Syllabus for M.Sc. Course
Geography & Environment Management

REVISED IN 2018: EFFECTIVE FROM THE ACADEMIC SESSION 2018-2019

Department ofGeography
PANSKURA BANAMALI COLLEGE (AUTONOMOUS)

DIVISION OF MARKS
Total marks: 1100(Core) + 100 (Elective)

For Internal Students				Elective
Semesters	**Theoretical**	**Practical**	**Total**	**Total**
Semester- I	200	100	300	-
Semester- II	150	100	250	50
Semester- III	150	100	250	50
Semester- IV	200	100	300	-
Total	**700**	**400**	**1100**	**100**

STRUCTURE OF SYLLABUS
SEMESTER-I (Duration: July –December)

Type	Paper	Unit	Marks				Credit	Total Class Hours
			End-term Exam.	Internal Exam.	Unit Total	Paper Total		
THEORETICAL	GEO-101	Unit-1:Geotectonics	20	5	25	50	4	60hours
		Unit-2:Geomorphology	20	5	25			
	GEO-102	Unit-3:Oceanography	20	5	25	50	4	60hours
		Unit-4:Hydrology	20	5	25			
	GEO-103	Unit-5:Climatology	20	5	25	50	4	60hours
		Unit-6Soil And Agricultural Geography	20	5	25			
	GEO-104	Unit-7:Environment and Ecology	20	5	25	50	4	60hours
		Unit-8: Landscape and Ecology	20	5	25			
PRACTICAL	GEO-105	Unit-9:Hydrological Techniques	25	-	25	50	4	60hours
		Unit-10: Soil and Environmental l Analysis Techniques	25	-	25			
	GEO-106	Unit-11:Application of Statistics in Geography	25	-	25	50	4	60hours
		Unit-12: Principles of Remote Sensing	25	-	25			

SYLLABUS
SEMESTER-I(300 MARKS)
THEORETICALCOURSES (200 Marks)
PRACTICAL COURSES (100 MARKS)

PAPER GEO-101: GEOTECTONICS AND GEOMORPHOLOGY
(Marks 50)

Unit-1: GEOTECTONICS

FullMarks-25(EndtermExamination-20andInternalAssessment-5)
*Pattern of setting questions: **Group-A** (Long Answer Type): Two questions, each of **8 marks** (without division), will be set for answering any one. **Group-B** (Semi-long Answer Type): Four questions, each of **4 marks** (without division), will be set for answering any two. **Group-C** (ShortAnswerType): Four questions, each of 2marks (without division), will be set for answering any two.*

1.1 Origin and evolution of Universe.

1.2 Relative and absolute dating: principles and techniques.

1.3 Origin of earth's magnetic field, paleomagnetism, geomagnetic polarity reversal and paleomagnetic timescale, paleomagnetic polar wandering curves and reconstruction of plate tectonic motions.

1.4 Mechanism of plate dynamics. Application of plate tectonic theory in explaining orogenesis, volcanism, earthquake.

1.5 Neo-tectonics and its worldwide evidences.

Unit-2: GEOMORPHOLOGY

FullMarks-25(EndtermExamination-20andInternalAssessment-5)
*Pattern of setting questions: **Group-A** (Long Answer Type): Two questions, each of **8marks** (without division), will be set for answering any one. **Group-B** (Semi-long Answer Type): Four questions, each of **4 marks** (without division), will be set for answering any two. **Group-C** (Short Answer Type): Four Questions, each of **2marks** (without division), will be set for answering any two.*

2.1 Concepts in geomorphology: historical and functional approaches, uniformitarianism and catastrophism, base level, grade and profile of equilibrium.

2.2 Weathering: factors, processes and land forms. Mass-wasting: safety factor, and resultant landforms.

2.3 Slope Evolution: process-form relationship on slope elements, theories of Wood, Davis, Penck, King, Young and Savigear. Dynamic metastability in slope evolution.

2.4 Fluvial processes and forms: threshold energy for entrainment and transport, channel form and patterns, flood plains, alluvial fan, terraces and delta.

2.5 Applied geomorphology in planning, hydrology and economic geology. Geomorphology in Hazard Management (flood, landslide and subsidence).

***PAPER-GEO-102*: OCEANOGRAPHY AND HYDROLOGY**
(Marks-50)

Unit-3: OCEANOGRAPHY

FullMarks-25(EndtermExamination-20andInternalAssessment-5)
*Pattern of setting questions: **Group-A** (Long Answer Type): Two questions, each of **8marks** (without division), will be set for answering any one. **Group-B** (Semi-long Answer Type): Four questions, each of **4marks** (without division), will be set for answering any two. **Group-C** (Short Answer Type): Four questions, each of **2marks** (without division), will be set for answering any two.*

3.1 Marine Environment and Processes: Major sub divisions of the marine environment, winds and ocean circulation, waves in the ocean, origin of the tides and tidal characteristics.

3.2 Physical and chemical structure of oceans: Water masses and their properties. Sediment in the Sea.

3.3 Coastal Habitats: Estuaries, lagoons, salt marshes, mangroves swamps, coral reefs; origin, circulation, sedimentation and ecology.

3.4 The Dynamic Shoreline: Coastal water movement, circulation in the surf zone, beaches, beach profiles, sand budgets, coastal dunes, barrier island, tidal inlets, cliffed coasts, deltas, Storm effects. Human impact on the coastline.

3.5 The Ocean's Resources: Law of the sea, law of the sea treaty, exclusive economic zones, mineral resource-oil and natural gas, gas hydrates, sand and gravel, man grove nodules, Cobalt-rich oceanic crusts, phosphate deposits, living resources.

Unit-4: HYDROLOGY

FullMarks-25(EndtermExamination-20andInternalAssessment-5)
*Pattern of setting questions: **Group-A** (Long Answer Type):Two questions, each of **8marks** (without division),will be set for answering any one. **Group-B** (Semi-long Answer Type): Four questions, each of **4 marks** (without division), will be set for answering any two. **Group-C** (Short Answer Type): Four questions, each of **2marks** (without division), will be set for answering any two.*

4.1 Hydrological systems, estimating water potential, water budgeting at watershed level. Hydrologic frequency analysis (Gumbel's equation and log probability law).

4.2 Precipitation estimates: point rainfall analysis, area-depth curve, theissen network and isohyetal method for estimating rainfall volumes.

4.3 Infiltration and evapotranspiration: soil-vegetation complex and infiltration estimates. Methods of estimating evapotranspiration.

4.4 Runoff estimate using curve number, stream discharge estimates by area-velocity method. Ground water: storage structure, flow, recharge and discharge.

4.5 Hydro graphs and Rating curve: Time dimensions of hydrographs: concept of unit hydrograph and rating curve sand their significance. Flood & Drought as Hydrological Hazards.

PAPER -GEO-103: CLIMATOLOGY, SOIL ANDAGRICULTURAL GEOGRAPHY (Marks-50)

Unit-5: CLIMATOLOGY

FullMarks-25(EndtermExamination-20andInternalAssessment-5)
*Pattern of setting questions: **Group-A** (Long Answer Type): Two questions, each of **8 marks** (without division), will be set for answering any one. **Group-B** (Semi-long Answer Type): Four questions, each of **4 marks** (without division), will be set for answering any two. **Group-C** (Short Answer Type): Four questions, each of **2marks** (without division), will be set for answering any two.*

5.1 Nature and Scope of Climatology and its relationship with Meteorology, climatological systems operating in different space and timescale: thunderstorm, tropical cyclone and associated hazards, jet Stream, planetary wind systems.

5.2 The General Circulation: GCM, Tropical circulation-mechanism of Indian monsoon, Walker circulation and ENSO phenomena, Temperate Circulation.

5.3 The Climatic Zones of the world with special reference to tropical climates: wet, wet and dry, savanna, desert and highland.

5.4 Sea surface temperature and its climatic significance; Maritime influence on coastal weather: Seasonal changes and storm events
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5.5 Climatic changes through geological periods- evidences and possible causes; Global Warming-Natural and anthropogenic causes and probable consequences.

Unit-6: SOIL ANDAGRICULTURAL GEOGRAPHY

FullMarks-25(EndtermExamination-20andInternalAssessment-5)
*Pattern of setting questions: **Group-A** (Long Answer Type): Two questions, each of **8marks** (without division), will be set for answering any one. **Group-B** (Semi-long Answer Type): Four questions, each of**4 marks** (without division), will be set for answering any two. **Group-C** (Short Answer Type): Four questions, each of **2marks** (without division), will be set for answering any two.*

6.1 Variation in physico-chemical properties of soil with climate and dominance of local factors: organic matter content, pH clay content, clay mineralogy, soil colour, calcium carbonate and soluble salt content.

6.2 Bio-functions and degradation of Soil; Soil organic matter, Soil organisms and Micro-organisms and their relation with soil fertility; Soil degradation and pollution: causes, processes and consequences; Preventive, ameliorative and conservation measures

6.3 Approaches in agricultural geography: agricultural systems (ecological or near-ecological systems). Approaches to study agricultural geography, Jonnason's theory on agricultural landuse.

6.4 Determinants of agricultural pattern: physical and institutional, precision farming, use of modern technology.

6.5 Issues and policies in modern Agriculture: Impact of green revolution, food security GM Crops, food security, agricultural policies and their implication.

PAPER-GEO-104: GEOGRAPHY OF ENVIRONMENT AND ECOLOGY
(Marks-50)

Unit-7: ENVIRONMENTAND ECOLOGY

FullMarks-25(EndtermExamination-20andInternalAssessment-5)
*Pattern of setting questions: **Group-A** (Long Answer Type): Two questions, each of **8 marks** (without division),will be set for answering any one. **Group-B** (Semi-long Answer Type): Four questions, each of **4 marks** (without division), will be set for answering any two. **Group-C** (Short Answer Type): Four questions, each of **2marks** (without division), will be set for answering any two.*

7.1 Concept of Environment, major elements of environment, functioning of environmental systems, role of biotic and abiotic elements.

7.2 Ecosystem: structure, function and processes, patterns of energy flow

7.3 Biogeochemical cycles (Nitrogen, Carbon, Phosphorus), ecosystem metabolism, ecosystem process (photosynthesis and respiration), trophic levels (food web and chain) decomposition, ecosystem stability.

7.4 Terrestrial ecosystems: Forest, Grassland and Agriculture

7.5 Biodiversity: Genetic, species, community and ecosystem diversity; biodiversity uses, threats to biodiversity, biodiversity conservation.

Unit-8: LANDSCAPE AND ECOLOGY

Full Marks- 25 (End term Examination- 20 and Internal Assessment- 5)
*Pattern of setting questions: **Group- A** (Long Answer Type): Two questions, each of **8 marks** (without division), will be set for answering any one. **Group- B** (Semi-long Answer Type): Four questions, each of **4 marks** (without division), will be set for answering any two. **Group- C** (Short Answer Type): Four questions, each of **2 marks** (without division), will be set for answering any two.*

8.1. Landscape: Definition, concept, nature and role, ecological description of landscape

8.2. Structure of Landscape: Patches (shape, size, nature and boundary), corridors (type, network, matrix) and mosaics, habitat arrangement measuring metrices (Shanon Diversity Index and Simpson Diversity Index).

8.3. Landscape Dynamics: Energy flow, species movement, nutrient movement.

8.4. Anthropogenic Modification: Consequences of deforestation and exploitation of targeted species; Forest conservation, Social forestry and Participatory Management of Forest.

8.5. Landscape management and planning: Role of keystone species, conservation of fragmented habitats, sustainable landscape, and role of Traditional Ecological Knowledge (TEK) in conserving landscape. Role of GIS in landscape planning.

PRACTICALCOURSES

(100 Marks)

PAPER GEO-105: MAPPING TECHNIQUES IN PHYSICAL GEOGRAPHY (50Marks)

Unit-9: Hydrological Techniques

*Full Marks-25Pattern of Setting Questions: **Three** compulsory questions bearing marks**7,7and6** respectively, will be set covering the whole unit.**5** marks will be allotted for Laboratory Note Book and Viva-voce.*

9.1 Point rainfall analysis, area-depth curves, Thiessen network and Isohyetal methods to determine rainfall volumes.

9.2 Estimating in filtration using infiltrometer and other field techniques. Drawing infiltration curve.

9.3 Evaporation estimation: Use of evaporation pan and empirical equations using climatic data.

9.4 Runoff and discharge estimation: Curve Number methods for estimating runoff: area-Velocity method for discharge estimate.

9.5 Construction of unit-hydrograph and rating curves.

Unit-10: S o i l a n d Environmental Analysis Techniques

*FullMarks-25 Pattern of Setting Questions: **Three** compulsory questions bearing marks**7,7 and 6** respectively, will be set covering the whole unit.**5**marks will be allotted for Laboratory Note Book and Viva-voce.*

10.1 Estimation and mapping of soil properties: texture, structure, moisture, colour, pH, organic matter, NPK, soil profile mapping.

10.2 Estimation of Water Properties: BOD, COD, Dissolved Oxygen, pH, suspended solid, turbidity and electric conductivity.

10.3 Ecological Micro-Zonation Mapping.

10.4 Vegetation density mapping

10.5 Association between soil parameters, vegetation types and density.

PAPER-GEO-106: BASIC STATISTICSIN GEOGRAPHYAND PRINCIPLES OF AERIAL PHOTOGRAPH AND REMOTE SENSING (Marks-50)

Unit-11: BASIC STATISTICS IN GEOGRAPHY

*FullMarks-25Pattern of Setting Questions: **Three** compulsory questions bearing marks**7,7and 6** respectively, will be set covering the whole unit.**5**marks will be allotted for Laboratory Note Book and Viva-voce.*

11.1 Measurement in Geography: Nominal, ordinal, interval and ratio measurement.

11.2 Concept of covariance, correlation and regression: Bi-variate analysis- linear, exponential, Product moment correlation, Spearman's Rank correlation, correlation matrix, partial correlation, residuals -mapping of residuals.

11.3 Probability distribution: addition and Law of multiplication, concept of probability distributions (binomial distributions, normal probability distribution), properties of normal curve.

11.4 Hypothesis testing: Formulation, Rejection rule, one and two tailed tests, significance level, degrees of freedom Type-I and Type-II errors, Standard Error. Different types of significance test for various purposes. Chi-square test, student's t- test.

11.5 Sampling techniques for geographical analysis.

Unit-12: PRINCIPLES OF REMOTE SENSINGAND AERIAL PHOTOGRAPHY

*FullMarks-25 Pattern of Setting Questions: **Three** compulsory questions bearing marks**7, 7and 6** respectively, will be set covering the whole unit.**5**marks will be allotted for Laboratory Note Book and Viva-voce.*

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

12.2. Satellite System: Keplers's Laws, Major-Semi-major axis, eccentricity, velocity (Numerical Problems). Details of some important satellites - Resourcesat-2 and INSAT-3DR.

12.3. Satellite Sensors: Concept of IFOV, resolution and determination of pixel size, referencing Scheme of satellite system (path/row calculation). Details of some important Sensors - Landsat 8 OLI and TIRS, Sentinel-2 and LISS-IV sensors.

12.4. Basics of Aerial Photograph: Concept of Aerial Photo film, Basics geometry of aerial photograph determination of scale and height, Distortions, Image parallax, Relief displacement.

12.5. Stereoscopy and Aerial Photo Interpretation: Stereoscopy, Pseudo copy, mapping of Physical and Cultural features with the Air photo interpretation keys: shape, size, pattern, tone, texture, shadow, site and associations.

STRUCTURE OF SYLLABUS

SEMESTER-II (Duration: January – June)

Type	Course	Unit	Marks				Credit	Total Class Hours
			End-term Exam.	Internal Exam.	Unit Total	Paper Total		
THEORETICAL	GEO -201	Unit- 13: Environmental Geography	20	5	25	50	4	60 hours
		Unit- 14: Regional Geography of India	20	5	25			
	GEO -202	Unit- 15: Population and Development Geography	20	5	25	50	4	60 hours
		Unit-16: Regional Approach in Geography	20	5	25			
	GEO -203	Unit- 17: Settlement Geography	20	5	25	50	4	60 hours
		Unit- 18: Social and Political Geography	20	5	25			
(THEORY)	GEO -204 **ELECTIVE PAPER**	***Unit- 19: Essentials of Physical Geography***	20	5	25	50	4	60 hours
		Unit-20: Essentials of Human Geography	20	5	25			
PRACTICAL	GEO -205	Unit- 21: Thematic Mapping in Physical Geography	25	-	25	50	4	60 hours
		Unit- 22: Thematic Mapping in Human Geography	25	-	25			
	GEO -206	Unit- 23: Computer Application in Geographical Data Analysis	25	-	25	50	4	60 hours
		Unit-24: Applications of Remote Sensing and Geographic Information System	25	-	25			

Semester- II (300 Marks)

THEORETICAL COURSES (200 Marks)

PAPER- GEO-201: ENVIRONMENTAL AND REGIONAL GEOGRAPHY OF INDIA
(Marks 50)

Unit- 13: ENVIRONMENTALGEOGRAPHY

Full Marks- 25 (End term Examination- 20 and Internal Assessment- 5)
*Pattern of setting questions: **Group- A** (Long Answer Type): Two questions, each of **8 marks** (without division), will be set for answering any one. **Group- B** (Semi-long Answer Type): Four questions, each of **4 marks** (without division), will be set for answering any two. **Group- C** (Short Answer Type): Four questions, each of **2 marks** (without division), will be set for answering any two.*

13.1. Definition and Domain of Environment aspect, Waste water treatment: Primary, Secondary and Tertiary treatment; Disposal in Indian cities

13.2. Sludge treatment; Solid (Municipal) waste management, Hazardous waste management in India.

13.3. Air pollution; Air sampling and measurement, Air pollution control technologies.

13.4. Noise Pollution; Measurement of noise, Biophysical impacts, Mitigation Technologies.

13.5. Arsenic Pollution; Spatial distribution, Impacts, Mitigation with special reference to West Bengal.

Unit- 14: REGIONAL GEOGRAPHY OF INDIA

Full Marks- 25 (End term Examination- 20 and Internal Assessment- 5)
*Pattern of setting questions: **Group- A** (Long Answer Type): Two questions, each of **8 marks** (without division), will be set for answering any one. **Group- B** (Semi-long Answer Type): Four questions, each of **4 marks** (without division), will be set for answering any two. **Group-C** (Short Answer Type): Four questions, each of **2 marks** (without division), will be set for answering any two.*

14.1 Geomorphology of Darjeeling Himalaya and Terai Region of West Bengal

14.2 Drainage system of peninsular and extra-peninsular region.

14.3 Geomorphology and soil-landform assemblages of Chhotanagpur Plateau, Geomorphology of Rajasthan desert with special reference to Marusthali.

14.4 Form, process and evolution of Ganga and Godavari delta.

14.5 Tectonics and Geomorphology of the Islands of Andaman and Nicobar, Laksha-Minikoi and Amindivi.

PAPER GEO-202: POPULATION & DEVELOPMENT AND REGIONAL APPROACH IN GEOGRAPHY

(Marks- 50)

Unit-15: POPULATION AND DEVELOPMENT

Full Marks- 25 (End term Examination- 20 and Internal Assessment- 5)
*Pattern of setting questions: **Group- A** (Long Answer Type): Two questions, each of **8 marks** (without division), will be set for answering any one. **Group- B** (Semi-long Answer Type): Four questions, each of **4 marks** (without division), will be set for answering any two. **Group-C** (Short Answer Type): Four questions, each of **2 marks** (without division), will be set for answering any two.*

15.1 Population growth: Link to economic development, resource scarcity, food security and sustainable development. Concept of logistic and exponential growth

15.2 Population and development integration with special reference to India

15.3 Theories and approaches of population growth and regulation: Malthus, Marx And Neo-Malthusiasm

15.4 Migration: Concept of social mobility, concept, types, patterns, theories (Ravenstein, Lee, Louis and Zelinsky), consequences.

15.5 The fate of Millennium development goals, Human development and gender issues: HDI, GDI, GEM-concept, measures and criticism, disparities

Unit-16: REGIONAL APPROACH IN GEOGRAPHY

Full Marks- 25 (End term Examination- 20 and Internal Assessment- 5)
*Pattern of setting questions: **Group- A** (Long Answer Type): Two questions, each of **8 marks** (without division), will be set for answering any one. **Group- B** (Semi-long Answer Type): Four questions, each of **4 marks** (without division), will be set for answering any two. **Group- C** (Short Answer Type): Four questions, each of **2 marks** (without division), will be set for answering any two.*

16.1 Regional concept in geography: concept, typology, hierarchy, methods of regional delineation and regional system

16.2 Contribution of Ratzel, Hartshorne, Schaefer and Vidal de la Blache to the development of regional concept. The character of regional geography, Space: the fundamental stuff of geography (Geography in history or historical geography

16.3 Formal regions: Natural, Agro-climatic, socio-cultural regions with special reference to India

16.4 Functional region: City region, industrial region with special reference to India

16.5 Planning regions in India: Conceptual framework, purpose, types and delineation, planning of problem regions: Tribal, coastal, drought prone area, flood prone area.

PAPER GEO- 203: CONEPTS IN SETTLEMENT GEOGRAPHY, SOCIAL AND POLITICAL GEOGRAPHY
(Marks- 50)

Unit- 17: SETTLEMENT GEOGRAPHY

Full Marks- 25 (End term Examination- 20 and Internal Assessment- 5)
*Pattern of setting questions: **Group- A** (Long Answer Type): Two questions, each of **8 marks** (without division), will be set for answering any one. **Group- B** (Semi-long Answer Type): Four questions, each of **4 marks** (without division), will be set for answering any two. **Group-C** (Short Answer Type): Four questions, each of **2 marks** (without division), will be set for answering any two.*

17.1 Concept and evolution of settlement: Rural and Urban

17.2 Urban Settlements: Census categories, Metropolitan concept, City-region and Conurbation, Urban governance.

17.3 Rural Settlements: Site and situation, nature and characteristics, Types and patterns of rural settlement Classification of rural settlements, Morphology of rural settlement in the Indian context

17.4 Concepts of urban morphology. Classical models - Burgess, Homer-Hoyt, Harris and Ullman

17.5 Settlement Hierarchy: Primate City, Rank-Size Rule, Central Place Theory; Settlement Classification: Harris and Nelson

Unit-18: SOCIAL AND POLITICAL GEOGRAPHY

Full Marks- 25 (End term Examination- 20 and Internal Assessment- 5)
*Pattern of setting questions: **Group- A** (Long Answer Type): Two questions, each of **8 marks** (without division), will be set for answering any one. **Group- B** (Semi-long Answer Type): Four questions, each of **4 marks** (without division), will be set for answering any two. **Group-C** (Short Answer Type): Four questions, each of **2 marks** (without division), will be set for answering any two.*

18.1 Political Geography: Scope, Content and Evolution of Political Geography, Relation with other branches of Social Sciences

18.2 Scope of electoral geography, Global strategic views- Heartland and Rimland theories and their significance in present international politics. Geopolitical significance of core-periphery theory

18.3 Geography and federalism; Reorganization of Indian states since independence, Partition of India and its consequences

18.4. International and interstate water disputes in India.

18.5. Political and economic blocs; Geopolitics in the context of globalization, colonialism and post colonialism.

ELECTIVE PAPERS

PAPER- GEO-204: RESOURCE AND ITS MANAGEMENT AND EARTH SYSTEM SCIENCE (Marks- 50)

Unit-19: ESSENTIALS OF PHYSICAL GEOGRAPHY

Full Marks- 25 (End term Examination- 20 and Internal Assessment- 5)
*Pattern of setting questions: **Group- A** (Long Answer Type): Two questions, each of **8 marks** (without division), will be set for answering any one. **Group- B** (Semi-long Answer Type): Four questions, each of **4 marks** (without division), will be set for answering any two. **Group- C** (Short Answer Type): Four questions, each of **2 marks** (without division), will be set for answering any two.*

19.1 Origin of earth and tectonic theory

19.2 Internal structure of the earth, earthquake and volcanism

19.3 Slope analysis: W M Davis and W Penck; concept of equilibrium

19.4 Composition and layering of atmosphere and atmospheric processes

19.5 Oceans; temperature, salinity distribution and tide.

Unit-20: ESSENTIALS OF HUMAN GEOGRAPHY

Full Marks- 25 (End term Examination- 20 and Internal Assessment- 5)
*Pattern of setting questions: **Group- A** (Long Answer Type): Two questions, each of **8 marks** (without division), will be set for answering any one. **Group- B** (Semi-long Answer Type): Four questions, each of **4 marks** (without division), will be set for answering any two. **Group- C** (Short Answer Type): Four questions, each of **2 marks** (without division), will be set for answering any two.*

20.1 Human geography: scope, content, present relevance and inter disciplinary Approach.

20.2 Population: Growth, distribution and migration in India and world perspective

20.3 Human settlement: Factors, site and situation of rural and urban settlement; Problems of urbanization.

20.4 Human development: indicators, measurement and development policies.

20.5 Human social, cultural changes and social problems in India; livelihood security.

PRACTICAL COURSES (100 Marks)

COURSE NO. GEO-205: THEMATIC MAPPING IN PHYSICAL AND HUMAN GEOGRAPHY (Marks-50)

Unit- 21: THEMATIC MAPPING IN PHYSICAL GEOGRAPHY

Full Marks- 25
*Pattern of Setting Questions: **Three** compulsory questions bearing marks **7, 7 and 6** respectively, will be set covering the whole unit. **5** marks will be allotted for Laboratory Note Book and Viva-voce.*

21.1 Identification and measurements of fluvial landforms: Meandering, Bars and Braiding Pattern (BI)

21.2. Morphometric Analysis of Fluvial Landscape: Testing the Laws of Morphometry (Laws of Length, Area, Slope and Allometric Growth), Drainage Density, Sinuosity Index as a Measure of Stream Pattern

21.3 Field measurements and interpretation: Cross Profiles, Calculation of Discharge, Velocity (by Current meter)

21.4 Texture analysis of sediment samples using standard techniques, statistical representation

21.5 Sedimentary environmental facies analysis.

Unit – 22: THEMATIC MAPPING IN HUMAN GEOGRAPHY

Full Marks- 25
*Pattern of Setting Questions: **Three** compulsory questions bearing marks **7, 7 and 6** respectively, will be set covering the whole unit. **5** marks will be allotted for Laboratory Note Book and Viva-voce.*

22.1 Estimation and Mapping of Social Well-being, HDI, GDI

22.2 Estimation of Human Poverty Index for Indian States

22.3 Mapping of social vulnerability using published data of District Statistical Handbook

22.4 Social area analysis: Identification, mapping and interpretation

22.5 Perception analysis of social issues in Indian perspective using Likart scale

PAPER-GEO-206: COMPUTER APPLICATIONS IN GEOGRAPHICAL DATA ANALYSIS AND REMOTE SENSING & GEOGRAPHIC INFORMATION SYSTEM

(Marks 50)

Unit- 23: COMPUTER APPLICATION IN GEOGRAPHICAL DATA ANALYSIS

Full Marks- 25
*Pattern of Setting Questions: **Three** compulsory questions bearing marks **7, 7 and 6** respectively, will be set covering the whole unit. **5** marks will be allotted for Laboratory Note Book and Viva-voce.*

23.1 Representation of data; Numbering Systems; Binary Arithmetic; Basic Logic Gates; Boolean Logic and Reduction Techniques

23.2 Computation, Storing and Formatting Spreadsheets: Computation of Rank, Mean, Median, Mode, Standard Deviation, Moving Averages, Sample Variation; Selection of technique and interpretation using MS-Excel and SPSS Environment.

23.3 Regression, correlation, curve fitting, multivariate analysis.

23.4 Array: Types, operations and application using MS-Excel

23.5 Internet Surfing- generations of data and extraction of information for power-point presentation, Manipulation and editing of graphic files.

Unit-24: APPLICATIONS OF REMOTE SENSING & GEOGRAPHIC INFORMATION SYSTEM

Full Marks- 25
*Pattern of Setting Questions: **Three** compulsory questions bearing marks **7, 7 and 6** respectively, will be set covering the whole unit. **5** marks will be allotted for Laboratory Note Book and Viva-voce.*

24.1 Geo-referencing of maps and satellite images.

24.2 Preparation of different types of FCC. Image enhancement, Band rationing, Density slicing.

24.3 Supervised and Unsupervised Classification Techniques, generation of signature statistics and signature reparability reports. Generation of NDVI.

24.4 GIS: RS, GIS and GNSS.

24.5 Map layers: Overlay analysis, buffering and map composition

STRUCTURE OF SYLLABUS

SEMESTER-III (Duration: July - December)

Type	Paper	Unit	Marks				Credit	Total Class Hours
			End-term Exam.	Internal Exam.	Unit Total	Paper Total		
THEORETICAL	GEO-301	Unit-25: Economic Zones and Development Programmes In India	20	5	25	50	4	60hours
		Unit-26: Geography of Globalization	20	5	25			
	GEO-302	Unit-27: Environmental Ethics and Regulations	20	5	25	50	4	60hours
		Unit-28: Transport Geography	20	5	25			
	GEO-303 **Special Paper**	Unit-29: Coastal Processes (OP – A) **Or** Unit- 29: Urban Geography (OP – B) **Or** Unit- 29: Physical Basis of Remote Sensing and Satellite System (OP – C)	20	5	25	50	4	60hours
		Unit- 30: Coastal Environments: Focus on Indian Regions (OP – A) **Or** Unit- 30: Regional Geography (OP – B) **Or** Unit- 30: Photogrammetry, Aerial Photo and Digital Map (OP – C)	20	5	25			
	GEO-304 ***Elective paper***	*Unit-* 31*: Emerging Issues in Environmental Geography*	20	5	25	50	4	60hours
		Unit- 32*: Geography of Hazards and Disaster Management*	20	5	25			
PRACTICAL	GEO-305	Unit- 33: Map Transformation and Geodesy	25	-	25	50	4	60hours
		Unit- 34: Spatial Analysis in Geography	25	-	25			
	GEO-306	Unit- 35: Research Methodology	25	-	25	50	4	60hours
		Unit- 36: Research Exercise in Geography	25	-	25			

Semester- III (300 Marks)

THEORETICAL COURSES (200 Marks)

GEO-301: ECONOMIC ZONES & DEVELOPMENT PROGRAMMES IN INDIA AND GEOGRAPHY OF GLOBALIZATION

(Marks-50)

Unit- 25: ECONOMIC ZONES AND DEVELOPMENT PROGRAMMES IN INDIA

Full Marks- 25 (End term Examination- 20 and Internal Assessment- 5)

Pattern of setting questions: Group- A (Long Answer Type): Two questions, each of 8 marks (without division), will be set for answering any one. Group- B (Semi-long Answer Type): Four questions, each of 4 marks (without division), will be set for answering any two. Group- C (Short Answer Type): Four questions, each of 2 marks (without division), will be set for answering any two.

25.1 Concepts of Special Economic Zone (SEZ), Exclusive Economic Zone (EEZ), Export Processing Zone (EPZ), industrial complex and industrial hub.

25.2 Economic Development Programmes: Rural and urban poverty alleviation programmes- National Rural Employment Guarantee Act, Jawahar Rozgar Yojana, Sampoorna Grameen Rozgar Yojana, Jawaharlal Nehru National Urban Renewal Mission; Infrastructural development programmes- Indira Avas Yojana.

25.3 Transport Development Programmes: Golden Quadrilateral, Pradhan Mantri Gram Sadak Yojana, National Freight Corridor. Bharat Nirman Programmes.

25.4 Industrial Development Programmes: Food Processing, Information Technology, Tourism industry.

25.5 Development of activities: Growth, characteristics and relative importance of Tertiary, Quaternary, Quinery activities.

Unit-26: GEOGRAPHY OF GLOBALIZATION

Full Marks- 25 (End term Examination- 20 and Internal Assessment 5)

Pattern of setting questions: Group- A (Long Answer Type): Two questions, each of 8 marks (without division), will be set for answering any one. Group- B (Semi-long Answer Type): Four questions, each of 4 marks (without division), will be set for answering any two. Group- C (Short Answer Type): Four questions, each of 2 marks (without division), will be set for answering any two.

26.1. Transformed Geography: Concept of Liberalization, Privatization and Globalization (LPG), rise of the globalization, conflicts of globalization, and concept of glocalilisation.

26.2. Globalization and Economic Geography: Economic geography in the era of Globalization;

Changes and recent trends, Impact of globalization on agriculture, industry and trade.

26.3 World economic order: Economic booms and crisis.

26.4. Globalization and cultural changes: Globalization and cultural transformations.

26.5. Assessing the future of globalization and global challenges: Inequality, development and globalization, environment, sustainability and globalization.

PAPER-GEO-302: ENVIRONMENTAL ETHICS AND REGULATIONS AND TRANSPORT GEOGRAPHY

(Marks- 50)

Unit-27: ENVIRONMENTAL ETHICS AND REGULATIONS

Full Marks- 25 (End term Examination- 20 and Internal Assessment 5)

Pattern of setting questions: Group- A (Long Answer Type): Two questions, each of 8 marks (without division), will be set for answering any one. Group- B (Semi-long Answer Type): Four questions, each of 4 marks (without division), will be set for answering any two. Group- C (Short Answer Type): Four questions, each of 2 marks (without division), will be set for answering any two.

27.1 Environmental ethics and education; Concept and development of environmental philosophy, Ecocentrism and Anthropocentrism, the land ethic (Aldo Leopold), Gaia concept, Eco-feminism. Formal and non-formal environmental education, Tbilisi conference, environmental awareness.

27.2 Ethics, culture and conservation of environment: Landscape ecology and ethno-ecology, environmental stewardship.

27.3 Environmental Impact Assessment (EIA), Environmental Management Planning (EMP), Environmental Performance Assessment (EPA).

27.4 Global Environmental Issues: Stockholm Conference, the Earth Summits, Inter- Governmental Panel for Climate Change (IPCC).

27.5 Environmental Laws in India: Wild life Act, Forest Acts, Environmental Protection Act,

National Environmental Tribunal Act.

Unit-28: TRANSPORT GEOGRAPHY

Full Marks- 25 (End term Examination- 20 and Internal Assessment 5)

Pattern of setting questions: Group- A (Long Answer Type): Two questions, each of 8 marks (without division), will be set for answering any one. Group- B (Semi-long Answer Type): Four questions, each of 4 marks (without division), will be set for answering any two. Group- C (Short Answer Type): Four questions, each of 2 marks (without division), will be set for answering any two.

28.1 Concept of distance, Transportation and space, space-time relation through transportation, Transport network analysis, Centrality, Accessibility, Connectivity and Rationality. Transport Models (Gravity Models, Linear Programming Model, Traffic Congestion Model).

28.2 Transport cost, Principles of transport cost fixation, comparative cost advantage.

28.3 Planning for public transport, desired characteristics, modes and optimal pricing, services, ownership and regulation.

28.4 Transport Policy: Problem oriented planning, and objective-led approach; Infrastructure,

Management, Information, Pricing and landuse components; National transport policy

(National highways, railways and waterways).

28.5 Communication Technology- roles in reducing transport demand.

PAPER- GEO- 303: SPECIAL PAPERS (Marks- 50)

(Option-A: COASTAL MANAGEMENT)

Unit-29: COASTAL PROCESSES

Full Marks- 25 (End term Examination- 20 and Internal Assessment5)

Pattern of setting questions: Group- A (Long Answer Type): Two questions, each of 8 marks (without division), will be set for answering any one. Group- B (Semi-long Answer Type): Four questions, each of 4 marks (without division), will be set for answering any two. Group- C (Short Answer Type): Four questions, each of 2 marks (without division), will be set for answering any two.

29.1 Definition of coastal zone, relevance of coastal study, classification of coast - Beach stage model.

29.2 Wave hydrodynamics; wave modification near coast with special reference to attenuation, breaker types, energy dissipation during breaking wave.

29.3 Tide; diurnal and semi-diurnal, rotating and progressive tide, concept of live storage, tidal

Environment with special reference to estuary.

29.4 Coastal current; intensity of longshore component and its implications, cell circulation.

29.5 Macro land forms with special reference to beaches and dunes; micro and biogenic forms.

Unit- 30: COASTAL ENVIRONMENTS: FOCUS ON INDIAN REGIONS

Full Marks- 25 (End term Examination- 20 and Internal Assessment- 5)

Pattern of setting questions: Group- A (Long Answer Type): Two questions, each of 8 marks (without division), will be set for answering any one. Group- B (Semi-long Answer Type): Four questions, each of 4 marks (without division), will be set for answering any two. Group- C (Short Answer Type): Four questions, each of 2 marks (without division), will be set for answering any two.

30.1 Tide dominated coastal environment: (Estuaries of India, estuary morphology, estuary hydrodynamics); wave dominated coastal environments: (The shore face, beaches, barriers and human activity) - Indian experiences.

30.2 Morphodynamic behavior of coastal systems (Modification of coastal features in temporal and spatial scales with feedback mechanisms).

30.3 Carbonate platforms and beach rocks (Andaman and Nicobar Islands).

30.4 Coastal erosion problems (West Bengal, Orissa coasts), land reclamations and associated problems (Sundarbans coastal tract)

30.5 Techniques for assessing coastal hazards areas (Hazard zonation along the coasts).

(Option-B: URBAN AND REGIONAL PLANNING)

Unit- 29: URBAN GEOGRAPHY

Full Marks- 25 (End term Examination- 20 and Internal Assessment5)

Pattern of setting questions: Group- A (Long Answer Type): Two questions, each of 8 marks (without division), will be set for answering any one. Group- B (Semi-long Answer Type): Four questions, each of 4 marks (without division), will be set for answering any two. Group- C (Short Answer Type): Four questions, each of 2 marks (without division), will be set for answering any two.

29.1 Development of urban geography as a systematic discipline: Scope, content and recent trends. Origin and Evolution of Towns in India and World. Urban sociology: classic and modern statements (Max Weber, Robert Park and Louis Wirth).

29.2 Concept and definitions of urban system: Urban, urbanization, urbanism, urban ecology and pathology, national urban system. Trend of Urbanization in India.

29.3 Theories of Urban Morphological Growth, Theory Functional Classification of Towns -Basic & Non Basic functions, Quantitative and Qualitative Classification of Towns.

29.4 Cities and suburbs: Functional Zones-C.B. D, Urban System Analysis Rank-Size Rule, City Primacy, Umlaland, Suburbs- urban sprawl, smart growth, exurbs, the new cities and gated communities.

29.5 Urban Issues - Landuse, Transport, Water, Sanitation, Drainage and Sewage, Slums and congestion, Pollution and health, Urban poverty, Crime and homelessness, New towns movement, Urban Livability and Sustainable urban development.

Unit- 30: REGIONAL GEOGRAPHY

Full Marks- 25 (End term Examination- 20 and Internal Assessment 5)

Pattern of setting questions: Group- A (Long Answer Type): Two questions, each of 8 marks (without division), will be set for answering any one. Group- B (Semi-long Answer Type): Four questions, each of 4 marks (without division), will be set for answering any two. Group- C (Short Answer Type): Four questions, each of 2 marks (without division), will be set for answering any two.

30.1 Concept of Region and Regional Development. Regional Development Models/Theories (Spatial, Non-Spatial Models, Strategies for Development).

30.2 Regional Development Strategies: Growth pole and Growth centers. Theories of Regional Growth and Location; Perroux, Myrdal, Hirschman, Boudiville.

30.3 Regional imbalance and disparity in India. Planning Regions of India. Problem and Prospects of Regional development.

30.4 Social Dimensions of Regional Development. Decentralized Planning with Emphasis on Districts Planning in India. Delineation of Planning Region, Multi-Purpose River Valley Development in India. Tribal Area Development in West Bengal.

30.5 Role of agriculture in regional development. Regional plans for agricultural development in India. Industrial development and industrial regionalization in India. Linkages between Agriculture and industry.

(Option-C: REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEM)

Unit- 29: PHYSICAL BASIS OF REMOTE SENSING AND SATELLITE SYSTEM

Full Marks- 25 (End term Examination- 20 and Internal Assessment- 5)

Pattern of setting questions: Group- A (Long Answer Type): Two questions, each of 8 marks (without division), will be set for answering any one. Group- B (Semi-long Answer Type): Four questions, each of 4 marks (without division), will be set for answering any two. Group- C (Short Answer Type): Four questions, each of 2 marks (without division), will be set for answering any two.

29.1 Concept and scope of Remote Sensing: Definitions, Process and Characteristics of Remote Sensing System, Advantages and limitations. Concept of Electromagnetic Radiation (EMR): Wavelength-Frequency-energy relationship of EMR, EMR Spectrum and its properties, EMR Wavelength regions and their applications.
29.2 Atmospheric windows, Energy Interaction in the atmosphere: Scattering, absorption, transmission, Atmospheric windows. Energy Interactions with Earth Surface Features: Spectral Reflectance Curve, Concept of signatures
29.3 Principles of Satellite movements, orbits and trajectory. Types of satellites, Characteristics and uses of different satellites (IRS series, LANDSAT series, SPOT series, CARTOSAT series, IKONOS Series, QUICKBIRD series, INSAT series, NOAA, OCEANSAT).
29.4 Satellite Platforms and Sensors: Types of platform for civilian applications, advantages, Disadvantages and characteristics of various satellite platforms. Physical principles and Characteristics of various satellites sensor, sensor selection parameters, resolution.
29.5 Remote Sensing Data: Data acquisition and reception, Data Products, Storage and dissemination.

Unit- 30: PHOTOGRAMMETRY, AERIAL PHOTO AND DIGITAL MAP

Full Marks- 25 (End term Examination- 20 and Internal Assessment- 5)

Pattern of setting questions: Group- A (Long Answer Type): Two questions, each of 8 marks (without division), will be set for answering any one. Group- B (Semi-long Answer Type): Four questions, each of 4 marks (without division), will be set for answering any two. Group- C (Short Answer Type): Four questions, each of 2 marks (without division), will be set for answering any two.

30.1 Basics of Aerial Photograph: Types of aerial photographs, Geometry of single Aerial Photograph, Photographic overlap, flight planning, Scale, Lens Distortions, Relief Distortions and Tilt distortions. Image displacement and parallax.

30.2 Aerial Photographic Film: Film density and Characteristics Curve, Colour Infrared Films, Film Resolution, Filters. Classification of Aerial Film Cameras, Digital cameras Components of aerial Cameras, Camera Calibration, Photogrammetric Applications and Products.

30.3 Photogrammetry: Development of Photogrammetry, Classification, processes and Limitations of photogrammetry.

30.4 Stereo photogrammetry: Conditions for Stereo vision, Stereoscopes, Stereoscopic parallax, Parallax Bar, Floating mark, stereoscopic measurements, Use of Parallax bar in height measurement, Parallax Formula Stereoscopic 3D viewing, Image parallax, Rectification, Orthorectification.

30.5 Concept of DEM, DSM and DTM, DEM extraction and Orthoimage generation. Concept of Image Matching, Automatic DEM generation, Orthoimage generation, Digital maps and their characteristics.

ELECTIVE PAPER

PAPER- GEO-304: EMERGING ISSUES AND ENVIRONMENTAL HAZARDS AND DISASTER MANAGEMENT IN GEOGRAPHY

(Marks-50)

Unit- 31: Emerging Issues in Environmental Geography

Full Marks- 25 (End term Examination- 20 and Internal Assessment- 5)

Pattern of setting questions: Group- A (Long Answer Type): Two questions, each of 8 marks (without division), will be set for answering any one. Group- B (Semi-long Answer Type): Four questions, each of 4 marks (without division), will be set for answering any two. Group- C (Short Answer Type): Four questions, each of 2 marks (without division), will be set for answering any two.

31.1 Global climate change, water scarcity and politics of water

31.2 Geographical analysis of environmental degradation and pollution

31.3 Environment and development: Debate and Issues

31.4 Social and Cultural Hazards

31.5 Globalization and Environment

Unit- 32: Geography of Hazards and Disaster Management

Full Marks- 25 (End term Examination- 20 and Internal Assessment- 5)

Pattern of setting questions: Group- A (Long Answer Type): Two questions, each of 8 marks (without division), will be set for answering any one. Group- B (Semi-long Answer Type): Four questions, each of 4 marks (without division), will be set for answering any two. Group- C (Short Answer Type): Four questions, each of 2 marks (without division), will be set for answering any two.

32.1 Concepts and techniques for analysis of risk, hazard, disaster, vulnerabilities and resilience.

32.2 Cyclone and storm surges, thunderstorms and lighting, earthquake, tsunami wave and landslide hazards.

32.3 Natural hazard and disaster management in India, Agricultural drought hazard and the national experience

32.4 International Disaster Response Laws Rules (IDRL)

32.5 National policy and appraisal of hazard

PRACTICAL COURSES

(100 Marks)

PAPER-GEO-305: MAP TRANSFORMATION & GEODESY AND SPATIAL ANALYSIS IN GEOGRAPHY

(Marks-50)

Unit- 33: MAP TRANSFORMATION AND GEODESY

Full Marks- 25

Pattern of Setting Questions: Three compulsory questions bearing marks 7, 7 and 6 respectively, will be set covering the whole unit. 5 marks will be allotted for Laboratory Note Book and Viva-voce.

33.1 Map transformation: Scale factor; distortion types; systems of map projections; principles of choosing Map projection; importance of map projection in GIS.

33.2 Principle, construction, properties and uses of following map projections:

a) Conformal Projections- Mercator's Projection; Transverse Mercator Projection and Lambert's Conformal Conic (LCC) Projection.

33.3 Principle, construction, properties and uses of following map projections b) Equal Area Projection- Mollweide's Projection. c) Conical Projection- Simple Conical Projection with Two Standard Parallels.

33.4 Geodesy: Scope and application; concept of Geoid, reference ellipsoid and spheroid- WGS 84, Everest Spheroid.

33.5 Coordinate Systems: Cartesian, Rectangular, Spherical, Curvilinear, Spherical, UTM Grid System.

Unit- 34: SPATIAL ANALYSIS IN GEOGRAPHY

Full Marks- 25

Pattern of Setting Questions: Three compulsory questions bearing marks 7, 7 and 6 respectively, will be set covering the whole unit. 5 marks will be allotted for Laboratory Note Book and Viva-voce.

34.1 Transport network analysis: Centrality Indices, Shortest path analysis (Transport and allocation problems), Detour and spread.

34.2 Distance Matrix (Aggregate Travel Distance).

34.3 Point spatial distribution analysis: Uniformity, randomness and compactness.

34.4 Analysis of Directional Data; Rose diagram, Dominant Direction, Mean direction.

34.5 Analysis of Shape: Measures based on axial ratios, perimeters to areas, areas to axial length.

PAPER- GEO-306: RESEARCH METHODOLOGY AND RESEARCH EXERCISE IN GEOGRAPHY

(Marks- 50)

Unit- 35: RESEARCH METHODOLOGY

Full Marks- 25

Pattern of Setting Questions: Three compulsory questions bearing marks 7, 7 and 6 respectively, will be set covering the whole unit. 5 marks will be allotted for Laboratory Note Book and Viva-voce.

35.1 Research ethics and paradigm shift of research methodology in Geography

35.2 Need for research, basic research types

35.3 Identification of research problems, development of theoretical background- literature review, research gap and research question and specification of the objectives of study; hypothesis building, Framework of research writing.

35.4 Methods of data collection- primary and secondary; Preparation of questionnaire and survey schedule and their differences, research ethics.

35.5 Methods of writing notes, style of referencing, bibliography and appendices, abstract and synopsis writing.

Unit- 36: RESEARCH EXERCISE IN GEOGRAPHY

Full Marks- 25 (Evaluation of written report-10 and Viva-voce based on Power point presentation- 15)

Field work on a specific environmental issue and generation of report (within about 50 A4 size pages including 15-20 maps/diagrams/field photographs

STRUCTURE OF SYLLABUS
SEMESTER-IV (Duration: January - June)

Type	Paper	Unit	Marks				Credit	Total Class Hours
			End-term Exam	Internal Exam	Unit Total	Paper Total		
THEORETICAL	GEO-401	Unit- 37: Schools in Geographical Thought	20	5	25	50	4	60 hours
		Unit-38: Contemporary Discourses in Geography	20	5	25			
	GEO-402	Unit-39: Land Resource Management	20	5	25	50	4	60 hours
		Unit- 40: Water Resource Management	20	5	25			
	GEO-403	Unit- 41: Forest Resource Management	20	5	25	50	4	60 hours
		Unit- 42: Biodiversity Management	20	5	25			
	GEO-404 **Special Paper**	Unit- 43: Coastal Ecology and Hazards or Unit- 43: Urban Planning or Unit- 43: Advanced Remote Sensing	20	5	25	50	4	60 hours
		Unit-44: Coastal Issues and Management or Unit-44: Regional Planning or Unit- 44: Advanced GIS and Applications of Remote Sensing	20	5	25			
PRACTICAL	GEO-405	Unit- 45: Advanced Quantitative Methods	25	-	25	50	4	60 hours
		Unit- 46: Geographic Information System	25	-	25			
	GEO-406	Unit- 47: Special Paper Practical	25	-	25	50	4	60 hours
		Unit- 48: Field Report and Presentation	25	-	25			

SEMESTER- IV (300 MARKS)

Theoretical Courses (200 Marks) Practical Courses (100 Marks)

PAPER- GEO-401: Schools in Geographical Thought and Contemporary Discourses in Geography
(Marks- 50)

Unit- 37: Schools in Geographical Thought

Full Marks- 25 (End term Examination- 20 and Internal Assessment- 5)
Pattern of setting questions: Group- A (Long Answer Type): Two questions, each of 8 marks (without division), will be set for answering anyone. Group- B (Semi-long Answer Type): Four questions, each of 4 marks (without division), will be set for answering any two. Group- C (Short Answer Type): Four questions, each of 2 marks (without division), will be set for answering any two.

37.1 The Field of Geography, Place of Geography in classification of knowledge and other disciplines, Geography as a social science, Physical and Human Geography. Linkages among the sub-disciplines of physical and human geography.
37.2 Development of Geography in 19th Century: Contribution of German, French, British and American schools of thought.
37.3 Conceptual and methodological development in 20th Century: changing paradigms, evolution of man-nature relation.
37.4 Typology of models and uses: structure component and characters.
37.5 Dualism and dichotomies in Geography: Determinism and Possibilism, Systematic and Regional, Aerial differentiation and Spatial organization.

Unit-38: Contemporary Discourses in Geography

Full Marks- 25 (End term Examination- 20 and Internal Assessment- 5)
Pattern of setting questions: Group- A (Long Answer Type): Two questions, each of 8 marks (without division), will be set for answering anyone. Group- B (Semi-long Answer Type): Four questions, each of 4 marks (without division), will be set for answering any two. Group- C (Short Answer Type): Four questions, each of 2 marks (without division), will be set for answering any two.

38.1 Pragmatism, Positivism and Quantitative revolution in geography
38.2 Development of critical social theories: Humanistic geography, Behaviouralism, Radicalism, Welfare geography, Feminist geography
38.3 Structuralism and Post-structuralism, Modernism and Postmodernism.
38.4 Concept of space: absolute, relative, material and social space, concept of 3rd space in geography, temporal geography, time-space prism
38.5 Recent trends in geography.

PAPER- GEO- 402: Land and Water Resource Management
(Marks-50)

Unit-39: Land Resource Management

Full Marks- 25 (End term Examination- 20 and Internal Assessment- 5)
Pattern of setting questions: Group- A (Long Answer Type): Two questions, each of 8 marks (without division), will be set for answering any one. Group- B (Semi-long Answer Type): Four questions, each of 4 marks (without division), will be set for answering any two. Group- C (Short Answer Type): Four questions, each of 2 marks (without division), will be set for answering any two.

39.1 Land as a resource, Land class systems, land use capability classes.
39.2 Land degradation, land conservation and land improvement. wetland ecology & management.
39.3 Land and landuse management: Economic, spatial and strategic planning, land conflicts, political negotiations
39.4 Fundamental issues of sustainable land resource management in the developing countries.
39.5 Land mapping: Application of GIS for land use management, preparation of land bank for space-time use.

Unit- 40: Water Resource Management

Full Marks- 25 (End term Examination- 20 and Internal Assessment- 5)
Pattern of setting questions: Group- A (Long Answer Type): Two questions, each of 8 marks (without division), will be set for answering anyone. Group- B (Semi-long Answer Type): Four questions, each of 4 marks (without division), will be set for answering any two. Group- C (Short Answer Type): Four questions, each of 2 marks (without division), will be set for answering any two.

40.1 Water Resources: Global distribution, water potential, hydrological cycle and its components.
40.2 Classification of water resources. Problems of surface and ground water resource depletion. Use and over-utilization of surface and ground water
40.3 Watershed management: Rain water harvesting and storage, recharging of ground water; role of dams.
40.4 Water pollution: Causes and consequences, Water treatment: Industrial, urban sewage treatment, domestic water treatment. Drinking water quality. Threats to surface water resources.
40.5 Water ecology and management: Principles and approaches of surface and ground water management, waste water use. Concept of virtual water and water trade.

PAPER- GEO- 403 Forest Resource and Biodiversity Management
(Marks-50)

Unit- 41: Forest Resource Management

Full Marks- 25 (End term Examination- 20 and Internal Assessment- 5)
Pattern of setting questions: Group- A (Long Answer Type): Two questions, each of 8 marks (without division), will be set for answering any one. Group- B (Semi-long Answer Type): Four questions, each of 4 marks (without division), will be set for answering any two. Group- C (Short Answer Type): Four questions, each of 2 marks (without division), will be set for answering any two.

41.1 Principles of forest management; Scope and object of forest management, ecosystem management, development of forest management in India. National Forest Policy – 1894, 1952 and 1988.
41.2 Forest ecosystem: Concept, stand dynamics-forest succession, competition and tolerance, classification of world's forest vegetation.
41.3 Afforestation programmes and forest conflicts, wildlife and human conflicts. Pastoralists and their dependence on forests. Forests and economic security of tribals.
41.4 Forest as Common property resource: Common Property Resources (CPRs) and open access resources, tragedy of the commons, sustainable livelihood strategies, eco-tourism and local development.
41.5 Forest rights, community participation, Joint Forest Management, global environmental change and resettlement of forest tribals, Forest Dwellers act, 2006, poverty alleviation and forests,

Unit- 42: Biodiversity Management

Full Marks- 25 (End term Examination- 20 and Internal Assessment- 5)
Pattern of setting questions: Group- A (Long Answer Type): Two questions, each of 8 marks (without division), will be set for answering any one. Group- B (Semi-long Answer Type): Four questions, each of 4 marks (without division), will be set for answering any two. Group- C (Short Answer Type): Four questions, each of 2 marks (without division), will be set for answering any two.

42.1 Introduction to biodiversity: Concepts, significance and distribution. Biodiversity trends, diversity gradients, methods for monitoring biodiversity trends.
42.2 Threats to biodiversity: Major causes, extinction's, vulnerability of species to extinction, Causes and consequences of loss of biodiversity.
42.3 Values and ethics of biodiversity; Global patterns of biodiversity, biodiversity hotspots and mega diversity realm; Biogeographic zones in India.
42.4 Biodiversity conservation approaches: Local, National and International, In-situ and ex- situ conservation.
42.5 Uses of biodiversity: Source of food, medicine, raw material, aesthetic, cultural and ecosystem services, strategies for sustainable exploitation of biodiversity.

GEO -404: SPECIAL PAPERS
(50 marks)

Option-1: Coastal Management

Unit- 43: Coastal Ecology and Hazards

Full Marks- 25 (End term Examination- 20 and Internal Assessment- 5)
Pattern of setting questions: Group- A (Long Answer Type): Two questions, each of 8 marks (without division), will be set for answering any one. Group- B (Semi-long Answer Type): Four questions, each of 4 marks (without division), will be set for answering any two. Group- C (Short Answer Type): Four questions, each of 2 marks (without division), will be set for answering any two.

43.1 Coastal Hazard: Natural vs. Man-made hazard - Hazard and disaster, vulnerability, resilience-coping mechanisms
43.2 Dune vegetation: Dune initiating and dune building types, adaptation and reproduction, plant-animal interaction in sand dune.
43.3 Coastal studies in India: Estuarine and Mangrove Ecology, Salt Marsh Ecology - Coral Reef Ecology, Human Impacts on the coastal Environment,
43.4 Coastal hazards and their management: Sea level change- long- and short-term changes, Storm hazard: role in sediment transfer, effects on open and estuarine coast, management of storm hazard.
43.5 Techniques of monitoring coastal processes and land forms. Coastal erosion- causes and effects

Unit-44: Coastal Issues and Management

Full Marks- 25 (End term Examination- 20 and Internal Assessment- 5)
Pattern of setting questions: Group- A (Long Answer Type): Two questions, each of 8 marks (without division), will be set for answering any one. Group- B (Semi-long Answer Type): Four questions, each of 4 marks (without division), will be set for answering any two. Group- C (Short Answer Type): Four questions, each of 2 marks (without division), will be set for answering any two.

44.1 Coral bleaching: Impact of Global warming, coastal eutrophication and habitat conservation (Coastal lagoons, other coastal wetlands)
44.2 Coastal tourism and environment conflicts (Beaches and barrier coasts, mangrove dominated coasts, coral coasts, environmental regulations).
44.3 Application of remote sensing and GIS techniques in coastal management (Geomorphological mapping, coastal cell circulation systems, environmental zoning approach, identification and diversity of coastal habitats)
44.4 Managing coastal change: Assessment of coastal vulnerability, ecosystem valuation of coast, integrated coastal zone management, coastal regulations); Coastal engineering: Developments in hard structure designs, developments in soft structure designs, new dredging techniques and procedures.
44.5 Coastal urbanization and population pressures, Coastal resource management.

Option- 2: Urban and Regional Planning

Unit- 43: Urban Planning

Full Marks- 25 (End term Examination- 20 and Internal Assessment- 5)
Pattern of setting questions: Group- A (Long Answer Type): Two questions, each of 8 marks (without division), will be set for answering any one. Group- B (Semi-long Answer Type): Four questions, each of 4 marks (without division), will be set for answering any two. Group- C (Short Answer Type): Four questions, each of 2 marks (without division), will be set for answering any two.

43.1 Changing approaches in Urban Geography; Methodology in urban planning studies; Type of urbanized regions: Conurbation, Metropolis, Megalopolitan development.
43.2 Urban Hierarchies; Central Place Theory (Christaller and Losch); Peripheral urbanization: Functional areas and Peri-urban areas; Exo-urbanization
43.3 Perspectives and Policies of Urban planning and development. Gentrification, Green space and Garden city movement. Sustainable Urban Development and Future of the Cities.
43.4 Smart city: concept and definition, features and infrastructure, smart governance and services. Strategic components for development Smart solution. Govt. of India Smart Cities Mission.
43.5 National Urbanization Policies and 74th Constitutional Amendment Act - Salient Features.

Unit-44: Regional Planning

Full Marks- 25 (End term Examination- 20 and Internal Assessment- 5)
Pattern of setting questions: Group- A (Long Answer Type): Two questions, each of 8 marks (without division), will be set for answering anyone. Group-B (Semi-long Answer Type): Four questions, each of 4 marks (without division), will be set for answering any two. Group-C (Short Answer Type): Four questions, each of 2 marks (without division), will be set for answering any two.

44.1 Basic Principles and Objectives of Regional Planning; Regional Planning and Economic Development, Basic Elements of Rural Development, Growth versus Development and, Approaches to Study of Rural Development
44.2 Process of Regional Development; Indicators of regional development; Theories of regional development: Spatial and non-spatial models (Rostow's stages of economic growth). Strategies for India's regional development.
44.3 Rural Poverty Scenario in India. Regional Poverty Alleviation Measures. Regional and Rural Development Policies and Programmes in India.
44.4 Theories of Rural Development: Marxist School and Gandhian Model. Globalization and Regional Planning. The 73rd Constitution Amendment Act and its impact on Rural Development People and Development
44.5 Planning: Development Planning for Infrastructure, Education, Housing, and Health in India.

Option-3: Remote Sensing and Geographic Information System

Unit- 43: Advanced Remote Sensing

Full Marks- 25 (End term Examination- 20 and Internal Assessment- 5)
Pattern of setting questions: Group- A (Long Answer Type): Two questions, each of 8 marks (without division), will be set for answering any one. Group- B (Semi-long Answer Type): Four questions, each of 4 marks (without division), will be set for answering any two. Group- C (Short Answer Type): Four questions, each of 2 marks (without division), will be set for answering any two.

43.1 Thermal Remote Sensing: Concept, Sensors and Utility.

43.2 Microwave Remote Sensing: Concept, Comparison with optical system, advantages and disadvantages, spatial resolution, Real and Synthetic Aperture Radar, Passive Microwave Remote Sensing, Lidar.

43.3 Hyperspectral Remote Sensing: Concept, Sensors and utility.

43.4 Visual Image Processing and Digital image interpretation: Elements of Visual image interpretation, generation of thematic maps, information extraction.

43.5 Digital Image Processing: Pre-processing, Image Registration, Image geometric operations, Enhancement, Spatial filtering, Transformation, classification, data compression, spectral pattern recognition, output generation.

Unit- 44: Advanced GIS and Applications of Remote Sensing

Full Marks- 25 (End term Examination- 20 and Internal Assessment- 5)
Pattern of setting questions: Group- A (Long Answer Type): Two questions, each of 8 marks (without division), will be set for answering any one. Group- B (Semi-long Answer Type): Four questions, each of 4 marks (without division), will be set for answering any two. Group- C (Short Answer Type): Four questions, each of 2 marks (without division), will be set for answering any two.

44.1 Advanced GIS: Spatial data model, Data entry, data analysis, Data models. Data sources, Data captures, attribute data management and Meta data concept.

44.2 Data Infrastructure: Spatial Data Infrastructure: NSDI.

44.3 Modern trend in GIS: Local to Global concept in GIS, Integration of GIS and Multimedia,3D GIS and Web GIS, Real time GIS, Mobile GIS, Collaborative GIS, concept and application of GPS and GNSS.

44.4 Integration of Remote sensing and GIS: Concept and importance of Remote Sensing and GIS integration in Geographical studies.

44.5 Applications of Remote Sensing and GIS: Land use/land covers mapping, soil and agricultural mapping, geomorphological mapping, watershed mapping.

PRACTICAL (100 Marks)

GEO-405 Advanced Quantitative Methods and Geographic Information System (50 Marks)

Unit- 45: Advanced Quantitative Methods

Full Marks- 25
Pattern of Setting Questions: Three compulsory questions bearing marks 7, 7 and 6 respectively, will be set covering the whole unit. 5 marks will be allotted for Laboratory Note Book and Viva-voce.

45.1 Analysis of Variance: Objectives; One-way and Two-way ANOVA.

45.2 Fitting Second Degree Polynomial curves to bivariate geographical data and testing by ANOVA.

45.3 Multiple Regression: Linear multiple regression equation, Multiple and partial correlation coefficient.

45.4 Elementary multiple regression modeling techniques: Stepwise variable entry method,

45.5 Basic operation of Matrix and Determinants

Unit- 46: GEOGRAPHIC INFORMATION SYSTEM

Full Marks- 25
Pattern of Setting Questions: Three compulsory questions bearing marks 7, 7 and 6 respectively, will be set covering the whole unit. 5 marks will be allotted for Laboratory Note Book and Viva-voce.

46.1 Basic Concepts and components in GIS: An overview of the development of the GIS fields, Data Sources; Data acquisition methods

46.2 Data structure: Vector and Raster data structures, data storage.

46.3 Modern trends in GIS: 3D GIS and Web GIS, Real time GIS, Mobile GIS and application of GIS

46.4 Basics of GPS Surveying: Conceptual Framework, Space Segment, Ground Segment, Control Segment, Satellite Triangulation, Pseudo Random Code. DGPS and GNSS

46.5 GPS-aided traversing; Manual and Computer plotting for preparation of maps.

Geo-406: Special Paper Based Practical and Field Report (Marks- 50)

Unit- 47: Special Paper Practical
Full Marks- 25
Pattern of Setting Questions: Three compulsory questions bearing marks 7, 7 and 6 respectively, will be set covering the whole unit. 5 marks will be allotted for Laboratory Note Book and Viva-voce.

Option -1 Coastal Management
(Field Measurement techniques and application in coastal geomorphology)

47.1 Understanding beach morphology: Beach profiles; Coarse sediment analysis: size and shape; Fine sediment analysis: size and shape
47.2 Measurement of Longshore drift: direction and strength
47.3 Physical impact of coastal management: Groyne measurements Rip-rap volume and weight measurements
47.4 Human impact of coastal management: Bi-polar analysis Questionnaires Cost-benefit analysis, Shoreline Management Plans
47.5 Risk and vulnerability analysis: Data analysis, Risk mapping

Option -2 Urban and Regional Planning
(Field Measurement techniques and application in Urban and Regional Planning)

47.1 Method of delimitation of C.B.D and mapping of functional areas of cities
47.2 Urban renewal and re-development of towns
47.3 Gravity model, Breaking Point Analysis, Population Potentials.
47.4 Urban service satisfaction and livability analysis
47.5 Delimitation of Planning regions and Agricultural Regions

Option -3 Application Remote Sensing and Geographic Information System
(Field Measurement techniques and application in Remote Sensing and Geographic Information System)

47.1 Measurement of stereoscopic parallax and relief displacement. Creation of Digital Elevation Model (DEM)
47.2 Application on hydrology: Soil and Water Assessment Tool (SWAT)
47.3 Forest Fragmentation Mapping: Application of FRAGSTAT software, Mapping of Forest ecosystem services.
47.4 Application of Thermal Remote Sensing for Urban Heat Island mapping
47.5 Network analysis and point pattern analysis, Urban amenities and facilities analysis.

Unit- 48: Field Report and Presentation

Full Marks- 25 (Field report -15 and Presentation -10)

Option -1 Coastal Management
Option -2 Urban and Regional Planning
Option -3 Remote Sensing and Geographic Information System

Field Report
Field work (at least 7 days field work at relevant places as per option).
Submission of project report in the format as – Issue / Background information, problem statement, objectives, rationale, methodology, scheme of the study, literature review, analysis of data collected from field both in qualitative and quantitative with proper mapping and references.
Student have to submit hard copy spiral binding - **A4** size paper, **MS** word format, **12** fonts, single side print, **1.5**-line spacing, maximum **50** pages and a soft copy in .pdf and MS Word format.

Presentation of Field Report
Power Point Presentation of the report containing Issue / Background information, problem statement, objectives, rationale, methodology, scheme of the study, literature review, mapping, major findings and references (within 15 slides)