University of Kalyani

Department of Geography

REVISED SYLLABUS

M.A. / M.Sc. COURSE IN GEOGRAPHY

2 Year PG Course (Semester System with Credit and Course)

(With Effect From: 2019-2020)

Department of Geography

University of Kalyani

Kalyani, Nadia-741235, West Bengal

M.A. / M.Sc. COURSE IN GEOGRAPHY

SEMESTER I

Paper Code	Group	Course Title	Contact hours per week			Credit	Internal Assessment/ Evaluation	Examination/ Report/ Viva-Voice	Total Marks	Total Credit
			L	Tu	P					
GEOCCT-101	A	Geotectonics and Geomorphology	3	1	0	4	10	40	100	4
	B	Hydrology and Management of Water Resources	3	1	0		10	40		
GEOCCT-102	A	Climatology	3	1	0	4	10	40	100	4
	B	Soil Geography and Biogeography	3	1	0		10	40		
GEOCCT-103	A	Geographical Thought	3	1	0	4	10	40	100	4
	B	Political and Historical Geography	3	1	0		10	40		
GEOCCP-104	A	Toposheet Interpretation and Fluvial Morphometry	0	2	6	4	10	30+10	100	4
	B	Survey with Instruments	0	2	6		10	30+10		
Total							400			16

M.A. / M.Sc. COURSE IN GEOGRAPHY

SEMESTER II

Paper Code	Group	Course Title	Contact hours per week			Credit	Internal Assessment/ Evaluation	Examination/ Report/ Viva-Voice	Total Marks	Total Credit
			L	Tu	P					
GEOOCT-205	A	Earth and Society	3	1	0	4	10	40	100	4
	B	Geography of Resources and Hazards	3	1	0		10	40		
GEOCCT-206	A	Population Geography	3	1	0	4	10	40	100	4
	B	Settlement Geography	3	1	0		10	40		
GEOCCT-207	A	Environmental Issues in Geography	3	1	0	4	10	40	100	4
	B	Geography of Hazards and Disasters	3	1	0		10	40		
GEOCCP-208	A	Quantitative Techniques in Geography	0	2	6	4	10	30+10	100	4
	B	Field Report	0	2	6		10	30+10		
Total							400			16

M.A. / M.Sc. COURSE IN GEOGRAPHY

SEMESTER III

Paper Code	Elective Paper	Group	Course Title	Contact hours per week			Credit	Internal Assessment/ Evaluation	Examination/ Report/ Viva-Voice	Total Marks	Total Credit
				L	Tu	P					
GEOCCT-309		A	Social Geography and Cultural Geography	3	1	0	4	10	40	100	4
		B	Economic Geography, Transport Geography and Geography of Trade	3	1	0		10	40		
GEOCCT-310		A	Advanced Cartography and Geoinformatics	3	1	0	4	10	40	100	4
		B	Research Methodology	3	1	0		10	40		
GEOEC(AG)T-311	Agricultural Geography (Special Paper)	A	Basic Concept in Agricultural Geography	3	1	0	4	10	40	100	4
		B	Emerging Issues in Agriculture	3	1	0		10	40		
GEOEC(EG)T-311	Environmental Geography (Special Paper)	A	Basic Concept in Environmental Geography	3	1	0	4	10	40	100	4
		B	Environment and Development	3	1	0		10	40		
GEOEC(UG)T-311	Urban Geography (Special Paper)	A	Background and Basic Concepts of Urban Geography	3	1	0	4	10	40	100	4
		B	Urban Morphology	3	1	0		10	40		
GEOEC(FG)T-311	Fluvial Geomorphology (Special Paper)	A	Basics of Fluvial Geomorphology	3	1	0	4	10	40	100	4
		B	Mechanism of Fluvial Processes	3	1	0		10	40		
GEOCCP-312		A	Remote Sensing and GIS - I	0	2	6	4	10	30+10	100	4
		B	Remote Sensing and GIS - II	0	2	6		10	30+10		
	Total							400			16

M.A. / M.Sc. COURSE IN GEOGRAPHY

SEMESTER IV

Paper Code	Elective Paper	Group	Course Title	Contact hours per week			Credit	Internal Assessment/ Evaluation	Examination/ Report/ Viva-Voice	Total Marks	Total Credit
				L	Tu	P					
GEOCCT-413		A	Regional Geography of India and West Bengal	3	1	0	4	10	40	100	4
		B	Regional Planning and Developmental Issues	3	1	0		10	40		
GEOEC(AG)T-414	Agricultural Geography (Special Paper)	A	Agriculture in India	3	1	0	4	10	40	100	4
		B	Agriculture in West Bengal	3	1	0		10	40		
GEOEC(EG)T-414	Environmental Geography (Special Paper)	A	Environmental Issues	3	1	0	4	10	40	100	4
		B	Environmental Management	3	1	0		10	40		
GEOEC(UG)T-414	Urban Geography (Special Paper)	A	Urban Processes, Social Analysis, Urban Spacing and Linkages	3	1	0	4	10	40	100	4
		B	Emerging Urban Issues in India	3	1	0		10	40		
GEOEC(FG)T-414	Fluvial Geomorphology (Special Paper)	A	Channel Morphology	3	1	0	4	10	40	100	4
		B	Fluvial Hazards and its Management	3	1	0		10	40		

Paper Code	Elective Paper	Group	Course Title	Contact hours per week			Credit	Internal Assessment/ Evaluation	Examination/ Report/ Viva-Voice	Total Marks	Total Credit
				L	Tu	P					
GEOEC(AG)P-415	Agricultural Geography (Special Paper)	A	Agricultural Data Collection, Analysis and Mapping	0	2	6	4	10	30+10	100	4
		B	Soil Testing and Application of RS and GIS	0	2	6		10	30+10		
GEOEC(EG)P-415	Environmental Geography (Special Paper)	A	Environmental Survey and Mapping	0	2	6	4	10	30+10	100	4
		B	Detection of Environmental Pollution and Analysis through Laboratory Techniques	0	2	6		10	30+10		
GEOEC(UG)P-415	Urban Geography (Special Paper)	A	Urban Concentration and Transport Network Analysis	0	2	6	4	10	30+10	100	4
		B	Perception Studies on Urban Environment	0	2	6		10	30+10		
GEOEC(FG)P-415	Fluvial Geomorphology (Special Paper)	A	Analysis of Drainage Basin	0	2	6	4	10	30+10	100	4
		B	Hydro Geomorphology of River Basin	0	2	6		10	30+10		
GEOEC(AG)P-416/ GEOEC(EG)P-416/ GEOEC(UG)P-416/ GEOEC(FG)P-416	Agricultural Geography (Special Paper)/ Environmental Geography (Special Paper)/ Urban Geography (Special Paper)/ Fluvial Geomorphology (Special Paper)	-	Field based Project Report/Dissertation	0	4	12	4	20	40+20+20	100	4
	Total							400			16

ABBREVIATIONS

CC – Core Course

EC – Elective Course

OC – Open Course

L – Lecture

T – Theory

P – Practical

Tu – Tutorial

AG – Agricultural Geography

EG – Environmental Geography

UG – Urban Geography

FG – Fluvial Geomorphology

SEMESTER-I

Paper: GEOCCT-101 (Total Credit - 4, Total Marks – 100)

GROUP – A: GEOTECTONICS AND GEOMORPHOLOGY
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination - 40)

Unit-1: Plate tectonics as a unified theory of global tectonics
Unit-2: Concepts in Geomorphology: spatial scale, temporal scale, systems, feedback, equilibrium and threshold
Unit-3: Tectonics and geomorphology: Influence of tectonics in landscape evolution
Unit-4: Catchment process and fluvial processes; Factors regulating entrainment, transportation and deposition
Unit-5: Adjustment of channel forms and patterns to morphodynamic variables
Unit-6: Coastal morphodynamic variables and their influence in evolution of landforms
Unit-7: Impact of Pleistocene on landform evolution
Unit-8: Elements of slope and different approaches to study slope development

GROUP – B: HYDROLOGY AND MANAGEMENT OF WATER RESOURCES
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination - 40)

Unit-9: Global hydrological cycle: concept and significance
Unit-10: Aquifers: types and issues related to overutilization; Principles of groundwater movement
Unit-11: Concept of basin hydrology and run off cycle; Unit hydrograph and rating curve and their applications
Unit-12: Consumptive and non-consumptive water use*;* Fresh water crisis- issues and management; Concept of integrated water resources management
Unit-13: Parameters and standards of water quality, water quality monitoring
Unit-14: Storm water and flood management: Storm water management, design of drainage system, flood routing through channels and reservoir, flood control and reservoir operation
Unit-15: Drought management**:** drought assessment and classification, drought analysis techniques, drought mitigation planning
Unit-16: Methods of water conservation: Rainwater harvesting and watershed management

Mode of Internal Evaluation:

For Group A: Class test
For Group B: Class test

SEMESTER-I

Paper: GEOCCT-102 (Total Credit - 4, Total Marks – 100)

GROUP – A: CLIMATOLOGY
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination - 40)

Unit-1: Nature and scope of Climatology
Unit-2: Adiabatic processes; atmospheric stability and instability
Unit-3: Air-masses
Unit-4: Tri-cellular model
Unit-5: Monsoon: theories of its origin (Folhn and Koteshwaram, Jet Stream), Recent trends of Monsoon in Indian subcontinent
Unit-6: El Nino, Southern Oscillation and La Nina
Unit-7: Weather forecasting: short, medium and long range
Unit-8: Climate change: evidences and possible causes; Global warming: causes and probable consequences

GROUP – B: SOIL GEOGRAPHY AND BIOGEOGRAPHY
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination - 40)

Unit-9: Soil system, Soil taxonomy and world pattern of soils
Unit-10: Soil nutrients; soil organisms; Micro-organisms and their relation with soil fertility
Unit-11: Management of saline and Alkaline soil
Unit-12: Concept of integrated management of soil
Unit-13: Plant ecology: Concept of Adaptation, Succession and Climax
Unit-14: Impact of climate and soil on distribution of plants
Unit-15: Means and barriers of dispersal and migration of animals
Unit-16: Biodiversity and related issues; International Biological Programme; Man and Biosphere Programme

Mode of Internal Evaluation:

For Group A: Class test
For Group B: Class test

SEMESTER-I

Paper: GEOCCT-103 (Total Credit - 4, Total Marks – 100)

GROUP – A: GEOGRAPHICAL THOUGHT
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination - 40)

Unit-1: Place of Geography in the classification of knowledge after Varenius and Kant
Unit- 2: Contributions of Greek, Roman, Indian scholars during the ancient period and Arab scholars during the medieval period
Unit-3: Contributions of Humboldt and Ritter in Geography; Social Darwinism and its importance in Geography; Morphology of cultural landscape (Carl O. Sauer)
Unit-4: Major paradigms in Geography and their shift

Unit-5: Dualism and Dichotomies in Geography: Physical and Human Geography, Regional and Systematic Geography, Ideographic and Nomothetic approach
Unit- 6: Positivism and Quantitative revolution in Geography; Hartshorne-Schaefer debate; System approach in Geography
Unit-7: Critical revolution in Geography; Humanistic Geography; Radical Geography; Behavioural Geography
Unit-8: Welfare Geography; Feminism and Feminist Geography; Postmodernism and Postmodern Geography; Subaltern studies in Geography

GROUP – B: POLITICAL AND HISTORICAL GEOGRAPHY
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination - 40)

Unit-9: Geographical perspectives on formation of State; Concept of State after Ratzel and Marx; Colonialism, Imperialism and Federalism in understanding core-periphery relationship
Unit-10: Concept of Geopolitics; Geopolitical significance of international water disputes: India and its neighbouring countries; Geopolitics of petroleum
Unit-11: Concept of Electoral Geography; Approaches to the study of Electoral Politics: Areal and Spatial Behavioural approaches; Spatial organization of electoral areas and the geography of representation
Unit-12: Scope and content of Historical Geography; Historical Geography and Historiography
Unit-13: Ancient period: Territorial organization of *JANAPADAS* in India
Unit-14: Agriculture, industry, trade and urbanization under the Mughal Empire
Unit-15: Plantation farming and textile industry during Colonial India
Unit-16: Post- colonial urbanization in India, Deterritorialisation for the formation of new Provinces in India in the new Millennium.

Mode of Internal Evaluation:
For Group A: Class test
For Group B: Class test

SEMESTER-I

Paper: GEOCCP-104 (Total Credit - 4, Total Marks – 100)

GROUP – A: TOPOSHEET INTERPRETATION AND FLUVIAL MORPHOMETRY
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination – 30+10=40)

Unit-1: Principle of topographical map numbering system
Unit-2: Profile drawing and analysis: serial, superimposed, projected and composite, longitudinal or valley thalweg
Unit-3: Interpretation: structure, relief, drainage, vegetation, transport and settlement from topographical maps (Plateau and Plain)
Unit-4: Nearest Neighbour Analysis of settlement distribution
Unit-5: Application of fluvial morphometric techniques on drainage basins demarcated on the topographical map- Linear aspect
Unit-6: Application of fluvial morphometric techniques on drainage basins demarcated on the topographical map- Aerial aspect
Unit-7: Application of fluvial morphometric techniques on drainage basins demarcated on the topographical map-Relief aspect
Unit-8: Slope Analysis (Wentworth)

- Laboratory Note Book and Viva voce (5+5).

GROUP – B: SURVEY WITH INSTRUMENTS
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination – 30+10=40)

Unit-9: Introduction to Surveying and Levelling
Unit-10: Dip measurement using clinometre
Unit-11: Slope measurement using Abney's level.
Unit-12: Determination of Distance by Transit Theodolite,
Unit-13: Determination of Height by Transit Theodolite (Level Ground Base Accessible Case, Base Inaccessible Case)
Unit-14: Theodolite traversing
Unit-15: Survey using GNSS
Unit-16: Application of Total Station

- Laboratory Note Book and Viva voce (5+5).

Mode of Internal Evaluation:

For Group A – Continuous assessment on map laboratory performance
For Group B – Performance during survey with instruments

SEMESTER-II
Paper: GEOOCT-205 (Total Credit - 4, Total Marks – 100)
[OPEN COURSE]

GROUP – A: EARTH AND SOCIETY
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination - 40)

Unit-1: Ecological system of the earth- atmosphere, lithosphere, hydrosphere and biosphere
Unit-2: Interior of the earth; earth crust, fluvial and arid processes and landforms
Unit-3 Indian Monsoon; Climate change
Unit-4: Concept of land and land use; Physical and chemical properties of soil
Unit-5: Concept and types of scale and map; Land survey instruments and their uses
Unit-6: Factors of population growth; Types of migration
Unit-7: Rural and urban settlements and its classification
Unit-8: Sustainable development

GROUP – B: GEOGRAPHY OF RESOURCES AND HAZARDS
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination - 40)

Unit-9: Major economic activities- primary, secondary and tertiary activities
Unit-10: Concept and classification of resources, conventional and non-conventional resources
Unit-11: Distribution of energy resources- coal
Unit-12: Types of Agriculture
Unit-13: Crisis, conservation and management of resource
Unit-14: Concept and classification of hazards; Natural Hazards in West Bengal : Flood and land slide
Unit-15 Industry: Iron and Steel, Tourism in India

Mode of Internal Evaluation:

For Group A: Class test
For Group B: Individual term paper on any hazard/ disaster in India

SEMESTER-II

Paper: GEOCCT-206 (Total Credit - 4, Total Marks – 100)

GROUP – A: POPULATION GEOGRAPHY
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination - 40)

Unit-1: Changing scope and approaches to Population Geography; Population Geography as distinct from Demography
Unit-2: Sources of population data
Unit-3: Theories of population growth: Malthusian, Marxian, Neo-Malthusian
Unit-4: Factors controlling fertility, mortality and migration
Unit-5: Demographic Transition Model; Limits to growth
Unit-6: Population composition and characteristics (age, sex, rural-urban, occupational structure and educational levels)
Unit-7: Population policies – Pro and Anti Natal
Unit-8: Comparative study of population policies between India and China

GROUP – B: SETTLEMENT GEOGRAPHY
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination - 40)

Unit-9: Concept of Ekistics
Unit-10: Study on settlement hierarchies
Unit-11: Theories and models of settlement study: Central Place, Rank-size Rule and concept of Primacy
Unit-12: Census categories of settlements in India; Rural-urban dichotomy and interaction
Unit-13: Types, pattern and segregation of rural settlements in India
Unit-14: Urbanization in India as multi-dimensional process
Unit-15: Megalopolis and Ecumenopolis
Unit-16: Urban Sprawl, Urban Renewal in Indian context

Mode of Internal Evaluation:

For Group A: Class test
For Group B: Class test

SEMESTER-II

Paper: GEOCCT-207 (Total Credit - 4, Total Marks – 100)

GROUP – A: ENVIRONMENTAL ISSUES IN GEOGRAPHY
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination - 40)

Unit-1: Concept of resource-population relationship
Unit-2: Types and significance of worldwide contemporary major environmental issues
Unit-3: Sustainable Development
Unit-4: Role of IUCN, UNDP, UNEP, IPCC and UNFCCC
Unit-5: Concept of participatory management of forest: Agro forestry, Social forestry and JFM
Unit-6: Wildlife conservation and management: Sanctuaries, National Parks and Biosphere Reserves w.r.t. India
Unit-7: Dams and development – displacement and rehabilitation issues
Unit-8: Environmental movements in India

GROUP – B: GEOGRAPHY OF HAZARDS AND DISASTERS
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination - 40)

Unit-9: Concept and types of hazards and disasters; Assessment of risk and vulnerability; Concepts of hazard and disaster management
Unit-10: Climatic hazards: Tropical cyclones (prediction, precaution and mitigation)
Unit-11: Marine hazard: Tsunami (prediction, precaution and mitigation)
Unit-12: Hydrological hazards: Flash floods in Himalayan Region and floods in southern part of West Bengal
Unit-13: Nuclear hazards and Radio-active contamination
Unit-14: Lead hazards; CFC hazards and depletion of ozone layer
Unit-15: Plastic hazards
Unit-16: Arsenic and Fluoride contaminations

Mode of Internal Evaluation:

For Group A: Class test

For Group B: Individual term paper on any hazard/ disaster in India

SEMESTER-II

Paper: GEOCCP-208 (Total Credit - 4, Total Marks – 100)

GROUP – A: QUANTITATIVE TECHNIQUES IN GEOGRAPHY
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination – 30+10=40)

Unit-1: Location of Mean Centre of population and shift over time
Unit-2: Correlation: Pearson's Product-Moment Correlation; Spearman's Rank Correlation
Unit-3: Bivariate Regression Analysis: linear and exponential
Unit-4: Concept of Probability and Normal Distribution; Skewness and Kurtosis
Unit-5: Hypothesis Testing: t-test, z-test and Chi-square test
Unit-6: Matrix Algebra; Shortest Path Analysis by Shimbel Index
Unit-7: Location Quotient and Lorentz Curve
Unit-8: Sampling techniques for geographical analysis

- Laboratory Note Book and Viva voce (5+5).

GROUP – B: FIELD REPORT
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination – 30+10=40)

- Field Report and Viva voce (30+10)

Mode of Internal Evaluation:

For Group A – Class test
For Group B – Continuous assessment during field survey

SEMESTER-III

Paper: GEOCCT-309 (Total Credit - 4, Total Marks – 100)

GROUP – A: SOCIAL GEOGRAPHY AND CULTURAL GEOGRAPHY
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination - 40)

Unit-1: Concept of space: Place, space and locale, physical and social perspective of space
Unit-2: Social structure and Social processes; Social distance, social isolation, social exclusion and inclusion; subalternism
Unit-3: Geography of inequality: race, ethnicity and gender; Class and caste; Emergence of ethnic geography: ethnic neighbourhood and ghetto; Ethno-ecology of PVTGs in India
Unit-4: Human ecology of disease and emergence of Medical Geography
Unit-5: Welfare Geography: Social well-being, HDI, GEM
Unit-6: Culture as a geographical and societal process; Mosaic of culture, language, religion and customs
Unit-7: Partition of India and Diaspora with special reference to Indian Diaspora in USA
Unit-8: Globalization and Cultural Ecology

GROUP – B: ECONOMIC GEOGRAPHY, TRANSPORT GEOGRAPHY AND GEOGRAPHY OF TRADE
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination - 40)

Unit-9: Economic and environmental perspective of resource, Scarcity of natural resources and their management; World energy crisis in developed and developing countries
Unit-10: Concept of agricultural region; Concept and measurement of agricultural productivity and efficiency; Green revolution and White revolution in India
Unit-11: Concept of industrial region and industrial complex; Growth of IT industry in India; Concept of Digital Divide; Knowledge Production (Education and R &D) industries
Unit-12: Liberalization; Privatization and Globalization and their impact on industry and trade
Unit-13: Theories and Models of spatial interaction (Edward Ullman and M.E.Hurst); Concept and measures of distance, accessibility and connectivity; Transport cost: factors and comparative cost advantages
Unit-14: Concept of Ring road, By-pass, Golden Quadrilateral, North-South and East-West Corridor
Unit-15: From Export Processing Zones to Special Economic Zone; Exclusive Economic Zone, Forward trading and E-commerce
Unit-16: Role of GATT and WTO in international trade; Issues related to FDI in India's retail sector

Mode of Internal Evaluation:

For Group A: Seminar Presentation any aspect of Social /Cultural Geography
For Group B: Class test

SEMESTER-III

Paper: GEOCCT-310 (Total Credit - 4, Total Marks – 100)

GROUP – A: ADVANCED CARTOGRAPHY AND GEOINFORMATICS
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination - 40)

Unit-1: Cartography – nature, scope and development; Basic Principles of Cartography
Unit-2: Concept of Geoid; Nature and type; Spheroids with special reference to NAD, Everest and WGS-84; Principles of Spherical Trigonometry
Unit-3: Principles and properties of UTM Projections
Unit-4: Concept of Geoinformatics; Remote Sensing Platforms and Sensors
Unit-5: Nature of EMR, EMS, and interaction with atmosphere and surface materials
Unit-6: Resolution of satellite data: types and significances
Unit-7: Digital Image Processing – Principles and approaches
Unit-8: Analytical Modelling in GIS, GNSS-GIS integration

GROUP – B: RESEARCH METHODOLOGY
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination - 40)

Unit-9: Spectrum of Geographical Research and its approaches: Inductive and Deductive, Objective and Subjective
Unit-10: Critical issues in major areas of geographical research
Unit-11: Identification of Research Problem
Unit-12: Hypothesis Building
Unit-13: Methods of Sampling and sample design
Unit-14: Methodological orientation: Quantitative and Qualitative
Unit-15: Abstract and summery and synopsis: their differences
Unit-16: Referencing style and preparation of Bibliography

Mode of Internal Evaluation:

For Group A: Class test
For Group B – Preparation of bibliography on any field of geographical research

SEMESTER-III

Paper: GEOEC(AG)T-311 (Total Credit - 4, Total Marks – 100)

AGRICULTURAL GEOGRAPHY (SPECIAL PAPER)

GROUP – A: BASIC CONCEPT IN AGRICULTURAL GEOGRAPHY
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination - 40)

Unit-1: Nature, scope and significance of Agricultural Geography
Unit-2: Approaches to the study of Agricultural Geography: regional, systematic and behavioural
Unit-3: Determinants of agricultural profile: physical and non-physical determinants
Unit-4: Concept of sustainable agriculture and integrated farming systems; Significance of mixed farming
Unit-5: Agricultural region: concept and evolution
Unit-6: Techniques and methods of agricultural regionalization
Unit-7: Agricultural systems of the world after Whittlesey
Unit-8: Models in agriculture: von Thunen's Model and Stamp

GROUP – B: EMERGING ISSUES IN AGRICULTURE
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination - 40)

Unit- 9: Acquisition of arable land with reference to India: issues and options
Unit-10: Possible impact of climate change on agriculture; Concept of agricultural carbon credits
Unit-11: Application of biotechnology in agriculture - GM crops: issues and implications
Unit-12: Role of agro-chemicals, bio-fertilizers and bio-pesticides in agriculture
Unit-13: Application of nanotechnology in agriculture: issues and options
Unit-14: Child labour in agriculture: issues and challenges
Unit-15: Gender issues in agriculture
Unit-16: Global Hunger Index and World patterns of hunger

Mode of Internal Evaluation

Group A: Term paper based on emerging issue(s) in agriculture
Group B: Research proposal on any aspect of Agricultural Geography

SEMESTER-III
Paper: GEOEC(EG)T-311 (Total Credit - 4, Total Marks – 100)

ENVIRONMENTAL GEOGRAPHY (SPECIAL PAPER)

GROUP – A: BASIC CONCEPT
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination - 40)

Unit-1: Nature, scope and content of Environmental studies in Geography
Unit-2: Ecosystem approach in Environmental studies
Unit-3: Bio-geo-chemical cycles: types and significance
Unit-4: Energy flow and balance of energy in the biosphere
Unit-5: Gaia-hypothesis; Spaceship earth; Deep ecology and Environmentalism in geography
Unit-6: Organismic and holistic explanations
Unit-7: Concept of Population equilibrium, Optimum population and Land-man ratio; Stationary state economy
Unit-8: Concept of environmental system, Environmental balance and Environmental degradation

GROUP – B: ENVIRONMENT AND DEVELOPMENT
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination - 40)

Unit-9: Man and Environment: Case studies from river valley projects – Silent Valley and Narmada dispute with special reference to environmental movement
Unit-10: Earth summits: 1972, 1992, and 2012; Parris Conference - 2015
Unit-11: Protocols: Montreal and Kyoto
Unit-12: Anthropogenic impact on environment: population, resource, development and environment
Unit-13: Environmental Impact Assessment, Environmental Performance Index and Environmental audit
Unit-14: Concept and methods of alternative agriculture
Unit-15: Use and misuse of forest resources and forest conservation
Unit-16: Tourism industry and environment: issues and challenges

Mode of Internal Evaluation

Group A: Term paper based on emerging issue(s) in environment
Group B: Research proposal on any aspect of Environmental Geography

SEMESTER-III
Paper: GEOEC(UG)T-311 (Total Credit - 4, Total Marks – 100)

URBAN GEOGRAPHY (SPECIAL PAPER)

GROUP – A: BACKGROUND AND BASIC CONCEPTS
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination - 40)

Unit-1: Concept of urban, urbanism and urbanization; Emergence of Urban Geography as a discipline: changing approaches and methodological foundations
Unit-2: History of urbanization in India: Mughal and colonial periods
Unit-3: Origin and classification of urban Settlements: J.M. Houston, G. Taylor, Mumford, C.D.Haris and Nelson
Unit-4: Concepts of urban region: City Region, Metropolis, Megalopolis, Ecumenopolis, Conurbation
Unit-5: Concepts of Megacity, Planned Towns, New Towns, Satellite Towns, Green/ Garden Cities, Sister Towns, Edge Cities
Unit-6: Changing urban forms: Urban corridor, rural-urban fringe, urban sprawl, counter-urbanization
Unit-7: Urban as a system: City-size distribution (Zipf and Berry) and urban primacy
Unit-8: Perception of urban-rural continuum

GROUP – B: URBAN MORPHOLOGY
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination - 40)

Unit-9: Delineation of functional and planning regions in Urban Arena – typologies and significances
Unit-10: Urban hierarchy and spacing after Christaller and Philbrick
Unit-11: Urban morphology: Models of Burgess, Homer Hoyt and Harris & Ullman
Unit-12: Role of urban hierarchy in regional planning
Unit-13: Significance of urban hierarchy in India
Unit-14: Social segregation in the city
Unit-15: Urban social area analysis after Shevky and Bell
Unit-16: Contemporary city ecology

Mode of Internal Evaluation

Group A: Term paper based on emerging issue(s) in urban environment
Group B: Research proposal on any aspect of Urban Geography

SEMESTER-III

Paper: GEOEC(FG)T-311 (Total Credit - 4, Total Marks – 100)

FLUVIAL GEOMORPHOLOGY (SPECIAL PAPER)

GROUP – A: BASICS OF FLUVIAL GEOMORPHOLOGY
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination - 40)

Unit-1: Scope, nature and significance of fluvial geomorphology; Scales in Fluvial geomorphology
Unit-2: Fluvial system: concept, components, input output, stores of material and energy; Variables of fluvial system: internal and external, adjustable and controlling factors
Unit-3: Initiation of channel: theory of overland flow, theory of sub-surface flow
Unit-4: Linear properties of drainage basin: river network, stream orders, Law of stream number, stream length, type of links, number of links, TDCN, TICN, drainage pattern,
Unit-5: Areal properties of drainage basin: size and shape, influence of basin shape on hydrological regime, law of basin area, stream frequency, drainage density
Unit-6: Altitudinal properties of drainage basin: relief, slope, law of stream slope, ruggedness number, Horton's stream laws
Unit-7: Drainage pattern evolution, importance of headward extension and branching, lateral expansion
Unit-8: Classification of natural streams by D. L. Rosgen.

GROUP – B: MECHANISM OF FLUVIAL PROCESSES
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination - 40)

Unit- 9: Hydraulics of channel flow: Stream power and energy; Types of flow: uniform and non-uniform, steady and unsteady, laminar and turbulent, tranquil and rapid, subcritical-supercritical
Unit-10: River velocity, factors and its distribution in open channels; Flow resistance and Chézy, Manning and Darcy–Weisbach equation
Unit-11: River flow regime, river discharge, hydrograph and rating curve
Unit-12: Erosion: threshold of erosion, processes of erosion, bed scouring, bank erosion
Unit-13: Transportation: processes of entrainment, bedload transport dynamics; Channel competence, capacity and efficiency
Unit-14: Deposition: factors controlling deposition, depositions along the channel and across the channel
Unit-15: Sediment deposits: nature and characteristics, flood plain and deltaic plain deposits
Unit-16: Expression of fluvial processes: types, spatial characteristics and evolution.

Mode of Internal Evaluation
Group A: Term paper based on emerging issue(s) in fluvial environment
Group B: Research proposal on any aspect of Fluvial Geomorphology

SEMESTER-III

Paper: GEOCCP-312 (Total Credit - 4, Total Marks – 100)

GROUP – A: REMOTE SENSING AND GIS - I
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination – 30+10=40)

Unit-1: Basic principles of photogrammetry
Unit-2: Types and geometry of aerial photographs; Stereovision; Determination of scale of aerial photographs
Unit-3: Delineation of overlapping area and effective area; Elements of aerial photo interpretation
Unit-4: Preparation and interpretation of land use/land cover map from sterio pairs.
Unit-5: Basics of Principles of visual interpretation of satellite images
Unit-6: Visual image interpretation: identification and delineation*n of physical features from satellite images
Unit-7: Visual image interpretation: identification and delineation of cultural features from satellite images
Unit-8: Preparation and interpretation of landuse and landcover from satellite images

- Laboratory Note Book and Viva voce (5+5).

GROUP – B: REMOTE SENSING AND GIS - II
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination – 30+10=40)

Unit 1: Pre-processing of Satellite Images – Radiometric correction; Geometric correction; Subsetting; Layer stacking; and mosaicking
Unit 2: Preparation of FCC and image classification (un-supervised) using software
Unit 3: Preparation of FCC and image classification (supervised) using software
Unit 4: Analysis of relief characteristics using digital elevation model – relief; slope; aspect; contour
Unit 5: Calculation of indices: NDVI and NDWI
Unit 6: Georeferencing and digitizing of a scanned map
Unit 7: Integrating Google Earth with QGIS software
Unit 8: Integration of spatial and non-spatial data and preparation of thematic maps using software

- Laboratory Note Book and Viva voce (5+5).

Mode of Internal Evaluation:

For Group A – Continuous assessment in RS laboratory
For Group B – Continuous assessment in GIS laboratory

SEMESTER-IV
Paper: GEOCCT-413 (Total Credit - 4, Total Marks – 100)

GROUP – A: REGIONAL GEOGRAPHY OF INDIA AND WEST BENGAL
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination - 40)

Unit-1: Physical Geography of India: Physiographic division, zones of Soil, natural vegetation, and Climate
Unit-2: Resources Base of India: Coastal and marine resources, water resource region, mineral and power resources, major agricultural and industrial regions
Unit-3: Physical Geography of West Bengal: Delineation of Geographical regions and identification of developmental bottlenecks
Unit-4: Regional status of Human Development and their constraints: India and West Bengal
Unit-5: Selected regions for planning and management: Flood prone and drought prone areas
Unit-6: Regional planning and developmental issues in North-East India and Damodar Valley regions
Unit-7: Regional planning and developmental issues in Indian Sunderban delta
Unit-8: Socio-economic developmental potentialities of Nadia and Murshidabad districts

GROUP – B: REGIONAL PLANNING AND DEVELOPMENTAL ISSUES
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination - 40)

Unit-9: Concept of region and regional hierarchy; Region as a social unit
Unit-10: Regional typology: Delineation and significances of formal, functional and planning regions
Unit-11: Basic principles of regional planning; Techniques of regionalization
Unit-12: City Region: Concept, structure and implication
Unit-13: Theories of regional development (Albert O. Hirschman, Gunnar Myrdal, John Friedman); Growth pole, concept of growth foci and service centre
Unit-14: Concept of balanced and imbalanced development; Agro-politan approach in development; Regional disparity and diversity in India
Unit-15: Role of SGSY and MGNREGA in rural development in India
Unit-16: Concept of multilevel planning in India: Local, regional and national level planning

Mode of Internal Evaluation:

For Group A – Class test

For Group B – Seminar presentation on any Block/ Municipal issue on developmental aspects (Preferably from area of origin of individual students)

SEMESTER-IV

Paper: GEOEC(AG)T-414 (Total Credit - 4, Total Marks – 100)

AGRICULTURAL GEOGRAPHY (SPECIAL PAPER)

GROUP – A: AGRICULTURE IN INDIA
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination - 40)

Unit-1: Agricultural regions of India: types and salient features
Unit-2: Agricultural revolution in India - Green, White and Yellow
Unit-3: Impact of new economic policy and information technology on Indian agriculture
Unit-4: Impact of MGNREGA on Indian agriculture
Unit-5: Agricultural policies of India since independence
Unit-6: Food and nutrition security in India; Role of Public Distribution System (PDS) in assuring food security in India
Unit-7: Farmers indebtedness and its fall out in India
Unit-8: Agrarian distress in India: causes and possible remedies

GROUP – B: AGRICULTURE IN WEST BENGAL
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination - 40)

Unit-9: Agro-climatic regions of West Bengal: types and characteristics
Unit-10: Broad pattern of land utilisation in West Bengal; Implications of land reforms in West Bengal
Unit-11: Changing agricultural profile of West Bengal: cropping intensity, cropping pattern, crop concentration, crop combination, crop diversification and crop productivity
Unit-12: Dairy development in West Bengal: issues and options
Unit-13: Organic and dry farming in West Bengal
Unit-14: Agricultural marketing in West Bengal
Unit-15: Scope of food processing industry in West Bengal
Unit-16: Agrarian crisis in West Bengal: nature and possible solutions

Mode of Internal Evaluation

Group A: Class test

Group B: Seminar presentation on any aspect of agricultural profile in any region in West Bengal

SEMESTER-IV
Paper: GEOEC(EG)T-414 (Total Credit - 4, Total Marks – 100)

ENVIRONMENTAL GEOGRAPHY (SPECIAL PAPER)

GROUP – A: ENVIRONMENTAL ISSUES
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination - 40)

Unit-1: Concept of the scale of environmental issues; Concept of environmental migration
Unit-2: Contemporary global issues in environment: Deforestation and Biodiversity loss
Unit-3: Contemporary global issues in environment: Global warming and Sea-level change
Unit-4: Contemporary global issues in environment: Wetland and Wasteland
Unit-5: Social pathology - Crime and Disease
Unit-6: Global resource scarcity with special reference to food and fresh water
Unit-7: Environmental pollution with reference to E-waste and other non-degradable waste products
Unit-8: Ground water contamination; Noise pollution

GROUP – B: ENVIRONMENTAL MANAGEMENT
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination - 40)

Unit-9: Environmental Management Planning: Purpose and Framework
Unit-10: Natural and quasi-natural hazards - case studies from littoral tract of West Bengal: Causes, Consequences and Strategies
Unit-11: Salient features of India's urban environment and sustainable transportation
Unit-12: Concept of sustainable development and sustainable development goals
Unit-13: Eco-tourism: Case studies from the Himalayas and the coastal belt of India
Unit-14: Green technology and green economy
Unit-15: Renewable energy and recycle
Unit-16: Environmental ethics, policies and laws in India with special reference to air, water and forest

Mode of Internal Evaluation:

For Group A: Class test

For Group B: Seminar presentation on any environmental issue and its management in India

SEMESTER-IV
Paper: GEOEC(UG)T-414 (Total Credit - 4, Total Marks – 100)

URBAN GEOGRAPHY (SPECIAL PAPER)

GROUP – A: URBAN PROCESSES, SOCIAL ANALYSIS AND LINKAGES
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination - 40)

Unit-1: Patterns and process of urbanization in Independent India, recent trends
Unit-2: Urban space: CBD, neighbourhood and communities
Unit-3: Impact of migration on the socio-economic structure of a specific urban area: Rural to urban, urban to urban and urban to rural migration
Unit-4: Gentrification-Concept, theories and impact analysis
Unit-5: Concept of economic marginalization and reasons behind the proliferation of Slums in Urban India
Unit-6: Urban economy: Basic and Non basic, formal and informal
Unit-7: Types of urban linkages and its significance in the theory of Cumulative Causation (G.Myrdal)
Unit-8: Development of migration-linkages in India during post-independence phase

GROUP – B: EMERGING URBAN ISSUES IN INDIA
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination - 40)

Unit -9: Pollution and health degradation in metropolitan India
Unit -10: Sanitation and sewerage related problems in Indian cities- Recent initiatives for development
Unit -11: Social problems: Crime and poverty in Indian metropolis
Unit-12: Urban transport system and its associated problems with special reference to mass transit and para-transit in Indian megacities - Solution-strategies
Unit-13: Analysis on Urban housing policies in India-its Problems and prospects
Unit-14: The city's ecological footprint, Urban Livability Index with reference to India
Unit-15: Urban development and planning in India: IDSMT, JNNURM, AMRUT and Smart City
Unit-16: Application of Remote Sensing and GIS in urban planning and management in India

Mode of Internal Evaluation

Group A: Class test

Group B: Seminar presentation on any aspect of emerging urban issues in India

SEMESTER-IV
Paper: GEOEC(FG)T-414 (Total Credit - 4, Total Marks – 100)

FLUVIAL GEOMORPHOLOGY (SPECIAL PAPER)

GROUP – A: CHANNEL MORPHOLOGY

(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination - 40)

Unit-1: Channel form and controls on its adjustment; Hydrological properties of channels, concept of equilibrium

Unit-2: Shape of channel, riffles and bars, channel asymmetry and bed asymmetry; Hydraulic geometry, bed configuration

Unit-3: Longitudinal profile of river channel, channel gradient, causes of profile concavity;

Unit-4: Channel pattern: straight, sinuous, meandering, braided, anabranching, anastomosing; Meander geometry, form-process relationship, migration processes and associated forms

Unit-5: Concept of unit channel bar location and computation; alluvial fans, deltas and estuaries, flood plain formation

Unit-6: Changes of river channel through time: causes and evidences of channel shifting

Unit-7: Decay of river channels: causes and consequences

Unit-8: Stream corridor, construction of dams and reservoirs and the impact on fluvial system

GROUP – B: FLUVIAL HAZARDS AND ITS MANAGEMENT

(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination - 40)

Unit- 9: Fluvial hazards: nature and types; Effect of flood - river bank erosion, channel modification and characterization

Unit-10: Flash flood – causes, spatial nature, behaviour, effects

Unit-11: Geo-environmental effects, control and management of fluvial hazards; Flood risk analysis

Unit-12: Management of river discharge at Farakka Barrage and the problems, management of riverbank erosion and floods with reference to West Bengal

Unit-13: River water as a resource, fresh water crisis and its sustainable management in India

Unit-14: Inter linking of rivers- proposal, benefits, challenges and its probable impact

Unit-15: Strategies and principles of watershed and floodplain management; Principles of Integrated River Basin Management approach

Unit-16: Regional Fluvial Geomorphology: forms, processes and geomorphic hazards of any two regions: a) Darjeeling Himalaya b) Terai and Dooars c) Rarh Bengal d) Sunderban e) Tista Mega fan

Mode of Internal Evaluation:Group A: Class test

Group B: Seminar presentation on any fluvial hazard and its management in India

SEMESTER-IV

Paper: GEOEC(AG)P-415 (Total Credit - 4, Total Marks – 100)

AGRICULTURAL GEOGRAPHY (SPECIAL PAPER)

GROUP – A: AGRICULTURAL DATA COLLECTION, ANALYSIS AND MAPPING
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination – 30+10=40)

Unit-1: Data collection techniques in Agricultural Geography: primary and secondary; Agriculture Census in India
Unit-2: Crop calendar and Ergograph
Unit-3: Cropping intensity and cropping pattern
Unit-4: Crop diversification index after Gibbs-Martin
Unit-5: Crop productivity index after Enyedi and Shafi
Unit-6: Crop concentration index after Bhatia
Unit-7: Crop combination analysis after Weaver and Rafiullah
Unit-8: Application of statistical software in agricultural research

- Laboratory Note Book and Viva voce (5+5).

GROUP – B: SOIL TESTING AND APPLICATION OF RS AND GIS
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination – 30+10=40)

Unit-9: Determination of moisture holding capacity from soil samples, preparation of maps and analysis
Unit-10: Determination of available pH and organic carbon from soil samples, preparation of maps and analysis
Unit-11: Determination of available N, P, K from soil samples, preparation of maps and analysis
Unit-12: Identification of crops and spices
Unit-13: Measurement of land capability and soil fertility
Unit-14: Preparation of land-use maps using RS and GIS techniques
Unit-15: Preparation of thematic maps based on agricultural data using RS and GIS techniques
Unit-16: Spatial modeling in agriculture using RS and GIS technique

- Laboratory Note Book and Viva voce (5+5).

Mode of Internal Evaluation:

Group A: Continuous assessment on performance in the application of statistical software for data analysis

Group B: Continuous assessment on performance in Agricultural Laboratory.

SEMESTER-IV

Paper: GEOEC(EG)P-415 (Total Credit - 4, Total Marks – 100)

ENVIRONMENTAL GEOGRAPHY (SPECIAL PAPER)

GROUP – A: ENVIRONMENTAL SURVEY AND MAPPING
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination – 30+10=40)

Unit-1: Sampling techniques for environmental studies
Unit-2: Identification and study of an environmental problem in field; Environmental Rating
Unit-3: Preparation of Survey Schedule/Questionnaires for Perception Survey of Natural and Social Environmental Studies
Unit-4: Preparation of the Environmental Management Plan in any hazard prone area
Unit-5: Floral species survey using grid method
Unit-6: Cartographic presentation of Primary/Secondary data and collation of Environmental Maps
Unit-7: Preparation and interpretation of Environmental Maps using RS and GIS techniques
Unit-8: Mapping of spatial and temporal variations of environmental parameters applying Geoinformatics

- Laboratory Note Book and Viva voce (5+5).

GROUP – B: ASSESSMENT OF ENVIRONMENTAL QUALITY THROUGH LABORATORY TECHNIQUES
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination – 30+10=40)

Unit-9: Measurement of Air Pollutants
Unit-10: Measurement of Noise Pollution
Unit-11: Determination of available N, P, K in soil
Unit-12: Determination of available pH and organic carbon in soil
Unit-13: Determination of Acidity and Alkalinity of water
Unit-14: TSS and TDS in water; BOD and Total Hardness of water
Unit-15: Correlation and Regression Analysis (bi-variate), Time Series Analysis of environmental data; Application of Lorenz Curve and Location Quotient for environmental data analysis and interpretation
Unit-16: Application of statistical software in Environmental data analysis

- Laboratory Note Book and Viva voce (5+5).

Mode of Internal Evaluation:

For Group A – Continuous assessment on performance in GIS Laboratory
For Group B – Continuous assessment on performance in Environmental Laboratory

SEMESTER-IV

Paper: GEOEC(UG)P-415 (Total Credit - 4, Total Marks – 100)

URBAN GEOGRAPHY (SPECIAL PAPER)

GROUP – A: URBAN CONCENTRATION AND TRANSPORT NETWORK ANALYSIS
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination – 30+10=40)

Unit-1: Concentration of Urban Population by Location Quotient, Measurement of Inequality by Lorenz Curve
Unit-2: Sphere of Influence by Gravity Model, Break-point analysis, Population potential surface
Unit-3: Analysis of Regional Disparity after Sopher
Unit-4: Rank-size Distribution of Towns after Zipf and Pareto (Normal and Log/log), Nearest Neighbour Analysis
Unit-5: Weighted Score and Combination Analysis,
Unit-6: Bivariate Regression and Spatial Correspondence
Unit-7: Connectivity Mapping by Alpha, Beta and Gamma Index, Network Analysis by König /Associated Number and Cyclomatic Number
Unit-8: Accessibility Development by Detour Index, Measurement of Transport Accessibility by Shortest Path Matrix after Shimbel and Distance Flow Matrix

- Laboratory Note Book and Viva voce (5+5).

GROUP – B: URBAN GROWTH AND PERCEPTION STUDIES ON URBAN ENVIRONMENT
(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination – 30+10=40)

Unit-9: Urban Growth Index and Decadal Growth Rate
Unit-10: Urban Growth by Time Series analysis in Least Square and Moving Mean Method
Unit-11: Index of Urbanization, Urban Intensity Index, Urban Density Distribution by Standard Deviation and Quartile Deviation Method
Unit-12: Urban Occupational Diversities and Specialization (After Nelson and C.D. Harris),
Unit-13: Urban Flow Analysis-Dependent and Independent Flow
Unit-14: Urban Land use Mapping through Satellite Imagery- Supervised and Unsupervised Classification
Unit-15: Perception Survey on Contemporary Urban Environmental Issues through Structured Questionnaire
Unit-16: Quality of Life Index for Urban Residential Areas

- Laboratory Note Book and Viva voce (5+5).

Mode of Internal Evaluation:

Group A: Continuous assessment on class performance
Group B: Continuous assessment on performance in the Laboratory of Urban Geography

SEMESTER-IV

Paper: GEOEC(FG)P-415 (Total Credit - 4, Total Marks – 100)

FLUVIAL GEOMORPHOLOGY (SPECIAL PAPER)

GROUP – A: ANALYSIS OF DRAINAGE BASIN

(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination – 30+10=40)

Unit-1: Drainage basin identification and delineation from topographical maps and images; Analysis of drainage basin using GIS software

Unit-2: Classification of channel links, Shreve's formula of link counting, computation of Topologically Distinct Channel Network and Topologically Integrated Channel Network

Unit-3: Quantitative analysis of Channel Plan forms and indices - Sinuosity index, Braiding indices

Unit-4: Morphometric analysis of drainage basin- linear, areal and relief aspects

Unit-5: Hypsometric analysis of drainage basin.

Unit-6: Channel Indices: meander shape index; meander form index, meander tightness, measurement of different parameters of meander bend, braiding index

Unit-7: Channel bed topography: identification, measurement, analysis of in-channel geomorphic units

Unit-8: Textural analysis of river sediments and pebbles using sieves and slide callipers

- Laboratory Note Book and Viva voce (5+5).

GROUP – B: HYDRO GEOMORPHOLOGY OF RIVER BASIN

(Credit - 2; Marks - 50: Internal Evaluation – 10 and Semester-end Examination – 30+10=40)

Unit - 9: Construction and interpretation of hydrographs: Monthly and Annual;

Unit-10: Unit hydrographs- Pnet method; Rating curves

Unit-11: Computation and interpretation of channel parameters –width (w), depth (d), wetted perimeter (p), cross-sectional area (A), flow parameters- hydraulic radius, velocity and discharge

Unit-12: Calculation of efficiency of channel cross-section; Analysis of hydro-system approach of drainage basin

Unit-13: Mapping of flood inundation and risk zones, vulnerability analysis of floods and riverbank erosion,

Unit-14: Preparation of overlays of fluvial features and their analysis

Unit-15: Preparation of geomorphic map

Unit-16: Interpretation of morphometric and morphologic changes from topographical maps and images

- Laboratory Note Book and Viva voce (5+5).

Mode of Internal Evaluation:

Group A - Continuous assessment on class performance

Group B - Continuous assessment in Laboratory

SEMESTER-IV

Paper: GEOEC(AG)P-416 (Total Credit - 4, Total Marks – 100)

AGRICULTURAL GEOGRAPHY (SPECIAL PAPER)

FIELD BASED PROJECT REPORT/DISSERTATION

(Credit - 4; Marks - 100: Internal Evaluation – 20 and Semester-end Examination – 40+20+20=80)

- Field based Project Report/Dissertation [Individual] - 40
- Seminar Presentation on Field based Project Report/Dissertation - 20
- Viva voce on Field based Project Report/Dissertation - 20

Mode of Internal Evaluation:

- **Field performance – 10**
- **Summary of the Field based Project Report/Dissertation (word limit - 1000 words) - 10**

SEMESTER-IV

Paper: GEOEC(EG)P-416 (Total Credit - 4, Total Marks – 100)

ENVIRONMENTAL GEOGRAPHY (SPECIAL PAPER)

FIELD BASED PROJECT REPORT/DISSERTATION

(Credit - 4; Marks - 100: Internal Evaluation – 20 and Semester-end Examination – 40+20+20=80)

- Field based Project Report/Dissertation [Individual] - 40
- Seminar Presentation on Field based Project Report/Dissertation - 20
- Viva voce on Field based Project Report/Dissertation - 20

Mode of Internal Evaluation:

- **Field performance – 10**
- **Summary of the Field based Project Report/Dissertation (word limit - 1000 words) - 10**

SEMESTER-IV

Paper: GEOEC(UG)P-416 (Total Credit - 4, Total Marks – 100)

URBAN GEOGRAPHY (SPECIAL PAPER)

FIELD BASED PROJECT REPORT/DISSERTATION

(Credit - 4; Marks - 100: Internal Evaluation – 20 and Semester-end Examination – 40+20+20=80)

- Field based Project Report/Dissertation [Individual] - 40
- Seminar Presentation on Field based Project Report/Dissertation - 20
- Viva voce on Field based Project Report/Dissertation - 20

Mode of Internal Evaluation:

- **Field performance – 10**
- **Summary of the Field based Project Report/Dissertation (word limit - 1000 words) - 10**

SEMESTER-IV

Paper: GEOEC(FG)P-416 (Total Credit - 4, Total Marks – 100)

FLUVIAL GEOMORPHOLOGY (SPECIAL PAPER)

FIELD BASED PROJECT REPORT/DISSERTATION

(Credit - 4; Marks - 100: Internal Evaluation – 20 and Semester-end Examination – 40+20+20=80)

- Field based Project Report/Dissertation [Individual] - 40
- Seminar Presentation on Field based Project Report/Dissertation - 20
- Viva voce on Field based Project Report/Dissertation - 20

Mode of Internal Evaluation:

- **Field performance – 10**
- **Summary of the Field based Project Report/Dissertation (word limit - 1000 words) - 10**