in analyzing demographic transition factors and migration patterns through correlation matrices.
3. Capability to project population using linear regression and assess human and gender development indices.
4. Understanding of settlement geography models, including gravity models and urbanization stages.
5. Skill in applying indices of Central Business Districts and analyzing rank-size relationships in population distributions.
6. Competence in preparing questionnaires for surveys and effectively collecting population and settlement data.
7. Ability to analyze rural and urban sprawl using spatial and temporal data derived from satellite images.

Topics and Learning points

Unit 1: Demographic indices

12

1. Mean age at marriage

2. Measures of fertility
3. Measures of mortality, IMR &A.S.D.R Dependency ratio

Unit 2: Determinants of Demographic transition: 12

1. Demographic transition-applied to Maharashtra
2. Pull-push factors affecting volume of migration-simple correlation Matrix
3. Rural urban composition of population

Unit 3: Population Projection and index 12

1. Population projection using linear equation regression
2. Human development index
3. Gender development index

Unit 4: Models in Settlement Geography**12**

1. Gravity model by W.J.Reilly and Zipf, its application,
2. Indices of C.B.D
3. Stages according to urbanization curve
4. Rank size rule
5. Gini's Coefficient concentration index

Unit 5: Village Survey/ Urban Study**16**

1. Preparation of questionnaire
2. Collection of Population and settlement data
3. Rural / Urban Sprawl
4. Spatial and temporal analysis using images of satellite
5. Data analysis and preparation of report

Reference Books:

1. Economic and Political weekly-Special issue of populationsurvey
2. Liendzore J.M Techniques in HumanGeography
3. Martin Cad: Analytical UrbanGeography
4. Siddharth,K and Mukherjee,S (1999): Cities urbanization and urbansystems
5. Chandana,R,.C.Population,Geography
6. Yeats,M.H.(1978): An introduction to quantitative analysis in humanGeography.
7. Carter Harold: UrbanGeography
8. John R.Weeks: Population – an introduction to concepts andissues.

Choice Based Credit System Syllabus (2022 Pattern)

Mapping of Program Outcomes with Course Outcomes**Class:** M.A./M.Sc. Geography I**Subject:** Geography**Course:** Practical in Population and Settlement Geography**Course Code:** PAGG 236 (C)**Weightage:** 1= Weak or low relation, 2= Moderate or partial relation, 3= Strong or directrelation

COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	2	1	3	2	1	2
CO2	3	2	2	1	3	2	1	2
CO3	3	2	2	1	3	2	1	2
CO4	2	2	2	3	3	2	1	2
CO5	2	2	2	3	3	2	1	2
CO6	3	2	2	1	3	2	1	2
CO7	3	2	2	2	3	2	1	2

Justification of CO-PO Mapping**PO1 - Research-Related Skills:**

Strong (3): All COs require the ability to analyze and interpret demographic data, necessitating strong research skills and scientific inquiry.

PO2 - Effective Citizenship and Ethics:

Moderate (2): Understanding demographic indices and their implications on society fosters social awareness and ethical considerations.

PO3 - Social Competence and Communication Skills:

Moderate (2): While COs emphasize data analysis, the ability to present findings and accommodate diverse views in discussions is relevant but secondary.

PO4 - Disciplinary Knowledge:

Strong (3): Many COs involve applying theoretical knowledge of demographics and settlement geography models, establishing a strong link.

PO5 - Personal and Professional Competence:

Strong (3): COs require collaboration in projects, and professional skills are necessary for tasks like survey preparation and analysis.

PO6 - Self-Directed and Life-Long Learning:

Moderate (2): Understanding and applying demographic principles promotes ongoing learning, though it is not the main focus of the COs.

PO7 - Environment and Sustainability:

Weak (1): While some COs may touch on sustainability in population distribution, the primary focus is on demographic analysis rather than environmental impact.

PO8 - Critical Thinking and Problem Solving:

Moderate (2): Analyzing demographic data involves critical thinking and problem-solving, though it is more focused on technical skills than broader problem-solving contexts.

UAGG SEC01: Advanced Techniques in Google Earth

No of Credits: 02

Periods: 32

Learning Objectives:

1. To understand the interface and tools available in Google Earth Pro.
2. To learn how to customize Google Earth Pro preferences for a better user experience.
3. To develop skills in importing and exporting data in various formats within Google Earth Pro.
4. To create and manage geographic features, including placemarks, polygons, and paths.
5. To perform spatial analysis and querying, including measuring distances and areas.
6. To utilize time and animation tools for dynamic presentations in Google Earth Pro.
7. To share and export maps and data effectively, including KML files.

Learning Outcomes:

By the end of the course, students will be able to:

1. Ability to navigate and utilize the Google Earth Pro interface and tools effectively.
2. Proficiency in customizing settings to enhance the Google Earth Pro experience.
3. Capability to import and export geographic data in different formats and manage data attributes.
4. Skill in creating and editing various geographic features and adding relevant attributes and labels.
5. Competence in performing spatial analysis, including measuring distances, areas, and calculating elevation profiles.
6. Understanding of how to use time and animation features to present data in Google Earth Pro.
7. Ability to create and share interactive maps and export KML files for broader use.

Topics and Learning points**Unit 1: Introduction to Google Earth****Lectures**

1. Overview of Google Earth Pro interface and tools
2. Customizing the Google Earth Pro preferences
3. Navigation and view controls in Google Earth Pro

06**Unit 2: Data Import and Management****06**

1. Importing and exporting data in different formats
2. Creating and managing folders, layers, and projects
3. Managing and editing data attributes and metadata

Unit 3: Creating and Editing Geographic Features **06**

1. Creating and editing placemarks, polygons, paths, and images
2. Adding and editing attributes and labels to geographic features
3. Using measurement and annotation tools in Google Earth Pro

Unit 4: Spatial Analysis and Querying **07**

1. Performing spatial queries and filters
2. Measuring distances and areas
3. Calculating elevation profiles and 3D views
4. Using time and animation tools in Google Earth Pro

Unit 5: Sharing and Exporting Maps and Data **07**

1. Creating and sharing maps and KML files
2. Using Google Earth Pro as a presentation tool
3. Exporting data to GIS software and other applications

Recommended Textbooks Websites:

- Battersby, S. E., and Finn, M. P. (2018). Mapping and Visualization with SuperCollider. Springer.
- Brown, M. (2014). Google Maps: Power Tools for Maximizing the API. McGraw Hill Professional.
- Joly, D., and Gaffuri, J. (2016). Web Mapping Illustrated: Using Open Source GIS Toolkits. O'Reilly Media.
- Kohler, A., and Gow, J. (2018). Using Google Earth in Geography Classrooms: A Collection of Lessons and Ideas. Springer.
- Roth, R. E., and Krum, K. (2013). Google Maps API. Apress.
- Google Earth Help Center: <https://support.google.com/earth/?hl=en#topic=4386911>
- Google Earth User Guide: <https://support.google.com/earth/answer/21955>
- Google Earth Outreach: <https://www.google.com/earth/outreach/>
- Google Earth Blog: <https://www.gearthblog.com/>

Choice Based Credit System Syllabus (2022 Pattern)

Mapping of Program Outcomes with Course Outcomes

Class: M.A./M.Sc. Geography I

Subject: Geography

Course: Advanced Techniques in Google Earth

Course Code: UAGG SEC01

Weightage: 1= Weak or low relation, 2= Moderate or partial relation, 3= Strong or direct relation

COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	1	2	2	2	2	1	2
CO2	2	1	2	2	2	2	1	1
CO3	3	1	2	2	3	2	1	2
CO4	3	1	2	2	3	2	1	2
CO5	3	1	2	2	3	2	1	2
CO6	2	1	2	2	2	2	1	1
CO7	3	1	2	2	3	2	1	2

Justification of CO-PO Mapping**PO1 - Research-Related Skills:**

Strong (3): CO1, CO3, CO4, CO5, and CO7 emphasize utilizing Google Earth Pro tools for data analysis and interpretation, aligning closely with research skills.

PO2 - Effective Citizenship and Ethics:

Weak (1): This PO does not strongly connect to the COs since they focus on technical skills rather than ethical or social issues.

PO3 - Social Competence and Communication Skills:

Moderate (2): CO1, CO2, CO3, CO4, CO5, and CO7 involve communicating geographic data effectively, which aligns with this PO.

PO4 - Disciplinary Knowledge:

Moderate (2): Most COs require a solid understanding of geographic principles, although this PO is not the primary focus.

PO5 - Personal and Professional Competence:

Moderate (2): CO3, CO4, CO5, and CO7 emphasize working collaboratively in data management and analysis, reflecting this PO's goals.

PO6 - Self-Directed and Life-Long Learning:

Moderate (2): Engaging with tools like Google Earth Pro encourages continuous learning, though not as a primary goal.

PO7 - Environment and Sustainability:

Weak (1): The COs do not directly address environmental issues; the focus is more on technical skills.

PO8 - Critical Thinking and Problem Solving:

Moderate (2): COs involve spatial analysis and data interpretation, which require critical thinking and problem-solving skills.

