



ROYAL GLOBAL UNIVERSITY
— GUWAHATI —

**ROYAL SCHOOL OF ENVIRONMENTAL AND EARTH
SCIENCES
(RSEES)**

DEPARTMENT OF GEOGRAPHY

**Learning Outcomes-based Curriculum Framework (LOCF) for
Postgraduate Programme in the line of NEP, 2020**

M.A/M.Sc. in Geography

Table of Contents

Sl. No.	Contents	Page no.
1	PREAMBLE	2
2	Introduction	3
3	Approach to Curriculum Planning	3
4	Aims of Masters degree Programme in M.A/M.Sc. in Geography	4
5	Graduate Attributes	4-6
6	Qualitative Descriptors, Programme Learning Outcomes, & Programme Specific Outcomes	6-7
7	Teaching Learning Methodologies	8
8	Assessment and Outcome Measurement Methods	8
9	Detailed Syllabus	9-49

1. Preamble

The LOCF is designed to emphasize the teaching-learning process at the postgraduate M.A/M.Sc. level in Geography to sensitize and train the students to develop a sound and systematic approach regarding the mechanism and processes of natural and human activities. The focus is to help the students to understand the latest tools and techniques, which would help in giving a focused and precise understanding of a geographical phenomenon. The purpose is to enhance the capability of the students in perceiving, creating and analyzing sound geographical bases and concepts.

This Learning Outcome based Curriculum Framework is designed to emphasize the teaching and learning process at the undergraduate M.A/M.Sc. from teacher centric to student centric by strengthening the quality of teaching and learning in the present day real life scenario at the global, regional and local levels. It has considered learning as an activity of creativity, innovations and analyzing geographical phenomena. The committee prepared the major learning outcomes, which would help the students to understand and critically analyze various dimensions of the geographical issues.

The following objectives would be achieved:

1. To orient the students towards the identification and analysis of various facets of geographical features and processes.
2. To develop students' aptitude for acquiring basic skills for carrying out fieldwork.
3. To facilitate the students to learn skills of map making.
4. To guide students to learn the science and art of collecting, processing and interpreting the data.
5. To expose the students to the use of the updated technologies of remote sensing, IRNSS, GNSS, Geographical Information System (GIS) and GIScience.

1.4 Introduction

Learning Outcomes based Curriculum Framework (LOCF) for Geography under CBCS Geography has been broadly accepted as a bridge discipline between human and physical sciences. In the beginning, geography focussed on the physical aspects of the earth but modern geography is an all-encompassing discipline that seeks to understand the earth and all of its human and natural processes as integrating elements. Geography has emerged through time as a transdisciplinary subject integrating regional diversity with the concepts of the timing of space and the spacing of time. It provides broad, human and place-centred perspectives on the transformation of rural ecology to a globalized urban landscape at different levels, from the local/regional/national to global. Geography is transformed through:

- i. Journey from Village Ecology to Urban Regional Studies
- ii. Qualitative Techniques to Spatial Information Technology
- iii. Global to Micro-level Community Perception Approach

It is essential to focus on the current socio-spatial problems, issues and challenges to make the students aware of the application of geography to sort out the societal upcoming problems. It is also essential to rejuvenate ancestral geographical knowledge to address the current local and global problems. In the light of exponential changes in the field of arts, science and technology, it is to be studied from multifaceted angles. It is important for the policymakers to consider the geospatial aspects with references to the location and in the context of the best utilization of public utilities. It is further expected that if the above said spatial aspects are considered, it will certainly develop the lagging regions and people living therein.

1.4 Approach to Curriculum Planning

Learning Outcomes based Curriculum Framework (LOCF) for geography curriculum revision incorporates dynamic processes including fundamental and modern techniques, contemporary paradigms such as global initiatives like Sustainable Development Goals (SDGs), Disaster Risk Reduction (DRR), Paris Climate Action and national initiatives like smart cities, Securities of food, water, energy, human health and livelihood, biodiversity, and disaster management. The approaches are to make geography more scientific and societal-need oriented which could be the panacea to India's developmental challenges. Geography uses scientific knowledge with the current focus that includes spatio-temporal analysis, skill development, GIScience, sustainable development and human security.

1.2.1 Nature and Extent of Masters Degree Programme in Geography

A Masters degree in Geography is a 2 year degree course which is divided into 4 semesters as under.

Sl. No.	Year	Mandatory Credits to be secured for the Award
1	After successful completion of 1st Year	51
2	After successful completion of 1st and 2nd Years	51

The curriculum inculcates knowledge of essential concepts of physical and human geography together with appropriate techniques using lectures, tutorials, group discussions, presentations, assignment evaluation, lab work and field visits. Thus, the pedagogy process includes:

- i. Identifying and explaining the physical and cultural characteristics globally and processes in varied spatiotemporal contexts.
- ii. Understanding human-environment and nature-society interactions as well as various global environmental challenges.
- iii. Analysing geographic information by using geospatial technologies.
- iv. Responding to the global and national challenges and initiatives.

1.2.2 Aims of Masters Degree Programme in Geography:

The overall objectives of the Learning Outcomes-bases Framework (LOCF) for MA/MSc degree in Geography are-

- i. Appreciate the relevance of geographical knowledge to everyday life.
- ii. Demonstrate the ability to communicate geographic information by utilising both lecture and practical exercises.
- iii. Inculcate the ability to evaluate and solve geographical problems effectively.
- iv. Demonstrate the skills in using geographical research tools including spatial statistics, cartography, remote sensing, GIS, IRNSS and GIScience.
- v. Based on the field knowledge and advanced technologies, the students should be able to understand the ongoing geographical problems in different regions and levels with appropriate pragmatic solutions.
- vi. Understand the relevance of geographical knowledge to everyday life.
- vii. Getting the ability to communicate geographic information utilizing both lecture and practical exercises.
- viii. Inculcate the ability to evaluate geographical problems effectively.

- ix. Exhibit the skill in using geographical research tools including spatial statistics, cartography, remote sensing, GIS, IRNSS and GIScience.

1.3 Graduate Attributes in Geography

Some of the characteristic attributes of a postgraduate in Geography include:

- G A 1. Disciplinary Knowledge:** Students gain in-depth knowledge of basic and applied areas of geography. Core and discipline courses train them in fundamental branches of the subject. Technical and skill courses help them to learn tools and techniques. Geography student gets a unique opportunity to experiment and observe on the field.
- G A 2. Problem Solving:** The understanding about surroundings, the issues that concern life, climate or to that matter water crisis etc makes students yearn to look for solutions. Geography discipline has the flair which connects to everyday living and survival thus generates problem solving aptitude.
- G A 3. Analytical Reasoning:** The geography course teaches variety of tools, techniques and data handling which develop analytical reasoning to solve the issues. In fact, the training in all these courses is meant to develop the analytical reasoning, mining the data from satellite images, aerial photographs, and observations to arrive at interpretations and inferences.
- G A 4. Research Related Skills:** The course content trains students to learn basic research design, data collection process, and ethics to conduct research work through field work. The specially developed course on research methodology and field work acquaints them to prepare questionnaires, selecting sample plans, identifying right kind of objectives, data collection methods, field exposure, mental mapping, reproducing the observations, analysis and finally to prepare reports.
- G A 5. Critical Thinking:** Geography subject creates scientific logic aptitude and approaches a problem through critical reasoning. The course content is enabled to stimulate the questioning capacity for what, where, who, when and how. The papers like Environmental Geography, Disaster Management, Global Economic System, Resource Management to name a few.
- G A 6. Cooperation/ Teamwork:** The course enables to develop skill to work with students of diverse backgrounds and cooperation on same topic will increase better understanding. The group assignments and presentations are essential elements in the course design that will inculcate the team spirits. The field excursions help develop great bonding, working and executing the plans on ground. They also learn to work as team in case any emergency with group member away from institution/home/or city.
- G A 7. Scientific Reasoning:** Course will develop critical analysis of theories and models, raising critical questions about the theories and models, developing hypothesis and learning their testing. Many of the courses in geography are truly scientific in nature which will generate scientific reasoning aptitude and also skills to look towards new approaches.
- G A 8. Self-Directed Learning:** A graduate in the discipline of geography has to engage continuously in a learning process that can give a sense of direction to him/her. Different types of project work and field-oriented papers encourage the pupil to take up self-directed task so as to widen their research horizon and ultimately look beyond the basic course book. Anyone with a mindset to move beyond the curriculum has to go for self-learning as the teaching content is fixed and defined. Under the supervision

of the teacher one can easily involve themselves in fruitful learning. This will enable the students to take up task that is well understood and adapting themselves to the changing curriculum needs.

G A 9. Multicultural Competence: Geography is a discipline which is not limited to any specific place or space. Its identity is based on multi-plural, multi-cultural and multi sited ethnography. As a subject it emphasizes on regional and cultural studies which involves detailed understanding of places and perceptions. Also, as a disciplinarian, it allows the learner to learn about both their own culture as well as those of their distant counterparts. This diversified knowledge also helps them to respect all fellows following varied community norms, traditions, and practices. Field studies have been much helpful in introducing multicultural competencies to students of geography.

G A 10. Leadership Readiness/ Quality: A good leader needs to have the knowledge, rational thinking and ready to act at the time of need. Geography encourages to have descriptive and explanatory knowledge of one's surroundings and the globe as a whole, it develops rational thinking and prepares the students to think about alternative social, economic and environmental futures. So, a geography student will be a good leader and will contribute to different capacities.

G A 11. Communication Skills: Students develops effective communication skills through oral presentations, and group discussions on the subject content. Besides interviewing people, field surveys and public dealing with different cadre of people makes him/her confident in communication. The compiling, processing, and analyzing the information from the field; and presenting in the form of reports enhances written communication skills.

G A 12. Lifelong learning: Lifelong learning is a seamless process of learning from primary education to higher levels and even during one's profession through formal or informal modes. The core of Geography is the man-environment interaction, which remains relevant for all at all stages of human life. So, the basic knowledge and the tools Geographer learns help them in their future life and the process of learning will continue throughout life.

1.4 Qualification Descriptors for M.A./M.Sc. Programme

The qualification descriptors for the M.A./M.Sc. Programme in Geography shall have the learning attributes such as field knowledge, use of advanced tools and techniques for better comprehension of space and society etc. It also involves awareness among the students regarding the issues of different regions and socio-cultural aspects. The main qualification descriptors for the geography M.A./M.Sc. Programme includes:

- i. Demonstration of exhaustive understanding of the basic concepts of Geography and an awareness of the emerging areas of the field.
- ii. Acquisition of in-depth understanding of the applied aspects of Geography as well as interdisciplinary subjects in everyday life.
- iii. Improvement of critical thinking and skills facilitating.
- iv. The application of knowledge gained in the field of Geography in the classroom to the practical solving of societal problems.
- v. Development of intellectual capabilities to get into further research in the discipline.
- vi. Acquirement of practical laboratory skills, systematic research design and collection of experimental data.

- vii. Exhibition of ability to quantitatively analyse the experimental data and writing project reports.
- viii. Development of strong oral and written communication skills promoting the ability to present ideas and also teamwork spirits.

1.5 The Programme Learning Outcomes relating to M.A./M.Sc. degree programme in Geography

The learning outcome is to prepare the students of MA/MSc degree in Geography, to understand the development of the subject and delve around issues suited to the needs of the contemporary world. It covers a wide range of papers covering various themes and maintains uniformity of structure across universities in the country. Geography being interdisciplinary in nature integrates learning derived from all basic and applied sciences/social sciences.

- PO-1: **Knowledge of Geography:** Students of the BA/BSc Honours degree in Geography will learn to use geographic understanding of various sub fields such as physiography, resources, global economic systems, socio- cultural aspects, rural and urban milieu, environmental and disaster studies, and mapping methods.
- PO-2: **Understanding of global issues:** They will also develop an understanding of global issues from economic, social, environmental, and political perspectives, which has relevance in further studies across the globe.
- PO-3: **Interpretation and generation of map:** They will be trained to read and interpret maps and generate maps and other geographic representations as well as extract, analyze, and present information from a spatial perspective.
- PO-4: **Analyse both geographical qualitative and quantitative data:** The learners will have a general understanding of the various theoretical and methodological approaches in both physical and human geography and be able to develop research questions and critically analyze both qualitative and quantitative data to answer those questions.
- PO-5: **Critical analysis with diverse perspective:** After the completion of the course, students will be able to evaluate, analyze, synthesize, and critique key concepts and experiences, and apply diverse perspectives to find creative solutions to problems concerning society and the natural world.
- PO-6: **Developing skills of team work:** They will also be able to learn how to take teamwork experiences in the classroom and field excursions and use them to their advantage to further their career.
- PO-7: **Skills of research and Hypothesis testing:** Students will acquire knowledge of scientific methods of data handling, hypothesis generation, testing and analysis.
- PO-8: **New and independent learning techniques:** Students will be able to assess and build upon previous learning and experiences to pursue new learning, independently and in collaboration with others.
- PO-9: **Preparing the students to face the real world challenges:** The course will better-equip students to face the challenges of an increasingly intercultural world, and contribute to improving tolerance within the diverse societies of India and World.
- PO-10: **Developing ethical aptitudes:** Students will develop the ethical aptitudes and dispositions necessary to acquire and hold leadership positions in industry, government, and professional organizations.
- PO-11: **Developing interest on exploration and personality development:** They will also develop zeal of exploration and investigation, travel exploration and effective communication skills and teamwork.
- PO-12: **Life-long learning:** The geography graduates will be able to pursue wide range of knowledge and experience from various fields. They will be well informed citizens who can play immense role in the civil society too and also be able to pursue career as planners, administrators, academicians, and managers.

Programme Specific Outcomes

- PSO-1: Correlate the knowledge of physical geography with the human geography.
- PSO-2: Develop a sustainable approach towards the ecosystem and the biosphere.
- PSO-3: Explain the cultural geographic processes and how variations in culture affect our perception and management of regions.
- PSO-4: Identify socio-economic problems of their community through field experience.

1.6 Teaching Learning Process

Teaching and learning in this programme involve classroom lectures, tutorials, and remedial classes.

For every core course in each semester, one tutorial class is provided per week as per the structure of the syllabus.

Remedial classes are organized for below mediocre class students who could not pass the particular course as well as those who would like to improve their performance in certain courses, during working days. Classes also could be organized during the long vacation like summer vacation or winter vacation for those students who are genuinely in need of such intensive coaching.

The teaching learning process allows **Direct Assessment** of students in the form of:

1. Written assignments and projects submitted by students the project-based learning
2. Group discussion
3. Home assignments
4. Quizzes and class tests
5. PPT presentations, Seminars, interactive sessions
6. Questionnaire/ Schedule survey
7. Space survey: GPS, Transect, Quadrat
8. Field visit

Indirect Assessment methods include:

1. Tutorial classes that allow closer interaction between the students and the teacher as each student gets individual attention.
2. Co-curricular activity
3. Mentor Mentee activity

1.6. Programme Evaluation

1. The Programme structures and examinations shall normally be based on Semester System. However, the Academic Council may approve Trimester/Annual System for specified programmes.
2. In addition to end term examinations, student shall be evaluated for his/her academic performance in a
3. Programme through, presentations, analysis, homework assignments, term papers, projects, field work, seminars, quizzes, class tests or any other mode as may be prescribed in the syllabi. The basic structure of each Programme shall be prescribed by the Board of Studies and approved by the Academic Council.
4. Each Programme shall have a number of credits assigned to it depending upon the academic load of the Programme which shall be assessed on the basis of weekly contact hours of

lecture, tutorial and laboratory classes, self-study. The credits for the project and the dissertation shall be based on the quantum of work expected.

5. Depending upon the nature of the programme, the components of internal assessment may vary. However, the following suggestive table indicates the distribution of marks for various components in a semester: -

	Components of Evaluation	Marks	Frequency	Code	Weightage (%)
A	Continuous Evaluation				
i	Analysis/Class test	Combination of any three from (i) to (v) with 5 marks each	1-3	C	25%
ii	Home Assignment		1-3	H	
iii	Project		1	P	
iv	Seminar		1-2	S	
v	Viva-Voce/Presentation		1-2	V	
vi	MSE		MSE shall be of 10 marks	1-3	
vii	Attendance	Attendance shall be of 5 marks	100%	A	5%
B	Semester End Examination		1	SEE	70%
	Total				100%

M.A/ M.Sc. Geography Programme Structure

First Semester							
Sl No.	Subject Code	Subject Names	L	T	P	C	TCP
1	GEO164C101	Geomorphology	4	0	0	4	4
2	GEO164C102	Principles of Climatology	4	0	0	4	4
3	GEO164C103	Geography of Economic Activities	4	0	0	4	4
4	GEO164C104	Geography of Population and Settlements	4	0	0	4	4
5	GEO164C115	Practical - I	0	0	8	4	8
Ability Enhancement Compulsory Courses (AECC)							
6	CEN984A101	Communicative English-I	1	0	0	1	1
7	BHS984A103	Behavioural Science-I	1	0	0	1	1
Discipline Specific Elective (DSE): Any one to be selected							
8	GEO164D101	Agricultural Practices in India	4	0	0	4	4
9	GEO164D102	Environment and Sustainable Development	4	0	0	4	4
TOTAL CREDITS (C) & TOTAL CONTACT PERIODS (TCP)			22	0	4	26	26
Second Semester							
Sl No.	Subject Code	Subject Names	L	T	P	C	TCP
1	GEO164C201	Geography of Development of India	4	0	0	4	4
2	GEO164C202	Soil and Biogeography	4	0	0	4	4
3	GEO164C203	Basics of Geoinformatics	4	0	0	4	4
4	GEO164C204	Cartographic Methods in Geography	4	0	0	4	4
5	GEO164C215	Practical-II	0	0	6	3	6
Ability Enhancement Compulsory Courses (AECC)							
6	CEN984A201	Communicative English-II	1	0	0	1	1
7	BHS984A203	Behavioural Science-II	1	0	0	1	1
		Ability Enhancement Elective Courses (AECC)	2	0	0	2	2
8	GEO164S211	Report writing on Environmental Issues	2	0	4	2	6
Discipline Specific Elective (DSE): Any one to be selected							
9	GEO164D201	Regional Development of Northeast India & Assam	4	0	0	4	4
10	GEO164D202	Geography of Tourism	4	0	0	4	4
TOTAL CREDITS (C) & TOTAL CONTACT PERIODS (TCP)			24	0	6	27	30

Third Semester							
Sl No.	Subject Code	Subject Names	L	T	P	C	TCP
1	GEO164C301	Research Methodology	4	0	0	4	4
2	GEO164C302	Quantitative Methods in Geography	4	0	0	4	4
3	GEO164C323	Minor Project/Internship	0	0	16	8	9
Ability Enhancement Compulsory Courses (AECC)							
4	CEN984A301	Communicative English-III	1	0	0	1	1
5		Ability Enhancement Elective Courses (AECC/ SEC-2*)					
6	GEO164S311	Biodiversity Conservation	2	0	4	2	6
Discipline Specific Elective (DSE): Any three to be selected							
7	GEO164D301	Remote Sensing: Principles and Applications	4	0	0	4	4
8	GEO164D302	Theoretical Basis of Regional Planning	4	0	0	4	4
9	GEO164D303	Principles of Agricultural Geography	4	0	0	4	4
10	GEO164D304	Geography of Food Security in India	4	0	0	4	4
11	GEO164D305	Disaster Management	4	0	0	4	4
TOTAL CREDITS (C) & TOTAL CONTACT PERIODS (TCP)			23	0	9	26	32
Fourth Semester							
Sl No.	Subject Code	Subject Names	L	T	P	C	TCP
1	GEO164C401	Geographical Thought	4	0	0	4	4
2	GEO164C402	Oceanography and Hydrology	4	0	0	4	4
3	GEO164P423	Major Project	0	0	12	6	12
Ability Enhancement Compulsory Courses (AECC)							
4	CEN984A401	Communicative English-IV	1	0	0	1	1
Discipline-Specific Elective (DSE): Any three to be selected							
5	GEO164D401	GIS, GPS Principles and applications	4	0	0	4	4
6	GEO164D402	Social and cultural Geography	4	0	0	4	4
7	GEO164D403	Political Geography	4	0	0	4	4
8	GEO164D404	Global Climate Change	4	0	0	4	4
9	GEO164D405	Urban Geography	4	0	0	4	4
TOTAL CREDITS (C) & TOTAL CONTACT PERIODS (TCP)			21	0	12	25	33
Total Credit= 24+27+26+25 = 102							

M.A./M. Sc. Course in Geography: Semester-I

Paper I Core Course	GEOMORPHOLOGY			Subject Code:
	L-T-P-C: 4-0-0-4	Credit Units: 4	Scheme of Evaluation: (T)	GE0164C 101

Course Objectives: *The pivotal point of this course is to make students familiar with the fundamental concepts of geomorphology which incorporates the topics related to geomorphic structure and processes, earth's interior and composition, evolution of landforms and so on.*

Course Outcomes:

By the end of this course the students will be able to:		
SI No.	Course Outcome	Blooms Taxonomy Level
C01.	Recall the principles, basic concepts of Geomorphology and its recent trends.	BT 1
C02.	Outline the roles of structure, process, and time in shaping the landforms along with interpreting geomorphological maps.	BT 2
C03.	Apply the knowledge in geographical research.	BT 3
C04.	Distinguish between the mechanisms that control these processes and also analyse how the natural and anthropogenic operating factors affect the development of landforms.	BT 4
C05.	Evaluate the functioning of Earth systems in real time.	BT 5

Detailed Syllabus:

Modules	Topics and Course Content	Periods
Unit 1	Definition, nature and scope of Geomorphology; Development of geomorphic ideas; Spatial scale, Geological time scale; Trends in geomorphological study: process geomorphology, structural geomorphology, climatic geomorphology, environmental geomorphology and palaeogeomorphology; Recent trends in geomorphology.	12
Unit 2	Concept of Catastrophism and uniformitarianism; Cyclic concept in geomorphology: Davisian Cycle of river erosion and Concept of peneplanation; system concepts in geomorphology: steady state and dynamic equilibrium, Concept of grade, Thresholds in geomorphology.	12
Unit 3	Epeirogenic and Orogenic movements, Plate Tectonics and theory supporting evidences and validity of sea floor spreading; Drainage patterns and their evolution, Concept of drainage basin, Laws of drainage morphometry, Quantitative analysis in Geomorphology.	12
Unit 4	Processes of landform developments and resultant landforms by running water, glacier, wind and sea waves; Weathering and mass wasting; Slope – development processes, elements, classification; Theories of slope development – slope decline, slope replacement and parallel retreat.	12
	Total	48

Text Books:

1. Hart, M. G. (1986): Geomorphology Pure and Applied, George Allen & Unwin, London
2. Dayal, P. (2nd edition), (1996): A Textbook of Geomorphology, Shukla Book Depot, Patna
3. Savindra Singh (Rep. 2011): Geomorphology, Prayag Pustak Bhawan, Allahabad.
4. Strahler A. H and Strahler, A. N. (1992): Modern Physical Geography, John Wiley, New York.
5. Thornbury, W. D. (Rep.2011): Principles of Geomorphology, John Wiley and Sons, New York.

Reference Books:

1. Ahmad, E., 1985: Geomorphology, Kalyani Publishers, New Delhi
2. Derbyshire, E. (ed), 1976: Geomorphology and Climate, Wiley, London.
3. Fairbridge, R.W. (ed), 1968: Encyclopedia of Geomorphology, Reinhold, New York
4. Gregory, K, J. and Walling, D.E., 1973: Drainage Basin- Form and Process, Edward Arnold, London
5. Goudie, Andrew, et. Al. (eds), 1981: Geomorphological Techniques, George Allen & Unwin, London.
6. Kale, V. S. and Gupta, A. (Rep.2011): Introduction to Geomorphology, Orient Longman, Calcutta.
7. Ollier, C. D. (1981): Tectonics and Landforms, Longman, London.
8. Spark B.W. (1972): Geomorphology, Longman, New York.
9. Young, A. (1972): Slope, Longman, New York, Oliver and Boyd, Edinburgh

Paper II Core Course	PRINCIPLES OF CLIMATOLOGY		Subject Code: GEO164C102
	L-T-P-C: 4-0-0-4	Credit Units: 4	

Course Objectives: *The course aims to illustrate the atmospheric elements, processes and resultant weather and climates, the impact of climates on planet earth and its associated processes.*

Course Outcomes:

By the end of this course the students will be able to:		
SI No.	Course Outcome	Blooms Taxonomy Level
C01.	Define the elements of weather and climate and its impacts at different scales.	BT 1
C02.	Demonstrate and interpret weather maps.	BT 2
C03.	Develop the climatic aspects and its bearing on planet earth.	BT 3
C04.	Distinguish world climatic regimes.	BT 4
C05.	Assess the monsoon and its vagaries, global climate change and its consequences.	BT 5

Detailed Syllabus:

Modules	Topics and Course Content	Periods
Unit 1	The field of Climatology and its subdivisions, Factors affecting weather and climate, Composition and vertical structure of the atmosphere- physical properties, chemical composition and temperature changes; Insolation, factors affecting insolation, latitudinal and seasonal variation of insolation and the heat budget.	10
Unit 2	Horizontal and Vertical distribution of temperature, Inversion of temperature, Pressure measurement and units, Factors affecting air pressure, Pressure changes with altitude, Observed distribution of surface pressure, Wind observation and measurement, Factors affecting wind, Geostrophic wind, Gradient wind, Pressure systems and air circulation, Models of general circulation, Local winds and Jet stream	14
Unit 3	Air mass and fronts: types, characteristics and their influence on weather and climate, Factors affecting evaporation, atmospheric lapse rate (Normal, environmental, dry and wet adiabatic) and stability (absolute stability, absolute instability, conditional instability); Changes of state of water, factors affecting condensation; Classification of world climate of Koppen and Thornthwaite	10
Unit 4	Monsoon climate: origin, mechanism of development and distribution. Climatic disturbances: cyclone, anticyclone, drought, cloud burst, el-nino; Techniques of weather forecasting, Global climatic change: spatio-temporal perspectives, causes, impacts and vulnerability and mitigation strategy.	14
	Total	48

Text Books:

1. Barry, R. G. and Chorley, R. J. (1971): Atmosphere, Weather and Climate, Methuen Co. Ltd, London.
2. Critchfield, H. J. (Rep.2010): General Climatology, Prentice Hall, New Delhi.
3. Lal, D. S. (2003): Climatology, Sharda Pustak Bhawan, 11 , University Road, Allahabad-211002
4. Rob Vandenburg (2009): Evaluating Climate Change and Development.
5. Singh, S. (Rep.2011): Climatology, Prayag Pustak Bhawan, Allahabad

Reference Books:

1. Lutgens F. K., Tarbuck E. J. and Tasa D., (2009): The Atmosphere: An Introduction to Meteorology, Prentice-Hall, Englewood Cliffs, New Jersey
2. Oliver J. E. and Hidore J. J., (2002): Climatology: An Atmospheric Science, Pearson Education, New Delhi.
3. Stringer, E. N., 1982: Hoirn, L. A., (1980): An Introduction to Climate, International Series.
4. Trewartha, G. T. and Horn, L. A., (1980): An Introduction to Climate, International Series.
5. Weiesner, C. J.: Hydrometeorology, Chapman & Hall Ltd.

Paper III Core Course	GEOGRAPHY OF ECONOMIC ACTIVITIES			Subject Code: GEO164C102
	L-T-P-C: 4-0-0-4	Credit Units: 4	Scheme of Evaluation: (T)	

Course Objectives: *It focuses on the basic concepts of economic geography and its associated patterns and processes of the prime economic activities of the world.*

Course Outcomes:

By the end of this course the students will be able to:		
SI No.	Course Outcome	Blooms Taxonomy Level
CO1.	Define concepts and ways on how geographical aspects organise economic space.	BT 1
CO2.	Compare different sectors of economy and arrive at logical conclusion regarding importance of each sector in economic development of the nation.	BT 2
CO3.	Identify the principles and significance of economic geography.	BT 3
CO4.	Discover new insights among students on the relevance of economy and geography and associated problems in contemporary times.	BT 4
CO5.	Appraise the regional variation in the economic scenario and distribution pattern of resources.	BT 5

Detailed Syllabus:

Modules	Topics and Course Content	Periods
Unit 1	Nature and scope of Economic Geography, its evolution and theoretical development; Approaches in Economic Geography, Types of economic activities and factors of location influencing the activities	10
Unit 2	Economic Geography of Agriculture, Place of agriculture in global economy, Agricultural System and Regions of the World and India, Types of agriculture, Concept of crop combination and its methods of delineation (Weaver, Doi and Rafiullah), diversification and rotation, Von Thunen Model of Land Use Planning.	14
Unit 3	Classification of Industries, Factors of Industrial location, , Theories of Industrial Location- A. Weber, E.M. Hoover, A. Losch, A. Pred and D. M. Smith, Industrial Regions: World and India, Industrial Development experience in India and Japan, World Distribution of ICT (Information and Communication Technology) .	10
Unit 4	Economic Geography of Resources; its global pattern of distribution and production: water, coal, petroleum, forest and nuclear, International trade of Food grains and cash crops, Special Economic Zones, Theories of development: Myrdal and Rostow, Level of economic development on global perspective.	14
	Total	48

Text Books:

- Alexander J. W., 1963: Economic Geography, Prentice-Hall Inc., Englewood Cliffs, New
- Coe, N. M., Kelly, P. F., & Yeung, H. W. (2019). *Economic geography: a contemporary introduction*. John Wiley & Sons.
- Combes P., Mayer T. and Thisse J. F., 2008: Economic Geography: The Integration of Introduction, Wiley-Blackwell.
- Hodder B. W. and Lee Roger, 1974: Economic Geography, Taylor and Francis.

Reference Books:

1. Gunner Alexanderson, 1988: *Geography of Manufacturing*, Prentice-Hall Inc, (E.E. Edition)
2. Isard, W., 1956: *Location and Space Economy*, MIT Press, Cambridge.
3. Losch, A., 1954: *The Economics of Location*, New Haven.
4. Smith, David M., 1981: *Industrial Location: An Economic Geographical Analysis*, Wiley, New York
5. Symons, L., 1979: *Agricultural Geography*, West view Press, Colorado
6. Thomas, R. S. and Corbin, P. B., 1974: *The Geography of Economic Activity*, McGraw Hill, New York

Paper IV Core Course	GEOGRAPHY OF POPULATION AND SETTLEMENTS			Subject Code:
	L-T-P-C: 4-0-0-4	Credit Units: 4	Scheme of Evaluation: (T)	GEO164C104

Course Objectives: *The course aims to make students understand different concept related to population and their characteristics.*

Course Outcomes:

By the end of this course the students will be able to:		
SI No.	Course Outcome	Blooms Taxonomy Level
CO1.	Tell about the basic definitions and concepts related to population geography and human settlements.	BT 1
CO2.	Outline the population parameters of India.	BT 2
CO3.	Apply and analyse the resultant impact of contemporary issues related to population on society and environment.	BT 3
CO4.	Analyse contemporary issues related to population dynamics and environment.	BT 4
CO5.	Determine clear exposition of spatial and structural characteristics of human settlements.	BT 5

Detailed Syllabus:

Modules	Topics and Course Content	Periods
Unit 1	Field of Population Geography, Basic concepts of Population Geography: under population, optimum population, over population, population explosion and population pressure, Population resource relationship, population-resource regions, World population distribution and growth, components of population growth: fertility, mortality, migration.	10
Unit 2	Population composition: age, sex, child women ratio and other related factors, Demographic transition model and theories of population Growth (Malthus, Sadler and Ricardo), Population policies in developed and developing economies.	14
Unit 3	Defining the field and scope of Settlement Geography and its approaches, origin and growth of settlement: rural and urban, types and pattern of settlement, concepts of rural-urban dichotomy, continuum and urban fringe, urban system (Law of primate city and rank size rule).	10
Unit 4	Concept of urbanization and westernisation, functional classification of urban settlements, internal structure of cities / settlement hierarchy with reference to central place theory (Christaller and Losch): Measurement of centrality, nodality and hierarchy	14
	Total	48

Text Books:

1. Singh R.Y. (Rep. 2010) - Geography of Settlements, ShardaPustakBhawan, Allahabad
2. Chandna R. C. (Rep.2010) – A Geography of Population, Concepts, Determinants andPatterns, Kalyani Publishers, New Delhi.
3. Maurya S.D (Rep. 2018): Settlement Geography, ShardaPustakBhawan, Allahabad
4. Sandram, K. V. and Nangia, S., (eds): Population Geography, Heritage Publishers, New Delhi. Inc., New York.

5. Ghosh, S. (2015) Introduction to Settlement Geography, Orient Black Swan Private Ltd., Kolkata.

Reference Books:

1. Clarke, J. I., 1972: Population Geography, Pergamon Press, Oxford.
2. Peters, G. L. and Larkin, R. P., 1979: Population Geography: Problems, Concepts and Prospects, Kendall/ Hunt Iowa.
3. Trewartha, G. T., 1969: A Geography of Population: World Pattern, John Wiley & Sons.
4. Woods, R., 1979: Population Analysis in Geography, Longman, London.
5. Robinson, H., 1981: Population and Resources, Macmillan Press, London
6. Kaushik, S.D. (2010) ManavBhugol, Rastogi Publication, Meerut
7. Maurya, S.D. (2012) ManavBhugol, ShardaPustakBhawan, Allahabad.

Paper V Core Course	PRACTICAL - I			Subject Code:
	L-T-P-C: 0-0-4-2	Credit Units: 4	Scheme of Evaluation: (P)	GEO164C115

Course Objectives: *The course aims at increasing the practical knowledge of the students.*

Course Outcomes:

By the end of this course the students will be able to:		
SI No.	Course Outcome	Blooms Taxonomy Level
CO1.	Define the principles and concepts involved in Practical Geography.	BT 1
CO2.	Classify the nature, characteristics, and sources of geospatial data.	BT 2
CO3.	Develop the skills and technical capabilities of the students.	BT 3
CO4.	Simplify the application of the concepts related to Geomorphology, Climatology and Population Geography.	BT 4
CO5.	Inspect geospatial tools and technologies to create and analyse geospatial data for natural resource assessments, planning and management related applications.	BT 4

Detailed Syllabus:

Modules	Topics and Course Content	Periods
Unit 1	Analysis of Slope by Wentworth's method - 1 Exercise , Profile drawing (Serial, Superimposed, Composite, Projected) - 2 Exercises , Drainage basin delimitation, Ordering of streams, calculation of bifurcation ratio, length ratio, drainage frequency and density, computation of basin circularity ratio- 1 exercise	4
Unit 2	Verification of law of drainage morphometry - 3 Exercises , drawing of Hypsometric curve and computation of Integral - 1 Exercise	4
Unit 3	Preparation of rainfall variability map (Assam and Rajasthan) - 2 Exercises , drawing of hythergraph, climograph and ergograph - 3 Exercises , rainfall frequency analysis, rainfall dispersion graph, water deficiency and surplus graph- 2 Exercises , weather chart interpretation- 1 Exercise	8
Unit 4	Mapping of Population distribution, density and concentration in the World and India, Population growth trend and projection in the World and India, Population-Resource regions in the world- 9 Exercises	8
	Total	24

Reference Books:

1. Weiesner, C. J.: *Hydrometeorology*, Chapman & Hall Ltd.
2. Gregory, K, J. and Walling, D.E., 1973: *Drainage Basin- Form and Process*, Edward Arnold, London
3. Goudie, Andrew, et. Al. (eds), 1981: *Geomorphological Techniques*, George Allen & Unwin, London.
4. Woods, R., 1979: *Population Analysis in Geography*, Longman, London.

Paper, DSE - 1	AGRICULTURAL PRACTICES IN INDIA			Subject Code:
	L-T-P-C: 4-0-0-4	Credit Units: 4	Scheme of Evaluation: (T)	GEO164D101

Course Objectives: *The course aims to make the students understand the role and place of agriculture in Indian Economy.*

Course Outcomes:

By the end of this course the students will be able to:		
SI No.	Course Outcome	Blooms Taxonomy Level
CO1.	Recall the definition, basic concepts and field of Agricultural Geography.	BT 1
CO2.	Apply the various indices associated with agriculture.	BT 3
CO3.	Develop the basic ideas related to geographical perspective of agriculture in India.	BT 3
CO4.	Analyse the fundamental processes associated with agricultural system of India.	BT 4
CO5.	Appraise the significance of agriculture in Indian economy.	BT 5

Detailed Syllabus:

Modules	Topics and Course Content	Periods
Unit 1	Place of Indian agriculture in global economy, type, characteristics, growth, distribution and development; Critical appreciation of large scale and small scale agriculture, Agricultural regions of India and their characteristics, Indian agriculture: types, characteristics, growth, distribution and development and position of Indian agriculture in the world	10
Unit 2	Agricultural land use pattern and shifting cropping pattern in India; Regional variation in the levels of agricultural development in India - Food deficit and food surplus regions; nutritional index, sustainability of agricultural practices and production	14
Unit 3	Political-economy of Indian agriculture, Problems of Indian agriculture: crop and cropping hazards, sustainability of agricultural practices and production; Technological factors in Indian agriculture, Government policy for agricultural policy and planning and agricultural trade in India.	10
Unit 4	Indian agriculture in the context of globalization and free market economy, Contemporary Issues of Indian agriculture: Food, nutrition and hunger, food security, food aid programmes; environmental degradation; role of irrigation, fertilizers, insecticides and pesticides, technological know-how, Agriculture in North East India – Agriculture as an economic basis of North-East India; major food crops and cash crops produced; problems and prospects of agriculture in North-East India with special reference to Assam	14
Total		48

Text Books:

1. Bayliss Smith, T. P., 1987: The Ecology of Agricultural Systems. Cambridge University Press, London
2. Morgan, W.B. : Agriculture in the Third World - A Spatial Analysis. Westview Press, Boulder, 1978
3. Hussain, M., 2001: Systematic Agricultural Geography, Rawat Publication, Jaipur and New Delhi.

Reference Books:

1. Grigg, D.B., 1978: *Agricultural Systems of the World: An Evolutionary Approach*, Cambridge University Press, Cambridge.
2. Singh, J., 1976: *Agricultural Geography*, Tata McGraw Hill Pub. Co., New Delhi. Sukla, S. P. and
3. Agarwal, A.K.: *Agriculture in Northeast India*.
4. Hussain, M., 2001: *Systematic Agricultural Geography*, Rawat Publication, Jaipur and New Delhi.

6. Mohammad, N. (ed), 1992: *New Dimensions in Agricultural Geography* (in 8 Volumes), Concept Publishing Company, New Delhi.

Paper, DSE - 2	ENVIRONMENT AND SUSTAINABLE DEVELOPMENT	Subject Code: GEO164D102
	L-T-P-C: 4-0-0-4 Credit Units: 4 Scheme of Evaluation: (T)	

Course Objectives: *The course aims to give the idea of the concept of global environment and its impact on various aspects, along with providing knowledge on adaptation and mitigation of climate impacts and also to know institutional role in it.*

Course Outcomes:

By the end of this course the students will be able to:		
SI No.	Course Outcome	Blooms Taxonomy Level
CO1.	Relate to basics of science of environmental change and sustainable development.	BT 1
CO2.	Classify different types of natural resources and its importance.	BT 2
CO3.	Develop understanding about various impacts of Climate Change on Agriculture and Water, Flora and Fauna, Human Health, ozone layer and other spheres of environment.	BT 3
CO4.	Inspect upon the issues of adaptation and mitigation from hazards and management of solid wastes.	BT 4
CO5.	Explain the policies of development and environmental protection in developed and developing countries.	BT 5

Detailed Syllabus:

Modules	Topics and Course Content	Periods
Unit 1	Introduction to Environment: definition and concept, types, Environmental factors, The Global Environment and its segments and development, Natural resources: renewable and non-renewable, land resources, water resource, forest resource and energy resource	12
Unit 2	Man- environment relationship: Historical perspectives on man's interaction with environment; population growth and environment; Man and atmosphere: Man as a factor of climatic change; Global environmental problems: Types and extent of environmental problems, area-specific major environmental issues and problems.	12
Unit 3	Concept of sustainability, concept of sustainable development, history, : relation among environment, economy and society, Pillars and principles of Sustainable development, Environmental Pollution- causes and effects, Nuclear Hazard and Human Health, Solid Waste Management, Climate Change and Global warming, ozone layer depletion and its impacts	12
Unit 4	Environmental protection movements: Chipko Movement, Silent Valley, Narmada Bachhao Andoloan; Environmental Legislation Programme in India: Wildlife Protection Act, Water Act, Forest Act, Air Act, Environmental Protection Act, International Agreement-Earth Summit, UNFCCC, Montreal and Kyoto Protocol, Environmental Communication and Awareness	12
	Total	48

Text Books:

1. Goudie, A., (1984): The Nature of Environment, Basil Blackwell, London.
2. Singh, S., 1991: Environmental Geography, Prayag Pustak Bhawan, Allahabad

Reference Books:

1. Park, C., (1997): The Environment, Routledge, London.
2. Pickering, K. T. & L. A. Owne, (1994): An Introduction to Global Environmental Issues, Routledge, London.
3. .
4. Strahler, A. N. and A. H. Strahler, 1976: Geography and Man's Environment, John Willey, New York.

M.A./M. Sc. Course in Geography: Semester-II

Paper I Core Course	GEOGRAPHY OF DEVELOPMENT OF INDIA	Subject Code:
	L-T-P-C: 4-0-0-4 Credit Units: 4 Scheme of Evaluation: (T)	GEO164C201

Course Objectives: *The course aims to define the regional basis of India and evaluate the basic ideas of the different aspects of India.*

Course Outcomes:

By the end of this course, the students will be able to:		
SI No.	Course Outcome	Blooms Taxonomy Level
CO1.	Define the concepts involved in explaining India as a regional unit.	BT 1
CO2.	Compare and interpret the disparity that prevails among the different states of India.	BT 2
CO3.	Build knowledge on population structure, industrial aspects, transport and communication of the region.	BT 3
CO4.	Analyse various prospects of India.	BT 4
CO5.	Examine the position of India in global context.	BT 4

Detailed Syllabus:

Modules	Topics and Course Content	Periods
Unit 1	India as a geographical entity, Location and situation; India in the context of neighbouring countries, Physical background of regional development: relief, drainage system, climate, soil and natural vegetation, major crops, Indian monsoon: mechanism and characteristics, natural disaster in India (earthquake, drought, flood, cyclone, tsunami, Himalayan highland hazards)	10
Unit 2	Population and development issues: population growth and its socio-economic implications, literacy, urbanization, occupation and social structure and development inequalities, tribes and religion	14
Unit 3	Mineral and power resources and development: iron ore, coal, petroleum and hydro- electric power potential, agro-climatic and physiographic divisions of India, agro climatic regions, industrial regions of India	12
Unit 4	Regional disparities in economic development: Agriculture, industry and transport and communication, India's geo-economic position in Asia and the world; its economic development policies and international relations.	12
	Total	48

Text Books:

1. Singh, R. L., (ed), 1971: India: A Regional Geography, National Geographical Society of
2. India, Varanasi.
3. Bhatt, L. S., 1973: Regional Planning in India, Statistical Publishing Society, Calcutta.
4. Tirtha R. & Gopal Krishna, 1996: Emerging India Reprinted by Rawat Publications, Jaipur.

Reference Books:

1. Dreze, Jean & Amartya Sen (ed.), 1996: India Economic Development and Social opportunity, Oxford University Press, New Delhi.
2. Kundu A. Raza Moonis, 1982: Indian Economy: the Regional Dimension. Spectrum Publishers, New Delhi.
3. Publishers, New Delhi.
4. Robinson, Francis, 1989 : The Cambridge Encyclopaedia of India, Pakistan, Bangladesh, Sri Lanka, Nepal, Bhutan & Maldives. Cambridge University Press, London.
- 5.

Paper II Core Course	SOIL AND BIOGEOGRAPHY			Subject Code:
	L-T-P-C: 4-0-0-4	Credit Units: 4	Scheme of Evaluation: (T)	GEO164C202

Course Objectives: *The course aims to make students understand the fundamental concept of soil and biogeography under various categories.*

Course Outcomes:

By the end of this course, the students will be able to:		
SI No.	Course Outcome	Blooms Taxonomy Level
CO1.	Define and understand the basic terms and concepts of soil and biogeography.	BT 1
CO2.	Interpret the important issues pertaining to environment.	BT 2
CO3.	Construct the basic properties, morphology and other properties associated with soil and biogeography.	BT 3
CO4.	Analyse independently the various biodiversity conservation and management issues.	BT 4
CO5.	Evaluate the regional basis and significance of Soil and Biogeography.	BT 5

Detailed Syllabus:

Modules	Topics and Course Content	Periods
Unit 1	Soil forming factors: Parent material, organic, climatic, topographic, spatio-temporal dimensions; Processes of soil formation and soil development: Physical, biotic and chemical; Soil profile development; soil catena	10
Unit 2	Physical properties of soils: Morphology, texture, structure, water, air, temperature and other properties of soil; chemical properties of soil and soil reaction; , pedogenic regimes; podzolization, laterization, calcification and gleezation.	12
Unit 3	Forms and functions of ecosystem: Forest, grassland, marine and mountain ecosystem; tropic level, Energy flux in the ecosystem; material Cycles / bio- energy cycles in the terrestrial ecosystem, concept of food chain, food web and ecological pyramid, Environmental ethics and Deep ecology	12
Unit 4	Biogeography: development and significance, Approaches in biogeography: evolutionary and ecological, Concept of biodiversity; Conservation of biotic resources; Biodiversity hotspots; State of forest cover changes in India, environment policy of India, National Forest Policy of India, legal framework for biodiversity protection: Brundtland Commission, Kyoto Protocol, Agenda 21, Sustainable Development Goals, Paris Agreement	14
	Total	48

Text Books:

1. Hugget, R. J., 1988: Fundamentals of Biogeography. Routledge, London.
2. Bunting, B. T., 1967: The Geography of Soil, Hutchinson, London.
3. Robinson, H., 1982: Biogeography, E.L.B.S., Mc Donald & Evans, London.

4. Sivaperuman, Chandrakasan et al., (2018): Biodiversity and Climate Change Adaptation in Tropical Islands, Academic Press, London.

Reference Books:

1. Barry, C., 1977: Biogeography - An Ecological and Evolutionary Approach, Cox Blackwell, Oxford.
2. Singh, S. 1991: Environmental Geography, Prayag Publications, Allahabad
3. Tivy, J. 1992: Biogeography: A study of Plants in Ecosphere, 3rd edn. Oliver and Boyd, U.S.A.

Paper III Core Course	BASICS OF GEOINFORMATICS			Subject Code:
	L-T-P-C: 4-0-0-4	Credit Units: 4	Scheme of Evaluation: (T)	GEO164C203

Course Objectives: *This course intends to show the rationale behind the use of remotely sensed data and its advantages and disadvantages and illustrate how GIS/GPS methodologies can be used to address spatial analysis from the theoretical and practical perspective.*

Course Outcomes:

By the end of this course the students will be able to:		
SI No.	Course Outcome	Blooms Taxonomy Level
CO1.	Define basic concepts of remote sensing.	BT 1
CO2.	Interpret principles and applications of various remote sensing techniques including aerial photography.	BT 2
CO3.	Develop the skills in integrating and analyzing spatial data.	BT 3
CO4.	Analyse this knowledge for land use land cover map preparation.	BT 4
CO5.	Assess remote sensing data products for minor and major projects on environmental/natural resource assessments and mapping, disaster and hazard management, urban planning, and many applications.	BT 5

Detailed Syllabus:

Modules	Topics and Course Content	Periods
Unit 1	Definition and scope of Geoinformatics; Fundamentals of Geodesy: Geoid, Ellipsoid, Coordinate Systems, Map projections, Geographic data and information, Types and structure of spatial data and their geometric characteristics; Introduction to Open Source and Professional GIS software systems and data input and output devices in GIS. Database Basics: Definition of database, Database Management System (DBMS), Spatial database (Geodatabase), Attribute database and Relational Database Management System (RDBMS).	14
Unit 2	Remote Sensing: What and Why, Sensors, platforms, EMR properties of earth materials, Remote Sensing Data characteristics and uses; Data products, data formats and application areas of: IRS-LISS-I, II, III, IV Data; CARTOSAT, LANDSAT, SENTINEL, SPOT, QuickBird and GeoEye data products	10
Unit 3	Visual techniques of interpretation of Remote Sensing data and aerial photographs; Digital Image Processing (DIP) Techniques, Aerial photographs, Geometry of vertical air photographs, Scale and height determination from Aerial photographs, Application areas of Remote Sensing and Aerial photographs	12
Unit 4	Introduction to GPS, GPS Satellite Systems, Time and position calculation, GPS Errors, Principles of DGPS, Surveying by GPS, Spatial Analysis of Geospatial data, Important application areas of GPS	12
	Total	48

Text Books:

1. Burrough, P.A. and Mc Donnel, R. A., 1998: Principles of Geographical Information Systems, Oxford University Press.
2. De Mars, M. N., 1999: Fundamentals of Geographic Information Systems, John Wiley & Sons Inc., New York.

3. Gopi, S., 2005: Global Positioning System Principles and Applications, Ta McGraw Hill, New Delhi.
4. Jensen, J. R., 2011: Remote Sensing of the Environment – An Earth Resource Perspective, 3rd Impression, Chapter-14, Pearson, New Delhi.

Reference Books:

1. Curtis, H., 2000: The GPS Accuracy Improvement Initiative, GPS World, June, 2000.
2. Gonzalez, R. C., Woods, R. E., 2000: Digital Image Processing, Fifth Indian Reprint, Addison Wesley Longman, Delhi.
3. Maguire, D. J., Goodchild, M. and Rhind, D. J., 1990: Geographical Information Systems: Principles and Applications, Longman Science and Technology Publications.
4. Sabins, Floyd F., 1987: Remote Sensing Principles and Interpretation, W.H. Freeman and Company, New York.

Paper IV Core Course	CARTOGRAPHIC METHODS IN GEOGRAPHY			Subject Code:
	L-T-P-C: 4-0-0-4	Credit Units: 4	Scheme of Evaluation: (T)	GEO164C204

Course Objectives: *This course focuses to make the students understand the science and art of map making along with clearing the basics of map and map scale and its varied types along with the diagrammatic representation of geographical data.*

Course Outcomes:

By the end of this course the students will be able to:		
SI No.	Course Outcome	Blooms Taxonomy Level
CO1.	Define about map and its types, map scale and profile mapping.	BT 1
CO2.	Interpret different projection systems and digital mapping analysis.	BT 2
CO3.	Construct graphs/charts, cartograms and thematic maps based on socio-economic, cultural and climatic data.	BT 3
CO4.	Conclude the importance of maps for regional development and decision-making.	BT 5
CO5.	Evaluate different aspects of surveying and levelling using varied techniques and equipment.	BT 5

Detailed Syllabus:

Modules	Topics and Course Content	Periods
Unit 1	Cartography: The science and art of map making; Nature and scope of Cartography; Earth as a cartographic problem, Scales, Coordinate systems, distance and directions in maps; Developable and developed surfaces - types and properties; Map projection systems and types; Importance of cartography in geography; Digital cartography- data sources for digital mapping and analysis.	10
Unit 2	Map Projection: Basic concepts, classification, basic Principles of construction of zenithal, conical and cylindrical groups of map projections and choice of map projections.	14
Unit 3	Principles of mapping and base map preparation; Concept of generalization; Map design and layout; Thematic map and its classes; Choropleth and isopleth maps; Map reading and analysis; Representation of socio-economic and climatic data	12
Unit 4	Basic idea of geodetic and plane surveying; Principles and techniques of surveying by: Plane Table, Prismatic Compass, Transit Theodolite, Levelling by Dumpy Level / Auto level, Total Station (Introductory idea)	12
Total		48

Text Books:

- Misra, R. P., et al., 2014: Fundamentals of Cartography, Concept Publishing co. New Delhi
- Monkhouse, F. J., and Wilkinson, H. R., 1989: Maps and Diagrams, B. I., Publications Pvt. Ltd., New Delhi-59
- Robinson, A. H., et al., 1995: Elements of Cartography, 6th Edition, John Wiley & Sons, New York.
- Steers, J. A., 1965: An Introduction to the Study of Map Projection, University of London, London.
- Talukder, S., 2008: Introduction to Map Projections, EBH Publishers (India), Guwahati.

Reference Books:

- Cuff, D. J. and Mattson, M. T., 1982: Thematic Maps: Their Design and Production, Methuen, New Work

2. Singh, R. L.: Elements of Practical Geography, Kalyani Publishers, New Delhi.
3. Sing, R. L. and Singh Rana, P. B., 1998: Elements of Practical Geography, Kalyani Publishers, New Delhi.
4. Saha, P. K. and Basu, P., 2010: Advanced Geography Practical – A Laboratory Manual, Books and Allied (P) Ltd., Kolkata.

Paper V Core Course	Practical II			Subject Code: GEO164C2 15
	L-T-P-C: 0-0-6-3	Credit Units: 4	Scheme of Evaluation: (P)	

Course Objectives: *It aims to give the idea of the importance of various surveying techniques in geographical study, the concepts regarding scale, map projections to suit map purposes and understand the field ethics and different tools of field study.*

Course Outcomes:

By the end of this course the students will be able to:		
SI No.	Course Outcome	Blooms Taxonomy Level
CO1.	Recall varied cartographic terms, terminologies and techniques.	BT 1
CO2.	Construct different types of projections.	BT 2
CO3.	Develop the skills in preparation of thematic maps at various levels.	BT 3
CO4.	Analyze GIS based maps and perform spatial analysis, classify remote sensing satellite-based data and prepare large scale maps by using traditional surveying equipment and GPS survey.	BT 4
CO5.	Assess the multiple surveying techniques and its application.	BT 5

Detailed Syllabus:

Modules	Topics and Course Content	Periods
Unit 1	Population projection model and graph of India /North East India/ Any State of India - 1 Exercise ; Cartogram for socio-economic or any other data of India or North East India - Urban population by proportionate sphere or circles - 1 Exercise ; Preparation of one quantitative thematic map (Choropleth technique or Isopleth technique) by using district level data of any state of India - 1 Exercise	12
Unit 2	Map Projection: Basic concepts, classification, basic Principles of construction of zenithal, conical and cylindrical groups of map projections and choice of map projections. Construction of graticules and drawing of maps thereon including properties and uses of: Zenithal Gnomonic Projection (Equatorial case) Mollweide's Projection Conical Projection with two-standard parallels Lambert's Conical Equal Area Projection Mercator's Projection	12
Unit 3	Georeferencing of maps by using Open Source GIS / Professional GIS Software (1 Exercise), Map in UTM Projection System (1 Exercise), Map digitization and creation of point, line and polygon layers (3 Exercises), Preparation of thematic maps (2 Exercises);	12
Unit 4	Digital Image Processing- Unsupervised Classification and Supervised Classification (2 Exercises); Geographic Analysis of Spatial data: Spatial Mean Centre and Standard Distance (1 Exercise); Preparation of maps by using GPS data (1 Exercise); Preparation of topographic maps / profile/ contouring by using: Plane Table / Prismatic Compass Surveying – (1 Exercise) Profile / Contouring by Dumpy Level / Autolevel- (1 Exercise)	12
Total		48

Text Books:

As per the list of GEO164C203 and GEO164C204

Reference Books:

As per the list of GEO164C203 and GEO164C204

SCHEME OF EVALUATION (GEO164C215)

- Internal Assessment and Mid-term Examinations: As per the University rules
- End Semester Examination should consist of the questions taking any one exercise from each module. The module-III and IV should have optional questions.
- The distribution of marks for each module will remain equal as far as practicable (Each question with 10% -20% variation in the distribution of marks may be set based on difficulty level and time requirements to perform the exercise). 80% of the total marks is reserved for 4 exercises to be performed with total duration of 4 (four) hours
- 10% of total marks is reserved for External Examiner
- 10% of total marks is reserved for Practical Records and Note Book
- Maintenance of Practical Records and Note Book is mandatory
- External Examiner is mandatory during End Semester Examination

Paper, DSE - 1	REGIONAL DEVELOPMENT OF NORTHEAST INDIA AND ASSAM	Subject Code: GEO164D201
	L-T-P-C: 4-0-0-4 Credit Units: 4 Scheme of Evaluation: (T)	

Course Objectives: *The course aims to define the regional basis of Northeast India and Assam and evaluate the basic ideas of the position of Northeast India and Assam in the Indian context.*

Course Outcomes:

By the end of this course, the students will be able to:		
SI No.	Course Outcome	Blooms Taxonomy Level
C01.	Define the concepts involved in explaining North-East India as a regional unit.	BT 1
C02.	Compare and interpret the disparity that prevails among the different states of northeast.	BT 2
C03.	Build knowledge on population structure, industrial aspects, transport and communication of the region.	BT 3
C04.	Analyse various prospects of northeast India and Assam.	BT 4
C05.	Examine the basic idea of position of Northeast India and Assam in Indian context.	BT 4

Detailed Syllabus:

Modules	Topics and Course Content	Periods
Unit 1	North East India: location and strategic significance; Physical characteristics and their relation to development: Relief, drainage, climate, soil and vegetation and bio-diversity, Position of North-East India in relation to India and its neighbours, Socio-economic and trade relation with ASEAN countries	12
Unit 2	Population and Development: Population growth, composition and distribution, migration, population characteristics, social structure: race, caste, religious and linguistic composition.	12
Unit 3	Natural resources, their utilization and development: Coal, petroleum, natural gas, water and forests in North East India; Agriculture and Development: Agricultural modernization and strategies for future development; constraints of Industrial development; problems and prospects of tourism.	12
Unit 4	Locational significance of Assam; Position of Assam in relation to rest of India, its physical characteristics and their relation to development: Relief, drainage, climate, soil and vegetation, Population growth, composition and distribution in North-East India and Assam; Agriculture, industry and tourism in Assam,	12
Total		48

Text Books:

1. Dutta Ray, B., et. al (eds), 2000: Population, Poverty and Environment in North East India, Concept Publishing Co., New Delhi.
2. Taher M. and Ahmed, P., 2000: Geography of North East India, Mani-Manik Prakash, Guwahati.
3. Bhagabati, A. K. et al, 2001: Geography of Assam, Rajesh Publications, New Delhi.

Reference Books:

1. Barua, P. C., 1990: Development Planning of North East India, Mittal Publications, New Delhi.

2. North East India Geographical Society: North Eastern Geographer, Department of Geography, Gauhati University.

Paper, DSE - 2	GEOGRAPHY OF TOURISM			Subject Code:
	L-T-P-C: 4-0-0-4	Credit Units: 4	Scheme of Evaluation: (T)	GEO164D202

Course Objectives: *The course aims to make the students define the basic theme and concepts of tourism geography and interpret the geographical components of tourism.*

Course Outcomes:

By the end of this course the students will be able to:		
SI No.	Course Outcome	Blooms Taxonomy Level
CO1.	Define the geographical aspects that organise economic space.	BT 1
CO2.	Illustrate the geographical aspects of tourism in an area.	BT 2
CO3.	Develop practical field knowledge about tourist places across India.	BT 3
CO4.	Analyse the knowledge gathered through field visits and prepare their respective reports.	BT 4
CO5.	Justify the methods of tourist flow in relation to the geographical setting of an area.	BT 5

Detailed Syllabus:

Modules	Topics and Course Content	Periods
Unit 1	Meaning, Scope and contents of Geography of tourism: Definition of tourism and its scope; Factors influencing tourism: historical, natural, socio cultural and economic, Importance of geography in tourism, Types of tourism, Constituents of tourism industry	10
Unit 2	Concept of Sustainable tourism: Definition and principles of sustainable tourism, Dimensions of sustainability, Impact of tourism - Environmental, Social, Cultural, and Economic; Concept of Responsible tourism, Global environmental change and tourism, concept of carrying capacity	14
Unit 3	Resources of Tourism: Destination and resource factors, Mass tourism vs. alternative tourism, Ecotourism, Spatial pattern of Tourism Resources in India-National Parks, Wild life sanctuaries, Tiger Reserves, Biosphere reserves & wetlands., history and culture	10
Unit 4	Understanding tourism system: Leiper's Model, Tourist map design, Travel Flows: models, trends and types, Important tourist destination of India, Tourist destinations in North America, South America, Europe, Africa, Antarctica, Australia and Asia, latitude, longitude and international date line	14
Total		48

Text Books:

1. Bhatia, A. K., 1996: Tourism Development: Principles and Practices, Sterling Publishers, New Delhi.
2. Milton, D., 1993: Geography of World Tourism Prentice. Hall, New York.
3. Sharma J. K. (ed.), 2000: Tourism Planning and Development - A new perspective, Kanishka Publishers, New Delhi.

Reference Books:

1. Robinson, H., 1996: A Geography of Tourism. Macdonald and Evans, London, 1996.
2. Williams Stephen, 1998: Tourism Geography, Routledge, Contemporary Human Geography Series, London.
3. Shaw G. and Williams A. M., 1994: Critical issues in Tourism-A Geographical Perspective, Oxford: Blackwell.

AEEC	Report Writing on Environmental Issues			Subject Code:
	L-T-P-C: 2-0-4-2	Credit Units: 2	Scheme of Evaluation: (T+P)	GEO164S211

Course Objectives: *This course intends to make the students understand the various dimensions of field work and its role in geographical studies, along with introducing to basic report writing and field tools.*

Course Outcomes:

After successful completion of the course, the students will be able to:		
Sl. No.	Course Outcome	Blooms Taxonomy Level
CO1	Choose new geographical landscape as study area.	BT1
CO2	Infer in-depth knowledge of different field techniques.	BT2
CO3	Choose the field ethics and different tools of field study.	BT3
CO4	Analyze different field techniques in detail.	BT4

Detailed Syllabus:

Modules	Topics and Course Content	Periods
Unit 1	Visit a local polluted area (local urban area/ agricultural area) , map the area and note the environmental issues thereof.	12
Unit 2	Generation of report (within about 100 A4 size pages including 30-40 maps/diagrams/field photographs) on the basis of field works carried out under	12
Total		24

Text Books:

1. Creswell, J., (1994). *Research Design: Qualitative and Quantitative Approaches*. UK: Sage Publications.
2. Dikshit, R. D. (2003). *The Art and Science of Geography: Integrated Readings*.

Reference books:

1. Evans, M. (1988). Participant Observation: The Researcher as Research Tool. In Eylesand, J and D. Smith (eds). *Qualitative Methods in Human Geography*. Cambridge, UK: Polity.
 2. Mukherjee, N. (2002). *Participatory Learning and Action: with 100 Field Methods*. Delhi, India: Concept Publs. Co.
 3. Stoddard, R. H. (1982). *Field Techniques and Research Methods in Geography*. USA: Kendall/Hunt.
- Wolcott, H. (1995). *The Art of Fieldwork*. CA, USA: Alta Mira Press.

Paper I Core Course	RESEARCH METHODOLOGY			Subject Code:
	L-T-P-C: 4-0-0-4	Credit Units: 4	Scheme of Evaluation: (T)	GEO164C301

Course Objectives: *The course aims to make the students understand the basics of qualitative and quantitative research, literature review, data collection, identification of research problem, formulate research objectives and research questions, formulation of hypothesis and testing, framing of questionnaires, techniques of collection of both qualitative and quantitative data and their analysis.*

Course Outcomes:

After the completion of course, the students will have ability to:		
SI No.	Course Outcome	Blooms Taxonomy Level
CO1.	Define the concepts and tools of research.	BT 1
CO2.	Infer ideas that can be taken up for research work through literature review.	BT 2
CO3.	Develop hypothesis and research questions.	BT 3
CO4.	Identify appropriate data collection and sampling techniques.	BT 3
CO5.	Interpret the various types of data along with critical evaluation .	BT 5
CO6.	Design and develop a scientific research report	BT 6

Detailed Syllabus:

Modules	Topics and Course Content	Periods
Unit 1	Research: Definition, types, significance and important features; Research methodology in geography; Defining a research problem; Statement of the problem; Objectives, and hypothesis/ research questions, Database and methodology, significance, review of research works and bibliography and references.	12
Unit 2	Research design: Meaning, need and features of a good design, Inductive and deductive approaches in geographic research, Hypothesis, theories and models in Geography; concept of model building and hypothesis testing.	12
Unit 3	Field techniques in Geography: Types, role and significance; Questionnaire design (Open, Closed, Structured, Non-structured), data collection, Post field processes: construction of data matrix, data processing and analysis; Role of quantitative techniques in Geography	12
Unit 4	Sources of geographic data (Conventional and Geospatial technology based), their representation, interpretation and analysis; Research ethics: Plagiarism- classification and prevention; Intellectual property rights; Research report: Structural components and presentation.	12
	Total	48

Note: Computer / calculator based compulsory home assignments may be given for various units. Scientific calculator may be permitted in the examination hall for this paper.

Text Books:

1. Harvey, D, 1969: Explanation in Geography, Scientific Publisher, Jodhpur.

2. Lenon, B., Cleves, P. 2015. Geography Fieldwork and Skills, Harper-Collins.
3. Montello , D.R, Sutton, P. 2012. An Introduction to Scientific Research Methods in Geography and Environmental Studies, 2nd ed, Sage.
4. Murthy , K.L.N. 2004. Research Methodology in Geography: A Text Book, Concept Publishing Co.

Reference Books:

1. Evans, M., (1988): "Participant Observation: The Researcher as Research Tool" in Qualitative Methods in Human Geography, eds. J. Eyles and D. Smith, Polity.
2. Special Issue on "Doing Fieldwork" The Geographical Review 91:1-2 (2001).
3. Stoddard, R. H., (1982): Field Techniques and Research Methods in Geography, Kendall/Hunt.
4. Wolcott, H., (1995): The Art of Fieldwork, Alta Mira Press, Walnut Creek, CA.
5. Northey, N., Draper, D., Knight, D.B. 2015. Making Sense in Geography and Environmental Sciences:A Student's Guide to Research and Writing, 6th ed, Oxford University Press.
6. Parsons, T., Knight, P.G. 2015. How To Do Your Dissertation in Geography and Related Disciplines,3rd ed, Routledge.

Paper II Core Course	QUANTITATIVE METHODS IN GEOGRAPHY			Subject Code: GEO164C3 02
	L-T-P-C: 4-0-0-4	Credit Units: 4	Scheme of Evaluation: (T)	

Course Objectives: *This paper provides an understanding of the pure and applied nature of Geography along with the key elements in the discipline.*

Course Outcomes:

After successful completion of the course, the students will be able to:		
SI No.	Course Outcome	Blooms Taxonomy Level
CO1.	Define the statistical methods and quantitative techniques used in Geography.	BT 1
CO2.	Interpret various methods and techniques of data collection, data tabulation, data interpretation and analysis.	BT 2
CO3.	Identify the importance of data in geography.	BT 3
CO4.	Analyse data through tabulation, sample size and other methods by handling data in the field.	BT 4
CO5.	Interpretation of data and validation of hypothesis	BT 5

Detailed Syllabus:

Modules	Topics and Course Content	Periods
Unit 1	Quantitative and qualitative techniques; Significance and limitations of quantitative techniques; Descriptive and inferential statistics; Levels of measurement; Data sources and acquisition techniques; Sample and sampling techniques; Geographic data matrix.	12
Unit 2	Measures of central tendencies (Mean, Median and Mode); Measures of dispersion (Range, Quartile Deviation, Mean Deviation, Standard Deviation; Coefficient of variation); Concept of spatial mean and median centres and standard distance and its uses, Nearest Neighbour Analysis (NNA), Inferential statistics – Chi-square (χ^2) Analysis, Concept of ANOVA and F-test;	12
Unit 3	Correlation and regression analysis (simple and multiple), Regression residual mapping, Parametric tests - t -test; Nonlinear relationships - Exponential and power function types; Theoretical distributions: Normal, Poisson and Binomial.	12
Unit 4	Basics of matrix algebra: Matrices - definition, types; minors and co-factors, determinant of a square matrix, inverse, adjoint, solutions of linear equations; Linear algebra in developing multivariate regression models;	12
	Total	48

Note: Computer / calculator based compulsory home assignments may be given for various units. Scientific calculator may be permitted in the examination hall for this paper.

Text Books:

1. Gregory, S., 1978: Statistical Methods and the Geographer, Longman, London.

2. Hammond R and P. S. McCullagh, 1974: Quantitative Techniques in Geography: An Introduction, Clarendon Press, Oxford.
3. Johnston R. J., 1973: Multivariate Statistical Analysis in Geography, Longman, London.
4. King, L. J., 1969: Statistical Methods in Geographical Studies, London.
5. Mahmood, A., 1977: Statistical Methods in Geographical Studies, Concept Publications, Delhi.
6. Maurice Yeats, 1974: An Introduction to Quantitative Analysis in Human Geography, McGraw, Hill, New York.
7. Paul, S. K., 1998: Statistics for Geoscientists, Tata McGraw Hill, New Delhi.
8. Robinson, G. M., 1998: Methods and Techniques in Human Geography, John Wiley & Sons, Chichester.
9. Sarkar, A. 2013: Quantitative Geography: Techniques and Presentations. Orient BlackSwan Private Ltd., New Delhi

Reference Books:

1. David Unwin, 1981: Introductory Spatial Analysis, Methuen, London.
2. John P.Cole and Cuchlaine A. M. King, 1968: Quantitative Geography, John Wiley, London.
3. Koutsoyiannis, 1973: Theory of Econometrics, Mcmillan, London.
4. Peter Haggett, Andrew D. Cliff, & Allan Frey, 1977: Location Methods Vol. I and II, Edward Arnold, London.
5. Taylor P.J., 1983: Quantitative Methods in Geography: An Introduction to Spatial Analysis, Waveland Press, Boston Publishers.

Paper III Core Course	MINOR PROJECT/ INTERNSHIP			Subject Code: GEO164C3 23
	L-T-P-C: 0-0-8-4	Credit Units: 4	Scheme of Evaluation: (P)	

Learning Objectives: *This paper provides an understanding the basics of research project preparation.*

Learning Outcomes:

After the completion of course, the students will have ability to:		
SI No.	Course Outcome	Blooms Taxonomy Level
C01.	Relate real world issues for carrying out research on a specific field	BT 1
C02.	Infer ideas of research through literature review.	BT 2
C03.	Develop hypothesis and research questions.	BT 3
C04.	Identify appropriate sampling techniques.	BT 3
C05.	Interpret the various types of data along with critical evaluation .	BT 5
C06.	Design and develop a detail project report	BT 6

Detailed Syllabus:

Modules	Topics and Course Content	Periods
Unit 1	<p>Identification of research problem / topic on any one of the following aspects (preferably of local area / Gram Panchayat / Revenue circle / District / State) during the 3rd semester:- Any kind of geographical studies on socio-economic / cultural issues / demographic problems and characteristics The topic selection / modification may be done just before the 2nd Semester End Examination so that the data collection can be done during semester break.</p> <p style="text-align: center;">OR</p> <p>Internship in institutes, organizations, and firms of repute in Northeast India.</p>	24
Unit 2	<p>Preparation of project report in prescribed format during 6th - 8th week of the commencement of course of 3rd semester. Submission of the report after a week of the announcement of routine for 3rd End Semester Examination. Final project presentation by each student using PowerPoint during on the scheduled date of viva-voce examination of this paper.</p> <p style="text-align: center;">OR</p> <p>Preparation of internship report in prescribed format during 6th - 8th week of the commencement of course of 3rd semester. Submission of the report after a week of the announcement of routine for 3rd End Semester Examination.</p>	24
	Total	48

Note: Students will work as an intern during the semester break for 4 weeks after 4th semester. Students not being able to obtain any internship will be assigned project work from the department.

Text Books:

As per the list of given in the syllabus for other papers

Reference Books:

As per the list of given in the syllabus for other papers

Paper DSE - 1	REMOTE SENSING: PRINCIPLES AND APPLICATIONS			Subject Code:
	L-T-P-C: 4-0-0-4	Credit Units: 4	Scheme of Evaluation: (T)	GEO164D301

Course Objectives: *This course intends to show the rationale behind the use of remotely sensed data and its advantages and disadvantages and illustrate how GIS/GPS methodologies can be used to address spatial analysis from the theoretical and practical perspective.*

Course Outcomes:

After successful completion of the course, the students will be able to:		
SI No.	Course Outcome	Blooms Taxonomy Level
CO1.	Define basic concepts of remote sensing.	BT 1
CO2.	Explain principles and applications of various remote sensing techniques including aerial photography.	BT 2
CO3.	Utilize remote sensing data products for minor and major projects on environmental/natural resource assessments and mapping, disaster and hazard management, urban planning, and many applications.	BT 3
CO4.	Apply this knowledge for land use land cover map preparation.	BT 3
CO5.	Interpret Geospatial data	BT 5

Detailed Syllabus:

Modules	Topics and Course Content	Periods
Unit 1	Needs and applications of Aerial photography; Aerial photography platforms; Planning aerial photography survey missions; Aerial camera and film characteristics; Types of aerial photographs, Vertical air photographs – its geometry, scale and height measurements, stereoscopic measurements of aerial photographs; Image / photo interpretation keys / elements;	12
Unit 2	Earth observation satellites (EOS) and Remote Sensing (RS) satellites - orbital characteristics; Payloads of RS satellites; Types and characteristics of sensors; Spatial, radiometric, spectral and temporal resolutions of RS data; Path –Row referencing system; Data products, characteristics and uses of selected Remote Sensing Satellites– LANDSAT, IRS, SPOT, Quickbird, GeoEye and Sentinel data	12
Unit 3	Electromagnetic radiation (EMR) principles, Spectral signatures / responses of earth materials – water, vegetation, urban landscape, soils and minerals; Major areas applications of remote sensing: Natural resource monitoring and management; Disaster management; Biomass estimation, Crop yield and acreage estimation.	12
Unit 4	Introduction to Digital Image Processing (DIP) tools and techniques: Data preparation processes and techniques; Image classification techniques (Supervised and Unsupervised); Major classifiers / classification functions; Change detection analysis and accuracy assessment methods. Basic ideas and applications of thermal, hyperspectral, microwave and LiDAR Remote Sensing.	12
	Total	48

Text Books:

1. Agarwal, C. S., and Garg, P. K., 2000: Textbook on Remote Sensing in Natural Resources Monitoring and Management, Wheeler Publishing, New Delhi.
2. Anji Reddy, M., 2008: Textbook of Remote Sensing and Geographic Information System, B.S. Publication, Hyderabad

Reference Books:

1. American Society of Photogrammetry, 1960: Manual of Photographic Interpretation, Banta Publishing Co., Menasha, Wisconsin.
2. Barret, E. C. and Curtis, L.E., 1976: Introduction to Environmental Remote Sensing, Chapman Hill, London.
3. Chetry, N. (Editor), 2019: A Glimpse of Geospatial Technologies and Applications, EBH Publishers (India), Guwahati
4. Curran, Paul, J., 1985: Principles of Remote Sensing, Longman Group Ltd.
5. Sabins, Floyd F., 1987: Remote Sensing Principles and Interpretation, W.H. Freeman and Company, New York.
6. Anderson, J. R., et al., 1976: A Landuse / Landcover Classification System for Uses with Remote Sensing Data, USGS Professional Paper
7. Avery, T.E., 1963: Interpretation of Aerial Photography, Burgess Publishing Co., Minneapolis.
8. Gonzalez, R. C., Woods, R. E., 2000: Digital Image Processing, Fifth Indian Reprint, Addison Wesley Longman, Delhi
9. Jensen, J. R., 2011: Remote Sensing of the Environment – An Earth Resource Perspective, 3rd Impression, Pearson, New Delhi
10. Joseph, George, 2005: Fundamentals of Remote Sensing, United Press India, Hyderabad.
11. Lilesand, T.M. and Kiefer, R.W., 2007: Remote Sensing and Image Interpretation, 6th Edition, John Wiley.
12. Rampal, K. K., 1999: Handbook of Aerial Photography and Interpretation, Concept Publishing Company, New Delhi-59.
13. Wolf, P. R., Dewitt, B. A., 2000: Elements of Photogrammetry With Applications in GIS, McGraw Hill, New York.

Paper DSE - 2	THEORETICAL BASIS OF REGIONAL PLANNING			Subject Code:
	L-T-P-C: 4-0-0-4	Credit Units: 4	Scheme of Evaluation: (T)	GEO164D302

Course Objectives: *This course intends to make the students understand the concept of a region from a Geographic perspective and its ramifications in planning.*

Course Outcomes:

After successful completion of the course, the students will be able to:		
SI No.	Course Outcome	Blooms Taxonomy Level
CO1.	Define basic concepts of regional planning	BT 1
CO2.	Explain the strategic importance and applicability of planning in multi-level aspects	BT 2
CO3.	Build plans for development in rural and urban regions	BT 3
CO4.	Apply this knowledge in real world situations.	BT 3
CO5.	Interpret various issues related to regional planning on national and global perspective	BT 5

Detailed Syllabus:

Modules	Topics and Course Content	Periods
Unit 1	Concept of region, regionalization, regionalism and regional development, Need and purpose of regional planning; Approaches to regional planning :Synoptic, functional and adhoc or specific.	12
Unit 2	Identification of resource regions; conservation and management of resources for regional development, Case studies of regional planning exercises: National Capital Region and North East India, River basin planning- a case study from India	12
Unit 3	Theories of spatial distribution: Central Place Theory of Christaller, Growth Pole Theory of Perroux and Boudeville, Theory of Prebisch, Cumulative Causation Theory of Gunnar Myrdal and Multi-level Growth Foci concept of R. P. Misra.	10
Unit 4	Decentralization and Multi-level planning - features of decentralised planning, decentralised planning in India, concept and procedures in multilevel planning; stages in the evolution of multi-level planning process, multi-level planning in India, Regional planning strategy under Five Year Plans	14
Total		48

Text Books:

1. Alden J. and R. Morgan, 1974: Regional Planning: A Comprehensive View, Leonard Hills Books, U.K.
2. Bhat, L. S., 1976: Micro-Level Planning: A Case Study of Karnal Area, Haryana, Concept Publishing Co., New Delhi.
3. Chand, M. and Puri, V. K. 1993: Regional Planning in India, Allied Publishers Limited, B/M Asraf, Ali Road, New Delhi-110002.
4. Chandna, . R. C., 2000: Regional Planning: A Comprehensive Text, Kalyani Publishers, New Delhi .

Reference Books:

1. Dickinson , R. E: City, Region and Regionalism,

2. Hall, P., 1975: Urban and Regional Planning, David and Charlos, London.
3. Hilborst, J. G. M. (1971) : Regional Planning: A System Approach, Notterdam
4. University Press.
5. Mishra, R. P, 1992: Regional Planning: Concept, Techniques, Policies and Case Studies,
6. Concept Publications, New Delhi.

Learning Outcomes:

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

- Understand the principles and regional planning
- Understand various
- Understand

Paper DSE - 3	PRINCIPLES OF AGRICULTURAL GEOGRAPHY			Subject Code:
	L-T-P-C: 4-0-0-4	Credit Units: 4	Scheme of Evaluation: (T)	GEO164D303

Course Objectives: *The course tries to make the students understand the basic concepts of agricultural geography and its associated patterns and processes of the prime economic activities of the world.*

Course Outcomes:

After successful completion of the course, the students will be able to:		
SI No.	Course Outcome	Blooms Taxonomy Level
CO1.	Define concepts of agricultural geography.	BT 1
CO2.	Compare different sectors of economy and arrive at logical conclusion regarding importance of agriculture sector in economic development of the nation.	BT 2
CO3.	Identify the principles and significance of agricultural geography.	BT 3
CO4.	Discover new insights on the relevance of agricultural geography and associated problems in contemporary times.	BT 4

Detailed Syllabus:

Modules	Topics and Course Content	Periods
Unit 1	Trends in the study of agricultural geography, Approaches to the study of agricultural geography: commodity, systematic, regional, inductive and deductive, Determinants of agriculture: physical, economic, social, institutional and technological, concept of Land holding and land tenure systems; Land reforms, land use policy and planning	12
Unit 2	Factors of agricultural production: land, labour, capital, organization and govt. policy, Concept of large-scale and small-scale agriculture , Concept of agricultural region, agricultural types and agricultural systems , Methods in agricultural geography: Von Thunen's model of agricultural location and Franklin's type of farming model	12
Unit 3	Methods of agricultural regionalization: crop-combination, crop concentration and diversification, crop intensity, degree of commercialisation , crop rotation and agricultural efficiency, Agricultural productivity: concept and measurement, factors influencing crop productivity, Cropping pattern, factors influencing cropping pattern, shifting in cropping pattern, crop and cropping hazards, crop and crop land management	14
Unit 4	Agricultural classification: according to Whittlesey, Richard Thoman and Peter Corbin, Land use and land capability classification, Agricultural development experiences of USA and Israel.	10
	Total	48

Text Books:

1. Anderson, J.R., 1970: A Geography of Agriculture, Iowa: WMC Brown Co. Clark, Colin and Haswell, Margaret, 1964: The Economy of Subsistence Agriculture, St. Martin's, London.
2. Chorley, R. J. and Haggett, P., 1971: Socio-Economic Models in Geography, Methuen and Co. Ltd., London.
3. Dunn, E. S., 1954: The Location of Agricultural Production, University of Florida Press, Gainesville.

Reference Books:

1. Hussain, M., 2001: Systematic Agricultural Geography, Rawat Publication, Jaipur and New Delhi.
2. Morgan, W.B. and Munton, R.J.C., 1971: Agricultural Geography, Methuen, London.
3. Singh, J., 1974: Agricultural Atlas of India: A Geographical Analysis, Vishal Publishers, Kurukhsetra.

4. Singh, J., 1976: Agricultural Geography, Tata McGraw Hill Pub. Co., New Delhi.
5. Symons, L., 1967: Agricultural Geography, G. Bells and Sons, London.

Learning Outcomes:

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

- Understand the principles of agricultural geography
- Understand various concepts related to agricultural geography
- Understand the strategic importance and applicability of agricultural geography in national and global aspects

Paper DSE - 4	GEOGRAPHY OF FOOD SECURITY OF INDIA			Subject Code:
	L-T-P-C: 4-0-0-4	Credit Units: 4	Scheme of Evaluation: (T)	GEO164D304

Course Objectives: *The objective of this course is to make the student understand about the importance of agriculture in Indian scenario and its relation with the food security of India.*

Course Outcomes:

After successful completion of the course, the students will be able to:		
SI No.	Course Outcome	Blooms Taxonomy Level
CO1.	Define concepts related to Indian agriculture and its characteristics.	BT 1
CO2.	Explain different problems of Indian agriculture and its sustainability.	BT 2
CO3.	Identify the technological factors effective in handling the problems associated with agriculture	BT 3
CO4.	Discover new insights on the relevance of government policies for agricultural planning and development.	BT 4

Detailed Syllabus:

Modules	Topics and Course Content	Periods
Unit 1	Place of Indian agriculture: in global economy, type, characteristics, growth, distribution and development; Critical appreciation of large scale and small scale agriculture, Agricultural regions of India and their characteristics	12
Unit 2	Agricultural land use pattern and shifting cropping pattern in India; Regional variation in the levels of agricultural development in India - Food deficit and food surplus regions; nutritional index, Problems of Indian agriculture: crop and cropping hazards, sustainability of agricultural practices and production	12
Unit 3	Technological factors in Indian agriculture, Green revolution, White revolution; Government policy for agricultural policy and planning and agricultural trade in India, Contemporary Issues of Indian agriculture: Food, nutrition and hunger, food security, food aid programmes; environmental degradation; role of irrigation, fertilizers, insecticides and pesticides, technological know-how, Indian agriculture: type, characteristics, growth, distribution and development and position of Indian agriculture in the world agricultural scenario	12
Unit 4	Government policy for agricultural planning and development in India , Agriculture in North East India – Agriculture as an economic basis of North East India; Indian agriculture in the context of globalization and free economic market, major food crops and cash crops produced; problems and prospects of agriculture in North East India with special reference to Assam	12
	Total	48

Text Books:

1. Anderson, J.R., 1970: A Geography of Agriculture, Iowa: WMC Brown Co.
2. Clark, Colin and Haswell, Margaret, 1964: The Economy of Subsistence Agriculture, St. Martin's, London.
3. Berry, B. J. L. et. al., 1976 : The Geography of Economic Systems. Prentice Hall, New York, 1976.
4. Brown, L.R. : The Changing World Food Prospects - The Nineties and Beyond. World Watch Institute, Washington D.C., 1990.
5. Das, M. M., 1984: Peasant Agriculture in Assam: A Structural Analysis, Inter India Publications, New Delhi.

Reference Books:

1. Hussain, M., 2001: Systematic Agricultural Geography, Rawat Publication, Jaipur and New Delhi.
2. Morgan, W.B. and Munton, R.J.C., 1971: Agricultural Geography, Methuen, London.
3. Singh, J. and Dhillon, S.S. : Agricultural Geography, Tata McGraw Hill Pub., New Delhi, 1988.
4. Sukla, S. P. and Agarwal, A.K.: Agriculture in North East India.
5. Whittlesey, D., 1936: Major Agricultural Regions of the World, Annals of the Association of American Geographers, 26.
6. Symons, L., 1967: Agricultural Geography, G. Bells and Sons, London.

Paper DSE - 5	DISASTER MANAGEMENT			Subject Code:
	L-T-P-C: 4-0-0-4	Credit Units: 4	Scheme of Evaluation: (T)	GEO164D305

Course Objectives: *The objective of this course is to make the student understand about the hazards, disasters, its associated causes and impacts, its distribution and mitigation with special reference to India.*

Course Outcomes:

After successful completion of the course, the students will be able to:		
SI No.	Course Outcome	Blooms Taxonomy Level
CO1.	Define the concepts of hazard and disaster and its related terminologies.	BT 1
CO2.	Demonstrate the distribution and mapping of disasters that is prevalent in India.	BT 2
CO3.	Explain the mitigation process and response to disasters across Indian territory.	BT 2
CO4.	Distinguish between causes and effect of varied disasters, as well as their implications in present day India.	BT 4

Detailed Syllabus:

Modules	Topics and Course Content	Periods
Unit 1	Disasters: Definition and Concepts: Hazards, Disasters; Risk and Vulnerability; Classification	12
Unit 2	Disasters in India: (a) Flood: Causes, Impact, Distribution and Mapping; Landslide: Causes, Impact, Distribution and Mapping; Drought: Causes, Impact, Distribution and Mapping	12
Unit 3	Disasters in India: (b) Earthquake and Tsunami: Causes, Impact, Distribution and Mapping; Cyclone: Causes, Impact, Distribution and Mapping. Manmade disasters: Causes, Impact, Distribution and Mapping	12
Unit 4	Response and Mitigation to Disasters: Mitigation and Preparedness, NDMA and NIDM; Indigenous Knowledge and Community-Based Disaster Management; Do's and Don'ts During and Post Disasters	12
Total		48

Text Book:

1. Singh, R. B. (ed.), (2006) Natural Hazards and Disaster Management: Vulnerability and Mitigation, Rawat Publications, New Delhi.
2. Sinha, A. (2001). Disaster Management: Lessons Drawn and Strategies for Future, New United Press, New Delhi.
3. Stoltman, J.P. et al. (2004) International Perspectives on Natural Disasters, Kluwer Academic Publications. Dordrecht.
4. Singh Jagbir (2007) "Disaster Management Future Challenges and Opportunities", 2007. Publisher- I.K. International Pvt. Ltd. S-25, Green Park Extension, Uphaar Cinema Market, New Delhi, India (www.ikbooks.com).

References:

1. Government of India. (1997) Vulnerability Atlas of India. New Delhi, Building Materials & Technology Promotion Council, Ministry of Urban Development, Government of India.
2. Kapur, A. (2010) Vulnerable India: A Geographical Study of Disasters, Sage Publication, New Delhi.

3. Modh, S. (2010) Managing Natural Disaster: Hydrological, Marine and Geological Disasters, Macmillan, Delhi.
4. Singh, R.B. (2005) Risk Assessment and Vulnerability Analysis, IGNOU, New Delhi.

Paper SEC Course	Biodiversity conservation		Subject Code: GEO162S311
	L-T-P-C: 2-0-4-2	Credit Units: 2	

Course Objectives: *This course intends to make the students understand the importance of biodiversity and its conservation*

Course Outcomes:

After the completion of the course, the students will have the ability to:		
Sl. No.	Course Outcome	Blooms Taxonomy Level
CO1	Build ideas on importance of biodiversity	BT1
CO2	Analyse the ways of biodiversity conservation at micro, meso and macro level	BT2
CO3	Interpret the various techniques of biodiversity conservation	BT3

Detailed Syllabus:

Modules	Topics and Course Content	Periods
Unit 1	Threats: Factors causing biodiversity degradation, Concept of species extinction. Traditional Conservation Practice: Traditional Ecological Knowledge and documentation of local biodiversity.	6
Unit 2	Species Conservation Techniques: In situ conservation (Biosphere Reserves, National Parks, Wildlife Sanctuaries, Conservation Reserves, Community reserves, Sacred Habitats), Ex-situ conservation (Botanical & Zoological Gardens, Gene Banks, Seed And Seedling Banks, Pollen Culture, Tissue Culture and DNA banks, Butterfly Gardening); Concept of Biodiversity Hotspots and Mega-diversity Country; Role of captivity In wildlife management. Habitat Conservation Techniques: Concept of Habitat, Habitat Management, Habitat Edge improvement, Role of Corridor in Wildlife Management, Ecological Restoration Programme; Social Forestry; Agro Forestry; Joint Forest Management	6
Total		24

Text Books:

3. Creswell, J., (1994). *Research Design: Qualitative and Quantitative Approaches*. UK: Sage Publications.
4. Dikshit, R. D. (2003). *The Art and Science of Geography: Integrated Readings*.

Reference books:

4. Evans, M. (1988). Participant Observation: The Researcher as Research Tool. In Eylesand, J and D. Smith (eds). *Qualitative Methods in Human Geography*. Cambridge, UK: Polity.
5. Mukherjee, N. (2002). *Participatory Learning and Action: with 100 Field Methods*. Delhi, India: Concept Publs. Co.
6. Stoddard, R. H. (1982). *Field Techniques and Research Methods in Geography*. USA: Kendall/Hunt.
7. Wolcott, H. (1995). *The Art of Fieldwork*. CA, USA: Alta Mira Press.

M.A./M. Sc. Course in Geography: Semester-IV

Paper I Core Course	GEOGRAPHICAL THOUGHT			Subject Code:
	L-T-P-C: 4-0-0-4	Credit Units: 4	Scheme of Evaluation: (T)	GEO164C401

Learning objective: The objective of this course is to make the student look into the chronology of development of the subject of geography through contribution of varied scholars, approaches and schools, major themes and components of geography.

Learning Outcomes:

After successful completion of the course the students will be able to:		
SI No.	Course Outcome	Blooms Taxonomy Level
CO 1.	Define the various parameters and components of Geography.	BT 1
CO 2.	Interpret the chronological development of the subject of geography.	BT 2
CO 3.	Identify the contributions made by the schools of geography.	BT 3
CO 4.	Discover the physical and humanistic perspective and its dimensions in Geography in relation to the physical and cultural surrounding	BT 4
CO 5.	Explain the various issues of real world with a geographical perspective	BT 5

Detailed Syllabus:

Modules	Topics and Course Content	Periods
Unit 1	Place of geography in the classification of knowledge: Defining the field of geography, relation of geography with other natural and social sciences; Geography as the study of areal differentiation and spatial organisation; Defining the field of human geography, reactions to nomothetic and ideographic approaches	12
Unit 2	Geography through the ages; general character of geographic knowledge during the ancient and mediaeval period; impact of discoveries and European renaissance on the emergence of modern geography, Foundations of modern geography: Contribution of German (Humboldt, Ritter, Ratzel), French (Paul Vidal de la Blache), British and American geographers.	12
Unit 3	Evolution of geographic thought (Determinism- the impact of Darwinism, Possibilism, Human Ecology, Morphology of Landscape), , Areal differentiation) and their impact in the development of the field	10
Unit 4	Positivism and quantitative revolution, behaviouralism, radicalism, humanism and post-modernism, locational analysis, Explanation in geography: laws and theories; models and system analysis, Spatial analysis: history and concept of space and spatial organisation, gender geography and post modernism geography	14
	Total	48

Text Books:

1. Adhikari, S., 1992: Geographical Thought, Chaitanya Pub. House, Allahabad.
2. Berry, B. J. L., 1973: 'A Paradigm for Modern Geography', in R. J. Chorley (ed), Directions in Geography, London Methuen.
3. Bunge, W., 1962: Theoretical Geography, Lund Studies in Geography, Lund, C.W.K. Gleerup.
4. Buttimar, A., 1978: 'On People, Paradigms and Progress in Geography', in D.R. Stoddart (ed),
5. Geography, Ideology and Social Concern, Oxford, Blackwell.
6. Dickinson, R. E., 1969: Makers of Modern Geography, Routledge and Kegan Paul, London.

Reference Books:

1. Dikshit, R. D., 1997: Geographical Thoughts: A Contextual History of Ideas, Prentice Hall of India, New Delhi.
2. Gold, J. R., 1980: An Introduction to Behavioural Geography, Oxford University Press.
3. Hartshorne, R., 1939: The Nature of Geography, Association of American Geographers, Lancaster, Penn.
4. Hartshorne, R., 1959: Perspective on the Nature of Geography, Rand Mckully, Chicago.
5. Harvey, D., 1969: Explanation in Geography, St. Martin's Press, New York.
6. Harvey, Milton and Holly, Brian P.1989: Themes in Geographic Thought, Routledge, London.
7. James, P. E., 1972: *All Possible World: A History of Geographic Ideas*, The Odyssey Press, New York.

Paper II Core Course	OCEANOGRAPHY AND HYDROLOGY			Subject Code:
	L-T-P-C: 4-0-0-4	Credit Units: 4	Scheme of Evaluation: (T)	GEO164C402

Course Objectives: *The course aims to illustrate the atmospheric elements, the impact of climates on planet earth, the oceanic processes, ocean floor topography and marine resources.*

Course Outcomes:

After successful completion of the course, the students will be able to:		
SI No.	Course Outcome	Blooms Taxonomy Level
CO5.	Define the elements of weather and climate and its bearing on planet earth and the oceanic process and availability of resources.	BT 1
CO6.	Demonstrate the marine resources of the earth.	BT 2
CO7.	Explain the ocean configuration of the earth.	BT 2
CO8.	Distinguish between the different ocean reliefs.	BT 4
CO9.	Determine the various issues related to oceanic topography.	BT 5

Detailed Syllabus:

Modules	Topics and Course Content	Periods
Unit 1	Definition and scope of oceanography, growth and development of oceanography; oceanography and other sciences; distribution pattern of land and sea, Age and origin of oceans, and ocean morphology, Distribution of temperature, salinity, and density of oceans, origin of ocean basins : Wegner's drift hypothesis and sea floor spreading & Plate Tectonics.	12
Unit 2	Depth of ocean, hypsometric curve, ocean floor profile-continental shelf, slope, ridge & deeps, abyssal plains; submarine canyons; coral reefs-origin and distribution; ocean deposits; configuration of ocean floors of Indian and Atlantic Ocean	12
Unit 3	Temperature of oceans; salinity in oceans; density of oceans; dynamics of ocean currents; currents of Atlantic, Pacific and Indian Ocean; tides and waves; Tsunami Marine sediments and deposits, Food and mineral resources of the sea.	10
Unit 4	Hydrological cycle, Factors affecting the movement of water, Patterns of movement: Water Budget, World water Resources, World Water Balance, Global Freshwater Resources, History of Hydrology Watershed, Its Characteristics and Evaporation Process: Topographic and Effective Watershed, Physiographic characteristics of a Watershed-Geometric & Drainage Network	14
Total		48

Text Books:

1. S. Kerhsaw, 2004, *Oceanography : An Earth Science Perspective*, Routledge, UK.
2. Garrison, T., 1995, *Essentials of Oceanography* Wardsworth Pub. Co., London.
3. Singh, S. (2014). *Oceanography*. Allahabad: Pravalika Publications

Reference Books:

1. Shepart, F., 1969, *The Earth Beneath the Sea*, Athneum, Rev. ed., New York.
2. Sieboldt, E., and W.H. Berger, 1994, *The Sea Floor*, 2nd ed., Freeman, New York.
3. Von Arx, W.S., 1962, *An Introduction to Physical Oceanography*, Addison, Wesley, New York.5. Chorley, R. J. (1967), "Water, Earth and Man", Methuen, London.
4. Chorley, R. J. (1969), "Introduction to Physical Hydrology", Methuen, London.
5. Jones, J. A. (1997), "Global Hydrology: Processes, Resources and Water Management", Longman, London.
6. Stewart, R. H. (2008). *Introduction to Physical Oceanography*.
7. Garrison, T. (2012). *Essentials of Oceanography* (Sixth Edit). Brooks/Cole, Cengage Learning

Paper III Core Course	MAJOR PROJECT			Subject Code:
	L-T-P-C: 4-0-0-4	Credit Units: 4	Scheme of Evaluation: (P)	GE0164C413

Learning Objectives: *The course aims to make the students understand how to approach a research problem and to formulate research objectives and research questions in proper perspective, formulation of hypothesis and testing, framing of questionnaires, techniques of collection of both qualitative and quantitative data and their analysis.*

Learning Outcomes:

After the completion of course, the students will have ability to:		
SI No.	Course Outcome	Blooms Taxonomy Level
CO7.	Choose appropriate research methods for carrying out research on a specific field.	BT 1
CO8.	Infer ideas and classify the issues that needs attention for formulation of hypothesis.	BT 2
CO9.	Develop hypothesis and research questions.	BT 3
CO10.	Identify appropriate sampling techniques.	BT 3
CO11.	Interpret the various types of data along with critical evaluation.	BT 5
CO12.	Design and develop a detail project report	BT 6

Detailed Syllabus:

Modules	Topics and Course Content	Periods
Unit 1	<p>Identification of research problem / topic on any one of the following aspects (preferably of local area / Gram Panchayat / Revenue circle / District / State) during the 3rd semester while working with a minor project by the individual student:- Any kind of geographical studies on socio-economic / cultural issues / demographic problems and characteristics</p> <ol style="list-style-type: none"> Agriculture, Industry, Mining related issues Environmental problems of the locality including disasters and hazards Natural resources assessments, planning and management Ecological crisis, Climate change and consequences Rural / Urban Ecosystems; Terrain / basin / watershed characterization and evaluation including integrated development studies <p><i>(This list is indicative only, the student may consult the assigned teacher as project supervisor / guide. Project supervisor / guide to each student will be allocated).</i> The topic selection / modification may be done just before the 3rd Semester End Examination so that the data collection can be done during semester break. A fresh project proposal / modified project proposal of minor project done in 3rd semester is to be submitted by each student (within 2nd week of the commencement of 4th semester classes) by mentioning the following:-</p> <ol style="list-style-type: none"> Project title Introduction to the problem Aims / objectives Research questions Database and Methodology Study of relevant literature Organization of study <p style="text-align: center;"><i>Marks for internal evaluation = 14</i></p>	12
Unit 2	<p>Project proposal presentation by each student using PowerPoint during 3rd week of the commencement of the course of 4th semester.</p> <p style="text-align: center;"><i>Marks for internal evaluation = 14</i></p>	12
Unit 3	<p>Reporting of data collection, tabulation, processing, mapping/charting and analysis by each student using PowerPoint during 5th week of the commencement of the course of 4th semester.</p> <p style="text-align: center;"><i>Marks for internal evaluation = 14</i></p>	12

Unit 4	Preparation of project report in prescribed format during 6th - 8th week of the commencement of course of 4th semester. Submission of the report after a week of the announcement of routine for 4th End Semester Examination. Final project presentation by each student using PowerPoint during on the scheduled date of viva-voce examination of this paper. <i>Marks for external evaluation = Viva-voce 8 + Presentation 20 = 28</i>	12
	Total	48

Note: Submission of project report in prescribed format and on specified date is mandatory. Equal weightages of marks for each stage of the work (upto 3rd stage) for internal evaluation of the project by the supervisor (60% of end semester examination). 40% of the total marks of end semester examination is for viva-voce and final presentation to be evaluated by an external examiner.

Text Books:

As per the list of given in syllabus based on topic selected

Reference Books:

As per the list of given in syllabus based on topic selected

Paper DSE-1	GIS AND GPS: PRINCIPLES AND APPLICATIONS			Subject Code:
	L-T-P-C: 4-0-0-4	Credit Units: 4	Scheme of Evaluation: (T)	GEO164D401

Course Objectives: *The course aims to make the students interpret the data, tools and technology and applications of Geoinformatics - GIS, Remote Sensing and GPS and Construct and Analyse maps using Geospatial Technology (Geoinformatics)*

Course Outcomes:

After successful completion of the course, the students will be able to:		
SI No.	Course Outcome	Blooms Taxonomy Level
CO13.	Define the fundamental terms and terminologies of Geoinformatics.	BT 1
CO14.	Outline the strength and application of Geospatial Technology.	BT 2
CO15.	Build map of the resources, their location and availability.	BT 3
CO16.	Analyse the different remote sensing data sets collected from various platforms.	BT 4
CO17.	Interpret Geospatial data in GIS platforms and perform analysis from various sources of data such as Remote Sensing and GPS for geographical research	BT 5

Detailed Syllabus:

Modules	Topics and Course Content	Periods
Unit 1	Geographical Information Sciences – a brief history; Definitions of GIS, Components of a GIS; Referencing systems: International Terrestrial Reference Frame (ITRF); Ellipsoids and datum, Coordinate Systems; GIS data types and structure, Types of GIS Software Systems; Database Management Systems; Relational Database Management System	12
Unit 2	Digital Elevation Model (DEM) and its derivatives; Analysis and uses of DEM; DEM data sources and data characteristics: SRTM, CartoSat DEM, ASTER, GLOBE, GTOPO, ALOS PRISM; 3-D visualization parameters of DEM; Methods for spatial interpolation for creating continuous 2-D surfaces from point / line data, their advantages and disadvantages; Triangulated Irregular Network (TIN) data structure and its characteristics.	12
Unit 3	GIS data collection, Creating and maintaining geographic databases; Geographic query and analysis: Map queries and map algebra, Map overlays- arithmetic and weighted overlays; Geoprocessing - Buffering and Proximity analysis	10
Unit 4	Basic concepts of GPS, Working principles of GPS, GPS errors and their corrections, GPS Receivers and their characteristics, Differential Positioning, Accuracy in GPS and DGPS, GPS surveying methods; Topographic mapping and GIS applications for GPS / DGPS.	14
Total		48

Text Books:

- Burrough, P. A., 1986: Principles of Geographical Information Systems in Land Resources Assessment, Clarendon Press, Oxford
- Burrough, P. A. and McDonnell, R. A., 1998: Principles of Geographical Information Systems, Oxford University Press, Oxford.
- Curtis, H., 2000: The GPS Accuracy Improvement Initiative, GPS World, June, 2000.
- Chrisman, N., 1997: Exploring Geographic Information Systems, John Wiley & Sons Inc.,
- De Mars, M. N., 1999: Fundamentals of Geographic Information Systems, John Wiley & Sons Inc., New York.
- Gopi, S., 2005: Global Positioning System Principles and Applications, Tata McGraw Hill, New Delhi.
- Kraaak, M. and Ormelling, F., 2004: Cartography Visualization of Geospatial Data, Pearson Education, Delhi.

Reference Books:

1. Chetry, N., (Editor) 2019: A Glimpse of Geospatial Technologies and Applications, EBH Publishers (India), Guwahati
2. Star, J. and Ester, J., 1990: Geographic Information System, Prentice-Hall.
3. Maguire, D. J., Goodchild, M. and Rhind, D. J., 1990: Geographical Information Systems: Principles and Applications, Longman Science and Technology Publications.
4. Robinson, A. H., et al., 1995: Elements of Cartography, John Wiley.

Paper DSE-2	SOCIAL AND CULTURAL GEOGRAPHY			Subject Code:
	L-T-P-C: 4-0-0-4	Credit Units: 4	Scheme of Evaluation: (T)	GEO164D402

Course Objectives: *The course aims to make students understand the basic concepts related to social and cultural geography in the geographical framework in the spatial context.*

Course Outcomes:

After successful completion of the course, the students will be able to:		
SI No.	Course Outcome	Blooms Taxonomy Level
CO1.	Define the fundamental concepts of social and cultural dimensions.	BT 1
CO2.	Interpret the social and cultural concepts in a broader and analytical manner	BT 2
CO3.	Build knowledge on structures, formations of countries as well as on various schools of social and cultural geography	BT 3
CO4.	Analyze the socio-cultural in the geographical dimensions	BT 4
CO5.	Perceive the issues related to socio-cultural aspects with a geographical perspective.	BT 5

Detailed Syllabus:

Modules	Topics and Course Content	Periods
Unit 1	Meaning, scope and subject matter of Social Geography, Growth and development of Social Geography, Development of the subject in India, Meaning and characteristics of Society, Types of Society: Tribal, agrarian and industrial, Social Groups: meaning, classification and characteristics, Importance of social groups, Primary and secondary groups, Spatial distribution of social groups in India, Community: meaning and characteristics	12
Unit 2	Concept of social space, social process, social differentiation, social structure, social justice. Social Conflict: meaning, characteristics and forms; Social cooperation: meaning, types and forms; Social well-being: meaning, types and indicators	12
Unit 3	Meaning, scope and development of cultural geography, Concept of culture, characteristics of culture, its components and functions, cultural region: meaning and types. Cultural regions of the world. Concept of cultural landscape, cultural integration, cultural diffusion, cultural heritage, cultural ecology, cultural convergence, cultural lag. Language and religion: worldwide distribution, Cultural diversity in North-east India and Assam	10
Unit 4	Socio-cultural Change and Transformation. Concept of modernisation: Sanskritization in India and the role of Westernization in modernising traditions. Effects of globalisation on social and cultural changes, Discrimination: Socio-spatial Segregation, gender based discrimination and gender geography. Concept of social exclusion.	14
	Total	48

Text Books:

1. Sen, J (2016): A text book of Social and Cultural Geography
2. Dwiveda R. L. : Fundamentals of Political Geography
3. Pounds N. J. G. (1972): Political Geography, McGraw Hill, New York.

Reference Books:

1. Jordan, T. G. and Rowntree, L.: The Human Mosaic: A Thematic Interpretation in Cultural Geography
2. John R. S., 1982: An introduction to Political Geography, Routledge, London.
3. Ahmad, A., 1999: Social Geography, Rawat Publication, Jaipur and New Delhi.
4. Ahmad, A. (ed), 1993: Social Structure and Regional Development: A Social Geography perspective, Rawat Publication, Jaipur.
5. Noble, A. G. and Dutta, A. K. (eds): India: Cultural Pattern and Processes, West View Press, Colorado.

Paper DSE-3	Political Geography			Subject Code:
	L-T-P-C: 4-0-0-4	Credit Units: 4	Scheme of Evaluation: (T)	GEO164D403

Course Objectives: *The course aims to provide knowledge on the development of Political Geography*

Course Outcomes:

After successful completion of the course, the students will be able to:		
SI No.	Course Outcome	Blooms Taxonomy Level
CO1.	Define the concepts involved in political geography	BT 1
CO2.	Interpret the evolution of states in India and factors of its rise and fall	BT 2
CO3.	Compare the geo-political relations of India with other countries.	BT 4
CO4.	Analyse various prospects of development in India and south east Asian countries.	BT 4
CO5.	Explain the global strategic views by understanding the theories of Heartland and Rimland.	BT 5

Detailed Syllabus:

Modules	Topics and Course Content	Periods
Unit 1	Introduction: Meaning, nature, scope, approaches of Political Geography, Geopolitics: Definition and scope, Historical development of Political Geography.	12
Unit 2	Elements in political Geography: Physical, Economic and Human; Concept of core area, ecumene and capital city, Frontiers and boundaries, Concept of Nation and State; concept of buffer state; interstate boundary dispute in NE India.	12
Unit 3	The state: definition, development and classification, Attributes of State: Area, population, Territory and Sovereignty; Evolution of India as a state; cause of rise and fall of states.	10
Unit 4	Two Global strategic views: Theories of Heartland and Rimland, International boundaries: Nature, Morphological classification and functions; Maritime boundaries and territorial waters; UN role in codifying the Law of the sea; International boundary disputes: India-China and India-Pakistan.	14
Total		48

Text Books:

1. Dwivedi, R L., 2014: Fundamentals of Political Geography, Allahabad.
2. Pounds N .J. G. (1972): Political Geography, McGraw Hill, New York.

Reference Books:

1. John R. S., 1982: An introduction to Political Geography, Routledge, London.
2. Ahmad, A., 1999: Social Geography, Rawat Publication, Jaipur and New Delhi.
3. Ahmad, A. (ed), 1993: Social Structure and Regional Development: A Social Geography perspective, Rawat Publication, Jaipur.

Paper DSE-4	GLOBAL CLIMATE CHANGE			Subject Code: GEO164D40 4
	L-T-P-C: 4-0-0-4	Credit Units: 4	Scheme of Evaluation: (T)	

Course Objectives: *The course aims to give the idea of the concept of climate change and its impact on various aspects in global context, along with providing knowledge on adaptation and mitigation of climate impacts and also to know institutional role in it.*

Course Outcomes:

After successful completion of the course, the students will be able to:		
SI No.	Course Outcome	Blooms Taxonomy Level
CO1.	Relate to basics of Science of Climate Change.	BT 1
CO2.	Classify different types of vulnerability.	BT 2
CO3.	Develop understanding about various Impacts of Climate Change on Agriculture and Water; Flora and Fauna; Human Health.	BT 3
CO4.	Inspect upon the issues of adaptation and mitigation.	BT 4
CO5.	Recommend suitable measure for mitigation of issues related to climate change.	BT 5

Detailed Syllabus:

Modules	Topics and Course Content	Periods
Unit 1	Causes of global warming and climate change - natural and anthropogenic (industrial and vehicular emissions of Green House Gases, Radiation patterns); Global precipitation and temperature distribution patterns; Extreme climatic events and processes; Urban heat island formation, concept of micro-climate in urban context El Nino and La Nina effects; Consequences of climate change in various geographical regions, concept of urban green space	12
Unit 2	Impact of climate change on agriculture and food security, human health, migration and socio-economic issues; Geographical theories of climatic changes involving displacement of continents, change in the composition of atmosphere, solar radiation.	12
Unit 3	Global climatic assessment by Inter-governmental Panel on Climate Change (IPCC); Sources of climatic data and Statistical analysis of climatic data; Climate and biodiversity: Ecological succession of plants and animal life; Biogeographical shifts of bio-resources.	10
Unit 4	Global and national initiatives on adaptation and mitigation measures on climate change; National Action Plan on Climate Change; Role of Non-governmental Organizations, Local Institutions -Urban Local Bodies and Panchayats	14
	Total	48

Text Books:

1. Chritchfield, H. J., 1992: General Climatology, Prentice-Hall of India Pvt. Ltd, New Delhi
2. Lal, D. S., 1997: Climatology, Sharada Pustak Bhawn, Allahabad-02
3. Lal, D. S., 2016: Climatology and Oceanography, Sharada Pustak Bhawn, Allahabad-02
4. Strahler, Alan., 2018: Introducing Physical Geography, 6th Edition, Wiley India Pvt Ltd. New Delhi

Reference Books:

1. IPCC, 2014: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
2. IPCC, 2007: Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change.
3. OECD, 2008: Climate Change Mitigation: "What do we do?" (Organisation and Economic Co-operation and Development).
4. UNEP, 2007: Global Environment Outlook: GEO4: Environment for Development, United Nations Environment Programme.
5. Sen, Roy, S., and Singh, R.B., (2002): Climate Variability, Extreme Events and Agricultural Productivity in Mountain Regions, Oxford & IBH Pub., New Delhi.
6. Singh, R.B., Mal, Suraj, and Huggel, Christian (2018): Climate Change, Extreme Events and Disaster Risk Reduction, Springer, Switzerland.

Paper DSE-5	Urban Geography		Subject Code: GE0164D405
	L-T-P-C: 4-0-0-4	Credit Units: 4	

Course Objectives: *The course aims to give the idea of the concept of urban geography and its major aspects as well as it seeks to develop new insights among the students on the relevance of urban geography and its associated problems in a rapidly urbanizing world.*

Course outcomes:

After successful completion of the course, the students will be able to:		
SI No.	Course Outcome	Blooms Taxonomy Level
C01.	Define concepts related to urban geography and its approaches.	BT 1
C02.	Explain different geographical factors which organise urban spaces and develop ideas in its relation.	BT 2
C03.	Identify the new insights on the relevance of urban geography.	BT 3
C04.	Discover and develop skills seeking advanced studies on urban planning and development.	BT 4

Detailed Syllabus:

Modules	Topics and Course Content	Periods
Unit 1	Urban Geography: Meaning, subject matter and scope; approaches and trends in urban geography. Towns: Types, characteristics, origin and growth in global and national contexts, Functional classification of towns; Schemes of city classification	10
Unit 2	Patterns of Urbanization in developed and developing countries; Components of urbanization and urban population growth, Urban morphology and land use structure; Theories on the internal structure of town: the Sector Theory of Homer and Hoyt, and the Multiple Nuclei Theory of Harris and Ullman	14
Unit 3	Concept of city-region, urban agglomeration, urban sprawl, Umland and periphery, rural-urban dichotomy and continuum, urban fringe, satellite town, new town, smart city. Urban Systems: Concept of urban system and hierarchy; Christaller's Central Place Theory; the rank-size distribution of cities; concept of primate city.	14
Unit 4	Urban issues and problems: Housing, slums, civic amenities (transportation and drinking water), traffic congestion, pollution (air, noise, water), and crime. Urbanization and urban development planning in India: Trend and regional patterns of urbanization; national urban development policies and programmes; emerging urban issues of selected cities (Delhi NCR, Mumbai, Guwahati).	10
	Total	48

Text Book:

1. Bansal, S.C. (2010): Urban Geography, Meenakshi Prakashan, Meerut.
2. Hall T., 2006: Urban Geography, Taylor and Francis.
3. Kaplan D. H., Wheeler J. O. and Holloway S. R., 2008: Urban Geography, John Wiley.

4. Knox P. L. and McCarthy L., 2005: Urbanization: An Introduction to Urban Geography, Pearson Prentice Hall New York.
5. Pacione M., 2009: Urban Geography: A Global Perspective, Taylor and Francis.

References:

1. Bala, R. (1986): Urbanisation in India, Rawat, Jaipur.
2. Fyfe N. R. and Kenny J. T., 2005: The Urban Geography Reader, Routledge.
3. Graham S. and Marvin S., 2001: Splintering Urbanism: Networked
4. Infrastructures, Technological Mobilities and the Urban Condition, Routledge
5. Knox P. L. and Pinch S., 2006: Urban Social Geography: An Introduction, Prentice Hall
6. Kundu, A. (1992): Urban Development and Urban Research in India, Khanna Publication, New Delhi.
7. Ramachandran R (1989): Urbanisation and Urban Systems of India, Oxford University Press, New Delhi