

Structure and Detailed Syllabus *for* Undergraduate Course *in* **Geography**

Under Curriculum and Credit Framework for Undergraduate
Programmes (CCFUP) - NEP 2020



With effect from Academic Session 2023-24

Kazi Nazrul University
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West Bengal
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Syllabus for Undergraduate Course in Geography under Curriculum and Credit Framework for Undergraduate Programmes (CCFUP) - NEP 2020 vide approval of structure and syllabus taken at the Meeting of the **Undergraduate Board of Studies (UGBOS)** in **Geography**, Kazi Nazrul University, held on **05.07.2023** and as resolved at the Workshop held on **03.08.2023**, and also as per subsequent UGBOS Meeting held on **22.08.2024, 05.04.2025** and **18.07.2025**.

Scheme for the Curriculum under CCFUP (As per NEP 2020)

✧ **Major Course (MJC)**

- BSCGEOMJ101 - Fundamentals of Physical Geography**
- BSCGEOMJ201 - Fundamentals of Human Geography**
- BSCGEOMJ301 - Climatology**
- BSCGEOMJ302 - Cartography and Surveying**
- BSCGEOMJ401 - Soil and Biogeography**
- BSCGEOMJ402 - Remote Sensing, GIS and GNSS**
- BSCGEOMJ501 - Economic and Transport Geography**
- BSCGEOMJ502 - Statistical Techniques in Geography**
- BSCGEOMJ503 - Basic Field Training and Field Report**
- BSCGEOMJ601 - Geographical Thought**
- BSCGEOMJ602 - Geography of India and West Bengal**
- BSCGEOMJ603 - Population and Settlement Geography**
- BSCGEOMJ604 - Advanced Remote Sensing and GIS**
- BSCGEOMJ701 - Geomorphology**
- BSCGEOMJ702 - Hydrology and Oceanography**
- BSCGEOMJ703 - Urban and Regional Planning**
- BSCGEOMJ704 – Advanced Statistical Methods in Geography**
- BSCGEOMJ801 - Environmental Geography**
- BSCGEOMJ802 - Geography of Development**
- BSCGEOMJ803 - Agricultural Geography and Landuse Planning**
- BSCGEOMJ804 - Social and Political Geography**

✧ **Skill Enhancement Course (SEC)**

- BSCGEOSE101 - Elementary Practicals in Physical Geography**
- BSCGEOSE201 - Elementary Practicals in Human Geography**
- BSCGEOSE401 - Computer Applications in Geography**



✧ **Summer Internship (SI)**

SI601 - Summer Internship

✧ **Research Project/ Dissertation (RP)**

BSCGEORP801 - Research Methodology and Ethics

BSCGEORP802 - Research Project/ Dissertation

✧ **Minor Course (MNC)**

BSCGEOMN101 - Fundamentals of Physical Geography

BSCGEOMN201 - Fundamentals of Human Geography

BSCGEOMN301 - Climate Change: Vulnerability and Adaptations

BSCGEOMN401 - Geospatial Science and Technology

BSCGEOMN501 - Sustainable Resource Development

BSCGEOMN701 - Geotourism

BSCGEOMN801 - Rural Development

✧ **Multidisciplinary Course (MDC): Courses for other Disciplines across the Faculties**

MDC104 - Disaster Management

MDC301 - Bharatavarsha - A Land of Rare Natural Endowments

✧ **Ability Enhancement Course (AEC-1): Pool of Communication Courses offered in Semester I**

AECE101 - English Communication

AECB101 - Bengali Communication

AECH101 - Hindi Communication

AECU101 - Urdu Communication

✧ **Value Added Course (VAC-2): Pool of Courses offered in Semester IV for all Disciplines across all Faculties**

VAC401 - Yoga and Health

VAC402 - Social Values and Ethics

VAC403 - Digital and Technological Solutions

VAC404 - Understanding India

VAC405 - Sustainable Development: Issues and Challenges

VAC406 - Goods and Services Tax

VAC407 - Basics of Indian Constitution



✧ Credits and Marks Distribution Scheme for Course Structure under CCFUP: UG Geography

Discipline Code: **BSCGEO**

Semester	Course Type and Details	Course Code and Name	Credits	Credit Pattern (L-T-P)	Marks Distribution				
					Continuous Assessment Marks		End Semester Marks		Total Marks
					Practical Exam	Theoretical Exam	Practical Exam	Theoretical Exam	
I Marks: 350 Credits: 20	Major MJC-1	BSCGEOMJ101: Fundamentals of Physical Geography	5	4 - 1 - 0	----	30	----	70	100
	Minor MNC-1	Choose from the Pool of Minor Courses offered in 1 st Semester by other Disciplines within the Faculty	5	4 - 1 - 0	----	30	----	70	100
	MD Multidisciplinary Course (MDC-1)	Choose from the Pool of Multidisciplinary Courses offered in 1 st Semester across the Faculties (See Pool)	3	2 - 1 - 0	----	15	----	35	50
	AE Ability Enhancement Course (AEC-1)	English/ MIL Communication (See Pool)	4	4 - 0 - 0	----	15	----	35	50
	SE Skill Enhancement Course (SEC-1)	BSCGEOSE101: Elementary Practicals in Physical Geography	3	0 - 0 - 6	30	----	20	----	50
II Marks: 350 Credits: 20	Major MJC-2	BSCGEOMJ201: Fundamentals of Human Geography	5	4 - 1 - 0	----	30	----	70	100
	Minor MNC-2	Choose from the Pool of Minor Courses offered in 2 nd Semester by other Disciplines within the Faculty (Corresponding Course Code of Minor opted in 1 st Semester)	5	4 - 1 - 0	----	30	----	70	100
	MD Multidisciplinary Course (MDC-2)	Choose from the Pool of Multidisciplinary Courses offered in 2 nd Semester across the Faculties (See Pool)	3	2 - 1 - 0	----	15	----	35	50



	Course Type and Details	Course Code and Name	Credits	Credit Pattern (L-T-P)	Marks Distribution					
					Continuous Assessment Marks		End Semester Marks		Total Marks	
					Practical Exam	Theoretical Exam	Practical Exam	Theoretical Exam		
	VA Value Added Course (VAC-1)	VAC201: Environment Studies	4	4 - 0 - 0	----	15	----	35	50	
	SEC Skill Enhancement Course (SEC-2)	BSCGEOSE201: Elementary Practicals in Human Geography	3	0 - 0 - 6	30	----	20	----	50	
Students exiting the programmes after securing 40 credits will be awarded UG Certificate in the relevant Discipline/ Subject, provided they secure following 4 credits in work-based vocational courses/ summer internship during 1 st year										
II	VC VCC-1	VC201: Vocational Course	(Any One)	4	0 - 0 - 8	30	----	20	----	50
	SI SIC-1	SI201: Summer Internship								
Marks: 400 Credits: 24										
III	Major MJC-3	BSCGEOMJ301: Climatology	5	3 - 0 - 4	30	15	20	35	100	
	Major MJC-4	BSCGEOMJ302: Cartography and Surveying	5	0 - 0 - 10	60	----	40	----	100	
	Minor MNC-3	Choose from the Pool of Minor Courses offered in 3 rd Semester by other Disciplines within the Faculty (See Pool)	5	4 - 1 - 0	----	30	----	70	100	
	MD Multidisciplinary Course (MDC-3)	Choose from the Pool of Multidisciplinary Courses offered in 3 rd Semester across the Faculties (See Pool)	3	2 - 1 - 0	----	15	----	35	50	
Marks: 400 Credits: 22										



Semester	Course Type and Details	Course Code and Name			Marks Distribution				
					End Semester Marks		End Semester Marks		Total Marks
					Practical Exam	Theoretical Exam	Practical Exam	Theoretical Exam	
III	AE Ability Enhancement Course (AEC-2)	English Communication	4	4 - 0 - 0	----	15	----	35	50
IV	Major MJC-5	BSCGEOMJ401: Soil and Biogeography	5	3 - 0 - 4	30	15	20	35	100
	Major MJC-6	BSCGEOMJ402: Remote Sensing, GIS and GNSS	5	3 - 0 - 4	30	15	20	35	100
	Minor MNC-4	Choose from the Pool of Minor Courses offered in 4 th Semester by other Disciplines within the Faculty (See Pool)	5	4 - 1 - 0	----	30	----	70	100
	SEC Skill Enhancement Course (SEC-3)	BSCGEOSE401: Computer Applications in Geography	3	0 - 0 - 6	30	----	20	----	50
	VA Value Added Course (VAC-2) (Any One)	VAC401: Yoga And Health	4	4 - 0 - 0	----	15	----	35	50
		VAC402: Social Values and Ethics		4 - 0 - 0	----	15	----	35	
		VAC403: Digital and Technological Solutions		4 - 0 - 0	----	15	----	35	
		VAC404: Understanding India		4 - 0 - 0	----	15	----	35	
		VAC405: Sustainable Development: Issues and Challenges		4 - 0 - 0	----	15	----	35	
		VAC406: Goods and Services Tax		4 - 0 - 0	----	15	----	35	
VAC407: Basics of Indian Constitution		4 - 0 - 0		----	15	----	35		
Marks: 400 Credits: 22									



	Course Type and Details	Course Code and Name	Credits	Credit Pattern (L-T-P)	Marks Distribution					
					Continuous Assessment Marks		End Semester Marks		Total Marks	
					Practical Exam	Theoretical Exam	Practical Exam	Theoretical Exam		
Students exiting the programmes after securing 84 credits will be awarded UG Diploma in the relevant Discipline/ Subject, provided they secure following 4 credits in work-based vocational courses/ summer internship during 2 nd year										
IV Marks: 450 Credits: 26	VC VCD-1	VC401: Vocational Course	(Any One)	4	0 - 0 - 8	30	----	20	----	50
	SI SID-1	SI401: Summer Internship								
V Marks: 400 Credits: 20	Major MJC-7	BSCGEOMJ501: Economic and Transport Geography		5	3 - 0 - 4	30	15	20	35	100
	Major MJC-8	BSCGEOMJ502: Statistical Techniques in Geography		5	3 - 0 - 4	30	15	20	35	100
	Major MJC-9	BSCGEOMJ503: Basic Field Training and Field Report		5	0 - 0 - 10	60	----	40	----	100
	Minor MNC-5	Choose from the Pool of Minor Courses offered in 5 th Semester by other Disciplines within the Faculty (See Pool)		5	4 - 1 - 0	----	30	----	70	100
VI Marks: 450 Credits: 22	Major MJC-10	BSCGEOMJ601: Geographical Thought		5	3 - 0 - 4	30	15	20	35	100
	Major MJC-11	BSCGEOMJ602: Geography of India and West Bengal		5	3 - 0 - 4	30	15	20	35	100
	Major MJC-12	BSCGEOMJ603: Population and Settlement Geography		5	3 - 0 - 4	30	15	20	35	100
	Major MJC-13	BSCGEOMJ604: Advanced Remote Sensing and GIS		5	3 - 0 - 4	30	15	20	35	100



	Course Type and Details	Course Code and Name	Credits	Credit Pattern (L-T-P)	Marks Distribution				
					End Semester Marks		End Semester Marks		Total Marks
					Practical Exam	Theoretical Exam	Practical Exam	Theoretical Exam	
	SI SIMC-1	SI601: Summer Internship	2	0 - 0 - 4	30	----	20	----	50
Total Credit and Marks		Total Credit	126		Total Marks				2350
Students who want to undertake 3-year UG programme will be awarded UG Degree in the relevant Discipline/ Subject upon securing 126 credits .									
4-Year UG Degree (Honours)									
VII Marks: 500 Credits: 25	Major MJC-14	BSCGEOMJ701: Geomorphology	5	3 - 0 - 4	30	15	20	35	100
	Major MJC-15	BSCGEOMJ702: Hydrology and Oceanography	5	3 - 0 - 4	30	15	20	35	100
	Major MJC-16	BSCGEOMJ703: Urban and Regional Planning	5	3 - 0 - 4	30	15	20	35	100
	Major MJC-17	BSCGEOMJ704: Advanced Statistical Methods in Geography	5	3 - 0 - 4	30	15	20	35	100
	Minor MNC-6	Choose from the Pool of Minor Courses offered in 7 th Semester by other Disciplines within the Faculty (See Pool)	5	4 - 1 - 0	----	30	----	70	100
VIII Marks: 500 Credits: 22	Major MJC-18	BSCGEOMJ801: Environmental Geography	5	3 - 0 - 4	30	15	20	35	100
	Major MJC-19	BSCGEOMJ802: Geography of Development	4	2 - 0 - 4	30	15	20	35	100
	Major MJC-20	BSCGEOMJ803: Agricultural Geography and Landuse Planning	4	2 - 0 - 4	30	15	20	35	100



Semester	Course Type and Details	Course Code and Name	Credits	Credit Pattern (L-T-P)	Marks Distribution				
					End Semester Marks		End Semester Marks		Total Marks
					Practical Exam	Theoretical Exam	Practical Exam	Theoretical Exam	
VIII	Major MJC-21	BSCGEOMJ804: Social and Political Geography	4	2 - 0 - 4	30	15	20	35	100
	Minor MNC-7	Choose from the Pool of Minor Courses offered in 8 th Semester by other Disciplines within the Faculty (See Pool)	5	4 - 1 - 0	----	30	----	70	100
Total Credit and Marks		Total Credit	173		Total Marks				3350
Students who want to undertake 4-year UG Honours program will be awarded UG Degree (Honours) in the relevant Discipline/ Subject provided they secure 173 credits.									
4-year UG Degree (Honours with Research)									
VII	Major MJC-14	BSCGEOMJ701: Advanced Geomorphology, Hydrology and Oceanography	5	3 - 0 - 4	30	15	20	35	100
	Major MJC-15	BSCGEOMJ702: Urban and Regional Planning	5	3 - 0 - 4	30	15	20	35	100
	Major MJC-16	BSCGEOMJ703: Advanced Analytical Techniques in Geography	5	3 - 0 - 4	60	----	40	----	100
	Major MJC-17	BSCGEOMJ704: Outreach Programme in Contemporary Issues	5	3 - 0 - 4	60	----	40	----	100
	Minor MNC-6	Choose from the Pool of Minor Courses offered in 7 th Semester by other Disciplines within the Faculty (See Pool)	5	4 - 1 - 0	----	30	----	70	100
Marks: 500 Credits: 25									



VIII Marks: 500 Credits: 22	Major MJC-18	BSCGEOMJ801: Environmental Geography	5	3 - 0 - 4	30	15	20	35	100
	RP Research Project (RPC--1)	BSCGEORP801: Research Methodology and Ethics	4	4 - 0 - 0	----	30	----	70	100
	RP Research Project (RPC--1)	BSCGEORP802: Research Project/ Dissertation	8	0 - 0 - 16	120	----	80	----	200
	Minor MNC-7	Choose from the Pool of Minor Courses offered in 8th Semester by other Disciplines within the Faculty (See Pool)	5	4 - 1 - 0	----	30	----	70	100
Total Credit and Marks		Total Credit	173		Total Marks				3350
Students who want to undertake 4-year UG Honours with Research program will be awarded UG Degree (Honours with Research) in the relevant Discipline / Subject provided they secure 173 credits .									

Semester wise Pool of **Minor Courses** offered by **GEOGRAPHY** for **other Disciplines** within the Faculty

Semester	Course Type and Details	Course Code and Name	Credits	Credit Pattern (L-T-P)	Marks Distribution				
					Continuous Assessment Marks		End Semester Marks		Total Marks
					Practical Exam	Theoretical Exam	Practical Exam	Theoretical Exam	
I	Minor MNC-1	BSCGEOMN101: Fundamentals of Physical Geography	5	4 - 1 - 0	----	30	----	70	100
II	Minor MNC-2	BSCGEOMN201: Fundamentals of Human Geography	5	4 - 1 - 0	----	30	----	70	100
III	Minor MNC-3	BSCGEOMN301: Climate Change: Vulnerability and Adaptations	5	4 - 1 - 0	----	30	----	70	100
IV	Minor MNC-4	BSCGEOMN401: Geospatial Science and Technology	5	4 - 1 - 0	----	30	----	70	100
V	Minor MNC-5	BSCGEOMN501: Sustainable Resource Development	5	4 - 1 - 0	----	30	----	70	100
VII	Minor MNC-6	BSCGEOMN701: Geotourism	5	4 - 1 - 0	----	30	----	70	100
VIII	Minor MNC-7	BSCGEOMN801: Rural Development	5	4 - 1 - 0	----	30	----	70	100

Note: Minor Courses (MNC): Students of a particular UG Course will choose from the Pool of Minor Courses offered by disciplines other than the major discipline opted by the student within the faculty. The student is required to opt the same Minor Discipline in the 2nd semester which he had opted in 1st semester. **Explanation:** If a student of GEOGRAPHY Major, opts for a Minor Course offered by Chemistry in 1st semester then that student is required to continue with the Minor Course offered by Chemistry for 2nd semester as Minor Course in the 2nd semester.



Semester wise Pool of Multidisciplinary Courses offered by GEOGRAPHY for other Disciplines across the Faculties									
Semester	Course Type and Details	Course Code and Name	Credits	Credit Pattern (L-T-P)	Marks Distribution				
					Continuous Assessment Marks		End Semester Marks		Total Marks
					Practical Exam	Theoretical Exam	Practical Exam	Theoretical Exam	
I	MD Multidisciplinary Course (MDC-1)	MDC104: Disaster Management	3	2 - 1 - 0	----	15	----	35	50
III	MD Multidisciplinary Course (MDC-3)	MDC301: Bharatavarsha - A Land of Rare Natural Endowments	3	2 - 1 - 0	----	15	----	35	50
Pool of Communication Courses offered as Ability Enhancement Courses in Semester I									
I	AEC-1 Ability Enhancement Course	AECE101: English Communication	4	4 - 0 - 0	----	15	----	35	50
		AECB101: Bengali Communication	4	4 - 0 - 0	----	15	----	35	50
		AECH101: Hindi Communication	4	4 - 0 - 0	----	15	----	35	50
		AECU101: Urdu Communication	4	4 - 0 - 0	----	15	----	35	50



Semester wise Pool of Multidisciplinary Courses offered for all Disciplines across the Faculties									
Semester	Course Type and Details	Course Code and Name (Offered By Discipline)	Credits	Credit Pattern (L-T-P)	Marks Distribution				
					Continuous Assessment Marks		End Semester Marks		Total Marks
					Practical Exam	Theoretical Exam	Practical Exam	Theoretical Exam	
I	MD Multidisciplinary Course (MDC-1) (Any One)	MDC101: Physical Science (Physics)	3	2 - 1 - 0	----	15	----	35	50
		MDC102: E-Commerce (BBA)	3	2 - 1 - 0	----	15	----	35	50
		MDC103: Human Rights (Political Science)	3	2 - 1 - 0	----	15	----	35	50
		MDC104: Disaster Management (Geography)	3	2 - 1 - 0	----	15	----	35	50
		MDC105: Fitness and Wellness (Physical Education)	3	2 - 1 - 0	----	15	----	35	50
		MDC106: Application of Bio-Science (Zoology)	3	2 - 1 - 0	----	15	----	35	50
		MDC107: Film Appreciation (English)	3	2 - 1 - 0	----	15	----	35	50
		MDC108: Accounting for All (Commerce)	3	2 - 1 - 0	----	15	----	35	50
		MDC109: Exploring Early Medieval Bengal: C.7th Century CE to 1206 CE (History)	3	2 - 1 - 0	----	15	----	35	50
		MDC110: Bangla Sahitya O Sanskriti (Bengali)	3	2 - 1 - 0	----	15	----	35	50
		MDC111: Money and Banking (Economics)	3	2 - 1 - 0	----	15	----	35	50
		MDC112: Patrakarita (Hindi)	3	2 - 1 - 0	----	15	----	35	50
		MDC113: Business Mathematics (Mathematics)	3	2 - 1 - 0	----	15	----	35	50
		MDC114: Indian Society (Sociology)	3	2 - 1 - 0	----	15	----	35	50
		MDC115: Yoga for Daily Life (Philosophy)	3	2 - 1 - 0	----	15	----	35	50
		MDC116: Electronic Measurements (Electronics)	3	2 - 1 - 0	----	15	----	35	50



		MDC117: Information and Communication Technology (Computer Science)	3	2 - 1 - 0	----	15	----	35	50
		MDC118: Introduction to Local Flora (Botany)	3	2 - 1 - 0	----	15	----	35	50
		MDC119: Information and Media Literacy (Computer Applications)	3	2 - 1 - 0	----	15	----	35	50
		MDC120: Personal Finance (Commerce)	3	2 - 1 - 0	----	15	----	35	50
II	MD Multidisciplinary Course (MDC-2) (Any One)	MDC201: Mathematical Science (Mathematics)	3	2 - 1 - 0	----	15	----	35	50
		MDC202: Business Environment (BBA)	3	2 - 1 - 0	----	15	----	35	50
		MDC203: Basic Statistics (Statistics)	3	2 - 1 - 0	----	15	----	35	50
		MDC204: Understanding Medieval Bengal Select Themes: 1206 CE-1727 CE (History)	3	2 - 1 - 0	----	15	----	35	50
		MDC205: Personal Finance (Commerce)	3	2 - 1 - 0	----	15	----	35	50
		MDC206: Nutrition and Public Health (Nutrition)	3	2 - 1 - 0	----	15	----	35	50
		MDC207: Educational Philosophy (Education)	3	2 - 1 - 0	----	15	----	35	50
		MDC208: Stress Management (Psychology)	3	2 - 1 - 0	----	15	----	35	50
		MDC209: Social Media and Cyber Awareness (Computer)	3	2 - 1 - 0	----	15	----	35	50
		MDC210: Adhunik Bangla Sahitya (Bengali)	3	2 - 1 - 0	----	15	----	35	50
		MDC211: Nazrul Sangeet (Nazrul Sangeet)	3	2 - 1 - 0	----	15	----	35	50
		MDC212: E-Waste Management (Electronics)	3	2 - 1 - 0	----	15	----	35	50
		MDC213: Chemical Science (Chemistry)	3	2 - 1 - 0	----	15	----	35	50
		MDC214: Critical Survey of Sanskrit Language (Sanskrit)	3	2 - 1 - 0	----	15	----	35	50
		MDC215: Asnaf - E -Adab (Urdu)	3	2 - 1 - 0	----	15	----	35	50
		MDC216: Anuvad Vigyan (Hindi)	3	2 - 1 - 0	----	15	----	35	50
		MDC217: Herbal Home Remedies (Botany)	3	2 - 1 - 0	----	15	----	35	50



III Marks: 50 Credits: 3	MD Multidisciplinary Course (MDC-3) (Any One)	MDC301: Bharatavarsha - A Land of Rare Natural Endowments (Geography)	3	2 - 1 - 0	----	15	----	35	50
		MDC302: The Vedangas and other Streams of Indian Knowledge System (Sanskrit)	3	2 - 1 - 0	----	15	----	35	50
		MDC303: Indian Astronomy (Physics)	3	2 - 1 - 0	----	15	----	35	50
		MDC304: Indian Health Sciences (Zoology)	3	2 - 1 - 0	----	15	----	35	50
		MDC305: Indian Mathematics (Mathematics)	3	2 - 1 - 0	----	15	----	35	50
		MDC306: Indian Education (Education)	3	2 - 1 - 0	----	15	----	35	50
		MDC307: Indian Polity and Economy (Political Science)	3	2 - 1 - 0	----	15	----	35	50
		MDC308: Methodology of Indian Knowledge System (Philosophy)	3	2 - 1 - 0	----	15	----	35	50



Programme: B.Sc.		Year: I		Semester: I	
Discipline: Geography					
Course Name: Fundamentals of Physical Geography					
Course Code: BSCGEOMJ101					
Course Type: Major (Theoretical)		Course Details: MJC-1		L-T-P: 4 - 1 - 0	
Course Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		---	30	---	70
Course Objectives: ✧ The course offers basic knowledge about the principal characteristics of the Earth's physical environment. ✧ To provide fundamental knowledge of the different aspects of Geomorphology, along with the ability to objectively identify and characterize the different Earth surface processes that have influenced the landscape expressions and landform assemblages and vital roles in the occurrence of several natural hazards.					
Learning Outcome: ✧ Students shall obtain an overview of the causes of various geophysical and geomorphic phenomena, their impression on the land surface, and their effect on the habitable world. ✧ The students will definitely assist people regarding risk reduction from any geomorphic hazards.					
Professional Skill Development: ✧ The obtained knowledge is vital to provide a foundation for future studies in Physical Geography or Earth System Sciences. ✧ This knowledge will help to provide inputs on the basic concepts that underlie much of the United Nations Sustainable Development Goals on clean water, land, natural resources, and human impacts on the physical environment.					
Sub units	Topics to be covered				No. of Lectures
Unit I: The Earth and its Physical Environment [30 Hours]					
1.1	Earth as a planet: theories on the origin of the Earth (Immanuel Kant and Pierre-Simon Laplace)				2
1.2	The Solid Earth: Earth's tectonic and structural evolution through geological timescales; Basics of geochronology				4
1.3	Thermal and physical state of the Earth's interior with special reference to seismological evidence; Genesis of earthquake; Volcanicity and related landforms				4
1.4	Continental drift and seafloor spreading with special reference to paleomagnetism; Isostasy (Models of Airy, Pratt and their applicability)				4
1.5	Earth's atmosphere: Insolation; Pressure belts; Planetary wind system; Greenhouse effect and global warming				4
1.6	Earth's hydrosphere: global hydrological cycle; Ocean circulation - major ocean currents (Atlantic and Pacific)				4



1.7	Earth's biosphere: major biomes of the world (Tropical Rainforest, Temperate Grassland and Tundra); Classification of forest (Champion)	4
1.8	Earth's pedosphere: concept of zonal, azonal and intrazonal soil; Soil erosion and conservation	4
Unit II: Earth Surface Dynamics and Processes [30 Hours]		
2.1	Basic concepts of Geomorphology (W.D. Thornbury); Scales in Geomorphology	4
2.2	Plate Tectonics and associated landforms: processes and landforms at plate margins and plate interiors	4
2.3	Degradational processes: weathering, mass wasting and resultant landforms	4
2.4	Models of landscape evolution: views of Davis, Penck, and Hack	4
2.5	Development of river network and landforms on uniclinal and folded structures	4
2.6	Development of landforms on igneous rocks: granite and basalt; Landforms on sedimentary rocks: sandstones and limestones	4
2.7	Surface processes and landforms: fluvial, aeolian and fluvio-aeolian, glacial and glacio-fluvial	4
2.8	Coastal processes and landforms	2

✧ Course Evaluation:

• Continuous Assessment: 30 Marks*

*[average of the obtained marks of two are to be made to calculate the final marks]

1. Seminar presentations: A powerpoint presentation to be conducted for internal assessment on the notified portions/ topics. [30 Marks]

2. Class test: There shall be test (s) of knowledge and understanding through written test on the notified portions/ topics (s). [30 Marks]

• End Semester Examination: 70 Marks

The end semester examination shall be conducted based on written test.

Question Pattern: Students have to answer Two questions carrying **10 marks** out of given **three** questions; Five questions carrying **5 marks** each out of given **eight** questions; Ten questions carrying **2 marks** each out of given **fourteen** questions; Five questions carrying **1 mark** each out of given **eight** questions.

✧ References

Agrawal, D.P. and Yadava, M.G. (1995): Dating the Human Past, ISPQS Monograph Series No. 1, Indian Society for Prehistoric and Quaternary Studies, Department of Archaeology, Deccan College, Pune.



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- Geological Society of India: <https://www.geosocindia.org/>
- Geological Survey of India: <https://www.gsi.gov.in/>
- Geomorphology Specialty Group, American Association of Geographers: <https://aag-gsg.org/>
- Indian Institute of Geomorphologists (IGI): <https://indiageomorph.org/>
- International Association of Geomorphologists (IAG): <http://www.geomorph.org/>
- Paleomap Project: <http://www.scotese.com/>
- Science Education Resource Center at Carleton College (Teaching about Geochronology): <https://serc.carleton.edu/NAGTWorkshops/time/geochronology.html>
- The Basics of Geomorphology | Online Resources: <https://study.sagepub.com/gregoryandlewin>
- This Dynamic Earth: the story of Plate Tectonics (USGS): <https://pubs.usgs.gov/gip/dynamic/dynamic.html>



Programme: B.Sc.		Year: I		Semester: I	
Discipline: Geography					
Course Name: Fundamentals of Physical Geography					
Course Code: BSCGEOMN101					
Course Type: Minor (Theoretical)		Course Details: MNC-1		L-T-P: 4 - 1 - 0	
Course Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		---	30	---	70
Course Objectives: ✧ The course offers basic knowledge about the principal characteristics of the Earth's physical environment. ✧ To provide fundamental knowledge of the different aspects of Geomorphology, along with the ability to objectively identify and characterize the different Earth surface processes that have influenced the landscape expressions and landform assemblages and vital roles in the occurrence of several natural hazards.					
Learning Outcome: ✧ Students shall obtain an overview of the causes of various geophysical and geomorphic phenomena, their impression on the land surface, and their effect on the habitable world. ✧ The students will definitely assist people regarding risk reduction from any geomorphic hazards.					
Professional Skill Development: ✧ The obtained knowledge is vital to provide a foundation for future studies in Physical Geography or Earth System Sciences. ✧ This knowledge will help to provide inputs on the basic concepts that underlie much of the United Nations Sustainable Development Goals on clean water, land, natural resources, and human impacts on the physical environment.					
Sub units	Topics to be covered				No. of Lectures
Unit I: The Earth and its Physical Environment [30 Hours]					
1.1	Earth as a planet: theories on the origin of the Earth (Immanuel Kant and Pierre-Simon Laplace)				2
1.2	The Solid Earth: Earth's tectonic and structural evolution through geological timescales; Basics of geochronology				4
1.3	Thermal and physical state of the Earth's interior with special reference to seismological evidence; Genesis of earthquake; Volcanicity and related landforms				4
1.4	Continental drift and seafloor spreading with special reference to paleomagnetism; Isostasy (Models of Airy, Pratt and their applicability)				4
1.5	Earth's atmosphere: Insolation; Pressure belts; Planetary wind system; Greenhouse effect and global warming				4
1.6	Earth's hydrosphere: global hydrological cycle; Ocean circulation - major ocean currents (Atlantic and Pacific)				4



1.7	Earth's biosphere: major biomes of the world (Tropical Rainforest, Temperate Grassland and Tundra); Classification of forest (Champion)	4
1.8	Earth's pedosphere: concept of zonal, azonal and intrazonal Soil; Soil erosion and conservation	4
Unit II: Earth Surface Dynamics and Processes [30 Hours]		
2.1	Basic concepts of Geomorphology (W.D. Thornbury); Scales in Geomorphology	4
2.2	Plate Tectonics and associated landforms: processes and landforms at plate margins and plate interiors	4
2.3	Degradational processes: weathering, mass wasting and resultant landforms	4
2.4	Models of landscape evolution: views of Davis, Penck, and Hack	4
2.5	Development of river network and landforms on uniclinal and folded structures	4
2.6	Development of landforms on igneous rocks: granite and basalt; Landforms on sedimentary rocks: sandstones and limestones	4
2.7	Surface processes and landforms: fluvial, aeolian and fluvio-aeolian, glacial and glacio-fluvial	4
2.8	Coastal processes and landforms	2

✧ Course Evaluation:

• Continuous Assessment: 30 Marks*

*[average of the obtained marks of two are to be made to calculate the final marks]

1. Seminar presentations: A powerpoint presentation to be conducted for internal assessment on the notified portions/ topics. [30 Marks]

2. Class test: There shall be test (s) of knowledge and understanding through written test on the notified portions/ topics (s). [30 Marks]

• End Semester Examination: 70 Marks

The end semester examination shall be conducted based on written test.

Question Pattern: Students have to answer Two questions carrying **10 marks** out of given **three** questions; Five questions carrying **5 marks** each out of given **eight** questions; Ten questions carrying **2 marks** each out of given **fourteen** questions; Five questions carrying **1 mark** each out of given **eight** questions.

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- International Association of Geomorphologists (IAG): <http://www.geomorph.org/>
- Paleomap Project: <http://www.scotese.com/>
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- The Basics of Geomorphology | Online Resources: <https://study.sagepub.com/gregoryandlewin>
- This Dynamic Earth: the story of Plate Tectonics (USGS): <https://pubs.usgs.gov/gip/dynamic/dynamic.html>



Programme: B.Sc.		Year: I		Semester: I	
Discipline: Geography					
Course Name: Elementary Practicals in Physical Geography					
Course Code: BSCGEOSE101					
Course Type: SEC (Practical)		Course Details: SEC-1		L-T-P: 0 - 0 - 6	
Course Credit: 3	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	---	20	---
Course Objectives: ✧ This course is an initiative to impart knowledge on the basic concept of the practicals in Physical Geography to students so that they can apply it to solve geographical problems in the field. ✧ To orient the students towards identifying and analysing various facets of geographical features and processes from maps and field.					
Learning Outcome: ✧ Students will learn about the application of scale in geographic studies. ✧ Students will be able to interpret landform structures with the help of geological maps and learn to identify minerals and rocks, the fundamental element of landforms. ✧ Upon completing this course, students will understand the interpretation techniques of topographical maps and their application.					
Professional Skill Development: ✧ The acquired knowledge is beneficial for future studies in physical geography. ✧ This obtained knowledge will provide essential inputs in skill development, which will place the students in their professional life in the near future.					
Sub units	Topics to be covered				Lab work hours
Unit I: Scale, Minerals and Rocks [20 Hours]					
1.1	Concept and classification of map scales (Linear, Diagonal and Vernier)				12
1.2	Megascopic identification of (a) Mineral samples: Bauxite, Calcite, Chalcopryrite, Feldspar, Galena, Gypsum, Hematite, Magnetite, Mica, Quartz, Talc, Tourmaline; and (b) Rock samples: Granite, Basalt, Dolerite, Pegmatite, Limestone, Shale, Sandstone, Conglomerate, Slate, Phyllite, Schist, Gneiss, Quartzite, Marble				8
Unit II: Basic Geological and Geomorphological Exercises [40 Hours]					
2.1	Measurement of dip and strike using clinometer; Analysis of geological maps (Horizontal, Uniclinal and folded structure along with intrusions and unconformities)				20



2.2	Preparation of data inventory in Physical Geography (Seismic data, Hydro-meteorological data, Soil data); Landform identification from Google Earth; Measurement of pebble shape using slide caliper	20
Unit III: Topographical Maps [30 Hours]		
3.1	Survey of India topographical maps: History, indexing vis-a-vis scale (old and open series); Information on the margin of maps	04
3.2	Extraction and interpretation of geomorphic information from topographical maps of plateau region (Open and Defence Series maps, RF 1:50k): Construction and interpretation of relief (superimposed, projected and composite) profiles and river profiles (cross and longitudinal), delineation of drainage basins, stream ordering (Horton and Strahler) and bifurcation ratio on a drainage basin; Morphometric techniques in 10 cm x 12 cm area: Relative Relief (after G.H. Smith, 1935), Average Slope (after C.K. Wentworth, 1930), Drainage Density and Stream Frequency (after R.E. Horton, 1945)	26

✧ Course Evaluation:

• Continuous Assessment: 30 Marks

1. Practical records: An A3 or tabloid-size (11 inch x 15 inch) laboratory notebook, comprising class assignments of all practical topics must be prepared and duly signed by the teacher. The exercises are to be drawn in pencil with photocopied representations of source materials where necessary. Screenshots for unit 2.2 should be given in the laboratory notebook where necessary. All texts are to be handwritten. [5 Marks]

2. Viva-voce based on the laboratory notebook. [10 Marks]

3. Practical Exercises: Internal assessment to be conducted on the basis of above three units. [15 Marks]

• End Semester Examination: 20 Marks

1. Written test: In the End Semester Examination, students have to answer the questions set from the above three units, except unit 2.2. [15 Marks]

2. Viva-voce based on laboratory notebook. [5 Marks]

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India Meteorological Department: www.imd.gov.in

India Water Resources Information System: <https://indiawris.gov.in/>

Intergovernmental Panel on Climate Change: www.ipcc.ch

Irrigation & Waterways Department, Government of West Bengal: <https://wbiwd.gov.in/>

National Atlas and Thematic Mapping Organisation: <https://portal.natmo.gov.in/en/>

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Programme: UG		Year: I		Semester: I	
Discipline: Geography					
Course Name: Disaster Management					
Course Code: MDC104					
Course Type: MD (Theoretical)		Course Details: MDC-1		L-T-P: 2 - 1 - 0	
Course Credit: 3	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		---	15	---	35
Course Objectives: ✧ This course has been framed with an intention to broaden the dimensions of disaster science education. ✧ It is innovative and knowledge oriented to attract bright students to critically understand the strengths and weaknesses of disaster management approaches, planning, and programming in India.					
Learning Outcome: ✧ Students will have in-depth knowledge about the different parameters during any disaster, which are critical to all life forms, especially humans, in a sustainable way. ✧ Students will familiarize about the mitigation measures to prevent and mitigate different disasters.					
Professional Skill Development: ✧ The students will definitely assist people regarding risk reduction from any disaster. ✧ This knowledge will help to provide inputs on the basic concepts that underlie much of the United Nations Sustainable Development Goals on reducing the adverse effects of natural disasters.					



Sub units	Topics to be covered	No. of Lectures
Unit I: Basic Concepts and Management [15 Hours]		
1.1	Basic concepts: definition and types of hazard and disaster (natural, quasi-natural and man-made); Vulnerability, risk and capacity; Cascading disasters and compound events	3
1.2	Disaster Risk Reduction (DRR) strategy: pre-disaster, disaster and post-disaster phase - preparedness, rehabilitation, reconstruction and recovery; Community-based DRR; National Disaster Management Guidelines and Disaster Management Act-2005	5
1.3	Global initiatives: SDG 11 - Target 5 (Reduce the adverse effect of natural disasters), Sendai Framework (DRR), Global Facility for Disaster Reduction and Recovery (GFDRR)	3
1.4	National initiatives: role of institutional framework in disaster management (NDMA-SDMA-DDMA, NDRF, Civic volunteers, NIDM); Disaster Management Support by NRSC, ISRO Bhuvan Portal (Real-time GIS-based disaster database of India)	4
Unit II: Disaster Specific Case Studies [15 Hours]		
2.1	Earthquake: factors, vulnerability, consequences and management; Tsunami: factors, vulnerability and management; Role of Indian Tsunami Early Warning Centre (ITEWC); Case study of Indian Ocean Tsunami 2004	4
2.2	Floods: meteorological and outburst floods (GLOF, LLOF, Avalanche) - causes, consequences and management; Case study of Bengal's Millennium Flood - 2000; Drought: meteorological, hydrological and agricultural droughts - factors, vulnerability and management	3
2.3	Landslide: factors and vulnerability; Major problems and mitigation strategy for landslides in Himalayan region; Case study of Darjeeling landslides; Cyclone: tropical cyclone and storm surge - factors, vulnerability and management	4
2.4	Mining disasters: open cast and shaft mining - vulnerability and management; Case study of Asansol-Raniganj coalfield; Industrial disasters: gas and radiation leaks, oil spills - vulnerability and management	4

✧ Course Evaluation:

• Continuous Assessment: 15 Marks

1. Project report: One Project Report is to be prepared and submitted based on any one case study among the above disasters from West Bengal, incorporating a preparedness plan. The report should be prepared on secondary data and handwritten on A4 page in candidates' own words, not exceeding 2,000 words excluding references. [10 Marks]

2. Viva-voce based on project report [5 Marks]

• End Semester Examination: 35 Marks

The end semester examination shall be conducted based on written test.



Question Pattern: Students have to answer One questions carrying **10 marks** out of given **two** questions; Two questions carrying **5 marks** each out of given **four** questions; Five questions carrying **2 marks** each out of given **eight** questions; Five questions carrying **1 mark** each out of given **eight** questions.

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National Center for Seismology: seismo.gov.in

United Nations Office for Disaster Risk Reduction: undrr.org

Irrigation & Waterways Department, Government of West Bengal: wbiwd.gov.in

Central Water Commission: cwc.gov.in

Disaster Management Support Services, RSAA/NRSC/ISRO: bhuvan-app1.nrsc.gov.in/bhuvandisaster



Programme: B.Sc.		Year: I		Semester: II	
Discipline: Geography					
Course Name: Fundamentals of Human Geography					
Course Code: BSCGEOMJ201					
Course Type: Major (Theoretical)		Course Details: MJC-2		L-T-P: 4 - 1 - 0	
Course Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		---	30	---	70
Course Objectives: ✧ To have a complete understanding of human aspects of geographical phenomena and their interface within the realm of our environment. ✧ To impart fundamental knowledge about Population Geography and basic concepts in Settlement Geography.					
Learning Outcome: ✧ At the end of this course, it is expected that students will be able to understand the social environment from local to global perspectives. ✧ Students will be able to describe and evaluate relevant issues to the needs of the contemporary world.					
Professional Skill Development: ✧ This knowledge will provide students with a wide range of professional skills applicable to various fields. ✧ It will prepare them for careers in urban planning, public policy, community development, international development, and social research.					
Sub units	Topics to be covered				No. of Lectures
Unit I: Nature and Principles of Human Geography [30 Hours]					
1.1	Nature, scope and recent trends; Development and branches of human geography				3
1.2	Approaches to Human Geography: resource, locational, landscape, environmental				4
1.3	Evolution of Man-Nature interaction: hunting and food gathering, pastoral nomadism, agrarian society and industrial society				4
1.4	Human adaptation to environment: case studies of Eskimo and Masai; Primitive people of India (Santhal and Nagas)				6
1.5	Space and Society: concept of culture and its components, innovation, diffusion and convergence of culture				3
1.6	Race and ethnic groups: concept, origin and distribution				4
1.7	Language and religion: origin, diffusion and distribution				4



1.8	Cultural realms of the world and their characteristics	2
Unit II: Population, Settlement and Development [30 Hours]		
2.1	Population geography and demography; Population growth and distribution; Population composition (age-sex composition)	4
2.2	Theories of population: Malthusian and demographic transition; Population-resource regions (W. Zelinsky and E.A. Ackerman)	4
2.3	Population and environment relations with special reference to development-environment conflict (multi-purpose river valley projects)	2
2.4	Origin and growth of rural settlements; Social morphology and rural house types in India; Types and patterns of rural settlements	6
2.5	Origin and growth of urban settlements; Functional classification of urban settlements; Morphology of urban settlements: models of Burgess, Hoyt, Harris and Ullman	6
2.6	Trends and patterns of world urbanization (ancient and modern)	2
2.7	Poverty and inequality: concept, causes and consequences; Food Security in Indian context	3
2.8	Indicators of social well-being; Human development	3

✧ Course Evaluation:

• Continuous Assessment: 30 Marks*

*[average of the obtained marks of two are to be made to calculate the final marks]

1. Seminar presentations: A powerpoint presentation to be conducted for internal assessment on the notified portions/ topics. [30 Marks]

2. Class test: There shall be test (s) of knowledge and understanding through written test on the notified portions/ topics (s). [30 Marks]

• End Semester Examination: 70 Marks

The end semester examination shall be conducted based on written test.

Question Pattern: Students have to answer Two questions carrying **10 marks** out of given **three** questions; Five questions carrying **5 marks** each out of given **eight** questions; Ten questions carrying **2 marks** each out of given **fourteen** questions; Five questions carrying **1 mark** each out of given **eight** questions.

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Civil Registration System: <https://dc.crsorgi.gov.in/crs/>

Directorate of Census Operations, West Bengal: <https://westbengal.census.gov.in/>

Government of India Data Platform: <https://www.data.gov.in/>

International Institute for Population Sciences: <https://www.iipsindia.ac.in/>

Ministry of Statistics and Programme Implementation (GoI): <https://www.mospi.gov.in/>

Socio-Economic Statistics India: <https://www.indiastat.com/>

UNDP India: <https://www.undp.org/india>

Programme: B.Sc.	Year: I		Semester: II		
Discipline: Geography					
Course Name: Fundamentals of Human Geography					
Course Code: BSCGEOMN201					
Course Type: Minor (Theoretical)	Course Details: MNC-2		L-T-P: 4 - 1 - 0		
Course Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		---	30	---	70
Course Objectives: ✧ To have a complete understanding of human aspects of geographical phenomena and their interface within the realm of our environment. ✧ To impart fundamental knowledge about Population Geography and basic concepts in Settlement Geography.					
Learning Outcome: ✧ At the end of this course, it is expected that students will be able to understand the social environment from local to global perspectives. ✧ Students will be able to describe and evaluate relevant issues to the needs of the contemporary world.					
Professional Skill Development: ✧ This knowledge will provide students with a wide range of professional skills applicable to various fields. ✧ It will prepare them for careers in urban planning, public policy, community development, international development, and social research.					



Sub units	Topics to be covered	No. of Lectures
Unit I: Nature and Principles of Human Geography [30 Hours]		
1.1	Nature, scope and recent trends; Development and branches of human geography	3
1.2	Approaches to Human Geography: resource, locational, landscape, environmental	4
1.3	Evolution of Man-Nature interaction: hunting and food gathering, pastoral nomadism, agrarian society and industrial society	4
1.4	Human adaptation to environment: case studies of Eskimo and Masai; Primitive people of India (Santhal and Nagas)	6
1.5	Space and Society: concept of culture and its components, innovation, diffusion and convergence of culture	3
1.6	Race and ethnic groups: concept, origin and distribution	4
1.7	Language and religion: origin, diffusion and distribution	4
1.8	Cultural realms of the world and their characteristics	2
Unit II: Population, Settlement and Development [30 Hours]		
2.1	Population geography and demography; Population growth and distribution; Population composition (age-sex composition)	4
2.2	Theories of population: Malthusian and demographic transition; Population-resource regions (W. Zelinsky and E.A. Ackerman)	4
2.3	Population and environment relations with special reference to development-environment conflict (multi-purpose river valley projects)	2
2.4	Origin and growth of rural settlements; Social morphology and rural house types in India; Types and patterns of rural settlements	6
2.5	Origin and growth of urban settlements; Functional classification of urban settlements; Morphology of urban settlements: models of Burgess, Hoyt, Harris and Ullman	6
2.6	Trends and patterns of world urbanization (ancient and modern)	2
2.7	Poverty and inequality: concept, causes and consequences; Food Security in Indian context	3
2.8	Indicators of social well-being; Human development	3

✧ Course Evaluation:

- **Continuous Assessment: 30 Marks***

*[average of the obtained marks of two are to be made to calculate the final marks]



1. Seminar presentations: A powerpoint presentation to be conducted for internal assessment on the notified portions/ topics. [30 Marks]
2. Class test: There shall be test (s) of knowledge and understanding through written test on the notified portions/ topics (s). [30 Marks]
- **End Semester Examination: 70 Marks**

The end semester examination shall be conducted based on written test.

Question Pattern: Students have to answer Two questions carrying **10 marks** out of given **three** questions; Five questions carrying **5 marks** each out of given **eight** questions; Ten questions carrying **2 marks** each out of given **fourteen** questions; Five questions carrying **1 mark** each out of given **eight** questions.

✧ References

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- Civil Registration System: <https://dc.crsorgi.gov.in/crs/>
- Directorate of Census Operations, West Bengal: <https://westbengal.census.gov.in/>
- Government of India Data Platform: <https://www.data.gov.in/>
- International Institute for Population Sciences: <https://www.iipsindia.ac.in/>
- Ministry of Statistics and Programme Implementation (GoI): <https://www.mospi.gov.in/>
- Socio-Economic Statistics India: <https://www.indiastat.com/>
- UNDP India: <https://www.undp.org/india>



Programme: B.Sc.		Year: I		Semester: II	
Discipline: Geography					
Course Name: Elementary Practicals in Human Geography					
Course Code: BSCGEOSE201					
Course Type: SEC (Practical)		Course Details: SEC-2		L-T-P: 0 - 0 - 6	
Course Credit: 3	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	---	20	---
Course Objectives: ✧ To develop students' aptitude for acquiring basic skills of carrying out fieldwork for collecting demographic and socio-economic data. ✧ To guide students to learn the science and art of collecting, processing and interpreting the data.					
Learning Outcome: ✧ Students shall be able to identify the socio-environmental problems of a locality through field experience in future. ✧ The students will efficiently extract, represent, analyse and interpret demographic and socio-economic data.					
Professional Skill Development: ✧ The acquired knowledge is beneficial for future studies in human geography. ✧ This obtained knowledge will provide essential inputs in skill development, which will place the students in their professional life in the near future.					
Sub units	Topics to be covered				Lab work hours
Unit I: Data Collection and Representation [30 Hours]					
1.1	Sources of demographic and socio-economic data; Data access from Census of India web portal; Preparation of questionnaire or schedule for collecting data through a household survey; Interview with special reference to focused group discussions				18
1.2	Preparation of maps showing population density by choropleth; Rural and urban population by dots and spheres; Population growth rates by line graph (Annual and Decadal)				12
Unit II: Data Analysis and Interpretation [30 Hours]					
2.1	Measurement of inequality by Lorenz curve and Gini coefficient; Analysis of occupation structure by pie diagram				14
2.2	Computation of Human Development Index (HDI), Multidimensional Poverty Index (MPI) and representation				16
Unit III: Topographical Maps [30 Hours]					



3.1	Study of correlation between physical and cultural features from Survey of India 1:50k topographical maps using transect chart and scatter plots	14
3.2	Analysis of transport and settlements: Transport network analysis by detour index and Nearest neighbour analysis of settlement patterns from toposheets	16

✧ Course Evaluation:

• Continuous Assessment: 30 Marks

1. Practical records: An A3 or tabloid-size (11 inch x 15 inch) laboratory notebook, comprising class assignments of all practical topics must be prepared and duly signed by the teacher. The exercises are to be drawn in pencil with photocopied representations of source materials where necessary. All texts are to be handwritten. Open/ closed ended questionnaires should be used in the field survey for Unit 1.1. Focused group discussion outcomes should be written in a single page. [5 Marks]

2. Viva-voce based on the laboratory notebook. [10 Marks]

3. Practical Exercises: Internal assessment to be conducted on the basis of above three units. [15 Marks]

• End Semester Examination: 20 Marks

1. Written test: In the End Semester Examination, students have to answer the questions set from the above three units. [15 Marks]

2. Viva-voce based on laboratory notebook. [5 Marks]

✧ References

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- Ministry of Statistics and Programme Implementation (GoI): <https://www.mospi.gov.in/>
- Socio-Economic Statistics India: <https://www.indiastat.com/>
- Sol, National Survey and Mapping Organization: <https://indiamaps.gov.in/login>



Programme: B.Sc.		Year: II		Semester: III	
Discipline: Geography					
Course Name: Climatology					
Course Code: BSCGEOMJ301					
Course Type: Major (Theoretical + Practical)		Course Details: MJC-3		L-T-P: 3 - 0 - 4	
Course Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	15	20	35
Course Objectives: ✧ To provide fundamental knowledge of the Earth's atmospheric system and climate patterns through data analysis and understanding natural processes. ✧ The course offers basic knowledge on relevant aspects of climatology, with particular emphasis on climatic elements diagrams and climatic classification.					
Learning Outcome: ✧ Students shall be able to learn the fundamental concepts of atmospheric science, as well as understand the basic physical processes governing atmospheric dynamics. ✧ The students will definitely interpret and explain atmospheric phenomena, climate variability and change, and climate impacts on society and the environment.					
Professional Skill Development: ✧ The obtained knowledge is vital to perform simple mathematical calculations related to atmospheric science and use different meteorological instruments for the acquisition of data related to various climatic variables. ✧ This knowledge will provide essential inputs in extracting climate data from open source archives and assisting to interpret synoptic weather maps.					
BSCGEOMJ301 - Theory [50 Marks]					
Sub units	Topics to be covered				No. of Lectures
Unit I: Elements of the Atmosphere [15 Hours]					
1.1	Nature, composition and layering of the atmosphere; Basic concepts in atmospheric physics: heat flow and heat capacity				4
1.2	Insolation: controlling factors; Heat balance (terrestrial and latitudinal); Heat budget of the atmosphere				3
1.3	Temperature: horizontal and vertical distribution; Inversion of temperature: types, causes and consequences; Adiabatic temperature changes; Heat waves: causes and effects				5
1.4	Greenhouse effect; Formation, depletion, restoration, and significance of the ozone layer				3
Unit II: Atmospheric Phenomena, Climate Change and Climatic Classification [30 Hours]					



2.1	Circulation in the atmosphere: planetary wind system with special reference to tri-cellular model, jet stream and monsoons; Atmospheric disturbances: tropical and mid-latitude cyclones	10
2.2	Condensation: processes and forms; Mechanism of precipitation: Bergeron-Findeisen theory, collision and coalescence theory; Forms of precipitation	6
2.3	Origin, classification and modification of Air mass; Types of fronts, frontogenesis and frontolysis; Stability and instability	6
2.4	Classification of World Climate: schemes of Köppen (1936) and Thornthwaite (1948); Evidences and causes of climate change	8
BSCGEOMJ301 - Practical (Lab) [50 Marks]		
Sub units	Topics to be covered	Lab work hours
Unit I: Data Collection in Climatology [20 Hours]		
1.1	Activities of India Meteorological Department (IMD); Measurement of weather elements using analogue instruments: mean daily temperature, air pressure, relative humidity, and rainfall	16
1.2	Preparation of an inventory of sources of gridded climate data	4
Unit II: Cartographic Representation of Climatic Data and their Interpretation [20 Hours]		
2.1	Construction and interpretation of hythergraph and climograph (G. Taylor); Construction and interpretation of wind rose	12
2.2	Construction and interpretation of ombrothermic diagram and hyetograph	8
Unit III: Analysis of Climatic Data and Maps [20 Hours]		
3.1	Preparation of station model (Indian Context) and interpretation of synoptic chart (Indian Context)	8
3.2	Interpretation of a daily weather map of India: Monsoon	12

✧ Course Evaluation:

🕒 BSCGEOMJ301 - Theory

• Continuous Assessment: 15 Marks*

*[average of the obtained marks of two are to be made to calculate the final marks]

1. Seminar presentations: A powerpoint presentation to be conducted for internal assessment on the notified portions/ topics. [15 Marks]
2. Class test: There shall be test (s) of knowledge and understanding through written test on the notified portions/ topics (s). [15 Marks]



- **End Semester Examination: 35 Marks**

The end semester examination shall be conducted based on written test.

Question Pattern: Students have to answer One questions carrying **10 marks** out of given **two** questions; Two questions carrying **5 marks** each out of given **four** questions; Five questions carrying **2 marks** each out of given **eight** questions; Five questions carrying **1 mark** each out of given **eight** questions.

🕒 **BSCGEOMJ301 - Lab**

- **Continuous Assessment: 30 Marks**

1. Practical records: An A3 or tabloid-size (11 inch x 15 inch) laboratory notebook, comprising class assignments of all practical topics must be prepared and duly signed by the teacher. India Meteorological Department data are to be used where applicable. The exercises are to be drawn in pencil with photocopied representations of source materials where necessary. All texts are to be handwritten. [5 Marks]

2. Viva-voce based on laboratory notebook. [10 Marks]

3. Practical Exercises: Internal assessment to be conducted on the basis of above three units. [15 Marks]

- **End Semester Examination: 20 Marks**

1. Practical Exercises: In the End Semester Examination, students have to answer the questions set from the above three units. [15 Marks]

2. Viva-voce based on laboratory notebook. [5 Marks]

📖 **References**

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WEBSITES:

Climate Hazards Group InfraRed Precipitation with Station data: www.chc.ucsb.edu/data/chirps

Climatological tables of observatories of India:

<https://www.imdpune.gov.in/library/public/Climatological%20Tables%201991-2020.pdf>

Gauge-based APHRODITE Gridded Precipitation Dataset: www.chikyu.ac.jp/precip

Greenhouse Gas Bulletin: wmo.int/publication-series/greenhouse-gas-bulletin

India Meteorological Department: www.imd.gov.in

Intergovernmental Panel on Climate Change: www.ipcc.ch

MERRA-2-Gridded Reanalysis Dataset: <https://power.larc.nasa.gov/data-access-viewer/>

Tropical Rainfall Measuring Mission: people.geog.ucsb.edu/~bodo/TRMM

United Nations Climate Action: www.un.org/en/climatechange

World Bank Climate Change Knowledge Portal: <https://climateknowledgeportal.worldbank.org>

World Meteorological Organization: public.wmo.int/en

Programme: B.Sc.	Year: II		Semester: III		
Discipline: Geography					
Course Name: Cartography and Surveying					
Course Code: BSCGEOMJ302					
Course Type: Major (Practical)	Course Details: MJC-4		L-T-P: 0 - 0 - 10		
Course Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		60	---	40	---

**Course Objectives:**

- ✧ This course is designed to provide the knowledge and skills for understanding the process of map making, and to acquaint students with new techniques used in map making.
- ✧ To impart knowledge on the various surveying instruments used in geography to students so that they can apply them to prepare plans and maps of the area surveyed.

Learning Outcome:

- ✧ Upon completing this course, the students will be able to apply the techniques and principles of map making and designing for map creation.
- ✧ Students will learn about the measurement of the earth's surface features on horizontal and vertical planes through the learning of different surveying and levelling operations.

Professional Skill Development:

- ✧ The acquired knowledge is beneficial for preparing a wide variety of maps using different datasets.
- ✧ This obtained knowledge will provide essential inputs in surveying skills, which will help the students get jobs in various industries, such as private surveying and engineering firms, land development, and real estate companies in the near future.

Sub units	Topics to be covered	Lab work hours
Unit I: Elements of Cartography [30 Hours]		
1.1	Maps: components and classification; Coordinate systems: polar and rectangular; Bearing: magnetic and true, whole-circle and reduced	6
1.2	Concept of generating globe; Grids: angular and linear measurement methods	5
1.3	Concepts of cartograms and thematic maps; Principal national agencies producing thematic maps in India: NATMO, GSI, NBSSLUP, NHO, NRSC/ Bhuvan	5
1.4	Cartograms: representation of data on map by proportional squares, pie diagrams with proportional circles, dots and spheres; Thematic maps: representation of data using choropleth, isopleth, chorochromatic maps	14
Unit II: Map Projection [40 Hours]		
2.1	Map projections: classification, properties, deformations and uses	5
2.2	Basic concepts: parallels and meridians, scale factor, developable surface, constant of a cone, orthodrome, loxodrome	5
2.3	Construction of projections: Polar Zenithal Case (Gnomonic and Stereographic), Conical Case (Simple Conic with one standard parallel and Bonne's)	20
2.4	Construction of projections: Cylindrical Case (Cylindrical Equal Area and Mercator's)	10
Unit III: Surveying and Mapping [80 Hours]		



3.1	Surveying: definition, classification, and principles; Plan and map; Measurement and mapping of a plot by Chain survey	20
3.2	Concept of traverse, numerical problems related to traverse (calculation of exterior and interior angles), Bowditch correction for closed traverse; Mapping a closed traverse by Prismatic Compass survey	20
3.3	Profile line survey using Dumpy Level; Preparation of contour map of a small area by Prismatic Compass and levelling instruments	20
3.4	Determination of height of base accessible and inaccessible objects by Theodolite (same vertical plane method)	20

✧ Course Evaluation:

• Continuous Assessment: 60 Marks

1. Practical records: An A3 or tabloid-size (11 inch x 15 inch) laboratory notebook, comprising class assignments of all practical topics must be prepared and duly signed by the teacher. The exercises are to be drawn in pencil with photocopied representations of source materials where necessary. All texts are to be handwritten. [10 Marks]

2. Viva-voce based on laboratory notebook. [20 Marks]

3. Practical Exercises: Internal assessment to be conducted on the basis of Unit II and Unit III. Students have to answer the questions set from the above two units. [30 Marks]

• End Semester Examination: 40 Marks

1. Practical Exercises: In the End Semester Examination, students have to answer the questions set from the above three units. [30 Marks]

2. Viva-voce based on laboratory notebook. [10 Marks]

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- Indian Naval Hydrographic Department: <https://hydrobharat.gov.in/>



International Cartographic Association: <https://icaci.org/>

ISRO Bhuvan 2D Platform: <https://bhuvan.nrsc.gov.in/home/index.php>

National Atlas and Thematic Mapping Organisation: <https://portal.natmo.gov.in/en/>

National Bureau of Soil Survey and Land Use Planning: <https://nbsslup.icar.gov.in/>

National Remote Sensing Centre: <https://www.nrsc.gov.in/>

Sol Onlinemaps Portal: <https://onlinemaps.surveyofindia.gov.in/>

Sol, National Survey and Mapping Organization: <https://indiamaps.gov.in/login>

Survey of India (Sol): <https://surveyofindia.gov.in/>

Survey of Villages Abadi & Mapping with Improvised Technology in Village Areas (SVAMITVA):
<https://svamitva.nic.in/svamitva/>

Programme: B.Sc.	Year: II		Semester: III		
Discipline: Geography					
Course Name: Climate Change: Vulnerability and Adaptations					
Course Code: BSCGEOMN301					
Course Type: Minor (Theoretical)	Course Details: MNC-3		L-T-P: 4 - 1 - 0		
Course Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		---	30	---	70
Course Objectives: ✧ To familiarize the students with the science of climate change and related aspects while keeping in view the vulnerability and human adaptation. ✧ This course is also oriented to deliver knowledge on the mitigation of climate impacts and to know the institutional role. ✧ The course offers the necessity to incorporate and consider the changing climate in various long-term planning and development activities.					
Learning Outcome: ✧ Students will be able to assess climate change impacts, vulnerability and adaptation, as well as how societies in developed and developing nations can effectively adapt to climate change. ✧ The students will acquire insight for explaining and demonstrating knowledge of different measures and strategies of climate change mitigation used in various parts of the world.					

**Professional Skill Development:**

- ✧ The obtained knowledge is vital to provide a foundation for collaborative interdisciplinary works with public agencies and NGOs.
- ✧ Students will become competent in climate change impact evaluation through the application of scientific principles and methodologies.

Sub units	Topics to be covered	No. of Lectures
Unit I: Basics of Climate Change [30 Hours]		
1.1	Climate change with reference to the geological time scale	2
1.2	Factors of climate change; Theories of climate change	4
1.3	Evidences of climate change; Reconstruction of past climates	4
1.4	Understanding recent climatic change; Greenhouse gases (GHGs) and global warming; Global climatic assessment: IPCC reports	5
1.5	Physical risks of climate change: acute (droughts and floods) and chronic (accelerating loss of biodiversity)	3
1.6	Climate change and vulnerability: physical, economic and social vulnerabilities, and measured indices	5
1.7	Impact of climate change: agriculture and water; flora and fauna; human health and morbidity	5
1.8	Reducing vulnerability: climate change adaptation, climate resilience	2
Unit II: Climate Change: Adaptation and Mitigation [30 Hours]		
2.1	Global initiatives to climate change mitigation: Kyoto Protocol, carbon trading, clean development mechanism, UNFCCC and COPs	5
2.2	Methods for reducing GHG emissions: carbon footprint and carbon sequestration	5
2.3	Climate change mitigation framework: climate-smart agriculture	4
2.4	Climate change adaptive strategies with particular reference to South Asia	4
2.5	National Action Plan on Climate Change (NAPCC): missions, status and drawbacks	4
2.6	Increasing cyclonic intensity in Indian Sundarban of recent times	4
2.7	Glacial lake outburst floods in Himalayan region	2
2.8	G20 and Climate Change	2

✧ Course Evaluation:

- **Continuous Assessment: 30 Marks***

*[average of the obtained marks of two are to be made to calculate the final marks]



1. Seminar presentations: A powerpoint presentation to be conducted for internal assessment on the notified portions/ topics. [30 Marks]

2. Class test: There shall be test (s) of knowledge and understanding through written test on the notified portions/ topics (s). [30 Marks]

• **End Semester Examination: 70 Marks**

The end semester examination shall be conducted based on written test.

Question Pattern: Students have to answer Two questions carrying **10 marks** out of given **three** questions; Five questions carrying **5 marks** each out of given **eight** questions; Ten questions carrying **2 marks** each out of given **fourteen** questions; Five questions carrying **1 mark** each out of given **eight** questions.

✧ References

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Intergovernmental Panel on Climate Change: www.ipcc.ch

International Geosphere-Biosphere Programme: <http://www.igbp.net/>

Ministry of Environment, Forest and Climate Change: <https://moef.gov.in/>

United Nations Climate Action: www.un.org/en/climatechange

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World Bank Climate Change Knowledge Portal: <https://climateknowledgeportal.worldbank.org>

World Meteorological Organization: public.wmo.int/en

Programme: UG		Year: II		Semester: III	
Discipline: Geography					
Course Name: Bharatavarsha - A Land of Rare Natural Endowments					
Course Code: MDC301					
Course Type: MD (Theoretical)		Course Details: MDC-3		L-T-P: 2 - 1 - 0	
Course Credit: 3	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		---	15	---	35

**Course Objectives:**

- ✧ To provide fundamental knowledge about history of ancient Bharatvarsha and its area, location and geographical background.
- ✧ The course offers basic knowledge on natural/ physical resources and their utilization.
- ✧ The course will provide knowledge about present prosperous India.

Learning Outcome:

After the completion of the course, the students will have the ability to:

- ✧ Understand the ancient Bharatvarsha and its frontiers and neighbouring countries.
- ✧ Understand the physical aspects of the country.
- ✧ Study the resource endowment and its spatial distribution and utilization.
- ✧ Understand the agricultural and industrial scenario of the country before and after the independence.
- ✧ Study the prosperity of the country in comparison to the rest of the world and the uniqueness of culture.

Professional Skill Development:

- ✧ The obtained knowledge will help the students in their future competitive examinations for jobs like CGL, PSC, UPSC etc.

Sub units	Topics to be covered	No. of Lectures
Unit I: Introducing Physical and Natural Environment of India [15 Hours]		
1.1	Bharatvarsha: Nomenclature; Meaning, concept and geographical area; Historical background	3
1.2	Spatial Features: Location, size and shape, geographical information, frontiers and neighbouring countries; Importance of geographical location	3
1.3	The land of India/ physical aspects: Physiographic characteristics; Drainage system; Seasonal rhythm and relationship with monsoon; Classification of soil and natural vegetation in India	5
1.4	Mineral and power resources: Distribution and utilization of iron ore, coal and petroleum; Non-conventional sources of energy: solar and wind	4
Unit II: Introducing Socio-Cultural Environment of India [15 Hours]		
2.1	Growth and distribution of population; Languages; Types of rural settlements; Trends of urbanization	5
2.2	Agro-ecological regions in India; Green revolution	3
2.3	Industrial development in India since independence; Impact of liberalization; Distribution and production of iron and steel, cotton textile and IT industries	5
2.4	Regional Cooperation: SAARC and BRICS	2

✧ Course Evaluation:

• Continuous Assessment: **15 Marks**

1. An assignment on the given topic is to be prepared and submitted. The assignment must be handwritten on A4 page and not exceed 2000 words excluding references. **[10 Marks]**



2. Viva-voce based on assignment. [5 Marks]

• End Semester Examination: **35 Marks**

The end semester examination shall be conducted based on written test.

Question Pattern: Students have to answer One questions carrying **10 marks** out of given **two** questions; Two questions carrying **5 marks** each out of given **four** questions; Five questions carrying **2 marks** each out of given **eight** questions; Five questions carrying **1 mark** each out of given **eight** questions.

✧ References

BOOKS:

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Tiwari, R.C. (2016): Geography of India, 11th ed., Pravalika Publications, Allahabad.

WEBSITES:

Chronological chart of the history of Bharatvarsh since its origination:

https://www.encyclopediaofauthenticindianism.org/articles/53_chronological_chart.htm

Department of Water Resources, River Development and Ganga Rejuvenation: <https://jalshakti-dwr.gov.in/>

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Programme: B.Sc.		Year: II		Semester: IV	
Discipline: Geography					
Course Name: Soil and Biogeography					
Course Code: BSCGEOMJ401					
Course Type: Major (Theoretical + Practical)		Course Details: MJC-5		L-T-P: 3 - 0 - 4	
Course Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	15	20	35
Course Objectives: ✧ To introduce different aspects of soil science, soil formation and development processes, and the classification and utility of the major soil groups, their erosion and relationships with land capability and crop suitability. ✧ The objective of this course is to make the students comprehend how the natural surroundings and human activities are responsible for the distribution of plants and animals.					
Learning Outcome: ✧ Students shall be able to understand soil profile development, their physico-chemical characteristics and changes over time, measure and quantify information on soil properties and erosion, and land capability and crop suitability. ✧ The students will acquaint themselves with various dimensions of biogeography, the function and structure of ecosystem and mass cum energy flow through it, and the significance of biodiversity.					
Professional Skill Development: ✧ Students are obtained the ability to recognize and sample different soils in the field, trained to imbibe fundamental knowledge on how to analyze soil properties, and learn skills for soil database generation and interpretation. ✧ This obtained knowledge will equip the students with tools for measuring, mapping, and analyzing the environment comprehensively.					
BSCGEOMJ401 - Theory [50 Marks]					
Sub units	Topics to be covered				No. of Lectures
Unit I: Soil Geography [25 Hours]					
1.1	Soil as a component of biosphere; Pedogenic processes and development of soil profiles; Factors of soil formation; Man as an active agent of soil transformation				4
1.2	Characteristics and significance of soil properties: physical (Texture, structure, colour and moisture) and chemical (pH, organic matter and NPK); Soil minerals and nutrients; Soil pollution: causes and consequences				10
1.3	Concept of soil catena; Study of soil profiles: Podzol, Laterite, Chernozem; Characteristics of Saline and Alkaline soils				6



1.4	Principles of soil classification: Genetic and USDA; Concept of land capability and its classification	5
Unit II: Biogeography [20 Hours]		
2.1	Nature, scope, and contents of Biogeography; Concepts of biosphere, ecosystem, biome, ecotone, community and ecology; Ecological successions: stages and climax	4
2.2	Concepts of trophic structure, food chain and food web; Energy flow in ecosystems	4
2.3	Factors of plant ecology; Classification of world biomes (Whittaker)	5
2.4	Concept of biodiversity; Biodiversity: hotspots, loss and conservation; Wildlife conservation in India: tiger and elephant conservation	7
BSCGEOMJ401 - Practical (Lab) [50 Marks]		
Sub units	Topics to be covered	Lab work hours
Unit I: Laboratory Analysis of Physical Properties of Soil [15 Hours]		
1.1	Soil sampling techniques: surface and profile	7
1.2	Determination of soil texture by feel method; Textural classification of soil by ternary diagram	8
Unit II: Laboratory Analysis of Chemical Properties of Soil and Analyzing Soil Maps [25 Hours]		
2.1	Determination of Soil pH, organic carbon and nutrient concentration (NPK) of soil with the help of soil kit	10
2.2	Data extraction from Bhoomi Geoportal; Interpretation of Soil & Land Use Survey of India (SLUSI) and ICAR-NBSS & LUP maps and soil databases	15
Unit III: Biogeography [20 Hours]		
3.1	Measuring species diversity and dominance: Simpson and Shannon-Wiener index	10
3.2	Preparation of Participatory Biodiversity Register	10

✧ Course Evaluation:

🕒 BSCGEOMJ401 - Theory

• Continuous Assessment: 15 Marks*

*[average of the obtained marks of two are to be made to calculate the final marks]

1. Seminar presentations: A powerpoint presentation to be conducted for internal assessment on the notified portions/ topics. [15 Marks]



2. Class test: There shall be test (s) of knowledge and understanding through written test on the notified portions/ topics (s). [15 Marks]

• **End Semester Examination: 35 Marks**

The end semester examination shall be conducted based on written test.

Question Pattern: Students have to answer One questions carrying **10 marks** out of given **two** questions; Two questions carrying **5 marks** each out of given **four** questions; Five questions carrying **2 marks** each out of given **eight** questions; Five questions carrying **1 mark** each out of given **eight** questions.

🕒 **BSCGEOMJ401 - Lab**

• **Continuous Assessment: 30 Marks**

1. Practical records: An A3 or tabloid-size (11 inch x 15 inch) laboratory notebook, comprising class assignments of all practical topics must be prepared and duly signed by the teacher. The exercises are to be drawn in pencil with photocopied representations of source materials where necessary. All texts are to be handwritten. [5 Marks]

2. Viva-voce based on laboratory notebook. [10 Marks]

3. Practical Exercises: Internal assessment to be conducted on the basis of above three units. [15 Marks]

• **End Semester Examination: 20 Marks**

1. Practical Exercises: In the End Semester Examination, students have to answer the questions set from the above three units. [15 Marks]

2. Viva-voce based on laboratory notebook. [5 Marks]

📖 **References**

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- BHOOMI GeoPortal: <http://www.bhoomigeoportal-nbsslup.in/>
- European Soil Data Centre (ESDAC): <https://esdac.jrc.ec.europa.eu/>
- Indian Biodiversity Information System: <https://www.indianbiodiversity.org/>
- National Atlas and Thematic Mapping Organisation: <https://portal.natmo.gov.in/en/>
- National Bureau of Soil Survey and Land Use Planning: <https://nbsslup.icar.gov.in/>
- Soil & Land Use Survey of India (SLUSI): <https://slusi.da.gov.in/>



Programme: B.Sc.		Year: II		Semester: IV	
Discipline: Geography					
Course Name: Remote Sensing, GIS and GNSS					
Course Code: BSCGEOMJ402					
Course Type: Major (Theoretical + Practical)		Course Details: MJC-6		L-T-P: 3 - 0 - 4	
Course Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	15	20	35
Course Objectives: ✧ This course introduces the students to the basic concepts of remote sensing and imparts necessary skills in remote sensing analysis and image interpretation. So that, students acquire employable skills in remote sensing. ✧ To study the basics of digital image processing to solve real-world problems. ✧ To provide a firm conceptual and technical understanding of GIS and GNSS.					
Learning Outcome: ✧ At the end of this course, it is expected that students will be able to learn fundamental principles and concepts of photogrammetry, remote sensing, and digital image processing. ✧ Students will be able to understand GIS data types and structures with processing and visualization techniques in GIS. ✧ Students will also be able to understand GNSS-based survey and mapping under variety of planning and management applications.					
Professional Skill Development: ✧ This knowledge will provide students with a wide range of professional skills applicable to various fields. ✧ Students will acquire employable skills in remote sensing and GIS.					
Sub units	Topics to be covered				No. of Lectures
BSCGEOMJ402 - Theory [50 Marks]					
Unit I: Photogrammetry and Remote Sensing [25 Hours]					
1.1	Concept, types and geometry of aerial photographs; Basic elements of aerial photo interpretation				5
1.2	Principles of Remote Sensing; Electro Magnetic Radiation and Electro Magnetic Spectrum, spectral reflectance curves; Platforms and geometry of orbits; Sensors and resolutions				8
1.3	Types of Satellite Remote Sensing; IRS and Landsat missions				6
1.4	Preparation of colour composites (TCC and SFCC); Concept of visual image interpretation and digital image interpretation of satellite imagery				6



Unit II: Geographic Information System (GIS) and Global Navigation Satellite System (GNSS) [20 Hours]		
2.1	Basics of GIS: Definition, components, development and applications; GIS data structures types: spatial and non-spatial, raster and vector	6
2.2	Principles of preparing attribute tables, data manipulation and query; Principles and significance of buffer preparation; Principles and significance overlay analysis	4
2.3	Geodesy and Coordinate Systems; Basics of GNSS: Principle, components and applications; Global/ Regional Satellite constellations, GNSS signals	5
2.4	Sources of error in a GNSS system; GNSS receiver types and positioning concepts	5
BSCGEOMJ402 - Practical (Lab) [50 Marks]		
Unit I: Photogrammetry and Remote Sensing [25 Hours]		
1.1	Determination of scale of aerial photographs; Determination of height of objects from aerial photographs using parallax bar under a mirror stereoscope; Identification and mapping of physical and cultural features from aerial photograph using mirror stereoscope	15
1.2	Georeferencing of scanned maps and satellite images; Mosaicking and layering of images and maps of different dates and scales; Creating region of interest (subsetting/ clipping)	10
Unit II: Remote Sensing and GIS [25 Hours]		
2.1	Preparation of reflectance libraries of LULC features across different image bands; Supervised image classification, class editing and post-classification analysis	15
2.2	Digitization of features and administrative boundaries; Data attachment, overlay and preparation of annotated thematic maps	10
Unit III: GNSS [10 Hours]		
3.1	Waypoint collection from GNSS receivers, exporting to GIS database and plotting	5
3.2	Mapping exercise with importing GPS data in Google Earth	5

✧ Course Evaluation:

☉ BSCGEOMJ402 - Theory

- Continuous Assessment: **15 Marks***

*[average of the obtained marks of two are to be made to calculate the final marks]

1. Seminar presentations: A powerpoint presentation to be conducted for internal assessment on the notified portions/ topics. [15 Marks]



2. Class test: There shall be test (s) of knowledge and understanding through written test on the notified portions/ topics (s). [15 Marks]

• **End Semester Examination: 35 Marks**

The end semester examination shall be conducted based on written test.

Question Pattern: Students have to answer One questions carrying **10 marks** out of given **two** questions; Two questions carrying **5 marks** each out of given **four** questions; Five questions carrying **2 marks** each out of given **eight** questions; Five questions carrying **1 mark** each out of given **eight** questions.

🕒 **BSCGEOMJ402 - Lab**

• **Continuous Assessment: 30 Marks**

1. Practical records: An A3 or tabloid-size (11 inch x 15 inch) laboratory notebook, comprising class assignments of all practical topics must be prepared and duly signed by the teacher. The exercises on scanned maps, satellite images and GPS data are to be represented from **QGIS/ Garmin BaseCamp/ Microsoft Excel** software as applicable. Methods and interpretations are to be handwritten. [5 Marks]

2. Viva-voce based on laboratory notebook. [10 Marks]

3. Practical Exercises: Internal assessment to be conducted on the basis of above three units. [15 Marks]

• **End Semester Examination: 20 Marks**

1. Practical Exercises: In the End Semester Examination, students have to answer the questions set from the above three units. [15 Marks]

2. Viva-voce based on laboratory notebook. [5 Marks]

📌 **References**

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Samanta, S. (2023): A Text Book of Remote Sensing, GIS and GNSS, Notion Press.

Wolf, P.R. (2013): Elements of Photogrammetry, Indian Edition, McGraw Hill Education.

WEBSITES:

Alaska Satellite Facility - Distributed Active Archive Center: <https://search.asf.alaska.edu/#/>

BaseCamp Software: <https://www.garmin.com/en-IN/software/basecamp/>

Campbell, J. and Shin, M. (2011): **Essentials of Geographic Information Systems**, Saylor Foundation: <https://open.umn.edu/opentextbooks/textbooks/67>

Centre for Space Science and Technology Education in Asia and the Pacific: <https://cssteapun.org/>

Copernicus Data Space Ecosystem: <https://dataspace.copernicus.eu/>

Geospatial World: <https://www.geospatialworld.net/>

Indian Institute of Remote Sensing: <https://www.iirs.gov.in/>

Indian Space Research Organisation: <https://www.isro.gov.in/>

International Society for Photogrammetry and Remote Sensing: www.isprs.org

ISRO Bhuvan 2D and 3D Platforms:

<https://bhuvan-app1.nrsc.gov.in/bhuvan2d/bhuvan/bhuvan2d.php>

<https://bhuvan-app1.nrsc.gov.in/globe/3d.php>

Magazine: Coordinates: <https://mycoordinates.org/>

Magazine: GIS World: <https://gisworld.co.in/>

Magazine: GPS World: <https://www.gpsworld.com/>

NASA Earthdata: <https://search.earthdata.nasa.gov/search/>

National Remote Sensing Centre Bhoonidhi: <https://bhoonidhi.nrsc.gov.in/bhoonidhi/home.html>

National Remote Sensing Centre: www.nrsc.gov.in

QGIS: <https://www.qgis.org/>

Space Applications Centre: <https://www.sac.gov.in/Vyom/>

USGS EarthExplorer: <https://earthexplorer.usgs.gov/>



Programme: B.Sc.		Year: II		Semester: IV	
Discipline: Geography					
Course Name: Geospatial Science and Technology					
Course Code: BSCGEOMN401					
Course Type: Minor (Theoretical)		Course Details: MNC-4		L-T-P: 4 - 1 - 0	
Course Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		---	30	---	70
Course Objectives: ✧ To familiarize the students with the detailed concept and understanding of geospatial science and the importance of major geospatial policies of India while keeping in view the growth of the geospatial industry. ✧ This course introduces the students to the basic concepts of remote sensing and imparts necessary skills in remote sensing analysis and image interpretation. So that, students acquire employable skills in remote sensing. ✧ The course offers information on how to solve spatial decision problems using geospatial technology, as well as the limitations and pitfalls of using these technologies.					
Learning Outcome: ✧ At the end of this course, it is expected that students will be able to learn fundamental concepts of geospatial science and mapping. ✧ Students will be able to acquire knowledge on GIS data structures with interpolation, modelling and functions. ✧ Students will also be able to understand GNSS-based survey and mapping as well as the application of geospatial technology for specific purposes.					
Professional Skill Development: ✧ This knowledge will provide students with a wide range of professional skills applicable to various fields. ✧ Students will acquire employable skills in geospatial technology.					
Sub units	Topics to be covered				No. of Lectures
Unit I: Introduction to Geospatial Science and Mapping [30 Hours]					
1.1	Geospatial Science: Definition, scope and historical development; Geospatial mapping: Datum surface and coordinate systems, transformation				5
1.2	Geodesy: Definition, shape and size of the Earth, geoid and reference ellipsoid				3
1.3	National Map Policy 2005; Role of National Mapping Organisations: Survey of India, NATMO and NRSC				4
1.4	Concept of data and information; Types of data: Spatial and non-spatial; Types, characteristics and sources of spatial data; Quality and reliability issues of geospatial data				5
1.5	Primary geospatial data acquisition techniques: Raster data capture (Earth imaging satellite capturing and UAV data); Vector data capture (field surveying techniques, crowdsourcing)				5



1.6	New Geospatial Data Guidelines 2021	2
1.7	Concept of Geospatial software and types (Open source and commercial software); Major functions of geospatial software available in the market	3
1.8	Geospatial industry: Concept and types; Role of geospatial industry in service provision and in the daily life aspects	3
Unit II: Geospatial Technology [30 Hours]		
2.1	History and evolution of photogrammetry and remote sensing (RS); Principles of RS; Platforms, geometry of orbits; Types of RS satellites and sensors; Sensor resolutions and their applications; Types of RS; Band Combination, FCCs and SFCC	9
2.2	Pre-processing of satellite data (geometric and radiometric corrections); Image enhancement techniques (spectral and spatial); Image classification (supervised and unsupervised)	6
2.3	Basics of GIS: Definition, components, development and applications	2
2.4	GIS variables: points, lines, polygon; Advantage and limitation of GIS	2
2.5	Spatial data structures in GIS: raster and vector; DBMS	3
2.6	Principle, components and applications of GNSS; GNSS signals	3
2.7	Trends in geospatial technology: Development of web-based spatial platforms with reference to Bhuvan and Google Earth Engine	2
2.8	Applications of geospatial technology in climate change studies and disaster risk reduction (DRR)	3

✧ Course Evaluation:

• Continuous Assessment: 30 Marks*

*[average of the obtained marks of two are to be made to calculate the final marks]

1. Seminar presentations: A powerpoint presentation to be conducted for internal assessment on the notified portions/ topics. [30 Marks]

2. Class test: There shall be test (s) of knowledge and understanding through written test on the notified portions/ topics (s). [30 Marks]

• End Semester Examination: 70 Marks

The end semester examination shall be conducted based on written test.

Question Pattern: Students have to answer Two questions carrying **10 marks** out of given **three** questions; Five questions carrying **5 marks** each out of given **eight** questions; Ten questions carrying **2 marks** each out of given **fourteen** questions; Five questions carrying **1 mark** each out of given **eight** questions.



✧ References

BOOKS:

Agarwal, G.C. (1974): Photogrammetric Surveys, their Planning, Execution and Costing, Survey of India Technical Publication, No. 7401.

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Joseph, G. and Jeganathan, C. (2018): Fundamentals of Remote Sensing, 3rd ed., Universities Press.

Lillesand, T.M., Kiefer, R.W. and Chipman, J.W. (2022): Remote Sensing and Image Interpretation (An Indian Adaptation), 7th edition, Wiley India Pvt Ltd.

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- GISGeography: <https://gisgeography.com/>
- Indian Institute of Remote Sensing: <https://www.iirs.gov.in/>
- Indian Space Research Organisation: <https://www.isro.gov.in/>
- International Society for Photogrammetry and Remote Sensing: www.isprs.org
- Magazine:** Coordinates: <https://mycoordinates.org/>
- Magazine:** GIS World: <https://gisworld.co.in/>
- Magazine:** GPS World: <https://www.gpsworld.com/>
- National Remote Sensing Centre: www.nrsc.gov.in



Programme: B.Sc.		Year: II		Semester: IV	
Discipline: Geography					
Course Name: Computer Applications in Geography					
Course Code: BSCGEOSE401					
Course Type: SEC (Practical)		Course Details: SEC-3		L-T-P: 0 - 0 - 6	
Course Credit: 3	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	---	20	---
Course Objectives: ✧ This course is an initiative to impart knowledge on the basics of computer and computer applications. ✧ To develop ability and skills in writing, editing, and presentation for representation of geographical information; data storing, formatting, and preparing graphs; developing internet surfing skills.					
Learning Outcome: Upon successful completion of this course, students will be able to: ✧ Get working knowledge of computer hardware and software. ✧ Develop writing, editing, and presentation skills for the representation of geographical information. ✧ Develop ability and skills in data management and graphical representation. ✧ Acquire internet surfing skills and enhance the ability to gain knowledge from the digital world. ✧ Know about sources and uses of online educational resources and e-learning methods.					
Professional Skill Development: ✧ This course has the great potential to advance the learner's career. The acquired knowledge is highly effective in developing data analysis skills, observation skills, communications skills in particular and digital skills in general. ✧ The knowledge obtained from this course will help the students to find employment opportunities.					
Sub units	Topics to be covered				Lab work hours
Unit I: Computer Basics [20 Hours]					
1.1	Computer components: Hardware and software: CPU, Input and Output devices; System software and application software				10
1.2	Common computer languages; Numbering systems				10
Unit II: Computer Application [40 Hours]					
2.1	Understanding word processing: Introduction and working with Microsoft Word, basic commands, formatting text and documents, sorting and tables, working with graphics; Microsoft PowerPoint: Making a small presentation using Microsoft PowerPoint				15
2.2	Spreadsheets: Basics of spreadsheet; Manipulation of cells; Formulas and functions; Data storing and formatting in spreadsheet; Printing of spreadsheet; Preparation of annotated diagrams: Bar, Pie, Line Graph and Doughnut Chart; Heat map creation in MS Excel				25

**Unit III: Internet Surfing [30 Hours]**

3.1	Concept of internet; Application of internet; World Wide Web; Sending email and password security; Storing and retrieving of data/ documents using online data storage facilities	10
3.2	Preparation of online questionnaire/ online survey through google forms; Comprehensive browsing and listing of useful geographical sites; E-learning through e-content and open online courses: e-PG Pathshala, digital library, SWAYAM-MOOCs	20

✧ Course Evaluation:**• Continuous Assessment: 30 Marks**

1. Practical records: An A3 or tabloid-size (11 inch x 15 inch) laboratory notebook, comprising class assignments of all practical topics must be prepared and duly signed by the teacher. Methods and interpretations are to be represented as computer prints. [5 Marks]

2. Viva-voce based on laboratory notebook. [10 Marks]

3. Practical Exercises: Internal assessment to be conducted on the basis of above three units. [15 Marks]

• End Semester Examination: 20 Marks

1. Practical Exercises: In the End Semester Examination, students have to answer the questions set from the above three units. [15 Marks]

2. Viva-voce based on laboratory notebook. [5 Marks]

✧ References**BOOKS:**

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

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National Digital Library of India: <https://ndl.iitkgp.ac.in/>



Programme: B.Sc.		Year: III		Semester: V	
Subject: Geography					
Course Name: Economic and Transport Geography					
Course Code: BSCGEOMJ501					
Course Type: Major (Theoretical + Practical)		Course Details: MJC-7		L-T-P: 3 - 0 - 4	
Course Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	15	20	35
Course Objectives: ✧ This course is designed to instill knowledge on fundamental ideas of economic geography, its major constituting dimensions, and economic theories. ✧ To acquaint students with the implications of trade blocs and their effect on economic activities. ✧ To impart knowledge on the problem-solving approaches to transportation and cost-effectiveness.					
Learning Outcome: ✧ Students will learn about the role of geographical parameters in determining various economic activities and understand the scope of economic geography, differentiating it from the classification of economic activities. ✧ Students will be able to recognize the significance of transportation in spatial connectivity and economic development. ✧ Students will get an applied perspective and practically evaluate economic phenomena, including transport effectiveness.					
Professional Skill Development: ✧ The acquired knowledge is beneficial for students to evaluate different economic activities and aspects with more efficiency, and this knowledge will help in the development of local economic enterprises. ✧ Students will be skilled in handling the syllabus for All India basis competitive exams.					
BSCGEOMJ501 - Theory [50 Marks]					
Sub units	Topics to be covered				No. of Lectures
Unit I: Economic Geography [25 Hours]					
1.1	Economic Geography: meaning, scope and approaches (regional, functional and commodity); Concepts in economic geography: goods and services, production, exchange and consumption				4
1.2	Economic activities and sectors (primary, secondary, tertiary, quaternary and quinary); Geography of resources: classification, conservation, problems, planning and management				7
1.3	Location of economic activities: agriculture (after Von Thunen), and industry (after Weber); Determination of market areas: theory of Losch				6



1.4	Role of different factors of global economic change; Global and regional economic forums: WTO, OPEC, BRICS; International trade blocs; Global conflict on petroleum	8
Unit II: Transport Geography [20 Hours]		
2.1	Transport Geography: nature, scope, significance and development; Relative importance of different modes of transport: railways, roads, waterways and airways	4
2.2	Factors associated with the development of transport system: technological, physical, economic, and social	4
2.3	Concept of distance; Transport network analysis: accessibility, connectivity, graph theory; Transport costs: factors and comparative cost advantages	6
2.4	Models of spatial interaction: Gravity and Edward Ullman's models; Managing urban transport problems: mass rapid transit system (MRTS) with special reference to Kolkata	6
BSCGEOMJ501 - Practical (Lab) [50 Marks]		
Sub units	Topics to be covered	Lab work hours
Unit I: Data Collection and Representation in Economic Geography [20 Hours]		
1.1	Annual Survey of Industries (ASI); Collection of economic data from various web portals; Representation and interpretation of economic data at country or state level	12
1.2	Classification of economic activities as per Census of India; Collection and representation of economic activity data from a locality	8
Unit II: Quantitative Techniques in Economic Geography [20 Hours]		
2.1	Locational pattern of agricultural productivity using isopleth; Time series analysis of industrial production	10
2.2	Methods of measuring the spatial distribution of industries: coefficients of localisation and geographical association; Index of specialisation	10
Unit III: Transport Geography: Data Analysis, Mapping and Interpretation [20 Hours]		
3.1	Transport network analysis: measuring accessibility (konig and shimbel indices) and connectivity (alpha, beta and gamma indices)	10
3.2	Preparation of an isochrone map; Construction of flow diagram representing transport network pressure	10

✧ Course Evaluation:

☉ BSCGEOMJ501 - Theory

- Continuous Assessment: 15 Marks*

*[average of the obtained marks of two are to be made to calculate the final marks]



1. Seminar presentations: A powerpoint presentation to be conducted for internal assessment on the notified portions/ topics. [15 Marks]
 2. Class test: There shall be test (s) of knowledge and understanding through written test on the notified portions/ topics (s). [15 Marks]
- **End Semester Examination: 35 Marks**

The end semester examination shall be conducted based on written test.

Question Pattern: Students have to answer One questions carrying **10 marks** out of given **two** questions; Two questions carrying **5 marks** each out of given **four** questions; Five questions carrying **2 marks** each out of given **eight** questions; Five questions carrying **1 mark** each out of given **eight** questions.

🕒 BSCGEOMJ501 - Lab

- **Continuous Assessment: 30 Marks**
1. Practical records: An A4-size laboratory notebook, comprising class assignments of all practical topics must be prepared and duly signed by the teacher. Census of India data are to be used where applicable. The exercises are to be drawn in pencil/ ink with photocopied representations of source materials where necessary. All texts are to be handwritten. [5 Marks]
 2. Viva-voce based on laboratory notebook. [10 Marks]
 3. Practical Exercises: Internal assessment to be conducted on the basis of above three units. [15 Marks]
- **End Semester Examination: 20 Marks**
1. Practical Exercises: In the End Semester Examination, students have to answer the questions set from the above three units. [15 Marks]
 2. Viva-voce based on laboratory notebook. [5 Marks]

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Programme: B.Sc.		Year: III		Semester: V	
Subject: Geography					
Course Name: Statistical Techniques in Geography					
Course Code: BSCGEOMJ502					
Course Type: Major (Theoretical + Practical)		Course Details: MJC-8		L-T-P: 3 - 0 - 4	
Course Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	15	20	35
Course Objectives: ✧ To familiarize the students with fundamental concepts of statistics, the computation of univariate and bivariate statistical analysis of geographical data, and to acquire knowledge about the process of interpreting quantitative data. ✧ The course offers knowledge on representing data through statistical diagrams and the necessity of inferential statistics.					
Learning Outcome: ✧ At the end of this course, it is expected that students will be able to understand the methods and techniques of data collection, organization, visualization, analysis, and interpretation. ✧ Students will be able to develop analytical skills in statistical techniques, design statistical hypotheses about real-world problems, and conduct appropriate tests for drawing valid inferences about the population.					

**Professional Skill Development:**

- ✧ This knowledge will provide students with a wide range of analytical and computational skills applicable to various fields.
- ✧ After strengthening the analytical skills, this knowledge will help to provide the fundamental foundation for further studies in research.

BSCGEOMJ502 - Theory [50 Marks]

Sub units	Topics to be covered	No. of Lectures
Unit I: Basic Statistics [25 Hours]		
1.1	Significance of statistical techniques in Geography; Sources of data, nature of statistical data (discrete, continuous, parametric and non-parametric data); Variables and attributes	3
1.2	Population and samples; Scales of measurement (nominal, ordinal, interval and ratio); Other scaling techniques (weighted score, Likert's opinionnaire)	6
1.3	Geographical data management: collection (sampling techniques), classification, tabulation and analysis; Frequency distribution (discrete and continuous, ordinary and cumulative) and its representation (histogram, frequency polygon, curve and ogives)	8
1.4	Descriptive statistics: central tendency (major and minor averages), dispersion (absolute and relative), and shape; Partition values (quantiles); Standard Score	8
Unit II: Predictive and Inferential Statistics [20 Hours]		
2.1	Covariance; Correlation: product moment correlation coefficient and rank correlation coefficient	5
2.2	Regression: linear and curvilinear (parabolic, geometric and exponential); Regression coefficients and coefficient of determination; Residuals and standard error of estimates	6
2.3	Time series analysis: secular trend, seasonal variation, cyclical variation, irregular variation; Methods for measuring secular trend: semi-average, moving average, curve fitting	4
2.4	Hypothesis testing and statistical decision: hypothesis formulation and establishment, type I and type II errors, one-tailed and two-tailed tests, parametric and non-parametric tests	5
BSCGEOMJ502 - Practical (Lab) [50 Marks]		
Sub units	Topics to be covered	Lab work hours
Unit I: Descriptive Statistics [25 Hours]		
1.1	Preparation of frequency distribution table: discrete and continuous (equal and unequal class); Graphical representation: histogram, frequency polygon and curve, ogive	8
1.2	Central tendency: arithmetic mean, median and mode; Partition values (quartiles, deciles and percentiles); Dispersion (range, mean deviation, standard deviation and coefficient of variation); Graphical representation: median, mode, quartile and percentile, box-plots	17



Unit II: Predictive Statistics [20 Hours]		
2.1	Simple correlation: scatter diagram and plotting best-fit line using least-square method (linear regression), coefficient of correlation (product moment and Spearman's rank)	10
2.2	Sum of squares and coefficient of determination; Estimation of standard error; Standard score and absolute residual mapping	10
Unit III: Predictive and Inferential Statistics [15 Hours]		
3.1	Time series analysis (measuring trend): actual trend, semi average, moving average and least square (linear)	8
3.2	Hypothesis testing: parametric (t-test) and non-parametric (chi-squared test), test of significance of correlation coefficient	7

✧ Course Evaluation:

☉ BSCGEOMJ502 - Theory

• Continuous Assessment: 15 Marks*

*[average of the obtained marks of two are to be made to calculate the final marks]

1. Seminar presentations: A powerpoint presentation to be conducted for internal assessment on the notified portions/ topics. [15 Marks]
2. Class test: There shall be test (s) of knowledge and understanding through written test on the notified portions/ topics (s). [15 Marks]

• End Semester Examination: 35 Marks

The end semester examination shall be conducted based on written test.

Question Pattern: Students have to answer One questions carrying **10 marks** out of given **two** questions; Two questions carrying **5 marks** each out of given **four** questions; Five questions carrying **2 marks** each out of given **eight** questions; Five questions carrying **1 mark** each out of given **eight** questions.

☉ BSCGEOMJ502 - Lab

• Continuous Assessment: 30 Marks

1. Practical records: An A4-size laboratory notebook, comprising class assignments of all practical topics must be prepared and duly signed by the teacher. The exercises are to be drawn in pencil/ ink with photocopied representations of source materials where necessary. All texts are to be handwritten. [5 Marks]
2. Viva-voce based on laboratory notebook. [10 Marks]



3. Practical Exercises: Internal assessment to be conducted on the basis of above three units. [15 Marks]

• **End Semester Examination: 20 Marks**

1. Practical Exercises: In the End Semester Examination, students have to answer the questions set from the above three units. [15 Marks]

2. Viva-voce based on laboratory notebook. [5 Marks]

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Programme: B.Sc.		Year: III		Semester: V	
Subject: Geography					
Course Name: Basic Field Training and Field Report					
Course Code: BSCGEOMJ503					
Course Type: Major (Practical)		Course Details: MJC-9		L-T-P: 0 - 2 - 6	
Course Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		60	---	40	---

**Course Objectives:**

- ✧ The course aims to provide hands-on experience and enhance understanding of geographical concepts through direct observation and data collection.
- ✧ Field training equips students with skills in data collection through the use of surveying instruments, sampling, interviewing, and finally, map-making.
- ✧ This course eventually helps the students develop field skills in geography and explore the physical and human components of a landscape and their linkages.
- ✧ Field training and reporting will enhance geographical thinking and develop research skills.

Learning Outcome:

- ✧ At the end of this course, it is expected that students will learn to conduct a range of surveys in both physical and human geography, which will allow assessment of the physical environment, existing socio-economic and demographic aspects of a region, and the understanding of how these attributes are linked.
- ✧ Students will be able to develop practical skills, enhance their understanding of real-world applications, and strengthen analytical abilities.
- ✧ Upon completing this course, students will prepare themselves for future research through the skills and experiences gained through field training and reporting.

Professional Skill Development:

- ✧ The acquired knowledge will foster both technical expertise and crucial soft skills.
- ✧ The obtained knowledge will provide problem-solving thinking, specific knowledge on techniques, or procedures, or tools to be used, thus enhancing proficiency in a particular area.
- ✧ Being powerful tools for professional skill development, field training and reporting will enable students to acquire both technical expertise and essential soft skills, preparing them for success in their chosen field.

Sub units	Topics to be covered	Lab work hours
Unit I: Field Training Basics [20 Hours]		
1.1	Concept of field training in geography; Selection of study site and objectives	5
1.2	Pre-field academic preparations; Field logistics and handling of emergencies; Post-field tabulation, processing and analysis of quantitative and qualitative data; Ethics of fieldwork	5
1.3	Field techniques and tools: observations (participant and non-participant, controlled and uncontrolled), questionnaires (open and closed, structured and non-structured), interview	5
1.4	Field techniques and tools: survey of study site using transects and quadrants, records through sketches, photos and videos	5
Unit II: Field Training Methods [30 Hours]		
2.1	Measurement and mapping of slope using Dumpy Level/ Abney Level	10
2.2	Measurement and mapping of geomorphic features and species diversity of an area; Analysis of water and its mapping: pH, TDS, salinity	10
2.3	Acquisition and mapping of landuse pattern by 'plot-to-plot' survey using cadastral map or of a municipal ward or of a Gram Panchayat	5



2.4	Acquisition and mapping of socio-economic data by 'door-to-door' household enumeration/ market survey using questionnaire/ interview schedule	5
Unit III: Field Report [40 Hours]		
3.1	Field report: meaning and importance; Benefits of field report	5
3.2	Basic principles of field work and approaches to the field study; Sequence of steps for the preparation of field report	5
3.3	Preparation of a field report: Each student will prepare a field report on problem-specific study based on primary data collected from field survey and secondary data collected from different sources	30
3.4	Preparation of a field report: Students will select either one rural area (mouza) or an urban area (municipal ward) for the study, with the primary objective of evaluating the relationship between physical and cultural landscape	

✧ Guidelines for Field Report:

Every student needs to participate in fieldwork and prepare a field report according to the following guidelines, failing which he/ she will not be evaluated.

The following methods are to be followed for fieldwork:

- All surveys should pertain to the objective of the study. Surveys not relevant for establishing the relation between physical and cultural landscape should be avoided.
- The field report, along with photographs, maps, and diagrams/ graphs should be prepared in a computer using MS Word for typing and MS Excel for calculation and graphs. It is preferred that remote sensing data be used in the field report. The maps should be prepared in QGIS environment. The cartographic and statistical techniques used in the field report should be at par with the syllabus of the UG Course.
- The report should be typed in English, printed on A4 size paper within 4,000 words, excluding tables, photographs, maps, diagrams, references and appendices. The font size is fixed at 12 in Times New Roman, and the line spacing is 1.5.
- All sections of the report should contain relevant maps, diagrams and photographs using primary and secondary data, clearly citing sources.

The field work and post-field work will include:

- (i) Collection of primary data on physical aspects (relief and soil) of the study area. Students should use survey instruments like prismatic compass, dumpy level, theodolite, Abney level, and clinometer wherever necessary.
- (ii) Collection of soil samples from different land cover land use regions of the study area for determining pH and NPK values with the help of a soil kit.



(iii) Collection of socio-economic data, at the household level (with the help of a questionnaire) in the selected study area. A filled-in questionnaire used in the survey should be attached with report, signed by the concerned teacher and the student.

(iv) Plot-to-plot land use survey for the preparation of a land use map, covering whole or part of the selected area.

(v) Visit to different organisations and departments for the collection of secondary data.

(vi) Any other survey relevant to the objective of the study.

✧ Course Evaluation:

• Continuous Assessment: 60 Marks

1. Practical records: An A4-size laboratory notebook, comprising class assignments of all practical topics (except 3.3 and 3.4), must be prepared and duly signed by the teacher. All texts are to be handwritten, and the exercises are to be drawn in pencil/ ink. [10 Marks]

2. Viva-voce based on laboratory notebook. [20 Marks]

3. Practical Exercises: Internal assessment to be conducted on the basis of Unit I and Unit II. Students have to answer the questions set from Unit I and Unit II. [30 Marks]

• End Semester Examination: 40 Marks

1. Practical Exercises: In the End Semester Examination, students have to answer the questions set from Unit II and Unit III. [10 Marks]

2. Field report [15 Marks] and Viva-voce [15 Marks] based on prepared field report.

✧ References

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Programme: B.Sc.	Year: III		Semester: V		
Discipline: Geography					
Course Name: Sustainable Resource Development					
Course Code: BSCGEOMN501					
Course Type: Minor (Theoretical)	Course Details: MNC-5		L-T-P: 4 - 1 - 0		
Course Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		---	30	---	70
Course Objectives: ✧ To emphasize the integration of ecological, economic, and social factors in natural resource management (NRM), moving beyond mere conservation to encompass broader NRM principles. ✧ To equip students from diverse academic backgrounds with the necessary skills and knowledge to effectively manage natural resources while considering ecological integrity, economic viability, and social equity.					

**Learning Outcome:**

- ✧ At the end of this course, it is expected that students will have detail extensive knowledge of different dimensions of sustainability and natural resource management.
- ✧ Students will be able to assess the issues and challenges of managing land, water, forest and energy resources.
- ✧ Students will be able to critically analyze the efforts and initiatives of the Governments in reducing the levels of poverty and inequality among the people of various countries.
- ✧ The students will be able to elaborate natural resource governance and policies.

Professional Skill Development:

- ✧ This knowledge will provide students with a wide range of competencies for collaborative interdisciplinary works with public agencies and NGOs.
- ✧ The students will become competent in sustainable policy making and plan formulation.

Sub units	Topics to be covered	No. of Lectures
Unit I: Natural Resources and Sustainable Development [30 Hours]		
1.1	Sustainable development: definition, concept, historical background, components and limitations	4
1.2	Types of natural resources: renewable and non-renewable resources, their importance, and utilization	3
1.3	Resource degradation and conservation: understanding the causes and consequences of resource degradation and the importance of conservation	4
1.4	Land resources: sustainable land management practices, soil health, and food security	4
1.5	Water resources: water scarcity, water quality, and sustainable water management; Wetland conservation and management	5
1.6	Energy resources: renewable and non-renewable energy sources, energy efficiency; Concept of energy audit	4
1.7	Forest resources: deforestation, reforestation, and joint forest management	3
1.8	Biodiversity: importance of biodiversity, conservation, and sustainable use of ecosystems	3
Unit II: Perspectives on Sustainable Resource Development [30 Hours]		
2.1	The millennium development goals: national strategies and international experiences	4
2.2	Sustainable development goals (SDGs): domain, targets, and conflicts	4
2.3	Sustainable resource management: sustainable consumption and production; Role of green technologies in sustainable development; Community-based resource management	4
2.4	Sustainable regional development: need and examples from different ecosystems	4
2.5	Indigenous knowledge system (IKS) for sustainable resource development; Nature-based solutions	3



2.6	Challenges of sustainable development: determinants, linkage among sustainable development, environment and poverty	3
2.7	Inclusive development: poverty and inequality, education, health; The role of higher education in sustainable resource development; The challenges of universal health coverage	4
2.8	Sustainable development policies and programmes: financing for sustainable development, principles of good governance, national environmental policy (2006), CDM	4

✧ Course Evaluation:

• Continuous Assessment: 30 Marks*

*[average of the obtained marks of two are to be made to calculate the final marks]

1. Seminar presentations: A powerpoint presentation to be conducted for internal assessment on the notified portions/ topics. [30 Marks]

2. Class test: There shall be test (s) of knowledge and understanding through written test on the notified portions/ topics (s). [30 Marks]

• End Semester Examination: 70 Marks

The end semester examination shall be conducted based on written test.

Question Pattern: Students have to answer Two questions carrying **10 marks** out of given **three** questions; Five questions carrying **5 marks** each out of given **eight** questions; Ten questions carrying **2 marks** each out of given **fourteen** questions; Five questions carrying **1 mark** each out of given **eight** questions.

✧ References

BOOKS:

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WEBSITES:

UNO Sustainable Development Knowledge Platform: sustainabledevelopment.un.org

The 17 Goals: Sustainable Development: <https://sdgs.un.org/goals>

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Programme: B.Sc.		Year: III		Semester: VI	
Subject: Geography					
Course Name: Geographical Thought					
Course Code: BSCGEOMJ601					
Course Type: Major (Theoretical + Practical)		Course Details: MJC-10		L-T-P: 3 - 0 - 4	
Course Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	15	20	35
Course Objectives: ✧ To impart a comprehensive understanding of the philosophical foundation of geography as a discipline, and build a strong base for academic research and professional practice in geography. ✧ To enable students to acquaint themselves with the philosophers of different schools of thought that contributed to developing geography as a branch of knowledge.					
Learning Outcome: ✧ Upon completion of this course, the students would have a comprehensive understanding of the historical development of geography, recognizing its evolution from ancient times to the modern era. ✧ Students will be skilled in employing spatial analysis by exploring quantitative revolution, positivist explanations, and logical reasoning in geography. ✧ They will be able to evaluate different geographical perspectives, including behavioural, humanistic, social relevance, and postmodernism, understanding their impact on the discipline's theories and methodologies. ✧ The students will have the power of critical thinking, which enhances research skills and prepares them for advanced studies.					
Professional Skill Development: ✧ The acquired knowledge will provide students to develop power of critical thinking and analytical skills, which enhance communication and problem-solving abilities for professional works in geography related fields. ✧ It will prepare them for careers in academia, research, policy-making, urban planning, environmental management, and other fields that require a deep understanding of geographical thought and its practical applications.					
BSCGEOMJ601 - Theory [50 Marks]					
Sub units	Topics to be covered				No. of Lectures
Unit I: Nature of Geography [25 Hours]					
1.1	Nature and scope of Geography; Development of Geography in the Ancient Period: contributions of Greek, Roman, and Indian geographers; Medieval Geography: 'Dark Age' in Europe and contributions of Arabian Scholars				8



1.2	Geography during the age of 'Discovery' and 'Exploration'; Transition from cosmography to scientific geography (contributions of Bernard Varenus and Immanuel Kant)	5
1.3	The emergence of scientific geography in the 19 th Century: contributions of Alexander von Humboldt and Carl Ritter; Schools of Geography - German, French, British, and American	7
1.4	Dualism in geography: General vs. Particular, Physical vs. Human, Regional vs. Systematic, Determinism vs. Possibilism, Ideographic vs. Nomothetic	5
Unit II: Geography in the 20th Century and Recent Trends [20 Hours]		
2.1	Trends of Geography during Post-War period: Positivism and Empiricism, Hartshorne-Schaefer debate, Quantitative revolution and paradigm shift in geography	5
2.2	Behavioural Geography; Marxist, Radicalist and Humanistic Geography	5
2.3	Welfare Geography; Geography of Gender; Critical Geography	5
2.4	Changing concept of space in geography; Postmodernism	5
BSCGEOMJ601 - Practical (Lab) [50 Marks]		
Sub units	Topics to be covered	Lab work hours
Unit I: Geographical Concepts, Ideas and their Applications [20 Hours]		
1.1	Changing perception of maps of the world: Ptolemy, Ibn Batuta, and Mercator; Mapping voyages: Columbus, Vasco da Gama, Magellan, and James Cook	10
1.2	Analysis of deterministic control of land plot through mouza map (charland, riverine mouzas) and Google map (sloping plateau fringe)	10
Unit II: Areal, Spatial and Environmental Analysis [20 Hours]		
2.1	Coding and decoding of land use and analysis of land character; Coding and decoding of social area analysis; Ecological footprint of terrain through transect chart	10
2.2	Association and dissociation of land use and its economic significance using Google map; Areal differentiation and spatial integration from toposheets; Analysis of behavioural matrix	10
Unit III: Contemporary Pedagogies and Research Frontiers [20 Hours]		
3.1	Group presentation of five to ten students on any selected paradigm in geographical thought by using poster	10
3.2	A book review within 1000 words to be chosen from Hartshorne (The Nature of Geography), Dickinson (The Makers of Modern Geography), Johnston and Sidaway (Geography and Geographers: Anglo-American human geography since 1945), and Atkinson (Cultural Geography: A Critical Dictionary of Key Concepts)	10

✧ Course Evaluation:



☉ BSCGEOMJ601 - Theory

- **Continuous Assessment: 15 Marks***

*[average of the obtained marks of two are to be made to calculate the final marks]

1. Seminar presentations: A powerpoint presentation to be conducted for internal assessment on the notified portions/ topics. [15 Marks]

2. Class test: There shall be test (s) of knowledge and understanding through written test on the notified portions/ topics (s). [15 Marks]

- **End Semester Examination: 35 Marks**

The end semester examination shall be conducted based on written test.

Question Pattern: Students have to answer One questions carrying **10 marks** out of given **two** questions; Two questions carrying **5 marks** each out of given **four** questions; Five questions carrying **2 marks** each out of given **eight** questions; Five questions carrying **1 mark** each out of given **eight** questions.

☉ BSCGEOMJ601 - Lab

- **Continuous Assessment: 30 Marks**

1. Practical records: An A4-size laboratory notebook, comprising class assignments of all practical topics (except 3.1), must be prepared and duly signed by the teacher. The exercises are to be drawn in pencil/ ink with photocopied representations of source materials where necessary. All texts are to be handwritten. [5 Marks]

2. Viva-voce based on laboratory notebook. [10 Marks]

3. Group Presentation: Internal assessment to be conducted on the basis of Unit 3.1. Posters related to Unit 3.1 should be of 59.4 × 84.1 cm size (A1), approximately. The technique of preparing posters can be manual, digital or blended. They should carry the signatures of teacher (s) responsible for supervising their preparation. [15 Marks]

- **End Semester Examination: 20 Marks**

1. Practical Exercises: In the End Semester Examination, students have to answer the questions set from the above three units. [15 Marks]

2. Viva-voce based on laboratory notebook. [5 Marks]

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Programme: B.Sc.		Year: III		Semester: VI	
Subject: Geography					
Course Name: Geography of India and West Bengal					
Course Code: BSCGEOMJ602					
Course Type: Major (Theoretical + Practical)		Course Details: MJC-11		L-T-P: 3 - 0 - 4	
Course Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	15	20	35
Course Objectives: ✧ This course aims to understand the regional geography of India and West Bengal. The main goal is to provide basic knowledge about the tectonic history, drainage evolution, seasonality of climate, agricultural and industrial development and their constraints. ✧ The course will provide some contemporary aspects related to Indian political scenario, including border dispute, threat to economy and India's leadership in the world.					
Learning Outcome: ✧ The learning outcome will bring conceptual clarity among the students on the physical, economic, demographic, social and political spheres of India and West Bengal. ✧ Students will be aware of the spatial dimensions of the different regions of the country and evaluate the plans and policies for sustainable regional development.					
Professional Skill Development: ✧ Several professional skills that students may develop after completing this course. Such skills will help the students in their future academic and professional careers.					
BSCGEOMJ602 - Theory [50 Marks]					



Sub units	Topics to be covered	No. of Lectures
Unit I: Geography of India [25 Hours]		
1.1	Structure and relief: triple tectonic divisions of India; Evolution of Himalayan drainage; Climatic extremes in India; Major soil groups and vegetation	7
1.2	Agro-ecological regions; Green revolution (Phase I and II); Mineral (Iron ore and Copper) and power (Coal, Petroleum) resources: distribution and utilization; Industrial development since independence; Role of SEZ in regional development	8
1.3	Population growth and distribution; Migration and literacy; Characteristics and recent trends of urbanization	4
1.4	Regionalization of India: physiographic (R.L. Singh), and economic (P. Sengupta); Regional cooperation: Indian federalism; Water dispute (national and international)	6
Unit II: Geography of West Bengal [20 Hours]		
2.1	Physical perspectives: physiographic divisions with special reference to <i>Western Plateau Fringe</i> and <i>Rarh</i> ; River systems and water resources	5
2.2	Changing pattern of agricultural and industrial development in West Bengal since independence; Problems related to development of SEZ	3
2.3	Population: growth, distribution and migration; Problems of infiltration; Human development patterns of West Bengal	5
2.4	Regional perspective and problems: Darjeeling hills, Asansol - Durgapur, and Sundarban; Regional Development Authority: Paschimanchal Unnayan Parshad and tribal development	7
BSCGEOMJ602 - Practical (Lab) [50 Marks]		
Sub units	Topics to be covered	Lab work hours
Unit I: Physical Aspects [20 Hours]		
1.1	Preparation of a geomorphological map (6 km × 6 km) from Survey of India RF 1:50k topographical map of a plateau region showing landforms and hydrological features there in	10
1.2	Computation of pluviometric coefficient and mapping of equipluves of ten selected stations in West Bengal, Analysis of rainfall variability by dispersion diagram	10
Unit II: Economic Aspects [20 Hours]		
2.1	Preparation of composite index (Kendall's method): Comparison of agricultural productivity of developed and less-developed states of India	10
2.2	Graphical representation of annual trends of production: mineral resources and industrial goods	10
Unit III: Population and Social Aspects [20 Hours]		



3.1	Identification of dominant and distinctive functions of towns of India	6
3.2	Concentration of urban population of West Bengal by location quotient; Change in mean centre of population of West Bengal over any three census years	14

✧ Course Evaluation:

☉ BSCGEOMJ602 - Theory

• Continuous Assessment: 15 Marks*

*[average of the obtained marks of two are to be made to calculate the final marks]

1. Seminar presentations: A powerpoint presentation to be conducted for internal assessment on the notified portions/ topics. [15 Marks]

2. Class test: There shall be test (s) of knowledge and understanding through written test on the notified portions/ topics (s). [15 Marks]

• End Semester Examination: 35 Marks

The end semester examination shall be conducted based on written test.

Question Pattern: Students have to answer One questions carrying **10 marks** out of given **two** questions; Two questions carrying **5 marks** each out of given **four** questions; Five questions carrying **2 marks** each out of given **eight** questions; Five questions carrying **1 mark** each out of given **eight** questions.

☉ BSCGEOMJ602 - Lab

• Continuous Assessment: 30 Marks

1. Practical records: An A4-size laboratory notebook, comprising class assignments of all practical topics must be prepared and duly signed by the teacher. The exercises are to be drawn in pencil with photocopied representations of source materials where necessary. All texts are to be handwritten. [5 Marks]

2. Viva-voce based on laboratory notebook. [10 Marks]

3. Practical Exercises: Internal assessment to be conducted on the basis of above three units. [15 Marks]

• End Semester Examination: 20 Marks

1. Practical Exercises: In the End Semester Examination, students have to answer the questions set from the above three units. [15 Marks]



2. Viva-voce based on laboratory notebook. [5 Marks]

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National Bureau of Soil Survey and Land Use Planning: nbsslup.in

Indian Council of Agricultural Research: icar.org.in

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https://en.wikipedia.org/wiki/List_of_Indian_states_and_union_territories_by_GDP_per_capita

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India Meteorological Department: <https://mausam.imd.gov.in>

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West Bengal District Statistical Handbooks:

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Programme: B.Sc.	Year: III		Semester: VI		
Subject: Geography					
Course Name: Population and Settlement Geography					
Course Code: BSCGEOMJ603					
Course Type: Major (Theoretical + Practical)	Course Details: MJC-12		L-T-P: 3 - 0 - 4		
Course Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	15	20	35

**Course Objectives:**

- ✧ To inculcate fundamental knowledge about population and settlement geography, and to introduce students to how the differential characteristics of populations and settlements influence the overall development process of an area.
- ✧ To introduce various contemporary and applied aspects of population and settlement geography.

Learning Outcome:

- ✧ At the end of this course, it is expected that students will be able to develop ideas about spatio-temporal changes in the characteristics of population and settlement and the factors associated with them.
- ✧ The students will be skilled in analyzing population dynamics and its different measures, and also in employing modern techniques to discern types and patterns of settlement.

Professional Skill Development:

- ✧ This knowledge will provide students with a wide range of professional skills applicable in various fields, and can prepare them for careers in population science, urban planning, public policy, community development, international development, and social research.

BSCGEOMJ603 - Theory [50 Marks]

Sub units	Topics to be covered	No. of Lectures
Unit I: Population Geography [25 Hours]		
1.1	Population Geography: nature, scope, content and development, its relationship with Demography; Sources of population data, their level of reliability and problems of mapping	4
1.2	Population density and growth; Population growth theories (Marx and Doubleday); Population quality: literacy, occupation, and health; Population composition (age-sex, occupational structure); Concepts of cohort and life table	8
1.3	Determinants of population dynamics: fertility, mortality and migration; Determinants and measures of fertility and mortality; Migration: theories (Ravenstein and Lee), types, causes, and consequences	7
1.4	Review of population policies: Sweden, China, and India; Ageing of population and demographic dividend: trends and patterns in developed and developing countries	6
Unit II: Settlement Geography [20 Hours]		
2.1	Settlement Geography: nature, scope, content, and development; Dichotomy of settlement: rural and urban; Rural settlement: definition, nature and characteristics	4
2.2	Rural settlements: morphology and segregation (Indian context), classification; Function of village and environment relationship; Geographies of ruralization; Rural hollowing	5
2.3	Urban settlement: census definition (temporal) and categories in India, urban agglomeration; Urban sprawl, Types of urbanized regions: conurbation, metropolis, megalopolis	5
2.4	Rural-urban linkages in a metropolitan system in India; Concepts of rural-urban continuum, rural and periurban; Settlement hierarchy: central place theory, rank-size rule, primate city	6



BSCGEOMJ603 - Practical (Lab) [50 Marks]		
Sub units	Topics to be covered	Lab work hours
Unit I: Population Characteristics [25 Hours]		
1.1	Construction and interpretation of age-sex pyramid; Measures of fertility (CBR, ASFR, TFR, GRR, NRR), mortality (CDR, ASDR, IMR) and population quality (literacy rate and dependency ratio)	15
1.2	Calculation of life table and intercensal migration rates from census data; Representation of population migration using flow chart; Population projection by arithmetic method	10
Unit II: Spatio-Temporal Dynamics of Population Growth [15 Hours]		
2.1	Measuring arithmetic growth rate of population; Absolute growth rate using linear regression	5
2.2	Relative growth rate of population: system component analysis; Population packing technique	10
Unit III: Analytical Techniques in Settlement Geography [20 Hours]		
3.1	Identification of types of rural settlements using concentration index (Bernard's method (1931)); Identification of rural service centres on the basis of score of functions	10
3.2	Mapping sphere of influence (breaking point analysis); Ternary diagram showing functional classification of towns (after Ashok Mitra); Rank-size rule with settlement data (G.K. Zipf)	10

✧ Course Evaluation:

🕒 BSCGEOMJ603 - Theory

• Continuous Assessment: 15 Marks*

*[average of the obtained marks of two are to be made to calculate the final marks]

1. Seminar presentations: A powerpoint presentation to be conducted for internal assessment on the notified portions/ topics. [15 Marks]

2. Class test: There shall be test (s) of knowledge and understanding through written test on the notified portions/ topics (s). [15 Marks]

• End Semester Examination: 35 Marks

The end semester examination shall be conducted based on written test.

Question Pattern: Students have to answer One questions carrying **10 marks** out of given **two** questions; Two questions carrying **5 marks** each out of given **four** questions; Five questions carrying **2 marks** each out of given **eight** questions; Five questions carrying **1 mark** each out of given **eight** questions.



☉ **BSCGEOMJ603 - Lab**

• **Continuous Assessment: 30 Marks**

1. Practical records: An A4-size laboratory notebook, comprising class assignments of all practical topics must be prepared and duly signed by the teacher. Census of India data are to be used where applicable. The exercises are to be drawn in pencil/ ink with photocopied representation of source materials where necessary. All texts are to be handwritten. [5 Marks]

2. Viva-voce based on laboratory notebook. [10 Marks]

3. Practical Exercises: Internal assessment to be conducted on the basis of above three units. [15 Marks]

• **End Semester Examination: 20 Marks**

1. Practical Exercises: In the End Semester Examination, students have to answer the questions set from the above three units. [15 Marks]

2. Viva-voce based on laboratory notebook. [5 Marks]

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Association of Population Geographers of India: <https://apgin.org/>

Census of India: <https://censusindia.gov.in/census.website/data/census-tables>

Civil Registration System: <https://dc.crsorgi.gov.in/crs/>

Directorate of Census Operations, West Bengal: <https://westbengal.census.gov.in/>

Government of India Data Platform: <https://www.data.gov.in/>

International Institute for Population Sciences: <https://www.iipsindia.ac.in/>

Ministry of Statistics and Programme Implementation (GoI): <https://www.mospi.gov.in/>

Socio-Economic Statistics India: <https://www.indiastat.com/>

Population Council: <https://www.popcouncil.org/>

Population Reference Bureau: www.prb.org

The World Bank: www.worldbank.org

United Nations Development Program: <http://hdr.undp.org/en>



Programme: B.Sc.		Year: III		Semester: VI	
Discipline: Geography					
Course Name: Advanced Remote Sensing and GIS					
Course Code: BSCGEOMJ604					
Course Type: Major (Theoretical + Practical)		Course Details: MJC-13		L-T-P: 3 - 0 - 4	
Course Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	15	20	35
Course Objectives: ✧ This course introduces the students to advanced remote sensing and GIS concepts and imparts necessary skills in digital image processing and advanced geoprocessing techniques. ✧ To impart basics of thermal, microwave and hyperspectral remote sensing, and advanced GIS and spatial analysis. ✧ To provide a firm conceptual and technical understanding of DEM analysis.					
Learning Outcome: ✧ At the end of this course, it is expected that students will be able to handle large geospatial datasets, their analysis, information extraction and mapping, and three-dimensional modelling of terrain. ✧ Students will be able to acquire knowledge on spatial data editing with interpolation, modelling and functions. ✧ Students will gain knowledge on the concept of Web GIS, Mobile GIS, and location based services.					
Professional Skill Development: ✧ The imparted skills are directly related to facets of India's space programme and geospatial industry, with students able to advance into these domains and undertake further training and employment. ✧ This knowledge will provide students with a wide range of professional skills applicable to various fields.					
BSCGEOMJ604 - Theory [50 Marks]					
Sub units	Topics to be covered				No. of Lectures
Unit I: Advanced Remote Sensing [25 Hours]					
1.1	Digital Image Processing (DIP): concept of digital image, digital data formats, software and hardware requirements for DIP; Data loading; Image restoration, reduction and magnification				5
1.2	Geometric and radiometric corrections; spectral enhancement (Band Ratioing, RGB Transformations, PCA, Image fusion), spatial enhancement (filtering techniques) and radiometric enhancement (contrast stretching)				8
1.3	Image classification: unsupervised (Isodata and K-Mean) and supervised (minimum distance to mean, parallelepiped, maximum likelihood); Accuracy assessment				6
1.4	Concept, characteristics and working principles of thermal and microwave remote sensing; Basic ideas and applications of hyperspectral and LiDAR remote sensing				6



Unit II: Advanced GIS [20 Hours]		
2.1	Concept and types of geodatabase; Characteristics and applicability of advanced geoprocessing techniques: query building, field calculator, and geometry calculation	6
2.2	Spatial data editing: detecting and correcting errors, re-projection, transformation and generalization, edge matching and rubber sheeting, topology	4
2.3	Network analysis; Surface analysis (spatial interpolation); Concept of Web GIS, Mobile GIS, and location based services	5
2.4	Digital Elevation Models (DEMs): concept and application, attributes of DSM and DTM, DEM preparation methods and accuracy; Different DEM datasets, their resolution and repositories	5
BSCGEOMJ604 - Practical (Lab) [50 Marks]		
Sub units	Topics to be covered	Lab work hours
Unit I: Advanced Remote Sensing [20 Hours]		
1.1	Image enhancement techniques: band rationing, PCA, spatial filtering, contrast enhancement, grey scale thresholding; LULC change detection studies using supervised classification	10
1.2	NDVI and NDWI based mapping using Landsat and Sentinel images; Land surface temperature estimation from Landsat thermal band	10
Unit II: Advanced GIS [20 Hours]		
2.1	Query building: variable based, field calculator, geometry calculation and map layout preparation; Buffer demarcation for point, segment and polygon layers	12
2.2	Spatial interpolation: IDW and Kriging	8
Unit III: DEM Generation and Surface Analysis [20 Hours]		
3.1	Mapping of primary terrain attributes from DEM: contour, slope, curvature, aspects, hillshade	10
3.2	Extraction of drainage network and catchment demarcation from DEM; Representation of morphometric aspects: stream ordering, drainage density, relative relief	10

✧ Course Evaluation:

🕒 BSCGEOMJ604 - Theory

• Continuous Assessment: 15 Marks*

*[average of the obtained marks of two are to be made to calculate the final marks]

1. Seminar presentations: A powerpoint presentation to be conducted for internal assessment on the notified portions/ topics. [15 Marks]



2. Class test: There shall be test (s) of knowledge and understanding through written test on the notified portions/ topics (s). [15 Marks]

• **End Semester Examination: 35 Marks**

The end semester examination shall be conducted based on written test.

Question Pattern: Students have to answer One questions carrying **10 marks** out of given **two** questions; Two questions carrying **5 marks** each out of given **four** questions; Five questions carrying **2 marks** each out of given **eight** questions; Five questions carrying **1 mark** each out of given **eight** questions.

🕒 **BSCGEOMJ604 - Lab**

• **Continuous Assessment: 30 Marks**

1. Practical records: An A4-size laboratory notebook, comprising class assignments of all practical topics must be prepared and duly signed by the teacher. The exercises on satellite images, DEMs and other geospatial datasets are to be represented from **QGIS** software as applicable. Methods and interpretations are to be handwritten. [5 Marks]

2. Viva-voce based on laboratory notebook. [10 Marks]

3. Practical Exercises: Internal assessment to be conducted on the basis of above three units. [15 Marks]

• **End Semester Examination: 20 Marks**

1. Practical Exercises: In the End Semester Examination, students have to answer the questions set from the above three units. [15 Marks]

2. Viva-voce based on laboratory notebook. [5 Marks]

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WEBSITES:

- Alaska Satellite Facility - Distributed Active Archive Center: <https://search.asf.alaska.edu/#/>
- Copernicus Data Space Ecosystem: <https://dataspace.copernicus.eu/>
- Geospatial World: <https://www.geospatialworld.net/>
- ISRO Bhuvan 2D and 3D Platforms:
<https://bhuvan-app1.nrsc.gov.in/bhuvan2d/bhuvan/bhuvan2d.php>
<https://bhuvan-app1.nrsc.gov.in/globe/3d.php>
- NASA Earthdata: <https://search.earthdata.nasa.gov/search/>
- National Remote Sensing Centre Bhoonidhi: <https://bhoonidhi.nrsc.gov.in/bhoonidhi/home.html>
- QGIS: <https://www.qgis.org/>
- USGS EarthExplorer: <https://earthexplorer.usgs.gov/>

Programme: B.Sc.		Year: III		Semester: VI	
Discipline: Geography					
Course Name: Summer Internship					
Course Code: SI601					
Course Type: SI (Practical)		Course Details: SIMC-1		L-T-P: 0 - 0 - 4	
Course Credit: 2	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	---	20	---
Course Overview: An internship in GEOGRAPHY is gaining first-hand experience by students besides comprehending the way of working in an organisation, leading to improvement of the skill/ aptitude needed to tackle real-world spatial challenges and building research capabilities with learning opportunities.					
Course Objectives: Following are the intended objectives of engaging undergraduate students with major course as GEOGRAPHY in internship for employability and research internship programmes: (i) Integration of workshop with workplace; (ii) Understanding of the world of work; (iii) Physical and hybrid model learning; (iv) Developing research aptitude; (v) Exposure in emerging technologies; (vi) Enhance entrepreneurial capabilities; (vii) Development of decision-making and teamwork skills; (viii) Cultivate a sense of Social Imagery and Citizenship Responsibility; (ix) Stimulate collaborative influence; and (x) Enhancing professional competency.					
Learning Outcome: ✧ Students shall get an excellent opportunity to see how the theoretical aspects learned in classes are integrated into the practical world. On-floor experience during the internship provides much more professional experience, often worth more than classroom teaching. ✧ The students will learn various soft skills such as time management, positive attitude and communication skills while performing the tasks assigned in the internship organisation.					
Professional Skill Development: ✧ The obtained knowledge is vital to test the theoretical learning in practical situations by accomplishing the tasks assigned during the internship. ✧ This knowledge will help to develop essential soft skills like time management, organisation, adaptability, problem-solving, and teamwork.					
	Internship Categories (students can opt any one)				60 hrs
I. Conventional					
In conventional/ traditional internships, interns may work on specific projects or tasks in an organisation/ research institute/ science laboratory/ parent university .					

Suggested Domains and Internship Tasks		
Domain	Internship Task	Example Organisation/ Research Institute/ Science Laboratory
Geomorphology and Soil Geography	Engineering geomorphology, river hydrology and hydraulics, coastal zone management, polar science and cryosphere studies, soil survey and resource mapping	GSI (Kolkata), River Research Institute (West Bengal), IESWM (Kolkata), NCPOR, ICAR-NBSS&LUP
Climate and Water Studies	Hydrometeorological analysis, WASH analysis, climate perception survey, water quality mapping	IMD-RMC (Kolkata), CGWB, UNICEF Projects, ATREE, NITI Aayog
Urban and Regional Planning	Land use survey, urban mapping, Smart Cities project evaluation	Town & Country Planning Dept., Municipal Corporations, Ministry of Housing and Urban Affairs (TULIP)
Environment and Disaster Management	Hazard mapping, risk analysis, community surveys	WBPCB, NDMA, SDMA, NGOs (e.g., WWF, SEEDS), UNDP Projects
Geospatial Technologies	GIS/ RS-based mapping, spatial analysis	NRSC, ISRO, Space Applications Centre, NRSC-RRSC, NIC, ESRI India, District NRDMS Centre, Remote Sensing Labs
Rural and Agricultural Studies	Agricultural survey, watershed management, land capability studies	Krishi Vigyan Kendras, ICAR, NABARD
Tourism and Cultural Geography	Tourist satisfaction survey, heritage site mapping	Tourism Dept., INTACH, District Tourism Offices
Social and Economic Geography	Household surveys, migration studies, livelihood mapping	NSSO, CSO, Local Government Offices
Transport & Infrastructure	Accessibility analysis, transport flow mapping	Transport Dept., Metro Rail, Urban Development Authorities
	Students may be offered a course/ project related to their curriculum by the mentors. The content of the course or outline of the project will be designed by the respective mentor.	
	After completion of the course, the respective mentor will issue a completion certificate along with his/ her opinion about the merit of the course.	
II. Community Engagement Programme		
Interns may work on specific projects with NCC/ NSS/ Local Clubs/ NGOs/ Local Administration.		

1.	Linking learning with community service: Students can conduct water and soil testing in and around waste disposal sites and coal mining areas and share the results with the local community. Students can also perform surveying and prepare plans for any agriculture field/ plot using chain survey and share the results with the land owner.
2.	Linking research with community knowledge: Students can undertake research in partnership with the community/ Local Administration/ NGOs on land subsidence, pollution, solid and liquid waste disposal, biodiversity count/ register, vulnerability assessment of a community (industrial workers, BPL people, racial or ethnic minorities, migrant workers, etc.), identification of areas of concern and remediation.
3.	Knowledge sharing and knowledge mobilisation: Students can undertake a survey for cleanliness, hygiene and sanitation with the community/ local administration/ NGOs and educate them about hygiene and nutrition.

III. Field-based Learning

Interns may undertake **a field-based learning** in collaboration with local industry, government and private organisations, and business organisations to enhance employability. Interns will be provided opportunities to actively engage in on-site learning and hands-on training to work on research tools, techniques, methodologies, equipment, policy framework and other aspects for enhancing employability.

1.	Interns may learn data generation techniques through handling equipment (e.g. hydrological instruments, soil testing equipment, water quality testing equipment, meteorological instruments, and modern surveying instruments) in government or private organisations.
2.	Interns may visit Geospatial Companies and conduct a short research project on the topic of advanced learning that would be effective for their future careers, like learning of application-based software (RS and GIS domain-specific), or programming language.
3.	Interns may visit Micro, Small, and Medium Enterprises (MSMEs) in Paschim Bardhaman district and conduct a short research project on environmental management strategies.
4.	Students may visit government or private organisations to gain valuable exposure of data management (e.g. demographic data management) and analytics, and prepare a short report.

✧ Summary Guidelines:

- **Title:** Internship Assessment through Projects (Group Internship is allowed)
- **Duration:** 60 hours (may be undertaken at any time during the 2nd/ 4th/ 6th Semester)
- **Nature of Internship Project:** Inter-Institutional Activities/ Activities with NCC/ NSS, or Industrial/ Research Organisations/ Soft-skill/ Professional Skill/ Technological Skill providing Institutes/ NGO/ MSME/ Local Club/ Rural Internship/ Innovation/ Local Administration/ Science Laboratory
- After the completion of the Internship Programme, the student will submit a report with relevant photographs as part of the report, inclusive of an **Attendance Document** and an **Authenticated Certificate** jointly signed by the **Supervisor/ Mentor** and the **Head of the Institution/ Head of the Department** (in case of University)/ **Laboratory in-charge/ Principal** (in case of college).

- **Internship Programme** will be fully organised, executed and monitored by the **R&D Cell** of the institution through a **Nodal Officer** to be appointed by the **Head of the Institution/ Principal**. The nodal officer may reach out to HEIs, research organisations, science laboratories, corporates, industry, NGOs etc., and moreover to local administrative offices like Deputy Commissioners and heads of certain government offices like labour, municipal, hospital, tourism, public relations, finance, agriculture, social welfare, etc. to seek the opportunity of an internship for the institution. **The nodal officer will ensure the registration of students, internship supervisors, mentors and internship providing organisation in the portal.**

- An institution must nominate an **Internship Supervisor** at the start of the academic year for each batch. The Internship Supervisor from the host institute should monitor the regularity of the intern at his/ her workplace. Students should preferably inform the Internship Supervisor at least one day prior to availing leave during the internship except for emergencies.

- A **mentor** will be identified for **Conventional Internship/ Field-based Learning** by the nodal officer or by students himself/ herself through their network. The mentor should be identified, and his/ her concurrence should be conveyed to the internship supervisor. He/ she will be providing professional/ research guidance to the student during the internship. The mentors will also facilitate networking with other subject matter experts/ professionals, which will enhance the internship experience and learning of the intern.

- Students can opt for activities from the list of Internships for enhancing the employability and/ or developing the research aptitude.

✧ Course Evaluation:

- On completion of the **Summer Internship Programme**, the students will submit a report with relevant photographs as part of the report, inclusive of an **Attendance Document** and an **Authenticated Certificate** jointly signed by the **Supervisor/ Mentor** and the **Head of the Institution/ Head of the Department** (in case of University)/ **Laboratory in-charge/ Principal** (in case of college).

- The report is to be signed by the **Supervisor/ Mentor** with **official seal**.

- **Continuous Assessment: 30 Marks**

1. Attendance: An attendance document to be submitted for internal assessment. **[15 Marks]**

2. Evaluation of Report: There shall be an evaluation of the report by the Internship Mentor/ Supervisor. **[15 Marks]**

- **End Semester Examination: 20 Marks**

At the end of the semester, a viva-voce will be conducted by the department, including HoD, Supervisor, Mentor and one External Examiner/ Expert appointed from the University to assess the report and knowledge gathered by the students.

Marks Pattern: Format of presentation and the quality of the intern's report: 10; Viva voce: 10



Programme: B.Sc.		Year: IV		Semester: VII	
Subject: Geography					
Course Name: Geomorphology					
Course Code: BSCGEOMJ701					
Course Type: Major (Theoretical + Practical)		Course Details: MJC-14		L-T-P: 3 - 0 - 4	
Course Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	15	20	35
Course Objectives: ✧ This course is designed to instill knowledge on fundamental concepts, theories, and contemporary approaches in Geomorphology. ✧ To acquaint students with examining geomorphic processes responsible for landscape evolution and landform development. ✧ To impart necessary knowledge and skills in quantitative analysis of topographic and fluvial characteristics. ✧ To improve knowledge on the application of geomorphological techniques, including RS-GIS, in mapping, hazard assessment, and environmental management.					
Learning Outcome: After completing the course, students will be able to: ✧ Explain major geomorphological concepts, theories, and recent developments in the discipline. ✧ Analyze weathering, denudation, fluvial, coastal, tectonic, and anthropogenic geomorphic processes and landforms. ✧ Perform quantitative geomorphic analyses using field measurements, topographic maps, and geomorphic indices. ✧ Apply geomorphological mapping and RS-GIS techniques for landscape interpretation and hazard assessment.					
Professional Skill Development: ✧ Students will be skilled in geomorphological field surveys, data collection, and quantitative terrain analysis. ✧ The acquired knowledge is beneficial for students to apply RS-GIS and geomorphic mapping techniques for environmental assessment and hazard management.					
BSCGEOMJ701 - Theory [50 Marks]					
Sub units	Topics to be covered				No. of Lectures
Unit I: Geomorphology: Concepts, Approaches and Processes [25 Hours]					
1.1	Evolution of geomorphological thought and changing paradigms; Progress of geomorphological research in India; System approach in Geomorphology				6
1.2	New perspectives of Geomorphology: Quantitative and Experimental, Ecogeomorphology, Quaternary Geomorphology, Anthropogeomorphology, Urban Geomorphology				5



1.3	Deep weathering - factors, profiles and resultant products; Denudation processes - mechanism and controls; Morphogenetic regions - concept, processes and Peltier's model	7
1.4	Hill slope processes - types, slope recession, slope development models (King, Wood and Young); Models of channel initiation and network development; Forms of valley development	7
Unit II: Geomorphology: Processes and Applications [20 Hours]		
2.1	River hydraulics - flow, energy and hydraulic geometry; Channel geometry and the concept of grade; Factors regulating entrainment, transportation and deposition of sediments; River channel changes through time	5
2.2	Tectonic Geomorphology - principles, geomorphic markers, rates of uplift and erosion, isostatic relations; Anthropogeomorphology - geomorphic impacts of human activities	6
2.3	Coastal morphodynamic variables and their influence on evolution of coastal forms; Periglacial processes and landforms	5
2.4	Applied Geomorphology - Feasibility assessment of engineering and industrial projects, geomorphic approaches to hazard studies and management of geomorphic hazards	4
BSCGEOMJ701 - Practical (Lab) [50 Marks]		
Sub units	Topics to be covered	Lab work hours
Unit I: Quantification and Interpretation of Topographic Characteristics [20 Hours]		
1.1	Measurement of slope profiles with Abney Level and interpretation; Construction of hypsometric curve and derivation of hypsometric integer	10
1.2	Analysis of tectonic activity from SOI 1:50k topographical maps: basin asymmetry factor, transverse topographic symmetry factor, Hack's semi-logarithmic profile and SL index	10
Unit II: Quantification and Interpretation of Fluvial Processes [20 Hours]		
2.1	Determination of channel sinuosity index and braiding index of rivers from SOI 1:50k topographical maps; Estimation of flow velocity using Manning's equation	10
2.2	Calculation of hydraulic geometry equations from field data; Estimation of unit stream power and shear stress; Analyses of pebbles and sediments: shape indices, textural analysis by sieving	10
Unit III: Mapping Techniques in Geomorphology [20 Hours]		
3.1	Analysis and interpretation of geological maps - faulted structure; Interpretation of geological maps of India (Scale: 1:250k); Geomorphic mapping using field observations and Bhuvan data	10
3.2	RS - GIS application in Geomorphology - overlay of maps and images of different time periods to detect channel shifting, flood hazard mapping	10

✧ Course Evaluation:

🕒 BSCGEOMJ701 - Theory

• Continuous Assessment: 15 Marks*



*[average of the obtained marks of two are to be made to calculate the final marks]

1. Seminar presentations: A powerpoint presentation to be conducted for internal assessment on the notified portions/ topics. [15 Marks]

2. Class test: There shall be test (s) of knowledge and understanding through written test on the notified portions/ topics (s). [15 Marks]

● **End Semester Examination: 35 Marks**

The end semester examination shall be conducted based on written test.

Question Pattern: Students have to answer One questions carrying **10 marks** out of given **two** questions; Two questions carrying **5 marks** each out of given **four** questions; Five questions carrying **2 marks** each out of given **eight** questions; Five questions carrying **1 mark** each out of given **eight** questions.

⦿ BSCGEOMJ701 - Lab

● **Continuous Assessment: 30 Marks**

1. Practical records: An A4-size laboratory notebook, comprising class assignments of all practical topics, must be prepared and duly signed by the teacher. The exercises for **Units 3.1 (geomorphic mapping)** and **3.2** are to be completed in **QGIS**, as applicable. Other exercises are to be drawn in pencil/ ink with photocopied representations of source materials where necessary. Methods and interpretations are to be handwritten. [5 Marks]

2. Viva-voce based on laboratory notebook. [10 Marks]

3. Practical Exercises: Internal assessment to be conducted on the basis of above three units. [15 Marks]

● **End Semester Examination: 20 Marks**

1. Practical Exercises: In the End Semester Examination, students have to answer the questions set from the above three units. [15 Marks]

2. Viva-voce based on laboratory notebook. [5 Marks]

✧ References

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- Central Water Commission: <https://cwc.gov.in/>
- Dartmouth Flood Observatory: <https://floodobservatory.colorado.edu/>
- Geological Society of India: <https://www.geosocindia.org/>
- Geological Survey of India: <https://www.gsi.gov.in/>
- Geomorphology Specialty Group, American Association of Geographers: <https://aag-gsg.org/>
- India Water Resources Information System: <https://indiawris.gov.in/>
- Indian Institute of Geomorphologists (IGI): <https://indiageomorph.org/>
- International Association of Geomorphologists (IAG): <http://www.geomorph.org/>
- ISRO Bhuvan 2D Platform: <https://bhuvan.nrsc.gov.in/home/index.php>
- National Remote Sensing Centre: <https://www.nrsc.gov.in/>
- Sol Onlinemaps Portal: <https://onlinemaps.surveyofindia.gov.in/>
- Sol, National Survey and Mapping Organization: <https://indiamaps.gov.in/login>
- Survey of India (Sol): <https://surveyofindia.gov.in/>
- The Basics of Geomorphology | Online Resources: <https://study.sagepub.com/gregoryandlewin>



Programme: B.Sc.		Year: IV		Semester: VII	
Subject: Geography					
Course Name: Hydrology and Oceanography					
Course Code: BSCGEOMJ702					
Course Type: Major (Theoretical + Practical)		Course Details: MJC-15		L-T-P: 3 - 0 - 4	
Course Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	15	20	35
Course Objectives: ✧ To introduce students to the fundamental concepts, processes, and components of Hydrology and Oceanography and their significance in the Earth system. ✧ To develop an understanding of surface water, groundwater, and marine systems in relation to environmental sustainability and resource management. ✧ The course equips students with the knowledge and skills required for hydrological and oceanographic data collection, analysis, and interpretation. ✧ To foster awareness of sustainable water-resource utilization, watershed management, and coastal environmental conservation.					
Learning Outcome: ✧ At the end of this course, it is expected that students will be able to apply hydrological concepts, techniques, and instruments for the measurement, analysis, and interpretation of various hydrological parameters. ✧ Students will be able to learn the fundamental concepts of Physical Oceanography, including the origin of major ocean-floor features, the properties of ocean water, and the dynamics of oceanic circulation. ✧ Students will be able to understand and explain the causes, impacts, and environmental implications of marine issues and hazards, with particular emphasis on coastal environments.					
Professional Skill Development: ✧ This course equips students with practical skills in hydrological measurements, hydrological and oceanographic data analysis, and the interpretation and preparation of environmental and bathymetric maps. ✧ The knowledge gained through this course strengthens students' analytical and quantitative abilities, enabling them to address water-resource and coastal-management challenges through informed problem-solving and decision-making.					
BSCGEOMJ702 - Theory [50 Marks]					
Sub units	Topics to be covered				No. of Lectures
Unit I: Hydrology [25 Hours]					
1.1	Hydrology - scope and content; Hydrosphere - components and distribution; Significance of global hydrological cycle with special reference to global storage and transportation of heat; Concept of water budget				7



1.2	Runoff - factors, components and cycle; Interception, depression storage, infiltration and evapotranspiration; Drainage basin as a hydrological unit; Inter-basin water transfer	6
1.3	Occurrence and storage of groundwater; Water table and piezometric surface; Factors controlling recharge, discharge and movement of groundwater; Aquifer - properties and types	7
1.4	Principles of water harvesting and watershed management; Water resource - crisis, conflict and management; Indigenous Knowledge Systems of Water Management in India	5
Unit II: Oceanography [20 Hours]		
2.1	Major relief features of the ocean floor - characteristics and origin according to plate tectonics; Properties of ocean water and their spatial variations (temperature, salinity and density); T-S diagram; Residence times of elements in sea water	7
2.2	Ocean water: waves and tides; Major water masses of the world's oceans; Thermohaline circulation and the oceanic conveyor belt	5
2.3	Ocean deposits - types, formation, and importance; Coral Reefs - formation, classification and threats; Coastal habitats - estuaries, lagoons, salt marshes, mangrove swamps	4
2.4	Sea level change - types, causes and implications; Marine resources - classification and sustainable utilization; Marine pollution - causes, types and mitigation	4
BSCGEOMJ702 - Practical (Lab) [50 Marks]		
Sub units	Topics to be covered	Lab work hours
Unit I: Pure Hydrology [20 Hours]		
1.1	Computation of discharge (area-velocity method) and suspended sediment concentration (gravimetric analysis) from collected data; Preparation of a list of secondary data sources for surface water (GDSQ) and groundwater (level and resources)	12
1.2	Construction of Thiessen polygon from precipitation data; Derivation of infiltration indices: ϕ -index (phi index) and w-index; Preparation of water budget graph	8
Unit II: Applied Hydrology [20 Hours]		
2.1	Construction and interpretation of rating curves; Construction and interpretation of hydrographs and unit hydrographs	8
2.2	Runoff estimation: curve number method; Computation of runoff coefficient; Preparation and interpretation of flow duration curves	12
Unit III: Oceanography [20 Hours]		
3.1	Signs and symbols in hydrographic charts and reading of hydrographic charts; Reading of bathymetric charts; Plotting of bathymetric curves	8
3.2	Preparation and interpretation of bathymetric maps using gridded bathymetry data; Preparation of T-S diagram; Mean monthly and annual sea level trends using linear regression	12



✧ Course Evaluation:

🕒 **BSCGEOMJ702 - Theory**

• **Continuous Assessment: 15 Marks***

*[average of the obtained marks of two are to be made to calculate the final marks]

1. Seminar presentations: A powerpoint presentation to be conducted for internal assessment on the notified portions/ topics. [15 Marks]

2. Class test: There shall be test (s) of knowledge and understanding through written test on the notified portions/ topics (s). [15 Marks]

• **End Semester Examination: 35 Marks**

The end semester examination shall be conducted based on written test.

Question Pattern: Students have to answer One questions carrying **10 marks** out of given **two** questions; Two questions carrying **5 marks** each out of given **four** questions; Five questions carrying **2 marks** each out of given **eight** questions; Five questions carrying **1 mark** each out of given **eight** questions.

🕒 **BSCGEOMJ702 - Lab**

• **Continuous Assessment: 30 Marks**

1. Practical records: An A4-size laboratory notebook, comprising class assignments of all practical topics, must be prepared and duly signed by the teacher. The exercises for **Unit 3.2 (bathymetric maps using gridded bathymetry data)** are to be completed in **QGIS**, as applicable. Other exercises are to be drawn in pencil/ ink with photocopied representations of source materials where necessary. Methods and interpretations are to be handwritten. [5 Marks]

2. Viva-voce based on laboratory notebook. [10 Marks]

3. Practical Exercises: Internal assessment to be conducted on the basis of above three units. [15 Marks]

• **End Semester Examination: 20 Marks**

1. Practical Exercises: In the End Semester Examination, students have to answer the questions set from the above three units. [15 Marks]

2. Viva-voce based on laboratory notebook. [5 Marks]

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UN Atlas of the Oceans: <http://www.oceansatlas.org/>

Water Resources Information System (WRIS): <https://indiawriss.gov.in/wris/#/>



Programme: B.Sc.		Year: IV		Semester: VII	
Subject: Geography					
Course Name: Urban and Regional Planning					
Course Code: BSCGEOMJ703					
Course Type: Major (Theoretical + Practical)		Course Details: MJC-16		L-T-P: 3 - 0 - 4	
Course Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	15	20	35
Course Objectives: ✧ This course is designed to instill knowledge of fundamental ideas of urbanization and regional planning, including the evolution of the subject matter and theories. ✧ To acquaint students with the implications of different analytical techniques for urban geography and regional planning studies. ✧ To impart knowledge on the emerging issues of urban areas and regional development to develop an understanding of the changing city areas.					
Learning Outcome: ✧ At the end of this course, it is expected that students will be able to learn changing approaches of urban urbanization and regional planning, and also learn different theories of urban and regional development. ✧ Students will be able to recognize the significance of urban areas for economic, social and environmental development and how regional planning can help a country develop. ✧ Students will gain an applied perspective and practically evaluate urban and regional issues, which can help them develop ideas for how to solve these issues.					
Professional Skill Development: ✧ The acquired knowledge will be beneficial for students to evaluate different stages of regional planning and how analytical techniques may be applied for understanding regional issues and their mitigation measures. ✧ Students will be skilled in handling the syllabus for All-India basis competitive exams.					
BSCGEOMJ703 - Theory [50 Marks]					
Sub units	Topics to be covered				No. of Lectures
Unit I: Urbanization and Urban Development [20 Hours]					
1.1	Concept of Urbanization, urbanism and urban development; Urbanization in developed and developing countries; Theories of evolution of urbanization				6
1.2	Selected theories and concepts of urbanization and urban development: Modernization theory; Dependence theory and World System theory; Global cities				4



1.3	Urbanization and emerging issues - urban sprawl and fringe, slum and squatter settlement, urban water crisis and sanitation, air pollution	4
1.4	Urban development and planning in India: Urbanization in India: ancient, medieval, modern, and post-modern periods; Metropolitan planning of KMDA; National Commission on Urbanization (NCU); IDSMT; JNNURM; AMRUT, Smart city	6
Unit II: Regional Planning and Development [25 Hours]		
2.1	Regions - concept, types and delineation; Concept of planning, its types and characteristics; Need for regional planning; Concept of growth and development; Indicators of development	5
2.2	Schemes of planning regions in India: Bhat and Rao, Nath, Sengupta; Town and Country Planning Organization (TCPO)	5
2.3	Models for regional planning and development: Stage of development (Rostow); Growth Pole model (Perroux); Core-Periphery model (Friedman); Growth Foci model (R.P. Misra)	8
2.4	Regional disparity; Regional planning in India - Delhi-Mumbai Industrial Corridor (DMIC), Special area development program; NITI Aayog: objectives and key initiatives	7
BSCGEOMJ703 - Practical (Lab) [50 Marks]		
Sub units	Topics to be covered	Lab work hours
Unit I: Practicals in Urban Development [20 Hours]		
1.1	Differentiate rural and urban areas from census data using the census definition; Urban occupational diversity and specialization	8
1.2	Calculation of degree of urbanization; Temporal analysis of urban growth using census data: moving average and least square method	12
Unit II: Practicals in Regional Planning [20 Hours]		
2.1	Delineation of formal regions by weighted index method; Delineation of functional regions by gravitational analysis; Representation of country-level development using ternary diagram	8
2.2	Measuring regional disparity using Sopher's disparity index; Mapping regional disparity of industrial or agricultural development using choropleth; Calculation of weighted composite index using AHP method	12
Unit III: Advanced Practicals in Urban and Regional Planning [20 Hours]		
3.1	Reading and interpretation of regional planning maps of selected development regions in West Bengal; Preparation of questionnaires for field data collection on emerging urban environmental issues	8
3.2	Identification and mapping of urban morphology from Google Earth; Analysis of urban growth from two consecutive LULC maps; Calculation and interpretation of NDBI to detect built-up areas; Preparation of a base map for any one urban amenities	12

✧ Course Evaluation:



☉ BSCGEOMJ703 - Theory

- **Continuous Assessment: 15 Marks***

*[average of the obtained marks of two are to be made to calculate the final marks]

1. Seminar presentations: A powerpoint presentation to be conducted for internal assessment on the notified portions/ topics. [15 Marks]

2. Class test: There shall be test (s) of knowledge and understanding through written test on the notified portions/ topics (s). [15 Marks]

- **End Semester Examination: 35 Marks**

The end semester examination shall be conducted based on written test.

Question Pattern: Students have to answer One questions carrying **10 marks** out of given **two** questions; Two questions carrying **5 marks** each out of given **four** questions; Five questions carrying **2 marks** each out of given **eight** questions; Five questions carrying **1 mark** each out of given **eight** questions.

☉ BSCGEOMJ703 - Lab

- **Continuous Assessment: 30 Marks**

1. Practical records: An A4-size laboratory notebook, comprising class assignments of all practical topics, must be prepared and duly signed by the teacher. The exercises for **Unit 3.2** are to be completed in **QGIS**, as applicable. Other exercises are to be drawn in pencil/ ink with photocopied representations of source materials where necessary. Methods and interpretations are to be handwritten. [5 Marks]

2. Viva-voce based on laboratory notebook. [10 Marks]

3. Practical Exercises: Internal assessment to be conducted on the basis of above three units. [15 Marks]

- **End Semester Examination: 20 Marks**

1. Practical Exercises: In the End Semester Examination, students have to answer the questions set from the above three units. [15 Marks]

2. Viva-voce based on laboratory notebook. [5 Marks]

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WEBSITES:

OpenCity - Urban Data Portal: <https://data.opencity.in/dataset>

National Institute of Urban Affairs (NIUA): <https://niua.in/>

Ministry of Housing and Urban Affairs: <https://mohua.gov.in/>

Programme: B.Sc.		Year: IV		Semester: VII	
Subject: Geography					
Course Name: Advanced Statistical Methods in Geography					
Course Code: BSCGEOMJ704					
Course Type: Major (Theoretical + Practical)		Course Details: MJC-17		L-T-P: 3 - 0 - 4	
Course Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	15	20	35
Course Objectives: ✧ The course equips students with a sound understanding of probability theory, sampling methods, statistical distributions, and hypothesis testing techniques used in geographical and spatial data analysis. ✧ To develop an understanding of the application of correlation, regression, matrix algebra, and multivariate statistical methods to examine relationships among geographic variables. ✧ To provide a conceptual understanding of analyzing spatial and temporal datasets using factor analysis, principal component analysis, spatial statistics, and trend detection techniques. ✧ To gain practical proficiency in statistical computing, interpretation, and visualization of geographical data through laboratory-based exercises.					

**Learning Outcome:**

- ✧ At the end of this course, it is expected that students will be able to compute probabilities, perform sampling procedures, test data normality, and conduct appropriate parametric and non-parametric statistical tests.
- ✧ Students will be able to evaluate relationships among variables using correlation, regression, interpolation, extrapolation, and contingency analysis techniques.
- ✧ Students will be able to apply multivariate and spatial statistical methods, including PCA, factor analysis, spatial autocorrelation, and geographically weighted regression, to geographical datasets.
- ✧ Analyze temporal patterns and changes using Markov chains, trend tests, change-point detection methods, and autocorrelation-based time series techniques.

Professional Skill Development:

- ✧ This course equips students with statistical and spatial analytical techniques for evidence-based problem-solving and decision-making in geographical studies.
- ✧ The knowledge gained through this course strengthens students' analytical and quantitative abilities, enabling them to manage, analyze, interpret, and present spatial and temporal data using statistical methods.

BSCGEOMJ704 - Theory [50 Marks]

Sub units	Topics to be covered	No. of Lectures
Unit I: Probability, Sampling and Hypothesis Testing [25 Hours]		
1.1	Basics - set theory, counting rules (permutation and combination); Concept of probability - classical theory, application of Bayes' theorem	6
1.2	Data distribution and types: normal, binomial and poisson; Tests for normality (Q-Q Plot, Kolmogorov-Smirnov Test)	6
1.3	Sampling techniques: random, systematic stratified, purposive and clustered; Sampling distribution: concept, sampling distribution of mean, standard error of mean, estimation of sample points interval	7
1.4	Confidence limit; Hypothesis testing: parametric (Z-test, ANOVA - one-way and two-way) and non-parametric (Mann-Whitney U Test and Kruskal-Wallis H Test)	6
Unit II: Statistical Interrelationships and Time Series [20 Hours]		
2.1	Correlation - Kendall's tau, multiple and partial correlation; Interpolation and Extrapolation techniques (Newton, Lagrange and Binomial); Association attributes: cross classifications and contingency tables	4
2.2	Basic matrix algebra; Determinant and Matrix; Correlation and covariance matrix; eigenvalue and eigenvector	6
2.3	Multivariate analysis – Supervised: Multiple linear regression and testing for multicollinearity, Logistic regression; Unsupervised: factor analysis (CFA and PCA); Spatial statistics - trend surface analysis	6
2.4	Advanced time series analysis: Markov Chains; Mann-Kendall test; Detecting changes in time series (Pettitt's test)	4



BSCGEOMJ704 - Practical (Lab) [50 Marks]		
Sub units	Topics to be covered	Lab work hours
Unit I: Probability, Sampling and Hypothesis Testing [20 Hours]		
1.1	Exercises on probability: random experiments and basic probability, conditional and independent probability, Bayes' theorem; Normal, Binomial and Poisson distributions	8
1.2	Sampling techniques: simple random and systematic; Sampling distribution of mean, standard error of mean, estimation of sample points interval; Tests for normality (Q-Q plot); parametric hypothesis testing (Z-test, ANOVA - one-way and two-way)	12
Unit II: Statistical Interrelationships [25 Hours]		
2.1	Computation of Kendall's tau, multiple and partial correlation coefficients; Interpolation and Extrapolation techniques (Newton and Lagrange); Yule's coefficient of association	10
2.2	Solving multiple linear regression equations using Matrix and Cramer's rule; Testing for multicollinearity (VIF); Mapping and clustering through PCA; Spatial statistics: TSA (1 st order)	15
Unit III: Advanced Time Series Analysis [15 Hours]		
3.1	Mapping transition matrix using Markov chains; Method for testing trend of time series (Mann-Kendall test)	10
3.2	Detecting changes in time series (Pettitt's test)	5

✧ Course Evaluation:

🕒 BSCGEOMJ704 - Theory

• Continuous Assessment: 15 Marks*

*[average of the obtained marks of two are to be made to calculate the final marks]

1. Seminar presentations: A powerpoint presentation to be conducted for internal assessment on the notified portions/ topics. [15 Marks]

2. Class test: There shall be test (s) of knowledge and understanding through written test on the notified portions/ topics (s). [15 Marks]

• End Semester Examination: 35 Marks

The end semester examination shall be conducted based on written test.

Question Pattern: Students have to answer One questions carrying **10 marks** out of given **two** questions; Two questions carrying **5 marks** each out of given **four** questions; Five questions carrying **2 marks** each out of given **eight** questions; Five questions carrying **1 mark** each out of given **eight** questions.



⦿ BSCGEOMJ704 - Lab

• Continuous Assessment: 30 Marks

1. Practical records: An A4-size laboratory notebook, comprising class assignments of all practical topics, must be prepared and duly signed by the teacher. The exercises are to be drawn in pencil/ ink with photocopied representations of source materials where necessary. All texts are to be handwritten. [5 Marks]

2. Viva-voce based on laboratory notebook. [10 Marks]

3. Practical Exercises: Internal assessment to be conducted on the basis of above three units. [15 Marks]

• End Semester Examination: 20 Marks

1. Practical Exercises: In the End Semester Examination, students have to answer the questions set from the above three units. [15 Marks]

2. Viva-voce based on laboratory notebook. [5 Marks]

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WEBSITES:

Census of India: <https://censusindia.gov.in/census.website/data/census-tables>

Directorate of Census Operations, West Bengal: <https://westbengal.census.gov.in/>

Government of India Data Platform: <https://www.data.gov.in/>

West Bengal District Statistical Handbooks:

<http://wbpspm.gov.in/publications/District%20Statistical%20Handbook>



Programme: B.Sc.		Year: IV		Semester: VII	
Discipline: Geography					
Course Name: Geotourism					
Course Code: BSCGEOMN701					
Course Type: Minor (Theoretical)		Course Details: MNC-6		L-T-P: 4 - 1 - 0	
Course Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		---	30	---	70
Course Objectives: ✧ To familiarize students with the geographical dimensions of tourism, including its relationship with physical and human environments and its environmental impacts. ✧ To develop an understanding of the tourism industry, its logistics, and its role in regional and economic development. ✧ To equip students from diverse academic backgrounds with the necessary skills and knowledge to understand a systematic analysis of methods and resources supporting geoconservation and geotourism worldwide.					
Learning Outcome: Transacting the course will enable students to: ✧ Understand the fundamental concepts of tourism and tourism geography and their significance in society. ✧ Analyze the relationship between tourism activities, social issues, and the various components of the tourism industry. ✧ Evaluate the environmental, social, and economic impacts of tourism, with particular emphasis on unsustainable tourism practices. ✧ Develop an understanding of geoheritage, geotourism, geodiversity, and geoconservation, and apply geoconservation principles to address tourism-related challenges.					
Professional Skill Development: ✧ This knowledge will equip students with a broad range of competencies required for professional careers in geoheritage management within public agencies, non-governmental organizations (NGOs), and related sectors. ✧ Students will develop industry-oriented expertise in geotourism development, destination interpretation, and sustainable tourism practices, enhancing their readiness for careers in the tourism and heritage sectors.					
Sub units	Topics to be covered				No. of Lectures
Unit I: Tourism: Concept and Perspectives [30 Hours]					
1.1	Tourism - definition and concept; Tourism as a subject of multidisciplinary research; Tourism, recreation and leisure inter-relations; Geographical parameters of tourism by Robinson				4
1.2	Evolving tourism typologies - Concepts and practices of nature tourism, ecotourism, ethnotourism, adventure tourism, medical tourism, religious tourism (pilgrimage), agritourism, wildlife tourism, educational tourism, geotourism				3



1.3	Factors influencing tourism: historical, natural, socio-cultural and economic; Motivating factors for pilgrimages	4
1.4	Spatial pattern of tourism: spatial affinity; areal and locational dimensions comprising physical, cultural, historical and economic; International travel destinations - cultural and historical	4
1.5	Impact of tourism - physical, economic and social, and perceptive positive and negative impacts; Role of foreign capital and impact of globalization on tourism; National tourism policy	5
1.6	Recent trends of tourism: international and domestic (India) and local, sustainable tourism, Meeting Incentives Conventions and Exhibitions (MICE)	3
1.7	Tourism in India: tourism infrastructure; regional dimensions of tourist attraction; case studies of Dal lake, Goa, Garhwal Himalaya, desert and coastal areas	4
1.8	Infrastructure and support system: accommodation and supplementary accommodation, other facilities and amenities	3

Unit II: Geoheritage and Geotourism [30 Hours]

2.1	Concept of geodiversity and geoheritage (geo-wealth); Classification of geoheritage: geological (geosites and geopark) and geomorphological (geomorphosites and geomorphoparks)	4
2.2	Geoheritage identification and designation - Role of UNESCO, IUCN, GNN and IUGS; Geoparks: creation, management and outputs; IUGS Heritage Stones	4
2.3	Geodiversity values; Threats to geodiversity; Geoconservation principles to protect geoheritage; Geoheritage for geohazard resilience	4
2.4	Geotourism- definition, scope and methods; Characteristics of a geotourism site: environment, heritage, aesthetics, culture, and well-being; Relations between geoheritage and geotourism	4
2.5	India's World Heritage Sites and National Geological Monuments; Conserving Indian geoheritage: Geopark approach	3
2.6	Geomorphological heritage sites in India; Gaps in geomorphodiversity information; Geomorphosite assessment and classification	3
2.7	Organizational efforts towards India's national heritage conservation: Geological Survey of India, Archaeological Survey of India, MoHUA, INTACH	4
2.8	Geotourism industry in the 21 st century: A futuristic approach; Geotrails; Best practices for visiting geotourism sites	4

✧ Course Evaluation:

• Continuous Assessment: 30 Marks*

*[average of the obtained marks of two are to be made to calculate the final marks]

1. Seminar presentations: A powerpoint presentation to be conducted for internal assessment on the notified portions/ topics. [30 Marks]



2. Class test: There shall be test (s) of knowledge and understanding through written test on the notified portions/ topics (s). [30 Marks]

● **End Semester Examination: 70 Marks**

The end semester examination shall be conducted based on written test.

Question Pattern: Students have to answer Two questions carrying **10 marks** out of given **three** questions; Five questions carrying **5 marks** each out of given **eight** questions; Ten questions carrying **2 marks** each out of given **fourteen** questions; Five questions carrying **1 mark** each out of given **eight** questions.

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