DEPARTMENT OF GEOGRAPHY
KAZI NAZRUL UNIVERSITY

ASANSOL 713 340

WEST BENGAL

(www.knu.ac.in)

Preamble:

The purpose of a Learning Outcome-based Curriculum Framework (LOCF) is to change the paradigm of higher education from a teacher-centric to learner-centric curriculum. It is hoped that this paradigmatic change will bring about a significant improvement in the quality of higher education and make the learners both competent and confident to face the challenges of a modern competitive world. The philosophy of this new curriculum framework is pragmatism, to realise that it is not enough for institutions of higher learning to produce good humans and responsible citizens of the country but also to produce employed graduates and postgraduates. After all, it is not prudent to expect an unemployed youth to cherish values like humanity and responsibility towards the nation; he/she first needs to have a productive employment to nourish such values.

LOCF seeks to make higher education in India learner-centric so that graduates and postgraduates not only have a more holistic understanding of their subject but also be able to better serve the humanity with dignity and honour, which can be expected only if they are able to secure productive employment after completing their higher education degrees.

Introduction to Learning Outcome Based Curriculum Framework (LOCF) in Kazi Nazrul University:

Two year Post-Graduate programs in Kazi Nazrul University have been designed as a base for research and application of knowledge. The syllabus and curricula of the post graduate programmes have been developed following the UGC LOCF guidelines and through rigorous academic exercises after consulting eminent academic experts and feedback received from various stakeholders of the University. These two-year programs will enable the students to enhance their learning after under-graduate course and to join the workforce in their respective fields. Kazi Nazrul University has an aim to develop the future generation learners sensitive towards the developmental challenges of the nation with special emphasis on the local developmental needs. The University also aims to foster this future generation of learners with a systematic understanding of global development need. The learning outcome-based curricula of different disciplines reflect the national as well as global sustainable needs listed below in the respective programme and course specific outcomes:

National needs:

- Promote Right to education
- Inculcate ethical and professional values
- Increase national and international visibility;
- leverage institutional strengths through strategic partnerships;
- enlarge the academic community within which to benchmark their activities;
- mobilise internal intellectual resources;
- add important, contemporary learning outcomes to student experience;
- Develop stronger research groups.
- Encourage multidisciplinary
- Promote Cross cultural exchanges
- Preservation of traditional knowledge
- Creating human resource for Economic growth
- Promotion of scientific mind-set and critical thinking

Sustainable development needs:

- Help to eradicate poverty
- Ensuring meal for all
- Promoting good health and well being
- Promoting quality education
- Promoting gender equality
- Initiatives for clean water and sanitization
- Programmes to reduce inequalities
- Develop sustainable cities and communities
- promote decent work and economic growth
- initiate industry-academia collaboration for innovative research
- encourage responsible consumer behaviour
- encourage pro-environment awareness

Program Outcomes (PO)s

The overall program outcome of the LOCF at PG level are to:

- help formulate postgraduate attributes, qualification descriptors, programme learning outcomes and course learning outcomes that are expected to be demonstrated by the holder of a Master's degree;

- enable prospective students, parents, employers and others to understand the nature and level of learning outcomes (knowledge, skills, attitudes and values) or attributes a graduate/postgraduate should be capable of demonstrating on successful completion of MA/MSc/ M.Com/ MBA
- maintain national standards and international comparability of standards to ensure global competitiveness, and to facilitate postgraduate mobility; and
- provide higher education institutions and their stake holders an important point of reference for setting and assessing standards.

Postgraduate Attributes

The postgraduate attributes reflect the particular quality and feature or characteristics of an individual, including the knowledge, skills, attitudes and values that are expected to be acquired by a postgraduate through studies at the higher education institution (HEI) such as a college or university. Such attributes include capabilities that help strengthen one's abilities for widening current knowledge base and skills, gaining new knowledge and skills, undertaking future studies and performing well in a chosen career and playing a constructive role as responsible citizen of the country. The Attributes define the characteristics of a student's university degree programme(s), and describe a set of characteristics/competencies that are designed to be transferable beyond the particular disciplinary area and programme contexts in which they have been developed. Such attributes are fostered through meaningful learning experiences made available through the curriculum, the total college/university experiences and a process of critical and reflective thinking.

The learning outcomes-based curriculum framework is based on the premise that every student is unique. Each student has his/her own characteristics in terms of previous learning levels and experiences, life experiences, learning styles and approaches to future career-related actions. The quality, depth and breadth of the learning experiences made available to the students while at the college/University help develop their characteristic attributes. The postgraduate attributes reflect both disciplinary knowledge and understanding and generic/global skills and competencies that all students in different academic fields of study should acquire/attain and demonstrate. Some of the desirable attributes which a postgraduate student should demonstrate will include the following:

- ***Disciplinary Knowledge:*** Demonstrate comprehensive knowledge and understanding of one or more disciplines that form a part of a programme of study, and knowledge and skills

acquired from interaction with educators and peer group throughout the programme of study.

- ***Communication Skills:*** Express thoughts and ideas effectively in writing and orally, communicate with others using appropriate media, confidently share one's views and express herself/himself, demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.
- ***Critical Thinking:*** Apply analytic thought to a body of knowledge, analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence, identify relevant assumptions or implications, formulate coherent arguments, critically evaluate practices, policies and theories by following scientific approach to knowledge development.
- ***Problem Solving:*** Demonstrate capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge and apply one's learning to real life situations.
- ***Analytical Reasoning****:* Demonstrate the ability to evaluate the reliability and relevance of evidence, identify logical flaws and holes in the arguments of others, analyse and synthesise data from a variety of sources, draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints.
- ***Research-related Skills****:* Demonstrate a sense of inquiry and capability for asking relevant/appropriate questions, problematising, synthesising and articulating, demonstrate the ability to recognise cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyse, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships, plan, execute and report the results of an experiment or investigation.
- ***Collaboration/Cooperation/Team work****:* Demonstrate ability to work effectively and respectfully with diverse teams, facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.
- ***Scientific Reasoning using Quantitative/Qualitative Data****:* Demonstrate the ability to understand cause-and-effect relationships, define problems, apply scientific principles, analyse, interpret and draw conclusions from quantitative/qualitative data, and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.
- ***Reflective Thinking:*** Demonstrate critical sensibility to lived experiences, with self-awareness and reflexivity of both self and society.

- ***Information/Digital Literacy:*** Demonstrate capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources and to use appropriate software for analysis of data.
- ***Self-Directed Learning:*** Demonstrate ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.
- ***Multicultural Competence:*** Demonstrate knowledge of the values and beliefs of multiple cultures and a global perspective, effectively engage in a multicultural society, interact respectfully with diverse groups.
- ***Moral and Ethical Awareness/Reasoning****:* Demonstrate the ability to embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Demonstrate the ability to identify ethical issues related to one's work, avoid unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights, appreciate environmental and sustainability issues, and adopt objective, unbiased and truthful actions in all aspects of work.
- ***Community Engagement:*** Demonstrate responsible behaviour and ability to engage in the intellectual life of the educational institution, and participate in community and civic affairs.
- ***Leadership Readiness/Qualities****:* Demonstrate capability for mapping out where one needs to go to "win" as a team or an organization, and set direction, formulate an inspiring vision, build a team who can help achieve the vision, motivate and inspire team members to engage with that vision, and use management skills to guide people to the right destination, in a smooth and efficient way.
- ***Lifelong Learning****:* Demonstrate the ability to acquire knowledge and skills, including 'learning how to learn' that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge/skill development/reskilling.

Structure and Detailed Syllabus of the Post Graduate Courses

Department of Geography

Department of Geography, Kazi Nazrul University was established in 2015. Two Post Graduate Courses in (1) Geography and (2) Geoinformatics are offered at present by the department. Two-year M.Sc. programme in Geography was started in 2015-16 academic year and Geoinformatics in 2017-18 academic year. The thrust areas of the department are on Advance Geomorphology, Environmental Issues in Geography, Urban Geography, Disaster Management along with Photogrammetry, Remote Sensing, Web Mapping and Web GIS and application of Geographic Information System (GIS). The department is equipped with advanced RS and GIS laboratory and seminar library. In this short period of journey, the number of students of the department has increased almost thrice. The Department of Geography aims to promote a balanced sense of theoretical geography and its application in various fields among the students. Both, the students of Geoinformatics and Geography are trained with professional ethics and scientific temper.

Courses offered in the Department

- *M.Sc. in Geography (Two years)*
- *M.Sc. in Geoinformatics (Two years)*

Mission

Department of Geography, Kazi Nazrul University has a mission to develop the future generation Geographers sensitive towards the region-specific issues of the nation with special emphasis on the local developmental issues. The department also aims to foster this future generation of Geographers with a systematic understanding of physical and human geography and equip them with state-of art technology.

Vision

Department of Geography, Kazi Nazrul University envisions to be a global destination for practising Geography and Geoinformatics. Working in collaboration with government, industry and non-governmental organization, the department upholds a vision to apply the knowledge of Geography and technology of Geoinformatics in reducing spatial disparity, promoting equality and social justice.

Programme- specific Outcomes

- *Two years Post-Graduate programmes have been designed as a base for research and application of Geography and Geoinformatics. These two years programme will enable the students to enhance their learning after under-graduate course and to join the workforce in the field of Geography and Geoinformatics.*
- *Two years Post-Graduate programmes will enable the students with understanding the spatial logic and methodology of geography. After two years, students will be able to work in the areas of urban and regional planning, disaster management, environmental planning and management and related areas.*
- *Two years Post-Graduate programmes in Geoinformatics will enable the students with recent development in the field of Remote Sensing and Geographic Information System. After two years, students will be able to work in the areas of mapping and digital cartography, application of GIS in the field urban planning, disaster management, web mapping and web GIS and related areas.*

Global Needs	MSCGEOGC101	MSCGEOGC102	MSCGEOGC103	MSCGEOGC104	MSCGEOGC105	MSCGEOGC106	MSCGEOGC201	MSCGEOGC202	MSCGEOGC203	MSCGEOGC204	MSCGEOGC205	MSCGEOGMIE201
Systems thinking competency	√	√			√	√	√	√	√	√	√	√
Anticipatory competency			√	√								
Normative competency					√	√						√
Strategic competency									√	√		
Transdisciplinary collaboration competency	√	√	√	√	√	√	√	√	√	√	√	√
Critical thinking competency					√	√	√	√	√	√	√	√
Creativity competency			√		√	√					√	
Self-awareness competency			√		√	√						

Global Needs	MSCGEOGC301	MSCGEOGC302	MSCGEOGC303	MSCGEOGMJE301	MSCGEOGMJE302	MSCGEOGMJE303	MSCGEOGMJE304	MSCGEOGMJE305	MSCGEOGMJE306	MSCGEOGMJE307	MSCGEOGMJE308	MSCGEOGMIE301	MSCGEOGMIE302	MSCGEOGC401	MSCGEOGC402	MSCGEOGC403	MSCGEOGC404	MSCGEOGMJE401	MSCGEOGMJE402	MSCGEOGMJE403	MSCGEOGMJE404	MSCGEOGMJE405	MSCGEOGMJE406	MSCGEOGMJE407	MSCGEOGMJE408
Systems thinking competency	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Anticipatory competency																									
Normative competency	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Strategic competency																									
Transdisciplinary collaboration competency	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Critical thinking competency				√	√	√	√	√	√	√	√	√	√				√	√	√	√	√	√	√	√	√
Creativity competency				√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Self-awareness competency	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

National needs	MSCGEOGC101	MSCGEOGC102	MSCGEOGC103	MSCGEOGC104	MSCGEOGC105	MSCGEOGC106	MSCGEOGC201	MSCGEOGC202	MSCGEOGC203	MSCGEOGC204	MSCGEOGC205	MSCGEOGMIE201
Promote Right to education									√			
Inculcate ethical and professional values				√	√	√			√	√	√	
Increase national and international visibility;	√	√	√	√	√	√	√	√	√	√	√	√
Leverage institutional strengths through strategic partnerships;					√	√					√	
Enlarge the academic community within which to benchmark their activities;	√	√	√	√	√	√	√	√	√	√	√	√
Mobilise internal intellectual resources;	√	√	√	√	√	√	√	√	√	√	√	√
Add important, contemporary learning outcomes to student experience;	√	√	√	√	√	√	√	√	√	√	√	√
Develop stronger research groups.	√	√	√	√	√	√	√	√	√	√	√	√
Encourage multidisciplinary	√	√	√	√	√	√	√	√	√	√	√	√
Promote Cross cultural exchanges				√					√			
Preservation of traditional knowledge	√	√	√	√	√	√	√	√	√	√	√	√
Creating human resource for Economic growth	√	√	√	√	√	√	√	√	√	√	√	√
Promotion of scientific mind-set and critical thinking	√	√	√	√	√	√	√	√	√	√	√	√

National needs	MSCGEOGC301	MSCGEOGC302	MSCGEOGC303	MSCGEOGMJE301	MSCGEOGMJE302	MSCGEOGMJE303	MSCGEOGMJE304	MSCGEOGMJE305	MSCGEOGMJE306	MSCGEOGMJE307	MSCGEOGMJE308	MSCGEOGMIE301	MSCGEOGMIE302	MSCGEOGC401	MSCGEOGC402	MSCGEOGC403	MSCGEOGC404	MSCGEOGMJE401	MSCGEOGMJE402	MSCGEOGMJE403	MSCGEOGMJE404	MSCGEOGMJE405	MSCGEOGMJE406	MSCGEOGMJE407	MSCGEOGMJE408
Promote Right to education															√										
Inculcate ethical and professional values	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Increase national and international visibility;	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Leverage institutional strengths through strategic partnerships;			√	√	√	√	√	√	√	√	√					√	√	√	√	√	√	√	√	√	√
Enlarge the academic community within which to benchmark their activities;	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Mobilise internal intellectual resources;	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Add important, contemporary learning outcomes to student experience;	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Develop stronger research groups.	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Encourage multidisciplinary	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Promote Cross cultural exchanges	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Preservation of traditional knowledge	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Creating human resource for Economic growth	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Promotion of scientific mind-set and critical thinking	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

Sustainable development needs:	MSCGEOGC101	MSCGEOGC102	MSCGEOGC103	MSCGEOGC104	MSCGEOGC105	MSCGEOGC106	MSCGEOGC201	MSCGEOGC202	MSCGEOGC203	MSCGEOGC204	MSCGEOGC205	MSCGEOGMIE201
Help to eradicate poverty				√					√			
Ensuring meal for all				√					√			
Promoting good health and well being				√					√			
Promoting quality education	√	√	√	√	√	√	√	√	√	√	√	√
Promoting gender equality				√					√			
Initiatives for clean water and sanitization		√	√	√			√					
Programmes to reduce inequalities				√					√			
Develop sustainable cities and communities				√		√			√	√	√	

Sustainable development needs:	MSCGEOGC301	MSCGEOGC302	MSCGEOGC303	MSCGEOGMJE301	MSCGEOGMJE302	MSCGEOGMJE303	MSCGEOGMJE304	MSCGEOGMJE305	MSCGEOGMJE306	MSCGEOGMJE307	MSCGEOGMJE308	MSCGEOGMIE301	MSCGEOGMIE302	MSCGEOGC401	MSCGEOGC402	MSCGEOGC403	MSCGEOGC404	MSCGEOGMJE401	MSCGEOGMJE402	MSCGEOGMJE403	MSCGEOGMJE404	MSCGEOGMJE405	MSCGEOGMJE406	MSCGEOGMJE407	MSCGEOGMJE408
Help to eradicate poverty	√							√	√	√	√					√								√	√
Ensuring meal for all	√															√									
Promoting good health and well being	√															√								√	√
Promoting quality education	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Promoting gender equality															√	√									
Initiatives for clean water and sanitization						√	√	√	√	√	√				√	√								√	√
Programmes to reduce inequalities	√									√	√				√	√								√	√
Develop sustainable cities and communities						√	√	√	√	√	√									√	√	√	√	√	√

Course Description

Duration of Post Graduate Course of Studies in Geography will be two years with Semester I, Semester II, Semester III and Semester IV, each of six months leading to Semester I, Semester II, Semester III and Semester IV examinations in Geography at the end of each semester. Semester I and III comprise ODD SEMESTER and Semester II and IV comprise EVEN SEMESTER of each year. Syllabus for post graduate course in Geography is hereby reframed into Choice Based Credit System (CBCS) in compliance with recent directives from the University Grants Commission (UGC).

Scheme:

Both the course of Geography and Geoinformatics consist of 88 credits with at least 20 credits in a semester within the faculty of science. In Semester II and Semester III, students have to choose Minor Elective papers of minimum 4 credits offered by the other Departments or their own Department. There are Major Elective papers in Semester III and Semester IV. The department offers a cluster of Major Elective papers and the students have to choose Major Elective papers according to the norms decided by the Department.

Choice Based Credit System (CBCS)

The CBCS is an effective 'Supply side Initiative' measure evolved as a process of 'Academic Reforms' to sustain the Quality Education that focuses on the learner centric education. It provides an opportunity for the students to choose courses from the prescribed courses comprising core, elective/minor or skill-based courses. It allows students to choose interdisciplinary, intra-disciplinary courses, skill-oriented papers (even from other disciplines according to their learning needs, interests and aptitude) and more flexibility during the entire course of studies. As a result, this not only broadens their horizons but also aims to make students well rounded in all spheres of development. The courses can be evaluated following the grading system, which is considered to be better than the conventional marks system.

It is also a cafeteria-type learning system in a semester pattern to foster creativity and innovation that bridges the gap between professional and liberal education to empower the students for meeting the challenges of Globalization with an inbuilt International acceptance of recognition of Degrees. Syllabus for Post Graduate course in Geography and Geoinformatics of Kazi Nazrul University, Asansol is hereby reframed into Choice Based Credit System (CBCS) in compliance with recent directives from the University Grants Commission (UGC). The main objective of this new curriculum is to give the students a holistic understanding of the subject, putting equal weightage to the core content and techniques used in Geography as well as in Geoinformatics.

CBCS SYLLABUS

for

Post Graduate Courses in Geography

(REVISED)

With effect from Academic Session 2022-23

KAZI NAZRUL UNIVERSITY

ASANSOL 713 340

WEST BENGAL

(www.knu.ac.in)

- **Semester System: terms and conditions**

There shall be regular M.Sc. Course in Geography of two years duration. There shall be semester system spreading over four semesters, each of six months duration. There shall be 1200 marks in total and each semester shall carry 300 marks. There shall be 24 courses/ modules (16 theoretical courses, 8 practical courses including Dissertation) to cover the whole syllabus and each semester shall contain six modules. The Students shall be evaluated on the basis of continuous (internal) assessment during the semester and End Semester Examination at the end of the semester. Procedure of assessment/examination and evaluation of any course in a semester will be guided by Rules and regulations pertaining to the PG courses of the University.

- **Dissertation**

A Dissertation (Master's Thesis) on any branch of Geography will be a comprehensive work based on conceptual aspects, field work and analysis of primary and secondary data. It is to be produced individually by the students and this must be stated clearly in a certificate from the supervisor (s) and concerned Head of the Department of Geography, Kazi Nazrul University.

✧ Semester-wise Course Structure and Credits: M.Sc. in Geography

Semester	Core Course (C)		Major Elective Course (MJE)		Minor Elective Course (MIE)	Total Credit
	Theory (Th)	Practical (Pr)	Theory (Th)	Practical (Pr)		
I	16	4	---	---	---	20
II	12	6	---	---	4	22
III	8	2	4	4	4	22
IV	12	4	4	4	---	24
Total	**48**	**18**	**8**	**6**	**8**	**88**

- **Course Credits** denote the number of teaching hours allocated to the module/ week during the course of the semester. One credit is equivalent to one hour of teaching (lecture or tutorial) or two hours of practical work/ field work per week. Actually, assigning of credits is based on the course content and hours of teaching.
- **Core Courses**: Every student will take only core courses in the Semester I. In the Semester II, III and IV, students will take core courses along with the other courses.

• **Major Elective Courses (Specialization)**: Student will opt one out of the *three Major Electives Subjects* in Semester III and IV.

Option-A: Advanced Geomorphology

Option-B: Environmental Issues in Geography

Option-C: Urban Geography

Option-D: Population Geography

Any student has to opt for total four major elective courses i.e. one theory (4 credit) and one practical (4 credit) in Semester III and one theory (4 credit) and one practical (4 credit) in semester IV. All these four courses have to be related to one particular subject chosen from the above three elective subjects. Students will be submitting one dissertation based on *Major Elective* course in the Semester III and IV.

• **Minor Elective Courses (Interdisciplinary Course):** M.Sc. Geography students will opt two *Minor Elective* courses in the Semester II and Semester III offered by other allied PG Departments or their own department. Out of these Two (2) *Minor Elective* courses, one must be from any of the other disciplines across the Post Graduate courses of study.

✧ Semester-wise Course Structure and Module Composition: M.Sc. in Geography

Semester	Papers	No. of Modules	Total Credit	Marks	Total Marks
I	Theory	4	16	200	300
	Practical	2	4	100	
II	Theory	4	16	200	300
	Practical	2	6	100	
III	Theory	4	16	200	300
	Practical	2	6	100	
IV	Theory	4	16	200	300
	Practical	2	8	100	
Total	Theory	16	64	800	**1200**
	Practical	8	24	400	

Academic Session: Each semester shall contain at least 16 teaching weeks.

Odd Semesters: *Semester One and Three* - July to December; **Even Semesters**: *Semesters Two and Four* - January to June.

KAZI NAZRUL UNIVERSITY			FACULTY OF SCIENCE, TECHNOLOGY AND VOCATIONAL STUDIES		DEGREE PROGRAMME: M.SC IN GEOGRAPHY			WITH EFFECT FROM THE ACADEMIC SESSION: 2022-23								
Abbreviated Degree	Discipline	Abbreviated Degree Programme	Semester	Course Name	Course Type	Course Code	Course Details	L - T - P	Course Credit	Sem Credit	CA Marks		ESE Marks		Total Marks	Sem Marks
											Practical	Theoretical	Practical	Theoretical		
M.SC	GEOGRAPHY	MSCGEOG	I	Geographical Thought	C	MSCGEOGC101	CC-1	4 - 0 - 0	4	20		15		35	50	300
				Geotectonics and Geomorphology	C	MSCGEOGC102	CC-2	4 - 0 - 0	4			15		35	50	
				Hydrology and Oceanography	C	MSCGEOGC103	CC-3	4 - 0 - 0	4			15		35	50	
				Geography of Resources	C	MSCGEOGC104	CC-4	4 - 0 - 0	4			15		35	50	
				Map Projection and Surveying	C	MSCGEOGC105	CC-5	0 - 0 - 4	2		30		20		50	
				Thematic Mapping	C	MSCGEOGC106	CC-6	0 - 0 - 4	2		30		20		50	
			II	Climatology	C	MSCGEOGC201	CC-7	4 - 0 - 0	4	22		15		35	50	300
				Soil and Biogeography	C	MSCGEOGC202	CC-8	4 - 0 - 0	4			15		35	50	
				Social, Cultural and Settlement Geography	C	MSCGEOGC203	CC-9	4 - 0 - 0	4			15		35	50	
				Quantitative Techniques in Geography	C	MSCGEOGC204	CC-10	0 - 0 - 4	2		30		20		50	
				Computer Basics and Field Report	C	MSCGEOGC205	CC-11	0 - 0 - 8	4		30		20		50	
				Choose from Pool of Minor Electives	MIE	See Pool	MIEC-1	See Pool	4		See Pool				50	
			III	Agricultural Geography and Landuse Planning	C	MSCGEOGC301	CC-12	4 - 0 - 0	4	22		15		35	50	300
				Remote Sensing & Geographic Information System - I	C	MSCGEOGC302	CC-13	4 - 0 - 0	4			15		35	50	
				Remote Sensing & Geographic Information System - II	C	MSCGEOGC303	CC-14	0 - 0 - 4	2		30		20		50	
				Advanced Geomorphology - I	Group-A	MSCGEOGMJE301	MJEC-1 & MJEC-2	4 - 0 - 0	4X2=8			15		35	50X2=100	
				Advanced Geomorphology - II		MSCGEOGMJE302		0 - 0 - 8			30		20			
				Environmental Issues in Geography - I	Group-B	MSCGEOGMJE303		4 - 0 - 0				15		35		
				Environmental Issues in Geography - II		MSCGEOGMJE304		0 - 0 - 8			30		20			
				Urban Geography - I	Group-C	MSCGEOGMJE305		4 - 0 - 0				15		35		
				Urban Geography - II		MSCGEOGMJE306		0 - 0 - 8			30		20			
				Population Geography-I	Group-D	MSCGEOGMJE307		4 - 0 - 0				15		35		
				Population Geography-II		MSCGEOGMJE308		0 - 0 - 8			30		20			
				Choose from Pool of Minor Electives	MIE	See Pool	MIEC-2	See Pool	4		See Pool				50	
			IV	Historical and Political Geography	C	MSCGEOGC401	CC-15	4 - 0 - 0	4	24		15		35	50	300
				Contemporary Issues in Geography	C	MSCGEOGC402	CC-16	4 - 0 - 0	4			15		35	50	
				Regional Planning and Research Methodology in Geography	C	MSCGEOGC403	CC-17	4 - 0 - 0	4			15		35	50	
				Dissertation	C	MSCGEOGC404	CC-18	0 - 2 - 4	4		30		20		50	
				Advanced Geomorphology - III	Group-A	MSCGEOGMJE401	MJEC-3 & MJEC-4	4 - 0 - 0	4X2=8			15		35	50X2=100	
				Advanced Geomorphology - IV		MSCGEOGMJE402		0 - 0 - 8			30		20			
				Environmental Issues in Geography - III	Group-B	MSCGEOGMJE403		4 - 0 - 0				15		35		
				Environmental Issues in Geography - IV		MSCGEOGMJE404		0 - 0 - 8			30		20			
				Urban Geography - III	Group-C	MSCGEOGMJE405		4 - 0 - 0				15		35		
				Urban Geography - IV		MSCGEOGMJE406		0 - 0 - 8			30		20			
				Population Geography-III	Group-D	MSCGEOGMJE407		4 - 0 - 0				15		35		
				Population Geography-IV		MSCGEOGMJE408		0 - 0 - 8			30		20			
				Total Credit and Marks						**88**						**1200**

MJE (Any One Group)

MJE (Continuation of previous Group)

Abbreviations: C= Core; CC=Core Course; MJE= Major Elective; MJEC= Major Elective Course; MIE= Minor Elective; MIEC= Minor Elective Course; CA Marks= Continuous Assessment Marks; ESE Marks= End Semester Examination Marks; L= Lecture Hour; T= Tutorial Hour; P= Practical Hour/ Field Work and NA= Not Applicable

Pool of Minor Elective [Offered by the Department of Geography for all other Departments across faculties]. Student has to choose at least one Minor Elective from other departments except his/her own department.

Discipline	Semester	Course Name		Course Type	Course Code	Course Details	L - T - P	Course Credit	Sem Credit	CA Marks		ESE Marks		Total Marks	Sem Marks
										Practical	Theoretical	Practical	Theoretical		
GEOGRAPHY	II	Geospatial Science		MIE	MSCGEOGMIE201	MIEC-1	4 - 0 - 0	4	NA		15		35	50	NA
	III	Geography of Tourism with Special Reference to India	(Any One)	MIE	MSCGEOGMIE301	MIEC-2	4 - 0 - 0	4	NA		15		35	50	NA
		Disaster Management			MSCGEOGMIE302		4 - 0 - 0				15		35		

SYLLABUS

for

M.Sc. in Geography

(Semester - I)

Semester - I

(MSCGEOGC101: Core Course-1, Theoretical)

Geographical Thought

✧ **Full Marks: 50** ✧ **CA+ESE Marks: 15+35**
✧ **Credit: 4** ✧ **L - T – P: 4 - 0 - 0**
✧ **End Sem Exam Duration: 2 Hours**

Course Learning Outcomes:

1. *Learn the fundamentals of the evolution and the philosophical bases of geography as a discipline.*
2. *Trace the development of geography in chronological phases and the debate which define the nature of geography as multidimensional.*
3. *Learn uniqueness of geography as locational and spatial science.*
4. *Learn emerging modern concepts of geography.*

Unit-1: Evolution of Geographical Thought

1.1 Place of Geography in the classification of knowledge; Geography as a Social Science; Physical and Human Geography: linkages among the sub-disciplines of Physical and Human Geography.

1.2 The Emergence of Scientific Geography: Humboldt, Ritter and their Legacy; Conceptual and Methodological development of Geography during 20th Century; Impact of World Wars in the development of Geography; Progress of Geography in India.

Unit-2: Development of Geography since World War II

2.1 The Hartshorne- Schaefer Debate; Exceptionalism to Generalisation and Theory; Geography as Science of Spatial Analysis; Realism as the basis of knowing the World.

2.2 Approaches to Regional Studies; The Grigg-Bunge Debate; Man-Nature-Nurture: The Current views on Man- Environment Relationship.

Unit-3: Dualism and Concept of Space in Geography

3.1 Dichotomies in Geography: Physical and Human Geography; Idiographic and Nomothetic; Determinism and Possibilism; Systematic and Regional.

3.2 Place, Space and Locality; Geographical Perception of Space with Special Emphasis on Behavioural Space; Social Space, Social Problems and Processes in Spatial Analysis.

Unit-4: Modern Trends in Geography

4.1 Development of Critical Geography: Critiques of Positivism, Humanistic Geography; Concept of System; Revival of Ecological Studies in Geography.

4.2 Geography of Inequality and Uneven development: International, Intra-National and Intra-Urban. Modern Geography and changeover to Post- Modern Geography.

Continuous Assessment (The department shall decide the method) [15 Marks]

✧ Suggested Readings:

1. Adhikari, S. (1992): *Fundamentals of Geographical Thought*, Chaitanya Publishing House, Allahabad.
2. Banerjee-Guha, S. (2004): *Space, Society and Geography*, Rawat, New Delhi.
3. Broek, J.O.M. (1965): *Geography: Its Scope and Spirit*, Charles E. Merrill Publishing Co., Columbus, Ohio.
4. Dickinson, R.E. (1969): *The Makers of Modern Geography*, Routledge, London
5. Dikshit, R. (2006): *Geographical Thought: A Contextual History of Ideas*, Prentice Hall of India Private Limited,
6. Dikshit, R.D. (ed.) (1994): *The Art and Science of Geography: Selected Readings*, Prentice Hall India Ltd.
7. Freeman, T.W. (1961): *A Hundred Years of Geography*, Gerald Duckworth, London.
8. Gregory, D (1978): *Ideology, Science & Human Geography*, Hutchinson, London.
9. Gregory, D. and Walford, R. (1988): *Horizons in Human Geography*, Macmillan, London.
10. Hartshorne, R. (1959): *Perspective on the Nature of Geography*, McNally and Co., Chicago.
11. Hartshorne, R. (1994): *The Nature of Geography*, Rawat, New Delhi.
12. Harvey, D. (1972): *Explanations in Geography*, Edward-Arnold, London.
13. Harvey, Milton E. and Brian, P. Holly (ed.) (1981): *Themes in Geographical Thought*, Rawat Publication, Delhi.
14. Hussain, M. (1988): *Evolution of Geographical Thought*, Rawat Publications, Jaipur.
15. Johnston, R.J. (1997): *Geography & Geographers*, Arnold, London.
16. Lefebre, H. (1991): *The Production of Space*, Blackwell, Oxford.
17. Pandey, P. (1983): *Modern Geographical Trends*, Todays and Tomorrow Printers and Publishers, New Delhi.
18. Peet, R. (2001): *Modern Geographical Thought*, Rawat, New Delhi.
19. Peet, R. (2003): *Radical Geography*, Rawat, New Delhi.
20. Rana, L. (2008): *Geographical Thought (A Systematic Record of Evolution)*, Concept Publishing Company.
21. Soja, E. (2003): *Postmodern Geographies*, British Library Cataloguing in Publication Data, UK.
22. Stoddart, D.R. (1986): *On Geography and its History*, Basil Blackwell, Oxford.
23. Taylor, G. (ed.) (1953): *Geography in the Twentieth Century*, Methuen and Company, London.
24. Wooldridge, S.W. (1956): *The Geographer as Scientist*, Thomas Nelson and Sons Ltd., London.

Semester - I
(MSCGEOGC102: Core Course-2, Theoretical)

Geotectonics and Geomorphology

✧ **Full Marks: 50** ✧ **CA+ESE Marks: 15+35**
✧ **Credit: 4** ✧ **L - T – P: 4 - 0 - 0**
✧ **End Sem Exam Duration: 2 Hours**

Course Learning Outcomes:

1. *Students will be introduced to fundamental physical laws towards understanding the initial phases of the early Universe with special reference to the Earth.*
2. *Develop understanding of the genesis of the Earth's magnetic field and palaeomagnetism that will enhance the understanding about the Earth's geological history and theories about the continental drift and sea floor spreading.*
3. *Understanding crustal mobility and tectonics; with special emphasis on their role in landform development.*
4. *Acquire knowledge on global topography and hypsometry.*
5. *The course is also designed to have some advanced level of understanding of the geochronology to find the ages of geological formation.*
6. *Understand the nature, scope and significance of geomorphology and progress of geomorphological researches in Europe, North America and India.*
7. *Understand how different scales of time and space affect geomorphological processes.*
8. *Understand landscape development through the help of various traditional and time independent models.*
9. *The completion of this course will give impetus to the research insights for the students who would like to pursue their future carrier in geosciences.*

GROUP-A: GEOTECTONICS

Unit-1: Fundamentals of Geotectonics

1.1 Origin of the Earth (monistic theories) and Universe (views of Stephen W. Hawking); Geological Time Scale and related topographic and structural evolution; Earth's Crust and the interior; Thermal and electric field of the Earth.

1.2 Earth's magnetic field: Origin, Geomagnetism and Paleomagnetism; Continental Drift and Seafloor Spreading with special reference to Paleomagnetism; Basics of Earth's gravity, Isostatic models of Airy and Pratt: adjustments and anomalies.

Unit-2: Geotectonics and Landforms

2.1 Plate tectonics: landforms and tectonics of plate margins and plate interiors; Triple-Plate Junctions: varieties, plate geometry and movements, surface expressions; Passive continental margins with great escarpments: case of Western Ghats.

2.2 Global topography and hypsometry; Tectonic Geomorphology: principles, geomorphic markers, rates of uplift and erosion, isostatic relations; Geochronology: concepts; absolute and relative dating of landscapes and events.

GROUP-B: GEOMORPHOLOGY

Unit-3: Theoretical Geomorphology

3.1 Evolution of Geomorphological Ideas: Brief Review of developments in Europe and North America in last two centuries; Progress of geomorphological researches in India; Approaches to Geomorphology: Static, Dynamic, Environmental and Applied.

3.2 Time and space in geomorphology; Gradualism *vs* Catastrophism, Neocatastrophism; Systems approach in geomorphology: Feedback mechanisms, ideas of equilibrium, threshold, sensitivity, connectivity, equifinality.

Unit-4: Geomorphology: Concepts and Processes

4.1 Models of long-term landscape development: Traditional models (Davisian Cycle of erosion and Penck's model), Time- independent model (Hack dynamic equilibrium model); Responses of geomorphic systems to climate, sea level and tectonics in the Quaternary: evidences and chronologies

4.2 Elements of slope and slope evolution models (King, Wood and Young); Denudation processes: mechanism and controls; Processes of channel initiation and network development; Forms of valley development and profile of equilibrium.

Continuous Assessment [15 Marks]
(*The department shall decide the methods of internal assessment*)

✧ Suggested Readings:

1. Anderson, R.S. and Anderson, S.P. (2010): *Geomorphology: The Mechanics and Chemistry of Landscapes*, Cambridge University Press, Cambridge.
2. Bierman, P.R. and Montgomery, D.R. (2014): *Key Concepts in Geomorphology*, W.H. Freeman and Company Publishers, New York.
3. Bloom, A.L. (2002): *Geomorphology: A Systematic Analysis of Late Cenozoic Landforms*, Prentice Hall, Upper Saddle River, New Jersey.
4. Brown, G.C. and Mussett, A.E. (1993): *The Inaccessible Earth (An integrated view to its structure and composition)*, Chapman & Hall, London.
5. Bull, W.B. (1991): *Geomorphic Responses to Climatic Change*, Oxford University Press, New York.
6. Bull, W.B. (2007): *Tectonic Geomorphology of Mountains: A New Approach to Paleoseismology*, Blackwell Publishing Ltd., USA.
7. Burbank, D.W. and Anderson, R.S. (2001): *Tectonic Geomorphology*, Blackwell Publishing, USA.
8. Chorley R.J. (ed.) (1973): *Introduction of Fluvial Process*, Methuen & Co., London.
9. Chorley, R., Schumm, S. and Sugden, D.E. (1994): *Geomorphology*, Methuen, London.
10. Chorley, R.J. and Kennedy, B.A. (1971): *Physical Geography: A Systems Approach*, Prentice Hall, Upper Saddle River, New Jersey.
11. Coates D.R. and Vitek J.I. (1980): *Thresholds in Geomorphology*, George Allen & Unwin, London.

12. Condie, K.C. (2003): *Plate Tectonics and Crustal Evolution*, Fourth Edition, Butterworth-Heinemann, Oxford.
13. Cox, A. and Hart, R.B. (1986): *Plate Tectonics: How it Works*, Blackwell Scientific Publications, Oxford.
14. Fairbridge, R.W. (1968): *The Encyclopedia of Geomorphology*, Reinhold Book Corporation, New York.
15. Fowler, C.M.R. (2005): *The Solid Earth (An introduction to Global Geophysics)*, Cambridge University Press, UK.
16. Frisch, W., Meschede, M. and Blakey, R.C. (2011): *Plate Tectonics: Continental Drift and Mountain Building*, Springer.
17. Fryirs, K.A. and Brierley, G.J. (2012): *Geomorphic Analysis of River Systems: An Approach to Reading the Landscape*, Wiley, New York.
18. Gregory, K.J. and Lewin, J. (2014): The Basics of Geomorphology: Key Concepts, Sage.
19. Gutierrez, M. (2013): *Geomorphology*, CRC Press, Boca Ranton, Florida.
20. Hallam, A. (1973): *A revolution in the Earth Sciences (From Continental Drift to Plate Tectonics)*, Clarendon Press,Oxford.
21. Hamblin, W.K. and Christiansen, E. (2003): *Earth's Dynamic Systems*, Prentice Hall, Upper Saddle River, New Jersey.
22. Hart, M.G. (1986): *Geomorphology: Pure and Applied*, George Allen and Unwin, London.
23. Harvey, A. (2012): *Introducing Geomorphology: A Guide to Landforms and Processes*, Dunedin Academic Press.
24. Huggett, R.J. (2011): *Fundamentals of Geomorphology*, Routledge, New York.
25. Kale, V.S. and Gupta, A. (2001): Introduction to Geomorphology, Orient Balckswan Ltd., Hyderabad.
26. Kearey, P., Klepeis, K.A. and Vine, F.J. (2009): *Global Tectonics*, 3rd Edition, Wiley-Blackwell, UK.
27. Knighton, A.D. (1984): Fluvial Forms and Processes, Edward Arnold.
28. Lobeck, A.K. (1939): *Geomorphology (An Introduction to the Study of Landscapes)*, McGraw-Hill Book Company, New York.
29. Lowrie, W. (2007): *Fundamentals of Geophysics*, Second Edition, Cambridge University Press, UK.
30. Mussett, A.E. and Khan, M.A. (2009): *Looking into the Earth (An introduction to geological geophysics)*, Cambridge University Press, UK.
31. Ollier, C.D. (1981): *Tectonics and landforms*, Longman Scientific & Technical, London.
32. Pichon, X.L., Francheteau, J. and Bonnin, J. (1973): *Plate Tectonics*, Elsevier Scientific Publishing Company, Amsterdam.
33. Rice, R.J. (1988): *Fundamentals of Geomorphology*, 2nd Edition, *Longman Scientific and Technical*, London.
34. Ruhe, R.V. (1982): Geomorphology, Honghton Mifflin Company, Boston.
35. Selby, M.J. (1985): *An Introduction to Geomorphology*, Clarendon, Oxford.
36. Sparks, B.W. (1972): *Geomorphology*, Longman, London.
37. Summerfield, M.A. (1991): *Global Geomorphology: An Introduction to the Study of Landforms*, John Wiley and Sons Ltd., New York.
38. Thornbury, W.D. (1969): *Principles of Geomorphology*, Wiley Eastern Limited, New Delhi.
39. Wirthmann, A. (1987): *Geomorphology of the Tropics* (Translated by Detlef Busche), Springer

Semester - I
(MSCGEOGC103: Core Course-3, Theoretical)

Hydrology and Oceanography

- ✧ **Full Marks: 50**
- ✧ **CA+ESE Marks: 15+35**
- ✧ **Credit: 4**
- ✧ **L - T – P : 4 - 0 - 0**
- ✧ **End Sem Exam Duration: 2 Hours**

Course Learning Outcomes:

1. *Learn various aspects of pure hydrology and hydrological cycle.*
2. *Delineate -river basin and acquire knowledge regarding Artificial rainmaking, Rainwater harvesting; Principles of integrated basin management and water resource management strategies with special reference to tropical cities.*
3. *Learn various basic concepts of Physical Oceanography such as origin of the major structural and morphological features of the ocean floor, properties of ocean water, Oceanic circulation etc.*
4. *Understand concept of costal environment and Ocean Resources.*

GROUP-A: HYDROLOGY

Unit-1: Pure Hydrology

1.1 Cycle and Regional Water Budget; Ground Water in the Hydrological Cycle; Significance of the Global Hydrological Cycle.

1.2 Surface hydrology: delineation, properties and significance Hydrological Systems; Hydrological of drainage basin as a hydrological unit; Runoff: components and cycle; Groundwater hydrology: components, factors, processes and laws controlling movement and storage.

Unit-2: Applied Hydrology

2.1 Concept of applied hydrology; Application of hydrological knowledge in real world scenario; Runoff estimates (curve number) and stream discharge estimates (area-velocity method); Unit Hydrograph and Rating Curve: concept and significance, Concept of Rainfall Run-off modelling.

2.2 Water management in tropical farmlands: techniques and approaches; Artificial rainmaking. Water management in tropical cities: techniques and approaches; Rainwater harvesting; Principles of Integrated Basin Management with reference to Micro-Watershed Planning.

GROUP-B: OCEANOGRAPHY

Unit-3: Physical Oceanography

3.1 Classification, characteristics and origin of the major structural and morphological features of the ocean floor with particular reference to plate tectonics; Bottom topography of Indian Ocean, Atlantic Ocean and Pacific Ocean.

3.2 Properties of Ocean Water and their nature of distribution (Temperature, Salinity and Density); Oceanic Currents; Ocean Circulation: Thermohaline circulation and Oceanic Conveyor Belt; Tides: generating forces, types, theories and effects; Oceanic sediments.

Unit-4: Marine Environment: Hazards and Ocean Resources

4.1 Coastal Habitats: Estuaries, lagoons, salt marshes, mangrove swamps; Coral Reefs and Atolls: types, factors and evolution; Marine Pollution and Tsunamis: types, causes and implications.

4.2 Pelagic and Benthic Communities of the Ocean; Ocean as a resource: Anthropogenic utilization of the oceans; Importance of EEZ and CRZ.

Continuous Assessment [15 Marks]
(*The department shall decide the methods of internal assessment*)

✧ **Suggested Readings**:

1. Brutsaert, W. (2005): *Hydrology: An Introduction*, Cambridge University Press, Cambridge.
2. Carter, R.W.G. (1988): *Coastal Environments: An Introduction to the Physical, Ecological and Cultural Systems of Coastlines*, Academic Press, London.
3. Chow, V.T. (1988): *Applied Hydrology*, McGraw-Hill Education, New York.
4. Davis, R.J.A. (1986): *Oceanography - An Introduction of the Marine Environment*, Win C. Brown, Iowa
5. Dingman, S.L. (2002): *Physical Hydrology*, 2nd Edition, Prentice Hall, Englewood Cliffs.
6. Garrison, T.S. (2007): *Oceanography: An Invitation to Marine Science*, 6th Edition, Brooks Cole, Chicago.
7. Keith, D. and Mays, L.W. (2004): *Groundwater Hydrology*, 3rd Edition, Wiley, Chichester.
8. King, C.A. (1962): *Oceanography for Geographers*, Edward Arnold, New York.
9. Meinzer, O.E. (1949): *Hydrology*, Dover Publications, Mineola, New York.
10. Pinet, P.R. (2006): *Invitation to Oceanography*, 4th Edition, Jones & Bartlett Pub., New York.
11. Raghunath, H.M. (2006): *Hydrology: Principles, Analysis and Design*, New Age International (P) Limited Publishers.
12. Reddy, P.J.R. (2005): *A Textbook of Hydrology*, Firewall Media, New Delhi.
13. Sverdrup, K.A. and Armrest, E.V. (2010): *An Introduction to the World Oceans*, 10th Edition, McGraw Hill.
14. Thorpe, S.A., Steele, J.H. and Turekian, K.K. (eds.) (2009): *Elements of Physical Oceanography*, Academic Press,London.
15. Thruman, H.V. and Trujillo, A.P. (2003): *Introductory Oceanography*, 10th Edition, Prentice Hall, Englewood Cliffs.
16. Todd, D.K. (2004): *Groundwater Hydrology*, 3rd Edition, Wiley, Chechester.
17. Trujillo, A.P. and Thurman, H.V. (2007): *Essentials of Oceanography*, 9th Edition, Prentice Hall, Englewood Cliffs.
18. Weyl, P.K. (1970): *Oceanography: An Introduction of the Marine Environment*, John Wiley and Sons Ltd., London.
19. Woodroffe, C.D. (2003): *Coasts: Form, Process and Evolution*, Cambridge University Press, Cambridge.

Semester - I

(MSCGEOGC104: Core Course-4, Theoretical)

Geography of Resources

✧ **Full Marks: 50**	✧ **CA+ESE Marks: 15+35**
✧ **Credit: 4**	✧ **L - T – P: 4 - 0 - 0**
✧ **End Sem Exam Duration: 2 Hours**	

Course Learning Outcomes:

1. *Acquire knowledge about the concepts and classification of resources.*
2. *Describe importance of conservation and management of resources for sustainable development.*
3. *Get knowledge about water resource management along with waste water management and water quality assessment.*
4. *Understand different theories of Human Resource Management and enhance the knowledge towards understanding the debate on Automation vs Manual Labor.*

Unit-1: Concept of Resources

1.1 Resource: Concept and Classification; Economic and Environmental approaches of Resource utilization; Resource depletion and resource conservation; Forrester-Meadows model on Limits to Growth; Sustainable use of resources.

1.2 Natural Resource Economics; Markets and Natural Resource Services. Resource Scarcity: Reuse and Recycling.

Unit-2: Conservation and Management of Resources

2.1 Land and Soil as resources; and Conservation. Problems of land acquisition in developing countries; Development of EPZ and SEZ; Land reforms in India with special reference to West Bengal.

2.2 Bio-resource and their utilisation: Forestry, Fishing, livestock farming. Problems of Resource Depletion: Global Scenario (Forest, Water, Fossil Fuels).

Unit-3: Water Resource Management

3.1 Use, Issues and Management of River Water for Irrigation and Hydel power. Overuse of Ground Water and measures of conservation.

3.2 Parameters of Water Quality: Sources and types of Pollution; Waste Water Management.

Unit-4: Human Resource Management

4.1 Concept of Human Resource: Components, Classification and Importance. Scenario of Human Resource in developed and developing countries. Debate on Automation *vs* Manual Labor.

4.2 Human Capital: Issues related to Human Resource Management; Theories of Human Resource Management: Gini, De Castro, Leibenstein, Schumpeter, Cole.

Continuous Assessment [15 Marks]
(*The department shall decide the methods of internal assessment*)

✧ Suggested Readings:

1. Bagchi-Sen S. and Smith H. L., (2006): Economic Geography: Past, Present and Future, Taylor and Francis
2. Beaujaeu-Garnier, J., (1978): *Geography of Population*, Longman, London.
3. Becker, G.S. (1993): *Human Capital: A Theoretical and Empirical Analysis*, Chicago: University of Chicago Press.
4. Berry, B.J.L., Conklin, E.C. and Ray, M.D. (1976): *The Geography of Economic Systems*, Prentice Hall, New Jersey.
5. Boyce, Ronald Reed (1974): *The Bases of Economic Geography*, Holt, Rine Hart and Winston Inc, New York.
6. Bradford, M.G. and Kent, W.A. (1977): *Human Geography, Theories and Applications*, Oxford University Press, Oxford.
7. Brereton, E. (1992): *Resource Use and Management*, Cambridge University Press, Cambridge.
8. Brock, J.O.M. and Webb, J.W. (1973): *A Geography of Mankind*, McGraw Hill, New York.
9. Combes, P., Mayer, T. and Thisse, J.F. (2008): *Economic Geography: The Integration of Regions and Nations*, Princeton University Press.
10. Guha, J.L. and Chattaraj, P.R. (1989): *A New Approach to Economic Geography: A Study of Resources*, World Press, Kolkata.
11. Hartshorn, T.A. and Alexander, J.W. (1988): *Economic Geography*, Prentice Hall India, New Delhi.
12. Jhingan, M.L. (1978): *Economics of Development and Planning*, Vikash Publishing House, New Delhi.
13. Jones, C.F. and Darkenwald, G.G. (1954): *Economic Geography*, Macmillan, New York.
14. Leong. G.C. and Morgan, G.C. (1975): *Human and Economic Geography*, Oxford University Press, Hong Kong.
15. Mamoria, C.B. (1997): *Economic and Commercial Geography of India*, Shiva Lal Publications, Agra.
16. Mitchell, B. (1997): *Resources and Environment Management*, Addison Wesley Lon~an Ltd., Harlow.
17. Paterson, J.H. (1976): *Land, Work and Resources: An Introduction to Economic Geography*, Edward Arnold, London.
18. Sadhukhan, S.K. (1986): *Economic Geography*, S. Chand, New Delhi.
19. Simmons, I.G. (1981): *The Ecology of Natural Resources*, ELBS/ Edward Arnold, London.
20. Simmons, I.G. (1991): *Earth, Air and Water: Resources and Environment in the 20th Century*, Edward Arnold, London.
21. Tiwari, R.C. (2008): *Geography of India*, Prayag Pustak Bhawan, Allahabad.
22. Wheeler, J.O., Muller, P.O., Thrall, G.I. and Fik, T.J. (1998): *Economic Geography*, 3rd Edition, Wiley.
23. Willington, D.E. (2008): *Economic Geography*, Husband Press.
24. Wood, A. and Roberts, A. (2010): *Economic Geography: Places, Networks and Flows*, Routledge.

Semester - I

(MSCGEOGC105: Core Course-5, Practical)

Map Projection and Surveying

✧ **Full Marks: 50** ✧ **CA+ESE Marks: 30+20**
✧ **Credit: 2** ✧ **L - T – P: 0 - 0 - 4**
✧ **End Sem Exam Duration: 2 Hours**

Course Learning Outcomes:

1. *Understand definition, types, necessity and graphical construction of different map projections.*
2. *Develop skill to choose map projection according to the purpose of map making.*
3. *Students completing this course would have acquired practical knowledge on handling survey instruments like Dumpy level, Theodolite and Total Station and have adequate knowledge to carryout traversing, levelling and triangulation surveying including general field marking for various projects.*
4. *The course aims to give hands-on-training in preparation of land use and land cover map using tacheometric method with the application of Theodolite/ Total Station.*
5. *On completion of this course students should be able to take decisions regarding what measurements to take, and which instruments to use.*

Unit-1: Elements of Map Projection and their construction [15 Marks]

1.1 Map Projections: Necessity and Classification; Basic concepts: parallels and meridians, datum, spheroid, geoid, scale factor, deformations, orthodrome, loxodrome and geodesic (simple problems).

1.2 Perspective of Suitable Projections; Numerical Problems of Projections: Coordinate, Distance, Azimuth and Scale Variation.

1.3 Principles, Theories, Construction and Properties of Selected Map Projections: Equatorial Zenithal Case (Gnomonic, Stereographic and Orthographic); Conical Case (Bonne's and Sinusoidal); Cylindrical Case (Gall's stereographic); Special Case (Mollweide Projection).

1.4 Universal Transverse Mercator (UTM) Grid System.

Unit-2: Surveying and Mapping` [15 Marks]

2.1 Levelling (simple and reciprocal methods) using Dumpy level.
2.2 Measurement of height and distance (Oblique method) by Theodolite
2.3 Triangulation, Traversing and Area Calculation using Theodolite.
2.4 Land use and Land cover mapping (Tacheometric Method) using Theodolite/ Total Station

In the End Semester Examination, students have to answer one compulsory question from the above two Units.

Viva-voce [5 Marks]
Continuous Assessment [30 Marks]
*(*A Project File, comprising one exercise each is to be submitted)*

✧ Suggested Readings:

1. Alvi, Z. (1994): *A Textbook of Practical Geography*, Vikas Publishing House Pvt. Ltd., New Delhi.
2. Basak, N.N. (2008): *Surveying and Levelling*, Tata McGraw-Hill Publishing Company Limited, New Delhi.
3. Beaumont, J.R. and Williams, S.W. (1983): *Project Work in the Geography Curriculum*, Croom Helm, London.
4. Bygott, J. (1964): *Introduction to Mapwork and Practical Geography*, Harper Collins Distribution Services, London.
5. Elfic, M.H., Fryer, J.G., Brinkner, R.C. and Wolf, P.R. (1994): *Elementary Surveying*, 8th Edition, Harper Collins Publishers, London.
6. Hussain, S.K. and Nagaraj, M.S. (1992): *Text Book of Surveying*, S. Chand & Co. Ltd., New Delhi.
7. Ishtiaq, M. (1994): *Practical Geography*, Jawahar Publishers & Distributors, New Delhi.
8. Kanetkar, R.P. and Kulkarni, S.V. (1988): *Surveying and Levelling*, Part-I, Vaidyarthi Griha Prakashani, Pune.
9. Kellaway, G.P. (1979): *Map Projections*, 1st Indian Edition, B.I. Publication, Delhi.
10. Khan, Md. Z.A. (1998): *Text Book of Practical Geography*, Concept Publishing Company, New Delhi.
11. Kochher, C.L. (1993): *A Text Book of Surveying*, S.K. Katariya & Sons, Delhi.
12. Mailing, D.H. (1973): *Coordinate Systems and Map Projections*, George Phillip &Sons, London.
13. Mishra R.P. and Ramesh, A., (1989): *Fundamentals of Cartography*, Concept, New Delhi
14. Monkhouse F.J. and Wilkinson, H.R. (1971): *Maps and Diagrams: Their Compilation and Construction*, B.I. Publications Private Limited, New Delhi.
15. Punmia, B.C. (1985): *Surveying*, Volume II, Standard Book House, Delhi.
16. Raisz, E.J. (1962): *Principles of Cartography*, McGraw-Hill.
17. Robinson, A.H., Sale, R.D. and Morrison, J. (1984): *Elements of Cartography*, Wiley, New York.
18. Saha, P.K. and Basu, P. (2009): *Advanced Practical Geography*, Books and Allied (P) Ltd., Kolkata.
19. Sarkar, A. (1997): *Practical Geography: A Systematic Approach*, Orient Longman Ltd., Hyderabad.
20. Shepherd, F.A. (1983): *Engineering Surveying*, Edward Arnold, London.
21. Singh, Gopal (1998): *Map Work and Practical Geography*, Vikas Publishing, New Delhi.
22. Singh, L.R. (2005): *Fundamentals of Practical Geography*, Sharda Pustak Bhawan, Allahabad.
23. Singh, R.L. and Singh, R.P.B. (1991): *Elements of Practical Geography*, Kalyani Pub., New Delhi.
24. Steers J.A., (1965): *An Introduction to the Study of Map Projections*, University of London Press, London.
25. Talukder, S. 2008): *An Introduction to Map Projections*, EBH Publishers (India), Guwahati.
26. Venkatramaiah, C. (1996): *A Textbook of Surveying*, Universities Press/Orient Longman Ltd., Hyderabad.

Semester - I

(MSCGEOGC106: Core Course-6, Practical)

Thematic Mapping

✧ **Full Marks: 50** ✧ **CA+ESE Marks: 30+20**
✧ **Credit: 2** ✧ **L - T – P: 0 - 0 - 4**
✧ **End Sem Exam Duration: 2 Hours**

Course Learning Outcomes:

1. *Understand interpretation techniques of topographical maps and its application in practical.*
2. *Get skill of creating slope map, dissection Index map, relative relief map, absolute relief map, altimetric frequency and hypsometric Curve.*
3. *Predict Soil fertility (NPK, pH) and Organic Matter.*
4. *Create different types of thematic maps (economic and social environment) and interpreting the results.*

Unit-1: Thematic Mapping of Physical Environment [15 Marks]

1.1 Mapping and Interpretation of Morphometric aspects (Dissection Index, Drainage Density, Ruggedness Index, Slope by Raisz and Henry), Preparation and Interpretation of Altimetric frequency and Hypsometric Curve from SoI (1:50000) topographical maps of plateau region.

1.2 Preparation of Geomorphic Maps of Flood-prone and Drought-prone areas and their interpretation. Analysis and Interpretation of Geological Maps, Subsurface lithological correlation techniques and its interpretation.

1.3 Computation, Drawing and Mapping of Pluviometric Coefficient; Equipluves, Aridity and Moisture Index and Coefficient of Variability of Rainfall; Construction of Thiessen Polygon from Precipitation data.

1.4 Analysis of Soil and its Mapping: NPK, pH and Organic Matter.

Unit-2: Thematic Mapping of Economic and Social Environment [15 Marks]

2.1 Test for Clustering and Regularity (Nearest Neighbour Analysis); Lorenz curve and Determination of Gini's coefficient; Location Quotient Analysis.

2.2 Index of Disparity by Kendall's method; Preparation of Maps on Crop Combination (Weaver and Rafiullah's methods) and Diversification of Crops (Bhatia's method).

2.3 Functional Classification of Towns by Dominant and Distinctive Functions; Applicability of Rank Size Rule with settlement data (Normal and Log).

2.4 Network as a Graph; Alfa, Beta and Gamma Index of Connectivity; Accessibility by Detour Index; Mapping of Sphere of Influence (Breaking Point).

In the End Semester Examination, students have to answer one compulsory question from the above two Units.

Viva-voce [5 Marks]

Continuous Assessment (**A Project File, comprising one exercise each is to be submitted*) [30 Marks]

✧ Suggested Readings:

1. Alvi, Z. (1995): *Statistical Geography: Methods and Applications*, Rawat Pub., New Delhi.
2. Campbell, J. (1993): *Map Use and Analysis*, Wm. C. Brown Publishers, USA.
3. Dackombe, R.V. and Gardiner, V. (1983): *Geomorphological Field Manual*, George Allen and Unwin, London.
4. FitzGerald, B.P. (1974*): Science in Geography (Data description and presentation)*, Oxford University Press.
5. Goudie, A. (1990): *Geomorphological Techniques*, Unwin Hyman, London.
6. Hammond, R. and McCullagh, P. (1991): *Quantitative Techniques in Geography*, Clarendon Press, Oxford.
7. Khan, N. (2002): *Quantitative Methods in Geographical Research*, Concept Publishing Company, New Delhi.
8. Liendsor, J.M. (1997): *Techniques in Human Geography*, Routledge.
9. Mahmood, A. (1998): *Statistical Methods in Geographical Studies*, Rajesh Publication.
10. Maltman, A. (1990): *Geological Maps: An Introduction*, Open University Press, Buckingham.
11. Monkhouse F.J. and Wilkinson, H.R. (1971): *Maps and Diagrams: Their Compilation and Construction*, B.I. Publications Private Limited, New Delhi.
12. Platt, J.I. and Challinor, J. (1956): *Simple Geological Structures (A Series of Notes and Map Exercises)*, Thomas Murby & Co, London.
13. Raghunath, H.M. (2006): *Hydrology: Principles, Analysis, Design*, 3rd Edition, New Age International Publishers.
14. Sarkar, A. (2015): *Practical Geography: A Systematic Approach*, 3rd Edition, Orient Blackswan Private Ltd.
15. Sarkar, A. 2013): *Quantitative Geography: Techniques and Presentations*, Orient BlackSwan, Hyderabad.
16. Saxena, H.M. (2005). *Transport Geography*, Rawat Publications.
17. Sen, A.K. (1995): *Laboratory Manual of Geology*, Modern Book Agency (P) Ltd., Kolkata.
18. Singh, R.L. and Singh, R.P.B. (1991): *Elements of Practical Geography*, Kalyani Pub., New Delhi.
19. Toyne, P. and Newby, P.T. (1971): *Techniques in Human Geography*, Macmillan Education, London.
20. United States Department of Agriculture (USDA) (2014): *Soil Survey and Laboratory Methods Manual*, Soil Survey Investigations Report No. 51.
21. Yeates, M. (1974): *An Introduction to Quantitative Analysis in Human Geography*, McGraw Hill, New York.

SYLLABUS

for

M.Sc. in Geography

(Semester - II)

Semester - II

(MSCGEOGC201: Core Course-7, Theoretical)

Climatology

✧Full Marks: 50 **✧ CA+ESE Marks: 15+35**
✧ Credit: 4 **✧ L - T – P: 4 - 0 - 0**
✧ End Sem Exam Duration: 2 Hours

Course Learning Outcomes:

1. *Learn the dynamics of climatic phenomenon and their interrelationship.*
2. *Get insights in occurrences and variability of extremity of weather events.*
3. *Apply knowledge of climate towards identification and demarcating the region of geographical importance.*
4. *Predict future climatic changes through analysing the past events and current climatic scenario*

Unit 1: Introduction to Climatology

1.1 Concept, Nature and Scope of Climatology and its Relationship with Meteorology; Insolation; Heat Budget of Earth; Temperature, Pressure and Winds, Precipitation.

1.2 Atmospheric Stability and Instability; Fronts and Upper Air Circulation; Cyclones and Anticyclones (Tropical and Temperate).

Unit 2: Monsoon and Extreme Climatic Events

2.1 Genesis of Indian Monsoon and its Variability: Thermal and Dynamic Theories; Role of Jet Streams and Tibetan Plateau; El Nino, La Nina and Southern Oscillations; MONEX.

2.2 Extreme Weather Phenomena: Thunderstorms, Tornadoes and Hailstorms; Heat and Cold waves; Drought and Cloudburst.

Unit 3: Climatic Classification and Agro-climatic Regions

3.1 Classification of World Climate: Koppen, Thornthwaite, Trewartha; Classification of Climate with special reference to India: Koppen, Thornthwaite and R.L.Singh.

3.2 Agro-climatic Regions in India: Basis of Identification and Important Characteristics; Bio-climatic Regions with Special Reference to Tropical Climate.

Unit 4: Climate Change and Associated Phenomena

4.1 Global climate change: evidences of past climatic changes and possible causes; Feedback mechanism; Vulnerability of climate change and its impact assessment; Weather forecasting: approaches and techniques.

4.2 Paleoclimate: concept and reconstruction; Climates of the past: Snowball Earth, Cretaceous Hot House, Cenozoic Climate (Palaeocene-Eocene Thermal Maximum, Pleistocene Glaciation, Maximum Holocene).

Continuous Assessment [15 Marks]
(*The department shall decide the methods of internal assessment*)

✧ Suggested Readings:

1. Anthes, R.A. (1997): *Meteorology*, Prentice Hall, Upper Saddle River, N.J.
2. Barry, R.G. and Chorley R.J. (2003): *Atmosphere, Weather and Climate*, Routledge, London and New Work.
3. Bigg, G.R. (2003): *The Ocean and Climate*, Cambridge University Press, Cambridge.
4. Byers H .R. (1974): *General Meteorolgy*, 4th Edition, McGraw Hill, New York.
5. Chatterjee, S.B. (1953): *Indian Climatology, Climostatics, Climate classification of India with special reference to the Monsoons*, Calcutta.
6. Cock, N.K.(1995) : *Geohazards: Natural and Human*, Prentice Hall.
7. Critchfield, J.H. (1983): *General Climatology*, Prentice HAll.
8. Cronin, T.M. (2009): *Paleoclimates: Understanding Climate Change Past and Presen*, Columbia University Press, New Work.
9. Das, P.K. (1995): *Monsoons*, National Book Trust, New Delhi
10. Griffiths, J.F. (1976): *Applied Climatology*, Oxford University Press, London.
11. Hobbs, J.E.(1980): *Applied Climatology: A Study of Atmospheric Resources*, Westview Press.
12. Huntington, E. and S.S. Visher.(1922): *Climatic Changes; Their Nature and Causes*, Yale University Press, New Haven.
13. Lal, D.S. (2003): *Climatology*, Sharda Pustak Bhavan, Allahabad.
14. Lal. M. (Eds.) (1993): *Global Warming: Concern for Tomorrow*, Tata McGraw Hill, New Delhi.
15. Lamb, H.H. (2011): *Climate : Present, Past and Futur*, Vol.1&2. Routledge.
16. Linacre, E. and Geerts, B.(1997): *Climates and Weather Explained*, Routledge, London.
17. Lutgens, F.K.. and Tarbuck, E.J.(2010): *The Atmosphere: An Introduction to Meteorology*, 11th edition, Prentice-Hall.
18. Oliver J.E. & Hioddore J.J, (2003): *Climatology: An Atmospheric Science*, Prentice Hall.
19. Pant, G.B. and Kumar, R.K.(1997): *Climates of South Asia*, Wiley, Chichester.
20. Singh R.L (Eds.) (1971): *India: A Regional Geography*, National Geog. Society of India, Varanasi.
21. Singh, S. (2013): *Physical Geography*, Prayag Pub., Allahabad.
22. Singh, S. (2009): *Climatology*, Prayag Pustak Bhandar, Allahabad.
23. Trewartha,G.T. and Horn, L.A., (1980): *An Introduction to Climate*, McGraw Hill, New Work

Semester - II

(MSCGEOGC202: Core Course-8, Theoretical)

Soil and Biogeography

✧**Full Marks: 50** ✧ **CA+ESE Marks: 15+35**
✧ **Credit: 4** ✧ **L - T – P: 4 - 0 - 0**
✧ **End Sem Exam Duration: 2 Hours**

Course Learning Outcomes:

1. *Describe the major factors and processes governing the soil formation.*
2. *Get knowledge about the different issues regarding soil degradation and soil conservation.*
3. *Explain the major principles and processes that govern the local and global distribution of plants and animals*
4. *Identify the roles of energy flow and biogeochemical cycling in ecosystems.*
5. *Critically assess theoretical and conceptual issues related to anthropogenic impacts on biodiversity and its conservation.*

Unit 1: Soil Geography

1.1 Soil Formation: Factors and Processes; Soil Properties (Physical and Chemical); Soil Nutrients and Organisms; Soil Profile.

1.2 Soil Taxonomy: Classification by USDA and FAO; Soil Degradation: Causes and Consequences; Soil Conservation.

Unit 2: Plant and Animal Community

2.1 Plant Community: Meaning and Concepts; Evolution and Classification of Plants; Plant Response to Environment: Adaptation, Succession, and Climax; Dispersal and Distribution of Plants.

2.2 Animal Community: Factor influencing the Distribution, Dispersal and Migration of Animals; Means and Barriers; Extinction of Animal Species.

Unit 3: Ecosystem and Ecology

3.1 Ecosystem: Meaning and Concepts; Components and Classification of Ecosystem; Functions: Trophic Levels, Energy Flows, Cycles (Geo-chemical, Carbon, Nitrogen and Oxygen), Food Chain, Food Web and Ecological Pyramid.

3.2 Ecology: Concept of Ecology; Principles of Physical and Human Ecology; Ecosystem: Forest and Desert with Special Reference to India.

Unit 4: Biomes and Biodiversity

4.1 Biomes with Special Reference to Tropical Rain Forests, Tropical Monsoon Deciduous Forest, Tropical and Temperate Grass Lands.

4.2 Biodiversity: Concept, Types and Importance; Biodiversity Conservation; Biosphere Reserve with Special Reference to Sundarbans and Western Ghats.

Continuous Assessment [15 Marks]

(*The department shall decide the methods of internal assessment*)

✧ Suggested Readings:

1. Allee, W.C. & Schmidt, K.P. (1937): *Ecological Animal Geography*, New York.
2. Cox, C.B. and Moore, P.D. (1993): *Biogeography: An Ecological and Evolutionary Approach, 5th Edition*, Blackwell, Oxford.
3. Cloudsley-Thompson, J.L.(1975): *Terrestrial Environment*, Wiley, New York.
4. Darlington, P. J. (1957): *Zoogeography: The Geographical Distribution of Animals*, Wiley, New York.
5. Dansereau, P.(1957): *Biogeography: An Ecological Perspective*, Ronald Press, New York
6. Good, R. (1974): *Geography of the Flowering Plants*, Longman, 4th Edition, Green & Co. London.
7. Haggett, R.J., (1998): *Fundamentals of Biogeography*, Routledge, London.
8. Illies, J. (1974): *Introduction to Zoogeography*, translated by W.D.Williams, Macmillan, London.
9. Jeffries, M.J. (1997): *Biodiversity and Conservation*, Routledge, London.
10. Jones, R.L. (1980): *Biogeography: Structure, Process Pattern and Change within the Biosphere*.
11. Mathur, M.S. (1988): *Essentials of Biogeography*, Jaipur
12. Miller, C.E. et al., (1990*): Fundamentals of Soil Science*, 8th edition, John Wiley and Sons, New York.
13. Newbigin, M.I.(1936): *Plant and Animal Geography*, Methuen & Co, London.
14. Odum, E.P. (1971): *Fundamentals of Ecology*, Saunders, Philadelphia.
15. Pielou, E.C.(1979) : *Biogeography*, John Wiley and Sons, New York.
16. Pimm,S.L.(1991) : *Balance of Nature-Ecological Issues in the Conservation of Species and Communities*, University Press, Chicago.
17. Shimvell, D.W.(1971): *Description and Classification of Vegetation*, University of Washington Press, Seattle.
18. Simmon, I.G.(1979):*Biogeography: Natural and Cultural*,E. Arnold, London.
19. Singer. M.J. & Donald, N.M. (1987): *Soils: An Introduction*, 2nd edition, Macmillan, N.Y.
20. Singh, R.B. (2009): (Eds.) *Biogeography and Biodiversity*. Rawat Publication, New Delhi.
21. Watts, David. (1971): *Principles of Biogeography*, McGraw Hill, New York.
22. Wilson, E.O.(1992*): Diversity of Life*, Harvard University Press, Cambridge.

Semester - II

(MSCGEOGC203: Core Course-9, Theoretical)

Social, Cultural and Settlement Geography

✧Full Marks: 50 **✧ CA+ESE Marks: 15+35**
✧ Credit: 4 **✧ L - T – P: 4 - 0 - 0**
✧ End Sem Exam Duration: 2 Hours

Course Learning Outcomes:

1. *Learn the components of society with varied nomenclature.*
2. *Get an insight to the richness of culture across spaces which give shape to the very branch of social and cultural geography.*
3. *Trace the evolutionary processes of human habitation which further gives input in the emergence of settlement patterns.*
4. *Locate the change in settlements in between rural to urban settings and the dynamism of human development.*

GROUP-A: SOCIAL AND CULTURAL GEOGRAPHY

Unit 1: Concepts and Elements of Social Geography

1.1 Scope and Content of Social Geography; Social space, Social Structure and Social Processes; Social Distance and Conflicts, Social Inequality, Concept of Welfare and Social Wellbeing

1.2 Social Groups and Ethnicity, Distribution of Social Groups with Special reference to Language, Race and Tribes in India.

Unit 2: Cultural Geography

2.1 Definition, Components and Functions of Culture; Cultural Diffusion, Cultural Hearth and Realm, Culture as a Geographical Process.

2.2 Acculturation; Metropolitan Culture and Cultural Globalization; Cultural Ecology and Folk Geography: study on Folk Architecture, Folk Music and Dance, Folk Fairs and Festivals.

GROUP-B: SETTLEMENT GEOGRAPHY

Unit 3: Rural Settlements

3.1 Evolution and Growth of Rural Settlement, Site and Situation, Patterns and Segregation of Rural Settlements; Rural Morphology

3.2 Rural House Forms and Types in Different Geographic Environment in India; Rural-urban Linkages with Special References to India.

Unit 4: Urban Settlements

4.1 Definition of Urban: World and India, Classification of Towns based on Function, Urban Systems and Hierarchy: Central Place, Rank Size Rule and Primacy.

4.2 Classical Models of Urban Land Use; Type of Urbanized Regions: Conurbation, Metropolis, Megalopolis; Socio-environmental Problems of Urban Settlement.

Continuous Assessment [15 Marks]

(*The department shall decide the methods of internal assessment*)

✧ Suggested Readings:

1. Ahmad, A. (1999): *Social Geography*, Rawat Publications, Jaipur and New Delhi.
2. Carter, H. (1972): *The Study of Urban Geography*, Edward Arnold, London.
3. Chisholm, M. (1967): *Rural Settlement and Land use*, John Wiley, New York.
4. Clout, H.D. (1977): *Rural Geography*, Pergamon, Oxford.
5. Coates, B.E., Johnston, R.J. and Knox, P.L. (1977): *Geography and Inequality*, Oxford University Press.
6. Doniel, P. and Hopkinson, M. (1986): *The Geography of Settlement*, Oliver & Boyd, Edinburgh.
7. Forde, C.D. (1934): *Habitat, Economy and Society*, Methuen and Company, London.
8. Gore, M.S. (1985): *Social Aspects of Development*, Rawat Publications, Jaipur.
9. Gregory, D. and Larry, J. (eds.) (1985): *Social Relations and Spatial Structures*, MacMillan, London.
10. Grover, N. (1985): *Rural Settlement: A Cultural Geographical Analysis*, Inter India Publication, Delhi.
11. Hudson, F.S. (1976): *A Geography of Settlements*, Macdonald and Evans, New York.
12. Johnson, J.H. (1976): *Urban Geography: An Introductory Analysis*, Pergamon Press.
13. Johnston, R.J. (1984): *Urban Geography*, Penguin, London.
14. Jones, E. (ed.) (1975): *Readings in Social Geography*, Oxford University Press, London.
15. Norton, W. (2006): *Cultural Geography: Environments, Landscapes, Identities, Inequalities*, Oxford University Press.
16. Ramachandran, H. (1985): *Village clusters and Rural Development*, Concept Publication, New Delhi.
17. Ramachandran, R. (1989): *Urbanization and Urban Systems in India*, Oxford University Press, New Delhi.
18. Rao, R.N. (1986): *Strategy for Integrated Rural Development*, B.R. Publication, Delhi.
19. Rapoport, A. (1969): *House Form and Culture*, Prentice Hall, New Jersey.
20. Singh R. L. (1975): *Readings in rural settlement geography*, National Geographical Society of India.
21. Singh, R.Y. (2002): Geography of Settlements, Rawat Publication.
22. Smith, D. (1977): *Geography: A Welfare Approach*, Edward Arnold, London.
23. Sopher, D. (1980): *An Exploration of India: Geographical Perspectives on Society and Culture*, Cornell University Press, Ithaca, New York.
24. Srinivas, M.N. (1968): *Village India*, Asia Publication House, Bombay.
25. Valentine, G. (2001): *Social Geographies: Space and Society*, Prentice Hall, Harlow, UK.
26. Verma, L.N. (2006): *Urban Geography*, Rawat Publications, Jaipur.
27. Wanmati, S. (1983): *Service Centers in Rural India*, B.R. Publication Corporation, Delhi

Semester - II

(MSCGEOGC204: Core Course-10, Practical)

Quantitative Techniques in Geography

✧ **Full Marks: 50** ✧ **CA+ESE Marks: 30+20**
✧ **Credit: 2** ✧ **L - T – P: 0 - 0 - 4**
✧ **End Sem Exam Duration: 2 Hours**

Course Learning Outcomes:

1. *Students will learn statistics from basic level to more advanced level from this course.*
2. *Understand the concept of sampling and different sampling techniques focusing on quantitative analysis of sampling design.*
3. *Learn to examine the relationship between two or more variables using correlation and regression analysis techniques.*
4. *Students will be able to understand the concept of hypothesis testing focusing on different measures of hypothesis test for different types of data.*
5. *Understanding matrix and its applicability for the analysis of geographical data.*
6. *They will get hands on experience on temporal data modeling through advanced statistical techniques.*
7. *Overall the students will learn how to analyse real world geographical data through different statistical techniques.*

Unit 1: Probability, Sampling and Test of Confidence [15 Marks]

1.1 Concept of probability and set theory; Conditional and independent probability, Application of Bayes' theorem; Selected distribution: Normal distribution curve and Z-score, Binomial and Poisson.

1.2 Sampling theory and techniques; Estimation from sample; Confidence limit; Standard error of mean.

1.3 Scaling techniques: Primary scaling techniques (Nominal, Ordinal, Ratio and Interval); Other scaling techniques (Rank Score, Weighted Score, Likert's Opinionnaire).

1.4 Hypothesis testing and statistical decision theory: Hypothesis formulation and rejection rule, Type I and Type II errors, One-tailed and two-tailed tests; t-test; Z-test, Analysis of Variance (ANOVA): One-way and Two-way.

Unit 2: Correlations, Regressions and Statistical inferences [15 Marks]

2.1 Bivariate Correlation (Rank: Kendall and Spearman; Product Moment); Regression: Linear and Curvilinear (Parabolic, Geometric and Exponential); Multiple and Partial Correlation.

2.2 Significance test of Correlation Coefficient and Regression Coefficient; Nonparametric Hypothesis tests: χ^2 test, Mann-Whitney U Test and Kruskal-Wallis Test.

2.3 Elementary ideas of Matrix algebra; Determinant and Cramer's rule; Solving Multiple Regression Equations using Matrix and Cramer's rule; Factor Analysis (Centroid Method).

2.4 Modeling Temporal Data: Markov Chains (Mapping Transition Matrix); Method for testing trend of time series (Mann-Kendall test); Detection of Cycles (Autocorrelation); Principles of ARIMA modeling.

In the End Semester Examination, students have to answer one compulsory question from the above two Units.

Viva-voce [5 Marks]
Continuous Assessment [30 Marks]
*(*A Project File, comprising one exercise each is to be submitted)*

✧ Suggested Readings:

1. Alvi, Z. (1995): *Statistical Geography: Methods and Applications*, Rawat Publications, New Delhi.

2. Chakravorty, J.G. and Ghosh, P.R. (2007): *Advanced Higher Algebra*, U.N. Dhur & Sons Private Ltd., Kolkata.

3. Chatfield, C. (1995): *The Analysis of Time Series: An Introduction*, Chapman & Hall, Boca Raton.

4. Clark, W.A.V and Hosking, P.L. (1986*): Statistical Methods for Geographers*, Wiley and Sons.

5. Cole, J.P. and King, C.A.M. (1969): *Quantitative Geography (Techniques and Theories in Geography)*, John Wiley & Sons Ltd., London.

6. Gun, A.M., Gupta, M.K. and Dasgupta, B. (2008): *Fundamental of Statistics* (Volume One and Two), The World Press Private Limited, Kolkata.

7. Haan, C.T. (1977): *Statistical methods in hydrology*, The Iowa State University Press, Ames.

8. Hammond, R. and McCullagh, P. (1991): *Quantitative Techniques in Geography*, Clarendon Press, Oxford

9. Hayslett, H.T. (1976): *Statistics: Made Simple*, W.H. Allen, London.

10. Joreskog, K.G., Klovan, J.E. and Reyment, R.A. (1976): *Geological Factor Analysis*, Elsevier Scientific Publishing Company, Amsterdam.

11. Khan, N. (2002): *Quantitative Methods in Geographical Research*, Concept Publishing Company, New Delhi.

12. Kothari, C.R. (1979): *Quantitative Techniques*, Vikas Publishing House Pvt. Ltd., New Delhi.

13. Kothari, C.R. (2009): *Research Methodology: Methods and Techniques*, New Age International Publishers, Kolkata.

14. Kurtz, N.R. (1983): *Introduction to Social Statistics*, McGraw-Hill International Book Company, Auckland.

15. Lehmann, E.L. and Joseph P. Romano, J.P. (2008): *Testing Statistical Hypotheses*, Springer.

16. Machiwal, D. and Jha, M.K. (2012): *Hydrologic Time Series Analysis: Theory and Practice*, Springer.

17. Mahmood, A. (1998): *Statistical Methods in Geographical Studies*, Rajesh Publication.

18. Malhotra, O.P. and Gupta, S.K. (1990): *Elementary Statistics*, S. Chand & Company Ltd., New Delhi.

19. Mukherjee, A. (2007): *Fundamental Treatise on Probability and Statistics*, Sree Tara Prakashani, Kolkata.

20. Naghettini, M. (Ed.) (2017): *Fundamentals of Statistical Hydrology*, Springer.

21. Pal, S.K. (1999): *Statistics for Geoscientists*, Concept publishing Company, New Delhi.

22. Sarkar, A. (2013): *Quantitative Geography: Techniques and Presentations*, Orient BlackSwan, Hyderabad.

23. Silk, J. (1979): *Statistical techniques in Geography*, George Allen and Unwin, London.

24. Spiegel, M.R. and Stephens, L.J. (2000): *Theory and Problems of Statistics*, Tata McGraw-Hill Publishing Company Limited, New Delhi.

25. Walford, P. (1995): *Geographical Data Analysis*, John Wiley and Sons Inc., New York.

26. Yeates, M. (1974): *An introduction to Quantitative Analysis in Human Geography*, McGraw-Hill.

Semester - II

(MSCGEOGC205 Core Course-11, Practical)

Computer Basics and Field Report

✧ **Full Marks: 50** ✧ **CA+ESE Marks: 30+20**
✧ **Credit: 4** ✧ **L - T – P: 0 - 0 - 8**
✧ **End Sem Exam Duration: 2 Hours**

Course Learning Outcomes:

1. *Gain knowledge about computer system and its components.*
2. *The students will learn about computer number system and also learn how to collect data from internet sources to arrive at a conclusion.*
3. *They will get hands on experience on statistical analyses using Excel spreadsheets and statistical softwares.*
4. *This course also aims to present the essence of geography as a field science. Students will develop their aptitude in observation, data generation through field survey, data analysis with various software and advanced techniques.*
5. *Upon completion of this course, they will finally know how to integrate all the data for the preparation of field report focusing on a specific problem.*

Unit 1: Computer Basics and Application in Data Processing and Representation
[15+10 = 25 Marks]

1.1 Computer components: Hardware and software: CPU, Input and Output devices; Common computer languages, System Software and Application Software.

1.2 Numbering Systems; Basic Logic Gates; Boolean Logic and Reduction Techniques; Data mining from internet sources: preparation of an inventory.

1.3 Computation, Storing and Formatting Spreadsheets using Microsoft Excel: Computation of Rank, Mean, Median, Mode, Standard Deviation, Moving Averages; Covariance, Correlation (Product Moment) and Correlation Matrix, Regression (Linear, Curvilinear and Multiple), Hypothesis testing; Graphical representation of data: Histogram, Curve fitting, Box-plots.

1.4 Advanced Data Processing using software: Optimization Problems (Regression Modeling) using Excel Solver; Temporal Data Modeling (Markov Chains, Mann-Kendall test, ARMA).

Continuous Assessment [15 Marks]
In the End Semester Examination, students have to answer one compulsory question from the above unit. [10 Marks]

Unit 2: Field report on either a Rural Mouza or at least one ward of an Urban area to be conducted during Field Excursion [15+10=25 Marks]

Guideline for field report on Rural Mouza

❖ The following methods are to be followed before the preparation of field report:

(a) Plot-to-Plot Land Use Survey
(b) Collection of Socio-Economic and Physical Data

(c) Classification and Tabulation of Data
(d) Preparation of Land Use Map on Cadastral Plan
(e) Preparation of Maps and Diagrams showing Physiography, Drainage, Soil, Forest, Settlement, Irrigation, Cropping pattern, Demographic Characteristics etc.
(f) Interrelation and Analysis of Data, Maps and Diagrams

❖ The Reports is to be Prepared under the following sections:

(a) Introduction: Objective, Extent and Space Relations, Sources of Information, Methodology etc.
(b) Physical Components: Lithology, Drainage, Surface Condition, Slope, Climate, Soil Vegetation, etc.
(c) Population: Number, FMR, Literacy, Occupational Structure, Ethnic and Religious Composition, Language, Mobility, Media Exposure, Per Capita Income etc.
(d) Settlement: Number of Houses, Building Materials, Number and Size of Rooms, Amenities etc.
(e) Agriculture: Soil Properties, Irrigational Facilities, General Land Use, Cropping Intensity, Crop- Combination, Use of Fertilisers, Production and Marketing etc.
(f) Other Economic Activities: Fishing, Horticulture, Brick-Kiln Industries
(g) Problems, Prospects, Suggestion and Conclusion.
(h) Bibliography.

Guideline for field report on Urban Area (At least One Ward)

❖ The following methods are to be followed before the preparation of Field Report:

(a) Plot – to- Plot Land Use Survey
(b) Collection of Socio-Economic Data.
(c) Classification and Tabulation of Data.
(d) Preparation of Urban Land Use Maps.
(e) Preparation of Maps and Diagrams showing Urban Morphology, Drainage and Sewage Networks, Communication Networks, Traffic Flow and Travel- Time, Demographic Characteristics, Cultural and Economic Zonation etc.
(f) Interrelation and Analysis of Data, Maps and Diagrams.

❖ The report is to be prepared under the following sections:

(a) Introduction: Objective, Extent and Space Relations, Sources of Information, Methodology etc.
(b) Physical Components: Surface Conditions, Slope, Drainage, Climate etc.
(c) Demography: Spatial Analyses of Population Density, FMR, Literacy, Occupational Structure, Ethnic and Religious Composition, Language, Mobility, Media Exposure, etc.
(d) Town Morphology: Activity Zones, Sectors of Land Use, Linkages between different Zones and Sectors.
(e) Economy: Economic Individuality of the Town, Production and Marketing Patterns, Spatial differences in Occupation and Per Capita Income Characteristics etc.
(f) Urban Waste and its Management: Types of Wastes Generated, Network of Drains, Efficiency of Waste Removal and Sewage Treatment, Peoples' Perception of Pollution Problem.
(g) Bibliography

- Field Reports is to be computerised.
- Text of the Report should not Exceed 4,000 words
- Maps and Diagrams Excluding Photo-Plates should not Exceed 20

Continuous Assessment for unit 2 will be based on field performance and preparation of the field report and presentation of the field report. [15 Marks]

End Semester for unit 2 will be based on Field Report+ Viva-voce [5 +5= 10 Marks]

✧ Suggested Readings:

1. Balagurusamy, E. (2009): *Fundamentals of Computers*, Tata McGraw-Hill Education Pvt. Ltd.

2. Bartee, T.C. (1977): *Digital Computer Fundamentals*, McGraw Hill.

3. Blissmer, R. (1996): *Working with MS Word*, Houghton Mifflin Co.

4. Chauhan, S., Saxena, A. and Gupta, K. (2006): *Fundamentals of Computer*, Laxmi Publications.

5. Flake, L.J., McClintock, C.E. and Turner, S. (1989): *Fundamental of Computer Education*, Wordsworth Pub. Co.

6. Leach, D.P., Malvino, A.P. and Saha, G. (2011): *Digital Principles and Applications*, Seventh Edition, Tata McGraw Hill Education Private Limited, New Delhi.

7. Leon, A. and Leon, M. (2009): *Introduction to Computers*, Vikas Publishing.

8. Leon, A. and Leon, M. (2012): *Internet for Everyone*, Second Edition, Vikas Publishing House

9. Mano, M.M. and Kime, C. (2014): *Logic and Computer Design Fundamentals*, Fourth Edition, Pearson Education Limited.

10. Miller M. (2007): *Absolute Beginner's Guide to Computer Basics*, Fourth Edition, QUE.

11. Rajaraman, V. (2003): *Fundamentals of Computers*, Prentice Hall India Learning Private Limited

12. Rajaraman, V. (2009): *Computer Primer*, 2nd Edition, Prentice Hall India Learning Private Limited.

13. Sarkar, A. and Gupta, S.K. (2002): *Elements of Computer Science*, S Chand and Company, New Delhi.

14. Sinha, P.K. and Sinha, P. (2008): *Foundations of Computing*, Third Edition, BPB Publication

Semester - II

(MSCGEOGMIE201: Minor Elective-1, Theoretical)

Geospatial Science

✧Full Marks: 50 **✧ CA+ESE Marks: 15+35**
✧ Credit: 4 **✧ L - T – P: 4 - 0 - 0**
✧ End Sem Exam Duration: 2 Hours

Course Learning Outcomes:

After completion of this course, students will be able to –

1. *Learn the conceptual foundation of Remote Sensing (RS), Geographic Information System (GIS) and Global Positioning System (GPS).*
2. *Learn various data Acquisition and analysis techniques in remote sensing.*
3. *Learn supervised and unsupervised image classification techniques with the help of software.*
4. *Examine and understand the spatial data models and its applications in geography.*

Unit 1: Basic Concept of Remote Sensing

1.1 Physics of Remote Sensing: Electro Magnetic Radiation (EMR), Radiation Laws (wavelength- frequency-energy relationship of EMR numerical problems).

1.2 Data Acquisition Techniques: Types of Remote Sensing data and methods of interpretation; Analysis of data with special reference to Aerial Photographs and Satellite Images.

Unit 2: Fundamental Concept of Remote Sensing

2.1 Concepts and Types of Remote Sensing: Thermal Remote Sensing, Microwave Remote Sensing, Hyper spectral Remote Sensing; Satellite Sensors: Concept of IFOV, Resolution, Band Combination, TCC, FCC and SFCC.

2.2 Referencing scheme of satellite system (path/row calculation); Digital image Classification: supervised and unsupervised classification.

Unit 3: Geographic Information System

3.1 Concept, Component and Data structure of GIS, Concept of Spatial data in GIS: Vector and Raster Data.

3.2 Data Acquisition Techniques: Use of GPS and Google Earth Image.

Unit 4: Image Rectification and Vectorizations

4.1 Demonstration of software (open Source)

4.2 Georeferencing, Reprojection, Vectorization and Spatial data editing; Digitization of Points, Line and Polygons; Preparation of different Types of FCC and Map Composition.

Continuous Assessment [15 Marks]

(*The department shall decide the methods of internal assessment*)

✧ Suggested Readings:

1. Agarwal, G.C. (1974): *Photogrammetric Surveys, their Planning, Execution and Costing*, Survey of India Technical Publication, No. 7401.
2. Bhatta, B. (2011): *Global Navigation Satellite Systems: Insights into GPS, GLONASS, Galileo, Compass and Others*, CRC Press.
3. Bhatta, B. (2011): *Remote Sensing and GIS*, 2nd ed., Oxford Univ. Press.
4. Campbell, J.B. (1996): *Introduction to Remote Sensing*, 2nd edition, Taylor and Francis, London.
5. Chaisman, N. (1992): *Exploring Geographical Information Systems*, John Wiley and Sons Inc., New York.
6. Curran, P.J. (1988): *Principles of Remote Sensing*, ELBS Edition, Longman Group Ltd., UK.
7. Heywood, D.I., Cornelius, S. and Carver, S. (2006): *An Introduction to Geographical Information Systems*, Prentice Hall, Upper Saddle River, New Jersey.
8. Jensen, J.R. (2006): *Remote Sensing of the Environment: An Earth Resource Perspective*, Prentice Hall, Upper Saddle River, New Jersey.
9. Joseph, G. (2003*): Fundamental of Remote Sensing*, University Press (India) Pvt. Ltd.
10. Joseph, G. and Jegannathan, C. (2018): *Fundamentals of Remote Sensing*, 3rd ed., Universities Press.
11. Lillesand, T.M. and Kiefer, R. W. (1994): *Remote Sensing and Image Interpretation*, 3rd edition, John Wiley and Sons, New York.
12. Marcolongo, B. and Mantorani, F. (1997): *Photogeology: Remote Sensing Application in Earth Science*, Oxford and IBH Pub. Pvt. Ltd., New Delhi

SYLLABUS

for

M.Sc. in Geography

(Semester - III)

Semester - III

(MSCGEOGC301: Core Course-12, Theoretical)

Agricultural Geography and Landuse Planning

✧**Full Marks: 50** ✧ **CA+ESE Marks: 15+35**
✧ **Credit: 4** ✧ **L - T – P: 4 - 0 - 0**
✧ **End Sem Exam Duration: 2 Hours**

Course Learning Outcomes:

1. *Trace the dynamism and evolutionary processes of agriculture as a discipline of geography over time.*
2. *Apply the knowledge of agricultural geography in identification and demarcation of region having agricultural importance using statistics.*
3. *Learn to plan the best possible uses of land applying suitable techniques over varied geographical locations*

GROUP-A: AGRICULTURAL GEOGRAPHY

Unit-1: Concept of Agriculture

1.1 Scope, content and its relation with other branches of Geography. History of evolution of agriculture in India.

1.2 Theories of Agricultural location: Von-Thünen's classical theory, Sinclair's model of Peri urban agriculture. Agricultural innovations and their diffusion.

Unit-2: Dimensions of Agriculture and Distribution

2.1 Determinants of agricultural land use: Physical, Socio-economic and Technological; Concept and techniques of delineation of Agricultural Regions, Cropping pattern, Crop combination, Crop diversification, Agricultural productivity and efficiency.

2.2 Changing pattern of world agriculture: Tropical, Temperate and Mediterranean region. Spatial and temporal variation of climate and their impact on agriculture.

GROUP-B: LANDUSE PLANNING

Unit-3: Landuse Techniques and Survey

3.1 Principles of Land use (after Graham, Stamp and Lewis). Land Classification - Storie's rating index, Azzi's index, Land Capability Classification by USDA.

3.2 Landuse survey - Reconnaissance, Topographical Survey, Remote Sensing, Integrated Survey Technique.

Unit-4: Landuse Model and Perception

4.1 Landuse pattern in Wetlands and suggestions for optimum use.

4.2 Landuse in Glaciated lands and suggestions for optimum use.

Continuous Assessment [15 Marks]
(*The department shall decide the methods of internal assessment*)

✧ **Suggested Readings**:

1. Briggs, D. (1985): *Agriculture and Environment, Longman*, London.
2. De, N.K. and Jana, N.C. (1997*): The Land: A Multifaceted Appraisal and Management*, Sribhumi Publishing Co.
3. FAO (1974): *A Framework for Land classification*, Soil Bulletin No. 32, FAO, Rome.
4. Gregor, H.P. (1970): *Geography of Agriculture*, Prentice Hall, New York.
5. Grigg, D. (1984): *An Introduction to Agricultural Geography*, Hutchinson Publication, London.
6. Grigg, D.B. (1974): *The Agricultural Systems of the World*, Cambridge University Press, New York.
7. Hironi, K. (1991): *Land use Planning and Geomorphology: A study of Swai Madhopur*, Concept Pub Co., New Delhi.
8. Husain, M. (1996): *Systematic Agricultural Geography*, Rawat Pub., New Delhi.
9. Joy, T.V. (1990): *Agricultural Ecology, Longman*, London.
10. Lindgren, D. (2002): *Land Use Planning*, Springer.
11. Mandal, R.B. (1982): *Land Utilization: Theory and Practice*, Concept Pub. Co., New Delhi.
12. Mather, A.S. (1986): *The Land*, Longman Group Ltd., UK.
13. Morgan, W.B. (1978): *Agriculture in the Third World: A spatial analysis*, Westview Press, Boulder.
14. Morgan, W.B. and Munton, R.J.C. (1971): *Agricultural Geography*, Methuen, London.
15. Randolph, John. (2003): *Environmental Land Use Planning and Management*, Island Press.
16. Roychaudhuri, S.P. (1966): *Land and Soil*, National Book Trust, New Delhi.
17. Shafi, M. (2005): *Agricultural Geography*, Pearson.
18. Sharma, K.D. and Soni, B. (2006): *Land Use Diversification for Sustainable Rainfed Agriculture*, Atlantic Publishers and Distributors.
19. Silberstein, J. and Maser, C. (2000): *Landuse planning for Sustainable Development*, CRC Press.
20. Singh, J. and Dhillon, S.S. (1988): *Agricultural Geography*, Tata McGraw-Hill, New Delhi.
21. Symons, L. (1972): *Agricultural Geography*, Bell and Sons, London.
22. Tarrant, J.R. (1974): *Agricultural Geography: Problems in Modern Geography Series*, John Wiley and Sons.

Semester - III

(MSCGEOGC302: Core Course-13, Theoretical)

Remote Sensing and Geographic Information System-I

✧**Full Marks: 50** ✧ **CA+ESE Marks: 15+35**
✧ **Credit: 4** ✧ **L - T – P: 4 - 0 - 0**
✧ **End Sem Exam Duration: 2 Hours**

Course Learning Outcomes:

1. *Understanding background process of a satellite remote sensing system with physical laws and other concepts.*
2. *Student will learn different types of remote sensing systems and their differential characteristics.*
3. *Student will understand the application fields of remote sensing data and also understand the working process of GPS and GNSS system.*

4. *Students will gain knowledge of GIS system and its applicability in different field of geographical studies along with its components*
5. *Students will built up their knowledge regarding image enhancement techniques required for better image analysis and also understand background theories of satellite image classification.*

Unit-1: Physical Basis of Remote Sensing and Satellite Systems

1.1 *Physics of Remote Sensing*: Electro Magnetic Radiation (EMR), Radiation laws (wave length frequency- energy relationship of EMR); Requirements and Stages of Remote Sensing; Satellite Platforms and Sensors: Basics, Kepler's laws, Major-Semi major axis and eccentricity, Velocity, Period, Historical development, Launch Vehicle, Indian scenario.

1.2 Satellite Data Acquisition techniques; Interpretation and analysis of aerial photographs and satellite images; Satellite Sensors: Concept of IFOV, Resolution, Band Combination, FCC and SFCC; Satellite Systems: Whiskbroom Systems (LANDSAT Series), Pushbroom Systems (SPOT, IRS series), Microwave Systems (RADARSAT), Coarse resolution/ Meteorological Satellite systems (NOAA, INSAT), Very high-resolution satellite systems (Quickbird, Cartosat, IKONOS, WorldView series). Referencing scheme of satellite system (path/row calculation). Spectral signature curve.

Unit-2: Applications of Remote Sensing and Global Navigation Satellite System (GNSS)

2.1 Application of Remote Sensing: Comparative assessment of SOI toposheet; Aerial photographs and Satellite imageries in representing geographical data. Remote Sensing in Landuse/ Landcover applications, Soil and Agriculture applications, Geomorphic Mapping, Watershed Management.

2.2 Principles of GNSS positioning with special reference to GPS; Sources of error in a GNSS system; DGPS and its uses.

Unit-3: Fundamentals of Geographic Information System

3.1 *Basic Concepts*: Definition of GIS, Components of GIS, Variables: points, lines, polygon, Functionality of GIS, Advantage and Limitation of GIS; *GIS Data:* Spatial and Attribute Data, Information Organization and Data Structures, Data file and database; Concept of Multi-criteria Decision Making and its application.

3.2 *Creating GIS Database*: File organization and formats, Geo-database, Rectification, Digitization and Map Composition. *GIS Data Input:* Nature and Source of data, Methods of spatial data capture: Primary and Secondary, digitization and scanning method; Techniques and procedure for digitizing, Errors of Digitization, Attribute data capture; *Data Editing:* Detecting and correcting errors, Re-projection, Transformation and Generalization, Edge matching and Rubber sheeting, Topology.

Unit-4: Digital Image Classifications

4.1 Definition of Digital Image; Source of Data and Data Formats; Hardware and Software

Consideration for Digital Image Processing; Satellite Data Encoding and Decoding, Data Loading; Image Restoration, Image Reduction and Magnification, Concept of Geometric, Atmospheric and Radiometric correction of satellite image.

4.2 *Image Enhancement Techniques*: Grey Level Thresholding, Level Slicing, Contrast Stretching - Linear and Non-Linear, Density Slicing; Image Filtering (Types and Methods), Multiband Enhancement (Band Ratioing, RGB Transformations, Principal Component Analysis, Image fusion); Digital image classification: supervised and unsupervised classification.

Continuous Assessment [15 Marks]

(*The department shall decide the methods of internal assessment*)

✧ **Suggested Readings**:

1. Bhatta, B. (2011): *Global Navigation Satellite Systems: Insights into GPS, GLONASS, Galileo, Compass and Others*, CRC Press.
2. Bhatta, B. (2011): *Remote Sensing and GIS*, 2nd ed., Oxford Univ. Press.
3. Campbell, J.B. (1996): *Introduction to Remote Sensing*, 2nd edition, Taylor and Francis, London.
4. Chaisman, N. (1992): *Exploring Geographical Information Systems*, John Wiley and Sons Inc., New York.
5. Curran, P.J. (1988): *Principles of Remote Sensing*, ELBS Edition, Longman Group Ltd., UK.
6. Heywood, D.I., Cornelius, S. and Carver, S. (2006): *An Introduction to Geographical Information Systems*, Prentice Hall, Upper Saddle River, New Jersey.
7. Jensen, J.R. (2006): *Remote Sensing of the Environment: An Earth Resource Perspective*, Prentice Hall, Upper Saddle River, New Jersey.
8. Joseph, G. (2003*): Fundamental of Remote Sensing*, University Press (India) Pvt. Ltd.
9. Joseph, G. and Jegannathan, C. (2018): *Fundamentals of Remote Sensing*, 3rd ed., Universities Press.
10. Lillesand, T.M. and Kiefer, R. W. (1994): *Remote Sensing and Image Interpretation*, 3rd edition, John Wiley and Sons, New York.
11. Marcolongo, B. and Mantorani, F. (1997): *Photogeology: Remote Sensing Application in Earth Science*, Oxford and IBH Pub. Pvt. Ltd., New Delhi.
12. Martin, D. (1991): *Geographical Information Systems and their Socioeconomic Applications*, London, Routledge.
13. Sabins, F.F. (1997): *Remote Sensing: Principles and Applications*, 3rd edition, W.H. Freeman & Company, New York.

Semester - III

(MSCGEOGC303: Core Course-14, Practical)

Remote Sensing & Geographic Information System - II

✧ **Full Marks: 50** ✧ **CA+ESE Marks: 30+20**
✧ **Credit: 2** ✧ **L - T – P: 0 - 0 - 4**
✧ **End Sem Exam Duration: 2 Hours**

Course Learning Outcomes:

1. *Students will able to download different satellite images from data providers and also get hands on exercise on common satellite data analysis procedures.*
2. *Learners will get knowledge about different image enhancement techniques required for pre-processing of the satellite image.*
3. *Students will learn to create LULC maps from satellite image and also they will learn to generate different bio-physical indices from satellite image.*
4. *After completing this course the students will learn different georeferencing process and how to create different thematic map from obtained data*
5. *Students will learn to arrive to a decision from different sources of data using Multi-criteria Decision Analysis methods*
6. *Learn DEM generation and Surface Analysis including Contour, Slope, Aspects, Hill shade.*
7. *They will learn to generate different Morphometric parameters from DEM such as Relative Relief, Drainage Density and Hypsometry.*

Unit-1: Techniques in Remote Sensing and Digital Image Processing (DIP) [15 Marks]

1.1 Familiarization with hard copy and soft copy satellite images; Selection procedure of IRS series satellite images; Exercise on Visual Image Interpretation: Preparation of thematic overlays from satellite images on the basis of feature identification keys.

1.2 Downloading of different Satellite Data Products (IRS, LANDSAT and Declassified images); File export-import/ translation, Georeferencing of scanned maps and satellite images; Applying reference spheroids and projections; Mosaicing and layering of images and maps of different dates and scales; Creating Region of Interest (sub setting/ clipping).

1.3 Preparation of Colour Composites using different band combinations; Extraction of Spectral Signature of different landuse / landcover features from Satellite Data; Image enhancement techniques: Linear and non-linear contrast enhancement, band rationing, edge enhancement, High pass and Low pass filtering, density slicing, principal component transformation.

1.4 Image Classification: Unsupervised and Supervised Classification. Post Classification Filtering, Accuracy assessment, Creation of look-up table, Classification report generation; Preparation of Iron Index map, Moisture map, Normalized Difference Vegetation Index (NDVI) and Normalized Difference Water Index (NDWI) map.

Unit-2: GIS Data Processing and Global Positioning System & DEM Analysis [15 Marks]

2.1 Scanning, Editing and Conversion in different file format; Generation of vector layers, buffers and attribute tables from image and/or map data; thematic maps using spatial and attribute data. Preparation of decision layer using Multi-criteria Decision Analysis.

2.2 Querying the database; Spatial analysis and modelling in GIS: Interpolation methods (IDW and Kriging), DEM, TIN, variance filter, surface modelling; Application of GIS modelling in Geomorphology or emerging issues in Environment (Case Study: any one).

2.3 Conceptual Framework of GPS surveying; Techniques of GPS data collection and mapping (using Map Source / any other GPS Software/ GIS Software) of a locality with prominent features.

2.4 DEM generation and Surface Analysis: Contour, Slope, Aspects, Hill shade; Representation of Morphometric aspects from DEM: Relative Relief, Drainage Density and Hypsometry.

In the End Semester Examination, students have to answer one compulsory question from the above two Units.

Viva-voce [5 Marks]

Continuous Assessment [30 Marks]

*(*A Project File, comprising one exercise each is to be submitted)*

✧ **Suggested Readings**:

1. Agarwal, G.C. (1974): *Photogrammetric Surveys, their Planning, Execution and Costing*, Survey of India Technical Publication, No. 7401.
2. Bolstad, P. (2016): *GIS Fundamentals: A First Text on Geographic Information Systems*, 5th ed., XanEdu Publishing.
3. Brewer, C.A. (2015): *Designing Better Maps: A Guide for GIS Users*, 2nd ed., ESRI Press.
4. Campbell, J.B. (1996): *Introduction to Remote Sensing*, 2nd edition, Taylor and Francis, London.
5. Chaisman, N. (1992): *Exploring Geographical Information Systems*, John Wiley and Sons Inc., New York.
6. Chang, K-t. (2015): *Introduction to Geographical Information System*, McGraw-Hill Education.
7. Fazal, S. (2008): *GIS Basics*, New Age International (P) Limited, Publishers, New Delhi
8. Harvey, F. (2015): *A Primer of GIS: Fundamental Geographic and Cartographic Concepts*, The Guilford Press.
9. Jensen, J.R. (2006): *Remote Sensing of the Environment: An Earth Resource Perspective*, Prentice Hall, Upper Saddle River, New Jersey.
10. Joseph, G. and Jegannathan, C. (2018): *Fundamentals of Remote Sensing*, 3rd ed., Universities Press.
11. Lillesand, T.M. and Kiefer, R.W. (1994): *Remote Sensing and Image Interpretation*, 3rd edition, John Wiley and Sons, New York.
12. Longley, P., Goodchild, M., Maguire, D.J. and Rhind, D.W. (2011): *Geographic Information Systems and Science*,John Wiley & Sons, New York.
13. Marcolongo, B. and Mantorani, F. (1997): *Photogeology: Remote Sensing Application in Earth Science*, Oxford and IBH Pub. Pvt. Ltd., New Delhi.
13. Rajan, M.S. (1995): *Space Today*, 2nd edition, National Book Trust, New Delhi.
14. Rao, U.R. (1996): *Space Technology for Sustainable Development*, Tata McGraw-Hill, New Delhi.
15. Sabins, F.F. (1997): *Remote Sensing: Principles and Applications*, 3rd edition, W.H. Freeman & Company, New York.
16. Sahu, K.C. (2007): *Textbook of Remote Sensing and Geographical Information Systems*, Atlantic Publishers, New Delhi

Semester - III

(MSCGEOGMJE301: Major Elective-1, Theoretical)

Advanced Geomorphology – I

✧Full Marks: 50 **✧ CA+ESE Marks: 15+35**
✧ Credit: 4 **✧ L - T – P: 4 - 0 - 0**
✧ End Sem Exam Duration: 2 Hours

Course Learning Outcomes:

1. *Understand the concept of theoretical and applied geomorphology, and their linkages with other discipline of knowledge.*
2. *Develop an advanced understanding of the distinct regions of the world in relation to morphological and climatic parameters.*
3. *Learn the forces resisting and driving the flow of water which has its resultant effect on the flow patterns and sediment load.*
4. *Understand the fluvial dynamics and fluvial system response to external forcing during Quaternary period.*
5. *Describe the dynamic and functional interrelationship between forms and processes in a coastal region. They will get knowledge about long term and short-term development of landforms by several processes in the coastal regions and form-process relationships in different spatial and temporal scales.*
6. *Analyze geomorphological issues at global, regional and local scale and application of geomorphological knowledge to resolve different real problems.*

Unit-1: Perspectives and Models in Geomorphology

1.1 Nature and scope of Geomorphology: Theoretical and Applied, its linkages with other branches of Geography and other disciplines; Methodology and recent trends in Geomorphological studies; Climatic Geomorphology and morphogenetic regions in the tropics.

1.2 Concepts of planation surfaces: Peneplanation, Pediplanation, Etchplanation and Cryoplanation. Theories and models of landforms: Tors and Bornhardts, Cirque, Pediment and Delta. Weathering processes and profiles in humid tropical environment.

Unit-2: Fluvial processes and forms

2.1 River hydraulics: flow, energy and hydraulic geometry; Channel geometry (bedrock and alluvial rivers) and the Concept of grade; Catchment processes and fluvial processes; Factors regulating entrainment, transportation and deposition of sediments.

2.2 Adjustment of channel forms and patterns to morphodynamic variables; Fluvial landforms: genetic classification, ordering, formation and evolution; River metamorphosis and Quaternary fluvial systems.

Unit-3: Coastal processes and landforms

3.1 Tidal and fluvial processes in Coasts; Processes and effects of Bioturbation; Bio-tidal accretion; Coral formation and Storm surge/Tsunamis in coasts.

3.2 Formation, System of change and Classification of Coastal Landforms with special reference to Rhythmic Beach Topography, Coastal Dunes and Deltas.

Unit-4: Applied and Regional Geomorphology

4.1 Application of geomorphology in feasibility assessment of engineering and industrials projects; Geomorphic approaches to hazard studies and management of Geomorphic Hazards (Landslides and Riverbank erosion).

4.2 Sikkim-Darjeeling Himalaya: Structure, Process and Landforms; Chhotanagpur Plateau: Delineation, Stratigraphy and Geomorphic Features; Evolution of Indian part of Ganga-Brahmaputra delta (GBD) with reference to climate, tectonics and eustasy.

Continuous Assessment [15 Marks]
(*The department shall decide the methods of internal assessment*)

✧ Suggested Readings:

1. Bierman, P.R. and Montgomery, D.R. (2014): *Key Concepts in Geomorphology*, W.H. Freeman and Company Publishers, New York.
2. Bridge, J.S. (2003): *Rivers and Floodplains: Forms, Processes, and Sedimentary Record*, Blackwell Publishing, Oxford.
3. Charlton, R. (2008): *Fundamental of Fluvial Geomorphology*, Routledge.
4. Gregory K.J. (1997): *River Channel Changes*, John Wiley & Sons., New York.
5. Gregory, K.J. and Goudie, A.S. (2011): *The SAGE Handbook of Geomorphology*, SAGE.
6. Gregory, K.J. and Lewin, J. (2014): *The Basics of Geomorphology: Key Concepts*, SAGE.
7. Gregory, K.J. and Walling, D.E. (1985): *Drainage Basin: Forms and Process - A Geomorphological Approach*, John Wiley & Sons., New York.
8. Gupta, A. (2011): *Tropical Geomorphology*, Cambridge University Press, New York.
9. Kingston D. (1984): *Fluvial Forms and Processes*, Edward Arnold, London.
10. Leopold, L.B., Wolman, M.G. and Miller, J.P. (1964): *Fluvial Processes in Geomorphology*, Dover Publications, Inc., New York.
11. Morisawa M. (1968): *Streams: their dynamics and morphology*, McGraw Hill, New York.
12. Pethick, J. (1984): *An Introduction to Coastal Geomorphology*, Edward Arnold, London.
13. Richards K. (1995): *Rivers*, Methuen & Co., London.
14. Robert, A. (2003): *River Processes: An Introduction to Fluvial Dynamics*, Arnold, London.
15. Schumm S.A. (1977): *The Fluvial System*, Willey Interscience Publication.
16. Sen, P.K. and Prasad, N. (2002): *An Introduction to the Geomorphology of India*, Allied Publishers Pvt. Ltd., New Delhi.
17. Thorn, C.E. (1988): *An Introduction to Theoretical Geomorphology*, Unwin Hyman, Boston.
18. Tinkler, K.J. (1985): *A Short History of Geomorphology*, Barnes & Noble.
19. Twidale, C.R. (1982): *Granite Landforms*, Elsevier Scientific Publishing Company, Amsterdam.
20. Woodroffe, CD. (2002): *Coasts: Form, Process and Evolution*. Cambridge University Press, Cambridge.

Semester – III

(MSCGEOGMJE302: Major Elective-2, Practical)

Advanced Geomorphology - II

✧ **Full Marks: 50** ✧ **CA+ESE Marks: 30+20**
✧ **Credit: 4** ✧ **L - T – P: 0 - 0 - 8**
✧ **End Sem Exam Duration: 2 Hours**

Course Learning Outcomes:

1. *Represent relief features of the flood plains, plateaus, hills, foothills, valleys and through serial, superimposed, composite, projected profiles.*
2. *Get skill of creating slope map, dissection Index map, relative relief map, absolute relief map, altimetric frequency and hypsometric Curve.*
3. *Apply different statistical methods used in geomorphological data analysis.*
4. *The students will be familiarized with various fluvial and topographic metrics which are the indicators of inherent geological and tectonic controls.*
5. *Develop aptitude in observation and data generation through field survey using different instruments and techniques. The stress on-field data collection and monitoring will train the students to develop their deep insight into the earth surface processes.*
6. *Students will be trained thoroughly on field method and laboratory method of sediment sampling and analysis respectively. This will help them to understand various types of environment and process domain under which sediments were deposited. Thus they can develop skills for reconstructing past.*

Unit-1: Measurement, Computation and Analysis in Geomorphology [15 Marks]

1.1 Profile analysis from Indian Topographical sheets (1:50,000): superimposed, projected and composite; Areal representation of slope by Raisz and Henry (1937) method; Construction of hypsometric curve and derivation of hypsometric integral.

1.2 Stream order (Strahler's and Horton method), Linear, areal and relief aspects of drainage basins, their bivariate and multivariate analysis; Analysis of Drainage Network Orientation and Topological Distinct Channel Network (TDCN).

1.3 Computation of Braiding index, Sinuosity index, Meander wavelength and Radius of curvature; Analysis of river longitudinal profiles.

1.4 Geomorphic indices of active tectonics (Drainage basin asymmetry, Valley width-height ratio, SL Index) and their calculations; Slope-area analysis and geomorphic interpretations.

Unit-2: Geomorphological field techniques and sediment analysis [15 Marks]

2.1 Measurement of hillslope profiles with abney's level and drawing of profiles maintaining slope forms; Measurement of dip and strike using clinometer; Field study of the weathering profiles/ laterite profiles; Calculation and interpretations of Si/Sesquioxide ratios and chemical weathering indices.

2.2 Measurement of channel cross-section in the field, study of erosional and depositional features (Creating sketch maps); Calculation of hydraulic geometry equations; Calculation of velocity and discharge using Manning equation.

2.3 Study of fluvial sedimentary sequences in the field (facies and major sedimentary structures, Mialls' facies notations/lithocodes) and interpret in terms of past and present geomorphic processes; Use of Munsell colour chart in sedimentary sequences.

2.4 Collection and analysis of sediments using Ø-graded sieves and electronic balance; Analysis of Pebble-grade sediments for shape and size; Measurement of suspended sediment concentration; Microscopic identification of minerals and biogenic forms.

In the End Semester Examination, students have to answer one compulsory question from the above two Units.

Viva-voce [5 Marks]
Continuous Assessment [30 Marks]
*(*A Project File, comprising one exercise each is to be submitted)*

✧ **Suggested Readings**:

1. Baker, V., Craig-Kochel, R. and Patton, P.C. (1988): *Flood Geomorphology*, Wiley, Chichester

2. Collinson, J.D and Thompson, D.B. (1988): *Sedimentary Structures*, Second Edition, Unwin Hyman, London.

3. Dackombe, R.V. and Gardiner, V. (1983): *Geomorphological Field Manual*. George Allen and Unwin, London.

4. Doornkamp, J.C. and King, C.A.M. (1971): *Numerical analysis in Geomorphology*, Edward Arnold, London.

5. Goudie, A.S. *et al.* (2005): *Geomorphological Techniques*, Second Edition, Routledge (Taylor & Francis Group), London.

6. King, C.A.M. (1966): *Techniques in Geomorphology*, Edward Arnold, London

7. Lindholm, R. (1986): *A Practical Approach to Sedimentology*, CBS Publishers and Distributors, New Delhi.

8. McLane, M (1995): *Sedimentology*, Oxford University Press, New York, Oxford.

9. Miall, A.D. (2006): *Geology of the Fluvial Deposits: Sedimentary Facies, Basin Analysis, and Petroleum Geology*, Springer.

10. Prasad, N. and Basu, R. (eds.) (2000): Contemporary Dimensions in Geography, Academic Staff College, The University of Burdwan.

11. Ramasamy, S.M. (2005): *Remote Sensing in Geomorphology*, New India Publishing Agency.

12. Reading, H.G. (1996): *Sedimentary Environments: Processes, Facies and Stratigraphy*, Blackwell Science.

13. Sen, P.K. (1993): *Geomorphological Analysis of Drainage Basin*, The University of Burdwan, Burdwan.

14. Sengupta, S.M. (2010): *Introduction to Sedimentology*, Second Edition, CBS Publishers & Distributors Pvt. Ltd., New Delhi.

Semester - III

(MSCGEOGMJE303: Major Elective-1, Theoretical)

Environmental Issues in Geography – I

✧Full Marks: 50 **✧ CA+ESE Marks: 15+35**
✧ Credit: 4 **✧ L - T – P: 4 - 0 - 0**
✧ End Sem Exam Duration: 2 Hours

Course Learning Outcomes:

1. *Learn the philosophical base which shapes the environmental concepts and enhance their ideas towards generating thought process.*
2. *Understand the dilemma over global resource crises along with sustainable solution for better resource utilization.*
3. *Get insights about the physical vulnerability of a geographical place and social processes in the context of environmental degradation.*
4. *Broaden the thinking towards utilization of varied technological and biological innovation in preserving and expanding the environmental space.*

Unit-1: Basic Concepts and Philosophies of Environmental Geography

1.1 Scope, Content and Approaches to Environmental Studies: Environmentalist, Holistic *vs* Reductionist and Deep *vs*. Shallow Ecology.

1.2 Philosophical bases of Environmental Studies: Gaia Hypothesis, Limits to Growth, Spaceship Earth, Ecosystem Balance, Population Equilibrium and Stationary State Economy.

Unit-2: Issues of Environmental Resource Utilization

2.1 Global Resource Crisis with special reference to Coal, Petroleum and Natural Gas.

2.2 Environmental politics regarding conflicts over water resource: Examples from World and India.

Unit-3: Environmental Degradation

3.1 Natural and quasi-natural Hazards: Risk, Vulnerability and Management of Cyclones, Earthquake, Droughts, Floods and Landslide.

3.2 Social Hazards: Tropical Diseases, Poverty, Crime, Human Trafficking and Social Exclusion.

Unit-4: Environmental Technology

4.1 Changes in the trend of Production Technology (with special reference to Green Technology); Role of State Control, Privatization and Out-sourcing; Environmental Audit.

4.2 Environmental microbiology: Bio-gas, Bio-remediation, Bio-transformation, Bio-conversion.

Continuous Assessment [15 Marks]
(*The department shall decide the methods of internal assessment*)

✧ **Suggested Readings**:

1. Abbasi, A., Krishnakumari, P., and Khan, F. (2000): *Hot Topics: Everyday Environmental Concern*, Oxford University Press.
2. Adams, W.M. (1995): *Green Development: Environmental Sustainability in the Third World*, Routledge, London.
3. Alexander, D. (1993): *Natural Disasters*, Research Press, New Delhi.
4. Allaby, M. (1996): *Basics of Environmental Science*, Routledge, London.
5. Bryant, E.A. (1991): *Natural Hazards*, Cambridge University Press, Cambridge.
6. Buchholz, R.A. (1993): *Principles of Environmental Management, the Greening of Biosphere*, Prentice Hall Inc.,New Jersey.
7. Chary, S.N. (2008): *Environmental Studies*, Macmillan Publication.
8. Dasgupta, P. and Miller, K.G. (1997): *The Environment and Emerging Development Issues*, (Volumes I and II), Clarendon Press, Oxford.
9. Gilpin, A. (1996): *Dictionary of Environment and Sustainable Development*, John Wiley and Sons Ltd.
10. Goudie, A. (1986): *The Human Impact on the Natural Environment*, 2nd edition, Blackwell Pub. Co., London.
11. Guha, R. (2008): *Social Ecology*, Oxford India Paperbacks.
12. Hardoy, J.E., Mittin, D. and Satterthwaite, D. (1992): *Environment Problems in the World Cities*, Earthscan Pub. Ltd., London.
13. Johansen, B.E. (2006): *Global Warming in the 21st Century*, Atlantic Publication.
14. Masters, G.M. (1991): *Introduction to Environmental Engineering and Sciences*, Prentice Hall India Ltd., New Delhi.
15. Mishra, R.N. (2008): *Environment and Forest Resource Management*, Sonali Publication, New Delhi.
16. Park, C. (1998): *The Environment: Principles and Applications*, Routledge, London.
17. Pickering, K.T. and Owen, L.A. (1997): *An Introduction to Global Environmental Issues*, Routledge, London.
18. Santra, S.C. (2001): *Environmental Science, Central Publication*.
19. Shaw, R. and Krishnamurty, R.R. (2009): *Disaster: Global Challenges and Local Solutions*, University Press.
20. Singh, R.B. and Misra, S. (1996): *Environmental Laws in .India: Issues and Responses*, Rawat Pub., New Delhi.
21. Speth, I.G. (Reprint 2005): *Global Environmental Challenges - Transitions to a Sustainable World*, Orient Longman, New Delhi.
22. Whyte, I.L. (1995): *Climate Change and Human Society*, Arnold, London.
23. Woodward, F.I. (1992): *Global Climatic Change: The Ecological Consequences*, Academic Press, London.

Semester - III

(MSCGEOGMJE304: Major Elective-2, Practical)

Environmental Issues in Geography - II

✧ **Full Marks: 50** ✧ **CA+ESE Marks: 30+20**
✧ **Credit: 4** ✧ **L - T – P: 0 - 0 – 8**
✧ **End Sem Exam Duration: 2 Hours**

Course Learning Outcomes:

1. *Enhance the skill towards identifying and analysing the environmental problems along with modelling the environmental data.*
2. *Instill the quality in perceiving the ground reality through primary survey and learn the technique in developing questionnaire schedule.*
3. *Learn to map and represent the environmental data for a better aerial and spatial understanding with sound management practices.*

Unit-1: Environmental Problems: Modelling and Quantitative Analysis ` [15Marks]

1.1 Identification and Modelling of Environmental Problems.

1.2 Regression analysis and Standard Error of the Estimate with Environmental data.

1.3 Correlation (Bivariate) analysis of Environmental Data.

1.4 Time series analysis of climatic data.

Unit-2: Environmental Survey. Mapping and Technology [15Marks]

2.1 Perception Survey Techniques; Preparation of Survey Schedule and Questionnaires for Natural and Social Hazards.

2.2 Sources and Collection of Environmental Data; Cartographic Representation of Primary and Secondary data with Environmental Significance.

2.3 Preparation and Interpretation of Environmental Maps: Micro levels (Area and Problem specific); Pollution and Hazard Mapping.

2.4 Environmental Management Plan.

In the End Semester Examination, students have to answer one compulsory question from the above two Units.

Viva-voce [5 Marks]

Continuous Assessment [30 Marks]

*(*A Project File, comprising one exercise each is to be submitted)*

✧ **Suggested Readings**:

1. Alvi, Z. (1995): *Statistical Geography: Methods and Applications*, Rawat Publications, New Delhi.
2. Chakravorty, J.G. and Ghosh, P.R. (2007): *Advanced Higher Algebra*, U.N. Dhur & Sons Private Ltd., Kolkata.
3. Clark, W.A.V and Hosking, P.L. (1986*): Statistical Methods for Geographers*, Wiley and Sons.
4. Cole, J.P. and King, C.A.M. (1969): *Quantitative Geography (Techniques and Theories in Geography)*, John Wiley & Sons Ltd., London.
5. Gun, A.M., Gupta, M.K. and Dasgupta, B. (2008): *Fundamental of Statistics* (Volume One and Two), The World Press Private Limited, Kolkata.
6. Hammond, R. and McCullagh, P. (1991): *Quantitative Techniques in Geography*, Clarendon Press, Oxford
7. Hayslett, H.T. (1976): *Statistics: Made Simple*, W.H. Allen, London.
9. Khan, N. (2002): *Quantitative Methods in Geographical Research*, Concept Publishing Company, New Delhi.
10. Kothari, C.R. (2009): *Research Methodology: Methods and Techniques*, New Age International Publishers, Kolkata.
11. Kothari, C.R. (1979): *Quantitative Techniques*, Vikas Publishing House Pvt. Ltd., New Delhi.
12. Kurtz, N.R. (1983): *Introduction to Social Statistics*, McGraw-Hill International Book Company, Auckland.
13. Mahmood, A. (1998): *Statistical Methods in Geographical Studies*, Rajesh Publication.
14. Malhotra, O.P. and Gupta, S.K. (1990): *Elementary Statistics*, S. Chand & Company Ltd., New Delhi.
15. Pal, S.K. (1999): *Statistics for Geoscientists*, Concept publishing Company, New Delhi.
17. Silk, J. 1(979): *Statistical techniques in Geography*, George Allen and Unwin, London.
19. Walford, P. (1995): *Geographical Data Analysis*, John Wiley and Sons Inc., New York.

Semester - III

(MSCGEOGMJE305: Major Elective-1, Theoretical)

Urban Geography – I

✧Full Marks: 50 **✧ CA+ESE Marks: 10+40**
✧ Credit: 4 **✧ L - T – P: 4 - 0 - 0**
✧ End Sem Exam Duration: 2 Hours

Course Learning Outcomes:

1. *Learn the concept of urban, urban space and process of urbanization and its temporal variation*
2. *Learn theories of types and patterns of urban settlements.*
3. *Trace the spacing of urban settlement over time based on models, theories and laws.*
4. *Keep pace with the changing economies, production system and phases of transition and changing pattern of urbanization*

Unit-1: Urbanization: Concept and Processes

1.1 Concept of urban, urbanism and urbanization; Concept of urban space; Attributes of urban places; Approaches to the Study of urban geography: traditional, modern and post-modern

1.2 Processes of Urbanization; Urbanization in the developing and developed world, causes of urban growth, urbanization cycles

Unit-2: Classification of Urban Settlements

2.1 Classification of Urban settlements: J.M. Houston, G.Taylor , Mumford, Concepts of Megacity, Megalopolis, Ecumenopolis, Conurbation, Counter-urbanization, Planned Towns, New Towns, Satellite Towns, Green/ Garden cities, Sister Towns, Urban Corridor, Rural-urban Fringe, Urban Sprawl, Urban Umland.

2.2 Concept of City Region after Dickinson; Urban Primacy; Rank-size Distribution of Towns after Zipf and B.J.L. Berry

Unit-3: Theories and Spacing of Urban Settlements

3.1 Theories of urban hierarchy and spacing of urban settlements after Christaller, Smailes and Philbrick, Role of Urban Hierarchy in Regional Planning

3.2 The theories and Model of Urban Morphology after Burgess, Homer Hoyt, Harris and Ullman, Mann, Sinclair with merits and demerits

Unit-4: Urban Economy and Segregation of Urban Spaces

4.1 Economic Base Theory, Formal and Informal Economy; Types of Urban Linkages and its significance, Concept of Economic Marginalization and reasons behind the proliferation of Slums and Shanty Towns

4.2 New Production Systems and New Industrial Spaces, Deindustrialisation and Tertiarisation of urban work force, The world city and Transnational urban systems

Continuous Assessment [15 Marks]
(*The department shall decide the methods of internal assessment*)

✧ Suggested Readings:

1. Bhattacharya, B. (2006). Urban Development in India. New Delhi: Concept Publishing Company
2. Bird, James 1977: Centrality And Cities. Routledge, London
3. Carter, H. 1981: Urban Geography, 3rd edition Arnold-Heinemann, New Delhi.
4. Chakroborty, J., & Ghosh, P. (2007). Higher Algebra. kolkata: Un Dhur and Sons Pvt Ltd.
5. Das, A. K. (2007). Urban Planning in India. Jaipur: Rawat Publications.
6. Dave, M. (1991). Urban Ecology and Levels of Development. Jaipur: Rawat Publications .
7. Dickinson, R.E. (1968): City and Region: A Geographical Interpretation. Routledge and Kegam Paul Ltd. London.
8. Ghosh, S. (1998): Introduction to Settlement Geography. Orient Longman Ltd., Calcutta
9. Gibbs.J(1961) : Urban Research Methods. East-West Press Pvt Ltd. New Delhi
10. Glasson,J.(1975): An Introduction to Regional Planning. Hutchinson and Co.,London
11. Hardoy, J. E., Mittin, D. & Satterthwaite, D. 1(992) : Environmental Problems in the World Cities. Earthscan Pub. Ltd. London.
12. Hudson, F.S. (1970): Geography of Settlements, Macdonald and Evans Ltd. PlymouthHerbert, David and Thomas, Colin, 1982: Urban Geography A First Approach,Jhon Wiley & Sons. New Delhi
13. Johnston .R.J (2000): The Dictionary of Human Geography.Blackwell. UK
14. Kaplan.D and Wheeler.J (2008):Urban Geography.John Wiley
15. Knox, P. (1982): Urban Social Geography. Longman Scientific and Technical, Harlow.
16. Law.N,Smith.D,(1991),Decision Making Geography. Stanley Thornes Pub. Ltd, Leckhampton
17. Mandal, R.B. (2000): Urban Geography: A Textbook. Concept Pub. Co., New Delhi.
18. Markandey, K., & Simhadri, S. (2009). Urban Environment and Geoinformatics. Jaipur: Rawat Publication.
19. Mcdonnell, M. J., Halns, A. K., & Breste, J. H. (2009). Ecology of Cities and Towns. Cambridge University Press.
20. Misra. H. N. (ed) 1987: Contributions to Indian Geography. Volume 9: Rural Geography, Heritage Pub., New Delhi.
21. Mohan Sudha (2005): Urban Development and New Localism. Rawat Publications, Jaipur.
22. Pacione, Micheal, (2001): Urban Geography, Routledge, London
23. Naqvi, H. K. (1971). Urbanisation and Urban Centres under the Great Mughals. Shimla: Indian Institute of Advance Studies .
24. Raza, M., & Aggarwal, Y. (1999). Transport Geography of India. New Delhi: Concept Publishing Company.
25. Ramachandran R. (1989): Urbanisation arid Urban Systems in India. Oxford University Press, New Delhi.
26. Rao, R. Rammohan and S. Simhadri (1999): Indian Cities: Towards Next Millenium, Rawat Publications, Jaipur.
27. Ray Chaudhuri,Jayasri(2001): An Introduction to Development and Regional Planning. Orient Longman,Kolkata
28. Sharma, R.N. and K. Sita (2001): Issues in Urban Development. Rawat Publications, Jaipur.
29. Short, J. R. (1984). An Introduction to Urban Geography. London: Routledge and Keygen Paul.
30. Singh, A. K. (1990). Urbanisation and Administration of Urban Infrastructure. New Delhi: Inter-India Publications.
31. Singh, R.L. et. al. (ed) (1976): Geographic Dimensions of Rural Settlements. National Geographical Society of India, Varanasi.
32. Singh, R. Y. (1994): Geography of Settlements, Rawat Pub. Co., New Delhi.
33. Singh, Ravinder Sandhu (ed) 2003:Urbanisation in India. Sage Publications, New Delhi.
34. Taylor, Griffith (1949): Urban Geography, Methuen and Co. Ltd., London.
35. Tewari, V. Weinston, J. and Prakash Rao, V.L.S. (1986): Indian Cities: Ecological Perspectives. Concept Pub. Co., New Delhi.
36. Thudipara, Jacob Z. (2007): Urban Community Development. Rawat Publications, Jaipur.
37. Vishwanadhan, G. (ed) 1986: Readings in Urban Structure of India. Ajanta Publications, Delhi.
38. Taafee, E. J., & Gauthier, H. L. (1973). Geography of Transportation. New Delhi: Prentice

Semester - III

(MSCGEOGMJE306: Major Elective-2, Practical)

Urban Geography- II

✧ **Full Marks: 50** ✧ **CA+ESE Marks: 30+20**
✧ **Credit: 4** ✧ **L - T – P: 0 - 0 - 8**
✧ **End Sem Exam Duration: 2 Hours**

Course Learning Outcomes:

1. *Learn the techniques and tools in measuring and predicting the urban growth.*
2. *Make sense of identifying and analysing urban diversity in terms of regional and occupational pattern.*
3. *Learn to graph the spacing of town over time and rank the size keeping pace with population growth.*

Unit-1: Analysis of Urban Growth and Urban Diversity [15 Marks]

1.1 Growth Index of Urban Population and Index of Urbanization, Urban Growth by Time Series analysis in Least Square and Moving Mean Method

1.2 Concentration of Urban Population by Location Quotient, Measurement of Inequality by Lorenz Curve and Ginni Co-efficient, Household Quality of Living Index (HQLI).

1.3 Urban Occupational Diversities and Specialization, Weighted Score and Combination Analysis, Calculation of Composite index

1.4 Analysis of Regional Disparity after Sopher's Index, Breaking point analysis

Unit-2: Analysis of Urban pattern [15 Marks]

2.1 Rank-size Distribution of Towns after Zipf (Normal and Log/log), Nearest Neighbour Analysis

2.2 Bivariate Regression and Spatial Correspondence, Index of Dissimilarity and Similarity

In the End Semester Examination, students have to answer one compulsory question from the above two Units.

Viva-voce [5 Marks]

Continuous Assessment [30 Marks]

*(*A Project File, comprising one exercise each is to be submitted)*

✧ **Suggested Readings**:

1. Alvi, Z. (1995): *Statistical Geography: Methods and Applications*, Rawat Publications, New Delhi.
2. Cole, J.P. and King, C.A.M. (1969): *Quantitative Geography (Techniques and Theories in Geography)*, John Wiley & Sons Ltd., London.
3. Gibbs.J(1961) : Urban Research Methods. East-West Press Pvt Ltd. New Delhi
4. Glasson,J.(1975): An Introduction to Regional Planning. Hutchinson and Co.,London
5. Gun, A.M., Gupta, M.K. and Dasgupta, B. (2008): *Fundamental of Statistics* (Volume One and Two), The World Press Private Limited, Kolkata.
6. Lillesand, T.M. and Kiefer, R. W. (1994): Remote Sensing and Image Interpretation. 3rd edition, John Wiley and Sons, New York
7. Mahmood, A. (1998): *Statistical Methods in Geographical Studies*, Rajesh Publication.

8. Malhotra, O.P. and Gupta, S.K. (1990): *Elementary Statistics*, S. Chand & Company Ltd., New Delhi.
9. Mandal,R.B(1989):Staistical Techniques for Social Scientist. Concept Pub. Co., New Delhi
10. Markandey, K., & Simhadri, S. (2009). Urban Environment and Geoinformatics. Jaipur: Rawat Publication.
11. Pacione, Micheal, (2001): Urban Geography, Routledge, London.
12. Pal, S.K. (1999): *Statistics for Geoscientists*, Concept publishing Company, New Delhi. Sarkar, A. (2013): *Quantitative Geography: Techniques and Presentations*, Orient BlackSwan, Hyderabad
13. Raza, M., & Aggarwal, Y. (1999). Transport Geography of India. New Delhi: Concept Publishing Company.
14. Taafee, E. J., & Gauthier, H. L. (1973). Geography of Transportation. New Delhi: Prentice
15. Toyne.P and Newby.P(1971)Techniques in Human Geography. Macmillian, London
16. Vishwanadhan, G. (ed) 1986: Readings in Urban Structure of India. Ajanta Publications, Delhi.

Semester - III
(MSCGEOGMJE307: Major Elective-1, Theoretical)
Population Geography-I

✧Full Marks: 50 **✧ CA+ESE Marks: 15+35**
✧ Credit: 4 **✧ L - T – P: 4 - 0 - 0**
✧ End Sem Exam Duration: 2 Hours

Course Learning Outcomes:

After the completion of this course, student should be able to:

1. *Understand the basic concept regarding different components of population like growth, fertility, mortality and migration.*
2. *Learn and understand population compositions, and to identify the intricate relationship.*
3. *Develop skill for identifying and analyzing the data and its spation-temporal linkage with different components.*

Unit-1: Basic Concepts, Sources of Data and Growth.

1.1. Nature, scope, content and developmrnt of Population Geography.
Sources of different demographic data and its uses and limitations: Census of India, Vital registration system, National Sample Survey, Sample Registration System.

1.2 Population Growth – Concept and Components; Population growth in the developed relm and developing relm with special reference to India.

Unit-2: Fertility and Mortality

2.1 Basic concept Fertility, Fucundity and Nuptiabty; Social, Economic, Demographic and Biological Determinents of fertility; Fertility transition in developing countries; Basic measures of fertility.

2.2 Basic concept of Mortality, Infant mortality and Child mortality; Determinents and important measures of Mortality; The basic concept of life table.

Unit-3: Mobility and Migration

3.1 Concept of Mobility and Migration; Types of migration; Theoties of migration.

3.2 Refugee migration, and Illegal migration issues in recent time. Patterns and trends of internal migration in India with special references to Rural-Urban migration and Urban-Urban Migration; Its causes, consequences, and the policy issues.

Unit-4: Composition of Population

4.1 Meaning, concept and significance of population composition; Social, Economic and Demographic composition of population.

4.2. Age, Sex, Ethnic, Religious, Literacy, Economic, Rural-Urban composition in India and its regional differentials.

Continuous Assessment [15 Marks]
(*The department shall decide the methods of internal assessment*)

✧ Suggested Readings:

1. Bhende, A., (1996): Principles of Population Studies (Seventh Edition), Himalaya Publishing House, Bombay.
2. Bogue, D., (1969): Principles of Demography, John Wiley and Sons, New York.
3. Chandna, R.C, Geography of Population- Concepts, dterminants and patterns, Kalyani Publicers. New Delhi.
4. Caldwell, J, Sally Findley, Pat Caldwell and Gigi Santow (1990): What we know about health transition: The cultural, social and behavioural determinants of health. The proceedings of an international workshop, Vol.1&2, ANU, Canberra, Health Transition Centre.
5. Jacob S. Siegel and David a. Swanson (2004): The Methods and Materials of Demography, Second Edition. Elsevier Science, USA.
6. John Weeks (2005): Population: An Introduction to Concepts and Issues (1986), Wordsworth Learning. Singapore 9th edition.
7. Mosley, W. H. and L. C. Chen (1984): Analytical framework for the study of child survival in developing countries, Population and Development Review 10 (Supplementary Copy).
8. Nag, Prithvish and Debnath G.C (2022) Population Geography. Bharti Prakashan, Varanasi.
9. Pathak, K.B. and F.Ram, (1998) Techniques of Demographic Analysis, Mumbai: Himalaya Publishing House,
10. Preston, Samuel H., Heuveline, Patrick, and Guillot, Michel (2001) Demography: Measuring and Modeling Population Processes. Oxford: Blackwell Publishers.
11. Siegel, Jacob S., and David A. Swanson (eds.), (2004) The Methods and Materials of Demography (Second edition). San Diego: Elsevier Academic Press.
12. Yaukey, David. 1985. Demography: The study of Human population. St. Martins, New York.
13. Cohen, Robin, (1996): Theories of Migration, The International Library of Studies on Migration, Edward Elgar, Cheltenham.
14. United Nations, (1974): Methods of Measuring Internal Migration, Manual VI, UN, New York.
15. United Nations, (1979): "Trends and Characteristics of International Migration Since 1950" Demographic Studies No. 64, UN, New York.
16. United Nations, (1983): Determinants and Consequences of Population Trends, Vol 1, UN, New York, Chapter-VI.

Semester - III
(MSCGEOGMJE308: Major Elective-1, Practical)
Population Geography-II

✧**Full Marks: 50** ✧ **CA+ESE Marks: 30+20**
✧ **Credit: 4** ✧ **L - T – P: 0 - 0 - 8**
✧ **End Sem Exam Duration: 2 Hours**

***Course Learning Outcomes*:**

After the completion of this course, student should be able to:

1. *Develop skill and able to make a plan for population inquiry.*
2. *Develop skill to design and execute a population survey.*
3. *Understand the suitable techniques and methods and its applicability in population research.*
4. *Learn and understand the theoretical concepts and practical applicability of sample survey.*

Unit-1: Methods of Data Collection [15 Marks]

1.1 Questionnaire/interview schedule design and construction: Principles of constructing a questionnaire/ interview schedule; Sequencing of questions. Complete enumeration versus sampling.

1.2 Preparation of life table from census/sample data; Direct estimation/calculation of a life table and intercensal migration rates from census data.

1.3 Population cartography: Diagrammatic representation of population Data, Population mapping, Population projection.

Unit-2: Sampling Methods [15 Marks]

2.1 Concept of sampling unit, sampling frame and sampling design

2.2 Sampling methods: Simple random sampling, stratified sampling, systematic sampling, cluster sampling, and purposive sampling.

2.3 Multistage sampling in large-scale surveys, self-weighting designs, Stratification in multistage sampling.

2.4 Sampling and non-sampling errors.

In the End Semester Examination, students have to answer one compulsory question from the above two Units.

Viva-voce [5 Marks]
Continuous Assessment [30 Marks]

*(*A Project File, comprising one exercise each is to be submitted)*

✧ Suggested Readings:

1. Bernard, H. Russell, (1995): Research Methods in Anthropology: Qualitative and Quantitative Approaches, Altamira Press, Walnut Creek.
2. Goode W J and Hatt P K. 1952. Methods in Social Resasrch. McGraw Hills, New York.
3. Kish, Leslie, (1995): Survey Sampling, John Wiley and Sons, Inc. New York.
4. Lohr L. Sharaon., (1999): Sampling: Design and Analysis, Duxbury Press, London.
5. Lwanga S. K. and Lemeshow S., (1991): Sample Size determination in Health Studies: A Practical Manual, World Health Organisation, Geneva.
6. Mukherji, P.N., (1999): Methodologies in Social Science, Sage Publications, New Delhi.
7. Pullum W. 2006. An Assessment of Age and Data Reporting in the DHS Surveys, 1985-2003. DHS Methodological Report No. 5. Calverton, Maryland, Marco International Inc.
8. Royce A. Singleton and Bruce C. Straits, (1999): Approaches to Social Research, Oxford, Oxford University Press.
9. Young P V. 1994. Scientific Social Surveys and Research. Prentice-Hall, New York (4th Edition)

Semester - III

(MSCGEOGMIE301: Minor Elective-2, Theoretical)

Geography of Tourism: Special Reference to India

✧**Full Marks: 50** ✧ **CA+ESE Marks: 15+35**
✧ **Credit: 4** ✧ **L - T – P: 4 - 0 - 0**
✧ **End Sem Exam Duration: 2 Hours**

Course Learning Outcomes:

1. *Get to learn the conceptual foundation of tourism as a discipline of geography.*
2. *Trace the importance of a location to be a potential space for the development of tourism as an industry.*
3. *It gives a sense of development when infrastructure and buildings are made to attract the tourist and to protect the places having scenic beauties.*
4. *Get to learn the places having importance from tourism point of view in India and to think for plans from management perspective.*

Unit-1: Basic Concepts of Geography of Tourism

1.1 Concepts, Scope, Nature and issues of Tourism, Recreation and Leisure inter-relation; Geographical Parameters of Tourism. Factors influencing tourism: historical, natural, sociocultural and economic.

1.2 Types of Tourism: Ecotourism, Cultural Tourism, Adventure Tourism, Medical Tourism, pilgrimage, International, National. (Case studies from India).

Unit-2: Factors and Impact of Tourism

2.1 Spatial pattern of tourism in India: Spatial affinity; areal and locational dimensions comprising physical, cultural, historical and economic; Role of international tourist organizations and travel agents in Indian Tourism Industry.

2.2 Motivation of Tourism; Impact of tourism: physical, economic and social and perceptive (positive and negative impacts).

Unit-3: Infrastructure and capital in tourism Industry

3.1 Tourism circuits- short and longer duration - agencies and intermediaries - Indian hotel Industry, Infrastructure and support system- accommodation and supplementary accommodation; other facilities and amenities.

3.2 Recent trends in tourism, role of foreign capital and impact of globalization on tourism in India.

Unit-4: Tourist attractions in India

4.1. Tourism in India: Tourism Infrastructure; Regional dimensions of tourist attraction; case studies of Dal Lake, western Ghat, Himalaya, Desert, and coastal Areas, plateaus. Likeliness to travel International travel destinations of Indian citizens.

4.2 Environmental laws and tourism: current tenders, spatial patterns and recent changes; Promotion of Tourism- National tourism policy.

Continuous Assessment [15 Marks]

(*Method of internal assessment is consisting of Term Paper on any case study. The size of the project report may be between 15 and 20 pages*)

✧ Suggested Readings:

1. Ateljevic, I., Pritchard, A. and Morgan, N. (2007): *The Critical Turn in Tourism Studies: Innovative ResearchMethodologies*, Elsevier.
2. Beeton, S. (2006): Community Development through Tourism, Landlinks Press.
3. Buckley, R. (2009): *Ecotourism: Principles and Practices*, CABI.
4. Butler, R. and Hinch, T. (2007): *Tourism and Indigenous Peoples*, Taylor and Francis.
5. Hall, C.M. and Higham, J. (2005): *Tourism, Recreation and Climate Change*, Channel View Publications.
6. Cooper, C. and Hall, C.M. (2008): *Contemporary Tourism: An International Approach*, Butterworth-Heinemann.
7. Fennell, D.A. and Malloy, D.C. (2007): *Codes of Ethics in Tourism: Practice, Theory and Synthesis*, Channel View Publications.
8. Gössling, S. and Hall, C.M. (2006): *Tourism and Global Environmental Change: Ecological, Social, Economic and Political Interrelationships*, Routledge.
9. Hall, C.M. and Page, S.J. (2014): *The Geography of Tourism and Recreation: Environment, Place and Space*, Taylor & Francis.
10. Hudman, L.E. and Jackson, R.H. (2003): *Geography of Travel and Tourism*, Thomson/Delmar Learning.
11. Jafari, J. (2003): *Encyclopedia of Tourism*, Routledge.
12. Jansen-Verbeke, M., Priestley, G.K. and Russo, A.P. (2008): *Cultural resources for tourism: patterns, processesand policies*, Nova Science Publishers.
13. Knudsen, D.C. (2008): *Landscape, Tourism, and Meaning*, Ashgate Publishing.
14. Lew, A., Hall, C.M. and Timothy, D.J. (2008): *World Geography of Travel and Tourism: A Regional Approach*,Elsevier Science.
15. Lew, A.A., Hall, C.M. and Williams, A.M. (2008): *A Companion to Tourism*, Wiley.
16. Lovelock, B. (2008): *Tourism and the Consumption of Wildlife: Hunting, Shooting and Sport Fishing*, Routledge.
17. Mathur, R. (2007): *International Tourism*, ABD Publishers.
18. Department of Tourism (2002): *National Tourism Policy*, Ministry of Tourism and Culture, Govt. of India.
19. Newsome, D., Dowling, R.K. and Moore, S.A. (2005): *Wildlife Tourism*, Channel View Publications.
20. Pearce, D.G. and Butler, R. (1999): *Contemporary Issues in Tourism Development*, Routledge.
21. Scott, D., Hall, C.M. and Gossling, S. (2012): *Tourism and Climate Change: Impacts, Adaptation and Mitigation*, Taylor & Francis.
22. Scott, N., Cooper, N.S.R.B.C. and Baggio, R. (2008): *Network Analysis and Tourism*, Channel View Publications.
23. Sharma, K.K. (2005): *Tourism and Development*, Sarup & Son.
24. Spirou, C. (2011): *Urban Tourism and Urban Change: Cities in a Global Economy*, Taylor & Francis.
25. Tribe, J. (2009): Philosophical Issues in Tourism. Channel View Publications
26. Wearing, S. and Neil, J. (2013): *Ecotourism*, Taylor & Francis.
27. Williams, S. (2009): *Tourism Geography: A New Synthesis*, Taylor & Francis.

Semester - III

(MSCGEOGMIE302: Minor Elective-2, Theoretical)

Disaster Management

✧Full Marks: 50 **✧ CA+ESE Marks: 15+35**
✧ Credit: 4 **✧ L - T – P: 4 - 0 - 0**
✧ End Sem Exam Duration: 2 Hours

Course Learning Outcomes:

After completion of this course, students will be able to –

1. *Understand the conceptual background of hazards, disasters and associated natural, anthropogenic and social phenomena.*
2. *Develop an idea about factors, consequences and management of earthquake, landslide, flood and riverbank erosion, drought, accidental release of toxic chemicals and nuclear fallouts.*
3. *Get idea about the human assistance before and after disaster.*
4. *Identify the role of local peoples, NGOs, police, army, paramilitary forces in disaster management*
5. *Acquire knowledge about Hazard/ mapping techniques and mitigation methods.*

Unit-1: Understanding Disasters

1.1 Definition, concept and Classification of hazards and disasters.

1.2 Risk and Vulnerability: concept, analysis and reduction.

Unit-2: Types of Disasters

2.1 Causes, impact, Distribution, and mapping and mitigation of Natural Hazards: Earthquake and Tsunami, Landslides.

2.2 Cause, impact, Distribution and mapping and mitigation of manmade disasters: Soil erosion, accidental release of toxic chemicals, Nuclear Fallouts.

Unit-3: Disasters Preparedness

3.1 Emerging approaches to Disaster Management: (a) Pre-disaster phase Preparedness. (b) Syn- Disaster phase Training. (c) Post Disaster phase. Role of Geospatial technology in Disaster management.

3.2 Role of NGOs and organizations (national and international) in Disaster management. (UNDMT, NDMA and NIDM).

Unit-4: Climate Change and its impacts on Disasters in Rural-Urban Scenarios

4.1 Rural Livelihood Management: case studies of Droughts in India.

4.2 Rainfall and Flood Disasters in Indian Cities.

Continuous Assessment [15 Marks]
(*Method of internal assessment is consisting of Term Paper on any case study. The size of the project report may be between 15 and 20 pages*)

✧ Suggested Readings:

1. Alexander, D. (1993): *Natural Disasters*, ULC press Ltd, London.
2. Alexander, D. (2000): *Introduction in Confronting Catastrophe*, Oxford University Press.
3. Carter, W.N. (1991): *Disaster Management: A Disaster Management Handbook*, Asian Development Bank, Bangkok.
4. Chakrabarty, U.K. (2007): *Industrial Disaster Management and Emergency Response*, Asian Books Pvt. Ltd., New Delhi.
5. Coch, N.K. (1994): Geohazards: Natural and Human, Prentice-Hall, Englewood Cliffs.
6. David, A. (1993): *Natural Disaster*, UCC Press, London.
7. Mishra, A. (2012): *New Dimensions of Disaster Management in India: Perspectives, Approaches and Strategies* (Set of 2 Volumes), Serials Publications, New Delhi.
8. Nasios, A.S. (1990): Disaster Mitigation and Economic Incentives. In: Colloquium on the *Environment and NaturalDisaster Management*, The World Bank, Washington, D.C.
9. Nishith, R. and Singh, A.K. (2012): *Disaster Management in India: perspectives, issues and strategies*, New Royal Book Company, Lucknow.
10. Parasuraman, S and Unnikrishnan, P.V. (ed.) (2000): India Disasters Report towards a policy initiative. Oxford.
11. Sahni, P. *et al.* (eds.) (2002): *Disaster Mitigation Experiences and Reflections*, Prentice Hall of India, New Delhi.
12. Sharma, V.K. (1999): *Disaster Management*, National Centre for Disaster management, IIPE, New Delhi.
13. Smith, K. (1992): *Environmental Hazards: Assessing Risk and Reducing Disaster*, Routledge, London.
14. Taori, K. (2005): *Disaster Management through Panchayati Raj*, Concept Publishing Company, New Delhi.
15. United Nations Disaster Relief Organization (1978): Disaster Prevention and Mitigation: A Compendium Of Current Knowledge, United Nations New York.
16. Wijkman, A. and Timberlake, L. (1988): *Natural Disasters: Acts of God, or Acts of Man*, Earthscan, London.

SYLLABUS

for

M.Sc. in Geography

(Semester - IV)

Semester - IV

(MSCGEOGC401: Core Course-15, Theoretical)

Historical and Political Geography

✧**Full Marks: 50** ✧ **CA+ESE Marks: 15+35**
✧ **Credit: 4** ✧ **L - T – P: 4 - 0 - 0**
✧ **End Sem Exam Duration: 2 Hours**

Course Learning Outcomes:

1. *Understand the Nature, scope, content and evolution of Historical and Political Geography.*
2. *Study of the historical geography in India.*
3. *Get knowledge of Geopolitical theories and learn basic concept of Electoral Geography and Political Ecology*
4. *Identify the necessity of political and economic blocks all over the world.*

GROUP-A: HISTORICAL GEOGRAPHY

Unit-1: Historical Geography: Conceptual Issues

1.1 Development of Historical Geography as a discipline; From Historical Geography to Historiography.

1.2 Sources of Historical Geography and cartographic materials; Elements of Historical Geography and travel literature: Hiuen Tsang, Ibn-E-Batuta, Barnier

Unit-2: Historical Geography of India

2.1 Development of the identity of India: Pilgrimage, population dynamics and sacred space; India in Mughal Period: Territorial Administration and Revenue Collection.

2.2 Colonial India: Plantation Farming; Trade and Transport; Independent India: State Reorganization and Industrialization.

GROUP-B: POLITICAL GEOGRAPHY

Unit-3: Concepts of Political Geography

3.1 Nature, scope and content, relationship with Political Science, Political Geography in the era of Globalisation; Concept of Geo-Politics and evolution of Geo-strategic views.

3.2 Concept of State, Nation and Nation State; Frontiers and Boundaries; Geopolitical Theories - Mackinder and Spykman. Electoral Geography: overview of models; Political ecology: tragedy of commons.

Unit-4: Politics of World Resources

4.1 Politics of World Energy Resources: Petroleum and Nuclear. Political and Economic blocs.

4.2 Bases of Re-organization of Indian states since Independence; India: Federalism, SAARC and BRICS.

Continuous Assessment [15 Marks]

(*The department shall decide the methods of internal assessment*)

✧ Suggested Readings:

1. Ali, S.M. (1966): The Geography of the Puranas, People's Publishing House, Delhi.
2. Baker, A.R.H (ed.) (1972): Progress in Historical Geography, David and Charles.
3. Tamaskar, B.G. (1985): Contributions to Historical Geography of India, Inter-India Publications, New Delhi.
4. Roberts, P.E. (1995): Historical Geography of India, Vol. I and II, Printwell, Jaipur.
5. Pacione, M. (1987): Historical Geography: Progress and Prospect, Croom Helm, London.
6. Butin, R.A. (1993): Historical Geography: Through the Gates of Space and Time, Edward Arnold, London.
7. Agnew, John (1997): Political Geography: A Reader, Arnold, London.
8. Adhikari, Sudeepta (2002): Political Geography, Rawat Publications, New Delhi.
9. Pounds, Norman J.G. (1963): Political Geography, McGraw Hill Book Company.
10. Husain Majid (1994): Political Geography, Anmol Publications Pvt. Ltd.
11. Cox, Kevin R. (2002): Political Geography: Territory, State, and Society, Blackwell Publishers, Oxford.
12. Dixit, R.D. (2000): Political Geography: The Spatiality of Politics, New Delhi, Tata McGraw Hill Publishing Co.Ltd.
13. Johnston, R.J., Taylor, P.J. and Watts, M.J. (eds.) (1995): Geographies of Global Change: Re-mapping the World in the Late Twentieth Century, Blackwell, Oxford.
14. Taylor, P.J. and House, J. (1984): Political Geography: Recent Advance and Future Direction, Crom Helm, Kent.

Semester – IV

(MSCGEOGC402: Core Course-16, Theoretical)

Contemporary Issues in Geography

✧Full Marks: 50 **✧ CA+ESE Marks: 15+35**
✧ Credit: 4 **✧ L - T – P: 4 - 0 - 0**
✧ End Sem Exam Duration: 2 Hours

Course Learning Outcomes:

After completion of this course, students will be able to –

1. *Learn the concept of Development.*
2. *Get familiar with the concept of GNP,GDP, Gross Happiness Index (GHI),HDI and GEM*
3. *Identify the constraints of Human Development and get knowledge about fertility, morbidity, mortality and expectancy of life.*
4. *Acquire knowledge about some Contemporary Geographical Issues in India such as impact assessment of big dams and mining, Joint forest management, white and green revolution etc.*
5. *Learn some important Contemporary Geographical Issues in West Bengal.*

Unit-1: Economic Development

1.1 Concept of Development and Basic indicators of economic development.

1.2 Concepts of GNP, GDP of New World and Third World. Gross Happiness Index.

Unit-2: Human Development

2.1 Basic indicators of human development; Disparities in Human Development. Concept of Gender Empowerment Ratio (GEM)

2.2 Demographic constraints: Significance of high fertility, morbidity and mortality, low expectancy of life.

Unit-3: Contemporary Geographical Issues in India

3.1 Large Scale Development Projects and Impact: (Big Dams and Mining); Forest Policies and Forest People; Success and Failure of Forest Management.

3.2 Green Revolution and White Revolution: Social and Ecological Consequences.

Unit-4: Contemporary Geographical Issues in West Bengal

4.1 Contamination of Ground Water in West Bengal: Arsenic and Fluoride; Tribal Development in Western Plateau and its Fringe Areas of West Bengal

4.2 Conflicting Issues in Sundarban Region: Human Ecosystem vs. Natural Ecosystem; Agriculture in Eastern Barddhaman District and Mining in Western Barddhaman District.

Continuous Assessment [15 Marks]

(*The department shall decide the methods of internal assessment*)

✧ Suggested Readings:

1. Agarwal, A.N. (1995): Indian Economy, Problems of Development and Planning, Vishwa Prakasan, New Delhi.
2. Misra, S.K, and Puri, V.K. (1997): Indian Economy, Himalaya Publishing House, Mumbai.
3. Adams, W.M. (1995): Green Development: Environmental Sustainability in the Third World, Routledge, London.
4. Alexander, D. (1993): Natural Disasters, Research Press, New Delhi.
5. Acharya S.S., Singh S. and Sagar V. (2005): Sustainable Agriculture Poverty and Food Security, Rawat Publication
6. Dasgupta P. (1996): An enquiry into Wellbeing and distribution. Clarendon Press, Oxford.
7. Raza, M. (1992): Development and Ecology, Rawat Publication.
8. Smith, D.M. (1980): Human Geography: a Welfare Approach, Edward Arnold.
9. Chandra R.G., Tribal development in India: the contemporary debate, Sage New Delhi
10. Smith. K, Environmental hazards: assessing risk and reducing disaster, Routledge London
11. Desai Vasant: Forest management in India-issues and problems, Himalaya Publishing House Bombay.
12. Swaminathan, S. (2007): Agriculture cannot wait, Academic Foundation, New Delhi.
13. Jain P.C. (2001): Globalization and tribal economy, Rawat.
14. Shaw R and Krishnamurthy R.R. (2009): Disaster: Global challenges and local solutions, University Press.
15. Newson, M. (2009): Land, Water and Development, Routledge.
16. Social forestry in India (1984): Birla Institute of Scientific Research, Radiant Publisher.
17. Sharma, T.C. and Coutinho, O. (1989): Green Revolution Gaps, Rawat.

Semester - IV

(MSCGEOGC403: Core Course-17, Theoretical)

Regional Planning and Research Methodology in Geography

✧Full Marks: 50 **✧ CA+ESE Marks: 15+35**
✧ Credit: 4 **✧ L - T – P: 4 - 0 - 0**
✧ End Sem Exam Duration: 2 Hours

Course Learning Outcomes:

1. *Get to learn the methodological foundation and the importance of planning at varied level.*
2. *Trace the linkages of planning with the regional development.*
3. *Come to know the conceptual and theoretical bases of doing scientific research.*
4. *Enhance the understanding towards framing and testing the hypothesis in producing scientific knowledge.*

GROUP-A: REGIONAL PLANNING AND DEVELOPMENT

Unit-1: Regional Planning: Concepts and Methods

1.1 Concept, Scope and Approaches of Regional Development and Planning. Multi-level planning in India. Need for regional planning in India. Metropolitan Region: Concept and Structure; Metropolitan Regions of India. Multi-Nuclei Development and Functional Inter-linkages.

1.2 City Region in Regional Planning. Decentralized Planning and People's Participation in planning process. Theories and Models of Regional Development: Growth Pole, Cumulative Causation and Core periphery.

Unit-2: Strategies for Regional Development

2.1 Regional Inequality, Regional Disparity and Regional Diversity in India. State as a Planning unit; Criteria for dividing a State into Planning Region: West Bengal as a case study.

2.2 Regional planning in India: Metropolitan planning (NCR), Tribal Regions (Bastar), River Valley Region (Damodar Valley Region). Special Economic Zones with special reference to West Bengal.

GROUP-B: RESEARCH METHODOLOGY

Unit-3: Introduction to Research Methodology

3.1 Concepts and Significance of Research in Geography; Objectives and Types of Research. Approaches to Research in Geography: Philosophy-Empiricist, Positivist and Post-Positivist; Methods- Inductive and Deductive; Analysis- Descriptive and Analytical.

3.2 Nature and Sources of data; Preparation of Data - Data Recording and Coding, Treatment of Missing Data; Types of Survey - Preparation of Questionnaires and Survey Schedule. Identification of a Research Problem, Research Questions and Hypothesis Building.

Unit-4: Research Design and Findings

4.1 Research Design: Need for Research Design, Important Concepts, Different Research Design. Qualitative and Quantitative research methods, Scaling Techniques, Sampling Design.

4.2 Data Management: Collection, Reliability and Authenticity; Processing and Analysis of Data, Hypothesis testing: t-test, z-test and χ2-test. Methods of Manuscript Writing and Scientific Drafting of Dissertation, Methods of Citation, Referencing and Bibliography

Continuous Assessment [15 Marks]
(*The department shall decide the methods of internal assessment*)

✧ **Suggested Readings**:

1. Agarwal, A.N. (1995): Indian Economy, Problems of Development and Planning, Vishwa Prakasan, New Delhi.
2. Ahuja, R. (2001): Research Methodology, Rawat Publication, Kolkata.
3. Boudeville, J.R. (1966): Problems of Regional Economic Planning, Edinburgh University Press, Edinburgh.
4. Chand, M. and Puri, V.K, (1983): Regional Planning in India, Allied Publishers, New Delhi.
5. Chandrasekhara, C.S. and Sundaram, K.V. (1968): Metropolitan Centres and Regions in India, 21st International Geographical Congress, Metropolitan Growth and Planning.
6. Chandrasekhara, C.S. and Sundaram, K.V. (1968): Planning Regions in India, Town and Country Planning Organisation (mimeo).
7. Chitambar, J.B. (1993): Introductory Rural Sociology, Wiley Eastern, New Delhi.
8. Das, D.L. (2000): Practice of Social Research, Rawat Publication, New Delhi.
9. David, F.E. (2000): Scientific Method for Ecological Research, Cambridge, U.K.
10. Dickinson, J., Gould, B., Clarke, C., Mather, S., Prothero, M., Siddle, D., Smith, C. and Thomas-Hope, E. (1996):A Geography of the Third World, 2nd edition, Routledge, London.
11. Dickinson. R.E. (1964): City and Region: A geographical interpretation, Routledge and Kegan Paul Ltd., London.
12. Goomen, M.A. and Datta, A. (1995): Panchayats and their Finance, Rawat Pub. Co., New Delhi.
13. Harper, C., and Marcus, R. (2007): Research for Development: A Practical Guide, Vistaar Publication, New Delhi.
14. Institute of Social Sciences (1994): Decentralised Planning and Panchayati Raj, Rawat Pub. Co., New Delhi.
15. Kothari, C. (2009): Research Methodology: Methods and Techniques, New Age International Publishers, Kolkata.
16. Mandal, R.B. (1988): Systems of Rural Settlements in Developing Counties, Concept Pub. Co., New Delhi.
17. Matthews, A. (1994): Panchayati Raj: From Legislation to Movements, Rawat Pub. Co., New Delhi.
18. Matthews, G. (editor) (1995): Status of Panchayati Raj: 1994, Institute of Social Sciences. Rawat Pub. Co., New Delhi.
19. Misra, H.M. (ed.) (1987): Contributions to Indian Geography, Volume 9: Rural Geography, Heritage Pub., New Delhi.
20. Misra, R.P. (1969): Regional Planning: Concepts, Techniques, Policies and Case Studies, Concept, New Delhi.
21. Ray Chaudhuri, J. (2001): An Introduction to Development and Regional Planning, Orient Longman, Kolkata.

22. Singh, R.L. (editor) (1971): India: A Regional Geography, National Geographical Society of India, UBS Pub.Distributors Ltd., New Delhi.
23. Spate, O.H.K. and Learmonth, A.T.A. (1967): India and Pakistan, 3rd edition, Munshiram Monoharlal Pub. Pvt.Ltd., New Delhi.

Semester - IV

(MSCGEOGC404: Core Course-18)

Dissertation

✧ **Full Marks: 50**	✧ **CA+ESE Marks: 30+20**
✧ **Credit: 4**	✧ **L - T – P: 0 - 2 - 4**

Course Learning Outcomes:

1. *Learn the skill in finding and drafting a research problem.*
2. *Become familiar with the scientific terminologies and concepts needed for conducting a scientific research.*
3. *Develop the skill of scientific writing and proficiency in presenting the research outcome.*

Dissertation and Seminar Presentation

The dissertation will be evaluated based on (a) written report and (b) seminar presentation the internal assessment for Dissertation on (a)written report will be of 20 marks and (b)seminar presentation of 10 marks. End semester evaluation for Dissertation on (a)written report will be of 10 marks and (b)seminar presentation of 10 marks.

1. Preparation of report mainly based on primary data and field work.
2. Seminar and presentation.
3. Evaluation of report.
4. Viva-voce on report.

The dissertation on respective special paper will be a solely individual comprehensive work based on conceptual aspects, field work analysis of primary and secondary data in the laboratory. It should mention the objectives, sources of information, methods and approaches. Interrelations between different aspects of the study should be the focus of the term paper.

Text of the report should not exceed 10,000 words and should ideally be divided into the following sections:

♦ Introduction ♦ Statement of problem (s) and Objectives ♦ Information and Analysis ♦ Results ♦ Discussions ♦ Conclusions ♦References / Bibliography and ♦ Appendices (if any).

Maps, diagrams and sketches, excluding photographs, should not exceed 30 pages of A4 size paper. Each of the dissertations is to be produced individually by the students and this must be stated clearly in a certificate from the supervisor(s). Photocopying and/or bulk computer typing are not to be allowed in any form.

Semester - IV

(MSCGEOGMJE401: Major Elective-3, Theoretical)

Advanced Geomorphology - III

✧Full Marks: 50 **✧ CA+ESE Marks: 15+35**
✧ Credit: 4 **✧ L - T – P: 4 - 0 - 0**
✧ End Sem Exam Duration: 2 Hours

Course Learning Outcomes:

After completion of this course, students will be able to –

1. *Understand and give explanation how the endogenic and exogenic interactions shape landforms and distinguish the mechanisms that control these processes.*
2. *Gain knowledge about the dating techniques of landscape and geomorphic events. This knowledge may help in understanding landscape sensitivity and change.*
3. *Learn about the mechanism and working principle of geomorphic processes in details that lead to shape present earth-surface.*
4. *Know geomorphic features that are not found on Earth. As a student of geomorphology, they will know how to use landforms on Earth to understand those on other Solar System bodies.*

Unit-1: Endogenic-exogenic interactions in Geomorphology

1.1 Rates of uplift and denudation. Tectonics and drainage development (active and passive tectonic controls). Time-dependent and time-independent landforms.

1.2 Impact of Quaternary climate change on landform evolution. Sea-level change and landform development.

Unit-2: Adjustments in Geomorphic System

2.1 Rates and changes in surface processes: techniques for process measurement and dating of sediment (Palaeomagnetism, Cosmogenic nuclides, Luminescence and ^{14}C dating).

2.2 River response to climate and tectonics. Human impacts on landforms during Anthropocene. Analyzing evolutionary trajectory of the landscapes.

Unit-3: Process Geomorphology

3.1 Bedrock channels: Stream Power law and Bedrock incision process. Coastal morphodynamic variables and their influence on evolution of coastal forms. Classification and evolution of periglacial landforms.

3.2 The geomorphology of the World's Largest Floods. Planetary geomorphology with special reference to Moon and Mars.

Unit-4: Applied Geomorphology

4.1 Quantitative Geomorphology: Geomorphological mapping and geomorphometry; DEM and digital geomorphometry, Fractals in Geomorphology.

4.2 Applied geomorphology in coastal-zone management; Urban Geomorphology: applications of geomorphology in urban planning; Geoheritage and Geomorphosites.

Continuous Assessment [15 Marks]

(*The department shall decide the methods of internal assessment*)

✧ Suggested Readings:

1. Anderson, R.S. and Anderson, S.P. (2010): Geomorphology: The Mechanics and Chemistry of Landscapes, Cambridge University Press, Cambridge.
2. Brown, A.G. (1997): Alluvial Geoarchaeology: Floodplain Archaeology and Environment Change, Cambridge University Press, Cambridge.
3. Chorley, R., Schumm, S. and Sugden, D.E. (1994): Geomorphology, Methuen, London.
4. French, H.M. (2007): The Periglacial Environment, Third Edition, John Wiley & Sons, Ltd.
5. Goswami, A.B. (2010): Principles of Quaternary Geology and Environment Study (Concept, Methodology and Technique), Books Way, Kolkata.
6. Goudie, A.S. and Viles, H.A. (2016): Geomorphology in the Anthropocene, Cambridge University Press, UK.
7. Gupta, A. (2011): Tropical Geomorphology, Cambridge University Press, New York.
8. Gutierrez, M. (2013): Geomorphology, CRC Press, Boca Ranton, Florida.
9. Kale, V.S. (eds.) (2017): Atlas of Geomorphosites in India (Glimpses of India's incredible Geodiversity and Geoheritage, Indian Institute of Geomorphologists (IGI).
10. Kale, V.S. and Gupta, A. (2001): Introduction to Geomorphology, Orient Longman, Kolkata.
11. Ollier, C.D. (1981): Tectonics and Landforms, Longman Group Ltd., London.
12. Richards, K. (1982): Rivers: Form and processes in alluvial channels, Methuen, London.
13. Shroder, J. (eds.) (2013): Treatise on Geomorphology, Elsevier.
14. Summerfield, M.A. (1991): Global Geomorphology: An Introduction to the Study of Landforms, Longman, London.
15. Wallace-Murray, CV. and Woodroffe (2014): Quaternary Sea-Level Changes: A Global Perspective, CambridgeUniversity Press, New York.

Semester - IV

(MSCGEOGMJE402: Major Elective-4, Practical)

Advanced Geomorphology - IV

✧ **Full Marks: 50**	✧ **CA+ESE Marks: 30+20**
✧ **Credit: 4**	✧ **L - T – P: 0 - 0 - 8**
✧ **End Sem Exam Duration: 2 Hours**	

Course Learning Outcomes:

1. *Acquire knowledge of spatial statistics and time series analysis of hydrology data for basin-scale management.*
2. *Understand the importance of logistic regression for estimating various geomorphic attributes. They will also learn the allometric change of landforms.*
3. *Learn selected quantitative techniques such as trend surface analysis, interpolation and extrapolation for analyzing geomorphic data.*
4. *Develop the capability of analyzing geomorphic data using advanced multivariate techniques like Principal Component Analysis, Discriminant Analysis, Cluster analysis and Canonical Correlation analysis.*
5. *Develop skills in application of theoretical knowledge of hydrology for estimating different hydrological attributes in formulating various hydro-geomorphological projects and their successful management.*
6. *Learn how to apply flood frequency-magnitude analysis in wide range of engineering and management problems ranging from drainage basin management to hazard management.*
7. *Develop skill of map making using software and foster their abilities in showing the spatial distribution of various geologic and geomorphic elements and their proper interpretation.*
8. *Learn techniques regarding extraction of drainage network from DEM*
9. *Identify coastal features using topographical maps/ satellite images.*
10. *Students can find career opportunities as Environmental Consultant and Research Scientist in engineering consulting firms and government agencies like NIO, INCOIS, ESSO (MoES) etc.*

Unit 1: Advanced Statistical Techniques in Geomorphology [15 Marks]

1.1 Spatial Statistics: Spatial Autocorrelation (Computation of Moran's I), Hot Spot Analysis using Getis-Ord G_i statistic; Methods for detecting changes in hydrological series.

1.2 Use of dummy variable and Logistic Regression; Allometric change in Geomorphology.

1.3 Trend Surface Analysis (TSA): computation of linear trend; Interpolation and Extrapolation: Newton, Lagrange and Binomial Method

1.4 Mapping and Clustering through Principal Component Analysis (PCA); Discriminant and Cluster analysis; Introduction of Canonical Correlation.

Unit 2: Flood analysis and Mapping techniques in Geomorphology [15 Marks]

2.1 Computation and preparation of Annual hydrograph; Computation of Runoff Co-efficient; Flow Duration Curves; Rating curves.

2.2 Estimation of shear stress and unit stream power; Analysis of Flood Frequency and Recurrence Interval: Weibull (1939) and Gumbel (1941) methods.

2.3 Interpretation of geological maps of India (Scale: 1:250,000). Preparation of geomorphic maps of fluvial features from field data and satellite images using standard symbols and colours and their interpretation. Flood hazard mapping using satellite images and interpretation (using Software).

2.4 Extraction of drainage network from DEM, catchment demarcation and stream ordering, extraction and mapping of morphometric parameters. Temporal analysis of channel shifting and planform dynamics using geoinformatics (using Software). Identification of coastal features using topographical maps/ satellite images and geomorphic mapping of coastal features (using Software).

In the End Semester Examination, students have to answer one compulsory question from the above two Units.
Viva-voce [5 Marks]
Continuous Assessment [30 Marks]
*(*A Project File, comprising one exercise each is to be submitted)*

✧ **Suggested Readings**:

1. Doornkamp. J.C. and King C.A.M. (1971): Numerical Analysis in Geomorphology: An Introduction, St. Martin's Press, New York.
2. Dackombe, R.V. and Gardiner, V. (1983): Geomorphological Field Manual. George Allen and Unwin, London.
3. King, C.A.M. (1966): Techniques in Geomorphology, Edward Arnold, London.
4. Miall, A.D. (2006): The Geology of Fluvial Deposits (Sedimentary Facies, Basin Analysis, and Petroleum Geology), Springer.
5. Sengupta, S.M. (2010): Introduction to Sedimentology, Second Edition, CBS Publishers & Distributors Pvt. Ltd., New Delhi.

Semester – IV

(MSCGEOGMJE403: Major Elective-3, Theoretical)

Environmental Issues in Geography - III

✧Full Marks: 50 **✧ CA+ESE Marks: 15+35**
✧ Credit: 4 **✧ L - T – P: 4 - 0 - 0**
✧ End Sem Exam Duration: 2 Hours

Course Learning Outcomes:

1. *Enhance the knowledge towards understanding the global debate on SDGs and climate change.*
2. *Learn the significance behind the environmental movements in India towards preserving the natural resources and to protect the ecological stability.*
3. *Introduce them to the legal understanding of the existing policies, laws and protocol and to instil moral values, ethical practices to save the environment.*

Unit-1: Global Environmental Issues, Assessment and Management

1.1 Environmental study of ecological history of human civilization. Concept of Sustainable Development. Environmental policies and laws with reference to Climate change, Earth summit, and Protocols (Kyoto and Montreal).

1.2 Environmental Impact Assessment (EIA); Case study of Big Dams and Environmental Management Plan (EMP); Case study of Chilka.

Unit-2: Environment and Development debate in India `

2.1 Environmental Movement: Objectives, Dynamics, Importance and Ecological foundation of Chipko Movement, Silent Valley Project and Narmada Bachao Andolan (NBA).

2.2 Anthropogenic Intervention on River Valley Planning: Case Study of Damodar River Valley (DVC); Mining Activities and Developmental Issues: Taking Cases from India.

Unit-3: Environmental Laws and Policies in India` and West Bengal

3.1 Environmental Ethics, Policies and Laws in India (Forest Policies): Social Forestry and Participatory Forest Management; Case Studies of JFM and Urban Forestry in India.

3.2 Policies and management of Wasteland –Case Studies from India. Wetland and Micro Watershed Management: Case Studies from West Bengal

Unit-4: Urbanization and Environmental Issues in India

4.1 Impact of Industrialization and Urbanization on Air, Water, Land and Forests and associated management plans.

4.2 Loss of Biodiversity with special reference to Eastern Himalayas, Western Ghats.

Continuous Assessment [15 Marks]

(*The department shall decide the methods of internal assessment*)

✧ Suggested Readings:

1. Adams, W.M. (1995): Green Development: Environmental Sustainability in the Third World, Routledge, London.
2. Alexander, D. (1993): Natural Disasters, Research Press, New Delhi.
3. Allaby, M. (1996): Basics of Environmental Science, Routledge, London.
4. Baarrsches, W.H. (1996): Eco-facts and Eco-fiction: Understanding the Environmental Debate, Routledge, London.
5. Blaikie, P., Cannon, T, Davis, I. and Wisener, (1994): At Risk: Natural Hazards, People's Vulnerability and Disasters, Routledge, London: 320p.
6. Bryant, E.A. (1991): Natural Hazards, Cambridge University Press, Cambridge.
7. Canter, L. W. (1996): Environmental Impact Assessment, 2nd edition, McGraw Hill, New York.
8. Chapman, D. (1994): Natural Hazards, Oxford University Press, Melbourne.
9. Chhatwal, G.R., Mensa, M.C., Satke, M., Katyal, T., Katyal, M., and Nagahiro, T. (1989): Environmental NoisePollution and its Control, Anmol Pub. Pvt. Ltd., New Delhi.
10. Colls, J. (1997): Air Pollution: An Introduction, E & FN Spon / Chapman and Hall, London.
11. Dasgupta, P. and Miller, K.G. (1997): The Environment and Emerging Development Issues, Volumes I and 2, Clarendon Press, Oxford.
12. Elsom, D.M. (1992): Atmospheric Pollution: A Global Problem, 2nd edition, Blackwell Pub. Co., London.
13. Falconer, R.A. and Goodwin, P. (editor) (1994): Wet and Management, Thomas Telford, London.
14. Farmer, A. (1997): Managing Environmental Pollution, Routledge, London.
15. Gilpin, A. (1996): Dictionary of Environment and Sustainable Development, John Wiley and Sons Ltd., Chichester.
16. Gilpin, A. (1997): Environmental Impact Assessment: Culling Edge for the Twenty-first Century, Cambridge University Press, Cambridge.
17. Goel, P.K. (1997): Water Pollution: Causes, Effects and Controls, New Age International (P) Ltd. Pub. New Delhi.
18. Goudie, A. (1986): The Human Impact on the Natural Environment, 2nd edition, Blackwell Pub. Co., London.
19. Marsh, W.M. and Grossa, J.M. (1996): Environmental Geography: Science, Landuse and Earth Systems, John Wiley and Sons Inc., New York.
20. Masters, G .M. (1991): Introduction to Environmental Engineering and Sciences, Prentice Hall India Ltd. New Delhi.
21. Middleton N. (1995): The Global Casino: An Introduction to Environmental Issues, John Wiley and Sons Inc., New York.
22. Park, C. (1998): The Environment: Principles and Applications, Routledge, London.
23. Pickering, K. and Owen, L.A. (1997): An Introduction to Global Environmental Issues, 2nd edition, Routledge, London.
24. Prabhakar, V.R. (1998): Social and Community Forestry, Indian Pub. Distribution, New Delhi.
25. Roberts, N. (editor) (1994): The Changing Global Environment, 3rd edition, Blackwell Pub. Co., London.
26. Singh, R.B. and Misra, S. (1996): Environmental Laws in India: Issues and Responses, Rawat Pub., New Delhi.
27. Valancy, F. and Bronstein, D.A. (1995): Environmental and Social Impact Assessment, John Wiley and Sons inc., New York.
28. Vogler, J. (1995): The Global Commons: A Regime Analysis, John Wiley and Sons Ltd., Chichester.
29. Wall, D. (1994): Green History: A Reader in Environmental literature, Philosophy and Politics, Routledge,London.
30. Wathern, P. (editor) (1988): Environmental Impact Assessment: Theory and Practice, Routledge, London.

Semester - IV

(MSCGEOGMJE404: Major Elective-4, Practical)

Environmental Issues in Geography - IV

✧ **Full Marks: 50** ✧ **CA+ESE Marks: 30+20**
✧ **Credit: 4** ✧ **L - T – P: 0 - 0 - 8**
✧ **End Sem Exam Duration: 2 Hours**

Course Learning Outcomes:

1. *Enhance the knowledge of mapping the physio-cultural environment, pollution zonation and soil quality estimation.*

2. *Get insights to map the local area and instill the skill of GIS and Statistics towards environmental monitoring and surveying.*

Unit 1: Advanced Statistical Techniques in Environmental Issues in Geography [15 Marks]

1.1 Use of dummy variable and Logistic Regression; System Component Growth.

1.2 Interpolation and Extrapolation: Newton, Lagrange and Binomial Method; Mean centre of population and its shift over time; Population Potential by Gravity model.

1.3 Shortest Path Analysis: Transport and Allocation Problems; Trend Surface Analysis (TSA): computation of linear trend.

1.4 Mapping and Clustering through Principal Component Analysis (PCA); Discriminant and Cluster analysis; Introduction of Canonical Correlation.

Unit-2: Estimation, Environmental Survey and Mapping of Environmental Data [15 Marks]

2.1 Methods of studying the Physical and Cultural Environment; Multivariate Estimation of environment from Geographical Data with t-test and $\chi 2$ test.

2.2 Estimation of Soil pH, organic carbon and nutrient concentration in soil (N, P, K).

2.3 Preparation and Interpretation of Environmental Maps: Cadastral Map/ Ward map; Mapping Spatial variation in Crime and Disease.

2.4 Environmental Mapping Techniques: Landuse and Land Cover Classification; Mapping to correlate Physical and Social Environmental elements using GIS. Mapping of Pollution Zones.

In the End Semester Examination, students have to answer one compulsory question from the above two Units.
Viva-voce [5 Marks]
Continuous Assessment [30 Marks]
*(*A Project File, comprising one exercise each is to be submitted)*

✧ **Suggested Readings**:

1. Hammond, R. and McCullagh, P. (1991): Quantitative Techniques in Geography, Clarendon Press, Oxford

2. Mahmood, A. (1998): Statistical Methods in Geographical Studies, Rajesh Publication.
3. Monkhouse F.J. and Wilkinson, H.R. (1971): *Maps and Diagrams: Their Compilation and Construction*, B.I. Publications Private Limited, New Delhi.
4. Pal, S.K. (1999): Statistics for Geoscientists, Concept publishing Company, New Delhi.
5. Sarkar, A. (2015): *Practical Geography: A Systematic Approach*, 3rd Edition, Orient Blackswan Private Ltd.
6. Sarkar, A. 2013): *Quantitative Geography: Techniques and Presentations*, Orient BlackSwan, Hyderabad.
7. Sen, A.K. (1995): *Laboratory Manual of Geology*, Modern Book Agency (P) Ltd., Kolkata.
8. Silk, J. 1(979): Statistical techniques in Geography, George Allen and Unwin, London.
9. United States Department of Agriculture (USDA) (2014): *Soil Survey and Laboratory Methods Manual*, Soil Survey Investigations Report No. 51.

Semester - IV

(MSCGEOGMJE405: Major Elective-3, Theoretical)

Urban Geography- III

✧Full Marks: 50 **✧ CA+ESE Marks: 15+35**
✧ Credit: 4 **✧ L - T – P: 4 - 0 - 0**
✧ End Sem Exam Duration: 2 Hours

Course Learning Outcomes:

After completion of this course, students will be able to –

1. *Trace the trend in the migration pattern of population and societal changes over time.*
2. *Learn to live and counter the problems emerged while be in an urban setting.*
3. *Get an insight over the historical emergence of Indian cities and the phases of transition over time.*
4. *Come to know the strategies and challenges of the policies and programme implemented for urban planning in India.*

Unit-1: Migration and Urban change

1.1 Impact of Rural to Urban, Urban to Rural and Urban to Urban migration on the socio-economic structure of a specific urban area; Gentrification-Concept and its impact, Typologies, and Theories

1.2 Social area analysis after Shevky and Bell, Residential Segregation and Factorial Ecology

Unit-2: Urban Infrastructure and Urban Liveability

2.1 Urban Housing and housing markets, Urban Transport and associated problems, Issues related to urban transport planning

2.2 Urban water crisis, sanitation and sewerage related problems in cities, Impact of air pollution and water pollution on urban health, Urban Crime,Urban green space, Emerging urban flood.

Unit-3: Urbanization in India

3.1. Histogenesis of Urbanization with special reference to India –Ancient, Medieval, Colonial Phases, Regional pattern of Urbanization in Post-colonial India

3.2 Functional classification of Indian cities, rural-urban transformation in India

Unit-4: Urban Planning in India

4.1 Urban planning in Five Year Plans of India with special reference to IDSMT, Urban poverty alleviation programmes in India

4.2. Analysis on Urban Housing Policies in India-its Problems and Prospects; Urban Renewal and Urban Redevelopment in India - Role of JNNURM; Smart cities and AMRUT.

Continuous Assessment [15 Marks]

(*The department shall decide the methods of internal assessment*)

✧ Suggested Readings:

1. Bhattacharya, B. (2006). Urban Development in India. New Delhi: Concept Publishing Company
2. Bird, James 1977: Centrality And Cities. Routledge, London
3. Carter, H. 1981: Urban Geography, 3rd edition Arnold-Heinemann, New Delhi.
4. Chakroborty, J., & Ghosh, P. (2007). Higher Algebra. kolkata: Un Dhur and Sons Pvt Ltd.
5. Das, A. K. (2007). Urban Planning in India. Jaipur: Rawat Publications.
6. Dave, M. (1991). Urban Ecology and Levels of Development. Jaipur: Rawat Publications .
7. Dickinson, R.E. (1968): City and Region: A Geographical Interpretation. Routledge and Kegam Paul Ltd. London.
8. Diddee, Jaymala (1997): Indian Medium Towns. Rawat Publications, Jaipur.
9. Ghosh, S. (1998): Introduction to Settlement Geography. Orient Longman Ltd., Calcutta
10. Gibbs.J(1961) : Urban Research Methods. East-West Press Pvt Ltd. New Delhi
11. Glasson,J.(1975): An Introduction to Regional Planning. Hutchinson and Co.,London
12. Hardoy, J. E., Mittin, D. & Satterthwaite, D. 1(992) : Environmental Problems in the World Cities. Earthscan Pub. Ltd. London.
13. Hudson, F.S. (1970): Geography of Settlements, Macdonald and Evans Ltd. PlymouthHerbert, David and Thomas, Colin, 1982: Urban Geography A First Approach,Jhon Wiley & Sons. New Delhi
14. Johnston .R.J (2000): The Dictionary of Human Geography.Blackwell. UK
15. Kaplan.D and Wheeler.J (2008):Urban Geography.John Wiley
16. Knox, P. (1982): Urban Social Geography. Longman Scientific and Technical, Harlow.
17. Law.N,Smith.D,(1991),Decision Making Geography. Stanley Thornes Pub. Ltd, Leckhampton
18. Lillesand, T.M. and Kiefer, R. W. (1994): Remote Sensing and Image Interpretation. 3rd edition, John Wiley and Sons, New York
19. Mandal, R.B. (2000): Urban Geography: A Textbook. Concept Pub. Co., New Delhi.
20. Mandal,R.B(1989):Staistical Techniques for Social Scientist. Concept Pub. Co., New Delhi
21. Markandey, K., & Simhadri, S. (2009). Urban Environment and Geoinformatics. Jaipur: Rawat Publication.
22. Mcdonnell, M. J., Halns, A. K., & Breste, J. H. (2009). Ecology of Cities and Towns. Cambridge University Press.
23. Misra. H. N. (ed) 1987: Contributions to Indian Geography. Volume 9: Rural Geography, Heritage Pub., New Delhi.
24. Mohan Sudha (2005): Urban Development and New Localism. Rawat Publications, Jaipur.
25. Pacione, Micheal, (2001): Urban Geography, Routledge, London
26. Naqvi, H. K. (1971). Urbanisation and UrbanCentres under the Great Mughals. Shimla: Indian Institute of Advance Studies .
27. Raza, M., & Aggarwal, Y. (1999). Transport Geography of India. New Delhi: Concept Publishing Company.
28. Ramachandran R. (1989): Urbanisation arid Urban Systems in India. Oxford University Press, New Delhi.
29. Rao, R. Rammohan and S. Simhadri (1999): Indian Cities: Towards Next Millenium, Rawat Publications, Jaipur.
30. Ray Chaudhuri,Jayasri(2001): An Introduction to Development and Regional Planning. Orient Longman,Kolkata
31. Sharma, R.N. and K. Sita (2001): Issues in Urban Development. Rawat Publications, Jaipur.
32. Short, J. R. (1984). An Introduction to Urban Geography. London: Routledge and Keygen Paul.
33. Singh, A. K. (1990). Urbanisation and Administration of Urban Infrastructure. New Delhi: Inter-India Publications.
34. Singh, R.L. et. al. (ed) (1976): Geographic Dimensions of Rural Settlements. National Geographical Society of India, Varanasi.
35. Singh, R. Y. (1994): Geography of Settlements, Rawat Pub. Co., New Delhi.
36. Singh, Ravinder Sandhu (ed) 2003:Urbanisation in India. Sage Publications, New Delhi.
37. Taylor, Griffith (1949): Urban Geography, Methuen and Co. Ltd., London.
38. Tewari, V. Weinston, J. and Prakash Rao, V.L.S. (1986): Indian Cities: Ecological Perspectives. Concept Pub. Co., New Delhi.
39. Thudipara, Jacob Z. (2007): Urban Community Development. Rawat Publications, Jaipur.
40. Toyne.P and Newby.P(1971)Techniques in Human Geography. Macmillian, London
41. Vishwanadhan, G. (ed) 1986: Readings in Urban Structure of India. Ajanta Publications, Delhi.

42. Taafee, E. J., & Gauthier, H. L. (1973). Geography of Transportation. New Delhi: Prentice

Semester – IV

(MSCGEOGMJE406: Major Elective-4, Practical)

Urban Geography- IV

✧ **Full Marks: 50** ✧ **CA+ESE Marks: 30+20**
✧ **Credit: 4** ✧ **L - T – P: 0 - 0 - 8**
✧ **End Sem Exam Duration: 2 Hours**

Course Learning Outcomes:

1. *Become familiar with the field techniques while conducting a study over urban setting.*
2. *Learn the tools and methods of mapping the urban neighbourhood through primary survey.*
3. *Enhance the knowledge of using satellite data for a spatial analysis of urban areas.*

Unit 1: Advanced Statistical Techniques in Urban Geography [15 Marks]

1.1 Use of dummy variable and Logistic Regression; System Component Growth.

1.2 Interpolation and Extrapolation: Newton, Lagrange and Binomial Method; Mean centre of population and its shift over time; Population Potential by Gravity model.

1.3 Shortest Path Analysis: Transport and Allocation Problems; Trend Surface Analysis (TSA): computation of linear trend.

1.4 Mapping and Clustering through Principal Component Analysis (PCA); Discriminant and Cluster analysis; Introduction of Canonical Correlation.

Unit-2: Application of Satellite Remote Sensing and Field Techniques in Urban Geography [15 Marks]

2.1 Extraction of Built up Areas from Coarse to High Resolution Satellite Images. Assessment of Urban Growth Types: Infilling, Edge Growth and Leap frog.
2.2 Identification of Urban Sprawl from LULC Map using Spatial Landscape Matrices.
2.3 Urban Growth Prediction Using Cellular Automata Model.
2.4 Mapping of Urban Environment: Case Studies of Air, Water and Noise.

In the End Semester Examination, students have to answer one compulsory question from the above two Units.

Viva-voce [5 Marks]
Continuous Assessment [30 Marks]
*(*A Project File, comprising one exercise each is to be submitted)*

✧ **Suggested Readings**:

1. Alvi, Z. (1995): *Statistical Geography: Methods and Applications*, Rawat Publications, New Delhi.

2. Cole, J.P. and King, C.A.M. (1969): *Quantitative Geography (Techniques and Theories in Geography)*, John Wiley & Sons Ltd., London.
3. Gibbs.J(1961) : Urban Research Methods. East-West Press Pvt Ltd. New Delhi
4. Glasson,J.(1975): An Introduction to Regional Planning. Hutchinson and Co.,London
5. Gun, A.M., Gupta, M.K. and Dasgupta, B. (2008): *Fundamental of Statistics* (Volume One and Two), The World Press Private Limited, Kolkata.
6. Lillesand, T.M. and Kiefer, R. W. (1994): Remote Sensing and Image Interpretation. 3rd edition, John Wiley and Sons, New York
7. Mahmood, A. (1998): *Statistical Methods in Geographical Studies*, Rajesh Publication.
8. Malhotra, O.P. and Gupta, S.K. (1990): *Elementary Statistics*, S. Chand & Company Ltd., New Delhi.
9. Mandal,R.B(1989):Staistical Techniques for Social Scientist. Concept Pub. Co., New Delhi
10. Markandey, K., & Simhadri, S. (2009). Urban Environment and Geoinformatics. Jaipur: Rawat Publication.
11. Pacione, Micheal, (2001): Urban Geography, Routledge, London.
12. Pal, S.K. (1999): *Statistics for Geoscientists*, Concept publishing Company, New Delhi. Sarkar, A. (2013): *Quantitative Geography: Techniques and Presentations*, Orient BlackSwan, Hyderabad
13. Raza, M., & Aggarwal, Y. (1999). Transport Geography of India. New Delhi: Concept Publishing Company.
14. Taafee, E. J., & Gauthier, H. L. (1973). Geography of Transportation. New Delhi: Prentice
15. Toyne.P and Newby.P(1971)Techniques in Human Geography. Macmillian, London
16. Vishwanadhan, G. (ed) 1986: Readings in Urban Structure of India. Ajanta Publications, Delhi.

Semester - IV

(MSCGEOGMJE407: Major Elective-3, Theoretical)

Population Geography-III

✧**Full Marks: 50**	✧ **CA+ESE Marks: 15+35**
✧ **Credit: 4**	✧ **L - T – P: 4 - 0 - 0**
✧ **End Sem Exam Duration: 2 Hours**	

Course Learning Outcomes:

After the completion of this course, student should be able to:

1. *Develop the conceptual knowledge regarding different basic problems related to population*
2. *Understand the linkage between population-resource and population- environment related issues.*
3. *Realise the impact of economic transformation on population over time.*
4. *Understand the theories and modern policy issues related to population.*
5. *Aquire skill for identifying different problems related to population and may depict the future projection of the said issues.*

Unit-1: Population problems and Economic composition

1.1 Problems of under, over, declining and zero population; Population ageing and demographic dividend - trends and patterns in develop, developing countries and policy issues.

1.2 Structural change in the economy and its relation with work participation and occupational diversification; Work participation and occupational diversification after the post-liberal period in India. Sector-wise and sex-wise distribution of workforce and its trend.

Unit-2: Population and Resource

2.1 Population resource distribution and its regionilazition with special reference to India; Effect of demographic factors on savings and investments; Importance of technology to improve the productivity of physical assets.

Human resources – qualitative and quantitative aspects; economically active population, unemployment, underemployment, Human Development Index (HDI); Investment in human capital approach,

Unit-3: Population and Environment

3.1 Human impact on the environment; Pressure of population on water, land, and air; Pollution and environmental degradation;

3.2. Environmental degradation and its implications on population - food, health; Environmental policies and programmes- global and national policie; Population-environment and sustainable development.

Unit-4: Population Theories, Policies and Projections

4.1. Theories of Population Growth: Malthus and Marx; Theory of demographic transition; Theories of optimum population; Population Projections.

4.2. National population policies (NPP) in India. Evolution of Family Welfare Program in India; Program components and organization at different levels (Nation, State, District); Goals and achievements of NPP.

Continuous Assessment [15 Marks]

(*The department shall decide the methods of internal assessment*)

✧ **Suggested Readings**:

1. Bloom, D.E., D. Canning, et.al. (2002): The Demographic Dividend: A New Perspective on the Economic Consequences of Population Change. Santa Monica, CA, RAND.
2. Birdsall, Nancy, Kelley, Allen C. and Sinding, Steven W. (2001). Population Matters: Demographic Change, Economic Growth and Poverty in the Developing World, Oxford: Oxford University Press
3. Bose, A.B. (2006). Social Security for the Old. New Delhi: Concept Publishing Company.
4. David E Bloom, David Canning, Jaypee Sevilla, (2003): The Demographic Dividend. Sanata Monica, CA: Rand Corporation.
5. Goudie Andrew (1986) The human impact on the natural environment; Blackwell, UK 12. Rogers J W John and Feiss Geoffrey P (1998) People and the earth Cambridge University Press, UK
6. Government of India (2002): National Health Policy, Ministry of Health and Family Welfare, New Delhi.
7. Government of India, (1999): National Policy on Older Persons in India, Ministry of Social Justice and Empowerment, New Delhi.
8. Government of India, (2000): National Population Policy, Department of Health and Family Welfare, Ministry of Health and Family Welfare, Govt. of India, New Delhi.
9. Haq, Mahbubul (1996): Reflections on Human Development, Delhi: Oxford University Press.
10. Linda J. Waite (ed.) (2004) Aging, Health, and Public Policy: Demographic and Economic Perspectives, Supplement to Population and Development Review
11. Irudaya Rajan, (2007) Social Security for the Elderly Experiences from South Asia, Routledge, New Delhi
12. Jain, Anirudh, (1988): Do Population Policy Matter? Fertility and Policies in Egypt, India, Kenya, and Mexico, Population Council, New York.
13. Kawadia, G. and K. Ahuja, (2006): Environmental Issues of Development. Sections A and E, Ambala: Associated Publishers.
14. Kapila, Ray and Uma Kapila (2001): India's Economy in the Twenty First Century. 2nd Revised Edition. New Delhi: Academic Foundation.
15. Nag, Prithvish and Debnath G.C (2022) Population Geography. Bharti Prakashan, Varanasi.
16. National Research Council (1986): Population Growth and Economic Development: Policy Questions. Washington D.C.: National Academy Press.
17. Ray, Debraj (1998): Development Economics. Delhi: Oxford University Press.
18. Todaro, Michael P. (1981): Economic Development in the Third world. New York: Longman
19. United Nations (1998), Economic and Social Implications of Population Ageing, Department of International Economic and Social Affairs, UN, New York.
20. United Nations (2001): Living Arrangements of Older Persons: Critical Issues and Policy Responses. Population Division, Department of Economic and Social Affairs, Special Issue Nos. 42/43, 2001, New York.
21. United Nations Development Programme (2007): Human Development Report 2007/08, New Delhi: Palgrave Macmillan Technical Note 1. pp. 393-99.

22. UNFPA, 2001, Population Ageing and Development: Social, Health and Gender Issues, United Nations, Malta.

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Semester – IV

(MSCGEOGMJE408: Major Elective-4, Practical)

Population Geography-IV

✧ **Full Marks: 50** ✧ **CA+ESE Marks: 30+20**
✧ **Credit: 4** ✧ **L - T – P: 0 - 0 - 8**
✧ **End Sem Exam Duration: 2 Hours**

Course Learning Outcomes:

After the completion of this course, student should be able to:

1. *Acquire knowledge of spatial statistics and time series analysis of demographical data for population analysis.*
2. *Understand the importance of logistic regression for estimating various population attributes and*
   learn different quantitative techniques such as trend surface analysis, interpolation and extrapolation for analyzing demographic data.
3. *Develop the capability of analyzing data using advanced multivariate techniques like Principal Component Analysis, Discriminant Analysis, Cluster analysis and Canonical Correlation analysis which may develop skills in application of theoretical knowledge in practical field.*
4. *Develop skill through SPSS and Geospatial software to manage the demographical data.*

Unit-1: Advanced Statistical Techniques in Population Studies [15 Marks]

1.1 Use of dummy variables and Logistic Regression; System Component Growth.

1.2 Interpolation and Extrapolation: Newton, Lagrange and Binomial Method; Mean centre of population and its shift over time; Population Potential by Gravity model.

1.3 Shortest Path Analysis: Transport and Allocation Problems; Trend Surface Analysis (TSA): computation of linear trend.

1.4 Mapping and Clustering through Principal Component Analysis (PCA); Discriminant and Cluster analysis; Introduction of Canonical Correlation.

Unit-2: Computer Application [15 Marks]

2.1. Introduction to SPSS-facilities, creating database structure, data entry, specifying scales, validation of data entry, importing and exporting data, Data Manipulation; Qualitative data analysis for perception studies.

2.2. Introduction to geospatial software: GIS: discrete data: point, and polygon data, Raster and vector data, layouts preparation. Geocoding and basics of digitization in ArcGIS

In the End Semester Examination, students have to answer one compulsory question from the above two Units.

Viva-voce [5 Marks]
Continuous Assessment [30 Marks]
*(*A Project File, comprising one exercise each is to be submitted)*

✧ **Suggested Readings**:

1. . Hammond, R. and Mc Cullagh, P. (1991): Quantitative Techniques in Geography, Clarendon Press, Oxford.
2. Mahmood, A. (1998): Statistical Methods in Geographical Studies, Rajesh Publication.
3. Monkhouse F.J. and Wilkinson, H.R. (1971): Maps and Diagrams: Their Compilation and Construction, B.I. Publications Private Limited, New Delhi.
4. Pal, S.K. (1999): Statistics for Geoscientists, Concept publishing Company, New Delhi.
5. 5.SPSS 14.0 Brief Guide – SPSS Inc.
6. SPSS regression models 11.0 - SPSS Inc.
7. SPSS advanced models 11.0 - SPSS Inc.