Syllabus
for
B.Sc. Geography

Revised Under Graduate Syllabus (for CBCS)
w.e.f. 2018-2019

Raja Narendra Lal Khan Women's College
(Autonomous)

Gope Palace, Paschim Medinipur,
West Bengal, PIN -721102

Choice Based Credit System B.Sc. (Honours)

Geography Syllabus

	CORE COURSE (14)	**Ability Enhancement Compulsory Course (AECC) (2)**	**Skill Enhancement Course (SEC) (2)**	**Elective: Discipline Specific DSE (4)**	**Elective: Generic (GE) (4)**
I	Geomorphology Cartographic Techniques	(English/ Hindi/ MIL Communication)/ Environmental Science			GE-1 Rural Development
II	Hydrology and Oceanography Thematic Cartography	(English/ MIL Communication)/ Environmental Science			GE-2 Industrial Geography
III	Climatology Soil & Biogeography Statistical Methods in Geography		Climate change and vulnerability		GE-3 Environmental Geography
IV	Human, social and cultural Geography Regional Planning and Development Field Work and Research Methodology		**Remote sensing**		GE-4 Sustainable Development
V	Geography of India Geospatial Technology			**Economic Geography** **Tourism Geography**	
VI	Evolution of Geographical Thought Disaster Management based Project Work			**Population geography** **Environmental geography**	

B.A. /B.Sc. (Honours) Geography

Core Courses

Semester I

1. Geomorphology

2. Cartographic Techniques

Semester II

3. Hydrology and Oceanography
4. Thematic Cartography

Semester III

5. Climatology
6. Soil and bio geography
7. Statistical methods

Semester IV

8. Human, social and cultural Geography
9. Regional planning and development
10. Field Work and Research Methodology

Semester V

11. Geography of India
12. Geospatial Technology

Semester VI

13. Evolution of Geographical Thought
14. Disaster Management based Project Work

Skill Enhancement Course (SEC)

Semester III

1. Climate change and variability

Semester IV

2. Remote sensing

Elective Discipline Specific (DSE)

Semester V

DSE-1

1. Economic Geography
2. Tourism Geography

Semester VI

DSE-2

3. Population Geography
4. Environmental geography

Elective Generic Papers (GE)

Semester I

1. Rural Development

Semester II

2. Industrial Geography

Semester III

3. Environmental Geography

Semester IV

4. Sustainable Development

HONOURS COURSE: CORE SUBJECTS

GEO-H-CC-1-TH/P- Geomorphology

GEO-H-CC-2-TH/P-Cartographic Techniques

GEO-H-CC-3-TH/P- Hydrology and Oceanography

GEO-H-CC-4-TH/P- Thematic Cartography

GEO-H-CC-5-TH/P- Climatology

GEO-H-CC-6-TH/P- Soil and bio geography

GEO-H-CC-7-TH/P- Statistical methods

GEO-H-CC-8-TH/P- Human, social and cultural Geography

GEO-H-CC-9-TH/P- Regional planning and development

GEO-H-CC-10-TH/P- Field Work and Research Methodology

GEO-H-CC-11-TH/P- Geography of India

GEO-H-CC-12-TH/P- Geospatial Technology

GEO-H-CC-13-TH/P- Evolution of Geographical Thought

GEO-H-CC-14-TH/P- Disaster Management based Project Work

Honours course: Skill Enhancement Course

GEO-H-SEC-01-TH-Climate change and variability
GEO-H-SEC-02-TH-Remote sensing

Elective Discipline Specific

GEO-H-DSE-1-TH/P-Population Geography
GEO-H-DSE-2-TH/P-Economic Geography
GEO-H-DSE-3-TH/P-Tourism Geography
GEO-H-DSE-4-TH/P-Environmental geography

Elective Generic Papers

GEO-GE-01-TH-Rural Development
GEO-GE-02-TH-Industrial Geography
GEO-GE-03-TH-Environmental Geography
GEO-GE-04-TH-Sustainable Development

Structure of UG Geography Syllabus (CBCS)

Sem	Main Course	Course Title	Credit			Marks					Contact Hours/Semester	
			T	P	Total	T	P	IA	A	Total	T	P
I	Geography Core Course	GEO-H-CC-1- Geomorphology	4	2	6	40	20	10	5	75	60	30
		GEO-H-CC-2- Cartographic Techniques	4	2	6	40	20	10	5	75	60	30
	GE-I	Generic-I	6	0	6	60	0	10	5	75	24	0
II	Geography Core Course	GEO-H-CC-3- Hydrology and Oceanography	4	2	6	40	20	10	5	75	60	30
		GEO-H-CC-4- Thematic Cartography	4	2	6	40	20	10	5	75	60	30
	GE-2	Generic-2	6	0	6	60	0	10	5	75	24	0
III	Geography Core Course	GEO-H-CC-5- Climatology	4	2	6	40	20	10	5	75	60	30
		GEO-H-CC-6- Soil and biogeography	4	2	6	40	20	10	5	75	60	30
		GEO-H-CC-7- Statistical methods	4	2	6	40	20	10	5	75	60	30
	Skill Enhancement Course	GEO-H-SEC-01- Climate change and variability	4	0	4	40	0	5	5	50	16	0

	GE-3	**Generic-3**	**6**	**0**	**6**	**60**	**0**	**10**	**5**	**75**	**24**	**0**
IV	**Geography Core Course**	**GEO-H-CC-8-Human, social and cultural Geography**	**4**	**2**	**6**	**40**	**20**	**10**	**5**	**75**	**60**	**30**
		GEO-H-CC-9-Regional planning and development	**4**	**2**	**6**	**40**	**20**	**10**	**5**	**75**	**60**	**30**
		GEO-H-CC-10-Field Work and Research Methodology	**4**	**2**	**6**	**40**	**20**	**10**	**5**	**75**	**60**	**30**
	Skill Enhancement Course (SEC)	**GEO-H-SEC-02-Remote Sensing**	**2**	**2**	**4**	**40**	**0**	**5**	**5**	**50**	**16**	**0**
	GE-4	**Generic-4**	**6**	**0**	**6**	**60**	**0**	**10**	**5**	**75**	**24**	**0**
V	**Geography Core Course**	**GEO-H-CC-11-Geography of India**	**4**	**2**	**6**	**40**	**20**	**10**	**5**	**75**	**60**	**30**
		GEO-H-CC-12-Geospatial Technology	**4**	**2**	**6**	**40**	**20**	**10**	**5**	**75**	**60**	**30**
	Elective Discipline Specific (DSE)	**GEO-H-DSE-1-Economic Geography**	**4**	**2**	**6**	**40**	**20**	**10**	**5**	**75**	**60**	**30**
		GEO-H-DSE-2-Tourism Geography	**4**	**2**	**6**	**40**	**20**	**10**	**5**	**75**	**60**	**30**

VI	**Geography Core Course**	**GEO-H-CC-13-Evolution of Geographical Thought**	**4**	**2**	**6**	**40**	**20**	**10**	**5**	**75**	**60**	**30**
		GEO-H-CC-14-Disaster Management based Project Work	**4**	**2**	**6**	**40**	**20**	**10**	**5**	**75**	**60**	**30**
	Elective Discipline Specific (DSE)	**GEO-H-DSE-3-Population Geography**	**4**	**2**	**6**	**40**	**20**	**10**	**5**	**75**	**60**	**30**
		GEO-H-DSE-4-GEO-H-Environmental Geography	**4**	**2**	**6**	**40**	**20**	**10**	**5**	**75**	**60**	**30**

Division of Marks

Total marks: 1300 (CORE+SEC+DSE) + 300 (Generic)

For Internal Students						Generic Paper
Semester	**Theoretical**	**Practical**	**Internal Assessment**	**Class Attendance**	**Total**	**Total**
Semester-I	**80**	**40**	**10+10**	**5+5**	**150**	**75**
Semester-II	**80**	**40**	**10+10**	**5+5**	**150**	**75**
Semester-III	**120**	**40**	**10+10+5**	**5+5+5**	**200**	**75**
Semester-IV	**100**	**40+20**	**10+10+5**	**5+5+5**	**200**	**75**
Semester-V	**160**	**80**	**10+10+10+10**	**5+5+5+5**	**300**	**-**
Semester-VI	**160**	**80**	**10+10+10+10**	**5+5+5+5**	**300**	**-**
Total	**700**	**340**	**170**	**90**	**1300**	**300**

Outcome of the academic programme on B.Sc. in Geography

1. As Geography is the study of places and the relationships between people and their environments, students are able to correlate between the physical properties of Earth's surface and the human societies spread over the surface of the earth.

2. Syllabus structure provides students to encounter practical problems with theoretical knowledge in Geography and Environment.

3. Introduction of research methodology and field survey as well as laboratory-based field works will be helpful to gain practical experience on topics already taught theoretically.

4. This syllabus is designed to deliver students about basic knowledge of geography as a spatial science and train the undergraduates to secure employment in the sectors of geospatial analysis, development and planning, mapping and surveying.

B.A. /B.Sc. (Honours) GEOGRAPHY

Semester- I (300 Marks)

THEORETICAL COURSES (200 Marks)

1. GEO-H-CC-01-Geomorphology **6 CREDITS/60 MARKS** **90 hrs.**

Paper objectives and expected outcome:

Students are able to gain knowledge about earth's interior and develop the idea about concept of plate tectonics, and resultant landforms. Acquire knowledge about types of folds and faults and earthquakes and associated landforms. Overview and critical appraisal of landform development models. The practical section is helpful to acquire knowledge about identification of rocks and minerals, geological map and interpretation of topographical maps.

1.1. GEO-H-CC-01-TH-Geomorphology (Theory) **4 CREDITS / 40 MARKS** **60 hrs.**

1. Earth: Interior Structure and Isostasy.
2. Earth Movements: Plate Tectonics Types of Folds and Faults,
3. Geomorphic Processes: Weathering, Mass Wasting,
4. Cycle of Erosion (Davis, Penck and Hack).
5. Evolution of Landforms (Erosional and Depositional): Karst, Aeolian.
6. Evolution of Landforms: Uniclinal and Folded structure.

1.2 GEO-H-CC-01-P-Geomorphology (Practical) **2 Credits/ 20 Marks** **30 hrs.**

1. Identification of rocks and minerals.
   Rocks: Granite, Basalt, Laterite, Sandstone and Marble.
   Minerals: Talc, Mica, Hematite, Calcite, Quartz.
2. Interpretation of geological maps.
3. Interpretation of Topographical Map: slope map (Wentworth), relative relief map
4. Viva-Voce &Laboratory Notebook

Reading List

1. Bloom A. L., 2003: *Geomorphology: A Systematic Analysis of Late Cenozoic Landforms*, Prentice-Hall of India, New Delhi.
2. Bridges E. M., 1990: *World Geomorphology*, Cambridge University Press, Cambridge.
3. Christopherson, Robert W., (2011), Geosystems: *An Introduction to Physical Geography*, 8 Ed., Macmillan Publishing Company
4. Kale V. S. and Gupta A., 2001: *Introduction to Geomorphology*, Orient Longman, Hyderabad.
5. Knighton A. D., 1984: *Fluvial Forms and Processes*, Edward Arnold Publishers, London.
6. Richards K. S., 1982: *Rivers: Form and Processes in Alluvial Channels*, Methuen, London.
7. Selby, M.J., (2005), *Earth's Changing Surface*, Indian Edition, OUP
8. Skinner, Brian J. and Stephen C. Porter (2000), *The Dynamic Earth: An Introduction to physical Geology*, 4th Edition, John Wiley and Sons
9. Thornbury W. D., 1968: *Principles of Geomorphology*, Wiley.
10. Gautam, A (2010): *Bhautik Bhugol*, Rastogi Punlications, Meerut
11. Tikkaa, R N (1989): *Bhautik Bhugol ka Swaroop*, Kedarnath Ram Nath, Meerut
12. Singh, S (2009):*Bhautik Bhugol ka Swaroop*, Prayag Pustak,Allahabad

2. GEO-H-CC-02-TH Cartographic Techniques 6 CREDITS/60 MARKS 90 hrs.

Paper objectives and expected outcome:

The Cartographic Techniques provides a general understanding of the field geography. It mainly focuses on various types of map scale and their construction and principles of map projection. This paper focuses on general understanding of map type, map scale, map projection etc. Different cartographic techniques are used in this section for representation of various facets of physical and human-cultural-geographical data of any area of the topographical maps.

2.1 GEO-H-CC-02-TH Cartographic Techniques (Theory) 4 CREDITS / 40 MARKS 60 hrs.

1. Maps – Classification and Types, Components.
2. Scale: concept & application (Plain/Comparative/Diagonal/Vernier)
3. Coordinate system: Polar & Rectangular
4. Geoids: Angular and Linear Measurement.
5. Bearing: Magnetic &True Bearing; whole circle and reduced bearing.
6. Map projection: classification, properties and uses. Concept of Generating Globe. Significance of UTM projection.

2.2 GEO-H-CC-02-P- Cartographic Techniques (practical) 2 Credits/ 20 Marks 30 hrs.

1. Scale: linear, comparative, diagonal, vernier.
2. Map projection: Polar Zenithal Stereographic, Bonnes, Sinusoidal, and Mercator's Projection.
3. Topographical map: Broad Physiographic Division, Serial Profile: Superimposed, Projected, Composite. Relation between physical & cultural features: Transect Chart.
4. Viva-Voce &Laboratory Notebook

Reading List

1. Anson R. and Ormelling F. J., 1994: *International Cartographic Association: BasicCartographic Vol.* Pregmen Press.
2. Gupta K.K. and Tyagi, V. C., 1992: *Working with Map*, Survey of India, DST, New Delhi.
3. Mishra R.P. and Ramesh, A., 1989: *Fundamentals of Cartography*, Concept, New Delhi.
4. Monkhouse F. J. and Wilkinson H. R., 1973: *Maps and Diagrams*, Methuen, London.
5. Rhind D. W. and Taylor D. R. F., (eds.), 1989: *Cartography: Past, Present and Future*, Elsevier, International Cartographic Association.
6. Robinson A. H., 2009: *Elements of Cartography*, John Wiley and Sons, New York.
7. Sharma J. P., 2010: *Prayogic Bhugol*, Rastogi Publishers, Meerut.
8. Singh R. L. and Singh R. P. B., 1999: *Elements of Practical Geography*, Kalyani Publishers.
9. Sarkar, A. (2015) Practical geography: A systematic approach. Orient Black Swan Private Ltd., New Delhi
10. Singh R L & Rana P B Singh(1991) Prayogtmak Bhugol ke Mool Tatva, Kalyani Publishers, New Delhi

Semester- II (300 Marks)

THEORETICAL COURSES (200 Marks)

3. GEO-H-CC-03-TH- Hydrology and Oceanography **6 CREDITS/60 MARKS** **90 hrs.**

Paper objectives and expected outcome:

This paper is helpful to know the concepts of Hydrology and Oceanography mainly emphasizing on the significance of hydrological system and the role of the global hydrological cycle. Studying the ocean floor characteristics of the Indian Ocean, different oceanic movements, ocean salinity and temperature and coral reef formation are elaborately discussed here.

3.1 GEO-H-CC-03-TH- Hydrology and Oceanography (Theory) 4 CREDITS / 40 MARKS 60 hrs.

1. Hydrological Cycle: Systems approach in hydrology, human impact on the hydrological cycle;

2. Elements of Hydrological Cycle: Precipitation, interception, evaporation, evapo-transpiration, infiltration, ground-water, run off and over land flow.
3. River Basin Hydrology: Characteristics of river basins, basin surface run-off, measurement of river discharge; floods and droughts.
4. Ocean Floor Topography (Indian Ocean) and Oceanic Movements – Waves, Currents and Tides.
5. Ocean Salinity and Temperature – Distribution and Determinants.
6. Coral reef: formation, types, threats.

3.2 GEO-H-CC-03-P- Hydrology and Oceanography (practical) **2 Credits/ 20 Marks 30 hrs.**

1. Construction and Interpretation of Hypsometric Curve.
2. Construction and Interpretation of Unit Hydrograph.
3. Stream Ordering & Bifurcation Ratio.
4. Laboratory Note Book & Viva-Voce.

Reading List

1. Andrew. D. ward and Stanley, Trimble (2004): Environmental Hydrology, 2nd edition, Lewis Publishers, CRC Press.
2. Karanth, K.R., 1988: Ground Water: Exploration, Assessment and Development, Tata-McGraw Hill, New Delhi.
3. Ramaswamy, C. (1985): Review of floods in India during the past 75 years: A Perspective. Indian National Science Academy, New Delhi.
4. Rao, K.L., 1982: India's Water Wealth 2nd edition, Orient Longman, Delhi,.
5. Singh, Vijay P. (1995): Environmental Hydrology. Kluwar Academic Publications, the Netherlands.
6. Anikouchine W. A. and Sternberg R. W., 1973: *The World Oceans: An Introduction to Oceanography*, Prentice-Hall.
7. Garrison T., 1998: *Oceanography*, Wordsworth Company, Belmont.
8. Kershaw S., 2000: *Oceanography: An Earth Science Perspective*, Stanley Thornes, UK.
9. Pinet P. R., 2008: *Invitation to Oceanography* (Fifth Edition), Jones and Barlett Publishers, USA, UK and Canada.
10. Sharma R. C. and Vatal M., 1980: *Oceanography for Geographers*, Chaitanya Publishing House, and Allahabad.
11. Sverdrup K. A. and Armbrust, E. V., 2008: *An Introduction to the World Ocean*,

McGraw Hill, Boston.

4. GEO-H-CC-04-TH Thematic Cartography 6 CREDITS/60 MARKS 90 hrs.

Paper objectives and expected outcome:

This paper is very helpful to prepare thematic maps through the representation of various geographical data using different cartographic techniques and methods (manual and computer based). Students are able to learn the usages of survey instruments like Prismatic Compass, Dumpy level and Theodolite.

4.1 GEO-H-CC-04-TH Thematic Cartography (Theory) 4 CREDITS / 40 MARKS 60 hrs.

1. Concept of rounding, scientific notation, logarithm, anti-logarithm, natural and log scale.
2. Thematic Mapping – concept, types, Uses and Limitations;
3. Surveying: concept, classification.
4. Traverse survey: Prismatic Compass
5. Leveling survey: Dumpy Level
6. Determination of height and distance: Theodolite

4.2 GEO-H-CC-04-P- Thematic Cartography (Practical) 2 Credits/ 20 Marks 30 hrs.

1. Diagrammatic representation of data: Line, bar and circle,(both in graphical & MS. Excel) Choropleth, Dot
2. Traverse & contour survey: Prismatic Compass & Dumpy Level
3. Determination of Height and Distance: Theodolite (base accessible and inaccessible) same vertical plain.
4. Viva-Voce &Laboratory Notebook

Reading List

1. Cuff J. D. and Mattson M. T., 1982: *Thematic Maps: Their Design and Production*, Methuen Young Books
2. Dent B. D., Torguson J. S., and Holder T. W., 2008: *Cartography: Thematic Map Design* (6th Edition), Mcgraw-Hill Higher Education
3. Gupta K. K. and Tyagi V. C., 1992: *Working with Maps*, Survey of India, DST, New Delhi.
4. Kraak M.-J. and Ormeling F., 2003: *Cartography: Visualization of Geo-Spatial Data*, Prentice-Hall.
5. Mishra R. P. and Ramesh A., 1989: *Fundamentals of Cartography*, Concept, New Delhi.
6. Sharma J. P., 2010: *Prayogic Bhugol*, Rastogi Publishers, Meerut.
7. Singh R. L. and Singh R. P. B., 1999: *Elements of Practical Geography*, Kalyani Publishers.
8. Slocum T. A., Mcmaster R. B. and Kessler F. C., 2008: *Thematic Cartography and Geovisualization* (3rd Edition), Prentice Hall.
9. Tyner J. A., 2010: *Principles of Map Design*, The Guilford Press.
10. Sarkar, A. (2015) Practical geography: A systematic approach. Orient Black Swan Private Ltd., New Delhi
11. Singh, L R & Singh R (1977): Manchitra or Pryaogatamek Bhugol , Central Book, Depot, Allahabad
12. Bhopal Singh R L and Duttta P K (2012) Prayogatama Bhugol, Central Book Depot, Allahabad

5. GEO-H-CC-05-TH-Climatology 6 CREDITS/60 MARKS 90 hrs.

Paper objectives and expected outcome:

This paper is helpful to understand the elements of weather and climate, different atmospheric phenomena. Students are able to learn the approaches to climate classification. Students will learn to prepare various climatic maps and charts and interpret them and they also trained about the use of various meteorological instruments.

5.1 GEO-H-CC-05-TH-Climatology (Theory) 4 CREDITS / 40 MARKS 60 hrs.

1. Atmospheric Composition and Structure – Variation with Altitude, Latitude and Season.
2. Insolation and Temperature – Factors and Distribution, Heat Budget,
3. Atmospheric Pressure and Winds – Planetary Winds, Forces affecting Winds, General Circulation, Jet Streams.
4. Process and forms of condensation, mechanisms of precipitation.
5. Cyclones – Tropical Cyclones, Extra Tropical Cyclones, Monsoon - Origin and Mechanism.
6. Climatic classification: Koppen, Thornthawite.

5. 2 GEO-H-CC-05-P-Climatology (Practical) 2 Credits/ 20 Marks 30 hrs.

1. Measuring the weather elements using analogue instruments: Mean Daily Temperature, Air Pressure, Relative Humidity and Rainfall.
2. Interpretation of daily weather map: Monsoon Season, Post Monsoon Season
3. Construction & Interpretation of Climograph, Hythergraph.
4. Viva-Voce &Laboratory Notebook.

Reading List

1. Barry R. G. and Carleton A. M., 2001: *Synoptic and Dynamic Climatology*, Routledge, UK.
2. Barry R. G. and Corley R. J., 1998: *Atmosphere, Weather and Climate*, Routledge, New York.
3. Critchfield H. J., 1987: *General Climatology*, Prentice-Hall of India, New Delhi
4. Lutgens F. K., Tarbuck E. J. and Tasa D., 2009: *The Atmosphere: An Introduction to Meteorology*, Prentice-Hall, Englewood Cliffs, New Jersey.
5. Oliver J. E. and Hidore J. J., 2002: *Climatology: An Atmospheric Science*, Pearson Education, New Delhi.
6. Trewartha G. T. and Horne L. H., 1980: *An Introduction to Climate*, McGraw-Hill.
7. Gupta L S(2000): Jalvayu Vigyan, Hindi Madhyam Karyanvay Nidishalya, Delhi Vishwa Vidhyalaya, Delhi
8. Lal, D S (2006): Jalvayu Vigyan, Prayag Pustak Bhavan, Allahabad
9. Vatal, M (1986): Bhautik Bhugol, Central Book Depot, Allahabad
10. Singh, S (2009): Jalvayu Vigyan, Prayag Pustak Bhawan, Allahabad

6.GEO-H-CC-06-TH-Soil and Biogeography 6 CREDITS/60 MARKS 90 hrs.

Paper objectives and expected outcome:

This paper gives knowledge about the character and profile of different soil types, properties of soil and students are able to understand the causes and conservation methods of soil erosion and land degradation. It is very helpful to understand the various ecosystems and consequences of habitat destruction in South-Bengal with special references with elephant migration. Students are trained to use soil kits for testing of different chemical properties of soil and the textural difference has been identified by different methods. The biodiversity of plants has been done by matrix method which will be very essential for species diversity identification.

6.1GEO-H-CC-06-TH-Soil and Biogeography (Theory) 4 CREDITS / 40 MARKS 60 hrs.

1. Soil: Forming Factors, Classification (Zonal, Azonal, Intra-zonal)
2. Physical & Chemical Properties of soil: Texture, Structure, Colour, pH, Organic Matter.
3. Mechanism and Formation of Laterite & Podzol Soil.
4. Causes of Soil Erosion and land degradation, methods of soil conservation.
5. Biomes: concepts, types; adaptation with environments (Tropical Rainforest & Temperate Grass Land).
6. Migration of animals due to habitat distraction in south Bengal with special references with elephant.

6.2 GEO-H-CC-06-P-Soil and Biogeography (Practical) 2 Credits/ 20 Marks 30 hrs.

1. Determination of Soil Reaction (pH, N, P&K) Using Field Kit.
2. Determination of Soil Texture.
3. Plant Species Diversity Determination by Matrix Method.
4. Laboratory Notebook Viva-Voce.

Reading List

1. Chandna R. C., 2002: *Environmental Geography*, Kalyani, Ludhiana.
2. Cunninghum W. P. and Cunninghum M. A., 2004: *Principals of EnvironmentalScience: Inquiry and Applications*, Tata Macgraw Hill, New Delhi.
3. Goudie A., 2001: *The Nature of the Environment*, Blackwell, Oxford.
4. Singh, R.B. (Eds.) (2009) Biogeography and Biodiversity. Rawat Publication, Jaipur
5. Miller G. T., 2004: *Environmental Science: Working with the Earth,* Thomson BrooksCole, and Singapore.
6. MoEF, 2006: *National Environmental Policy-2006,* Ministry of Environment andForests, Government of India.
7. Singh, R.B. and Hietala, R. (Eds.) (2014) Livelihood security in Northwestern Himalaya: Case studies from changing socio-economic environments in Himachal Pradesh, India. Advances in Geographical and Environmental Studies, Springer
8. Odum, E. P. et al, 2005: *Fundamentals of Ecology,* Ceneage Learning India.
9. Singh S., 1997: *Environmental Geography,* Prayag Pustak Bhawan. Allahabad.
10. UNEP, 2007: *Global Environment Outlook: GEO4: Environment For Development,* United Nations Environment Programme.
11. Singh, M., Singh, R.B. and Hassan, M.I. (Eds.) (2014) Climate change and biodiversity:

Proceedings of IGU Rohtak Conference, Volume 1. Advances in Geographical and Environmental Studies, Springer
12. Singh, R.B. (1998) Ecological Techniques and Approaches to Vulnerable Environment, New Delhi, Oxford & IBH Pub...
13. Singh, Savindra 2001. *Paryavaran Bhugol*, Prayag Pustak Bhawan, Allahabad. (in Hindi)

7. GEO-H-CC-07-TH-Statistical Methods in Geography 6 CREDITS/60 MARKS 90 hrs.

Paper objectives and expected outcome:

Comprehend the concept of scales and representation of data through statistical diagrams. Students are able to understand the measures of central tendency , measures of dispersion, concepts of sampling techniques ,concept of probability and normal distribution, concepts of association and correlation .It is also helpful to understand bivariate data and its graphical plotting etc.

7.1 GEO-H-CC-07-TH-Statistical Methods in Geography (Theory)

4 CREDITS / 40 MARKS 60 hrs.

1. Sources of Data, Scales of Measurement (Nominal, Ordinal, Interval, Ratio).
2. Measures of central tendency: Mean, Median & Mode.
3. Measures of dispersion: Range, Quartile Deviation, Mean Deviation, Standard Deviation, Variance and Coefficient of Variation.
4. Sampling: Concepts, Types & Significance.
5. Theoretical Distribution: Probability & Normal Distribution.
6. Association and Correlation: Rank Correlation, Product Moment Correlation, and Simple Regression.

7.2 GEO-H-CC-07-P-Statistical Methods in Geography (Practical) 2 Credits/ 20 Marks 30 hrs

1. Frequency distribution & graphical construction: histogram, frequency polygon, frequency curve.
2. Measuring central tendency & dispersion.
3. Analysis of bivariate data: scatter diagram, regression line, and residual. Correlation coefficient (rank correlation, product moment correlation)
4. Laboratory Notebook Viva-Voce.

Reading List:

1. Berry B. J. L. and Marble D. F. (eds.): Spatial Analysis – A Reader in Geography.
2. Ebdon D., 1977: Statistics in Geography: A Practical Approach.
3. Hammond P. and McCullagh P. S., 1978: Quantitative Techniques in Geography: An Introduction,Oxford University Press. 4. King L. S., 1969: Statistical Analysis in Geography, Prentice-Hall.
5. Mahmood A., 1977: Statistical Methods in Geographical Studies, Concept.
6. Pal S. K., 1998: Statistics for Geoscientists, Tata McGraw Hill, New Delhi.
7. Sarkar, A. (2013) Quantitative geography: techniques and presentations. Orient Black Swan PrivateLtd., New Delhi
8. Silk J., 1979: Statistical Concepts in Geography, Allen and Unwin, London.
9. Spiegel M. R.: Statistics, Schaum's Outline Series.
10. Yeates M., 1974: An Introduction to Quantitative Analysis in Human Geography, McGraw Hill, NewYork.

Semester- IV (300 Marks)

THEORETICAL COURSES (200 Marks)

8. GEO-H-CC-08-TH- Human and Social-Cultural Geography: 6 CREDITS/60 MARKS 90 hrs.

Paper objectives and expected outcome:

The paper is based on the nature, scope and content of human Geography. This paper emphasizes on the cultural regions of the world, human races, religions, languages and tribal groups of India, concepts of welfare geography, types of rural settlements and urban settlements and pattern of urbanization of India. The practical portion emphasizes on the spatial distribution of different aspects of demographic composition, urban hierarchy and spacing of settlements through Nearest Neighborhood analysis.

8.1 GEO-H-CC-08-TH- Human and Social-Cultural Geography (Theory)

4 CREDITS / 40 MARKS 60 hrs

1. Introduction: Defining Human Geography; Major Themes; Contemporary Relevance
2. Space and Society: Cultural Regions;
3. Race; Religion and Language and Tribes of India (Santal and Jarwa)
4. Geographies of welfare: concepts and components-healthcare, housing & education.
5. Settlements: Types of Rural Settlements; Classification of Urban Settlements;
6. Trends and Patterns of Indian Urbanization

8.2 GEO-H-CC-08-P-Human and Social-Cultural Geography (Practical)

2 Credits/ 20 Marks 30 hrs

1. Preparation of Spatial Distribution Map of India: Gender, Caste & Religion.
2. Rank size rule to identify urban hierarchy.
3. Nearest neighbor analysis to identify settlement pattern.
4. Laboratory Notebook Viva-Voce.

Reading List

1. Chandna, R.C. (2010) Population Geography, Kalyani Publisher.
2. Hassan, M.I. (2005) Population Geography, Rawat Publications, Jaipur
3. Daniel, P.A. and Hopkinson, M.F. (1989) The Geography of Settlement, Oliver & Boyd, London.
4. Johnston R; Gregory D, Pratt G. et al. (2008) The Dictionary of Human Geography, Blackwell Publication.
5. Jordan-Bychkov et al. (2006) The Human Mosaic: A Thematic Introduction to Cultural Geography. W. H. Freeman and Company, New York.
6. Kaushik, S.D. (2010) Manav Bhugol, Rastogi Publication, Meerut.
7. Maurya, S.D. (2012) Manav Bhugol, Sharda Pustak Bhawan. Allahabad.
8. Hussain, Majid (2012) Manav Bhugol. Rawat Publications, Jaipur

9. GEO-H-CC-09-TH-Regional Planning and Development 6 CREDITS/60 MARKS 90 hrs.

Paper objectives and expected outcome:

This course is focused on the fundamental concepts of regional geography including the classical approach to define an area as region. It includes the methods of regional delineation and classification of region based on their properties. Students are able to understand various concepts such as the difference between regional planning and planning region, identification of Indian planning region, different models of regional development planning and different methods and indicators of measuring regional development.

9.1GEO-H-CC-09-TH-Regional Planning and Development (Theory)

4 CREDITS / 40 MARKS 60 hrs

1. Definition and Types of Region,: Formal, Functional, Adhoc and Planning Regions
2. Regional planning: Needs, principles, Types and components of regional Planning.
3. Planning region :characteristics ,economic regionalization and identification of Indian planning regions (V, Nath,P. Sengupta & TCPO)
4. Concepts And Models Of Regional Development Planning: Rostow Perroux,Hirschman,Myrdal.
5. Growth Centre & Service Center Approaches Of Development In Indian Context.
6. Measuring Regional development: Methods & Indicators (Economic, Social and Environmental);

9.2GEO-H-CC-09-P-Regional Planning and Development (Practical)

2 Credits/ 20 Mark 30 hrs

7. Measurement of inequality by Lorenz curve & Gini Coefficient
8. Measurement of Differential Activity Concentration by location quotient
9. Mapping of spatial distribution of regional disparity.
10. Laboratory note book & viva voce.

Reading List

1. Blij H. J. De, 1971: *Geography: Regions and Concepts*, John Wiley and Sons.
2. Claval P.l, 1998: *An Introduction to Regional Geography*, Blackwell Publishers, Oxford and Massachusetts.
3. Friedmann J. and Alonso W. (1975): *Regional Policy - Readings in Theory and Applications*, MIT Press, Massachusetts.
4. Gore C. G., 1984: *Regions in Question: Space, Development Theory and Regional Policy*, Methuen, London.
5. Gore C. G., Köhler G., Reich U-P. and Ziesemer T., 1996: *Questioning Development; Essays on the Theory, Policies and Practice of Development Intervention*, Metropolis-Verlag, Marburg.
6. Haynes J., 2008: *Development Studies*, Polity Short Introduction Series.
7. Johnson E. A. J., 1970: *The Organization of Space in Developing Countries*, MIT Press, Massachusetts.
8. Peet R., 1999: *Theories of Development*, The Guilford Press, New York.
9. UNDP 2001-04: *Human Development Report*, Oxford University Press.
10. World Bank 2001-05: *World Development Report*, Oxford University Press, New

10. GEO-H-CC-10-TH-Field Work and Research Methodology: 6 CREDITS/60 MARKS 90 hrs.

Paper objectives and expected outcome:

The learners will get the initial training on various steps involved in geographical research. They will develop the idea on fundamentals of research methodology including data collection, methodology and report writing. This course aims to develop fundamental research aptitude among all the students through field survey.

10. 1 GEO-H-CC-10-TH-Field Work and Research Methodology (Theory)

4 CREDITS / 40 MARKS 60 hrs

1. Literature review & formulation of research design.
2. Defining of research problems, objectives & hypothesis, Materials and Methods of Research.
3. Data Analysis: Quantitative & Qualitative Data: Data Representation Technique.
4. Field Techniques – Merits, Demerits and Selection of the Appropriate Technique; Observation (Participant / Non Participant), Questionnaires (Open/ Closed / Structured / Non-Structured); Interview with Special Focus on Focused Group Discussions; Space Survey (Transects and Quadrants, Constructing a Sketch)
5. Use of Field Tools – Collection of Material for Physical and Socio-Economic Surveys.
6. Designing the Field Report – Aims and Objectives, Methodology, Analysis, Interpretation, References, Bibliography, Citation, & Abstract.

10.2 GEO-H-CC-10-P-Field Work and Research Methodology (practical)

2 Credits/ 20 Marks 30 hrs

1. Group of student (not more than 40) will prepare an individual report based on primary and secondary data collected during field work.
2. The duration of the field work should not exceed 10 days.
3. The word count of the report should be about **8000 to 12,000** excluding figures, tables, photographs, maps, references and appendices. One copy of the report on A 4 size paper should be submitted in soft binding.
5. Laboratory note book & viva voce

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Reading List

1. Creswell J., 1994: *Research Design: Qualitative and Quantitative Approaches* Sage Publications.
2. Dikshit, R. D. 2003. The Art and Science of Geography: Integrated Readings. Prentice-Hall of India, New Delhi.
3. Evans M., 1988: "Participant Observation: The Researcher as Research Tool" in *Qualitative Methods in Human Geography*, eds. J. Eyles and D. Smith, Polity.
4. Mukherjee, Neela 1993. Participatory Rural Appraisal: Methodology and Application. Concept Publs. Co., New Delhi.
5. Mukherjee, Neela 2002. Participatory Learning and Action: with 100 Field Methods. Concept Publs. Co., New Delhi
6. Robinson A., 1998: "*Thinking Straight and Writing That Way*", in *Writing Empirical Research Reports: A Basic Guide for Students of the Social and Behavioural Sciences*, eds. by F. Pryczak and R. Bruce Pryczak, Publishing: Los Angeles.
7. Special Issue on "Doing Fieldwork" *The Geographical Review* 91:1-2 (2001).

8. Stoddard R. H., 1982: *Field Techniques and Research Methods in Geography*, Kendall/Hunt.
9. Wolcott, H. 1995. The Art of Fieldwork. Alta Mira Press, Walnut Creek, CA.

Semester- V (300 Marks)

THEORETICAL COURSES (200 Marks)

11. GEO-H-CC-11-TH-Geography of India **6 CREDITS/60 MARKS** **90 hrs.**

Paper objectives and expected outcome:

This paper gives knowledge about the Physiographic divisions & classification of India & West Bengal. It includes the different characteristics & classification of Indian soil, vegetation & climate. It is also helpful to understand the growth, policy & structure of population & utilization of minerals and power resources (iron ore, coal, petroleum, natural gas). The course is focused on the Green revolution of agricultural region & automobile and Information technology in India and also helpful to understand the regional problems of Darjeeling and Jangalmahal region. The practical section is helpful to acquire knowledge about identification of monthly temperature and rainfall graph, crop combination and trend of production by time series analysis.

11. 1 GEO-H-CC-11-TH-Geography of India (Theory) 4 CREDITS / 40 MARKS 60 hrs

1. Physical: Physiographic Divisions (characteristics &classification of India & West Bengal),Indian soil, vegetation and climate (characteristics and classification)
2. Population: Distribution and growth, Structure & Policy.
3. Economic: Mineral and power resources distribution and utilization of iron ore, coal, petroleum, natural gas;
4. agricultural region: green revolution & consequences
5. Industrial development : automobile and Information technology
6. Regional Issues of West Bengal: Darjeeling & Jangalmahal.

11.2 GEO-H-CC-11-P-Geography of India (Practical) 2 Credits/ 20 Marks 30 hrs

1. Monthly Temperature and rainfall graph of five selected stations from different physiographic region of India
2. Crop Combination of Any Two Contrasting District Of West Bengal.
3. Annual Trend of Production of Mineral Resources: by time series analysis.
4. Laboratory note book & viva voce.

Reading List

1. Deshpande C. D., 1992: *India: A Regional Interpretation*, ICSSR, New Delhi.
2. Johnson, B. L. C., ed. 2001. *Geographical Dictionary of India*. Vision Books, New Delhi.
3. Mandal R. B. (ed.), 1990: *Patterns of Regional Geography – An Intenational Perspective. Vol. 3 – Indian Perspective*.
4. Sdyasuk Galina and P Sengupta (1967): *Economic Regionalisation of India*, Census of India
5. Sharma, T. C. 2003: India - Economic and Commercial Geography. Vikas Publ., New Delhi.
6. Singh R. L., 1971: *India: A Regional Geography*, National Geographical Society of India.
7. Singh, Jagdish 2003: *India - A Comprehensive & Systematic Geography*,Gyanodaya Prakashan, Gorakhpur.
8. Spate O. H. K. and Learmonth A. T. A., 1967: *India and Pakistan: A Generaland Regional Geography*, Methuen.
9. Tirtha, Ranjit 2002: *Geography of India*, Rawat Publs., Jaipur & New Delhi.
10. Pathak, C. R. 2003: *Spatial Structure and Processes of Development in India*.Regional

Science Assoc., Kolkata.
11. Tiwari, R.C. (2007) Geography of India. Prayag Pustak Bhawan, Allahabad
12. Sharma, T.C. (2013) Economic Geography of India. Rawat Publication, Jaipur

12. GEO-H-CC-12-TH- Geospatial Technology **6 CREDITS / 40 MARKS 90 hrs.**

Paper objectives and expected outcome:

The course is designed for the general ideas of GIS and image-based information. This paper helps students to know about the concept of Digital Image Processing, image classification based on different software, concept of GPS and DGPS and GIS platform helps to compose different maps like land use land cover map, forest monitoring maps etc.

12 GEO-H-CC-12-TH- Geospatial Technology (Theory)

4 CREDITS / 40 MARKS 60 hrs.

1. Digital Image Processing: Pre-Processing (Radiometric and Geometric Correction)
2. Digital Image Classification: Supervised and Unsupervised
3. Geographical Information System: definition and component.
4. Global Positioning System (GPS) – Principles and Uses; DGPS
5. GIS Data Structures: Types (spatial and Non-spatial), Raster and Vector Data Structure.
6. Application of RS & GIS: Land Use Mapping; Urban Sprawl Analysis; Forests Monitoring.

12.1 GEO-H-CC-12-P- Geospatial Technology (Practical)

2 Credits/ 20 Marks 30 hrs.

1. Image Classification: Supervised and Unsupervised by ERDAS/ARC GIS software.
2. Layer crating (point, line, and polygon) by ERDAS/any GIS software.
3. Map composition by any GIS software
4. Laboratory note book and viva voce.

Reading List

1. Bhatta, B. (2010) Analysis of Urban Growth and Sprawl from Remote Sensing,Springer, Berlin Heidelberg.41
2. Burrough, P.A., and McDonnell, R.A. (2000) Principles of Geographical Information System-Spatial Information System and Geo-statistics. Oxford University Press
3. Chauniyal, D.D. (2010) Sudur Samvedan evam Bhogolik Suchana Pranali, Sharda Pustak Bhawan, Allahabad
4. Heywoods, I., Cornelius, S and Carver, S. (2006) An Introduction to Geographical Infromation system. Prentice Hall.
5. Jha, M.M. and Singh, R.B. (2008) Land Use: Reflection on Spatial Informatics Agriculture and Development, New Delhi: Concept.
6. Nag, P. (2008) Introduction to GIS, Concept India, New Delhi.
7. Sarkar, A. (2015) Practical geography: A systematic approach. Orient Black Swan Private Ltd., New Delhi
8. Singh, R.B. and Murai, S. (1998) Space Informatics for Sustainable Development, Oxford and IBH, New Delhi.

Semester- VI (300 Marks)

THEORETICAL COURSES (200 Marks)

13. GEO-H-CC-13-TH- Evolution of Geographical Thought 6 CREDITS/60 MARKS 90 hrs.

Paper objectives and expected outcome:

The course has incorporated the fundamental concepts of geographical thought. It includes the premier concepts of geography at the time of its emergence to the past century (20th century). Upon completion of this course, the students would have a comprehensive idea of the fundamental nature of Geography and how it evolves with time.

13.1 GEO-H-CC-13-TH- Evolution of Geographical Thought (theory)

4 CREDITS / 40 MARKS 60 hrs.

1. Development of pre modern geography: contribution of Greek, Chinese, Indian Romans; contribution of Arab Geographers
2. Development of geography in classical period: contribution of Humbolt and Ritter.
3. Development of geography in modern period: contribution of German, French, British, American school of thought.
4. Debates: Debates – Environmental Determinism and Possibilism, Systematic and Regional, Ideographic and Nomeothetic.
5. Trends in geography: quantitative revolution & its importance; Behaviouralism, Radicalism, System approach, Feminism. Paradigm shift in geography
6. Changing concept of space in geography.

13.2 GEO-H-CC-13-P- Evolution of Geographical thought (practical)

2 Credits/ 20 Marks 30 hrs

1. Changing Perception of Map: Ptolemy, Mercator.
2. Mapping Of Voyages: Columbus, Vasco da Gama, Magalen, and Thomas Cook.
3. Group Presentation Of Students (Not More Than 10) Any Selected Philosophies of Geographical Thought.
4. Laboratory Note Book and Viva Voce.

Reading List

1. Arentsen M., Stam R. and Thuijis R., 2000: Post-modern Approaches to Space, ebook.
2. Bhat, L.S. (2009) Geography in India (Selected Themes). Pearson
3. Bonnett A., 2008: What is Geography? Sage.
4. Dikshit R. D., 1997: Geographical Thought: A Contextual History of Ideas, Prentice– Hall India.
5. Hartshone R., 1959: Perspectives of Nature of Geography, Rand MacNally and Co.
6. Holt-Jensen A., 2011: Geography: History and Its Concepts: A Students Guide, SAGE.
7. Johnston R. J., (Ed.): Dictionary of Human Geography, Routledge.
8. Johnston R. J., 1997: Geography and Geographers, Anglo-American Human Geography since 1945, Arnold, London.
9. Kapur A., 2001: Indian Geography Voice of Concern, Concept Publications.
10. Martin Geoffrey J., 2005: All Possible Worlds: A History of Geographical Ideas, Oxford.
11. Soja, Edward 1989. Post-modern Geographies, Verso, London. Reprinted 1997: Rawat Publ., Jaipur and New Delhi

14. GEO-H-CC-14-TH Disaster Management based Project 6 CREDITS/60 MARKS 90 hrs.

Paper objectives and expected outcome:

The learners will get the concept of hazards and disaster, vulnerability & consequences of landslide management. They will develop the idea on flood management and riverbank erosion management including data collection, methodology and report writing. This course aims to develop management of disaster, hazards and writing project report.

14.1 GEO-H-CC-14-TH Disaster Management based Project Work (Theory)
4 Credits/ 40 Marks 60 hrs.

1. Concepts: hazard and disaster.
2. Concepts: risk and vulnerability.
3. Landslide: factors, vulnerability, consequences & management.
4. Flood: factors, vulnerability, consequences & management
5. Riverbank erosion: factors, vulnerability, consequences & management
6. Human induced hazard: industrial accident (Bhopal)

14.2 GEO-H-CC-14-P- Disaster Management based Project Work (Practical)
2 Credits/ 20 Marks 30 hrs.

The Project Report based on based case studies among following disasters and one disaster preparedness plan of respective college or locality:

1. Landslide
2. River Bank Erosion
3. Coastal Hazard
4. Pollution

Reading List:

1. Government of India. (1997) Vulnerability Atlas of India. New Delhi, Building Materials & Technology Promotion Council, Ministry of Urban Development, Government of India.

2. Kapur, A. (2010) Vulnerable India: A Geographical Study of Disasters, Sage Publication, New Delhi.

3. Modh, S. (2010) Managing Natural Disaster: Hydrological, Marine and Geological Disasters, Macmillan, Delhi.

4. Singh, R.B. (2005) Risk Assessment and Vulnerability Analysis, IGNOU, New Delhi. Chapter 1, 2 and 3

5. Singh, R. B. (ed.), (2006) Natural Hazards and Disaster Management: Vulnerability and Mitigation, Rawat Publications, New Delhi.

6. Sinha, A. (2001). Disaster Management: Lessons Drawn and Strategies for Future, New United Press, New Delhi.

7. Stoltman, J.P. et al. (2004) International Perspectives on Natural Disasters, Kluwer Academic Publications. Dordrecht.

8. Singh Jagbir (2007) "Disaster Management Future Challenges and Oppurtunities", 2007. PublisherI.K. International Pvt. Ltd. S-25, Green Park Extension, Uphaar Cinema Market, New Delhi, India (www.ikbooks.com).

Skill Enhancement Course (SEC)

GEO-H-SEC-01-TH- **Climate Change: Vulnerability and Adaptation**

4 CREDITS / 40 MARKS 24 hrs.

Paper objectives and expected outcome:

This paper is helpful to understanding the climate change, greenhouse gases, global warming and climatic assessment of IPCC. Students are able to learn the different vulnerability of climate change and impact of climate change on human health, flora & fauna. The course is also focused on Kyoto protocol and climate change mitigation.

1. Science of Climate Change: Understanding Climate Change; Green House Gases and Global Warming; Global Climatic Assessment- IPCC
2. Climate Change and Vulnerability: Physical Vulnerability; Economic Vulnerability; Social Vulnerability
3. Impact of Climate Change: Agriculture and Water; Flora and Fauna; Human Health
4. Global initiation of climate change mitigation: Kyoto protocol.

Further Readings

1.IPCC (2014) Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
2.. IPCC (2014) Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
3. Palutikof, J. P., van der Linden, P. J. and Hanson, C. E. (eds.), Cambridge University Press, Cambridge, UK.
4. OECD. (2008) Climate Change Mitigation: What Do we Do? Organisation and Economic Cooperation and Development.
5. UNEP. (2007) Global Environment Outlook: GEO4: Environment for Development, United Nations Environment Programme.
6. Singh, M., Singh, R.B. and Hassan, M.I. (Eds.) (2014) Climate change and biodiversity: Proceedings of IGU Rohtak Conference, Volume 1. Advances in Geographical and Environmental Studies, Springer .
7. Sen Roy, S. and Singh, R.B. (2002) Climate Variability, Extreme Events and Agricultural Productivity in Mountain Regions, Oxford & IBH Pub., New Delhi.

GEO-H-SEC-02-TH- Remote Sensing **4 CREDITS / 40 MARKS 24 hrs.**

Paper objectives and expected outcome:

The course content is focused on basic understanding of satellite remote sensing. Basic principles of satellite motion and sensor parameters help the students to formalize with the modern space based analytical techniques. The practical portion helps to understand the image processing and interpretation of satellite images through introduction of National Education Policy, 2020.

2. GEO-H-SEC-02-TH- Remote Sensing (theory)

1. Remote Sensing: Definition, stages and importance;
2. Satellite Remote Sensing: Principles, EMR Interaction with Atmosphere and Earth Surface& resolution;
3. Satellites (Landsat and IRS); Sensors

2.1 GEO-H-CC-14-P- Remote Sensing (practical)

1. Image Processing (Manual)
2. Laboratory note book and viva voce.

Reading List

1. Bhatta, B. (2010) Analysis of Urban Growth and Sprawl from Remote Sensing, Springer, BerlinHeidelberg.41

2. Burrough, P.A., and McDonnell, R.A. (2000) Principles of Geographical Information System-Spatial Information System and Geo-statistics. Oxford University Press

3. Chauniyal, D.D. (2010) Sudur Samvedan evam Bhogolik Suchana Pranali, Sharda Pustak Bhawan, Allahabad

4. Heywoods, I., Cornelius, S and Carver, S. (2006) An Introduction to Geographical Infromation system. Prentice Hall.

5. Jha, M.M. and Singh, R.B. (2008) Land Use: Reflection on Spatial Informatics Agriculture and Development, New Delhi: Concept.

6. Nag, P. (2008) Introduction to GIS, Concept India, New Delhi.

7. Sarkar, A. (2015) Practical geography: A systematic approach. Orient Black Swan Private Ltd., New Delhi

8. Singh, R.B. and Murai, S. (1998) Space Informatics for Sustainable Development, Oxford and IBH, New Delhi

Elective Discipline Specific (DSE)

1. GEO-H-DSE-1-TH- Economic Geography 6 CREDITS /60 MARKS 90 hrs.

Paper objectives and expected outcome:

This paper gives knowledge about the concept and classification of economic activity and location of economic activity, Von Thunen theory & Weber's theory. It includes primary activities & different agricultural process and secondary activities of India's manufacturing fields, SEZ, WTO & BRICS structure and function. The practical section is helpful to acquire knowledge about choropleth map, pie diagram and detour index and shortest path analysis.

1.1 GEO-H-DSE-1-TH- Economic Geography (theory) 4 CREDITS / 40 MARKS 60 hrs.

1. Introduction: Concept and classification of economic activity
2. Factors Affecting location of Economic Activity with special reference to Agriculture (Von Thunen theory), Industry (Weber's theory).
3. Primary Activities: Subsistence and Commercial agriculture, forestry, fishing and mining.
4. Secondary Activities: Manufacturing (Cotton Textile, Iron and Steel), Concept of Manufacturing Regions,
5. Special Economic Zones of India.
6. WTO and BRICS: evolution, structure and function.

1.2 GEO-H-DSE-01-P- Economic Geography (practical) 2 CREDITS / 20 MARKS 30 hrs.

1. Choropleth map: state wise GDP variation.
2. Pie diagram: sate wise variation of occupation structure.
3. Transport network analysis: detour index and shortest path analysis.
4. Laboratory note book and viva voce.

Reading List

1. Alexander J. W., 1963: Economic Geography, Prentice-Hall Inc., Englewood Cliffs, New Jersey.
2. Coe N. M., Kelly P. F. and Yeung H. W., 2007: Economic Geography: A Contemporary Introduction, Wiley-Blackwell.
3. Hodder B. W. and Lee Roger, 1974: Economic Geography, Taylor and Francis.
4. Combes P., Mayer T. and Thisse J. F., 2008: Economic Geography: The Integration of Regions and Nations, Princeton University Press.
5. Wheeler J. O., 1998: Economic Geography, Wiley..
6. Durand L., 1961: Economic Geography, Crowell.
7. Bagchi-Sen S. and Smith H. L., 2006: Economic Geography: Past, Present and Future, Taylor and Francis.
8. Willington D. E., 2008: Economic Geography, Husband Press.
9. Clark, Gordon L.; Feldman, M.P. and Gertler, M.S., eds. 2000: The Oxford

2. GEO-H-DSE-02-TH- Geography of Tourism 6 CREDITS /60 MARKS 90 hrs.

Paper objectives and expected outcome:

Students will be able to learn about the importance of tourism as well as different types of tourism and their impacts on environment and society. The practical portion helps students to know the impact, present condition and future prospect of different tourism through field study.

2.1 GEO-H-DSE-02-TH- Geography of Tourism (theory) 4 CREDITS / 40 MARKS 60 hrs.

1. Scope and Nature: Concepts and Issues.
2. Tourism, Recreation and Leisure Inter-Relations.
3. Geographical Parameters of Tourism by Robinson.
4. Type of Tourism: Nature Tourism, Cultural Tourism, Medical Tourism, Pilgrimage, Eco-Tourism, Sustainable Tourism.
5. Impact of Tourism: Economy; Environment; Society
6. Tourism in India: Tourism Infrastructure, National Tourism Policy.

2.2 GEO-H-DSE-02-P- Geography of Tourism (practical) 2 CRIDITS/ 20 MARKS 30 hrs.

Assessment of present condition and future prospects on (field report): ecotourism, sustainable tourism and geo tourism.

Reading List

1. Dhar, P.N. (2006) International Tourism: Emerging Challenges and Future Prospects. Kanishka, New Delhi.

2. Hall, M. and Stephen, P. (2006) Geography of Tourism and Recreation – Environment, Place and Space, Routledge, London.

3. Kamra, K. K. and Chand, M. (2007) Basics of Tourism: Theory, Operation and Practise, Kanishka Publishers, Pune.

4. Page, S. J. (2011) Tourism Management: An Introduction, Butterworth-HeinemannUSA. Chapter 2.

5. Raj, R. and Nigel, D. (2007) Morpeth Religious Tourism and Pilgrimage Festivals Management: An International perspective by, CABI, Cambridge, USA, www.cabi.org.

6. Tourism Recreation and Research Journal, Center for Tourism Research and Development, Lucknow

7. Singh Jagbir (2014) "Eco-Tourism" Published by - I.K. International Pvt. Ltd. S-25, Green Park Extension, Uphaar Cinema Market, New Delhi, India (www.ikbooks.com)

3.GEO-H-DSE-03-TH- Population Geography 6 CREDITS /60 MARKS 90 hrs.

Paper objectives and expected outcome:

Students are able to gain knowledge about population census, population growth rate, patterns, Malthusian theory, demographic transition theory. The course is focused on the fertility rate, mortality rate & migration, age-sex composition & characteristics, and ageing population. The practical section is helpful to acquire knowledge about different age-sex pyramid & projection of future population.

3.1 GEO-H-DSE-03-TH- Population Geography 4 CREDITS / 40 MARKS 60 hrs.

1. Sources of Data with special reference to India (Census, Vital Statistics and NSS).
2. Population Growth – Determinants and Patterns; Theories of Growth – Malthusian Theory.
3. Demographic Transition Theory.
4. Population Dynamics: Fertility, Mortality and Migration – Measures, Determinants and Implications.
5. Population Composition and Characteristics – Age-Sex Composition; Rural and Urban Composition.
6. Contemporary Issues – Ageing of Population; Declining Sex Ratio.

3.2 GEO-H-DSE-03-P- Population Geography Lab 2 CREDITS / 20 MARKS 30 hrs.

1. Assessment of population growth data (decadal) & projection of future population
2. Identification of center point analysis of region population by man center analysis.
3. Construction of Age-sex pyramid of different types (Expansive, Constrictive,Stationary)
4. Viva-voce on Lab notebook.

Reading List

1. Barrett H. R., 1995: Population Geography, Oliver and Boyd.
2. Bhende A. and Kanitkar T., 2000: Principles of Population Studies, Himalaya Publishing House.
3. Chandna R. C. and Sidhu M. S., 1980: An Introduction to Population Geography, Kalyani Publishers.
4. Clarke J. I., 1965: Population Geography, Pergamon Press, Oxford.
5. Jones, H. R., 2000: Population Geography, 3rd ed. Paul Chapman, London.
6. Lutz W., Warren C. S. and Scherbov S., 2004: The End of the World Population Growth in the 21st Century, Earthscan
7. Newbold K. B., 2009: Population Geography: Tools and Issues, Rowman and Littlefield Publishers.
8. Pacione M., 1986: Population Geography: Progress and Prospect, Taylor and Francis.
9. Wilson M. G. A., 1968: Population Geography, Nelson.
10. Panda B P (1988): Janasankya Bhugol, M P Hindi Granth Academy,Bhopal
11. Maurya S D (2009) Jansankya Bhugol, Sharda Putak Bhawan, Allahabad 12. Chandna, R C (2006), Jansankhya Bhugol, Kalyani Publishers, Delhi

GEO-H-DSE-04-TH- Environmental Geography 6 CREDITS /60 MARKS 90 hrs.

Paper objectives and expected outcome:

This paper is helpful to understand the concept, structure, & function of Ecosystem, various approaches of environment, sources and control of land pollution, water pollution, air pollution, local & global environmental problem. It includes the waste management and environmental policies of local, national and global levels. The practical portion emphasizes on the preparation of questionnaire survey on environmental problem, quality assessment of soil using field kit and interpretation of air quality data.

4.1 GEO-H-DSE-04-TH- Environmental Geography (Theory) 4 CREDITS / 40 MARKS 60 hrs.

1. Concept of holistic environment and system approach.
2. Ecosystem: Concept, structure and functions.
3. Environmental pollution and degradation: Land, water and air.
4. Space–time hierarchy of environmental problems: Local, regional and global.
5. Urban environmental issues with special reference to waste management.
6. Environmental programmes and policies – Global, national and local levels.

4.2 GEO-H-DSE-04-P- Environment Geography (Practical) 2 CREDITS / 20 MARKS 30 hrs

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

1. Preparation of questionnaire for perception survey on environmental problems2. Quality assessment of soil using field kit: pH and NPK
3. Interpretation of air quality using CPCB / WBPCB data

Reading List

1. Chandna R. C., 2002: Environmental Geography, Kalyani, Ludhiana.

2. Cunninghum W. P. and Cunninghum M. A., 2004: Principals of EnvironmentalScience: Inquiry and Applications, Tata Macgraw Hill, New Delhi.

3. Goudie A., 2001: The Nature of the Environment, Blackwell, Oxford.

4. Singh, R.B. (Eds.) (2009) Biogeography and Biodiversity. Rawat Publication, Jaipur

5. Miller G. T., 2004: Environmental Science: Working with the Earth, Thomson BrooksCole, Singapore.

6. MoEF, 2006: National Environmental Policy-2006, Ministry of Environment andForests, Government of India.

7. Singh, R.B. and Hietala, R. (Eds.) (2014) Livelihood security in Northwestern Himalaya: Case studies from changing socio-economic environments in Himachal Pradesh, India. Advances in Geographical and Environmental Studies, Springer

8. Odum, E. P. et al, 2005: Fundamentals of Ecology, Ceneage Learning India.

9. Singh S., 1997: Environmental Geography, Prayag Pustak Bhawan. Allahabad.

10. UNEP, 2007: Global Environment Outlook: GEO4: Environment For Development, United Nations Environment Programme.

11. Singh, M., Singh, R.B. and Hassan, M.I. (Eds.) (2014) Climate change and biodiversity: Proceedings of IGU Rohtak Conference, Volume 1. Advances in Geographical and Environmental Studies, Springer

12. Singh, R.B. (1998) Ecological Techniques and Approaches to Vulnerable Environment, New Delhi, Oxford & IBH Pub..

13. Singh, Savindra 2001. Paryavaran Bhugol, Prayag Pustak Bhawan, Allahabad. (in Hindi)

GENERIC ELECTIVE (GE)

1. GEO-GE-01-TH- Rural Development: 6 CREDITS / 60 MARKS 24hrs.

Paper objectives and expected outcome:

This paper is helpful to understand the basic elements of rural development, rural Panchayati raj system, non-farm activities, co-operative activities. The course is focused on DPAP, PMGSY, MNREGA, Jan Dhan Yojana and elementary education of rural area.

1. Rural Development: Concept, Basis, Elements, Measuring the level of rural development.
2. Rural Economic Base: Panchayati Raj System, Agriculture and Allied Sectors, Seasonalityand Need for Expanding Non-Farm Activities, Co-operatives, PURA.
3. Area Based Approach to Rural Development: Drought Prone Area Programmes, PMGSY.
4. Target Group Approach to Rural Development: SJSY, MNREGA, Jan Dhan Yojana and Rural Connectivity.
5. Provision of Services – Physical and Socio-Economic Access to Elementary Education and Primary Health Care.

Reading List

1. Gilg A. W., 1985: *An Introduction to Rural Geography*, Edwin Arnold, London.
2. Krishnamurthy, J. 2000: *Rural Development - Problems and Prospects*, Rawat Publs., Jaipur
3. Lee D. A. and Chaudhri D. P. (eds.), 1983: *Rural Development and State*, Methuen, London.
4. Misra R. P. and Sundaram, K. V. (eds.), 1979: *Rural Area Development: Perspectives and Approaches*, Sterling, New Delhi.
5. Misra, R. P. (ed.), 1985: *Rural Development: Capitalist and Socialist Paths*, Vol. 1, Concept, New Delhi.
6. Palione M., 1984: *Rural Geography*, Harper and Row, London.
7. Ramachandran H. and Guimaraes J.P.C., 1991: *Integrated Rural Development in Asia – Leaning from Recent Experience*, Concept Publishing, New Delhi.
8. Robb P. (ed.), 1983: *Rural South Asia: Linkages, Change and Development*, Curzon Press.
9. UNAPDI 1986: *Local Level Planning and Rural Development: Alternative Strategies*. (United Nations Asian & Pacific Development Institute, Bangkok), Concept Publs. Co., New Delhi.
10. Wanmali S., 1992: *Rural Infrastructure Settlement Systems and Development of the Regional Economy in South India*, International Food Policy Research Institute, Washington, D.C.
11. Yugandhar, B. N. and Mukherjee, Neela (eds.) 1991: *Studies in Village India: Issues in Rural Development*, Concept Publs. Co., New Delhi.

02. GEO-GE-02-TH- Industrial Geography **6 CREDITS / 60 MARKS** **24hrs.**

Paper objectives and expected outcome:

This paper is helpful to understand the types, characteristics of Industrial geography, Weber's theory, coal and Iron Industry, rural based industry. Students are able to gain knowledge about industrial complex and industrial region, impact of industrialization & Industrial policy of India.

1. Nature and Scope of Industrial Geography
2. Types, Geographical Characteristics and Location of Industries (Weber's Theory): Small and Medium Industries, Heavy Industries: Coal and Iron based industries; Rural based Industries, Footloose Industry.
3. Mega Industrial Complexes: Bengaluru-Chennai Industrial Region and Chota Nagpur Industrial Region
4. Impact of Industrialization in India: Environmental; Social and Economic
5. Industrial Policy of India

Reading List

1. Alexander J.W. (1979). Economic Geography, Printice Hall of India Pvt. Ltd., New Delhi.
2. Goh Cheng Leong (1997). "Human and economic geography", Oxford University Press, New York.
3. Thoman, R.S., Conkling E.C. and Yeates, M.H. (1968). Geography of Economic Activity, McGraw Hill Book Company, 1968.
4. Miller, E. (1962) Geography of Manufacturing Printice Hall - Englewood Cliff, New Jersey
5. Gunnar Alexandersson (1967). "Geography of Manufacturing, Prentice Hall, New Jersey Truman, A. Harishorn, John W. Alexander (2000) " Economic Geography", Prentice Hall of India Ltd., New Delhi.
6. Singh, Jagdish 2003: *India - A Comprehensive & Systematic Geography*, Gyanodaya Prakashan, Gorakhpur.
7. Tirtha, Ranjit 2002: *Geography of India,* Rawat Publs., Jaipur & New Delhi.
8. Pathak, C. R. 2003: *Spatial Structure and Processes of Development in India*. Regional Science Assoc., Kolkata.
9. Tiwari, R.C. (2007) Geography of India. Prayag Pustak Bhawan, Allahabad
10. Sharma, T.C. (2013) Economic Geography of India. Rawat Publication, Jaipur

3. GEO-GE-O3-TH- Environmental Geography **6 CREDITS / 60 MARKS 24hrs.**

Paper objectives and expected outcome:

This paper is helpful to understand the concept, structure, & function of Ecosystem, various approaches of environment, sources and control of land pollution, water pollution, air pollution, local & global environmental problem. It includes the different Biomes, Chipko & Narmada Banchao environmental movement.

1. Environmental Geography – Concept and Scope.
2. Ecosystem: Concept, Structure & Functions.
3. Human Environmental Relationship- Historical Progression; Biomes: Desert & Mangrove.
4. Environmental Pollution (Air, Water & Land): Causes, Effects & Remedies.
5. Environmental Movement: Chipko, Narmada Banchao.

Reading List

1. Chandna R. C., 2002: Environmental Geography, Kalyani, Ludhiana.

2. Cunninghum W. P. and Cunninghum M. A., 2004: Principals of EnvironmentalScience: Inquiry and Applications, Tata Macgraw Hill, New Delhi.

3. Goudie A., 2001: The Nature of the Environment, Blackwell, Oxford.

4. Singh, R.B. (Eds.) (2009) Biogeography and Biodiversity. Rawat Publication, Jaipur

5. Miller G. T., 2004: Environmental Science: Working with the Earth, Thomson BrooksCole, Singapore.

6. MoEF, 2006: National Environmental Policy-2006, Ministry of Environment andForests, Government of India.

7. Singh, R.B. and Hietala, R. (Eds.) (2014) Livelihood security in Northwestern Himalaya: Case studies from changing socio-economic environments in Himachal Pradesh, India. Advances in Geographical and Environmental Studies, Springer

8. Odum, E. P. et al, 2005: Fundamentals of Ecology, Ceneage Learning India.

9. Singh S., 1997: Environmental Geography, Prayag Pustak Bhawan. Allahabad.

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12. Singh, R.B. (1998) Ecological Techniques and Approaches to Vulnerable Environment, New Delhi, Oxford & IBH Pub..

13. Singh, Savindra 2001. Paryavaran Bhugol, Prayag Pustak Bhawan, Allahabad. (in Hindi)

4. GEO-GE-04-TH-Sustainable Development **6 CREDITS / 60 MARKS 24hrs.**

Paper objectives and expected outcome:

Students are able to gain knowledge about definition & limitations of sustainable development, national and international strategies of development, inclusive development of higher education, the policies and global cooperation for climate change. The course is focused on the sustainable development programmes likes national environmental policy, CDM & Rio+20.

1. Sustainable Development: Definition, Components, Limitations and Historical Background.
2. The Millennium Development Goals: National Strategies and International Experiences
3. Sustainable Regional Development: Need and examples from different Ecosystems.
4. Inclusive Development: Education, Health; Climate Change: The role of higher education in sustainable development; The human right to health; Poverty and disease; The Challenges of Universal Health Coverage; Policies and Global Cooperation for Climate Change
5. Sustainable Development Policies and Programmes: The proposal for SDGs at Rio+20; Illustrative SDGs; Goal-Based Development; Financing for Sustainable Development; Principles of Good Governance; National Environmental Policy, CDM.

Reading List

1. Agyeman, Julian, Robert D. Bullard and Bob Evans (Eds.) (2003) Just Sustainabilities: Development in an Unequal World. London: Earthscan. (Introduction and conclusion.).
2. Ayers, Jessica and David Dodman (2010) "Climate change adaptation and development I: the state of the debate". Progress in Development Studies 10 (2): 161-168.
3. Baker, Susan (2006) Sustainable Development. Milton Park, Abingdon, Oxon; New York, N.Y.: Routledge. (Chapter 2, "The concept of sustainable development").
4. Brosius, Peter (1997) "Endangered forest, endangered people: Environmentalist representations of indigenous knowledge", Human Ecology 25: 47-69.
5. Lohman, Larry (2003) "Re-imagining the population debate". Corner House Briefing 28.
6. Martínez-Alier, Joan et al (2010) "Sustainable de-growth: Mapping the context, criticisms and future prospects of an emergent paradigm" Ecological Economics 69: 1741-1747.
7. Merchant, Carolyn (Ed.) (1994) Ecology. Atlantic Highlands, N.J: Humanities Press. (Introduction, pp 1- 25.)
8. Osorio, Leonardo et al (2005) "Debates on sustainable development: towards a holistic view of reality". Environment, Development and Sustainability 7: 501-518.
9. Robbins, Paul (2004) Political Ecology: A Critical Introduction. Blackwell Publishing.
10. Singh, R.B. (Eds.) (2001) Urban Sustainability in the Context of Global Change, Science Pub., Inc., Enfield (NH), USA and Oxford & IBH Pub., New Delhi.