Savitribai Phule Pune University, Pune

(Formerly University of Pune)

Bachelor of Science (B.Sc.) in Geography

(Faculty of Science and Technology)

New Syllabus of S.Y.B. Sc. Geography

[As Per National Education Policy (NEP-2020)]

For Colleges Affiliated to Savitribai Phule Pune University, Pune

To be implemented from Academic Year 2025-2026

Approved by

Board of Studies in Geography,

Savitribai Phule Pune University, Pune

Table of Contents

Abbreviation Used

- **NEP**
  - National Education Policy
- **DSE**
  - Discipline Specific Course
- **T**
  - Theory Course
- **P**
  - Practical Course
- **GE/OE**
  - Generic Elective/Open Elective
- **SEC**
  - Skill Enhancement Course
- **IKS**
  - Indian Knowledge System
- **AEC**
  - Ability Enhancement Course
- **VEC**
  - Value Education Course
- **CC**
  - Co-curricular Course
- **OJT**
  - On Job Training
- **CEP**
  - Community Engagement Programme
- **FP**
  - Field Project
- **RM**
  - Research Methodology
- **RP**
  - Research Project
- **VSC**
  - Vocational Skill Course

Introduction to Undergraduate Degree in Geography

As per the recommendations of UGC and Savitribai Phule Pune University guidelines, the undergraduate (UG) degree course in Geography is a VI - semester course for III-academic years or VIII- semester course for IV- academic years. The curriculum frame work design is as per UGC, Savitribai Phule Pune University, NEP 2020 guidelines with the approach of student-centric Teaching- Learning Process (TLP). B.Sc. Geography course involves theory, practical's, vocational and skill-based verticals.

The expected programme specific outcomes outline with graduate attributes. The vision of NEP followed to enable the interdisciplinary and multidisciplinary approach within the syllabus structure. Students have appropriate flexibility in pursuing various courses and multiple entry/exit at UG level.

Award of UG Certificate / UG Diploma / Bachelor's Degree in Geography

Sr. No.	Type of Award	Stage of Exit or Continue with Major and Minor
1.	UG Certificate in Geography	Exit Option: After successful completion of first year, award of UG certificate with 44 credits and an additional 4 credits course NSQF courses / internship. Continue Option: From the DSE courses students will select Geography subject among the (Subject-1, Subject-2 and Subject-3) as a major and another as minor and third subject will be dropped.
2.	UG Diploma in Geography	After successful completion of second year, award of UG diploma in major and minor with 88 credits and an additional 4 credits course NSQF courses/internship or continue with major and minor.
3.	Bachelor of Science in Geography	After successful completion of third year, award of UG degree in major with 132 credits and an additional 4 credits course NSQF courses/internship or continue with major and minor.
4.	Bachelor of Science in Geography (Honors)	After successful completion of semester fourth year, award of UG degree (Honours) in major with 176 credits and an additional 4 credits course NSQF courses/internship.

Objectives of the B. Sc. Geography Programme

1. To familiarize students with fundamentals concepts and principles of Geography
2. To guide students in an identification and analysis of various facets of geographical features and processes.
3. To enhance students ability in spatial analysis, relationship between people, places and environment.
4. To develop critical thinking and problem-solving skills, analytical and scientific reasoning, reflective thinking, moral & reflective awareness amongst the students.
5. To facilitate the students to learn skills of cartographic techniques, data analysis and interpretation, carrying out field work, use of Geo-informatics techniques, research projects, applications and applied studies.

Programme Specific Outcomes: B. Sc. Geography

Sr. No.	PSO Statement: After Completing the B.Sc. in Geography, Students will be able to	Knowledge and Skills
PSO 1	Illustrate the geographical concepts and theories, practicals, regional approach focus on global, continental, countrywide and statewide	Disciplinary Knowledge
PSO 2	Understanding the ethical consideration in geographic research and environment values in developing sustainable resolves	Moral and Ethical Awareness
PSO 3	Interpret the spatial relationships between places, people And environment	Spatial Analysis Skills
PSO 4	Apply geographic knowledge and skills to solve real-world Problems and issues	Critical Thinking and Problem Solving Ability
PSO 5	Analyze and interpret spatial data using GIS, Remote Sensing and cartographic techniques	Analytical Reasoning / Digitally Literacy
PSO 6	Appraise geographic issues and regional to global Perspectives in the context of sustainability	Scientific Reasoning
PSO 7	Capability to design, conduct and present field work / survey projects and research projects	Research Related Skills / Self - relative Learning
PSO 8	Develop team work and leadership qualities through seminars, outdoor practicals, field work and study tours	Team work / Leadership Qualities
PSO 9	Evaluate human impacts on environment and develop sustainable resolves	Reflective Thinking
PSO 10	Creating skills for professional careers in the field of environmental management, rural development, urban planning, geospatial technologies, cartography, field survey techniques**,** disaster management, tourism sector etc	Preparation for Livelihoods / Lifelong Learning

Structure of the Programme

The detailed frame work of Undergraduate (B.Sc.) Degree Programme in Geography

Level	Semester	DSE Subject- 1	DSE Subject - 2	DSE Subject - 3	GE/OE	SEC	IKS	AEC	VEC	CC	Total
4.5/ 100	I	**GEO(S) -101** Fundamentals of Physical Geography [2T] **GEO(S) -102** Practicals in Physical Geography [2P]	2 (T) + 2 (P)	2 (T) + 2 (P)	**(Select any one of the following)** **OE-101-GEO(S)** Geography of Rural Development [2T] OR **OE-102-GEO(S)** Agricultural Geography [2T]	**(Select any one of the following)** **SEC-101-GEO(S)** Introduction to Cartography [2T] OR **SEC-102-GEO(S)** Introduction to Digital Mapping [2T]	2 (T) Generic	2 T	2	-	**22**
	II	**GEO(S) -151** Fundamentals of Human Geography [2T] **GEO(S) -152** Practicals in Human Geography [2P]	2 (T) + 2 (P)	2 (T) + 2 (P)	**(Select any one of the following)** **OE-151-GEO(S)** Practicals in Rural Development [2P] OR **OE-152-GEO(S)** Practicals in Agricultural Geography [2T]	**(Select any one of the following)** **SEC-151-GEO(S)** Practicals in Cartographic Techniques [2P] OR **SEC-152-GEO(S)** Practicals in Digital Mapping [2T]	-	2 T	2	2	**22**

Exit option : Award of UG Certificate in Major with 44 credits and an additional 4 credits Course NSQF courses / Internship OR Continue with Major and Minor

Continue Option: Students will select one subject among the (subject-1, subject-2 and subject-3) as a major and another as minor and third subject will be dropped.

Important Instructions:

a. It is mandatory to have a certified journal during the practical examination for practical courses.

b. Both practical and theory courses have internal and external examination and evaluation pattern.

c. Practical course external examination pattern (Skeleton) will be provided by BOS Geography before the end semester examination.

d. For the practical courses teaching batch size: **15 students** per batch

Structure of the Programme

The detailed framework of under graduate (B.Sc.) Degree Programme in Geography

Level	Semester	Credits Related to Major				Minor	GE/OE	SEC	IKS	AEC	VEC	CC	Total
		Major Core	Major Elective	VSC	FP/OJT/ CEP								
5.0/ 200	III	**GEO(S) -201-MJ** Geomorphology [4T] **GEO(S) -202 -MJP** Practicals in Geomorphology [2P]	--	**(Select any one of the following)** **GEO(S) -221 - VSC** Water Analysis [2T] **OR** **GEO(S) -222 - VSC** Land Measurement and Surveying [2T]	**GEO(S) -231-FP** Field Visit and Report Writing [2FP]	**GEO(S) -241-MN** Geography of India [2T] **GEO(S) -242-MNP** Practicals In Map Elements [2P]	**OE -201-GEO(S)** Geography of Soil [2T]	--	**GEO(S)-201-IKS** Development of Indian Geographical Knowledge [2T]	2 T	-	[2T]	**22**
	IV	**GEO(S) -251 -MJ** Fundamentals of Population and Settlement Geography [4T] **GEO(S)- 252 - MJP** Practicals in Fundamentals Population and Settlement Geography [2P]	--	**(Select any one of the following)** **GEO(S) -271 -VSC** Practicals in Water Analysis [2P] **OR** **GEO(S) -272 -VSC** Practicals in Land Measurement And Surveying [2P]	**GEO(S) -281-CEP** Community Engagement Programme [2CEP]	**GEO(S) -291-MN** Geography of Maharashtra [2T] **GEO(S)-292-MNP** Practicals in Weather Study [2P]	**OE-251-GEO(S)** Practicals in Use of Google Earth [2P]	**SEC-251-GEO(S)** Practical in Statistical Analysis [2P]	--	2 T	-	[2T]	**22**
Exit option: Award of UG Diploma in Major and Minor with 88 credits and an additional 4 credits Course NSQF courses / Internship OR Continue with Major and Minor.													

Important Instructions:

a. It is mandatory to have a certified journal during the practical examination for practical courses.

b. Both practical and theory courses have internal and external examination and evaluation pattern.

c. Practical course external examination pattern (Skeleton) will be provided by BOS Geography before the end semester examination.

d. For the practical courses batch size: **12 students** per batch.

Structure of the Programme

The detailed frame work of under graduate (B.Sc.) Degree Programme in Geography

Level	Semester	Credits Related to Major				Minor	DSE 2 & 3	GE / OE	SEC	IKS	AEC	VEC	CC	Total
		Major Core	Major Elective	VSC	FP/OJT/ CEP									
5.5 / 300	V	GEO(S) - 301 - MJ Regional Geography of India [4T] GEO(S) - 302 - MJ Introduction to GIS [4T] GEO(S) - 303 - MJP Practicals Map Projections and Statistical Analysis [4P]	(Select any one of the following) GEO(S) - 310 - MJ Geography of Maharashtra [2T] OR GEO(S) - 311 - MJ Soil Geography [2T] (Select any one of the following) GEO(S) - 312 - MJP Practicals in GIS [2P] OR GEO(S)- (A) 313- MJP Practicals in Soil Geography [2P]	(Select any one of the following) GEO(S) - 321 - VSC Fundamentals of GPNS [2T] OR GEO(S) - 322 - VSC Fundamentals of Tourism Geography [2T]	GEO(S) -331 - FP/CEP Field visit and report writing [2FP]	GEO(S) - 341 - MN Hydrology [2T]	--	--	--	--	--	--	--	22
	VI	**GEO(S) - 351 - MJ** Watershed Analysis [4T] **GEO(S) - 352 - MJ** Introduction to Remote Sensing [4T] **GEO(S) - 353 - MJP** Practicals in Advanced Spatial Analysis [4P]	**(Select any one of the following)** **GEO(S) - 360 - MJ** Oceanography [2T] **OR** **GEO(S) - 361 - MJ** Disaster Management [2T] **(Select any one of the following)** **GEO(S) - 362 - MJP** Practicals in Remote Sensing [2P] **OR** **GEO(S) – 363 - MJP** Practicals in Watershed Management [2P]	**(Select any one of the Following)** **GEO(S) - 371 - VSC** Practicals in Modern Surveying [2P] **OR** **GEO(S) - 372 - VSC** Practicals in Fundamentals of Tour Planning [2P]	**GEO(S) - 381 - OJT** [4OJT]	--	--	--	--	--	--	--	--	--	22
Total 3 Year		**44**	**8**	**8**	**10**	**18**	**8**	**8**	**6**	**4**	**8**	**4**	**6**	**132**

Exit option: Award of UG Degree in Major with 132 credits and an additional 4 credits Course NSQF courses / Internship or Continue with Major and Minor.

Assessment and Examination Pattern

Examination Pattern:

2 Credits Course Examination Pattern			
Evaluation Details	Total Marks	Internal Examination (Continuous Internal Evaluation)	External Examination (End Semester University Examinations)
Total Marks	50	15	35
Marks for Passing	20	06	14
Examination Evaluation Pattern	--	▪ Class test/examination Short Questions, Quizzes, MCQs: Marks - 10 ▪ Home assignment /Oral examination/ Students seminar/ presentation/field visit/survey/project work: Marks - 05	Q.1 Answer the following question in 20 words (Any five) Marks - 10 Q.2 Answer the following question in 50 words (Any two) Marks - 10 Q.3 Answer the following question in 100 words (Any two) Marks - 15
4 Credits Course Examination Pattern			
Evaluation Details	Total Marks	Internal Examination (Continuous Internal Evaluation)	External Examination (End Semester University Examinations)
Total Marks	100	30	70
Marks for Passing	40	12	28
Examination Evaluation Pattern	--	▪ Tutorial/examination Short Questions, Quizzes, MCQs : Marks - 20 ▪ Home assignment /Oral examination/ Students seminar/ presentation/field visit/survey/project work : Marks - 10	Q.1 Answer the following question in 20 words (Any eight) Marks - 16 Q.2 Answer the following question in 50 words (Any four) Marks - 16 Q.3 Answer the following question in 100 words (Any two) Marks - 18 Q.4 Answer the following question in 300 words (Any one) Marks - 20

Savitribai Phule Pune University, Pune
B.Sc. (Geography) as per NEP 2020

Name of the Programme	**:**	B.Sc. (Geography)
Class	**:**	S.Y.B. Sc.
Semester	**:**	III
Name of Vertical Group	**:**	Major Core
Course Code	**:**	**GEO(S) -201- MJ**
Course Title	**:**	**Geomorphology**
Type of course	**:**	Theory
Total Credits	**:**	04
Workload	**:**	(15hours / credit) 4 credits x 15 hours = 60 hours in semester

Objectives of the Course:

1. Understand the Fundamentals of Geomorphology**:** Familiarize students with the fundamentals, and branches of geomorphology while emphasizing its significance in understanding Earth's surface processes and landforms.
2. Analyze Tectonic and Weathering Processes: Explore the theories of plate tectonics, seafloor spreading, and the classification of crustal movements and weathering processes
3. Examine Erosional and Depositional Processes and Human Interactions

Topics and Learning Points

Topic No	Topic Name	Sub Topic	No. of Hours
1.	Introduction of Geomorphology	1. Definition of Geomorphology 2. Nature and scope of Geomorphology 3. Branches of Geomorphology 4. Significance of Geomorphology	10
2.	Tectonics and Crustal Movements	1. Origin of continents and oceans i. Theory of Plate Tectonics ii. Theory of Sea Floor Spreading 2. Classification of crustal movements i. Slow movements- folding and faulting and its types ii. Rapid movements - volcanism and earthquakes: causes, consequences	16
3.	Weathering	1. Definition of Weathering 2. Types of weathering 3. Physical (ii) Chemical (iii) Biological	10

Topic No	Topic Name	Sub Topic	No. of Hours
4.	Agents of Erosion and Deposition	1. Erosional and depositional landforms created by the following geomorphic agents (i) River (ii) Sea wave	12
5.	Applied Geomorphology	1. Definition and significance of applied geomorphology 2. Concept of geomorphosites 3. Human activity and geomorphology (i) Settlement (ii) Mining (iii) Urbanization (iv) Land Degradation	12

Course Outcomes:

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

CO 1 : Define geomorphology and explain its scope, including the relationship with other Earth sciences.

CO 2 : Identify the main branches of geomorphology and their applications.

CO 3 : Evaluate the significance of geomorphology in understanding landscape formation, environmental processes, and human activities.

CO 4 : Explain the origin of continents and oceans using the theories of plate tectonics and sea floor spreading.

CO 5 : Classify slow and rapid crustal movements and their effects on the Earth's surface.

CO 6 : Apply knowledge of tectonic processes to understand landform development, including mountain ranges, valleys, and faults.

CO 7 : Identify and describe the major agents of erosion and deposition, including rivers, sea waves, and wind.

CO 8 : Relate the processes of erosion and deposition to real-world geomorphological features and landscapes.

CO 9 : Explain the concept of applied geomorphology and its relevance to real-world

CO 10 : Apply geomorphological knowledge to environmental hazard assessment.

References:

1. Allison, R.J. (2005), Applied Geomorphology: Theory and Practice, Wiley, New York.
2. Bloom, A. L. (1978), Geomorphology: a systematic analysis of late Cenozoic landforms,Waveland PrInc, Long Grove, Illinois.
3. Chorley, R.J., Schumm, S. A. and Sugden, D. E. (1984), Geomorphology, Methuen, London.
4. Gutierrez, M. (2012), Geomorphology, CRC Press, Boca Raton, Florida.
5. Huggett, R.J. (2008), Fundamentals of Geomorpholog, Routledge, London and New York.

6. Kale, V.S. and Gupta, A. (2001), Elements of Geomorphology, Oxford Univ. Press.
7. Kale, V.S. and Gupta, A. (2015), Introduction of Geomorphology, University Press, Kolkata.
8. Karlekar S. (2019), Introduction to Physical Geography: Geomorphology, Diamond Publications,Pune.
9. Khullar, D.R.(2018), Physical Geography, Kalyani Publications, Ludhiana.
10. Singh, S. (2000), Physical Geography, Prayag Pustak Bhavan, Allahabad.
11. Thornbury, W. D. (1954). Principles of geomorphology, LWW, US.
12. Wani B. K. and Patil N.M., (2020), Physical and Human Geography (Marathi Edition), Atharv Publication Jalgaon.

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B.Sc. (Geography) as per NEP 2020

Name of the Programme	**:**	B.Sc. (Geography)
Class	**:**	S.Y.B. Sc.
Semester	**:**	III
Name of Vertical Group	**:**	Major Core
Course Code	**:**	**GEO(S)-202-MJP**
Course Title	**:**	**Practicals in Geomorphology**
Type of course	**:**	Practical
Total Credits	**:**	02
Workload	**:**	(30 hours / credit) 2 credits x 30 hours = 60 hours in semester

Objectives of the Course:

1. Develop Skills in Geomorphological Mapping and Analysis: Equip students with the ability to interpret SOI topographic sheets, identify geomorphological features and utilize tools like Google Earth for enhanced spatial understanding of landforms.
2. Techniques for Slope and Drainage Basin Analysis: Train students to measure slope angles, classify drainage patterns, construct and interpret cross-sectional profiles, and apply Strahler's stream order method for geomorphological assessment
3. Gain Hands-On Experience in Field Mapping and Report Wring: Provide practical exposure to mapping, identifying landforms and preparing reports

Topics and Learning Points

Topic No	Topic Name	Sub Topic	No. of Hours
1.	Introduction to Geomorphological Tools and Techniques	1. Introduction to SOI topographic sheets and understanding geomorphological features based on contour patterns/relief 2. Identifying fluvial features such as 'V' shaped valley, gorge, waterfall, potholes, meanders, deltas, floodplains etc. using contour patterns or Google Earth programming 3. Identifying coastal features: beaches, sea cliff, sea island etc. using contour patterns or Google Earth	15
2.	Slope and Drainage Basin Analysis	1. Measuring slope angles 2. Identifying drainage patterns and their geomorphological significance	15

Topic No	Topic Name	Sub Topic	No. of Hours
		3. Profile- Drawing and interpretation of cross-section of river 4. Stream order and number by Strahlers method	
3.	Field Mapping Techniques (Field excursion)	1. Techniques for mapping landforms in the field using SOI toposheet or GPS 2. Field survey for locating bench mark/spot height/triangulation mark with reference to SOI toposheet 3. Identifying landforms in the field (at least any two depositional or erosional landforms of fluvial /coastal /aeolian) 4. Report writing on the basis of geomorphic landscape **(Conduct a field visit or field excursion lasting one or more days)**	30

Course Outcomes:

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

CO1 : Demonstrate proficiency in interpreting SOI topographic sheets to identify geomorphological features such as relief and contour patterns

CO2 : Recognize and explain the formation and characteristics of fluvial/coastal landforms sing topographic maps or Google Earth.

CO3 : Measure and interpret slope angles to understand their implications for geomorphic processes and landscape development

CO4 : Identify and analyze drainage patterns and explain their geomorphological significance, emphasizing their role in watershed and terrain evolution

CO5 : Create and interpret cross-sectional profiles of landscapes to understand elevation changes, landform processes, and spatial relationships

CO6 : Apply Strahler's method to classify stream orders and assess drainage basin characteristics effectively

CO7 : Use SOI topographic maps and GPS devices to map landforms accurately during field excursions

CO8 : Conduct field surveys and Compile a detailed report summarizing field observations, including mapped data, identified landforms, and geomorphological interpretations

References:

1. Ahirrao, D.Y. and Karanjkhele E.K. (2002) Pratyakshik Bhugol, Sudharshan Publication , Nashik
2. Chorley, R. J. (1972). Spatial Analysis in Geomorphology, Harper & Row.
3. Chorley, R. J., Schumm, S. A., & Sugden, D. E. (1984). Geomorphology. Methuen.
4. Compton, R. R. (1985). Geology in the Field, Wiley.
5. Dackombe, R. V. and Gardiner, V. (1983): Geomorphological Field Manual. George Allen and Unwin, London.
6. Fryirs, K.A. and Brierley, G. J. (2013): Geomorphic Analysis of River Systems: An approach to reading the landscape, Wiley Blackwell.
7. Goudie, A. (1990): Geomorphological Techniques, UN win Hyman, London.
8. Goudie, A. (2004). Encyclopedia of Geomorphology, Routledge.
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10. King, C. A. M. (1966): Techniques in Geomorphology, Edward Arnold, London.
11. Kondolf, M.G. and Piegay, H. (2016): Tools in Fluvial Geomorphology, Wiley Blackwell.
12. Leopold, L. B., Wolman, M. G., & Miller, J. P. (1964). Fluvial Processes in Geomorphology, W. H. Freeman & Co.
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14. McCullagh, P. J. (1988). Fieldwork in Geography, HarperCollins.
15. Monkhouse, F. J., & Wilkinson, H. R. (1989). Maps and Diagrams: Their Compilation and Construction. Methuen.
16. Sing, R. L. (2005) Elements of Practical Geography, Kalyani Publishers, New Delhi
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19. Strahler, A. N. (1952). "Hypsometric (area-altitude) analysis of erosional topography." Geological Society of America Bulletin.
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Web References:

1. Bench Mark and Spot Height Guidelines (Survey of India): SOI Publications.
2. Field Mapping Techniques using GPS: National Geographic Resources.
3. Google Earth Tutorials and Tools: earth.google.com
4. Survey of India (SOI) Resources: www.surveyofindia.gov.in
5. Survey of India Topographic Map Field Guide.
6. Tools for Field Geomorphology: Tutorials from USGS.
7. NASA Earth Observatory: earthobservatory.nasa.gov

Savitribai Phule Pune University, Pune
B.Sc. (Geography) as per NEP 2020

Name of the Programme	**:**	B.Sc.(Geography)
Class	**:**	S.Y.B. Sc.
Semester	**:**	III
Name of Vertical Group	**:**	VSC
Course Code	**:**	**GEO(S) -221-VSC**
Course Title	**:**	**Water Analysis**
Type of course	**:**	Theory
Total Credits	**:**	02
Workload	**:**	(15hours / credit) 2 credits x 15 hours = 30 hours in semester

Objectives of the Course:

1. To understand water quality parameters.
2. To learn various types and sources of water.
3. To learn various quality indices useful for drinking and irrigation water analysis.

Topics and Learning Points:

Topic No	Topic Name	Sub Topic	No. of Hours
1.	Types of Water Sources and Pollutions	1. Types of water sources and importance 2. Water pollution: source and management	10
2.	Parameters of Water Quality	1. Parameters of water quality: a. Physical, b. Chemical, c. Biological, 2. Significance of water analysis	08
3.	Standards of Water Quality and Indices	1. BIS (Bureau of Indian Standards) 2. WHO (World Health Organization) 3. Indices for drinking water- WQI 4. Indices for irrigation water a. Sodium Adsorption Ratio (SAR) (Richards 1954), b. Residual Sodium Carbonate (RSC) (Eaton 1950), c. Sodium Percentage (SP) (Wilcox 1955), d. Kelly's ratio (Kelly 1963)	12

Course Outcome:

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

CO1: Comprehensive understanding of various water quality parameters useful for assessment of water resources.

CO 2: Understand water quality standards of BIS and WHO.

CO 3: Understand the characteristics of water quality indices for drinking water and irrigation.

References:

1. Standard Methods for the Examination of Water and Wastewater - American Public Health Association, American Water Works Association, Water Environment Federation.
2. Water Quality Assessments: A Guide to the Use of Biota, Sediments and Water in Environmental Monitoring - Deborah V. Chapman (Editor).
3. Water Quality: Guidelines, Standards and Health - Lorna Fewtrell and Jamie Bartram.
4. Environmental Engineering: Water, Wastewater, Soil and Groundwater Treatment and Remediation - Nelson L. Nemerow and Franklin J. Agardy.
5. BIS 10500:2012 - Drinking Water Specification
6. BIS 2296:1982 - Specifications for Packaged Natural Mineral Water
7. BIS 3025:1983 - Methods of Sampling and Test (Physical and Chemical) for Water and Waste Water
8. BIS 3589:2001 - Methods of Sampling and Test (Physical and Chemical) for Water and Waste Water (Revision of IS 3025)
9. BIS 1622:2008 - Drinking Water - Specification
10. BIS 3025:1964 - Methods of Sampling and Test (Physical and Chemical) for Water and Waste Water

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B.Sc. (Geography) as per NEP 2020

Name of the Programme	**:**	B.Sc. (Geography)
Class	**:**	S.Y.B. Sc.
Semester	**:**	III
Name of Vertical Group	**:**	VSC
Course Code	**:**	**GEO(S) -222 -VSC**
Course Title	**:**	**Land Measurement and Surveying**
Type of course	**:**	Theory
Total Credits	**:**	02
Workload	**:**	(15hours / credit) 2 credits x 15 hours = 30 hours in semester

Objectives of the Course:

1. To acquaint students with the principles, significance, and modern techniques in surveying.
2. To familiarize the students with the basic aspects of linear, areal and vertical measurements in surveying.
3. To understand the structures, functions, merits and demerits of land surveying instruments.
4. To enhance skills for accurate land measurements and surveying

Topics and Learning Points

Topic No	Topic Name	Sub Topic	No. of Hours
1.	Land Measurement	1. Definition of land measurement 2. Development of land measurement 3. Types of land measurement a. Linear Methods, b. Areal Methods 4. Importance of land measurement	08
2.	Surveying	1. Definition of surveying 2. Types of surveys: plane surveying and geodetic surveying 3. Classification of survey a. On the basis of area b. On the basis of objectives c. On the basis of survey instruments	08

		(conventional and modern) 4. Importance of surveying	
3.	Introduction to Survey Instruments	1. Structure, function, merits and demerits of following survey instruments a. Plane Table b. Dumpy c. GPS d. Total Station 2. Applications of land measurement and surveying in Geography	14

Course Outcomes:

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

CO 1 : Grasp fundamental surveying principles and the importance of modern techniques.

CO 2 : Develop skills in linear, areal and vertical measurements of land.

CO 3 : Acquire a comprehensive understanding of surveying instruments.

CO 4 : Gain employment opportunities in land measurement and surveying.

References:

1. Ahirrao, D. Y. And Karanjkhele, E.K., (2002), Pratyakshik Bhugol, Sudarshan Publication, Nashik.
2. Bygott, J. (1955). Map work and Practical Geography.5th Edition, University Tutorial Press, London.
3. Davis, R.E. and Foote, F.S. (1953). Surveying, McGraw-Hill Book Co., New York.
4. Deshpande, G.B. (1991). Surveying, Everest Publishing House, Pune.
5. Ghilani, C.D. and Wolf, P.R. (2017). Elementary Surveying: An Introduction to Geomatics. 15th Edition. Pearson Education, Inc., Hoboken, New Jersey.
6. Kanetkar T.P. and Kulkarni S.V. (1983). Surveying and Levelling (Part I and II), Vidyarthi Gruha Prakashan, Pune.
7. Mishra, R.P, and Ramesh A. (2000). Fundamental of Cartography, Concept Publishing, Company, New Delhi.
8. Monkhouse, F.X.J. & Wilkinson, H.R. (1989). Maps & Diagrams, B.I Publications, Bombay.
9. Robinson, A.H. & Sleep, R.D. (1969).Elements of Practical Geography, John Wiley publications, New York.
10. Singh Gopal (1996). Map Work and Practical Geography, Vikas Publishing House Pvt. Ltd., New Delhi.
11. Singh, Lekhraj & Singh R. (1973). Map work and Practical, Central Book Depot. Allahabad.
12. Singh, R.C., and Dutta (1993). Elements of Practical Geography, Kalyani Publications, New Delhi.
13. Singh, R.L., and Kanaujia L.R.S. (1963). Map Work and Practical Geography, Central Book Depot, Allahabad.
14. Singh, R.L., and Singh, R.P.B. (1997). Elements of Practical Geography, Kalyani Publishers, New Delhi.

Savitribai Phule Pune University, Pune
B.Sc. (Geography) as per NEP 2020

Name of the Programme	**:**	B. Sc. (Geography)
Class	**:**	S.Y.B. Sc.
Semester	**:**	III
Name of Vertical Group	**:**	FP / OJT / CEP
Course Code	**:**	**GEO(P) -231-FP**
Course Title	**:**	**Field Visit and Report Writing**
Type of course	**:**	Field Project
Total Credits	**:**	02
Workload	**:**	(30 hours/credit) 2 credits x 30 hours = 60 hours in semester

Objectives of the Course:

1. To give hands-on experience and practical training to students in different sectors related to geography
2. To develop marketable skills among students and to apply their knowledge in real situations
3. To expose students to different industrial, educational and research institutes and future employers and help them gain experience in writing technical reports

Guidelines:

- A field visit to a geographical area should be conducted in pre-approved locations that provide opportunities to observe and analyze geographical phenomena, including natural landscapes, urban environments, or socio-economic settings.
- Faculty members will provide guidance and supervision throughout the field visit. Students must adhere to their instructions.
- Students are required to actively participate in data collection, group discussions, and assigned tasks while working effectively with peers and supervisors.
- Students must submit a field report, highlighting their observations about the geographical phenomena studied.
- The field report should follow the prescribed format, including Title Page, Table of Contents, Introduction, Objectives, significance of the study, Study Area, Methodology, Techniques and tools used for data collection, Observations, Description, Major findings and Summary.
- Maps, Grphas, Digrams and Geotagged photographs should be included in the final report.
- The final field report should be submitted in both printed and digital formats to the department.

Course Outcomes:

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

CO 1 : Gain practical exposure by conducting field visits to various geographical locations, observing and analyzing natural, urban, and socio-economic environments.

CO 2 : Develop essential research skills by applying field-based data collection techniques, mapping, surveys and interviews.

CO 3 : Improve technical writing skills by preparing structured field report that includes research objectives, methodology, data analysis, and observations.

CO 4 : Cultivate industry-relevant skills through hands-on training, field exposure, and interactions with professionals in education, research, and various sectors.

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B. Sc. (Geography) as per NEP 2020

Name of the Programme	**:**	B.Sc. (Geography)
Class	**:**	S.Y.B. Sc.
Semester	**:**	III
Name of Vertical Group	**:**	Minor
Course Code	**:**	**GEO(S) -241-MN**
Course Title	**:**	**Geography of India**
Type of course	**:**	Theory
Total Credits	**:**	02
Workload	**:**	(15hours / credit) 2 credits x 15 hours = 30 hours in semester

Objectives of the Course:

1. To understand the location and physical divisions of India.
2. To understand the drainage systems of India.
3. To study the major seasons and their characteristics in India.
4. To understand the soil and forest types and their distribution.

Topics and Learning Points:

Topic No	Topic Name	Sub Topic	No. of Hours
1.	Location and Physical Setting	1. Location, relation with neighboring countries 2. Physical divisions a. The Northern Mountains b. The North Indian Plains c. The Peninsular Plateau d. The Coastal lowlands and Islands	10
2.	Drainage System and Climate	1. Drainage system a. East flowing rivers- Ganga, Bramhputra, Godawari, Krushna and Kaveri b. West flowing rivers- Indus, Narmda, Tapi and Vashishti 2. Major Seasons and weather associated with them a. Summer b. Monsoon c. Winter	12

3.	Soil and Forest	1. Soil types and distribution 2. Soil conservation 3. Forest types and distribution 4. Forest conservation	8

Course Outcomes:

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

CO 1 : Remember the location and physical features of India.

CO 2 : Understand and explain the drainage system of India.

CO 3 : Understand the characteristics of major seasons of India

CO 4 : Understand the major soil and forest types and their distribution.

References:

1. Chapman, G. and Baker, K.M. (eds.) (1992), The Changing Geography of Asia. Routledge, London.
2. Farmer, B.H. (1983), Introduction to South Asia. Methuen and Company Ltd. and Company Ltd., London.
3. Gole, P. N. (2001), Nature Conservation and Sustainable Development in India. Rawat publications, Jaipur and New Delhi.
4. Johnson, B.L.C. (1983), Development in South Asia. Penguin Books, Harmonsworth.
5. Khullar, D. R. (2006), India. A Comprehensive Geography. Kalyani Publishers., New Delhi.
6. Krishnan, M. S. (1968), Geology of India and Burma. 4th edition. Higgin Bothams Private. Ltd., Madras.
7. Mundhe N.N., Landge A. A., Zolekar R.B. and Wavale S.G.(2022), Geography of India(Marathi Edition), Dimand Publication, Pune
8. Nag, P. and Gupta S. S. (1992), Geography of India. Concept Publishing. Company, New Delhi.
9. Sharma, T. C. (2003): India, Economic and Commercial Geography. Vikas Publication., New Delhi.
10. Singh, J. (2003): India, A Comprehensive and Systematic Geography. Gyanodaya Prakashan, Gorakhpur.
11. Singh, R. L. (ed.) (1971), India. A Regional Geography. National Geographical Society of India.
12. Spate, O.H.K., Learmonth, A.T.A. and Farmer, B. H. (1979), India and Pakistan. Methuen and Company Ltd. and Company Ltd., London.
13. Subbarao, B. (1959), The Personality of India. University of Baroda Press, Baroda.
14. Sukhwal, B.L. (1987), India. Economic Resource Base and Contemporary Political Patterns. Sterling Publication, New Delhi.
15. Tiwari, R. C. (2007), Geography of India, Prayag Pustak Bhawan, Allahabad
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B.Sc. (Geography) as per NEP 2020

Name of the Programme	**:**	B.Sc. (Geography)
Class	**:**	S.Y.B. Sc.
Semester	**:**	III
Name of Vertical Group	**:**	Minor
Course Code	**:**	**GEO(S) -242 -MNP**
Course Title	**:**	**Practicals in Map Elements**
Type of course	**:**	Practical
Total Credits	**:**	02
Workload	**:**	(30 hours / credit) 2 credits x 30 hours = 60 hours in semester

Objectives of the Course:

1. To introduce the basic concepts in Map Reading
2. To enable students to use various Scales and Projection Techniques in Geography.
3. To acquaint students with the utility of various Projections in Geographical knowledge.
4. To explain the elementary and essential principles of practical work in Geography.

Topics and Learning Points

Topic No	Topic Name	Sub Topic	No. of Hours
1.	Introduction to Map	1. Map: definition and elements 2. Classification of map: based on scale and purpose 3. Use of map	08
2	Map Scale	1. Definition 2. Types of scale: verbal, numerical and graphical 3. Conversion of scale (British and Metric system) a. Verbal scale to representative fraction b. Representative fraction into verbal scale 4. Construction of simple graphical scale (At least two examples from each)	16
3.	Introduction to Map Projection	1. Definition and types of map projection 2. Basic concepts of projection: latitude, longitude, parallel of latitude, meridian of longitude, prime meridian, equator, direction 3. Calculation of time basis on meridian and GMT (Calculation of minimum two examples)	18

4.	Interpretation of Maps and Excursion	1. Introduction to Survey of India toposheets - marginal information, conventional signs and symbols and colours in S.O.I. toposheets 2. Interpretation of S.O.I. toposheets (At least one map of mountain, plateau, plain and costal region) 3. One-day field excursion for orientation of maps and toposheets, reading of maps in the field.	18

Course Outcomes:

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

CO 1 : Develop practical skill and use of map scale and projection.

CO 2 : Understand the new techniques, accuracy and skills of map making.

CO 3 : Understand and prepare different kinds of maps.

CO 4 : Recognize basic themes of map making.

References:

1. Sharma J. P., 2010, Prayogic Bhugol, Rastogi Publishers, Meerut.
2. Singh R. L. and Singh R. P. B., 1999, Elements of Practical Geography, Kalyani Publishers.
3. Slocum T. A., Mcmaster R. B. and Kessler F. C., 2008, Thematic Cartography and Geovisualization (3rd Edition), Prentice Hall.
4. Tyner J. A., 2010, Principles of Map Design, The Guilford Press.
5. Sarkar A., 2015, Practical Geography: A Systematic Approach, Orient Black Swan Private Ltd., New Delhi
6. Singh R. L. and Duttta P. K., 2012, Prayogatama Bhugol, Central Book Depot, Allahabad
7. Ahirrao Y., Karanjkhele E. K., 2002, Practical Geography, Sudarshan Publication, Nashik
8. Saptarshi P. G., Jog S. R., Statistical Methods ,
9. Karlekar S. N., 2008, Statistical Methods, Diamond Publication, Pune
10. Kanetkar T. P., Kulkarni S. V., 1986, Surveying and Leveling, Pune Vidyrthi Griha Publication, Pune
11. Kumbhare A., Practical Geography,
12. Karlekar Shrikant- Bhoogol Shastratil Sanshodhan Paddhati,
13. Monkhouse F.J. - Maps & Diagrams, Methuen and Co., London, 1971 (3rd Edition, Revised).
14. NCERT - Textbook for Class-12, Practical Work in Geography Part II

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B.Sc. (Geography) as per NEP 2020

Name of the Programme	**:**	B.Sc. (Geography)
Class	**:**	S.Y.B. Sc.
Semester	**:**	III
Name of Vertical Group	**:**	Minor
Course Code	**:**	**OE -201-GEO(S)**
Course Title	**:**	**Geography of Soil**
Type of course	**:**	Theory
Total Credits	**:**	02
Workload	**:**	(15hours / credit) 2 credits x 15 hours = 30 hours in semester

Objectives of the Course:

1. To introduce students to the basic concepts, nature, and scope of soil geography and its relevance in the physical environment.
2. To understand the processes and factors involved in soil formation and the development of soil horizons.
3. To examine the physical and chemical properties of soils and their influence on soil productivity and classification.
4. To analyze the types of soils in India, causes of soil degradation, and human-induced impacts on soil health.

Topics and Learning Points:

Topic No	Topic Name	Sub Topic	No. of Hours
1.	Introduction to Soil Geography	i. Definition, Nature, and Scope of Soil Geography ii. Definition of soil iii. Components of soil (Mineral matter, organic matter, water, and air)	08
2.	Soil Formation, Development and Properties	i. Factors of soil formation: (Climate, Organisms, Relief, Parent material, Time) ii. Soil profile development and horizons iii. Texture, Structure, color and porosity iv. Soil moisture and temperature v. Soil pH, salinity and cation exchange capacity (CEC)	12
3.	Soil Types and Soil Degradation	i. Major soil types of India: Alluvial, Black, Red, Laterite, Desert, Forest, Peaty & Marshy soils	10

		ii. Types and causes of soil degradation: erosion, salinization, acidification, pollution iii. Human impact on soils: deforestation, agriculture, urbanization	

Course Outcomes:

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

COs1 : Define and explain key concepts of soil geography and identify the components of soil.

COs 2 : Describe the soil formation processes and evaluate the influence of various factors on soil development.

COs 3 : Analyze and interpret soil physical and chemical properties such as texture, moisture, pH, and CEC.

COs 4 : Identify and classify the major soil types found in India with reference to their characteristics and distribution.

COs 5 : Assess various causes of soil degradation and understand human activities affecting soil quality and sustainability.

References:

1. Brady, N.C. & Weil, R.R. (2016) *The Nature and Properties of Soils.* Pearson Education
2. Daji, J.A. (1970)*A Textbook of Soil Science.* Asia Publishing House
3. Raychaudhuri, S.P. (1971)*Soils of India.* Indian Council of Agricultural Research (ICAR)
4. Singh, R.L. (2008)*Fundamentals of Soil Geography*.Rawat Publications
5. Sehgal, J.L. (1996)*Pedology: Concepts and Applications.*Kalyani Publishers
6. Puri, G.S. (1970)*Indian Forest Ecology: Volume I – The Soil.* ICAR
7. Kumar, S. (2004)*Soil Geography and Land Use.* Discovery Publishing House
8. NBSS & LUP Publications*(National Bureau of Soil Survey and Land Use Planning)*
9. ICAR (Indian Council of Agricultural Research)*Handbook of Soil Science* – Various editions.

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B. Sc. (Geography) as per NEP 2020

Name of the Programme	**:**	B.Sc. (Geography)
Class	**:**	S.Y.B. Sc.
Semester	**:**	III
Name of Vertical Group	**:**	IKS
Course Code	**:**	**GEO(S)- 201- IKS**
Course Title	**:**	**Development of Indian Geographical Knowledge**
Type of course	**:**	Theory
Total Credits	**:**	02
Workload	**:**	(15 hours / credit) 2 credits x 15 hours = 30 hours in semester

Objectives of the Course:

1. To introduce students about Geogrpahical IKS
2. To demonstrate the multifaceted nature of IKS and its importance in contemporary society.
3. To explain the Geographical knowledge in vedas, vedangas, Upavedas and Puranas.
4. To know the development of Indian Geographical knowledge and its importance in contemporary society.

   To motivate students to study Indian Geographical knowledge in detail and explore their application potential

Topics and Learning Points:

Topic No	Topic Name	Sub Topic	No. of Hours
1.	Introduction to Indian Knowledge System (IKS)	1. Concept of IKS 2. Nature and Scope of IKS 3. IKS based approaches on knowledge paradigms 4. IKS From ancient to medieval period.	08
2.	Indian Geographical knowledge	1. Geographical Literature - Vaidikas, Puranas, the Ramayana, the Mahabharata, the works of Buddhists, Jains and Gandhian philosophy. 2. Geographical concepts in ancient India – eclipses, earth, size of earth, latitude and longitude, atmosphere, weather and climate, division of celestial sphere (Panchang), planetary computation 3. Regional geography of ancient India: continents, Bharatvarsa, mountains and rivers	12

		4. Gandhian ideas of regional development, concept of gramswaraj as microregional approach.	
3.	Practices of Indian Knowledge in Geography	1. Ancient routes of trade (Inland and Overseas) 2. Observatories in historical India – Rajasthan, Delhi, Uttar Pradesh and Madhya Pradesh 3. Indian geographical knowledge and cultural practices in India. (Agriculture, Festivals, Architecture), 4. Gandhian approach towards agriculture, architecture, resource management and environment. 5. Gandhian philosophy for climate adaptation.	10

Course Outcomes:

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

CO 1 : Understand the IKS

CO 2 : Utilize the multifaceted nature of IKS and its importance in contemporary society.

CO 3 : Explain the Geographical knowledge in vedas, vedangas, Upavedas and Puranas.

CO 4 : Acquire the development of Indian Geographical knowledge and its importance in contemporary society.

CO 5 : Study Indian Geographical knowledge in detail and explore their application potential

References:

1. Vasant Lad (1996), "Ayurveda: A Brief Introduction and Guide", (whole article).
2. Ramachandrudu P. (2010), "Glimpse into Kautilya's Arthashastra", Sanskrit Academy, Hyderabad.
3. Kantawala, S.G. (1999). "Purāṇas: Source of Ancient Indian History & Culture
4. Bhagwat, B. (2009). "Kalpa-Vedāṅga: Origin & Development", Adarsha Sanskrit Shoda Samsthan, Pune, Selected portions from the book.
5. Vartak, P.V. (1995). "Veda and Jyotish", Issues in Veda and Astrology, H Pandya (Ed.)
6. Sundaram, A.V. (1995). "Astrology: Its usefulness and Limitations in Modern Times",
7. Ali. S. M., The Geography of Puranas, Peoples publishing House New Delhi
8. Dube B. 1967 Geographical concepts in ancient India, The National Geography Society of India, HU Varansasi
9. Majumdar S.N. 1924 Cunningham's Ancient Geography of India Culcutta
10. Sircar D.C. 1960 Studies in the Ancient and Medieval India
11. Rana P.B. Singh Geographical thoughts in India: Snapshots and visions for the 21st Century

Savitribai Phule Pune University, Pune
B.Sc. (Geography) as per NEP 2020

Name of the Programme	**:**	B. Sc. (Geography)
Class	**:**	S.Y.B. Sc.
Semester	**:**	IV
Name of Vertical Group	**:**	Major Core
Course Code	**:**	**GEO(S)-251-MJ**
Course Title	**:**	**Fundamentals of Population and Settlement Geography**
Type of course	**:**	Theory
Total Credits	**:**	04
Workload	**:**	(15 hours / credit) 4 credits x 15 hours = 60 hours in semester

Objectives of the Course:

1. Understand the foundations of population and settlement Geography
2. Examine the population growth and its components
3. Study the population theories and policies
4. Explore the concepts and distribution of settlements
5. Analyze rural and urban settlements

Topics and Learning Points

Topic No	Topic Name	Sub Topic	No. of Hours
1.	Introduction to Population Geography	1. Definition, nature and scope of Population Geography 2. Relation of Population Geography with other disciplines 3. Concepts a. Population as Resource b. Over Population c. Optimum Population d. Under Population	08
2.	Components and Growth of Population	1. Concept of population growth 2. Factors affecting population growth 3. Components of population growth a. Fertility b. Mortality c. Migration 4. Spatio-temporal variation in population growth (special reference to India) 5. Impact of over population in India	12

3.	Population Theory and Policies	1. Population Theories- Malthusian theory 2. Population Policies of India 3. Population Policies of Norway	08
4.	Introduction to Settlement Geography	1. Definition, nature and scope of Settlement Geography 2. Factors affecting growth and distribution of settlement 3. Concepts in Settlement Geography a.) Site and Situation of Settlements b.) Growth of Settlements c.) Rehabilitated Settlements d.) Ideal Village e.) Planned City	12
5.	Rural Settlement	1. Pattern of Settlement 2. Characteristics and function of rural settlement	08
6.	Urban Settlement	1. Concepts i. Town ii. City iii. Metropolitan City iv. Megalopolis v. Conurbation vi. Smart City vii. CBD 2. Rural-Urban Fringe 3. Kingsley Davis Model of urbanization 4. Urbanization in India 5. Problems associated with urbanization in India	12

Course Outcomes:

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

CO 1 : Understand the core concepts and interdisciplinary nature of population and settlement Geography

CO 2 : Analyze population growth and its determinants

CO 3 : Evaluate population theories and policies

CO 4 : Understand settlement distribution and growth dynamics

CO 5 : Understand challenges of urbanization and settlement planning

References:

1.Chandna, R.C. (2010), Population Geography, Kalyani Publisher.

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

3. Hassan, M.I. (2005), Population Geography, Rawat Publications, Jaipur

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

5. Musmade Arjun, Sonawane Amit and Jyotiram More, (2015), Population & Settlement Geography, Diamond Publication, Pune.
6.Carter Harold (1977), The study of Urban Geography
7. Hans Raj (1978), Fundamentals of Demography
8. Hudson F.S. (1976), Geography of Settlements
9. Bhende, A. and Kanitkar, T. (2011), Principles of Population Studies, Himalaya Publishing House, Bombay.
10. Beaujeu, G. J. (1966), Geography of Population, Longman Group Ltd.
11. Chandna, R.C. (Rep.2010), Geography of Population, Concepts, Determinants and Patterns, Kalyani Publishers, New Delhi.
12. Khullar, D. R. (2011), India A Comprehensive Geography, Kalyani Publication, New Delhi.
13. Michel Chisholm (1973), Studies in Human Geography, London.
14. Ahirrao V. R, Varat T.M., Alizad S.S, and Dhapate C.D. (1990).Settlement Geography, Gaaj Prakashan Keadgaon, Ahmednagar.
15. Gharpure V.T. (1999), Settlement Geography, Pimplapure and Co. Publisher, Nagpur.
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B.Sc. (Geography) as per NEP 2020

Name of the Programme	**:**	B.Sc. (Geography)
Class	**:**	S.Y.B. Sc.
Semester	**:**	IV
Name of Vertical Group	**:**	Major Core
Course Code	**:**	**GEO(S)- 252-MJP**
Course Title	**:**	**Practicals in Fundamentals of Population and Settlement Geography**
Type of course	**:**	Practical
Total Credits	**:**	02
Workload	**:**	(30 hours/credit) 2 credits x 30 hours = 60 hours in semester

Objectives of the Course:

1. To develop analytical skills for measuring population growth and dynamics
2. To apply methods of population density and projection
3. To learn practical applications of settlement geography
4. To conduct case studies in settlement analysis

Topics and Learning Points

Topic No	Topic Name	Sub Topic	No. of Hours
1.	Measures of Population Growth	1. Measures of Fertility i. Crude Birth Rate (CBR) ii. General Fertility Rate (GFR) iii. Age Specific Fertility Rates (ASF) 2. Measures of Mortality Rate i. Crude Death Rate (CDR) ii. Infant Mortality Rate (IMR) iii. Age Specific Mortality Rates (ASMR) (Calculation, plotting and interpretation of one example of each method)	15
2	Measures of Population Density and Population Projection	1. Measures of Population Density i. Arithmetic Population Density ii. Physiological Population Density iii. Agricultural Population Density 2. Population Projections i. Total Projections and Regional Projections	18

		ii. High, Medium and Low Projections of Population 3. Measures of Population Projection i. Mathematical Method (Arithmetic Method, Geometric Method) ii. Growth Component Method (Calculation, plotting and interpretation of one example of each method)	
3.	Practicals in Settlement Geography	1. Gravity Model 2. Lorenz Curve, Gini Coefficient for assessment of amenities in settlements 3. Urbanization Curve	12
4.	Case Studies	1. A case study of demography and amenities in nearby village **or** 2. A case study of Ideal Village	15

Course Outcomes:

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

CO 1 : Analyze population growth and mortality trends using quantitative techniques

CO 2 : Apply methods to assess population density and projection

CO 3 : Utilize quantitative models in settlement studies

CO 4 : Integrate theory and practice through case studies

References:

1. Brian, R.K. (1996), Landscape of Settlement Prehistory to present, Routledge, London.
2. Careter (1972), Fourth edition: The study of Urban Geography, Arnold, London.
3. Agarwala, S. N. (1962), Age at Marriage in India, Allahabad: Kitab Mahal Pvt. Ltd.
4. Ahirrao V. R, Varat T.M., Alizad S.S, and Dhapate C.D. (1990),Settlement Geography, Gaaj Prakashan Keadgaon, Ahmednagar.
5. Gharpure V.T. (1999), Settlement Geography, Pimplapure and Co. Publisher, Nagpur.
6. Barclay, G. W. (1958), Techniques of Population Analysis, New York: John Wiley and Sons.
7. Mandal, R. B., Uyanga, J., and Prasad, H. (2007), Introductory Methods in Population Analysis, New Delhi: Concept Publishing Company.
9. Pathak, K. B., and Ram, F. (2013). Techniques of Demographic Analysis, Mumbai: Himalaya Publishing House.
10. Singh. K. and Steinberg. F. (eds) (1998), Urban India in Crisis. New Age Intern.
11. Ashish Bose (1974), Studies in India's Urbanization-1901-71 Tata McGraw-Hill, Delhi.
12. Hudson F.S. (1976), Geography of Settlements.
13. Singh, R. L. Reading in Rural Settlement Geography.

14. Yeats, M. H. (1974), An introduction to Quantitative Analysis in Human Geography.
15. Liendsor, J. M. (1997), Techniques in Human Geography, Routledge.
16. Landge A. A., Wani B. K., Pawar R.S. and Aher S.A, (2020), Population Geography (Marathi Edition), Atharv Publication, Jalgaon.

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Name of the Programme	**:**	B.Sc. (Geography)
Class	**:**	S.Y.B. Sc.
Semester	**:**	IV
Name of Vertical Group	**:**	VSC
Course Code	**:**	**GEO(S) -271-VSC**
Course Title	**:**	**Practicals in Water Analysis**
Type of course	**:**	Practical
Total Credits	**:**	02
Workload	**:**	(30 hours / credit) 2 credits x 30 hours = 60 hours in semester

Objectives of the Course:

1. To identify and explain key water quality parameters.
2. To learn various quality indices useful for drinking and irrigation water analysis.
3. To train the students for the interpretation of water quality data with the comparison of regulatory standards.

Topics and Learning Points

Topic No	Topic Name	Sub Topic	No. of Hours
1.	Introduction to Water Quality	1. Water quality parameters: Physical, Chemical 2. Standards of water quality assessment: BIS (Bureau of Indian Standards) and WHO 3. Classification of water qualities	16
2.	Water Quality Analysis for Drinking Water	1.Calculation of WQI using weighted parameters 2. Gibbs Analysis	20
3.	Water Quality Analysis for Irrigation	1. Calculate, and compare WHO standards and interpret two examples of each following indices a. Sodium Absorption Ratio (SAR) (Richards 1954), b. Residual Sodium Carbonate (RSC) (Eaton 1950), c. Sodium Percentage (SP) (Wilcox 1955), d. Kelly's ratio (Kelly 1963),	24

Course Outcomes:

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

CO 1 : Comprehensive understanding of various quality indices useful for assessment of water resources.

CO 2 : Select and calculate appropriate water quality indices based on specific objectives and available data.

CO 3 : Interpret the overall water qualities with a comparison of BIS and WHO standards.

References:

1. Standard Methods for the Examination of Water and Wastewater - American Public Health Association, American Water Works Association, Water Environment Federation.
2. Water Quality Assessments: A Guide to the Use of Biota, Sediments and Water in Environmental Monitoring - Deborah V. Chapman (Editor).
3. Water Quality: Guidelines, Standards and Health - Lorna Fewtrell and Jamie Bartram.
4. Environmental Engineering: Water, Wastewater, Soil and Groundwater Treatment and Remediation - Nelson L. Nemerow and Franklin J. Agardy.
5. BIS 10500:2012 - Drinking Water Specification
6. BIS 2296:1982 - Specifications for Packaged Natural Mineral Water
7. BIS 3025:1983 - Methods of Sampling and Test (Physical and Chemical) for Water and Waste Water
8. BIS 3589:2001 - Methods of Sampling and Test (Physical and Chemical) for Water and Waste Water (Revision of IS 3025)
9. BIS 1622:2008 - Drinking Water - Specification
10. BIS 3025:1964 - Methods of Sampling and Test (Physical and Chemical) for Water and Waste Water

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B.Sc. (Geography) as per NEP 2020

Name of the Programme	**:**	B.Sc. (Geography)
Class	**:**	S.Y.B. Sc.
Semester	**:**	IV
Name of Vertical Group	**:**	VSC
Course Code	**:**	**GEO(S) - 272 -VSC**
Course Title	**:**	**Practicals in Land Measurement and Surveying**
Type of course	**:**	Practical
Total Credits	**:**	02
Workload	**:**	(30hours / credit) 2 credits x 30 hours =60 hours in semester

Objectives of the Course:

1. To equip students with the practical skills and theoretical knowledge required for accurately measuring distances, converting area units, and computing areas using various surveying techniques.
2. To immerse students in the hands-on essentials of measuring linear, vertical, and areal aspects of surveying with real-world applications.
3. To train students with practical experience and knowledge in utilizing GPS technology.
4. To enhance skills for accurate land measurements and surveying

Topics and Learning Points:

Topic No	Topic Name	Sub Topic	No. of Hours
1.	Measurement of Distances and Computation of Areas	1. Distance measurements by taping a. Measure a road for a length of minimum 500 meters adjacent to college campus b. Measure an area of a building/plot/agricultural farm/garden in vicinity of the college campus 2. Area conversion measured by students *a.* Square meter to *Guntha* b. Square meter to acre c. *Bigha* to hectare d. Square foot to acre e. Measure a square mile area from a toposheet and convert it into hectare	16

		f. Measure square kilometer area from a toposheet and convert it into square mile 3. Computation of areas a. Measure an area by division into simple figures such as triangles, squares, rectangles, trapezoids, circles, etc. calculate the total area measured by these figures. b. Compute the area of the tract by offsets from straight line	
2.	Plane Table Survey	1. Survey an area with the help of Plane Table a. Radiation Method b. Intersection Method (Two examples of each method)	20
3.	Dumpy/Auto Level Survey and GPS Survey	1. Survey along a line with the help of Dumpy/Auto Level a. Collimation plain Method b. Rise and Fall Method (Two examples of each method) 2 Survey of an area with the help of GPS a. Plotting of area on a graph with the help of data collected by GPS	24

Course Outcomes:

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

CO 1 : Understand fundamental surveying principles and the importance of modern techniques.

CO 2 : Develop skills in linear, areal and vertical measurements of land.

CO 3 : Acquire a comprehensive understanding of surveying instruments.

CO 4 : Gain employment opportunities in land measurement and surveying.

References:

1. Ahirrao, D. Y. And Karanjkhele, E.K., (2002), Pratyakshik Bhugol, Sudarshan Publication, Nashik.
2. Bygott, J. (1955). Map work and Practical Geography.5th Edition, University Tutorial Press, London.
3. Davis, R.E. and Foote, F.S. (1953). Surveying, McGraw-Hill Book Co., New York.
4. Deshpande, G.B. (1991). Surveying, Everest Publishing House, Pune.
5. Ghilani, C.D. and Wolf, P.R. (2017). Elementary Surveying: An Introduction to

Geomatics. 15th Edition. Pearson Education, Inc., Hoboken, New Jersey.

6. Kanetkar T.P. and Kulkarni S.V. (1983). Surveying and Levelling (Part I and II), Vidyarthi Gruha Prakashan, Pune.
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9. Robinson, A.H. & Sleep, R.D. (1969). Elements of Practical Geography, John Wiley publications, New York.
10. Singh Gopal (1996). Map Work and Practical Geography, Vikas Publishing House Pvt. Ltd., New Delhi.
11. Singh, Lekhraj & Singh R. (1973). Map work and Practical, Central Book Depot. Allahabad.
12. Singh, R.C., and Dutta (1993). Elements of Practical Geography, Kalyani Publications, New Delhi.
13. Singh, R.L., and Kanaujia L.R.S. (1963). Map Work and Practical Geography, Central Book Depot, Allahabad.
14. Singh, R.L., and Singh, R.P.B. (1997). Elements of Practical Geography, Kalyani Publishers, New Delhi.

Savitribai Phule Pune University, Pune
B.Sc. (Geography) as per NEP 2020

Name of the Programme	**:**	B.Sc. (Geography)
Class	**:**	S.Y.B. Sc.
Semester	**:**	IV
Name of Vertical Group	**:**	FP/OJT/CEP
Course Code	**:**	**GEO(S)-281-CEP**
Course Title	**:**	**Community Engagement Programme**
Type of course	**:**	Practical
Total Credits	**:**	02 CEP
Workload	**:**	(30 hours / credit) 2 credits x 30 hours = 60 hours in semester

Objectives of the Course:

1. To enable students to realize and understand the realities of society.
2. To make students aware of their inner strength and help them to find out solutions on society problems.
3. To develop an understanding of ethical considerations and responsibilities when conducting community based research and projects.
4. To teach students how to use geographical tools and technologies to analyze and address community issues.
5. To help students to initiate developmental activities in the community in coordination with public and government authorities.

Topics and Learning Points

Topic No	Topic Name	Sub Topic	No. of Hours
1.	Social Awareness Programme	▪ Organization of following program (any Two) i. Clean India mission campaign ii. AIDS awareness rally iii. Anti drugs campaign iv. Blood donation camp v. Tree plantation program vi. Water conservation program	18

2.	Field Visit and Interaction	▪ Organization of field visit and interaction (any One) i. Gram Panchayat ii. Nagarpalika iii. Panchayat Samiti iv. Mahanagarpalika v. Zilla Parishad etc	18
3.	Socio Economic Survey and Report Writing	▪ Organization of socio-economic survey of any village/city i. Field visit and data collection (Survey, Interviews, Observations etc) ii. Recording and organizing field data (Photographs, Maps, Diagrams, Notes etc) iii. Data analysis, presentation and interpretation iv. Finding, conclusion and recommendations v. Submission of final report	24

Course Outcomes:

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

CO 1 : Analyze and assess the needs and challenges faced by a community through fieldwork and surveys

CO 2 : Design comprehensive and feasible engagement programmes to address specific community issues

CO 3 : Demonstrate the ability to execute and monitor community engagement projects effectively

CO 4 : Evaluate the impact of community initiatives using qualitative and quantitative methods

CO 5 : Reflect on personal learning and growth through engagement activities and teamwork

CO 6 : Apply ethical practices and promote inclusivity and sustainability in community projects

References:

1. Mukherjee, Neela (2002), Participatory Learning and Action with 100 Field Methods Concept Publishing, New Delhi.
2. Rao, P. S. (2006), Research Methodology for Social Sciences. Anmol Publications, New Delhi.
3. Kothari, C. R. (2004), Research Methodology: Methods and Techniques. New Age International Publishers, New Delhi.
4. Sundaram, K. V. (2007), Geography Fieldwork and Techniques. Concept Publishing, New Delhi.
5. Singh, R. L. (1994), Elements of Practical Geography. Kalyani Publishers, New Delhi.

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B.Sc. (Geography) as per NEP 2020

Name of the Programme	**:**	B.Sc. (Geography)
Class	**:**	S.Y.B. Sc.
Semester	**:**	IV
Name of Vertical Group	**:**	Minor
Course Code	**:**	**GEO(S)-291-MN**
Course Title	**:**	**Geography of Maharashtra**
Type of course	**:**	Theory
Total Credits	**:**	02
Workload	**:**	(15 hours/credit) 2 credits x 15 hours = 30 hours in semester

Objectives of the Course:

1. To acquaint students with Geography of our State.
2. To make students aware of the magnitude of problems and prospects in Maharashtra.
3. To help students understand the inter relationship between the subject and the society.
4. To help students understand the recent trends in regional studies.

Topics and Learning Points:

Topic No	Topic Name	Sub Topic	No. of Hours
1.	Administrative Set up of Maharashtra	1. Geographical location 2. Adjoining states 3. Administrative divisions	10
2.	Physiography and Climate	1. Physical structure (mountain, plateau and plains) 2. Drainage pattern (east and west flowing rivers) 3. Major seasons and weather associated with them	12
3.	Soil and Forest	1. Soil types and distribution 2. Soil Conservation 3. Forest types and distribution 4. Forest Conservation	08

Course Outcomes:

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

CO 1 : Gain the ability to describe and analyze the administrative structure of Maharashtra.

CO 2 : Able to explain the physical features of Maharashtra

CO 3 : Explore and describe the climatic diversity of Maharashtra.

CO 4 : Assess the environmental and resource management challenges facing Maharashtra.

References:

1. Dikshit K.R ., Maharashtra in Maps,
2. Deshpande C. D. , Maharashtra
3. Sadhu Arun, Maharashtra, National Book Trust
4. Savadi A. B., Geography of Maharashtra: Nirali Prakashan, Pune.
5. Dastane S., Maharashtra, Ramchandra and company, Pune
6. Sawadi A. B., The Mega State Series : Nirali Publication, Pune.
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8. Karve I., Maharashtra its Land and people,
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Savitribai Phule Pune University, Pune
B.Sc. (Geography) as per NEP 2020

Name of the Programme	**:**	B.Sc. (Geography)
Class	**:**	S.Y.B.Sc.
Semester	**:**	IV
Name of Vertical Group	**:**	Minor
Course Code	**:**	**GEO(S)-292- MNP**
Course Title	**:**	**Practicals in Weather Study**
Type of course	**:**	Practical
Total Credits	**:**	02
Workload	**:**	(30 hours / credit) 2 credits x 30 hours = 60 hours in semester

Objectives of the Course:

1. Comprehend the mechanisms and functions of weather instruments: To understand the working principles, construction, and applications of various weather instruments
2. Develop practical skills in using weather instruments: To gain hands-on experience in operating weather instruments and recording accurate meteorological data.
3. Interpret and analyze meteorological data: To learn the methods of interpreting weather information obtained from weather maps.

Topics and Learning Points

Topic No.	Topic Name	Sub Topic	No. of Hours
1.	Introduction to Weather Instruments	1. Understanding weather instruments: mechanisms, functions, and usage i. Measurement of temperature: Simple Thermometer ii. Measurement of humidity: Hygrograph iii. Measurement of precipitation: Rain Gauge iv. Measurement of air pressure: Barograph v. Identification of wind direction: Wind Vane vi. Measurement of wind velocity: Cup Anemometer 2. Practical Activities: • Demonstrating the use of weather instruments • Recording and interpreting climatological readings	20
2.	Isobaric Patterns	1. Drawing of isobaric patterns and associated weather i. Cyclone ii. Anticyclone iii. Ridge	20

Topic No.	Topic Name	Sub Topic	No. of Hours
		iv. Trough v. Wedge 2. Secondary depression and Col	
3.	Weather Maps	1.Introduction to IMD weather maps/reports 2. Symbols in daily weather report used by (IMD) 3.Reading and interpretation of weather maps of three seasons: i. Summer ii. Monsoon iii. Winter 4. Weather applications: Mausam, Meghdoot, Damini 5. Visit to nearby weather station	20

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

Course Outcomes:

CO 1 : Explain the mechanisms and functions of weather instruments

CO 2 : Demonstrate the use of weather instruments

CO 3 : Record and interpret weather data

CO 4 : Understand and interpret the IMD weather maps

CO 5 : Identify meteorological symbols

CO 6 : Analyze isobaric patterns

CO 7 : Evaluate seasonal weather conditions

CO 8 : Develop practical skills in weather forecasting

CO 9 : Engage in field observations and reporting

References:

1. World Meteorological Organization. (1983). Guide to meteorological instruments andmethods of observation. Secretariat of the World MeteorologicalOrganization.

2. Jarraud,M. (2008). Guide to meteorological instruments and methods of observation (WMO No. 8). World Meteorological Organization: Geneva, Switzerland.

3. M. Rajeevan**, Indian Climate and Weather Systems,** Springer India, 2016 Barry, R. G., & Chorley, R. J. (2010). *Atmosphere, Weather, and Climate*. Routledge.

4. Critchfield, H. J. (1997). *General Climatology*. Prentice Hall.

5. Monkhouse, F. J., & Small, J. (1978). *A Dictionary of Meteorology*. Edward Arnold Publishers

6. Petterssen, S. (1956). *Weather Analysis and Forecasting*. McGraw-Hill.

7. Stringer, E. T. (1972). *Techniques of Meteorology*. W. H. Freeman & Co.

8. Trewartha, G. T., & Horn, L. H. (1994). *An Introduction to Climate*. McGraw-Hill Education.

Websites: 1. World Meteorological Organization (WMO): www.wmo.int

2. India Meteorological Department (IMD): www.imd.gov.in
3. National Weather Service: www.weather.gov

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B.Sc. (Geography) as per NEP 2020

Name of the Programme	**:**	B.Sc. (Geography)
Class	**:**	S.Y.B. Sc.
Semester	**:**	IV
Name of Vertical Group	**:**	GE/OE
Course Code	**:**	**OE-251- GEO(S)**
Course Title	**:**	**Practicals in Use of Google Earth**
Type of course	**:**	Practical
Total Credits	**:**	02
Workload	**:**	(30 hours/credit) 2creditsx 30 hours =60 hours in semester

Objectives of the Course:

1. To introduce students to the interface and tools of Google Earth.
2. To develop skills in visualizing, interpreting, and analyzing spatial data.
3. To apply Google Earth tools in geographic mapping, measurements, and data collection.
4. To encourage the use of open-source geospatial tools in research and fieldwork planning

Topics and Learning Points:

Topic No	Topic Name	Sub Topic	No. of Hours
1.	Introduction to Google Earth	1. Overview, installation, interface navigation, base map types (satellite, terrain, hybrid) 2. Tools and Features- Zoom, search, historical imagery, layers (borders, roads, weather, 3D buildings), Street View	20
2.	Mapping and Marking	1. Adding placemarks, paths, polygons, image overlays, folders, changing styles and colors	10
3.	Measurement and Analysis	1. Measuring distance, area, elevation profile; GPS coordinates, location identification, KML/KMZ files, importing shapefiles, integrating with Google My Maps, exporting maps	15
4.	Applications in Geography	1. Case studies (Any one) : land use mapping/water body change detection/ settlement pattern analysis/tourism site identification	15

Course Outcomes:

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

COs1 : Navigate and operate Google Earth software effectively.

COs 2 : Create and manage custom geographic data using placemarks, paths, and polygons

COs 3 : Measure and analyze spatial features using built-in tools.

COs 4 : Import/export geospatial data formats (KML/KMZ).

COs 5 : Apply Google Earth for academic and field-based geographic research.

References:

1. Google Earth User Guide – Google Help Center
2. Misra, R.P. (2015). *Geospatial Technologies in Geography*.
3. Singh, R.L. – *Practical Geography*.
4. YouTube Tutorials – *Google Earth for Beginners*, *KML Mapping Techniques*

Websites:

- https://www.google.com/earth/
- https://earth.google.com/web/

Savitribai Phule Pune University, Pune
B.Sc. (Geography) as per NEP 2020

Name of the Programme	**:**	B.Sc.(Geography)
Class	**:**	S.Y.B. Sc.
Semester	**:**	IV
Name of Vertical Group	**:**	SEC
Course Code	**:**	**SEC- 251- GEO(S)**
Course Title	**:**	**Practical in Statistical Analysis**
Type of course	**:**	Practical
Total Credits	**:**	02
Workload	**:**	(30hours / credit) 2 credits x 30 hours = 60 hours in semester

Objectives of the Course:

1. To introduce students with the fundamental concepts and applications of statistics
2. To explore different types of data and introduce major sampling techniques used in statistical analysis
3. To apply descriptive statistics, including measures of central tendency and dispersion, to summarize and analyze data efficiently

Topics and Learning Points

Topic No	Topic Name	Sub Topic	No. of Hours
1.	Introduction to Statistics	1. Definition and concepts of statistics 2. Scope of statistics 3. Application of statistics	06
2.	Data Types and Sampling Methods	i. Scales of Measurement: nominal scale, ordinal scale, Interval scale, ratio scale, ii. Types of data: primary and secondary, discrete and continuous iii. Concept of sample and population 4. Sampling methods: random sampling, stratified sampling, Systematic sampling 5. Graphical Representation of data: histogram, frequency curve and frequency polygon, ogive curve. (At least two examples each)	20

3.	Measures of Central Tendency	1. Concept and significance of central tendency ii. Mean: definition, computation (ungrouped and grouped data), merits and demerits. iii. Mode: definition, computation (ungrouped and grouped data), merits and demerits. iv. Median: definition, computation (ungrouped and grouped), merits and demerits. (minimum two examples each)	14
4.	Measures of Dispersion	i. Concept of dispersion, characteristics of a good measure of dispersion. ii. Range: definition, computation, merits and demerits. iii. Semi-interquartile range (Quartile deviation): Definition, computation, merits and demerits iv. Standard deviation and variance: definition, computation, merits and demerits v. Measures of dispersion for comparison: coefficient of range, coefficient of quartile deviation, coefficient of mean deviation, and coefficient of variation (Minimum one example each)	20

Course Outcomes:

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

CO 1 : Classify and differentiate between different types of data, variables and sampling methods

CO 2 : Utilize graphical techniques to present statistical data using histograms, frequency and ogive curves

CO 3 : Apply descriptive statistics by computing and interpreting measures of central tendency and dispersion

CO 4 : Develop students' practical skills in statistical analysis and problem-solving.

References:

1. Croxton, C., Cowden, D. J., & Klein, S., 1967, Applied general statistics, Prentice Hall, New Jersey.
2. Frank, H., & Althoen, S. C., 1994, Statistics: Concepts and applications, Cambridge University Press.
3. Hammond, R., & McCullagh, P. S.,1985, Quantitative techniques in geography: an introduction, Clarendon Press, Oxford University Press.
4. Mann, P. S., 2020, Introductory statistics, John Wiley & Sons.
5. Rogerson, P. A., 2019, Statistical methods for geography: a student's guide, Sage Publications, London.