Syllabus
for
MA / MSc Course in Geography & Environment Management

REVISED IN 2014: EFFECTIVE FROM THE ACADEMIC SESSION 2014-2015

Department of Geography and Environment Management
Vidyasagar University
Midnapore
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PIN – 721 102

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DIVISION OF MARKS
Total marks: 1200

Semesters	Theoretical	Practical	Total
Semester- I	200	100	300
Semester- II	200	100	300
Semester- III	200	100	300
Semester- IV	200	100	300
Total	**800**	**400**	**1200**

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

Type	Paper	Unit	Marks				Examination Time
			End-term Exam.	Internal Exam.	Unit Total	Paper Total	
THEORETICAL	GEO-101	Unit-1: Geotectonics	20	5	25	50	2 hours
		Unit-2: Geomorphology	20	5	25		
	GEO-102	Unit-3: Oceanography	20	5	25	50	2 hours
		Unit-4: Hydrology	20	5	25		
	GEO -103	Unit-5: Climatology	20	5	25	50	2 hours
		Unit-6: Population Geography	20	5	25		
	GEO -104	Unit-7: Basics of Environment and Ecology	20	5	25	50	2 hours
		Unit-8: Agricultural Geography	20	5	25		
PRACTICAL	GEO -105	Unit-9: Hydrological Techniques	25	-	25	50	4 hours
		Unit-10:Environmental Mapping	25	-	25		
	GEO -106	Unit-11: Basic Statistics in Geography	25	-	25	50	4 hours
		Unit-12: Principles of Remote Sensing and Aerial Photography	25	-	25		

SEMESTER-II
(Duration: January – June)

Type	Course	Unit	Marks				Examination Time
			End-term Exam.	Internal Exam.	Unit Total	Paper Total	
THEORETICAL	GEO -201	Unit- 13: Regional Geomorphology	20	5	25	50	2 hours
		Unit- 14: Geography of West Bengal & India	20	5	25		
	GEO -202	Unit- 15: Population and Development	20	5	25	50	2 hours
		Unit-16: Regional approach in Geography	20	5	25		
	GEO -203	Unit- 17: Concepts in Settlement Geography	20	5	25	50	2 hours
		Unit- 18: Political Geography	20	5	25		
	GEO -204	Unit- 19: Environmental Engineering	20	5	25	50	2 hours
		Unit-20: Environmental Hazards and Management	20	5	25		
PRA	GEO -205	Unit- 21: Computer Basics and Applications	25	-	25	50	4 hours
		Unit- 22: Sedimentological Analysis	25	-	25		

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	GEO -206	Unit- 23: Physical and Social Thematic Mapping	25	-	25	50	4 hours
		Unit-24: Applications of Remote Sensing and Geographic Information System	25	-	25		

SEMESTER- III
(Duration: July – December)

Type	Course	Unit	Marks				Examination Time
			End-term Exam.	Internal Exam.	Unit Total	Paper Total	
THEORETICAL	GEO -301	Unit- 25: Soil and Ecosystem	20	5	25	50	2 hours
		Unit- 26: Geography of Globalization	20	5	25		
	GEO -302	Unit- 27: Economic Zones and Development Programmes in India	20	5	25	50	2 hours
		Unit- 28: Transport Geography	20	5	25		
	GEO -303	Unit- 29: Cultural Geography	20	5	25	50	2 hours
		Unit- 30: Environmental Ethics & Regulation	20	5	25		
		SPECIAL PAPERS **Option-1: Coastal Management**					
	GEO -304	Unit- 31: Coastal Processes	20	5	25	50	2 hours
		Unit-32: Coastal Environments: Focus on Indian Regions	20	5	25		
		Option- 2: Urban Geography & Regional Planning					
		Unit- 31: Foundation of Urban Geography	20	5	25	50	2 hours
		Unit- 32: Contemporary Urban Issues	20	5	25		
		Option-3: Remote Sensing and Geographic Information System					
		Unit- 31: Physical Basis of Remote Sensing	20	5	25	50	2 hours
		Unit-32: Photogrammetry, Aerial Photo and Satellite System	20	5	25		
PRACTICAL	GEO -305	Unit- 33:Map Transformation and Geodesy	25	-	25	50	4 hours
		Unit- 34: Spatial Analysis in Geography	25	-	25		
	GEO -306	Unit- 35: Research Methodology	25	-	25	50	4 hours
		Unit- 36: Research Exercise in Geography	25	-	25		

SEMESTER-IV

(Duration: January – June)

Type	Course	Unit	Marks				Examination Time
			End-term Exam.	Internal Exam.	Unit Total	Paper Total	
THEORETICAL	GEO -401	Unit- 37: Schools in Geographical Thought	20	5	25	50	2 hours
		Unit- 38: Contemporary Discourses in Geography	20	5	25		
	GEO -402	Unit-39: Land, Water and Forest: Conflict and Conservation	20	5	25	50	2 hours
		Unit- 40: Social and Health Geography	20	5	25		
	GEO -403	Unit- 41: Regional Development and Multilevel Planning	20	5	25	50	2 hours
		Unit- 42: Landscape Ecology and Planning	20	5	25		
		SPECIAL PAPERS **Option-1: Coastal Management**					
		Unit- 43: Coastal Ecology and Hazards	20	5	25		
		Unit- 44: Coastal Issues and Management	20	5	25	50	2 hours

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	GEO -404	**Option- 2: Urban Geography & Regional Planning**					
		Unit- 43: Theoretical Bases of Regional Planning	20	5	25	50	2 hours
		Unit-44: Planning for Regional Development	20	5	25		
		Option-3: Remote Sensing and Geographic Information System					
		Unit- 43: Advanced Remote Sensing	20	5	25	50	2 hours
		Unit- 44: Advanced GIS and Applications of Remote Sensing	20	5	25		
PRACTICAL	GEO -405	Unit- 45: Advanced Quantitative Methods	25	-	25	50	4 hours
		Unit- 46: Geographic Information System	25	-	25		
	GEO -406	Unit- 47: Field Work	25	-	25	50	4 hours
		Unit- 48: Field Report	25	-	25		

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SYLLABUS
Semester- I (300 Marks)
THEORETICAL COURSES (200 Marks)

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

Unit-1: GEOTECTONICS

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.*

1.1 Origin and evolution of Universe with special reference to Stellar evolution.
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

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.*

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 landforms. 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)

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Unit- 3: OCEANOGRAPHY

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.*

3.1 Marine Environment and Processes: Major subdivisions 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, mangrove 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, mangrove nodules, cobalt-rich oceanic crusts, phosphate deposits, living resources.

Unit-4: HYDROLOGY

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.*

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 estimates using curve number, stream discharge estimates by area-velocity method. Ground water: storage structure, flow, recharge and discharge.
4.5 Hydrographs and Rating curve: Time dimensions of hydrographs: concept of unit hydrograph and rating curves and their significance.

PAPER -GEO-103: CLIMATOLOGY AND POPULATION GEOGRAPHY

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(Marks- 50)

Unit-5: CLIMATOLOGY

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.*

5.1 Nature and Scope of Climatology and its relationship with Meteorology, climatological systems operating in different space and timescale: thunderstorm, tropical cyclone, 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 it's climatic significance; Maritime influence on coastal weather: seasonal changes and storm events.

5.5 Climatic changes through geological periods- evidences and possible causes; Global Warming- Natural and anthropogenic causes and probable consequences.

Unit-6: POPULATION 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.*

6.1 Scope, development and recent trends of population geography and its interdisciplinary nature.

6.2 Population composition and structure: Types, spatial and temporal variation and determinants of age, sex, literacy and rural-urban ratio.

6.3 Demographic Transition: Facts, theories, different waves. Its social, political and economic impacts.

6.4 Population projection: Concept, types and methods.

6.5 Population- resource relationship: Critical analysis of over, under and optimum population, population resource regions, carrying capacity and change in carrying capacity over time. Population policy issues, population equilibrium.

PAPER-GEO-104: BASICS OF ENVIRONMENT AND ECOLOGY AND AGRICULTURAL GEOGRAPHY

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(Marks- 50)

Unit-7: BASICS OF ENVIRONMENT 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 Concept of Environment, major elements of environment, functioning of environmental systems, role of biotic and abiotic elements.
8.2 Ecosystem: structure, function and processes, patterns of energy flow.
8.3 Biogeochemical cycles (Nitrogen, Carbon, Phosphorus), ecosystem metabolism, ecosystem process (photosynthesis and respiration), trophic levels (food web and chain) decomposition, ecosystem stability.
8.4 Terrestrial ecosystems: Forest, Grassland, Desert and Agriculture.
8.5 Biodiversity: Genetic, species, community and ecosystem diversity; biodiversity uses, threats to biodiversity, biodiversity conservation.

Unit-8: AGRICULTURAL 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.*

7.1 Agricultural Geography: concept, nature and scope.
7.2 Approaches in agricultural geography: agricultural systems (ecological or near-ecological systems). Approaches to study agricultural geography, Jonnason's theory on agricultural landuse.
7.3 Determinants of agricultural pattern: physical and institutional.
7.4 Methods and techniques in agricultural geography: crop combination, diversification, measurement of agricultural productivity and efficiency, crop intensity, precision farming, use of modern technology.
7.5 Issues and policies in modern Agriculture: Impact of green revolution, GM Crops, food security, agricultural policies and their implication.

PRACTICAL COURSES
(100 Marks)

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PAPER GEO-105: HYDROLOGICAL TECHNIQUES AND ENVIRONMENTAL MAPPING

(50 Marks)

Unit-9: HYDROLOGICAL TECHNIQUES

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.*

9.1 Point rainfall analysis, area-depth curves, Thiessen network and Isohyetal methods to determine rainfall volumes.
9.2 Estimating infiltration using infiltrometre 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: ENVIRONMENTAL MAPPING

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.*

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 STATISTICS IN GEOGRAPHY AND PRINCIPLES OF AERIAL PHOTOGRAPH AND REMOTE SENSING

(Marks- 50)

Unit-11: BASIC STATISTICS 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.*

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.

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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, shortest path analysis, student's t- test.
11.5 Sampling techniques for geographical analysis.

Unit-12: PRINCIPLES OF REMOTE SENSING AND AERIAL PHOTOGRAPHY
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.*

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).
12.3 Satellite Sensors: Concept of IFOV, resolution and determination of pixel size, referencing scheme of satellite system (path/row calculation).
12.4 Basics of Aerial Photograph: Basics geometry of aerial photograph, determination of scale and height, Distortions, Image parallax, Relief displacement.
12.5 Stereoscopy and Aerial Photo Interpretation: Stereoscopy, Pseudoscopy, Mirror Stereoscope, mosaic, edge information, mapping of Physical and Cultural features with the Air photo interpretation keys: shape, size, pattern, tone, texture, shadow, site and associations.

SUGGESTED REFERENCES

UNIT-1: Geotectonic

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U N I T - 2 : G e o m o r p h o l o g y

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UNIT-5: Climatology

Barry, R.G. and Chorley, R.T. (1992): *Atmosphere, Weather and Climate*, 6th edition, Routledge, London: 392p.

Critchfield, H.J. (1983): *General Climatology*, 4th edition, Prentice Hall India Ltd., New Delhi: 453p.

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UNIT-6: Population Geography

Binde and Kanitkar (2000): *The Principle of Population Studies*, Himalaya Publication

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UNIT-7: Agricultural Geography

Hussain, Majid (2003): *Agricultural Geography*, Anmol Publications Pvt Ltd, India.
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Gautam, Alka (2012): *Agricultural Geography*, Sharda Pustak Bhawan, Allahabad.
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Kamath M.G. (2000): *A dictionary of Indian agriculture*, Allied Publishers New Delhi.
Jha D N (2001): *Agriculture and Regeonal Planning*, Mittal Publications New Delhi.
Deininger Dina and Umali Maguire Charles (2006): *Agriculture in liberalizing economics: changing roles for governments*, World Bank Washington.
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Bhatia B.M. (2008): *Indian agriculture: a policy perspective*, Sage Publications India New Delhi.
Agrawal A.N (2005): *Indian agriculture: problems, progress and prospects*, Vani Educational Books New Delhi

UNIT-8: Basics of Environment and Ecology

Alexander, D. (1993): *Natural Disasters*, Research Press, New Delhi: 619p.
Allaby, M. (1996): *Basics of Environmental Science*, Routledge, London: 297p.
Chapman J.L. and Reiss, M.J. (1993): *Ecology: Principles and Applications*, Cambridge University Press.
Chapman, D. (1994): *Natural Hazards*, Oxford University Press, Melbourne: 174p.
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Farmer, A. (1997): *Managing Environmental Pollution*, Routledge, London: 246p.
Marsh, W.M. and Grossa, J.M. (1996): *Environmental Geography: Science, Landuse and Earth Systems*, John Wiley & Sons.
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UNIT-9: Hydrological Techniques

Bedinent, P.B.et.al. (2008*): Hydrology and Floodplain Management*, Prentice Hall,Upper Saddle River, NJ07458.
Biswas,A.K. (1972*): History of Hydrology*, North Holland Pub.Cc. Amsterdam.
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UNIT-10: Environmental Mapping

William J. Sutherland (2006): Ecological Census Techniques Edited by Cambridge 2nd edition

Lagacherie Philippe, McBratney Alex and Voltz Marc(2006) : Digital Soil Mapping :An Introductory Perspective,Elsevier

Scull, P.; J. Franklin, O.A. Chadwick & D. McArthur (June 2003). Predictive soil mapping - a review. Progress in Physical Geography ,Sage Publications.

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Gupta, K. K. and Tyagi, V. C. (1992): Working with maps, Survey of India Publication, Dehradun

UNIT-11: Basic Statistics in Geography

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

John, C. D. (2002): *Statistics and Data Analysis in Geology*; John Wiley & Sons.

Mehmood, A (1977): Statistical methods in Geographical studies, Rajesh Pub. New Delhi

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Sarkar, A. (2006): *Practical Geography; A systematic approach*, Orient Longman Ltd, Hydrabad,

Silk, J. (1979): *Statistical techniques in Geography*, George Allen and Unwin, London: 276p.

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Unit-12: Principles of Aerial Photography and Remote Sensing

Allison, L.J., Schnapf, A.(1983): Meteorological satellites: In Colwell, R.N.(ed.) *Manual of Remote Sensing*.

Campbell, J .B. (1996): *Introduction to Remote Sensing*, 2nd edition, Taylor & Francis, London: 622p.

Chaisman, N. (1992): *Exploring Geographical Information Systems*, John Wiley and Sons Inc., New York: 198p.

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Curran, P.J. (1988): *Principles of Remote Sensing*, ELBS Edn. Longman Group UK Ltd.

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Rajan, M.S. (1995): *Space today*, 2nd edition, National Book Trust, New Delhi, 344p.
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Slater, P.N. (1983): *Photographic systems for remote sensing*, Virginia,

Semester- II (300 Marks)

THEORETICAL COURSES (200 Marks)

PAPER- GEO-201: REGIONAL GEOMORPHOLOGY AND GEOGRAPHY OF INDIA & WEST BENGAL

(Marks- 50)

Unit- 13: REGIONAL GEOMORPHOLOGY

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 Geomorphology of Darjeeling Himalaya and Terai Region with special reference to landslides and alluvial fans.
13.2 Tectonics, drainage and geomorphology of Western Ghats with special reference to Deccan Trap.
13.3 Geomorphology and soil-landform assemblages of Chhotanagpur Plateau and its adjacent areas of West Bengal, Geomorphology of Rajasthan desert with special reference to Marusthali.
13.4 Form, process and evolution of Ganga, Subarnarekha and Godavari delta.
13.5 Tectonics and Geomorphology of the Islands of Bay of Andaman and Nicobar, Rameswaram and Laksha-Minikoi and Amindivi.

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Unit- 14: GEOGRAPHY OF WEST BENGAL & 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. Physical Geography of India: physiographic division, zones of natural vegetation and climate, national parks and reserves.
14.2. Resources Base of India: Coastal and marine resources, water resource region, agricultural regionalization, mineral and power resources, major industrial regions.
14.3 Major Tribes in India: Distribution and culture.
14.4 Races and Linguistic groups of India. Problem of regionalisation.
14.5 Physical Geography of West Bengal: Geographical Personality of West Bengal; Sub-regional classifications – identification and issues. Hills, Terrai- Duars, Barendra, Rarh, and Sundarban. Physiography of Purba and Paschim Medinipur.

PAPER GEO-202: POPULATION & DEVELOPMENT AND REGIONAL APPROACH IN GEOGRAPHY
(Marks- 50)

Unit-15: POPULATION & 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 The fate of Millennium development goals, Human development and gender issues: HDI,GDI, GEM-concept, measures and criticism, disparities
15.2 Population growth: Link to economic development, resource scarcity, food security and sustainable development. Concept of logistic and exponential growth
15.3 Population and development integration with special reference to India
15.4 Theories and approaches of population growth and regulation: Malthus, Marx and Neo-Malthusiasm
15.5 Migration: Concept of social mobility, concept, types, patterns, theories (Ravenstein, Lee, Louis and Zelinsky), consequences.

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.*

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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 AND POLITICAL GEOGRAPHY
(Marks- 50)

Unit- 17: CONEPTS IN 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 of shelter; Dwelling places as cultural expression
17.2 Census categories of settlements; Types, building materials and architectural design of houses- dependence on climate.
17.3 Site, situation and spacing of settlements- dependence on terrain characteristics and water availability. .
17.4 Concepts and components of rural and urban morphology.
17.5 Socio-economic segregation of rural settlements. Cities as melting pot of culture.

Unit- 18: 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.*

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18.1 Politics and Geography: Politics of Space, Scope of electoral geography, Global strategic views- Heartland and Rimland theories and their significance in present international politics.
18.2 Geopolitical significance of core-periphery theory; Nationalism and Regionalism.
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.

PAPER- GEO-204: ENVIRONMENTAL ENGINEERING AND ENVIRONMENTAL HAZARDS & MANAGEMENT
(Marks- 50)

Unit- 19: ENVIRONMENTAL ENGINEERING

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. Definition and Domain of Environment Engineering, Waste water treatment: Primary, Secondary and Tertiary treatment; Disposal.
19.2. Sludge treatment; Solid (Municipal) waste management, Hazardous waste management.
19.3. Air pollution; Indoor pollution, Air sampling and measurement, Air pollution control technologies.
19.4. Noise Pollution; Measurement of noise, Biophysical impacts, Mitigation technologies.
19.5. Arsenic Pollution; Spatial distribution, Impacts, Mitigation.

Unit-20: ENVIRONMENTAL HAZARDS & 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.*

20.1 Hazards and disasters: Concepts, paradigm and classification.
20.2 Dimensions, causes, risk perception and assessment, preparedness, impacts, responses, trauma and aftermath, vulnerability analysis, mapping and management of landslide, earthquake, flood and drought and cyclone
20.3 Dimensions, causes, risk perception and assessment, preparedness, impacts, responses, trauma and aftermath, vulnerability analysis, mapping and management of biophysical hazard (epidemic) and animal induced hazards.
20.4 Dimensions, causes, risk perception and assessment, preparedness, impacts, responses, trauma and aftermath, vulnerability analysis, mapping and management of agricultural and industrial hazards.
20.5 Dimensions, causes, risk perception and assessment, preparedness, impacts, responses, trauma and aftermath, vulnerability analysis, mapping and management of social hazards (crime and traficking).

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PRACTICAL COURSES (100 Marks)

COURSE NO. GEO-205: COMPUTER BASICS & APPLICATIONS AND SEDIMENTOLOGICAL ANALYSIS (Marks-50)

Unit- 21: COMPUTER BASICS AND APPLICATIONS

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 Computer components: Hardware and software: CPU, Input and Output devices; Common computer languages, System Software, Application Software and Operating Systems.
21.2 Representation of data; Numbering Systems; Binary Arithmetic; Basic Logic Gates; Boolean Logic and Reduction Techniques.
21.3 Computation, Storing and Formatting Spreadsheets: Computation of Rank, Mean, Median, Mode, Standard Deviation, Moving Averages, Sample Variation; Derivation of Correlation, Covariance and regression; Selection of technique and interpretation using MS-Excel and SPSS Environment.
21.4 Regression, correlation, curve fitting, multivariate analysis.
22.5 Internet Surfing- generations of data and extraction of information for power-point presentation, Manipulation and editing of graphic files.

Unit- 22: SEDIMENTOLOGICAL ANALYSIS

*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 Phi-scale of grain size distribution, texture analysis of sediment samples using standard techniques, statistical representation.
22.2 Form and shape analysis of pebble grade sediments.
22.3 Megascopic and microscopic examination of sediments.
22.4 Identification of sediментary and bioturbation structures.
22.5 Sedimentary environmental facies analysis.

PAPER-GEO-206: PHYSICAL & SOCIAL THEMATIC MAPPING AND APPLICATIONS OF REMOTE SENSING & GEOGRAPHIC INFORMATION SYSTEM (Marks- 50)

Unit- 23: PHYSICAL AND SOCIAL THEMATIC MAPPING

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 Morphometry and Drainage Network Analysis of watershed.

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23.2 Mapping of farming practices: Crop-combination, diversification and cropping intensity.
23.3 Mapping of social vulnerability and social disparities, ethnic mapping.
23.4 Estimation and Mapping of Social Well-being, HDI, GDI, GEM.
23.5 Estimation of Human Poverty Index –(HPI-I and II) for developed and developing countries.

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

SUGGESTED REFERENCES

UNIT-13: Regional Geomorphology

Ahmad, Enayat. (1972): *Coastal geomorphology of India*; Orient Longman.

Biswas, A. (1987): *Laterites and lateritoids, Explorations in the tropics*: V.S. Datye et. al., Prof. K.R.Dikshit felicitation Committee, Pune, PP.137-140.

Mukhopadhyay, S.C: *Geomorphology Of The Subarnarekha Basin: The Chota Nagpur Plateau (eastern India*, the University of Burdwan,

Rawat, T. (2008*): Environment of the Himalayas*, Eastern Book Corporation

Sehgal, J and Blum, W.E et al. (1998): *Red and Lateritic Soils*, Oxford and IBH pub.

Sharma, Hari Shanker. (1982): *Perspectives in Geomorphology*; Concept.

Sharma, H. S. (1991): *Indian Geomorphology*, Concept Publishing Company.

Starkel, L. and Basu, S. 2000 *Rains, Landslides and Floods in the Darjeeling Himalaya*, Indian National Science academy, New Delhi: 168p.

UNIT-14: Geography of West Bengal and India

Chakravorty, Satyesh (1972): Geography of West Bengal, Presidency College.

Choudhury, A.B, (1969): Geography of West Bengal,

Ranjit, Tirtha (2008): Geography of India, Rawat Publications, Jaipur.

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Singh, R. L. (2009): India: A Regional Geography, Ubs Publishers' Distributors (p) Ltd.

Goutam, Alka (2012): Advanced Geography of India, Sharda Pustak Bhawan, Allahabad

Hussain, M. (2008): Geography of India, Tata McGraw Hill Publishing Company Limited, New Delhi

UNIT-15: Population and Development

Deshpande, Ashwini. (2007): *Globalization and Development: A Handbook Of New Perspectives*; Oxford University Press, N Delhi.

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Gould, W. T. S. (2009): *Population and Development* (Series - Routledge Perspectives on Development); Taylor & Francis.
Nag, Prithvish; Kumar, Chandra Shekhar and Sengupta, Smita. (2001): *Environment, Population and Development*; Concept Publishing Company.
Ranjan, Alok. (1999): *Population And Development: The Indian Perspective*; Universal Publishers.
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Srivastava, A. K. (2004*): Population Development, Environment and Health*; Aph Publishing Corporations.
Sroaff, Meera. (2004): *Population and Sustainable Development*; Adhyayan Publishers and Distributors.
Youngs, G (2001); Globalization, Communication and Technology, Cambridge
Parr-S,F and Kumar, A.K (2005): Readings in Human Development, Oxford University Press, New Delhi
Morris, a (1998):Geography and Development, University College London Press, London

UNIT-16: Regional Approach in Geography

Bhat, L.S. (1973): *Regional Planning in India*, Statistical Pub. Society.
Chand, M. and Puri, V.K. (1988): *Regional Planning in India*, Vikas, New Delhi .
Chandana, R.C.(2000): *Regional Planning and Development*, Kalyani Publishers.
Glasson, J. (1974): *An Introduction to Regional Planning*, Hutchinson, London.
Greed (2000): *Introducing Planning*, Athlone Press, London.
Hall, P. (174): *Urban and Regional Planning*, Penguin, London.
Mishra, R.P. (1969): *Regional Planning, Concept, Techniques, Policies*, the University of Mysore Press.
Misra,R.P,Sundaram and Rao (1974): *Regional Planning In India*, Viking, Delhi.
Mitra, A. (1971): L*evels of Regional Development India*, Census of India.
Tim, Hall (2006): *Urban Geography*, Routledge.

UNIT-17: Concepts in Settlement Geography

Brian,K.R(1996):*Landscapes of Settlements:Prehistory to the Present*, Routledge,London
De Blij H.J. (1995): *The Earth: An Introduction to its Physical and Human Geography*, John Wiley and Sons Inc., New
De Blij H.J. (1996): *Human Geography: Culture, Society and Space*, John Wiley and Sons Inc., New York: 531 p.
Ghosh, S. (1998): *Introduction to Settlement Geography*, Orient Longman Ltd., Calcutta: 158p.
Hudson, F.S. (1970): *Geography of Settlements*, Macdonald and Evans Ltd., Plymouth
Hussain, M. (1994): *Human Geography*, Rawat Pub. Co., New Delhi: 485p.
Misra. H.N. (ed) (1987): *Contributions to Indian Geography*, Volume 9: *Rural Geography*, Heritage Pub., New Delhi.
Racine, J. (ed) : *Calcutta 1981*, Concept Pub. Co., New Delhi.
Rodwin (2006): *Shelter, Settlement and Development*, Rawat Pub.
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Ramachandram, R. (1999): Urbanization and urban systems in India, Oxford University Press, New Delhi
Verma, L (2009): Urban Geography, Rawat publication, Jaipur
Roy Chaudhuri, J. (2001): An Introduction to Development and Regional Planning-with special reference to India, Orient Blackshawn, Hyderaband

UNIT-18: Political Geography

Adhirari, S. (2004): *Political Geography*, Rawat Pub. Jaipur.

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Dikshit R. D. (1975): *Political Geography, - A contemporary perspective*, Tata McGraw Hill Pub. Company, New Delhi
Dwivedi, R.L.(1990): *Fundamental of political Geography*, Chaitanya publising House, Allahabad.
Goblet, Y.M. (1955): *Political Geography and the World Map*, George Philip and sons Ltd.
Hartshorne,T.A and Alexander ,J.W. (1988): *Economic Geography* (3rd Edition), Prentice Hall of India Pvt. Ltd.
Jackson, WAD (1964): *Politics and Geographic Relationship*, PrenticeHall.
Taylor, P.J.(1985): *Political Geography, World Economy, Nation, State & Locality*, Longman, Landon.
Weigest, H. (1957): *Principles of Political Geography*, Appleton century, Crasts Inc. New york.

UNIT-19: Environmental Engineering

Brady,N.C. and Well, R.R. (2005): *The Nature and Properties of Soil*, Pearson Education, Singapore.
Masters, G .M. (1991): *Introduction to Environmental Engineering and Sciences*, Prentice Hall India Ltd. New Delhi:
Nazaroff, W.W. and Alvarej, C.L. (2001*): Environment Engineering Science*; John Wiley & Sons, Newyork.
Pielou, E.C. (1975): *Ecological Diversity*, John Wiley & Sons, Newyork
Schwab,G.O. et.al. (1993): *Soil and Water Conservation Engineering*, 4th Edition, John Wiley & Sons, Newyork
Sing,V.P. Yavada,R.N.(2003): *Environmental Pollution*, Allied Publishers Pvt. Ltd. New Delhi.
Vesilind, P.A. and Morgan, S.M. (2004): *Introduction to Environmental Engineering* (2nd Edition), Thomson, Australia.

UNIT-20: Environmental Hazards and Mangement

Alexander, D. (1993): *Natural Disasters*, Research Press, New Delhi: 619p.
Baarrsches, W.H. (1996): *Eco-facts and Eco-fiction: Understanding the Environmental Debate*, Routledge, London.
Chapman, D. (1994): *Natural Hazards*, Oxford University Press, Melbourne: 174p.
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Elsom, D.M. (1992): *Atmospheric Pollution: A Global Problem*, 2nd edition, Blackwell Pub. Co., London: 422p.
Farmer, A. (1997): *Managing Environmental Pollution*, Routledge, London: 246p.
Hyndman, Donald and Hyndman, David. (2008): *Natural Hazards and Disasters*; Cengage Learning.
Keller, Edward A. and Blodgett,Robert H. (2007): *Natural Hazards: Earth's Processes As Hazards, Disasters and Catastrophes*; Pearson Prentice Hall.
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Pickering, K. and Owen, L.A. (1997): *An Introduction to Global Environmental Issues*, 2nd edition, Routledge, London:
Roberts, N. (editor) (1994): *The Changing Global Environment*, 3rd edition, Blackwell Pub. Co., London: 531 p.
Smith, Keith and Petley, David N. (2009): *Environmental Hazards: Assessing Risk And Reducing Disaster*; Taylor & Francis.
Valancy, F. and Bronstein, D.A. (1995): *Environmental and Social .Impact Assessment*, John Wiley and Sons inc., New York: 325p.
Vogler, J. (1995): *The Global Commons: A Regime Analysis*, John Wiley and Sons Ltd., Chichester: 233p.

UNIT-21: Computer Basics and Application

Bartee, Thomas C. (1977): Digital Computer Fundamental; McGraw Hill.
Blissmer (1996): *Working with MS Word*; Houghton Mifflin Co.
Chauhan, S.; Chauhan, A. and Gupta, K. (2006): *Fundamental of Computer*; Firewall Media.
Flake, L.J.; McClintock, C.E. and Turner, S. (1989): Fundamental of Computer Education; Wordsworth Pub. Co.

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Johnson, Steve (2007): Microsoft Power Point 2007; Pearson Paravia Bruno.
Leon, A .and Leon,M.(1999): Introduction to Computer, USB Publishers' Distributors Ltd.
Leon, A. and Leon, M.(1999): A beginners Guide to Computers, lean Vikas
Malvino, A.P. and Leach, D.P. (1981): Digital Principles and Appications; Tata McGraw Hill.
Mano, Moris M. and Kime, Charles R. (2004): *Logic and Computer Design Fundamental*; Prentice Hall.
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Rajaraman, V. (2008): Computer Primer; Prentice Hall of India Pvt. Ltd.
Sarkar, A. and Gupta, S.K (2002) Elements of computer Science, S Chand and Company, New Delhi
Shepard, Aaron (2007): *Perfect Pages*; Shepard Publications.
Tyson, Herbert L. (2007): Microsoft Word 2007 bible; John Wiley.
Walkenbach, John (2007): Excel 2007 Bible; John Wiley.

UNIT-22: Sedimentological Analysis

Maclane, M (1995): Sedimentology, Oxford University Press, New York, Oxford.
Folk, L. Robert (1978): Petrology of sedimentary rocks, Hemphill Publishing Company, Austin, Texas.
Collinson, J.D and Thompson, D.B. (1989): Sedimentary structures, CBS Publishers and Distributors, New Delhi.
Miall, A.D. (2006): Geology of the fluvial deposits: Sedimentary facies, basin analysis and petroleum geology, Springer.
Reading, H.G. (1996) Sedimentary environments: Processes, Facies and Stratigraphy, Blackwell Science.
Sengupta, S (1994): Introduction to sedimentology, Oxford and IBH Publishing New Delhi
Lindholm Roy C. (1986): A practical approach to sedimentology, C B S Publishers and Distributors New Delhi

UNIT-23: Physical and Social Thematic Mapping

Basu, R. and Bhaduri, S. (2007): Contemporary Issues and Techniques in Geography, Progressive Pub.
Dent., D.B (1993): *Cartography: Thematic map design*, Sea Brown Publishers
Misra, R.P and Ramesh, A (1989): *Fundamental of Cartography*, Concept, Delhi
Monkhouse F.J. and Wilkinson, H.R. (1971): *Maps and Diagrams: Their Compilation and Construction*, B.I. Publications Private Limited, New Delhi: 527p.
Nag, P and Dutta, G.K (1992): *Thematic Cartography and Remote Sensing*, Concept
Robinson, A.H., Sale, R.D., Morrison, J. (1984) : *Elements of Cartography*, Wiley, New York:
Wilford, J,N (2000): *The Map Makers*, A.A. Knopf

Dent, B. D. (1985): Principles of Thematic Map Design; Addison WESLEY Pub. Co.
Mahmood, A. (1997): Statistical Methods in Geographical Studies; Rajesh Publication.
Misra, R. P. and Ramesh, A. (1969): Fundamentals of Cartography; Prasaranga, University of Mysore.
Monkhouse F.J. and Wilkinson, H.R. (1971): *Maps and Diagrams: Their Compilation and Construction*, B.I. Publications Private Limited, New Delhi: 527p.
Robinson, A.H., Sale, R.D., Morrison, J. (1984): Elements of Cartography, Wiley, New York.

UNIT-24: Application of Remote Sensing In Geography

Allison, L.J., Schnapf, A.(1983): *Meteorological satellites*: In Colwell, R.N.(ed.) Manual of Remote Sensing (2nd edn).
Avery,T.E.,and G.L.Berlin, (1992): *Fundamental of remote sensing and air photo interpretation*,5th ed, Macmillan, New York,
Billingsley, F.C. (1983): *Data Processing and Reprocessing*: In Colwell, R.N.(ed.) Manual of Remote Sensing (2nd edn).
Bukata,R.P., et al., (1995): *Optical Properties And Remote Sensing Of Inland And Coastal Waters*, CRC press, New York,
Campbell, J .B. (1996): *Introduction to Remote Sensing*, 2nd edition, Taylor & Francis, London: 622p.
Canada Center for Remote Sensing, *Remote Sensing Tutorial*
Cracknelll, A.P., and L.W.B.Hayes, (1991): *Introduction to Remote Sensing*, Taylor and Francis, Washington.

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Curran, P.J. (1980): *Mlltispectral remote sensing of vegetation amount*, Progress in Physical Geography
Curran, P.J. (1988): Principles of Remote Sensing, ELBS Edn. Longman Group UK Ltd.
Guha, P.K. (2003): *Remote Sensing for the Beginner*, Affiliated East-West Press Pvt. Ltd., New Delhi
Joseph, George, (2003): *Fundamental of Remote Sensing*, University Press (India) Pvt. Ltd, Orient Longman Pvt. Ltd., Hyderabad, India
Lillesand, T.M. and Kieffer, R.W., 2003. Remote Sensing and Image Interpretation, 5th Edition. Wiley, NY.
Marcolongo, B. And Mantorani, F. (1997): *Photogeology: Remote Sensing Application in Earth Science*, Oxford and IBH Pub. Pvt. Ltd., New Delhi: 195p.
Rajan, M.S. (1995): *Space today*, 2nd edition, National Book Trust, New Delhi, 344p.
Sabins, F.F., (1997): *Remote Sensing: Principles and Applications*, 3rd edition, W.H. Freeman & Company, New York: 494p.

Semester- III (300 Marks)

THEORETICAL COURSES (200 Marks)

COURSE NO. GEO-301: SOIL & ECOSYSTEM AND GEOGRAPHY OF GLOBALIZATION
(Marks- 50)

Unit- 25: SOIL AND ECOSYSTEM

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 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.
25.2 Soil Geomorphology: soil landscape analysis in relation to geomorphic surfaces and surface morphometry, catena concept- catena and soil hydrology, slope description and catena, soil catena under different environment, soil morphology and chrono-sequence.
25.3 Linking people and ecosystems: Variety of earth's ecosystems, Managing ecosystems-trade offs and costs, causes and types of ecosystems degradation, managing ecosystem health.
25.4 Coastal ecosystems: Extent and modification, assessing goods and services, island ecology.
25.5 Freshwater ecosystems and Mountain ecosystems: Extent and Modification, assessing goods and services.

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***

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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, 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: ECONOMIC ZONES & DEVELOPMENT PROGRAMMES IN INDIA AND TRANSPORT GEOGRAPHY
(Marks- 50)

Unit-27: 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.*

27.1 Concepts of Special Economic Zone (SEZ), Exclusive Economic Zone (EEZ), Export Processing Zone (EPZ), industrial complex and industrial hub.
27.2 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.
27.3 Transport Development: Golden Quadrilateral, Pradhan Mantri Gram Sadak Yojana, National Freight Corridor. Bharat Nirman Programmes.
27.4 Emerging Industries: Food Processing, Information Technology, Tourism, Gems and Jewellery industry.
27.5 Relative Importance of Tertiary, Quaternary, Quinery activities.

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, Allocation Model, 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.

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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: CULTURAL GEOGRAPHY AND ENVIRONMENTAL ETHICS & REGULATIONS
(Marks-50)

Unit- 29: CULTURAL 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.*

29.1 Cultural Geography: Definition, scope and nature.
29.2 Race ,religion, language as cultural attributes with special reference to India, North-South social -cultural divide.
29.3 World cultural Realms, Morphology of cultural landscape (Carl O Sauer) and cultural diversity.
29.4 Cities as melting pot of culture. Traditional folk culture- crisis and transformation
29.5 Cultural processes: Diffusion, acculturation, assimilation and cultural pluralism.

Unit- 30: 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.*

30.1 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.
30.2 Ethics, culture and conservation of environment: Landscape ecology and ethno-ecology, environmental stewardship.
30.3 Environmental Impact Assessment (EIA), Environmental Management Planning (EMP), Environmental Performance Assessment (EPA).
30.4 Global Environmental Issues: Stockholm Conference, the Earth Summits, Inter-Governmental Panel for Climate Change (IPCC).
30.5 Environmental Laws in India: Wild life Act, Forest Acts, Environmental Protection Act, National Environmental Tribunal Act.

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PAPER- GEO- 304: SPECIAL PAPERS (Marks- 50)
(Option-1: COASTAL MANAGEMENT)

Unit- 31: COASTAL PROCESSES

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 Definition of coastal zone, relevance of coastal study, classification of coast - Beach stage model.
31.2 Wave hydrodynamics; wave modification near coast with special reference to attenuation, breaker types, energy dissipation during breaking wave.
31.3 Tide; diurnal and semi-diurnal, rotating and progressive tide, concept of live storage, tidal environment with special reference to estuary.
31.4 Coastal current; intensity of long shore component and its implications, cell circulation.
31.5 Macro land forms with special reference to beaches and dunes; micro and biogenic forms.

Unit- 32: 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.*

32.1 Tide dominated coastal environment: (Estuaries of India, estuary morphology, estuary hydrolodynamics); wave dominated coastal environments: (The shore face, beaches, barriers and human activity)- Indian experiences.
32.2 Morphodynamic behavior of coastal systems (Modification of coastal features in temporal and spatial scales with feedback mechanisms).
32.3 Carbonate platforms and beach rocks (Andaman and Nicobar Islands).
32.4 Coastal erosion problems (West Bengal, Orissa coasts), land reclamations and associated problems (Sundarban coastal tract)
32.5 Techniques for assessing coastal hazards areas (Hazard zonation along the coasts).

(Option-2: URBAN GEOGRAPHY AND REGIONAL PLANNING)

Unit- 31: FOUNDATION OF URBAN 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 Development of urban geography as a systematic discipline: Scope, content and recent trends.

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31.2 Concept and definitions of urban system: Urban, urbanization, urbanism and urban ecology, National urban system and global economy: nature of urban system, global economy and global shift.
31.3 Today's cities and suburbs: suburban sprawl, smart growth, exurbs, the new cities and gated communities
31.4 Origin and growth of urban living: bases and processes, Historical perspectives on world urbanization
31.5 Urban planning, policies and regeneration: Architectural vision, European, Anglo American tradition and planning the social city, the new towns movement, toward planning for sustainable urban development.

Unit- 32: CONTEMPORARY URBAN ISSUES

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 Changing spatial and temporal scenario of metropolitan development in India.
32.2 The economy of urban areas: structure of urban economy (basic and non-basic), urban change within global economy (TNC, MNC, new production systems, deindustrialization and tertianization).
32.3 Urban sociology and urban life: classic and modern statements (Karl Marx, E. Durkheim, Max Weber, Robert Park and Louis Wirth), Classical theories: Tolerance and impersonality in the city, urban pathology and urban malaise
32.4 Social environment of the city: Social stratification, social class diversity, suburban social class, poverty, strangers, crowding, crime and homelessness.
32.5 Urban environment problems: Heat island, drainage, sewerage, sanitation, transport, congestion, pollution and health, the city's ecological footprint, Urban Livability Index. Application of Remote Sensing and GIS in urban planning and management.

(Option-3: REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEM)

Unit- 31: PHYSICAL BASIS 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.*

31.1 Physics of Remote Sensing: Source of Energy, Electro Magnetic Radiation (EMR), Radiation laws (wavelength-frequency-energy relationship of EMR), influence of atmosphere on Remote Sensing operation.
31.2 Fundamental of Thermal Remote Sensing: Radiant temperature, Kinetic temperature, Black body and real body radiation.

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31.3 Satellite orbits and Trajectories: Principles of satellite movements, orbits and trajectory, orbiting satellites-basic principles, orbital parameters, types of satellites.
31.4 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.
31.5 Remote Sensing Data: Data acquisition and reception, Data products, storage and Dissemination.

Unit- 32: PHOTOGRAMMETRY, AERIAL PHOTO 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.*

32.1 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.
32.2 Aerial Photographic Film: Film density and Characteristics Curve, Colour Infrared Films, Film resolution, Filters.
32.3 Photogrammetry: Development of Photogrammetry, Classification, processes and Limitations of photogrammetry.
32.4 Stereo photogrammetry: Conditions for Stereo vision, stereoscopic measurements, Sterescopic 3D viewing, Image parallax, Rectification, Orthorectification.
32.5 Satellite Systems: Whiskbroom system, Pushbroom system, Microwave system, coarse resolution, fine resolution and very fine resolution system.

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:

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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

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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).

SUGGESTED REFERENCES

UNIT-25: Soil and Ecosystem

Bhattacharjee, J.C. (1997): *Introduction to Pedology*, Oxford & IBH.
Biswas, T.D. and Mukherjee, S.K. (1987): *Textbook of Soil Science*, Tata-McGraw-Hill, 314p.
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De, N.K. & Ghosh, P. (1993): *A Study In Soil Geography*, Shribhumi.
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Sarkar, Dipak. (2003*): Fundamentals and Applications of Pedology*, Kalyani Pub.
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Simmons, I. G. 1981: The Ecology of Natural Resources, ELBS/ Edward Arnold, London.
Simmons, I.G. 1980: Bio-geographical Processes, George Allen and Unwin,

UNIT-26: Geography of Globalization

Appaduria, A. (2001): *Globalization*, Duke University Press
Cofman, E and Youngs, G (1996): *Globalization: Theory and Practice*, Continum International Publishing Group.
Dasgupta, Biplab (2005): *Globalization- India's Adjustment Experience*; SAGE, New Delhi.
Haggett, P. (2001): *Geography: A Global synthesis*, Prentice Hall
Mackinnon, D. and Cumbess, A. (2007): *An Introduction to Economic Geography: Globalization, Uneven development and ……*, Prentice Hall
Mc Cann(Eds)(2004):*From Local to the Global*, Rawat Publishers
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W.Murray (2006): *Geographies of Development*, Routhledge Publication
Youngs, G. (2001): *Globalization, Communication and Technology*, Cambridge.
Goldin, I and Reinert, K (2012) : Globalization for Development, Oxford University Press, New York
Potter, R.B and Binns, Tony (Eds) (2001); Globalization and Development, Pearson Education Limited, Harlow

UNIT-27: Economic Zones and Development Programmes in India

Churchel, R. R. and Lowe, A.D (1999): *The Law of the Sea*, Manchester University Press
Doshi, K (2007*): Treaties on Special Economic Zone*, Snow White Publication
Dutt, R. and Sundaram.K.P.M . (2007*): Indian Ecocomy*, S. Chand and Com Ltd, Ramnagar, New Delhi
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India, 2009: Publication Division,Ministry of Information Broadcasting, Govt. of India
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Menon, N and Nigom, A (2007): *Power and the Contestation: India since 1989*, Zed Books
Smith, R.W (1986*): Exclusive Economic Claims: An Analysis and Primary Documents*, Martinus Nijhoff Publisher

UNIT-28: Transport Geography

Adler, H.A (1987): *Economic Appraisal of Transport Project*, John Hapkins Press. Washington.
Dasgupta, A.K. and Pearee, D.W. (1972); *Cost Benefit analysis, theory and practice*; Mac Millan, London.
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Lays M.G. (1993*): Wags of the World*, Primarera Press, Sydwen
Pearce D.W. and Markyanda, A. (1989*): Environmental policy Benefits*, Manetany valuation OECD ,Paris.
While, P. (1986): *Public Transport Planning*, Management and operation, Hatechinson, London.

UNIT-29: Cultural Geography

Carter, J. And Jones, T. (1989): *Social Geography: An Introduction to Contemporary Issues*, Edward Arnold, London
De Blij H.J. (1996): *Human Geography: Culture, Society and Space*, John Wiley and Sons Inc., New York: 531 p.
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Jackson, A.K and et.al (2005): Cultural Geography: A critical dictionary of key concepts, Tauris, London

UNIT-30: Environmental Ethics and Regulation

Farmer, A. (1997): *Managing Environmental Pollution*, Routledge, London: 246p.
Ghosh, S.K. (2007): *Environmental Act in India*,
Joshi, A. (2008): *Global Environmental Agreements: Insight and Implication*, Eastern Book Corporation
Marsh, W.M. and Grossa, J.M. (1996): *Environmental Geography: Science, Landuse and Earth Systems*, John Wiley & Sons.
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Park, C. (1998): *The Environment: Principles and Applications*, Routledge, London:
Pickering, K. and Owen, L.A.(1997) : *An Introduction to Global Environmental Issues*, 2nd edition, Routledge, London.
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UNIT-31: Coastal Processes

Carter, R.W.G (1988): *Coastal Environments: An Introduction to the Physical, Ecological and Cultural Systems of Coastlines*, Academic Press, London
Dayer K.R. (1979): *Estuary Hydrography, and Sedimentation*, Cambridge Univ. Press, Cambridge.
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Harikawa , K. (1978): *Coastal Engineering*, Univ Of Tokyo Press, Tokyo.
Inman, D.L. (1960): *Shore Processes, Encyclopedia of Science & Technology*, Mc Graw Hill, New York.
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UNIT-32: Human Impact on Coastal Processes

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UNIT-31: Foundation of Urban Geography

Carter, H. (2002): *Urban Geography*, 4th edition Arnold-Heinemann, New Delhi: 434p.

De Blij, H.J. and Muller, P.O. (1997): *Geography: Realms Regions and Concepts*, 8th edition, John Wiley and Sons Ltd., New York: 569p.

Dickinson, J., Gould, B., Clarke, C., Mather, S., Prothero, M., Siddle, D., Smith, C. and Thomas-Hope, E. (1996): *A Geography of the Third World*, 2nd edition, Routledge, London: 334p.

Dickinson, R.E. (1968): *City and Region: A Geographical Interpretation*, Routledge and Kegam Paul Ltd. London.

Ghosh, S. (1998): *Introduction to Settlement Geography*, Orient Longman Ltd., Calcutta: 158p.

Gore, Charles (1984). : *Region in question*, Routledge Publisher.

Hudson, F.S. (1970): *Geography of Settlements*, Macdonald and Evans Ltd., Plymouth:

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Singh, R.L. (editor) (1971): *India: A Regional Geography*, National Geographical Society of India / UBS Pub. Distributors Ltd., New Delhi: 992p.

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Spate, O.H.K. and Learmonth, A. T.A. (1967): *India and Pakistan*, 3rd edition, Munshiram Monoharlal Pub. Pvt. Ltd., New Delhi: 877p.

Tewari, V. Weinston, J. and Prakash Rao, V.L.S. (1986): *Indian Cities: Ecological Perspectives*, Concept Pub. Co., New Delhi.

UNIT-32: Contemporary Urban Issues

Ahuja,R (1999): *Social Problem in India*, Rawat, Jaypur

Carter, H. (1981): *Urban Geography*, 3rd edition Arnold-Heinemann, New Delhi: 434p.

Herbert, D. (1977): *Urban Geography- A social Perspectives*, David and charles, London

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UNIT-31: Physical Basis of Remote Sensing

Campbell, J .B. (1996): *Introduction to Remote Sensing*, 2nd edition, Taylor & Francis, London; 622p.

Cracknelll, A.P., and L.W.B.Hayes, (1991): *Introduction to Remote Sensing*, Taylor and Francis, Washington, DC.

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Rajan, M.S. (1995): *Space Today*, 2nd edition, National Book Trust, New Delhi, 344p.

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UNIT-32: Photogrammetry and Satellite Systems

American Society of Photogrammetry (ASP), (1983): *Manual Of Remote Sensing*, second edition, ASP, Fallschurch, VA,

Chaisman, N. (1992): *Exploring Geographical Information Systems*, John Wiley and Sons Inc., New York: 198p.

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Martin, D. (1991): *Geographical Information Systems and their Socioeconomic Applications*. London, Routledge.
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Ulaby, F.T., Moore, R. K. and Fung, A.K. (1982): *Microwave Remote Sensing Active and Passive*, Volume II, Radar

UNIT-33: Map Transformation and Geodesy

Kraak, M.J. and Ormeling, F. (2004): *Cartography- Visualization of Geospatial Data*; Pearson Education, Singapore.
Maling, D.H. (1973*): Co-ordinate systems on Map Projection*; George Philip and Sons Ltd, London
Raisz, E. (1962): *Principles of cartography*; Mc Graw Hill, NY.
Richards, P. and Adler, R.K. (1974): *Map Projections*, North Holland Publishing Company, New Delhi.
Robinson, A.H., Sale, R.D., Morrison, J. (1984): *Elements of Cartography*, Wiley, New York:
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Steers, J.A. (1965): *An Introduction to Map Projections*, 14th ion, University of London Press, London:

UNIT-34: Spatial Analysis in Geography

Clark, C.D. and Wilson, C.(1994): *Spatial Analysis of Lineaments: Computer and Geosciences*, V.20.No. 7/8,p. 1237-1258.
Cliff, A.D. and J.K.Ord (1981): Spatial Processes: Models and Applications. London, Pion Ltd.
Getis, A. and B. Boots (1978): Models of Spatial Processes: An Approach to the study of Point, Line and Area Patterns. Cambridge, Cambridge University Press.
John, J.C.(2002):*Statistics and data nalysis in Geology*, Singapore, JohnWiley & Sons(Asia).
Watson, D.F. (1992): *Contouring: A Guide to the Analysis and Display of Spatial Data*, Oxford, Pergamon Press.
Watson, G.S. (1970): *Orientation Statistics in the Earth Sciences*, Bull.Geol. Inst.Uppsala, V.2. No. 9, p.73-89.
Watson, G.S. (1983): *Statistics on Spheres*, New York, John Wiley & Sons

UNIT-35: Research Methodology

Compton,R.R.(1985): *Geology in the Field*, John Wiley and Sons.
Gardiner,V. and Dacombe,R.(1983):*Geomorphological Field Mannual*,George Allen and Unwin, London
Ghosh,B.N.(1982): *Scientific Methods and Social Research* ,Starling Publishers Private Ltd. New Delhi.
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Kothari,R.C(2004):*Research Methodology*,New Age International Publishers, New Delhi.
Mishra,H.N(1998): *Research Methodology in Geography*, Rawat Publication.
Ramachandran,P.(1971):*Training in Research Methodology in Social Sciences in India*, ICSSR, New Delhi
Shama,B.A.V. et al (1983): *Research Methods in Social Sciences*, Chaitanya Publishing House, Allahabad.
Sjoberg g. and Nett (2002*): Methodology of Social Research*, Rawat Publication
Wang, X and Vonhofe, R.A (200&): *Research Method in Urban and Regional Planning*, Springer
Young,P.V.(1960): *Scientific Social Surveys and Research;* 3rd Ed ,Prentice Hall, New York
Bordens, K,S and Abbott, B.B (2011): Research Design and Methods, Tata McGraw Hill Edition, New Delhi

UNIT-XXXVI: Prototype Research Exercise in Geography

Alvi. Z. (1995*): Statistical Geography: Methods and Applications*, Rawat Publication, New Delhi
Compton,R.R.(1985): *Geology in the Field*, John Wiley and Sons.
Gardiner,V. and Dacombe,R.(1983):*Geomorphological Field Mannual*,George Allen and Unwin, London

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Kothari,R.C(2004):*Research Methodology*,New Age International Publishers, New Delhi.
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Pal, S.K. (1999): *Statistics for Geoscientists*, Concept publishing Company, New Delhi: 423p.
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Semester- IV (300 Marks)

THEORETICAL COURSES (200 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 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.*

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 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.*

38.1 Pragmatism, Positivism and Quantitative revolution in geography

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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, WATER AND FOREST: CONFLICT & CONSERVATION AND SOCIAL & HEALTH GEOGRAPHY

(Marks-50)

UNIT-39: LAND, WATER AND FOREST: CONFLICT AND CONSERVATION

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 class systems, land use capability classes.
39.2 Land degradation, land conservation and land improvement.
39.3 Water assessment: water quality, water availability and scarcity of water, saline ground water in coastal areas, functions of wetlands.
39.4 Characterization diversity of rainforests and mangrove forests
39.5 Degradation and management of forest, social forestry and agro-forestry.

Unit- 40: SOCIAL AND HEALTH 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.*

40.1 Nature, scope and content of social Geography; Ethnicity, tribe, dialect, language, caste and religion.
40.2 Social structure and processes, social exclusion, geographies of social well-being with special reference to India.
40.3 Geographies of health: Equatorial, Tropical and Temperate belts.
40.4 Disease, ecology and environment (the human ecology of disease), Landscape epidemiology and epidemiological transition.
40.5 Social perspectives on health inequalities, health care and its delivery system in India.

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PAPER-GEO-403: REGIONAL DEVELOPMENT & MULTILEVEL PLANNING AND LANDSCAPE ECOLOGY & PLANNING
(Marks- 50)

Unit- 41: REGIONAL DEVELOPMENT AND MULTILEVEL 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.*

41.1 Concept of planning: Levels of planning: Types of planning and regional disparities.
41.2 Basic principles and methodology of regional planning
41.3 Regional development strategies: Centralized, decentralized and multilevel planning for rural and urban areas, people's participation in planning- Panchayati Raj Institution.
41.4 Planning regions in India: Purpose and methods of delineating planning region. Demographic, social and economic disparities in India.
41.5 Concept and approach to rural development, Rural development programmes in India in different planning period.

Unit- 42: LANDSCAPE ECOLOGY AND 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.*

42.1 Landscape: Definition, concept, nature, role, ecological description of landscape.
42.2 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).
42.3 Landscape Dynamics: Energy flow, species movement, nutrient movement.
42.4 Anthropogenic Modification: Agricultural intensification, deforestation and development.

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42.5 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.

PAPER-GEO-404: SPECIAL PAPERS
(Marks- 50)

(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 Study and management of- Sea weeds; seaweed ecosystem, artificial seaweeds.
43.2 Dune vegetation: Dune initiating and dune building types, adaptation and reproduction, plant-animal interaction in sand dune. Mangroves: physical environment and ecology.
43.3 Coastal hazards and their management: Sea level change- long and short term changes, regional and global effects on shore; Coastal erosion- causes and effects; Storm hazard- role in sediment transfer, effects on open and estuarine coast, management of storm hazard.
43.4 Techniques of monitoring coastal processes and land forms.
43.5 Coastal studies in India: Monitoring and research.

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.

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(Option-2: URBAN GEOGRAPHY AND REGIONAL PLANNING)

Unit- 43: THEORETICAL BASES OF 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 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 History of regional planning in India, theories of regional planning. Concept of balanced and unbalanced growth
43.2 Regional development perspectives: Colonial period (Dependency theories- Friedman, Andre Gander Frank, David Slater)
43.3 Growth Pole theories and the developing world by Perroux, Myrdal, Hirschman, and Boudiville.
43.4 Agropolitan Development, Basic need approach (E.A.J Johnson, Dennis Rondinelli-USAID)
43.5 Regional Environmental issues in Purba and Paschim Medinipur Districts- Flood, Drought, coastal erosion, Salinization, Deprivation and related social conflicts, conflict in forest-society interface.

Unit- 44: PLANNING FOR REGIONAL 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.*

44.1 Concept of developed and underdeveloped economy, Regional development, level of planning, Intra- and Inter-regional planning.
44.2 Perspectives and policies of Rural and Urban planning and development.
44.3 Role of agriculture in regional development and regional plans for agricultural development in India; linkage between agriculture and industry.
44.4 Role of industries and transport in regional development.
44.5 Geographic Information System as a tool for regional planning.

(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***

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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& 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: Landuse/land covers mapping, soil and agricultural mapping, geomorphological mapping, watershed mapping.

PRACTICAL COURSES (100 Marks)

PAPER-GEO-405: ADVANCED QUANTITATIVE METHODS AND GEOGRAPHIC INFORMATION SYSTEM
(Marks- 50)

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.

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45.4 Elementary multiple regression modeling techniques: Stepwise variable entry method, Path Analysis.
45.5 Model building techniques

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.

PAPER- GEO-406: SPECIAL PAPER BASED FIELD WORKS
(Marks- 50)

Evaluation will be done on Participation of the candidate in field work- 10; Report making- 15;

(Option-1: Coastal Management)

Unit- 47: FIELD WORK

Field works in Deltaic/ Non-deltaic or Rocky Coastal Environments

47.1 Studies on the shore profile forms and channel cross sections using echo-sounder and current meter. Littoral environment observation with special reference hydrological parameters: Waves, tides, winds and currents.
47.2 Coastal sediment budget analysis.
47.3 Analysis of population pressure on the coastal zones.
47.4 Analysis of coastal ecosystem diversity using remote sensing.
47.5 Hazard mapping and community vulnerability mapping Mapping CRZ violation areas using GPS handset, Nearshore geomorphological mapping with conventional surveying equipments or with Total Station. Mapping of the forms of coastline changes

Unit- 48: FIELD REPORT
Presentation of research work-25 (Grand Viva-10 and/or Power Point presentation-15)

Generation of report (within about 100 A4 size pages including 30-40 maps/diagrams/field photographs) on the basis of field works carried out under Unit-47.

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Option-2: Urban Geography and Regional Planning)

Unit- 47: FIELD WORKS

Evaluation will be done on Participation of the candidate in field work- 10; Report making- 15;

Field works on focused urban issue(s) in an urban area e.g. Small town/ Big city/ Few wards of a Big City

47.1 Wardwise landuse/land cover survey using high resolution Remote Sensing data. Wardwise distribution of population and its change over time.

47.2 **Survey of** spatial distribution of urban facilities (Bank, School, College, Offices, Hospitals etc.), urban transport: Nodes, Network and flow: Collection of database (Primary and Secondary), Water supply system: waste collection and disposal system

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47.3 Study of Urban sprawling, renewal, economics, environmental problems etc.: Collection of database (Primary and Secondary)
47.4 Income/Social grouping, Ethnic groups Education; Occupation; Age-sex Composition etc.
47.5 Enquiries on future prospects and planning strategies

Unit- 48: FIELD REPORT
Presentation of research work-25 (Grand Viva-10 and/or Power Point presentation-15)

Generation of report (within about 100 A4 size pages including 30-40 maps/diagrams/field photographs) on the basis of field works carried out under Unit-47

(Option-3: Remote Sensing and Geographic Information System)

Unit- 47 (Field Works)
Evaluation will be done on Participation of the candidate in field work- 10; Report making- 15;
Field works for ground truth verification in a selected field area

47.1 Remote Sensing in Earth Sciences: Geomorphic Mapping; Visual interpretation of landforms; Basic Concepts, Recognition elements, interpretation of drainage pattern, erosion and deposition landforms.
47.2 Remote Sensing in Agricultural Applications: Soil Mapping, Crop Mapping/ Crop stress determination. Forest Management-Forest density mapping, Forest type mapping.
47.3 Remote Sensing in Land and Water Management: Landuse/ Land cover Planning, Land resource management; Water Resources: Surface water-ground water, water deciphering, quality inventory and monitoring, quality assessment; Watershed Management: Morphometric Analysis, Hydro-morphogeologic interpretation techniques for targeting ground water potential zones in alluvial, sedimentary and hard rock areas; flood assessment and watershed management.
47.4 Remote Sensing in Urban and Rural Development: Mapping of human habitation and type.
47.5 Remote Sensing in Coastal Management: Coastal Landuse, Spatial and temporal changes, SST, Phytoplankton assessment, Sediment assessment.

Unit- 48: FIELD REPORT
Presentation of research work-25 (Grand Viva-10 and/or Power Point presentation-15)

Generation of report (within about 100 A4 size pages including 30-40 maps/diagrams/field photographs) on the basis of field works carried out under Unit-47.

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Chorley, R.J. and Hagget, P. (editors) (1965): *Frontiers in Geographical Teaching*, OUP, Oxford: 231p.Delhi: 195p.

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UNIT-38: Contemporary Discourses in Geography

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Bird .J.(1989): *Changing Worlds of Geography: A Critical Guide to Concepts and Methods*, Oxford University Press
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UNIT-39: Land, Water and Forest: Conflict and Conservation

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UNIT-41: Regional Development and Multilevel Planning

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