Department of Geography

School of Earth Science

Course Contents & Syllabus

Fourth year (7th & 8th Semesters)

Four Year Under Graduate Programme (FYUP)
Under NEP 2020

(for Students enrolled 2022-23; 2023-2024; 2024-25 Academic Sessions)

Hemvati Nandan Bahuguna Garhwal University

(A Central University)

Srinagar Garhwal-246174 (Uttarakhand)

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Srinagar (Uttarakhand)

Four Year Under Graduate Programme (FYUP)
Under NEP 2020
(for Students enrolled 2022-23; 2023-2024; 2024-25 Academic Sessions)

The following course descriptions, course structure, and other relevant information will apply exclusively to students enrolling in undergraduate programmes for the first time in the academic session 2025–26.

Fourth year (7th & 8th Semesters)

Fourth Year – NHEQF Level- 6

In the fourth Year of Four-Year Undergraduate Program (FYUP) two types of programs are offered:

1. U.G. with Honours

2. U.G. Honours with Research

Candidates with a minimum CGPA of 7.5 will be eligible to continue their studies into the fourth year of the undergraduate program, leading to a four-year Bachelor's degree (Honours with Research).

Fourth Year- (U.G. with Honours)

The following course structure under FYUP for Multidisciplinary Programmes is designed for subjects which have practical based courses or have relatively larger emphasis on practical course-based learning.

(For practical based subjects)

Entry requirement	(After completing requirements of a 3-year bachelor's degree (120 credits) and 2 additional credits under SSD, will be allowed to continue studies in the fourth year of the undergraduate programme leading to the four years bachelor's degree (with Honours).							
Course Type	**Semester-VII**				**Semester-VIII**			
	Subject/Title	**No. of paper**	**Credits**		**Subject /Title**	**No. of paper**	**Credits**	
			T	**P**			**T**	**P**
Major Subject (One)	**Core Major -I** Geomorphology	**1**	**5**	**-**	**Core Major -I** Climatology	**1**	**5**	**-**
	Core Major –II Resource Geography	**1**	**5**	**-**	**Core Major –II** Regional Planning & Development	**1**	**5**	**-**
	Core Major –III Introduction to Remote Sensing	**1**	**5**		**Core Major –III** Introduction to GIS	**1**	**5**	**-**
	Core Major Elective –I* Geo-Environmental Studies	**1**	**4**	**-**	**Core Major Elective –II*** Hazards and Disaster Management	**1**	**4**	**-**
	Major Practical Remote Sensing	**1**	**-**	**5**	**Major Practical** Introduction to GIS	**1**	**-**	**5**
Minor (One)	**Minor–I** # Population Geography Practical- Quantitative Techniques	**1**	**2**	**2**	**Minor–II** # Social Geography Practical- Cartography	**1**	**2**	**2**
Total		**6**	**21**	**7**		**6**	**21**	**7**
NHEQF Level- 6	***Student on exit after successfully completing four years (i.e., securing minimum required 176 credits along with securing additional 2 credits under SSD course work) will be awarded "Four years Bachelor's Degree (Honours)", in related field/discipline***							

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Note: * In case of Core Major Elective course, if the department want to introduce practical component, the department may bifurcate the total 4 credits between theory and practical. ***Note: # If the minor course is offered without a practical component, the department must allocate 4 credits to the theory component. Electives may be offered by the departments under the Minor.***
Minor–I* Each department will have to prepare Minor course (One in each semester), which enriches the learner's knowledge beyond the Major discipline (Core Major). The minor courses opted by any learner should be different from the Core Major offered by the Department. If a student selects a minor course from a particular subject or department, they are required to study the courses offered by that same subject/department in both the 7th and 8th semesters. ***Important Note:*** *The student may select Minor course either from his/her second core, studied up to 6th semester, or may select from the I.D/M.D subject(s) they have pursued in the first and second year of their U.G. Programme.* **For Example:** If a student has passed U.G. 3 years with two core subjects i.e. Zoology and Botany, and the student have opted for Zoology as his/her Major subject in the 4th year, then the student may opt Minor courses (To be studied in 7th and 8th semester) from any one subject, which could be either Botany or ID/M.D subject (s) studied by him/her in first two years of FYUP.

Fourth Year- (U.G. Honours with Research)

The following course structure under FYUP is designed for subjects which have practical based courses or have relatively larger emphasis on practical course-based learning.

(For practical based subjects)

Entry requirement	(After completing requirements of a 3-year bachelor's degree (120 credits) and 2 additional credits under SSD, candidates who meet a minimum CGPA of 7.5 will be allowed to continue studies in the fourth year of the undergraduate programme leading to the four years bachelor's degree (Honours with Research).							
Course Type	**Semester-VII**				**Semester-VIII**			
	Subject/Title	**No. of paper**	**Credits**		**Subject /Title**	**No. of paper**	**Credits**	
			T	**P**			**T**	**P**
Core Subject (One)	**Core Major -I** Geomorphology	**1**	**5**	**-**	**Core Major-I** Climatology	**1**	**5**	**-**
	Core Major –II Resource Geography	**1**	**5**	**-**				
	Core Major Elective-I* Remote Sensing & GIS	**1**	**4**	**-**	**Core Major Elective -II*** Hazards and Disaster Management	**1**	**4**	**-**
	Major Practical Remote Sensing & GIS	**1**	**-**	**5**	**Major Practical** Surveying	**1**		**3**
	Research Methodology	**1**	**5**		**Dissertation**	**1**		**12**
Minor (One)	**Minor–I #** Population Geography Practical- Quantitative Techniques	**1**	**2**	**2**	**Minor–II #** Social Geography Practical- Cartography	**1**	**2**	**2**
Total		**6**	**21**	**7**		**5**	**11**	**17**
NHEQF Level- 6	***Student on exit after successfully completing four years (i.e., securing minimum required 176 credits along with securing additional 2 credits under SSD course work) will be awarded "Four years Bachelor's Degree (Honours with Research)", in related field/discipline***							

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Note: * In case of Core Major Elective course, if the department want to introduce practical component, the department may bifurcate the total 4 credits between theory and practical.
Note: # If the minor course is offered without a practical component, the department must allocate 4 credits to the theory component. Electives may be offered by the departments under the Minor courses.

Minor–I* Each department will have to prepare Minor course (One in each semester), which enriches the learner's knowledge beyond the Major discipline (Core Major). The minor courses opted by any learner should be different from the Core Major offered by the Department.

If a student selects a minor course from a particular subject or department, they are required to study the courses offered by that same subject/department in both the 7th and 8th semesters.

Important Note: *The student may select Minor course either from his/her second core, studied up to 6th semester, or may select from the I.D/M.D subject they have pursued in the first and second year of their U.G. Programme.*

For Example: If a student has passed U.G. 3 years with two core subjects i.e. Zoology and Botany, and the student have opted for Zoology as his/her Major subject in the 4th year, then the student may opt Minor courses (To be studied in 7th and 8th semester) from any one subject, which could be either Botany or ID/MD subject studied by him/her in first two years of FYUP.

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Syllabus of B.A./B.Sc. in Geography as per Four Year Under Graduate Programme (FYUP) Under NEP 2020 for Students enrolled in 2022-23, 2023-24, 2024-25 Academic Sessions

Applicable to B.A/B.Sc. VII Semester and VIII Semester Session 2025-26 only

Fourth Year- (U.G. with Honours)

Semester VII	Major Subject	Course Name	Credit
Core Subject (One)	Core Major -I	Geomorphology	5
	Core Major -II	Resource Geography	5
	Core Major -III	Introduction to Remote Sensing	5
	Core Major Elective-I*	Geo-Environmental Studies	4
	Major Practical	Remote Sensing	5
Minor (One)	Minor–I #	Population Geography with Practical-Quantitative Techniques	2+2
	Total		28
Semester VIII	**Major Subject**	**Course Name**	**Credit**
Core Subject (One)	Core Major -I	Climatology	5
	Core Major -II	Regional Planning & Development	5
	Core Major -III	Introduction to GIS	5
	Core Major Elective-II*	Hazards and Disaster Management	4
	Major Practical	Introduction to GIS	5
Minor (One)	Minor–II #	Social Geography with Practical- Cartography	2+2
	Total		28

Fourth Year- (U.G. Honours with Research)

Semester VII	Major Subject	Course Name	Credit
Core Subject (One)	Core Major -I	Geomorphology	5
	Core Major -II	Resource Geography	5
	Core Major -III	Research Methodology	5
	Core Major Elective-I*	Remote Sensing & GIS	4
	Major Practical	Remote Sensing & GIS	5
Minor (One)	Minor–I #	Population Geography with Practical-Quantitative Techniques	2+2
	Total		28
Semester VIII	**Major Subject**	**Course Name**	**Credit**
Core Subject (One)	Core Major -I	Climatology	5
	Core Major -II	Dissertation	12
	Core Major Elective-II*	Hazards and Disaster Management	4
	Major Practical	Surveying	3
Minor (One)	Minor–II #	Social Geography with Practical- Cartography	2+2
	Total		28

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Detailed Syllabus

Geography-B.A./B.Sc.
Fourth Year- (U.G. with Honours)
Semester-VII
CORE-Major

Paper - I: GEOMORPHOLOGY			
Paper Code: SOES/GEOG/C001			
Credit: 05			
Total Marks: 100	Internal Assessment: 40	End Semester: 60	Contact Hour per Week: 05

Course Outcomes:

CO1 : Students will learn the fundamental concepts of geomorphology, methods of landform study, and classical theories of landscape development.

CO2 : Students will understand the processes of plate tectonics, mountain building, isostasy, and geological structures and rocks.

CO3 : Students will apply concepts of geomorphic processes with special reference to the Uttarakhand Himalaya.

CO4 : Students will analyse applied geomorphological knowledge for engineering works, anthropogenic processes, and landscape planning in diverse geomorphic settings.

CO5 : Students will evaluate the regional geomorphology of Uttarakhand and their implications for sustainable development.

Note: The paper consists of four units. Two questions will be set from each unit. The candidate will be required to attempt four questions in all. Answer should be precise. All questions carry equal marks.

UNIT I

Fundamental concepts of Geomorphology; Methods and Approaches of landforms study; Theories of landscape development by Gilbert, Davis, Penk and Hack and morphogenetic region.

UNIT II

Plate tectonics; Mountain building; Isostasy; Tectonic Geomorphology; Theories of slope development by Young and King; Peneplain and Pedi plains; Geological structure and rocks.

UNIT III

Geomorphic process – River, glacier, underground water: Mass movement and resultant landforms; Morphometry of drainage basin; Profile of equilibrium rejuvenation and polycyclic landscape. (With special reference to Uttarakhand Himalaya)

UNIT IV

Applied Geomorphology engineering works; Anthropogenic process and landscape planning; Regional Geomorphology of Uttarakhand -Great, Lesser and Siwalik Himalaya.

Books Recommended:

1. Bloom, A.L.: Geomorphology, Prentice Hall, New Jersey USA, 1979.
2. Goudie, A.: Geomorphological Techniques, George Allen and Unwin, London, 1981.
3. Washborn, A.L.: Periglacial Process and Environment, Edward Arnold, London, 1973.
4. Young, A.: Slopes, Oliver and Boyd, London, 1972.
5. King, C.A.M.: Techniques in Geomorphology, Edward Arnold, London, 1968.
6. Embleton, C. and Theories, J.: Processes in Geomorphology, Arnold Hienman, London, 1979.
7. Phodes, D.D. and William, G.P.: Adjustment of Fluvial Process, George Allen and Unwin, Boston, 1982.
8. Tricart, L. and Callam: Introduction to climate Geomorpholgy, Longman, London, 1972.
9. Derbyshrine, E. Gregory K.J. and Halls, J.R.: Geomorphological Processes, Butterworths, London, 1979.
10. Gregory, K.J. and Willing, D.E.: Drainage Basin Processes and Forms, Edward Arnold, London,
11. Gregory, K.J. and Willing, D.E.: Man and Environment Processes, Butter Worths, London, 1981.
12. Singh Savindra: Bhu- Akriti vigyan in Hindi

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Paper – II: GEOGRAPHY OF RESOURCES			
Paper Code: SOES/GEOG/C002			
Credit: 05			
Total Marks: 100	Internal Assessment: 40	End Semester: 60	Contact Hour per Week: 05

The Course will help the learner to:

CO1: To remember the core concepts and classifications of resources and recall key theories of resource use and management.

CO2: To understand the spatial distribution, utilization, and associated challenges (misuse, depletion) of major global and Indian resources.

CO3: To apply principles of conservation and sustainable management to analyse real-world case studies of resource exploitation.

CO4: To analyse the interrelationships between resource depletion, environmental issues, and socio-economic policies.

CO5: To evaluate the effectiveness of global initiatives (e.g., SDGs, Agenda 21) and national policies for sustainable resource governance and conservation.

Note: The paper consists of four units. Two questions will be set from each unit. The candidate will be required to attempt four questions in all. Answer should be precise. All questions carry equal marks.

UNIT I

Definition and concept of Resources, Classification of Resources; Nature and Scope of Resources Geography; Theories of Resource use and Management.

UNIT II

Land, Water, Energy, Biotic Resources, and Human Resource - distribution, use-misuse and conservation Global and Indian scenario.

UNIT III

Resources depletion and emerging issues -Deforestation, loss of bio-diversity, acid rain, energy crises, environmental problems

UNIT IV

Over Exploitation and Conservation of resources; Global initiatives (Agenda 21, SDGs) and national resource policies, Community base Natural Resource Management (CBNRM), Resource management practices in Uttarakhand.

Books Recommended:

1. Holechek. J.L. et al: Natural Resources- Ecology, Economics and Policy, Prentice Hall, New Jersey, 2000.
2. Kates, R.W. and Burton, I. (ed): Geography, Resources and Environment, Vol, II, University of Chicago Press, Chicago, 1986.
3. Mc Laren, D.J. and Sklnnet, B.J. (ed): Resources and World Development, Jogn Wiley and Sons, New York, 1986.
4. Newson, M.D.: Land, Water and Development, River Basin System and Management, Routledge, London, 1991.
5. Owen, S. and Owen, P.L.: Environment Resources and Conservation, Cambdridge University Press, New York, 1991.
6. Rees, J.: Natural Resources, Allocation, Economics and Policy, Methuen, London, 1988.
7. Simmons, I.G.: Earth, Air and Water Resources and Environment in Late 20th Century, Edward, Arnold, 1991.

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Paper - III: INTRODUCTION TO REMOTE SENSING			
Paper Code: SOES/GEOG/C003			
Credit: 05			
Total Marks: 100	Internal Assessment: 40	End Semester: 60	Contact Hour per Week: 05

Course Outcomes (COs)

CO1: Students will learn the definitions, types, components, and platforms of remote sensing, and trace its development globally and in India.

CO2: Students will understand the principles of remote sensing, electromagnetic radiation (EMR) interaction with the atmosphere and sensors such as Landsat and IRS.

CO3: Students will apply the elements of image interpretation to conduct land use and land cover studies using remote sensing data.

CO4: Students will analyze different types of aerial photographs, and explain the simple geometry of conventional vertical aerial photographs.

CO5: Students will evaluate the suitability and effectiveness of various remote sensing data, platforms, and interpretation techniques for different geographical applications.

Note: The paper consists of four units. Two questions will be set from each unit. The candidate will be required to attempt four questions in all. Answer should be precise. All questions carry equal marks.

UNIT I

Definition, types, and components of remote sensing, types of platforms; Relevance of remote sensing, Development of Remote sensing in the world and India.

UNIT II

Principles, EMR Interaction with Atmosphere and Earth Surface; Satellites (Landsat and IRS) and Sensors

UNIT III

Elements of image Interpretation, Application of remote Sensing: Land use/ Land Cover studies.

UNIT IV

Types of aerial photographs, marginal information on aerial photographs; scale, Simple geometry of conventional vertical aerial photographs.

Books Recommended:

1. Sabine, F.F.: Remote Sensing- Principles & Interpretation.
2. Lillesand, R.M.: Remote Sensing and Image Interpretation Kiefer R.W.
3. Chauniyal, D.D.: Remote Sensing and GIS (Hindi).
4. Jensen, J.R.: Introductory Digital Image Processing- A Remote Sensing Perspective.
5. Jones, C.: Geographical Information System & Computer Cartography.
6. Ayery, T.E.: Introduction to Aerial Photographs.
7. Pratt, W.K.: Digital Image Processing, John Wiley & Sons Now York (1995).

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Paper - IV: GEO-ENVIRONMENTAL STUDIES			
Paper Code: SOES/GEOG/E001			
Credit: 04			
Total Marks: 100	Internal Assessment: 40	End Semester: 60	Contact Hour per Week: 04

Course Outcomes:

CO1: Students will learn the meaning, scope, and basic concepts of Environmental Geography, including components of environment, ecology, ecological succession, and the man–environment relationship.

CO2: Students will understand the structure and functioning of ecosystems, including their components, trophic levels, food chains, food webs, energy flow, stability, and productivity.

CO3: Students will apply their knowledge to identify and explain various forms of environmental degradation and pollution, as well as major global environmental problems such as climate change, ozone depletion, greenhouse effect, and acid rain.

CO4: Students will analyze environmental management concepts, approaches, and strategies, along with the integration of environmental dimensions in planning and sustainable development.

CO5: Students will evaluate national and international environmental policies, programs, and agreements and assess their implications through environmental impact assessments.

Note: The paper consists of four units. Two questions will be set from each unit. The candidate will be required to attempt four questions in all. Answer should be precise. All questions carry equal marks.

UNIT I

Meaning and scope of Environmental Geography; Basic concept of Environmental Geography; Component and types of environments; Ecology; Principles, types and ecological secession; Man-environment relationship.

UNIT II

Ecosystem - Concept and components; Trophic levels; Food Chain and Food Webs; Energy flow in the ecosystem; Ecosystem stability, and productivity.

UNIT III

Environmental degradation; Environmental Pollution (Air, Water and Solid Waste); Environmental Problems- Global Warming, Ozone depletion and Green House effect; Acid rain and climate change.

UNIT IV

Environmental Management: Concepts, approaches and management strategies; Environmental dimension in planning and sustainable development; Limits to growth - Rio Summit, Kyoto Protocol; Environment impact assessment; National environment policy and programs.

Books Recommended:

1. Sing. L.R. et al.: Environmental Management, Allahabad Geographical Society, Allahabad.
2. National Academy of Sciences: Understanding Climate Changes, Washington, D.C.
3. Furley, P.A. and Neway, W.W.: Man, and the Biosphere, Butterworth, London.
4. Arvil, R.: Man, and Environment, Penguin.
5. Bennet, R.J. and Chorley, R.J.: Environmental System- Philosophy, Analysis and Control, Methuen, London.
6. Singh, Savindra: Environmental Geography, Prayag Pushtak Bhawan, Allahabad.
7. Detwler, T.R.: Man's impact on the Environment, McGraw Hill, New York.
8. Sing, Savindra: Paryavaran Bhoogal, Prayag Pushtak Bhawan, Allahabad.
9. Odum, E.P.: Fundamentals of Ecology, W.B. Sounders Co. Philadelphia, 1971.
10. Mather, A.S. and Chapman, K.: Environmental Resources, Longman Group Ltd. U.K., 1995.

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Paper - V: PRACTICAL- REMOTE SENSING			
Paper Code: SOES/GEOG/C004 (P)			
Credit: 05			
Total Marks: 100	Internal Assessment: 40	End Semester: 60	Contact Hour per Week: 05

CO1: Students will learn the fundamentals of remote sensing data, platforms, and sensors, and practice downloading open-source satellite datasets.
CO2: Students will understand electromagnetic radiation (EMR) interactions and spectral signatures to interpret band combinations and create False Colour Composites (FCC).
CO3: Students will apply visual interpretation techniques (tone, texture, shape, size, pattern, association) to perform land use/land cover classification from satellite images.
CO4: Students will analyse spatial data using GPS and computer cartography to produce accurate thematic maps.
CO5: Students will evaluate the quality and suitability of remotely sensed data and mapping outputs for different geographical applications.

Note: The syllabus for practical is related to laboratory work on cartographic mapping. The practical exam will be of three hours' duration. The division of marks in practical shall be as given below.

Laboratory work (Cartography) - 40
Session Record Work - 10
Viva-voce - 10

The laboratory work is divided into four units. Two exercises are to be set from each unit with internal choice and candidates will be required to attempt four exercises in all. This paper examination will be of three hours' duration in which exercises will be given on cartographic. All questions carry equal marks.

UNIT I

Familiarization with different types of remote sensing data, Identification of different platforms and sensors using data sets, Hands-on collection and downloading of open source satellite data.

UNIT II

Introduction of EMR interaction through spectral signatures, Hands-on with satellite data- band combinations and their significance, False Colour Composite (FCC) using digital satellite data.

UNIT III

Visual Interpretation Techniques: tone, texture, shape, size, pattern, and association, Practical exercise on land use/land cover classification from satellite images.

UNIT IV

Basic of GPS and Computer Cartography & Mapping.

Books Recommended:

1. Jenson, J.R.: Introduction to Digital Image Processing, Prentice Hall, Englewood Cliffs, NJ.
2. Pratt, W.K.: Digital Image Processing, John Wiley & Sons, New York, 1995.
3. Hord, R.M.: Digital Image Processing of Remotely sensed data, Academic Press, New York, 1989.
4. Nag, P.: Thematic cartography and Remote Sensing Concept, Publishing House, New Delhi.
5. Blackwell, B.: Statistics in Geography, Basil Blackwell Ltd., 1988.
6. Sinha, P.K. & Sinha, P.: Computer Fundamentals, 3rd Ed. B.P.B. Publishing.
7. Lo, C.P.: Applied Remote Sensing, Longman Scientific and Technical, Harlow, ESSEX.
8. PEUQUET, D.J. & Marble, D.F.: Introductory Readings in Geographic Information Systems, Taylor & Francis, Washington, 1990.
9. Spurr, R.: Photogrammetry and Photo Interpretation, The Rolland Press, Co. London, 1960.
10. Cole, J.P. and King, C.A.M.: Quantitative Geography, John Wiley, London, 1968.

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Paper - VI: POPULATION GEOGRAPHY			
Paper Code: SOES/GEOG/MN001			
Credit: 02			
Total Marks: 100	Internal Assessment: 40	End Semester: 60	Contact Hour per Week: 02

CO code	Course Outcome (CO)
CO1	To learn the nature, scope, and significance of Population Geography and its relationship with other disciplines.
CO2	To understand the patterns of population composition, growth, density, and distribution across the world.
CO3	To apply demographic concepts such as fertility, mortality, migration, and demographic transition theories to analyze population changes.
CO4	To analyse the different dynamics of population such fertility, mortality, migration, population-resource dynamics and measures.
CO5	To evaluate the effectiveness of population policies, planning strategies, and human development indices at national and international levels, to achieve the goals of sustainable development.

Note: The paper consists of four units. Two questions will be set from each unit. The candidate will be required to attempt four questions in all. Answer should be precise. All questions carry equal marks.

UNIT I

Nature, scope and significance of Population Geography and its relationship with demography, Relevance of Population Geography; Recent approaches and methods to study population geography.

UNIT II

Population composition; Population growth, density, distribution patterns and their determinants; Concepts of under, over and optimum Population.

UNIT III

Concepts and measurements of fertility, mortality and migrations; major theories of fertility, mortality and migration, demographic transition theory, demographic dividend.

UNIT IV

Concept of Human Resource and Management; Population resource regions; Population planning and policies in under-developed and developed countries, Human development index; National Population Policies in India.

Books Recommended:

1. Asha A. Bhende and Tata Kanitkar (2024). Principles of Population Studies, 19th Edition, Himalaya Publishing House Pvt. Ltd., India
2. Chandna, R.C. (2000). A Geography of Population; Concept, Determinants and Patterns, Kalyani Pub. New Delhi
3. Beaujeu-Garnier, Jacqueline (1978). Geography of Population, Longman, London 1970.
4. Srinivasan, K. (1997). Basic Demographic Techniques and Applications, Sage Pub. New Delhi,
5. Clarke, J.I. (1972). Population Geography, Pergamon. Oxford
6. Bhagat, R. B. and Rajan, S. I. (2023). Researching Internal Migration, Routledge, London
7. Bhagat, R. B. (2008). Assessing the measurement of internal migration in India , Asian and Pacific Migration Journal, 17(1), 91-102
8. Md Izhaar Hassan (2020): Population Geography-A Systematic Exposition, Routledge, London
9. United Nations Demographic Manuals: https://www.unpopulation.org/en/development/desa/population/publications/manual/index.html
10. ORGI, UNFPA (2014), Training Manual on Demographic Techniques, https://india.unfpa.org/en/publications/training-manual-demographic-techniques

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Paper - VII: PRACTICAL-QUANTITATIVE TECHNIQUES			
Paper Code: SOES/GEOG/MN01 (P)			
Credit: 02			
Total Marks: 100	Internal Assessment: 40	End Semester: 60	Contact Hour per Week: 02

CO code	Course Outcome (CO)
CO1	To learn the types of data (spatial and non-spatial), and levels of measurement with suitable methods of diagrammatic representation.
CO2	To understand the measures of spatial inequality, and distribution using statistical tools.
CO3	To apply different cartographic principles in the construction of maps and diagrams and its interpretation.
CO4	To analyse various measures of concentration, and correlation for understanding spatial patterns and relationships.
CO5	To evaluate the appropriateness, strengths and limitations of statistical techniques in estimating the relationship of different variables of interest.

The syllabus for practical is related to laboratory work on quantitative techniques and mapping. Eight questions will be set selecting at least two questions from each unit. Candidate will have to attempt four questions selecting one question from each unit. It will be of three-hour duration.

Distribution of Marks:

Laboratory Work	-40
Sessional Record	-10
Viva Voce	-10

UNIT I

Types of data- spatial and non-spatial data; Levels of their measurement- Nominal, ordinal, interval and ratio; Diagrammatic representation of data, proportional circles, dot-spheres, cubes.

UNIT II

Measures of spatial inequality, Location quotient; Lorenz curve, Gini's Co-efficient; Concept of Spatial Distribution-Nearest Neighbour Analysis (NNA); Rank Size Rule;

UNIT III

Elements of Maps: Generalization, Symbolization and classification; choropleth and isopleths, Basics of topographical map and OSM, Elements of Weather map.

UNIT IV

Scatter plots and its types; Measures of central tendencies and dispersion, Correlation: Spearman's Rank and Karl Pearson's method, Simple linear regression: basic concepts and construction of regression line.

Books Recommended:

1. Thomas Lillesand, Ralph W. Kiefer, Jonathan Chipman (2015). Remote Sensing and Image Interpretation, 7th Edition, Wiley, New York
2. Partha Basu (2023). Advanced Practical Geography, 4th Edition, Books and Allied Private Limited, India
3. Aslam Mahmood (2020). Statistical Methods in Geographical Studies, Rajesh Publications, India
4. S. P. Gupta (2021). Statistica Methods, 46th Edition, Sultan Chand and Sons, New Delhi
5. D. N. Gujrati, D.C. Porter and S. Gunasekar (2017), Basic Econometrics, 5th Edition, McGraw Hill Education
6. Ashis Sarkar (2015). Practical Geography: A Systematic Approach, 3rd Edition, Orient BlackSwan,
7. Mishra, R.P. & Ramesh A (1989). Fundamentals of Cartography, 2nd Edition, South Aisa Books,
8. Singh, R. L. and R. P. B. Singh (2015). Elements of Practical Geography (English/Hindi), Kalyani Publishers
9. eGyanKosh, IGNOU Self Learning Material (SLM), Master of Science in Geography (MSCGG), https://egyankosh.ac.in/handle/123456789/98159
10. Kali Charan Sahu (2024), Textbook Of Remote Sensing and Geographical Information Systems, Atlantic Publishers & Distributors (P) Ltd, India.

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Geography-B.A./B.Sc.
Fourth Year- (U.G. with Honours)
Semester-VIII
CORE-Major

Paper - VIII: CLIMATOLOGY			
Paper Code: SOES/GEOG/C005			
Credit: 05			
Total Marks: 100	Internal Assessment: 40	End Semester: 60	Contact Hour per Week: 05

Course Outcomes (COs)

CO1: Students will learn and recall the meaning, scope, and development of climatology, jet streams, El Niño, La Niña, Walker circulation, precipitation, and humidity.

CO2: Students will understand and explain the origin, growth, classification, and distribution of air masses, and the genesis and characteristics of fronts, cyclones, and anticyclones in temperate and tropical regions.

CO3: Students will apply climate classification methods and atmospheric hazards and cloudbursts.

CO4: Students will analyze climatic change processes and by distinguishing between natural and anthropogenic factors affecting global climate.

CO5: Students will evaluate issues of global warming, artificial climate creation, and acid precipitation to propose informed perspectives and sustainable solutions to contemporary climatic challenges.

Note: The paper consists of four units. Two questions will be set from each unit. The candidate will be required to attempt four questions in all. Answer should be precise. All questions carry equal marks.

UNIT I

Meaning, scope and development of Climatology; Atmospheric Equilibrium; Adiabatic Temperature Change; Jet Stream; El-Nino; La-Nina; Walker Circulation; Precipitation and Humidity.

UNIT II

Air Masses - Origin, growth, classification and distribution; Horizontal and vertical motion of winds; Fronts and Fronts Genesis; Cyclones and Anti- cyclones; Temperate and Tropical Cyclones

UNIT III

Climate Classification of Koppen and Thornthwaite; Major climate types; Weather analysis - weather forecasting- methods, types and accuracy; Weather and human behavior; Weather modification; Atmospheric hazards - Cloud Bursts.

UNIT IV

Climatic Changes – Definition and detection; Tree rings; Solar variability; Human impact on global climate; Global Warming; Artificial climate and acid precipitation.

Books Recommended:

1. Chorley, R.J. and Barry, R.G.: Atmosphere, Weather and Climate Methuen & Co. Ltd. London, 1995.
2. Critchfield, H.J.: General Climatology, Prentice Hall of India, New Delhi, 2002.
3. Hidoore, J.J.: Global Environment Change, Prentice Hall, New Jersey, 1996.
4. Lockwood, J.G.: World Climatology, Elbs and Edward Arnold (Pub.) Ltd., 1979.
5. Miller, A. et al: Elements of Meteorology, Merrill and Columbus.
6. Oliver, J.E. & Hiddore J.J.: Climatology: An Atmosphere Science, Pearson Education, India, 2003.
7. Thomson, R.D. and Perry, A.: Applied Climatology, Routledge, London and New York, 1997.
8. Trewartha, G.T.: An introduction to climate, McGraw Hill Series in Geography, 1954.
9. Lal, D.S.: Climatology, Sharda Pushtak Bhawan, Allahabad.
10. Singh, Savindra: Climatology, Prayag Pushtak Bhawan, Allahabad, 2005.
11. Lal, D.S.: Jalvayu Vigyan, Sharda Pushtak Bhawan, Allahabad.
12. Singh, Savindra: Jalvayu Vigyan, Prayag Pushtak Bhawan, Allahabad.

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Paper – IX: REGIONAL PLANNING AND DEVELOPMENT			
Paper Code: SOES/GEOG/C006			
Credit: 05			
Total Marks: 100	Internal Assessment: 40	End Semester: 60	Contact Hour per Week: 05

Course Outcomes (COs)

CO1: Students will learn the concepts, scope, types, and historical development of planning, with special reference to regional planning and planning regions of India.

CO2: Students will understand various approaches, methodologies, techniques, and processes of regional planning, including principles of regionalization, sectoral and spatial planning, and different planning levels.

CO3: Students will apply regional development strategies to identify, delineate, and plan for different types of regions such as backward, hill, and tribal areas using case studies.

CO4: Students will analyze spatial inequalities, regional imbalances, and the problems of planning regions in India through relevant indicators and data.

CO5: Students will evaluate regional planning and development strategies for problem areas in India, particularly in the 21st century context, with reference to NITI Aayog and contemporary policy frameworks.

Note: The paper consists of four units. Two questions will be set from each unit. The candidate will be required to attempt four questions in all. Answer should be precise. All questions carry equal marks.

UNIT I

Concept, scope and types of Planning, Regional Planning-its meaning and needs; Approaches to Regional Planning; Historical development of Regional Planning, Planning Regions of the India

UNIT II

Methodology and techniques of Regional Planning; Analytical techniques and procedural techniques; Principles of regionalization; Planning Processes- sectoral and spatial planning; Short–term and long-term perspective planning; multi-regional, multi- level and decentralize planning.

UNIT III

Regional development strategies: Identification of planning region; Delineation and regions; Regional Planning strategies for backward areas, hill areas, tribal areas; Case studies of planning regions; Problems and prospects of Himalayan region.

UNIT IV

Spatial inequalities and regional imbalances in India; Problems of planning regions, indicators and level of regional development; Dilemma of development of problem areas, Regional Planning & development in India; Regional Planning and development strategies in the 21st century; NITI Aayog

Books Recommended:

1. Kuhlinski A.R. (ed.): Growth Poles and Growth Centers in Regional Planning, Mouton, The Hague, 1972.
2. Misra, R.P. et al: Regional Planning Concepts, Techniques and Policies, University of Mysore, Mysore, 1969.
3. Misra, R.P. et. At: Multi Level Planning, Heritage Publishers, Delhi, 1930.
4. Hall, Peter: Urban and Regional Planning, Penguin Books ins. New York.
5. Glasson John: Regional Planning, Hutchison, London.
6. Misra, R.P.: Development Issues of Our Time, Concepts Pub. Co., New Delhi.

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Paper - X: INTRODUCTION TO GIS			
Paper Code: SOES/GEOG/C007			
Credit: 05			
Total Marks: 100	Internal Assessment: 40	End Semester: 60	Contact Hour per Week: 05

Course Outcomes (COs)

CO1: Students will learn the definition, scope, development, and specific characteristics of GIS, and its relationship with Cartography, Remote Sensing, Computer Science, and Geography.

CO2: Students will understand the basic concepts and essential elements of GIS, including map concepts, and components of GIS with methods of data input.

CO3: Students will apply their knowledge to operate different GIS software integrate remote sensing data with GIS, perform digital terrain modeling, and carry out spatial analyses.

CO4: Students will analyze and manage databases (DBMS), including shapefiles (point, line, polygon), geo-referencing, and preparation of maps by extracting and integrating GPS data.

CO5: Students will evaluate GIS outputs, select appropriate tools/techniques for specific spatial problems, and design effective GIS-based solutions for real-world applications.

Note: The paper consists of four units. Two questions will be set from each unit. The candidate will be required to attempt four questions in all. Answer should be precise. All questions carry equal marks.

UNIT I

Geographical Information System (GIS): Definition, scope and specific characteristics; development in the world and in India, Relation of GIS with other collateral subjects like Cartography, Remote Sensing, Computer Science and Geography.

UNIT II

Basic concepts and essential elements of GIS-Map concepts; Data types involved in GIS; types of data structures, their characteristics, and merits-demerits, Components of GIS. Methods of inputting data in GIS.

UNIT III

GIS softwares: paid and open. Integration of remote sensing data with GIS; Digital terrain modeling and its application in GIS; Spatial analysis in GIS.

UNIT IV

Generation Date Base Management System (DBMS), shapefile; point, line, polygon. Geo-referencing and preparation of maps, Components of GPS; Data Extraction from GPS to GIS and mapping.

Books Recommended:

1. Lillesand, Thomas M. *Remote Sensing and Image Interpreation*. Wiley India, New Delhi. 2016. Michael, N. Demers. *Fundamentals of Geographic Information System*, Wiley India. New Delhi. 2015.
2. Nag, P., *Introduction to GIS,* Concept India, New Delhi, 2008.
3. Lo C.P. & Yeung A.K.W., *An Introduction to GIS*, P.H.I/Pearson Edu., Asia, 2002
4. Haywood I., Cornelius I. & Carver S., *An introduction to GIS*, Longman/Pearson Education Asia, 1998/2000.
5. Martin D. *GIS and their Socio-economic Applications,* Routledge, 2nd ed., 1997.
6. Goutam, N.C., *Fundamentals of GIS*, Pink Pubs. 1993.
7. Heywoods, I., Cornelius, S and Carver, S., *An Introduction to Geographical Infromation system*. Prentice Hall,2006.
8. Kraak M.J. & Ormeling F., *Cartography: visualization of Geo-spatial Data,* Pearson Education Asia., 2nd Ed., 2004.
9. Burrough P.A. & McDonnell R.A., *Principles of GIS for Land Resource Assessment,* OUP, 2nd ed. 1998.
10. Chrisman N., *Exploring Geographic Information Systems*, Wiley, 1997.

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Paper - XI: PRACTICAL- INTRODUCTION TO GIS			
Paper Code: SOES/GEOG/C008 (P)			
Credit: 05			
Total Marks: 100	Internal Assessment: 40	End Semester: 60	Contact Hour per Week: 05

Course Outcomes (COs)

CO1: Students will learn the fundamentals of computer-based GIS, map concepts, coordinate systems, projections types of GIS files, and layer stacking of multispectral imagery.

CO2: Students will understand the concepts of geo-referencing, sub-setting using AOI layers, mosaicking, and correction of radiometric and geometric errors in satellite imagery.

CO3: Students will apply spatial data integration techniques, digitization of point, line, and polygon features, and integration of non-spatial data for building geospatial databases.

CO4: Students will analyze spatial and non-spatial data through editing, topology building, and evaluation of data consistency to prepare meaningful geographic outputs.

CO5: Students will evaluate and interpret land use/land cover patterns of a selected area and compile a comprehensive project report integrating GIS and remote sensing techniques.

Note: The syllabus for practical is related to laboratory work on cartographic mapping. The practical exam will be of three hours' duration. The division of marks in practical shall be as given below.

Laboratory work (Cartography) - 40
Session Record Work - 10
Viva-voce - 10

The laboratory work is divided into four units. Two exercises are to be set from each unit with internal choice and candidates will be required to attempt four exercises in all. This paper examination will be of three hours' duration in which exercises will be given on cartographic. All questions carry equal marks.

UNIT I

Basic of Computer; Concept of maps; Coordinates System; Projection (WGS84 and Everest); Types of files, Export/Import file; Layer Stacking of Multispectral Imagery.

UNIT II

Concept of Geo-referencing (maps to image, image to image), sub-setting with the help of AOI layer; Mosaicking; Radiometric and Geometric errors and correction; Image classification.

UNIT III

Spatial data integration; Digitization (Point, Line, Polygon); Non-Spatial Data Integration; Editing of Spatial and Non-Spatial data; Building Topology.

UNIT IV

Preparation of land use/land cover map of a selected area and final project report.

Books Recommended:

1. Pratt, W.K.: Digital Image Processing, John Wiley & Sons, New York, 1995.
2. Hord, R.M.: Digital Image Processing of Remotely sensed data, Academic Press, New York, 1989.
3. Nag, P.: Thematic cartography and Remote Sensing Concept, Publishing House, New Delhi.
4. Blackwell, B.: Statistics in Geography, Basil Blackwell Ltd., 1988.
5. Sinha, P.K. & Sinha, P.: Computer Fundamentals, 3rd Ed. B.P.B. Publishing.
6. Lo, C.P.: Applied Remote Sensing, Longman Scientific and Technical, Harlow, ESSEX.
7. PEUQUET, D.J. & Marble, D.F.: Introductory Readings in Geographic Information Systems, Taylor & Francis, Washington, 1990.
8. Spurr, R.: Photogrammetry and Photo Interpretation, The Rolland Press, Co. London, 1960.
9. Cole, J.P. and King, C.A.M.: Quantitative Geography, John Wiley, London, 1968.

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Paper - XII: HAZARD AND DISASTER MANAGEMENT			
Paper Code: SOES/GEOG/E002			
Credit: 04			
Total Marks: 100	Internal Assessment: 40	End Semester: 60	Contact Hour per Week: 04

Course Outcomes (COs)

CO1: Students will learn the meaning, concept, and classification of hazards and disasters, including their elements, magnitude determinants, and scales.

CO2: Students will understand the typology, and trends of natural hazards, with emphasis on major terrestrial disasters such as earthquakes, volcanoes, landslides, and tsunamis.

CO3: Students will apply the principles of disaster management across various stages, including pre-disaster preparedness, mitigation, prediction, and post-disaster relief and remedial measures.

CO4: Students will analyze the different types of hazards and disaster-prone areas in India, the effectiveness of disaster management policies, and community-based responses.

CO5: Students will evaluate disaster management strategies, programs, and GIS in planning and implementing disaster mitigation and management.

Note: The paper consists of four units. Two questions will be set from each unit. The candidate will be required to attempt four questions in all. Answer should be precise. All questions carry equal marks.

UNIT I

Meaning and concept of Hazards and Disaster; Type of Natural and manmade Hazards; Elements of disasters; Magnitude determinants and scale.

UNIT II

Natural Hazards – Typology; Regional dimension of Hazards; Occurrence and trends; Methods of identifying hazard prone regions; Major terrestrial disaster- seismic disasters, volcanic disaster, landslides and tsunamic disasters; Reasons of increasing frequency of disasters.

UNIT III

Disaster Management: Concept, stage of disaster management; Pre-disaster stage-disaster preparedness, disaster research, disaster prediction and disaster warning; Methods and levels of preparedness; Disaster mitigation and disaster prevention; post-disaster stage-rescue and relief work; Remedial measures; Long term disaster planning.

UNIT IV

Different types of disaster and hazard prone areas in India; Disaster management policies and approaches; Major disasters in India and their management; Response to disasters, government, non-government; Community and individual; Mitigation and Management; Appraisal of government programs/institution of Disaster Management; Significance of Remote Sensing and GIS in planning to the context of Disaster Management.

Books Recommended:

1. Tianch, L.: Landslide Hazard Mapping and Management in China, ICIMOD. Nepal, 1996
2. Valdiya, K.S.: Environmental Geography, Tata McGraw Hill Co. Ltd. New Delhi, 1987
3. Zereba, Q. And Mance V.: Landslides and their Control, Elsevier Amsterdam, 1969.
4. White, G.F.: (ed.): Natural Hards: Local, National, Global, Oxford University Press, London, 1974.
5. Gupta, H.K.: Dams and Earthquakes, Elsevier, Amsterdam, 1976.
6. Burton, I. Et al: The Environment as Hazards, Spinger Verlay, New York, 1950.
7. Bolt, B.A. et ai. (ed.): Geological Hazards, Springer Verlay, New York, 1950.
8. Enbliton, C.: Natural Hazards and Global Change I.T.C., Journal, 1989.
9. Singh, Savindra: Environmental Geography (Eng. /Hindi).
10. Petak, W.J. & Atkinson, A.D.: Natural Hazards Risk Assessment and Public Policy, Springer-Verlay, New York, 1982.

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Paper – XII: SOCIAL GEOGRAPHY			
Paper Code: SOES/GEOG/MN02			
Credit: 02			
Total Marks: 100	Internal Assessment: 40	End Semester: 60	Contact Hour per Week: 02

CO code	Course Outcome (CO)
CO1	To learn the nature, scope, and relevance of Social Geography, its approaches and relation with other disciplines.
CO2	To understand the different fundamental concepts of Social Geography.
CO3	To apply social geographical perspective to examine the spatial distribution and diversity, processes of social transformation and social mobility of different social groups in India.
CO4	To analyse the different indicators of social well-being and social development for detailed understanding of different social issues in India.
CO5	To evaluate the development policies and planning (in promoting equity and social development) with reference to India and Uttarakhand.

Note: The paper consists of four units. Two questions will be set from each unit. The candidate will be required to attempt four questions in all. Answer should be precise. All questions carry equal marks.

UNIT I

Definition, nature and scope of social geography; concept of place, space and society and relevance of social geography; approaches and methods.

UNIT II

Key concepts in social geography- social stratification and differences, social hierarchy, culture, social structure, power structure and space; social ecology and space, mobility and space, social pluralism and diversity, race and ethnicity, religion.

UNIT III

Components of social space in India, process of social transformation- Sanskritization, westernization, modernization: post-modern approaches to understand social change and transformation, social bases of identity; social groups, distribution of castes, tribes and language in India, social factors in region formation; socio-cultural regionalism in India.

UNIT IV

Segregation and assimilation; social and spatial justice; inclusion and exclusion, indicators of social well-being and social pathology (crime, conflicts, other forms of social disorganization), problems and processes of socio-economic and political-inequality, social security and protective discrimination, policies and planning with special reference to India and Uttarakhand.

Books Recommended:

1. Ahmed, A. (1999). Social Geography, Rawat Publication, Jaipur.
2. Kath Browne, Dhiren Borisa, Mary Gilmartin, Niharika Banerjea (2024). Social Geographies-the Basics, Routledge, London
3. Social Geography, IGNOU Self Learning Material, Block-1 to Block-4, https://egyankosh.ac.in/handle/123456789/109916
4. Jones, E. and John Eyles (1979). Social Geography. Oxford University Press, London
5. Harvey, D. (1989). The Condition of Postmodernity: An Enquiry into the Origins of Cultural Change. Oxford: Blackwell.
6. Smith, David M. (1977). Human Geography: A Welfare Approach, Edward Arnold, London
7. Soja, E. W. (2009). The city and spatial justice. http://www.jssj.org.
8. Pirie, G. H. (1983). On Spatial Justice. Environment and Planning A: Economy and Space. 15(4) https://doi.org/10.1068/a150465.

9. Crane, R.I. (1973), Regions and regionalism in South Asia Studies: An Exploratory Study, Durham, Duke University.
10. Dube, S.C. (1991), Indian Societies, National Book Trust of India, New Delhi.
11. Kaufmann V. (2005). Re-thinking Mobility. Contemporary Sociology, Hampshire: Ashgate
12. Rawat, P.S. (1993): Migration and structural change a study of rural society in Garhwal Himalaya, Sarita Book House, Delhi, India
13. Indian Institute of Public Administration. (2020). Caste-Based Segregation in Public Spaces. New Delhi: IIPA.
14. Lefebvre, H. (1991). The Production of Space. Blackwell.
15. Pahl, R. E. (1965). 'Trends in Social Geography.', In Chorley, R. J. & Haggett, P. (Eds.). Frontiers in Geographical Teaching., London: Routledge.
16. Mukherjee, R. (1979). The construction of social indicators, The Use of Socio-Economic Indicators in Development Planning. Paris: UNESCO, United Nations Educational, Scientific and Cultural Organization, pp. 33 59.
17. Sheldon, Eleanor B., and Wilbert E. Moore (Eds.) (1968). Indicators of Social Change: Concepts and Measurements. New York: Russell Sage Foundation.
18. Laitinen, A., & Särkelä, A. (2018). Four conceptions of social pathology. *European Journal of Social Theory*, *22*(1), 80-102. https://doi.org/10.1177/1368431018769593 (Original work published 2019)
19. Bhagat, R. B. (2023). Population and Political Imagination: Census, Register and Citizenship in India, Routledge, London

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Paper - XIII: PRACTICAL IV - CARTOGRAPHY			
Paper Code: SOES/GEOG/MN02 (P)			
Credit: 02			
Total Marks: 100	Internal Assessment: 40	End Semester: 60	Contact Hour per Week: 02

CO code	Course Outcome (CO)
CO1	To learn fundamental concepts of map projections, slope analysis, morphometric parameters, and topo map interpretation.
CO2	To Understand the significance of cartographic and geomorphic techniques in geographical research.
CO3	To Apply appropriate methods for slope analysis, morphometric calculations, and map-based interpretations.
CO4	To Analyse terrain characteristics, drainage patterns, and spatial relationships using maps and data.
CO5	To Evaluate the accuracy, reliability, and suitability of geomorphological and cartographic methods in geographic studies.

Note: The syllabus for practical is related to laboratory work on cartographic mapping. The practical exam will be of three hours' duration. The division of marks in practical shall be as given below.

Laboratory work (Cartography) - 40
Session Record Work - 10
Viva-voce - 10

The laboratory work is divided into four units. Two exercises are to be set from each unit with internal choice and candidates will be required to attempt four exercises in all. The cartographic mapping work examination will be of three hours' duration in which exercises will be given on cartographic. All questions carry equal marks.

UNIT I

Map Projection: Mercator's, Polyconic, Stereographic, Interrupted Mollweide's and Interrupted Sinusoidal.

UNIT II

Slope analysis by Wentworth's, Smith's, Henry-Raiz's and Robinson's Methods; Analysis of relief characteristics from contour; Profile - Transverse, Longitudinal, Serial, Superimposed, Projected and Composite.

UNIT III

Morphometric analysis-Area-height, Altimetric frequency and Hypsometric curve; Drainage density; Stream order, Elongation; Circularity and Bifurcation ratio; Geomorphic Mapping.

UNIT IV

Interpretation of Topographical Maps-Land use and settlements; Topographical mapping; Geological Cross - Section Drawing.

Note: Examination - Departmental Committee appointed by HoD for University Campuses. External Examiners will be Appointed by the University for Affiliated Colleges.

Books Recommended:

1. Barrett, E.C. & Courtis, L.F.: Introduction to Environmental Remote Sensing.
2. Dickinson, G.O.: Maps and Aerial Photographs.
3. Smith, H.T.V.: Aerial Photographs and their Applications.
4. Deekshatula, B.L. & Rajani, Y.S.: Remote Sensing.
5. Davis, P.: Data Description and Presentation.
6. Garnett, A.: Geographical Interpretation of Topographical Maps.
7. Mishra, R.P. & Ramesh, A.: Fundamentals of Cartography.
8. Raja, Moonis: Source of Social-Economic Data.
9. Sharma, J.P.: Practical Geography (Hindi).

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Srinagar (Uttarakhand)

Detailed Syllabus

Geography-B.A./B.Sc.
Fourth Year- (U.G. Honours with Research)
Semester-VII
CORE-Major

Paper - I: GEOMORPHOLOGY			
Paper Code: SOES/GEOG/C001			
Credit: 05			
Total Marks: 100	Internal Assessment: 40	End Semester: 60	Contact Hour per Week: 05

Course Outcomes:

CO1 : Students will learn the fundamental concepts of geomorphology, methods of landform study, and classical theories of landscape development.

CO2 : Students will understand the processes of plate tectonics, mountain building, isostasy, and geological structures and rocks.

CO3 : Students will apply concepts of geomorphic processes with special reference to the Uttarakhand Himalaya.

CO4 : Students will analyse applied geomorphological knowledge for engineering works, anthropogenic processes, and landscape planning in diverse geomorphic settings.

CO5 : Students will evaluate the regional geomorphology of Uttarakhand and their implications for sustainable development.

Note: The paper consists of four units. Two questions will be set from each unit. The candidate will be required to attempt four questions in all. Answer should be precise. All questions carry equal marks.

UNIT I

Fundamental concepts of Geomorphology; Methods and Approaches of landforms study; Theories of landscape development by Gilbert, Davis, Penk and Hack and morphogenetic region.

UNIT II

Plate tectonics; Mountain building; Isostasy; Tectonic Geomorphology; Theories of slope development by Young and King; Peneplain and Pedi plains; Geological structure and rocks.

UNIT III

Geomorphic process – River, glacier, underground water: Mass movement and resultant landforms; Morphometry of drainage basin; Profile of equilibrium rejuvenation and polycyclic landscape. (With special reference to Uttarakhand Himalaya)

UNIT IV

Applied Geomorphology engineering works; Anthropogenic process and landscape planning; Regional Geomorphology of Uttarakhand -Great, Lesser and Siwalik Himalaya.

Books Recommended:

1. Bloom, A.L.: Geomorphology, Prentice Hall, New Jersey USA, 1979.
2. Goudie, A.: Geomorphological Techniques, George Allen and Unwin, London, 1981.
3. Washborn, A.L.: Periglacial Process and Environment, Edward Arnold, London, 1973.
4. Young, A.: Slopes, Oliver and Boyd, London, 1972.
5. King, C.A.M.: Techniques in Geomorphology, Edward Arnold, London, 1968.
6. Embleton, C. and Theories, J.: Processes in Geomorphology, Arnold Hienman, London, 1979.
7. Phodes, D.D. and William, G.P.: Adjustment of Fluvial Process, George Allen and Unwin, Boston, 1982.
8. Tricart, L. and Callam: Introduction to climate Geomorpholgy, Longman, London, 1972.
9. Derbyshrine, E. Gregory K.J. and Halls, J.R.: Geomorphological Processes, Butterworths, London, 1979.
10. Gregory, K.J. and Willing, D.E.: Drainage Basin Processes and Forms, Edward Arnold, London,
11. Gregory, K.J. and Willing, D.E.: Man and Environment Processes, Butter Worths, London, 1981.
12. Singh Savindra: Bhu- Akriti vigyan in Hindi

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Paper – II: GEOGRAPHY OF RESOURCES			
Paper Code: SOES/GEOG/C002			
Credit: 05			
Total Marks: 100	Internal Assessment: 40	End Semester: 60	Contact Hour per Week: 05

The Course will help the learner to:

CO1: Define the core concepts and classifications of resources and recall key theories of resource use and management – **Remembering.**

CO2: Explain the spatial distribution, utilization, and associated challenges (misuse, depletion) of major global and Indian resources – **Understanding.**

CO3: Apply principles of conservation and sustainable management to analyse real-world case studies of resource exploitation – **Applying.**

CO4: Analyse the interrelationships between resource depletion, environmental issues, and socio-economic policies – **Analysing.**

CO5: Evaluate the effectiveness of global initiatives (e.g., SDGs, Agenda 21) and national policies for sustainable resource governance and conservation – **Evaluating.**

CO6: Propose a community-based natural resource management (CBNRM) plan for a specific regional context – **Creating.**

Note: The paper consists of four units. Two questions will be set from each unit. The candidate will be required to attempt four questions in all. Answer should be precise. All questions carry equal marks.

UNIT I

Definition and concept of Resources, Classification of Resources; Nature and Scope of Resources Geography; Theories of Resource use and Management.

UNIT II

Land, Water, Energy, Biotic Resources, and Human Resource - distribution, use-misuse and conservation Global and Indian scenario.

UNIT III

Resources depletion and emerging issues -Deforestation, loss of bio-diversity, acid rain, energy crises, environmental problems

UNIT IV

Over Exploitation and Conservation of resources; Global initiatives (Agenda 21, SDGs) and national resource policies, Community base Natural Resource Management (CBNRM), Resource management practices in Uttarakhand.

Books Recommended:

1. Holechek. J.L. et al: Natural Resources- Ecology, Economics and Policy, Prentice Hall, New Jersey, 2000.
2. Kates, R.W. and Burton, I. (ed): Geography, Resources and Environment, Vol, II, University of Chicago Press, Chicago, 1986.
3. Mc Laren, D.J. and Sklnnet, B.J. (ed): Resources and World Development, Jogn Wiley and Sons, New York, 1986.
4. Newson, M.D.: Land, Water and Development, River Basin System and Management, Routledge, London, 1991.
5. Owen, S. and Owen, P.L.: Environment Resources and Conservation, Cambdridge University Press, New York, 1991.
6. Rees, J.: Natural Resources, Allocation, Economics and Policy, Methuen, London, 1988.
7. Simmons, I.G.: Earth, Air and Water Resources and Environment in Late 20th Century, Edward, Arnold, 1991.

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Paper - III: RESEARCH METHODOLOGY			
Paper Code: SOES/GEOG/C009			
Credit: 05			
Total Marks: 100	Internal Assessment: 40	End Semester: 60	Contact Hour per Week: 05

CO code	Course Outcome (CO)
CO1	To learn the nature, objectives, and significance of research in Geography, various approaches and its relation to other disciplines.
CO2	To understand nature and types of research design, methodologies, sampling methods, data collection tools and various methods of data analysis.
CO3	To apply knowledge of hypothesis formulation and hypothesis testing to solve real world research problems using suitable sampling techniques, methods, tools, and software.
CO4	To analyse the relationship in between variables in a study using appropriate methods of data analysis and interpretation of the outcome.
CO5	To evaluate the appropriateness, strengths and limitations of different statistical techniques, quality and validity of research findings.

Note: The paper consists of four units. Two questions will be set from each unit. The candidate will be required to attempt four questions in all. Answer should be precise. All questions carry equal marks.

UNIT I

Concept & significance of research in Geography; Nature, objective and basis of research; Types of research, approaches and methods; Research problem selection; Techniques and research process

UNIT II

Research Design-meaning, need, features and types Sampling: methods and steps; Design of spatial sampling; Survey and experiments; Data collection methods –primary and secondary data, schedule, questionnaire and observation. Introduction to advance open sources statistical software (hands on training)

UNIT III

Hypothesis: meaning, characteristic importance and formulation; Testing of Hypothesis parametric (standard) and non-parametric; Review of literature; Bibliography and Case Study.

UNIT IV

Application of Remote Sensing and GIS in research; Arrangements and analysis of data and map; Quantitative and qualitative interpretations; writing of research report / paper and dissertation; Farming of pilot and projects.

Books Recommended:

1. Bhatt H. P. and Bansal S.C. (2012): Research methodology (in Hindi), Meenakshi Prakashan, Meerut.
2. Ahuja, R. (2001): Research Methods, Rawat methodology, Excel Books, New Delhi.
3. Bhattacharya, D.K. (2005): Research Methodology, Excel Books, New Delhi.
4. Blaxter, L.; Hughes, C. and Tight, M. (1996): How to Research. Open University Press, Buckingham.
5. Denzin, N.K. and Lincoln, Y.S., (eds.) (2000): handbook of Qualitative Research thousand Oaks C.A. Sage Publications.
6. Dorling, D. And Simpson, L.(eds.) (1999): Statistics in Society. Edward Arnold, London.
7. Flowerdew, R. and Martin, D. (eds.) (1997): Methods in Human Geography. A Guide for Students Doing a Research Project. Longman, Harlow.
8. Hay, I. (ed.) (2000): Qualitative research Methods in Human Geography. Oxford University Press, New York.
9. Henn, M., Mark W., and Nick F. (2006): A short introduction to Social Research, Vistaar Publications, New Delhi.
10. Eyles J. And Smith D.M. (1988): Qualitative Methods in Human Geography, Polity Press, Dales Brewering Cambridge.
11. Kitchin, R. And Tate, N., (2001): Conducting Research into Human geography, Theory, Methodology and Practice. Prentice-hall, London.
12. Har Prasad: Research Methodology and Techniques in Geography, Rawat Publications, Jaipur.

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Paper - IV: REMOTE SENSING & GIS			
Paper Code: SOES/GEOG/E003			
Credit: 04			
Total Marks: 100	Internal Assessment: 40	End Semester: 60	Contact Hour per Week: 04

Course Outcomes (COs)

CO1: Students will learn the fundamental concepts, processes, and stages of Remote Sensing, including energy sources, electromagnetic radiation, satellite platforms, and image interpretation techniques.

CO2: Students will understand the principles and applications of Aerial Photography and Photogrammetry, including geometric characteristics, stereoscopic viewing, and their role in landform and urban mapping.

CO3: Students will apply GIS techniques for geo-referencing, data input, data integration, and geospatial data analysis, along with the use of GPS for accurate spatial information management.

CO4: Students will analyze digital maps, satellite imagery, and GIS datasets to interpret spatial patterns, create thematic maps, and environmental features using advanced computational tools.

CO5: Students will evaluate the practical applications of Remote Sensing and GIS in watershed management, disaster forecasting, weather monitoring, and geo-information systems to support planning and decision-making.

Note: The paper consists of four units. Two questions will be set from each unit. The candidate will be required to attempt four questions in all. Answer should be precise. All questions carry equal marks.

UNIT I

Definition, process and stages of Remote Sensing; Energy sources and radiation; EMR; Energy interaction with atmosphere and earth surface principles of micro wave Remote Sensing. Types of R.S. Platforms; Satellites and sensor; Sensor resolution, Digital image and satellite imagery; Elements of visual image interpretation; Digital image processing techniques

UNIT II

Definition, history types; classification and planning mission of A.P.; Basic geometric characteristics- scale, height, overlap, mosaic, resolution, stereoscopic coverage; Fundamental concept of Photogrammetry, Orientation, relief displacement, stereoscopic, 3D viewing, Uses of A.P. in landforms mapping and urban planning.

UNIT III

Definition, concept, scope and components of GIS; Data and Information; Geo-referencing and rectification; Data imputing methods and GPS. Data base, type of data; Data models in GIS; Data integration; Geospatial data analysis.

UNIT IV

Computer Cartography and mapping in digital image; Internal GIS, Web GIS, DTM, Recent trends of GIS, Emerging branches of GIS Science. Application of Remote Sensing and GIS in watershed management, weather information, disaster forecast and geo-information.

Books Recommended:

8. Sabine, F.F.: Remote Sensing- Principles & Interpretation.
9. Lillesand, R.M.: Remote Sensing and Image Interpretation Kiefer R.W.
10. Chauniyal, D.D.: Remote Sensing and GIS (Hindi).
11. Jensen, J.R.: Introductory Digital Image Processing- A Remote Sensing Perspective.
12. Demer, M.N.: Fundamentals of Geographic Information System.
13. Martin, D.S.: Geographic Information System- Socio-Economic Applications.
14. Aronoff, S.: Principles of Geographical Information Systems for Land Resource Assessment.
15. Aronoff, S.: Geographic Information System- A Management Perspective.
16. Bontham Carter, G.F.: Geographic Information System for Geoscientists.
17. Jones, C.: Geographical Information System & Computer Cartography.
18. Ayery, T.E.: Introduction to Aerial Photographs.
19. Pratt, W.K.: Digital Image Processing, John Wiley & Sons Now York (1995).

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Paper - V: PRACTICAL- REMOTE SENSING & GIS			
Paper Code: SOES/GEOG/C010 (P)			
Credit: 05			
Total Marks: 100	Internal Assessment: 40	End Semester: 60	Contact Hour per Week: 05
Course Objectives:			

Course Outcomes (COs)

CO1: Students will learn the fundamentals of computer-based GIS, map concepts, coordinate systems, projections types of GIS files, and layer stacking of multispectral imagery.

CO2: Students will understand the concepts of geo-referencing, sub-setting using AOI layers, mosaicking, and correction of radiometric and geometric errors in satellite imagery.

CO3: Students will apply spatial data integration techniques, digitization of point, line, and polygon features, and integration of non-spatial data for building geospatial databases.

CO4: Students will analyze spatial and non-spatial data through editing, topology building, and evaluation of data consistency to prepare meaningful geographic outputs.

CO5: Students will evaluate and interpret land use/land cover patterns of a selected area and compile a comprehensive project report integrating GIS and remote sensing techniques.

Note: The Laboratory work is divided into four units. Eight questions will be set selecting at least two questions from each unit. The division of marks in practical is given below:
Note: Examination Departmental Committee Appointed by HoD for University Campuses.
External Examiners will be Appointed by the University for Affiliated Colleges.

Laboratory Work:	M.M. 20
Field Work:	M.M. 30
Sessional Records:	M.M. 05
Viva-voce:	M.M. 05

UNIT I

Basic of Computer; Concept of maps; Coordinates System; Projection (WGS84 and Everest); Types of files, Export/Import file; Layer Stacking of Multispectral Imagery.

UNIT II

Concept of Geo-referencing (maps to image, image to image), sub-setting with the help of AOI layer; Mosaicking; Radiometric and Geometric errors and correction; Image classification.

UNIT III

Spatial data integration; Digitization (Point, Line, Polygon); Non-Spatial Data Integration; Editing of Spatial and Non-Spatial data; Building Topology and Web GIS.

UNIT IV

Basic of GPS and Computer Cartography & Mapping, Advanced Cartography techniques, Design of research project on physical and human studies.

Books Recommended:

1. Jenson, J.R.: Introduction to Digital Image Processing, Prentice Hall, Englewood Cliffs, NJ.
2. Pratt, W.K.: Digital Image Processing, John Wiley & Sons, New York, 1995.
3. Hord, R.M.: Digital Image Processing of Remotely sensed data, Academic Press, New York, 1989.
4. Nag, P.: Thematic cartography and Remote Sensing Concept, Publishing House, New Delhi.
5. Blackwell, B.: Statistics in Geography, Basil Blackwell Ltd., 1988.
6. Sinha, P.K. & Sinha, P.: Computer Fundamentals, 3rd Ed. B.P.B. Publishing.
7. Lo, C.P.: Applied Remote Sensing, Longman Scientific and Technical, Harlow, ESSEX.
8. PEUQUET, D.J. & Marble, D.F.: Introductory Readings in Geographic Information Systems, Taylor & Francis, Washington, 1990.
9. Spurr, R.: Photogrammetry and Photo Interpretation, The Rolland Press, Co. London, 1960.
10. Cole, J.P. and King, C.A.M.: Quantitative Geography, John Wiley, London, 1968.

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Paper - VI: POPULATION GEOGRAPHY			
Paper Code: SOES/GEOG/MN001			
Credit: 02			
Total Marks: 100	Internal Assessment: 40	End Semester: 60	Contact Hour per Week: 02

CO code	Course Outcome (CO)
CO1	To learn the nature, scope, and significance of Population Geography and its relationship with other disciplines.
CO2	To understand the patterns of population composition, growth, density, and distribution across the world.
CO3	To apply demographic concepts such as fertility, mortality, migration, and demographic transition theories to analyze population changes.
CO4	To analyse the different dynamics of population such fertility, mortality, migration, population-resource dynamics and measures.
CO5	To evaluate the effectiveness of population policies, planning strategies, and human development indices at national and international levels, to achieve the goals of sustainable development.

Note: The paper consists of four units. Two questions will be set from each unit. The candidate will be required to attempt four questions in all. Answer should be precise. All questions carry equal marks.

UNIT I

Nature, scope and significance of Population Geography and its relationship with demography, Relevance of Population Geography; Recent approaches and methods to study population geography.

UNIT II

Population composition; Population growth, density, distribution patterns and their determinants; Concepts of under, over and optimum Population.

UNIT III

Concepts and measurements of fertility, mortality and migrations; major theories of fertility, mortality and migration, demographic transition theory, demographic dividend.

UNIT IV

Concept of Human Resource and Management; Population resource regions; Population planning and policies in under-developed and developed countries, Human development index; National Population Policies in India.

Books Recommended:

11. Asha A. Bhende and Tata Kanitkar (2024). Principles of Population Studies, 19th Edition, Himalaya Publishing House Pvt. Ltd., India
12. Chandna, R.C. (2000). A Geography of Population; Concept, Determinants and Patterns, Kalyani Pub. New Delhi
13. Beaujeu-Garnier, Jacqueline (1978). Geography of Population, Longman, London 1970.
14. Srinivasan, K. (1997). Basic Demographic Techniques and Applications, Sage Pub. New Delhi,
15. Clarke, J.I. (1972). Population Geography, Pergamon. Oxford
16. Bhagat, R. B. and Rajan, S. I. (2023). Researching Internal Migration, Routledge, London
17. Bhagat, R. B. (2008). Assessing the measurement of internal migration in India , Asian and Pacific Migration Journal, 17(1), 91-102
18. Md Izhaar Hassan (2020): Population Geography-A Systematic Exposition, Routledge, London
19. United Nations Demographic Manuals: https://www.unpopulation.org/en/development/desa/population/publications/manual/index.html
20. ORGI, UNFPA (2014), Training Manual on Demographic Techniques, https://india.unfpa.org/en/publications/training-manual-demographic-techniques

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Srinagar (Uttarakhand)

Paper - VII: PRACTICAL-QUANTITATIVE TECHNIQUES			
Paper Code: SOES/GEOG/MN01 (P)			
Credit: 02			
Total Marks: 100	Internal Assessment: 40	End Semester: 60	Contact Hour per Week: 02

CO code	Course Outcome (CO)
CO1	To learn the types of data (spatial and non-spatial), and levels of measurement with suitable methods of diagrammatic representation.
CO2	To understand the measures of spatial inequality, and distribution using statistical tools.
CO3	To apply different cartographic principles in the construction of maps and diagrams and its interpretation.
CO4	To analyse various measures of concentration, and correlation for understanding spatial patterns and relationships.
CO5	To evaluate the appropriateness, strengths and limitations of statistical techniques in estimating the relationship of different variables of interest.

The syllabus for practical is related to laboratory work on quantitative techniques and mapping. Eight questions will be set selecting at least two questions from each unit. Candidate will have to attempt four questions selecting one question from each unit. It will be of three-hour duration.

Distribution of Marks:

Laboratory Work	-40
Sessional Record	-10
Viva Voce	-10

UNIT I

Types of data- spatial and non-spatial data; Levels of their measurement- Nominal, ordinal, interval and ratio; Diagrammatic representation of data, proportional circles, dot-spheres, cubes.

UNIT II

Measures of spatial inequality, Location quotient; Lorenz curve, Gini's Co-efficient; Concept of Spatial Distribution-Nearest Neighbour Analysis (NNA); Rank Size Rule;

UNIT III

Elements of Maps: Generalization, Symbolization and classification; choropleth and isopleths, Basics of topographical map and OSM, Elements of Weather map.

UNIT IV

Scatter plots and its types; Measures of central tendencies and dispersion, Correlation: Spearman's Rank and Karl Pearson's method, Simple linear regression: basic concepts and construction of regression line.

Books Recommended:

11. Thomas Lillesand, Ralph W. Kiefer, Jonathan Chipman (2015). Remote Sensing and Image Interpretation, 7th Edition, Wiley, New York
12. Partha Basu (2023). Advanced Practical Geography, 4th Edition, Books and Allied Private Limited, India
13. Aslam Mahmood (2020). Statistical Methods in Geographical Studies, Rajesh Publications, India
14. S. P. Gupta (2021). Statistica Methods, 46th Edition, Sultan Chand and Sons, New Delhi
15. D. N. Gujrati, D.C. Porter and S. Gunasekar (2017), Basic Econometrics, 5th Edition, McGraw Hill Education
16. Ashis Sarkar (2015). Practical Geography: A Systematic Approach, 3rd Edition, Orient BlackSwan,
17. Mishra, R.P. & Ramesh A (1989). Fundamentals of Cartography, 2nd Edition, South Aisa Books,
18. Singh, R. L. and R. P. B. Singh (2015). Elements of Practical Geography (English/Hindi), Kalyani Publishers
19. eGyanKosh, IGNOU Self Learning Material (SLM), Master of Science in Geography (MSCGG), https://egyankosh.ac.in/handle/123456789/98159
20. Kali Charan Sahu (2024), Textbook Of Remote Sensing and Geographical Information Systems, Atlantic Publishers & Distributors (P) Ltd, India.

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Geography-B.A./B.Sc.
Fourth Year- (U.G. Honours with Research)
Semester-VIII
CORE-Major

Paper - VIII: CLIMATOLOGY			
Paper Code: SOES/GEOG/C005			
Credit: 05			
Total Marks: 100	Internal Assessment: 40	End Semester: 60	Contact Hour per Week: 05

Course Outcomes (COs)

CO1: Students will learn and recall the meaning, scope, and development of climatology, jet streams, El Niño, La Niña, Walker circulation, precipitation, and humidity.

CO2: Students will understand and explain the origin, growth, classification, and distribution of air masses, and the genesis and characteristics of fronts, cyclones, and anticyclones in temperate and tropical regions.

CO3: Students will apply climate classification methods and atmospheric hazards and cloudbursts.

CO4: Students will analyze climatic change processes and by distinguishing between natural and anthropogenic factors affecting global climate.

CO5: Students will evaluate issues of global warming, artificial climate creation, and acid precipitation to propose informed perspectives and sustainable solutions to contemporary climatic challenges.

Note: The paper consists of four units. Two questions will be set from each unit. The candidate will be required to attempt four questions in all. Answer should be precise. All questions carry equal marks.

UNIT I

Meaning, scope and development of Climatology; Atmospheric Equilibrium; Adiabatic Temperature Change; Jet Stream; El-Nino; La-Nina; Walker Circulation; Precipitation and Humidity.

UNIT II

Air Masses - Origin, growth, classification and distribution; Horizontal and vertical motion of winds; Fronts and Fronts Genesis; Cyclones and Anti- cyclones; Temperate and Tropical Cyclones

UNIT III

Climate Classification of Koppen and Thornthwaite; Major climate types; Weather analysis - weather forecasting- methods, types and accuracy; Weather and human behavior; Weather modification; Atmospheric hazards - Cloud Bursts.

UNIT IV

Climatic Changes – Definition and detection; Tree rings; Solar variability; Human impact on global climate; Global Warming; Artificial climate and acid precipitation.

Books Recommended:

1. Chorley, R.J. and Barry, R.G.: Atmosphere, Weather and Climate Methuen & Co. Ltd. London, 1995.
2. Critchfield, H.J.: General Climatology, Prentice Hall of India, New Delhi, 2002.
3. Hidoore, J.J.: Global Environment Change, Prentice Hall, New Jersey, 1996.
4. Lockwood, J.G.: World Climatology, Elbs and Edward Arnold (Pub.) Ltd., 1979.
5. Miller, A. et al: Elements of Meteorology, Merrill and Columbus.
6. Oliver, J.E. & Hiddore J.J.: Climatology: An Atmosphere Science, Pearson Education, India, 2003.
7. Thomson, R.D. and Perry, A.: Applied Climatology, Routledge, London and New York, 1997.
8. Trewartha, G.T.: An introduction to climate, McGraw Hill Series in Geography, 1954.
9. Lal, D.S.: Climatology, Sharda Pushtak Bhawan, Allahabad.
10. Singh, Savindra: Climatology, Prayag Pushtak Bhawan, Allahabad, 2005.
11. Lal, D.S.: Jalvayu Vigyan, Sharda Pushtak Bhawan, Allahabad.
12. Singh, Savindra: Jalvayu Vigyan, Prayag Pushtak Bhawan, Allahabad.

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H.N.B. Garhwal University
Srinagar (Uttarakhand)

Paper - IX: DISSERTATION			
Paper Code: SOES/GEOG/C011			
Credit: 12			
Total Marks: 100	Internal Assessment: 40	End Semester: 60	Contact Hour per Week: 05
Course Objectives:			

CO1:To design for acquaint the student with the importance of field work as one of the methodologies in Geography and especially in research work.
CO2: The students are able to understand about field work and data/information collection.
CO3: To create the writing of report.

Note:

Topic of dissertation will be assigned by HOD or Supervisor of the Dept. concerned. HOD will ensure no repetition of topic and area. Dissertation topic will be selected from any core/elective paper offered by the student in semester only. Area of study shall be the Himalaya region preferably.

Distribution of marks

Periodical presentation (Internal Assessment) by Supervisor	- 20 Marks
Dissertation (evaluation by external examiner and supervisor jointly)	- 60 Marks
Power Point/ Viva-voce	- 20 Marks

The project report will involve statement of objectives and scope of field investigation, methods of field work for studies of different scales (Macro, Meso and Micro), Preparation of a questionnaire/schedule, sampling techniques, collection, processing, presentation, analysis and interpretation of data/information. The candidates are required to write a project report on assigned problem involving field investigations.

1. The candidates are required to submit their project reports one week before the commencement of examination to the concerned head of the department.
2. Assessment of report will be done by a Board of Examiners, consisting of external examiner and internal examiner.
3. Power point presentation is must, Separate external examiner will be appointed by the University, Supervisor of dissertation will act as an Internal examiner. In the absence of Supervisor, HOD will act as internal examiner.

Head
Department of Geography
School of Earth Science
H.N.B. Garhwal University
Srinagar (Uttarakhand)

Paper - XII: HAZARD AND DISASTER MANAGEMENT			
Paper Code: SOES/GEOG/E002			
Credit: 04			
Total Marks: 100	Internal Assessment: 40	End Semester: 60	Contact Hour per Week: 04

Course Outcomes (COs)

CO1: Students will learn the meaning, concept, and classification of hazards and disasters, including their elements, magnitude determinants, and scales.

CO2: Students will understand the typology, and trends of natural hazards, with emphasis on major terrestrial disasters such as earthquakes, volcanoes, landslides, and tsunamis.

CO3: Students will apply the principles of disaster management across various stages, including pre-disaster preparedness, mitigation, prediction, and post-disaster relief and remedial measures.

CO4: Students will analyze the different types of hazards and disaster-prone areas in India, the effectiveness of disaster management policies, and community-based responses.

CO5: Students will evaluate disaster management strategies, programs, and GIS in planning and implementing disaster mitigation and management.

Note: The paper consists of four units. Two questions will be set from each unit. The candidate will be required to attempt four questions in all. Answer should be precise. All questions carry equal marks.

UNIT I

Meaning and concept of Hazards and Disaster; Type of Natural and manmade Hazards; Elements of disasters; Magnitude determinants and scale.

UNIT II

Natural Hazards – Typology; Regional dimension of Hazards; Occurrence and trends; Methods of identifying hazard prone regions; Major terrestrial disaster- seismic disasters, volcanic disaster, landslides and tsunamic disasters; Reasons of increasing frequency of disasters.

UNIT III

Disaster Management: Concept, stage of disaster management; Pre-disaster stage-disaster preparedness, disaster research, disaster prediction and disaster warning; Methods and levels of preparedness; Disaster mitigation and disaster prevention; post-disaster stage-rescue and relief work; Remedial measures; Long term disaster planning.

UNIT IV

Different types of disaster and hazard prone areas in India; Disaster management policies and approaches; Major disasters in India and their management; Response to disasters, government, non-government; Community and individual; Mitigation and Management; Appraisal of government programs/institution of Disaster Management; Significance of Remote Sensing and GIS in planning to the context of Disaster Management.

Books Recommended:

1. Tianch, L.: Landslide Hazard Mapping and Management in China, ICIMOD. Nepal, 1996
2. Valdiya, K.S.: Environmental Geography, Tata McGraw Hill Co. Ltd. New Delhi, 1987
3. Zereba, Q. And Mance V.: Landslides and their Control, Elsevier Amsterdam, 1969.
4. White, G.F.: (ed.): Natural Hards: Local, National, Global, Oxford University Press, London, 1974.
5. Gupta, H.K.: Dams and Earthquakes, Elsevier, Amsterdam, 1976.
6. Burton, I. Et al: The Environment as Hazards, Spinger Verlay, New York, 1950.
7. Bolt, B.A. et ai. (ed.): Geological Hazards, Springer Verlay, New York, 1950.
8. Enbliton, C.: Natural Hazards and Global Change I.T.C., Journal, 1989.
9. Singh, Savindra: Environmental Geography (Eng. /Hindi).
10. Petak, W.J. & Atkinson, A.D.: Natural Hazards Risk Assessment and Public Policy, Springer-Verlay, New York, 1982.

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Paper - XI: PRACTICAL- SURVEYING			
Paper Code: SOES/GEOG/C012 (P)			
Credit: 05			
Total Marks: 100	Internal Assessment: 40	End Semester: 60	Contact Hour per Week: 05

The Course will help the learner to:

CO1: Remembering the components and recall the principles and procedures of various surveying instruments (Plane Table, Dumpy Level, Theodolite, Total Station, GPS, Altimeter)

CO2: Understanding the methodology for conducting specific surveying exercises like triangulation, contouring, and profile drawing.

CO3: Apply appropriate surveying techniques to execute field exercises such as the Two/Three Station Problem and GPS data acquisition.

CO4: Analyze collected survey data to interpret terrain profiles, contour maps, and weather map information.

CO5: Evaluate the accuracy and precision of survey data and critique the methodology used during field camp exercises.

Note: The syllabi for practical are divided into two sections: section A and B. A is related to field work. Candidate will have to attempt two exercises of surveying from section A of 2 hours' duration and two exercises of section B of 1-hour duration.

Distribution of Marks

(i)	Surveying (Two exercises)	30
(ii)	Survey Camp	20
(iii)	Sessional Record (min)	05
(iv)	Viva-voce	05

Section A: Field Work:

UNIT I

Plain Table Survey: Two and Three station Problem, Triangulation and determination of heights and contouring with clinometers.

UNIT II

Dumpy level survey: Contouring and profile drawing (Instrument based: Total station Survey and Theodolite)

UNIT III

Interpretation of Indian daily weather maps through the study of thermal & cloud condition and pressure system, Weather forecasting method.

Section B: Laboratory Work

(i) GPS: Handling usages, GPS based data acquisition, GPS system and application.

(ii) Altimeter (Hi-tech with precision): Handling and use.

Note: Examination: Departmental Committee Appointed by HoD for University Campuses. External Examiners will be Appointed by the University for Affiliated Colleges

Note:

1. In all 20 exercises from both the parts A and B shall constitute the sessional record covering all sub section.
2. Candidate shall attend (compulsory) field training (survey camp) of at least seven days' duration in a suitable area handling different instruments. They shall prepare minimum 05 exercise (survey camp) belonging to the original field survey.
3. Survey camp work will be evaluated at the time of the end semester practical exam.

Book Recommended:

1. Campbell, J., Introductory Cartography, Prentice Hall, Inc., Englewood Cliff, New Jersey, 1984.
2. Cuff, D.J., & Mattson, M.T., Thematic Maps, their Design and Production, Mathuen, New York., 1982.
3. Robinson, A.H. & others., Elements of Cartography, John Willey and Sons, New York (New edition).
4. Archer, J.E., & Dalton, T.H., Fieldwork in Geography, London.

Head
Department of Geography
School of Earth Science
H.N.B. Garhwal University
Srinagar (Uttarakhand)

5. National Atlas and Thematic Maps Organization (NATMO): National Atlas of India, Calcutta.
6. Monkhouse, F.J., Maps and Diagrams, Methuen & Co., London,1967

Paper – XII: SOCIAL GEOGRAPHY			
Paper Code: SOES/GEOG/MN02			
Credit: 02			
Total Marks: 100	Internal Assessment: 40	End Semester: 60	Contact Hour per Week: 02

CO code	Course Outcome (CO)
CO1	To learn the nature, scope, and relevance of Social Geography, its approaches and relation with other disciplines.
CO2	To understand the different fundamental concepts of Social Geography.
CO3	To apply social geographical perspective to examine the spatial distribution and diversity, processes of social transformation and social mobility of different social groups in India.
CO4	To analyse the different indicators of social well-being and social development for detailed understanding of different social issues in India.
CO5	To evaluate the development policies and planning (in promoting equity and social development) with reference to India and Uttarakhand.

Note: The paper consists of four units. Two questions will be set from each unit. The candidate will be required to attempt four questions in all. Answer should be precise. All questions carry equal marks.

UNIT I

Definition, nature and scope of social geography; concept of place, space and society and relevance of social geography; approaches and methods.

UNIT II

Key concepts in social geography- social stratification and differences, social hierarchy, culture, social structure, power structure and space; social ecology and space, mobility and space, social pluralism and diversity, race and ethnicity, religion.

UNIT III

Components of social space in India, process of social transformation- Sanskritization, westernization, modernization: post-modern approaches to understand social change and transformation, social bases of identity; social groups, distribution of castes, tribes and language in India, social factors in region formation; socio-cultural regionalism in India.

UNIT IV

Segregation and assimilation; social and spatial justice; inclusion and exclusion, indicators of social well-being and social pathology (crime, conflicts, other forms of social disorganization), problems and processes of socio-economic and political-inequality, social security and protective discrimination, policies and planning with special reference to India and Uttarakhand.

Books Recommended:

1. Ahmed, A. (1999). Social Geography, Rawat Publication, Jaipur.
2. Kath Browne, Dhiren Borisa, Mary Gilmartin, Niharika Banerjea (2024). Social Geographies-the Basics, Routledge, London
3. Social Geography, IGNOU Self Learning Material, Block-1 to Block-4, https://egyankosh.ac.in/handle/123456789/109916
4. Jones, E. and John Eyles (1979). Social Geography. Oxford University Press, London
5. Harvey, D. (1989). The Condition of Postmodernity: An Enquiry into the Origins of Cultural Change. Oxford: Blackwell.
6. Smith, David M. (1977). Human Geography: A Welfare Approach, Edward Arnold, London
7. Soja, E. W. (2009). The city and spatial justice. http://www.jssj.org.

8. Pirie, G. H. (1983). On Spatial Justice. Environment and Planning A: Economy and Space. 15(4) https://doi.org/10.1068/a150465.
9. Crane, R.I. (1973), Regions and regionalism in South Asia Studies: An Exploratory Study, Durham, Duke University.
10. Dube, S.C. (1991), Indian Societies, National Book Trust of India, New Delhi.
11. Kaufmann V. (2005). Re-thinking Mobility. Contemporary Sociology, Hampshire: Ashgate
12. Rawat, P.S. (1993): Migration and structural change a study of rural society in Garhwal Himalaya, Sarita Book House, Delhi, India
13. ndian Institute of Public Administration. (2020). Caste-Based Segregation in Public Spaces. New Delhi: IIPA.
14. Lefebvre, H. (1991). The Production of Space. Blackwell.
15. Pahl, R. E. (1965). 'Trends in Social Geography.', In Chorley, R. J. & Haggett, P. (Eds.). Frontiers in Geographical Teaching., London: Routledge.
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19. Bhagat, R. B. (2023). Population and Political Imagination: Census, Register and Citizenship in India, Routledge, London

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Paper - XIII: PRACTICAL IV - CARTOGRAPHY			
Paper Code: SOES/GEOG/MN02 (P)			
Credit: 02			
Total Marks: 100	Internal Assessment: 40	End Semester: 60	Contact Hour per Week: 02

CO code	Course Outcome (CO)
CO1	To learn fundamental concepts of map projections, slope analysis, morphometric parameters, and topo map interpretation.
CO2	To Understand the significance of cartographic and geomorphic techniques in geographical research.
CO3	To Apply appropriate methods for slope analysis, morphometric calculations, and map-based interpretations.
CO4	To Analyse terrain characteristics, drainage patterns, and spatial relationships using maps and data.
CO5	To Evaluate the accuracy, reliability, and suitability of geomorphological and cartographic methods in geographic studies.

Note: The syllabus for practical is related to laboratory work on cartographic mapping. The practical exam will be of three hours' duration. The division of marks in practical shall be as given below.

Laboratory work (Cartography) - 40
Session Record Work - 10
Viva-voce - 10

The laboratory work is divided into four units. Two exercises are to be set from each unit with internal choice and candidates will be required to attempt four exercises in all. The cartographic mapping work examination will be of three hours' duration in which exercises will be given on cartographic. All questions carry equal marks.

UNIT I

Map Projection: Mercator's, Polyconic, Stereographic, Interrupted Mollweide's and Interrupted Sinusoidal.

UNIT II

Slope analysis by Wentworth's, Smith's, Henry-Raiz's and Robinson's Methods; Analysis of relief characteristics from contour; Profile - Transverse, Longitudinal, Serial, Superimposed, Projected and Composite.

UNIT III

Morphometric analysis-Area-height, Altimetric frequency and Hypsometric curve; Drainage density; Stream order, Elongation; Circularity and Bifurcation ratio; Geomorphic Mapping.

UNIT IV

Interpretation of Topographical Maps-Land use and settlements; Topographical mapping; Geological Cross - Section Drawing.

Note: Examination - Departmental Committee appointed by HoD for University Campuses. External Examiners will be Appointed by the University for Affiliated Colleges.

Books Recommended:

1. Barrett, E.C. & Courtis, L.F.: Introduction to Environmental Remote Sensing.
2. Dickinson, G.O.: Maps and Aerial Photographs.
3. Smith, H.T.V.: Aerial Photographs and their Applications.
4. Deekshatula, B.L. & Rajani, Y.S.: Remote Sensing.
5. Davis, P.: Data Description and Presentation.
6. Garnett, A.: Geographical Interpretation of Topographical Maps.
7. Mishra, R.P. & Ramesh, A.: Fundamentals of Cartography.
8. Raja, Moonis: Source of Social-Economic Data.
9. Sharma, J.P.: Practical Geography (Hindi).

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