

CENTRE FOR STUDIES IN GEOGRAPHY
DIBRUGARH UNIVERSITY



SYLLABUS FOR MASTER DEGREE IN GEOGRAPHY
(UNDER CBCS SYSTEM)

M.A. /M.Sc. Geography

M.A./M.Sc. in Geography
Under Choice Based Credit System
Centre for Studies in Geography
Dibrugarh University
Dibrugarh 786004
Assam

Syllabus, Course contents and Reading materials for M.A./ M.Sc. in Geography (under Choice Based Credit System) as approved by the Board of Studies of Centre for Studies in Geography Dibrugarh University in its meeting held on 6th March 2019 by the Post Graduate Board in its meeting and the Academic Council of Dibrugarh University.

The Post Graduate Programme in Geography shall be of four semester covering two academic years.

The Course Structure

1. MA / MSc Programme in Geography shall be of minimum 76 credits, distributed in four semester
2. The Programme is divided into a number of courses :
 - a) **Core Course:** these courses include compulsory components of MA / MSc Programme in Geography and are to be compulsorily studied as a core requirement for the Programme. All core courses shall be of 4 (four) credit each. A total of 12 core courses are offered which are distributed equally in four semesters.
 - b) **Elective Courses:** Elective courses shall be chosen by each student from a pool of courses. The courses shall be of 4 (four) credits each. The elective courses shall be of two types:
 - i) **Discipline Specific Elective (DSE):** These course shall be intra departmental. At least one course out of a basket of DSE courses , shall be chosen by each student in each semester
 - ii) **Generic Elective (GE):** These courses shall be inter-departmental/ inter-disciplinary. The student shall have to opt at least 2(two) course from other departments according to his or her area of interest. These courses are offered in 2nd and 3rd Semesters.
 - c) **Ability Enhancement Courses (AEC):** Ability Enhancement Courses shall be interdisciplinary in nature and shall be of 2 (two) credits. The student shall have to opt at least 2(two) course from other departments according to his or her area of interest. These courses are offered in 1st and 3rd Semesters.
3. The MA/M.Sc. Programme in Geography shall be governed by The Dibrugarh University regulations for Post Graduate Programme in the Choice Based Credit System, 2018.

SEMESTER	COURSE	CORE COURSE TITLES
1	GG1C1	GEOMORPHOLOGY
	GG1C2	CLIMATOLOGY
	GG1C3	PRACTICALS ON MORPHOMETRIC TECHNIQUES AND THEMATIC MAPPING
2	GG2C1	SOCIAL GEOGRAPHY OF INDIA
	GG2C2	FUNDAMENTALS OF GEOINFORMATICS
	GG2C3	PRACTICALS ON SURVEYING AND SPATIAL PATTERNS
3	GG3C1	ADVANCED GEOINFORMATICS
	GG3C2	RESEARCH METHODOLOGY
	GG3C3	FIELD STUDY
4	GG4C1	GEOGRAPHIC THOUGHT
	GG4C2	GEOGRAPHY OF INDIA
	GG4C3	DISSERTATION

CORE COURSE

DISCIPLINE SPECIFIC ELECTIVE (DSE) 4credits

Semester	Paper	Papers available for selection (One Paper Per Semester)
1	GG1D1	Cultural Geography
	GG1D2	Geography of Resources and Economic Development
	GG1D3	World Geography
2	GG2D1	Fundamentals of Regional Planning
	GG2D2	Fundamentals of Fluvial Geomorphology
	GG2D3	Fundamentals of Disaster Management
3	GG3D1	Advanced Regional Planning
	GG3D2	Advanced Fluvial Geomorphology
	GG3D3	Disaster Management Methods and Techniques
4	GG4D1	Practicals on Regional Planning
	GG4D2	Practicals on Fluvial Geomorphology
	GG4D3	Application of GIS and RS in DRR

GENERIC ELECTIVE (GE) (4c) General Structure:

Semester	Course	Course available for selection (One Paper Per Semester)
1	NIL	
2	GG2G1	Environment and Development
	GG2G2	Climatology and Oceanography
	GG2G3	Geography of Gender Studies
3	GG3G1	Hydrology
	GG3G2	Application of Geoinformatics in Petroleum Exploration
	GG3G3	Geography of Tribal Studies
4	NIL	

ABILITY ENHANCEMENT COMPULSORY COURSE (SEC) (2c)

Semester	Course Code	Course Name
1	GG1A1	Application of RS / UAV in Geo-Spatial Analysis
2		NIL
3	GG1A2	Geographical information system Lab. Based
4		NIL

SEMESTER I

Sem	Course code	Title of the Course	Credit			Marks Distribution				
			Th	Prac	Total	Theory		Practical		Total
						End Sem	In- Sem	End Sem	In-Sem	
1 st Sem	GG1C1	Geomorphology	4		4	60	40			100
	GG1C2	Climatology	4		4	60	40			100
	GG1C3	Practicals on morphometric techniques and thematic mapping		4	4			60	40	100
	GG1D1	Cultural Geography	4		4	60	40			100
	GG1D2	Geography of Resources and Economic Development	4		4	60	40			100
	GG1D3	World Geography	4		4	60	40			100
	GG1A1	Application of RS / UAV in Geo-Spatial Analysis		2	2			30	20	50

SEMESTER II

Sem	Paper code	Title of the Course	Credit			Marks Distribution				
			Th	Prac	Total	Theory		Practical		Total
						End Sem	In- Sem	End Sem	In- Sem	
2 nd Sem	GG2C1	Social Geography of India	4		4	60	40			100
	GG2C2	Fundamentals of Geoinformatics	4		4	60	40			100
	GG2C3	Practicals on Surveying and Spatial Patterns		4	4			60	40	100
	GG2D1	Fundamentals of Regional Planning	4		4	60	40			100
	GG2D2	Fundamentals of Fluvial Geomorphology	4		4	60	40			100
	GG2D3	Fundamentals of Disaster Management	4		4	60	40			100
	GG2G1	Environment and Development	4		4	60	40			100
	GG2G2	Climatology and Oceanography	4		4	60	40			100
	GG2G3	Gender Studies	4		4	60	40			100

SEMESTER III

Sem	Course code	Title of the Course	Credit			Marks Distribution				
			Th	Prac	Total	Theory		Practical		Total
						End Sem	In- Sem	End Sem	In- Sem	
3rd Sem	GG3C1	Advanced Geoinformatics	4		4	60	40			100
	GG3C2	Research Methodology	4		4	60	40			100
	GG3C3	Field study		4	4			60	40	100
	GG3D1	Advanced Regional Planning	4		4	60	40			100
	GG3D2	Advanced Fluvial Geomorphology	4		4	60	40			100
	GG3D3	Disaster Management Methods and Techniques	4		4	60	40			100
	GG3G1	Hydrology	4		4	60	40			100
	GG3G2	Application of Geoinformatics in Petroleum Exploration	4		4	60	40			100
	GG3G3	Tribal Studies	4		4	60	40			100
	GG3A1	Practicals on Geoinformatics		2	2			30	20	50

SEMESTER IV

Sem	Paper code	Title of the Course	Credit			Marks Distribution				
			Th	Prac	Total	Theory		Practical		Total
						End Sem	In- Sem	End Sem	In- Sem	
4 th Sem	GG4C1	Geographic Thought	4		4	60	40			100
	GG4C2	Geography of India	4		4	60	40			100
	GG4C3	Dissertation		4	4			60	40	100
	GG4D1	Practicals on Regional Planning		4	4			60	40	100
	GG4D2	Practicals on Fluvial Geomorphology		4	4			60	40	100
	GG4D3	Application of GIS and RS in DRR		4	4			60	40	100

SEMESTER – I

GG1C1: GEOMORPHOLOGY
CREDIT 4
TOTAL MARKS 100

Course Definition:

Geomorphology is the study of the physical features of the surface of the earth and their relation to its geological structures. It is the scientific study of the origin and evolution of topographic and bathymetric features created by physical, chemical or biological processes operating at or near the Earth's surface

Course Objectives:

- To enhance the learner in the field of geomorphic concepts and its recent trends.
- To have an understanding of diverse geomorphic processes acting on the earth and their role on the development of different landform under different geo-climatic conditions.
- To acquire knowledge about the various morphometric techniques and its applicability.

UNITS	NAME	CONTENTS	L	T	P
1	Development of Geomorphic Ideas	a) Fundamental Geomorphic Concepts. b) Concepts of Uniformitarianism and Catastrophism. c) Recent trends in Geomorphology	8	4	
2	Fundamental Concepts in Geomorphology	a) System concept in geomorphology b) Concept of Steady state and Dynamic Equilibrium c) Geomorphic Thresholds.	8	4	
3	Geomorphic Process	a) Endogenetic and Exogenetic processes b) Dynamics of Fluvial, Glacial, Aeolian and Karst processes and resulting landforms. c) Study of slopes, slopes forming processes and different forms of slopes.	8	4	
4	Morphometric analysis	a) Linear Aspects: Stream ordering based on Horton and Strahler, Bifurcation ratio b) Areal Aspects: Geometry of basin shape, Basin Perimeter, Length and Area, Stream frequency and Drainage density. c) Relief Aspects: Hypsometric analysis-Hypsometric curve and Integral, Altimetric analysis.	8	4	

Books Recommended for Paper c- 101: Geomorphology

1. Ahmed, E., 1985: Geomorphology, KalyaniPubliser, New Delhi.
2. Bloom, Arthur L., 1978: Geomorphology-A Systematic Analysis of Late Cenozoic Land-Forms, Prentice Hall, Engelwood Cliffs, N.J.
3. Chorley, R.J., 1972: Spatial Analysis in Geomorphology, Harper&RowPublisher, London
4. Chorley, Water, Earth and Man, Methun and Co., London.

5. Chorley, R.J.,(ed),1968: Models in Geography, Methun and Co., London.
6. Dayal, P.(2ndedition),1996: A Textbook of Geomorphology, Shukla Book Depot, Patna.
7. Dixit,K.R.(ed),1983: Contribution to Indian Geography/Geomorphology, Heritage, New Delhi.
8. Gregory, K.J. 1985: The Nature of Physical Geography, Edward Arnold, London.
9. Gregory, K.J. & Walling, D.E.1973: Drainage Basin-Form and Process, Ed.Arnold, Lond.
8. Leopold, L.B., Wolman, M.G., Milier, J.P., 1964: Fluvial Processes in Geomorphology, Freeman, Sanfransisco.
9. Penck,W.,1924: Morphological Analysis of Landforms, McMillan, London.
10. Schumm, S.A.,(ed)1977: Drainage Basin Morphology, Dowden Hutchinson & Ross Inc.
11. Sharma, H.S.(ed)1982: Perspectives in Geomorphology, Vol. I to IV, Concept, New Delhi.
12. Sharma, H.S.(ed) 1986: Geomorphology-Earth Surface Processes and Forms, Tata McGraw Hill, New Delhi.
- 13.Smart, M.W.1951: The Origin of the Earth .
- 13.Steers, A.J.,1937:The Unstable Earth.
14. Strahler, A.N.1968: The Earth Science, Harper International Edition.
15. Strahler, A.N.1969: Physical Geography, 3rd Edition, Wiley International.
16. Thornbury, W.D.1969: Principles of Geomorphology, Wiley International.
17. Young, A.,1972: Slope, Longman, New York.

GG1C2: CLIMATOLOGY

CREDIT 4

TOTAL MARKS 100

Course Definition:

Climatology is the scientific study of climate. It is a branch of atmospheric sciences concerned with both the description of climate and the analysis of the causes of climatic differences. It also cover broad aspects of climate induced atmospheric phenomena's over different part of the earth surfaces

Course Objectives:

- To conceptualize the fundamentals of climate and weather and different climatic types.
- It also focuses on the nature and development of different atmospheric processes and whether phenomena over the surface of the earth.

UNIT	NAME	CONTENTS	L	T	P
1	Basic concept of weather, climate and atmosphere	a) Elements and characteristics of weather and climate b) Origin and development of atmosphere c) Layered structure and composition of atmosphere	8	4	
2	Basic concepts in heat, atmospheric Temperature & Hydrological Cycle	a) Insolation, Heat balance and distribution of temperature. b) Concept of hydrological cycle: factors controlling evaporation, transpiration, condensation and precipitation c) Adiabatic process of temperature change: dry and moist adiabatic lapse rate and atmospheric condition.	8	4	
3	Atmospheric circulation	a) Atmosphere pressure, global pressure systems and wind belts and its impact (El-Niño, La -Nina) b) The Monsoon-its origin, mechanism and development: Indian monsoon	8	4	
4	Atmospheric processes	a) Air masses: source regions, classification and modifications b) Atmospheric disturbances: tropical and temperate cyclones c) Concept and types of fronts: Frontogenesis and Frontolysis	8	4	

Books Recommended for Paper II: Climatology

1. Barry,R.G.& Chorley, R.J.1971: Atmosphere, Weather & Climate, Methuem Co.,London.
2. Critsfield,H.J.,1975:General Climatology, Prentice Hall,New Delhi.
3. Das,P.K.,1968: The Monsoon, National Book Trust,New Delhi.
4. Hobbs,J.E.,1980: Applied Climatology, Butterworth.
5. Lockwood,J.G.,1976: World Climatology-Environmental Approach, Ed. Arnold Ltd..
6. Lal,D.S.,1998: Climatology, ShardaPustakBhawan, Allahabad.
7. Miller,A.A.,1953: Climatology, Dutton.
8. Menon,P.A.,: Our Weather, National Book Trust.
9. Stringer,E.N.,1982: An Introduction to Climate, International Studies.
10. Trewarha,G.T. & Horn,L.A.,1980: An Introduction to Climate, International Studies.
11. Oliver J E & Hidore J J, Climatology: an atmospheric science

GG1C3: PRACTICALS ON MORPHOMETRIC TECHNIQUES AND THEMATIC MAPPING

4 CREDITS

Total Marks 100

Course Definition:

The morphometric analysis of the drainage basin and channel network play an important role in understanding the geo-hydrological behaviour of drainage basin and expresses the prevailing climate, geology, geomorphology, structural antecedents of the catchment. These studies are very useful for identifying and planning the groundwater potential zones and watershed management, including the whole gamut of natural resources connected with the watershed. Thematic maps are of immense importance. These maps are designed to illustrate a specific theme in relation to a geographic area. Whether it's trading patterns, the spread of a disease, or even the definitive ranking of people's favourite beverage by state, thematic maps always have something fascinating to share. Understanding of these techniques is very important in geographical studies.

Course Objective:

- The objective of this course is to familiarize the student about morphometric techniques and thematic mapping

UNIT	NAME	CONTENTS	L	T	P
1	Representation of Relief and Analysis	a) Profile Drawing and Interpretation. b) Preparation and analysis of relative relief maps based on Smith's method. c) Preparation and analysis of slope maps using Wentworth's method d) Dissection Index	2		10
2	Analysis of Basin Morphometry (based on Horton's and Strahler's)	a) Morphometric Analysis of Drainage basin-its geographical significance; Basin morphometry of fluvially originated drainage basin b) Linear Aspects: Stream ordering based on Horton and Strahler, Bifurcation ratio c) Areal Aspects: Geometry of basin shape, Basin Perimeter, Length and Area, Stream frequency and Drainage density. d) Relief Aspects: Hypsometric analysis-Hypsometric	2		10

		curve and Integral, Altimetric analysis			
3	Thematic Mapping and Preparation of Graphs.	a) Distribution, Density and Growth of Population-Assam and India b) Spatial variations of literacy ratio-Assam and India c) Preparation of Graphs and Maps based on Climatic data. Drawing and analysis of climograph, hythergraph and ergograph. Preparation of rainfall dispersion graph, rainfall variability and equifluves maps. d) Construction of water deficiency and surplus graphs.	2		10
4	Mapping Landscapes	a) Geomorphological map symbols and map preparation b) Land use and land cover map preparation (using mouza maps and Google Earth)	2		6

In-semester Examination 20 Marks, Internal Evaluation 20 Marks and End Semester 60 Marks

Reference books

1. Chorley R.J., (Ed.), (1972): Spatial Analysis in Geomorphology, Harper & Row.
2. Doornkamp, J.C. and King, C.A.M. (1971): Numerical Analysis in Geomorphology: An Introduction, Arnold, London.
3. Ishtiaq, M. (1989): Practical Geography, Heritage Publishers, New Delhi.
4. Khan, Md. Z.A. (1998): Text Book of Practical Geography, Concept, New Delhi.
5. Khullar, D.R. (2001): Essentials of Practical Geography, Second Edition, New Academic Publishing, Jalandhar.
6. Mayer, L. (1990): Introduction to Quantitative Geomorphology, Prentice Hall, New Jersey.
7. Misra, R.P. and Ramesh, A. (1989): Fundamentals of Cartography, Revised and Enlarged Edition, Concept, New Delhi.
8. Monkhouse, F.J. and Wilkinson, H.R. (1980): Maps and Diagrams, B. I. Publications, Bombay.
9. Morisawa, M. (1983): Geomorphological Laboratory Manual, John Wiley, New York.
10. Pal, S.K. (1998): Statistics for Geoscientists: Techniques and Application, Concept, New Delhi.
11. Robinson, A.H. et al. (2004): Elements of Cartography, Sixth Edition, Wiley-India, New Delhi
12. Sarkar, A. (2008): Practical Geography: A Systematic Approach, Orient Blackswan, Kolkata.
13. Sharma, J.P. (1996): Prayogik Bhoogol, Rastogi Publications, Meerut.
14. Singh, R.L. (1979): Elements of Practical Geography, Kalyani Publishers, New Delhi.
15. Singh, Savindra (1997): Geomorphology, Prayag Pustak Bhawan, Allahabad.
16. Sparks, B.W. (1982): Geomorphology, Second Edition, Longman.
17. Upton, W.B. (1970): Landforms and Topographic Maps, John Wiley, New York.
18. Alvi, Z. (1995): Statistical Geography: Methods and Applications, Rawat Publications, Jaipur
19. Anson R. and Ormelling F. J., 1994: International Cartographic Association: Basic Cartographic Vol. Pregmen Press.
20. Arora, K.R. (2010): Surveying (Volumes I & II), Standard Book House, New Delhi
21. Basak, N.N. 2017. Surveying and Levelling, 2nd ed, McGraw Hill Education.

22. Basu, R. and Bhaduri, S. eds., (2007): Contemporary Issues and Techniques in Geography, Progressive Publishers, Kolkata
23. Bennison, G.M. (1990): An Introduction to Geological Structures and Maps, Edward Arnold, London
24. Bolton, T. 2009 (reprint). Geological Maps: Their Solution and Interpretation, Cambridge University Press.
25. Ebdon, D. (1977): Statistics in Geography: A Practical Approach, Blackwell Publishers
26. Gopi, S. (2005): Global Positioning System: Principles and Applications, Tata McGraw-Hill Education, New Delhi
27. Kulkarni, S.V. and Kanetkar, T.R. (1965): Surveying and Levelling (Volumes I & II), A.V.G. Prakashan, New Delhi
28. Lisle, R.J. (2004): Geological Structures and Maps: A Practical Guide, Butterworth-Heinemann, Amsterdam
29. Mahmood, A. (1977): Statistical Methods in Geographical Studies, Rajesh Publications, New Delhi
13. Mishra R.P. and Ramesh, A., 1989: Fundamentals of Cartography, Concept, New Delhi.
14. Monkhouse, F.J. and Williamson, R.H. (1963): Maps and Diagrams: Their Compilation and Construction, Methuen, London
30. Pal, S. K. (1998): Statistics For Geoscientists Techniques and Applications, Concept Publishing Company, New Delhi
31. Rhind D. W. and Taylor D. R. F., (eds.), 1989: Cartography: Past, Present and Future, Elsevier, International Cartographic Association.
17. Saha, P.K. and Basu, P. (2009): Advanced Practical Geography, Books and Allied (P) Ltd., Kolkata
32. Sarkar, A. (2008): Practical Geography: A Systematic Approach, Orient BlackSwan, Kolkata
33. Sarkar, A. (2013): Quantitative Geography: Techniques and Presentations, Orient BlackSwan, New Delhi
34. Singh, R.L. and Singh, P.B. (2009): Elements of Practical Geography, Kalyani Publishers, New Delhi
35. Subramanian, R. 2012. Surveying and Levelling, 2nd ed, Oxford University Press
36. Davis, P: Data Description and Presentation.
37. Khullar, R.D. : Practical Geography .
38. Mishra, R.P: Fundamentals of Cartography.
39. Monkhouse, F.J: Maps and Diagrams.
40. Steers, J.A: Introduction to the Study of Map Projection.
41. Singh, R.L: Fundamentals of Practical Geography.
42. Singh, M.R.N: Map Work and Practical Geography.

GG1D1: CULTURAL GEOGRAPHY
CREDIT 4
TOTAL MARKS 100

Course Definition:

Cultural Geography forms one of the basic contemporary branches of Human Geography today. If culture has to be defined as the way of life and Geography as the man – environment relationship, it becomes important to understand how culture, which is essentially manmade and the environment comes to a juncture. This course on Cultural Geography not only focuses on acquainting the students with the relationship between culture and geography, but also has been designed to keep the students abreast with the contemporary issues in Geography.

Course Objectives:

- This course opens with the motive of introducing Cultural Geography as a new dimension in the discipline of Geography.
- To provide with the basic understanding of the evolution of Cultural Geography which include the Old and the New Schools of Cultural Geography.
- It attempts to lay the foundational background in Cultural Geography.
- To understand the main theoretical backgrounds.
- It focuses on the role of culture in shaping places, regions, and landscapes.
- To equip the students with the understanding of the production and diffusion of folk and popular culture.
- To appreciate culture from geographical perspective.
- To enable the learner to understand the cultural issues of the North East region of India, which encompasses the contemporary issues of the region as a cultural entity as a whole.

Unit	Name of the Units	Contents	L	T	P
1.	Introduction to Cultural Geography and Berkeley School of Cultural Geography	a) Meaning, definition, nature and scope of cultural geography. b) Environmental Determinism and the birth of Cultural Geography. c) Carl O Saur and his contribution. d) The Morphology of Landscape. e) Superorganism and its discontent.	12		

2.	New Cultural Geography	a) Birth of New Cultural Geography. b) New Approaches to Landscape: c) Landscape as a text; d) Landscape as an Ideology; e) Landscape as Labour.	12		
3.	Concepts In Cultural Geography	a) Concept of acculturation; cultural ecology; cultural hearth; cultural realm; cultural diffusion; cultural subjugation; cultural lag and cultural integration. b) Space and Place; Nature and Culture; c) Image & Reality; Self & Other. d) Politics of Culture; e) Popular culture; Media and cyber space;	12		
4.	Issues in Cultural Geography in the context of the North East India	a) North East as a Cultural Region; b) Tribes; Ethnicity; Migration and identity; c) Folk culture and diffusion of popular culture. d) Regional identities, Nationalism and Globalization.	12		

In-semester Examination 20 Marks, Internal Evaluation 20 Marks and End Semester 60 Marks.

References

1. Cloke,P., Crang,P.,Goodwin,M.,(ed) (1999), *Introducing Human Geographies*, London: Oxford University Press.
2. Rubenstein, James M. (2012) *Contemporary Human Geography*, Pearson Education, U.S.A.
3. Sen,J,(2012) *Social and Cultural Geography*, Kalyani Publishers, New Delhi.
4. Maurya, S.D. (2016), *Cultural Geography*,Sharda Pustak Bhawan, Allahabad.
5. Sopher D. (1980) (ed) 'An Exploration of India: Geographical Perspectives on Society and Culture', Cornell Press, New York.
6. Kosambi DD (1962) *Myth and Reality: Studies in the Formation of Indian Culture*, Popular Prakashan, Bombay.
7. Cosgrove Denis (1984) *Social Transformation and Symbolic Landscape*, Croom Helen, London.
8. Crang, Mike (1998) *Cultural Geography*, Routledge, London.
9. Duncan, James and Duncan, N (1988) “(Re) Reading the landscape”, *Environment and Planning D: society and Space*, 6, 117-26.
10. Hubbard, Phil et.al (2005) *Key Thinkers on Space and Place*, Sage Publications, London, Thousand Oaks, New Delhi.

11. Robertson Iaian and Penny Richards, (2003) *Studying Cultural Landscapes*, Oxford University Press, London and New York.
12. Cresswell, T. 1996 In *Place/Out of Place: Geography, Ideology and Transgression*. Minneapolis: University of Minnesota Press, Vol. 1, issue 6, New Delhi: The Magazine of the Council.
13. Lefebvre, H. 1991 *the Production of Space* (trans by D. Nicholson-Smith) Oxford:Blackwell.
14. Said, E. (1993) *Culture and Imperialism*, Alfred Knopf, New York.
15. Highmore, B (2005) *Cityscapes. Cultural Readings in the material and symbolic city*. New York: Palgrave.
16. Zukin Shawn (1995) *The Cultures of Cities*, Blackwell, Oxford.
17. Peet, R. and Thrift, N., (2002), *New Models in Geography-Volumes I & II*, London, Unwin Hyman.
18. Entrikin, J.N. 1991 *The Betweenness of Place: Towards a geography of Modernity*. Baltimore: Johns Hopkins University Press.
19. Dear, M.J and S. Flusty (eds) 2002 *The Spaces of Modernity. Readings in Human Geography*.Oxford: Blackwell.
20. Dear, M.J and S. Flusty (eds) 2002 *The Spaces of Modernity. Readings in Human Geography*.Oxford: Blackwell.

GG1D2: GEOGRAPHY OF RESOURCES AND ECONOMIC DEVELOPMENT

CREDIT 4

TOTAL MARKS 100

Course Definition:

Resources are crucial for the technological and economic development of firms in spatial perspective. Resources are spatially distributed varying in quantity and quality. Some resources are finite, while others can be replenished at varying rates. However, humans need to balance short-term rates of use against long-term availability to ensure a sustainable future.

Course Objectives:

- To acquaint the students with the conceptual parameters and utilization pattern of different types of resources.
- To understand the geography of economic development and different types of economic activity.
- To acquire knowledge about the various aspects of industrial, agricultural and transport geography.

UNITS	NAME	CONTENTS	L	T	P
1	Conceptual parameters of Resources	a) Concept and Classification of Resources. b) Dynamics of Resource base as related to Cultural, economic and technological Development. c) Methods of conservation and Management of resources.	8	4	
2	Utilization of Resources	a) Global distribution of mineral and power Resources. (iron, copper, aluminum, gold, coal, oil, natural gas, wind power and hydro power) b) Utilization pattern of mineral and power Resources. c) Role of Technology in Resource utilization.	8	4	
3	Geography of Economic Development	a) Characteristics of Economic Development, economy of Developed and Developing countries. b) Regional Disparities in terms of Development- causes and Remedies.	8	4	

		c) Globalization and Indian economy			
4	Geography of Economic Activity.	a) Agriculture- Place of agriculture in global economy, agriculture systems of the world. b) Classification of industries: Resource base and footloose industries c) Industrial location theories-Weber, Hoover and Losch. d) Role of transport in resource utilization.	8	4	

Books recommended

1. Guha,J.L&Chattarj,P.R 1999, new edition): A new Approach to Economic Geography.
2. Alexander .1986 Economic Geography,Prentic Hall
3. Das Gupta,A Economic Commercial Geography
4. Isard,W, 1975 Introduction to Regional Sciences,Engle Wood pub
5. Roy &Mukherjee,S, 1993 Economic Geography,Theory and Models,Progress Pub, Moscow
- Symons,L,1979,AgriculturalGeography.WV Press
6. Thomes R.S. & Corbin,P.B.1974 Geography of Economic Activity, McGraw Hill
7. Wheeler,J.O& Muller P.O. 1981 Economic Geography, Wiley & Sons
8. Eliot,H.M.(ed)1974 Transportation Geography Comments and Readings
9. Hay,A,1973 Transport Geography for the Space Economy
10. Isard ,W, 1956,Location and Space EconomyMIT Press
11. Losch.A.1954,The Economics of Location,New Haven
12. Choudhuri,M.R. 1970 Indian Industries, Development and Location,Oxford

GG1D3: WORLD REGIONAL GEOGRAPHY
CREDIT 4
TOTAL MARKS 100

Course Definition:

World Geography is a systematic investigation and comprehensive approach to search the spatial and regional variations of geographic phenomenon. World regional geography is also important for knowledge of spatial distribution of life and resources across the globe.

Course Objectives:

- General understanding of the concept of research and identification of overall process of designing a research work,
- To have a deeper understanding of complete designing of research from statement of research problem to final thesis writing
- Critical assessment of research methods pertinent to technology innovation research in the field of earth science

Credits: 4(3+1+0) (40 lectures, 8 Tutorials)

UNIT	NAME	CONTENTS	L	T	P
1	ASIA	a) Physiography : Relief and Drainage b) Soil and Climate c) Forest and Natural Vegetation d) Agriculture and Industry	10	2	
2	EUROPE	a) Physiography : Relief and Drainage b) Soil and Climate c) Forrest and Natural Vegetation d) Agriculture and Industry	10	2	
3	NORTH AND SOUTH AMERICA	a) Physiography : Relief and Drainage b) Soil and Climate c) Forest and Natural Vegetation d) Agriculture and Industry	10	2	
4	AFRICA AND AUSTRALIA	a. Physiography : Relief and Drainage b. Soil and Climate c. Forest and Natural Vegetation d. Agriculture and Industry	10	2	

Suggested Readings (Paper)

1. Hussain Mazid, 2012. World Geography, Rawat Publications, New Delhi
2. Joseph J Hobbs. 2007. World Regional Geography, Brooks/Cole Cengage Learning, Belmont, USA

3. Lydia Mihelic Pulsipher, Alex Pulsipher 1999. World Regional Geography: Global Patterns, Local Lives, W. H. Freeman, 2017
4. Manku, Darshan Singh, 2013. A Regional Geography of the World, Kalyani Publication

GG1A1: APPLICATION OF REMOTE SENSING AND UNMANNED AERIAL VEHICLE IN GEO-SPATIAL ANALYSIS

**CREDIT 2
TOTAL MARKS 50**

Course Definition:

Satellite remote sensing ensures a remarkable platform high up in space that offers us means of looking at our planet using acoustic energy employing cameras or electromagnetic radiation, radiometers, lasers, scanners, sonar, radar systems, thermal devices, and other sensing instruments and its application in geosciences.

UAV technology is coming up in a big way and there is huge demand for UAV surveys in different fields. To meet those requirements trained and skilled manpower is required. The course will mainly emphasis on the basic of UAV operations, technologies and modes of data acquisition. The processing of UAV acquired imagery for deriving various products such as ortho-rectified imagery, Digital Surface and Elevation models and 3D reconstruction of surface etc

Course Objectives:

- To make the students to understand the basic concepts of Remote Sensing and its applications
- To make the students to understand the basic concepts of UAV systems design and its applications.

UNIT	NAME	CONTENTS	L	T	P
1	FUNDAMENTALS AND APPLICATION OF REMOTE SENSING	a) Fundamentals of Remote Sensing b) Digital Image Processing c) Image Interpretation d) Application of remote sensing in the field of agriculture, forestry, urban planning, water resources and geology etc.	10	1	1
2	INTRODUCTION TO UAV AND APPLICATIONS OF UAV	a) UAV system design and integration-Theory b) UAV flight simulation-hands on practical c) UAV flight planning-Theory & Hands on practical d) UAV data processing-generation of Orthomosaic, Digital Elevation Model (DEM), Digital Surface Model (DSM), 3D modelling etc.-Theory & hands on practical.	10	1	1

		e) UAV applications in the field of agriculture, forestry, urban planning, water resources and geology etc.			
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In-semester Examination 10 Marks, Internal Evaluation 10 Marks and End Semester 30 Marks

Reference books

- 1.Jensen, J.R., 2000. Remote sensing of the environment: An earth resource perspective, Prentice Hall, Upper saddle river, NJ,
- 2.Joseph, George, (2003), Fundamental of Remote Sensing, University Press (India) Pvt. Ltd, Orient Longman Pte. Ltd., Hyderabad, India
- 3.Lillesand, T.M. and Kieffer, R.W., 2003. Remote Sensing and Image Interpretation, 5thEdition., Wiley, New York
- 4.Panda, B. C., 2008. Remote Sensing: Principles and Applications, Viva Books Private Limited, India
- 5.Reg Austin “Unmanned Aircraft Systems UAV design, development and deployment”, Wiley, 2010.
- 6.Robert C. Nelson, Flight Stability and Automatic Control, McGraw-Hill, Inc, 1998.
- 7.Kimon P. Valavanis, “Advances in Unmanned Aerial Vehicles: State of the Art and the Road to Autonomy”, Springer, 2007
- 8.Paul G Fahlstrom, Thomas J Gleason, “Introduction to UAV Systems”, UAV Systems, Inc, 1998
- 9.Dr. Armand J. Chaput, “Design of Unmanned Air Vehicle Systems”, Lockheed Martin Aeronautics Company, 2001
- 10.Everaerts J., The use of Unmanned Aerial Vehicles (UAVs) for Remote Sensing and Mapping. The International Archives of the photogrammetry, Remote Sensing and Spatial Information Services, Vol. XXXVII part B1, Beijing, 2008.
- 11.Handique, B.K., Goswami, J., Qadir, A., Gupta, C., Raju, P.L.N., Rapid assessment of boro paddy infested by brown planthopper in Morigaon district, Assam, India, using Unmanned Aerial Vehicle. Current Science, VOL. 111, No. 10, 25 Nov. 2016.
- 12.Jarrold C. H., Shane M. B., Rowan M., Ashley H., & Rohan H. C., Precision wildlife monitoring using unmanned aerial vehicles; Scientific Reports 6, Article number: 22574
- 13.Martínez-de Dios, J.R., et al., 2006. Experimental results of automatic fire detection and monitoring with UAVs. Forest Ecology and Management 234S (2006) S232.
- 14.Sugiura, R., et al, 2005. Remote-sensing technology for Vegetation Monitoring using an Unmanned Helicopter. Biosystems Engineering 90(4) (2005), 369-379
- 15.Vermeulen, C., Lejeune, P., Lisein, J., Sawadogo, P. & Bouche, P.Unmanned aerial survey of elephants. PLoS One 8, e54700, doi: 10.1371/journal.pone.0054700 (2013).

SEMESTER II

GG2C1: SOCIAL GEOGRAPHY OF INDIA

CREDIT 4

TOTAL MARKS 100

Course Definition:

Geography is essentially human as well. And humans being social animals cannot be successfully studied without a careful analysis of their social aspects. This particular course dwells on the socio-spatial aspects of the people of India which in itself is a diverse land both physically and culturally. As the geography of India is vast and varied, this course aims in understanding the built environment of the country from the perspective of areal differentiation.

Course Objectives:

- To have a basic introduction of Social Geography and to locate Social Geography amongst the other social sciences.
- To understand the various social aspects of the country from a geographical perspective.
- To learn about the relationships between the environment, development, modernization and societies.
- To provide an understanding on how the various social issues are etched on the geography of the country.

Units	Name of Units	Contents	L	T	P
1	An Introduction To Social Geography	a) Meaning, nature and scope of social geography; b) Growth and development of social geography; c) Development of social geography in India.	12		
2	Caste and Tribe In India	a) Origin of the caste system in India and their geographical patterning. b) The morphology of settlements of caste; caste in rural and urban neighbourhoods; caste and clan territories. c) Tribes in India; their geographical distribution and their rural-urban composition.	12		
3	Religions In	a) Religions in India and their diversity;	12		

	India	b) A geographical analysis and historical perspective of religions in India. c) Religious identity; its elements and its social expression.			
4	Language In India	a) Origins of language; dialect. b) Diffusion of language; language shift and its retention. c) Languages of India and their spatial patterning and formation of linguistic states.	12		

In-semester Examination 20 Marks, Internal Evaluation 20 Marks and End Semester 60 Marks.

References

1. Cloke,P., Crang,P.,Goodwin,M.,(ed) (1999), *Introducing Human Geographies*, London: Oxford University Press.
2. Ahmed, A, (1999) *Social Geography*, Rawat publications, Jaipur.
3. Registrar General of India, (1972) , *Economic and Socio cultural Dimensions of Regionalization of India*,Census Centenary Monograph No 7, New Delhi.
4. Ahmad ,A, (1993) (ed) *Social Structure and regional Development: A Social Geography Perspective*, Rawat Publications, Jaipur.
5. Sen,J,(2012) *Social and Cultural Geography*, Kalyani Publishers, New Delhi.
6. Subba Rao B. (1958), '*Personality of India*', MS University Press, Baroda.
7. Pain R, M. Barke, D Fuller, J Gough, R MacFarlane, G Mowl, (2001), *Introducing Social Geographies*, Arnold Publishers, London.
8. Dutt NK.,(1986), *Origin and Growth of Caste in India*, Firma Kin, Calcutta.
9. Taher, M,(2017), *Social Geography*, Ashok Book Stall, Guwahati.
10. Sopher D. (1980) (ed) '*An Exploration of India: Geographical Perspectives on Society and Culture*', Cornell Press, New York.
11. Singh K.S.(1993) *People of India Vol I to XI*, Oxford University Press, New Delhi.
12. Raza M and Ahmad A (1990) *An Atlas of Tribal India*, Concept Publishing Co, Delhi.
13. Kosambi DD (1962) *Myth and Reality: Studies in the Formation of Indian Culture*, Popular Prakashan, Bombay.
14. Khubchandani ML, (1988) *Language in a Plural Society*, Indian Institute of Advanced Study, Shimla.
15. Jones,Emrys and John Eyles,1977 :*A Introduction to Social Geography* ,London
16. Jones,Emrys,1975 *Readings in Social Geography* .London
17. Srinivas.M.N. *Social Change in Modern India*,OrientLongman,Delhi
18. Singh Yogendra,*Modernisation and Social change* : Orient Longman
19. Census of India ,*Economic and Social-Cultural Dimensions of Regionalisation*, Census Centenary Monograph No.7 New Delhi1974.

GG2C2: FUNDAMENTALS OF GEOINFORMATICS
CREDIT 4
TOTAL MARKS 100

Course Definition:

Geoinformatics is the spectrum of technologies involved in earth measurement, database generation and mapping. In common parlance it encompasses the Geographic Information system, remote sensing, Global Positioning System, Aerial Photography, Photogrammetry, Digital Cartography etc. Geographic Information system (GIS) is among the fastest growing technology in the world due to its immense capacity to handle galaxy of application areas with the help of proper data set.

Course Objectives:

- To understand the Fundamentals & Physics of Remote Sensing
- To understand the Remote Sensing Platforms and Sensors
- To acquire knowledge about the Digital Image Processing And Information Extraction from Satellite Images
- To understand the Fundamentals of Geographic Information System.

UNIT	NAME	CONTENTS	L	T	P
1	Fundamentals & Physics of Remote Sensing	a) Concepts and scope of remote; Definitions, Process and Advantages and limitations b) Concept of Electromagnetic Radiation (EMR); Atmospheric windows, Interaction of EMR with matter, Spectral signatures. c) Energy Interaction in the atmosphere: Scattering, absorption, transmission, atmospheric windows d) Energy Interactions with Earth Surface Features: Spectral Reflectance Curve, e) Elements of the visual image interpretation	10	2	
2	Platforms and Sensors	a) Introduction: Sensor materials, Sensor System - Framing and Scanning System, Whiskbroom scanners, Push-broom scanners, Side Looking scanner b) Types and Characteristics of Sensor: Imaging and non-imaging sensors, Active and passive sensors, Resolution of Sensors, - Spectral, Spatial, Radiometric & Temporal c) Remote Sensor Platforms and Satellite Orbits:	10	2	

		<p>Ground, Airborne and Space-borne Platforms, Geostationary, sun synchronous.</p> <p>d) Space Imaging Satellites: Early history of space imaging; Multispectral and Hyperspectral sensors, Radar, Lidar; Specification of some popular satellites – IRS, Landsat and SPOT series, ASTER; High resolution satellites – IKONOS, Cartosat, Quickbird, OrbView, GeoEye, WorldView; Other latest earth resource satellites.</p>			
3	Digital Image Processing And Information Extraction from Satellite Images	<p>a) Introduction: Definition of digital image, Source of Data, Image Pre-processing: Sources of Error in image data, Image Rectification and Registration, Resampling Techniques, Radiometric corrections</p> <p>b) Contrast Manipulation: Gray Level Thresholding, Level Slicing; Contrast Stretching – Linear and Non-linear, Spatial filtering – Linear, Directional and Gradient Filters; Edge Enhancement and Fourier Analysis</p> <p>c) Ground Truthing: Ground Truth Collection for Image Classification,</p> <p>d) Unsupervised Classification: ISODATA, K-mean and Supervised Classification: Minimum Distance to Mean, Parallelepiped, Maximum Likelihood, Mahalanobis Distance.</p> <p>e) Accuracy Assessment: Error of Commission and Omission, Error Matrix, Kappa Statistics and Change Detection Analysis</p>	10	2	
4	Fundamentals of Geographic Information System	<p>a) Basic Concepts: definition of GIS, Components of GIS, Areas of GIS application, Advantage and Limitation of GIS and GIS Data: Spatial and Attribute Data, Analog vs. Digital data,</p> <p>b) Information Organization and Data Structures: Raster and Vector data structures, advantages and disadvantages</p> <p>c) Creating GIS Database: GIS Software, file organization and formats, Rectification, Digitization and Map Composition</p> <p>d) Data Editing: Detecting and correcting errors, Re-projection, Transformation and Generalization, Edge matching and Rubber sheeting, Topology</p>	10	2	

In-semester Examination 20 Marks, Internal Evaluation 20 Marks and End Semester 60 Marks

Reference books

FUNDAMENTALS OF REMOTE SENSING

- TEXT BOOKS: 1.Jensen, J.R., 2000. Remote sensing of the environment: An earth resource perspective, Prentice Hall, Upper saddle river, NJ,
2.Joseph, George, (2003), Fundamental of Remote Sensing, University Press (India) Pvt. Ltd, Orient Longman Pte. Ltd., Hyderabad, India
3.Lillesand, T.M. and Kieffer, R.W., 2003. Remote Sensing and Image Interpretation, 5thEdition., Wiley, New York
4.Panda, B. C., 2008. Remote Sensing: Principles and Applications, Viva Books Private Limited, India

REFERENCE BOOKS

- 1.Avery,T.E.,andG.L.Berlin, Fundamental of remote sensing and airphoto interpretation,5thed, Macmillan, New York,1992
- 2.Barrett,E.C., and L.F.Curtis, Introduction to environmental remote sensing, 3rded, Chapman and Hall, New York,1992
- 3.Campbell J.B. (2002) Introduction to Remote Sensing, 3rd ed., The Guilford Press.
- 4.Canada Center for Remote Sensing, Remote Sensing Tutorial
- 5.Cracknell, A.P., and L.W.B.Hayes, Introduction to remote sensing, Taylor and Francis, Washington, DC,1991
- 6.Curran, P.J. (1980) Multispectral remote sensing of vegetation amount, Progress in Physical Geography, 4:315
- 7.Curran, P.J. (1988) Principles of Remote Sensing, ELBS Edn. Longman Group UK Ltd.
- 8.Guha, P.K. (2003) Remote Sensing for the Beginner, Affiliated East-West Press Pvt. Ltd., New Delhi
- 9.Jensen J.R. (2005) Digital Image Processing: A Remote Sensing Perspective, 3rd ed., Prentice Hall.
- 10.Jensen J.R. (2007) Remote Sensing of the Environment: An Earth Resource Perspective, 2nd ed., Prentice Hall.
- 11.John, R. J., Introductory Digital Image Processing – A Remote Sensing Perspective, Prentice Hall Series
- 12.Muralikrishna V., Geographical Information Systems and Remote Sensing Applications, Allied Publishers Private Limited.
- 13.Nag P. and Kudrat M., Digital Remote Sensing, New Delhi, Concept Publishing.
- 14.Reeves, Robert G., “Manual of Remote Sensing, Vol. I, American Society of Photogrammetry and Remote Sensing, Falls Church, Virginia, USA
- 15.Richards J.A. and Jia X. (2006) Remote Sensing Digital Image Analysis: An Introduction, 4th ed., Springer

FUNDAMENTALS OF GIS

TEXT BOOKS:

- 1.Anson, R.W. &Ormeling, F.J. (1993), Basic Cartography, Vol. 1, 2nd ed., Elsevier Applied Science Publishers, London.
- 2.Burrough, Peter A. and Rachael McDonnell, 1998, ‘Principles of Geographical Information Systems’ Oxford University Press, New York.
- 3.C.P.Lo and Albert K.W.Yeung 2005 “Concepts and Techniques of Geographic Information Systems” Prentice Hall of India,New Delhi.
- 4.Chakraborty and Sahoo, 2008, Fundamentals of Geographic Information Systems, Viva Books Private Limited, India

5. Maguire, D. J., Goodchild, M.F. and Rhind, D. M. Ed. 1991, 'Geographical Information Systems: Principles and Applications', Longman Group, U.K.
6. Robinson A.H. & Morrison J.L. (1995) Elements of Cartography, John Wiley & Sons

REFERENCE BOOKS:

1. Chaisman, N. 1992: Exploring Geographical Information Systems, John Wiley and Sons Inc., New York: 198p.
2. Chrisman, N.R. (1997) Exploring Geographic Information Systems. John Wiley and Sons.
3. DeMers, M.N., Fundamentals of geographic information system, Wiley, New York, 1997
4. ESRI (2004) ESRI Cartography: Capabilities and Trends, Redlands, CA, White Paper.
5. Foresman, T.W. (ed) History of GIS, Prentice-Hall, Upper saddle river, NJ, 1998
6. Harvey, F. 2008, A Primer of GIS: Fundamental Geographic and Cartographic Concepts, The Guilford Press, New York.
7. Humhold, W.E., 1991. An introduction to urban geographic information system, Oxford University press, New York
8. Ian Masser & Michael Blakemore., 1991, Handling Geographical Information: Methodology and Potential Applications, Ed.
9. Imus D. and Dunlavey P. (2002) Back to the Drawing Board: Cartography vs the Digital Workflow, MT, Hood, Oregon.
10. Kang-tsung Chang 2002, 'Introduction to Geographic Information Systems' Tata McGraw Hill, New Delhi.
11. Keates, J.S. (1973): Cartographic Design and production, London, Longman
12. MacEachren A.M. (1994) Some Truth with Maps: A Primer on Symbolization and Design, University Park: The Pennsylvania State University.
13. Maguire, D.J., Goodchild, M.F. and Rhind, D.W. (eds.) (1991) Geographical Information Systems: Principles and Applications. Avon, Longman Scientific and Technical.
14. Martin, D. (1991) Geographical Information Systems and their Socioeconomic Applications. London, Routledge.
15. Menno-Jan Kraak & Ferojan Ormeling, 2003, Cartography – Visualisation of Geospatial data, 2nd Edn, , Pearson Education Ltd.
16. Mishra, R.P. and. A. Ramesh, Fundamentals of Cartography , Concept Publishing House, New Delhi – 110059
17. Monkhouse F.J. and Wilkinson, H.R. 1971. : Maps and Diagrams: Their Compilation and Construction, B.I. Publications Private Limited, New Delhi: 527p.
18. Muralikrishna V., Geographical Information Systems and Remote Sensing Applications, Allied Publishers Private Limited.
19. Peterson, M.P. (1995) "Interactive and Animated Cartography" Upper Saddle River, NJ: Prentice Hall.
20. Peuquet, D.J. and Marble, D.F. (eds.) (1990) Introductory Readings in Geographic Information Systems. London, Taylor and Francis.
21. Ramesh, P. A. (2000): Fundamentals of Cartography, Concept Publishing Co., New Delhi.
22. Rampal, K.K. (1993): Mapping and Compilation, Concept Publishing Co., New Delhi.
23. Slocum T. (2003) Thematic Cartography and Geographic Visualization, Upper Saddle River, New Jersey: Prentice Hall.
24. Wilford J.N. (2000) The Mapmakers, Vintage Books.

**GG2C3: PRACTICAL ON SURVEYING AND SPATIAL
PATTERNS
CREDIT 4
TOTAL MARKS 100**

Course Definition:

Surveying or land *surveying* is the technique, profession, and science of determining the terrestrial or three-dimensional positions of points and the distances and angles between them and a spatial pattern is a perceptual structure, placement, or arrangement of objects on Earth. It also includes the space in between those objects. Patterns may be recognized because of their arrangement; maybe in a line or by a clustering of points.

Course Objectives:

The objective of this course is to develop skills among the students regarding the use of different surveying techniques. The students will also acquire knowledge about different field survey methods.

UNIT	NAME	CONTENTS	L	T	P
1	Surveying by Dumpy's and Theodololite	a) Profile levelling by Dumpy's level b) Contouring by Dumpy's level c) Measurement of vertical and horizontal angles. d) Triangulation and mapping of a micro region.	6	-	16
2	Measures of Spatial pattern	a) Rank size relationship. b) Density gradient analysis. c) Methods of regionalization: Ranking method, mean method and z-score standardization.	4	-	12
3	Field survey method.	a) Basic properties of a schedule and questionnaire. b) Preparation of household schedule for socio-economic survey. c) Methods of tabulation and organization of data. d) Methods of interpretation of data.	2	-	8
4	*Practical note book and viva voce				

Books Recomendaded

1. Mahmood A,: Statistical Method in Geography
2. Alvi,J.: Statistcal Geography

GG2D1: FUNDAMENTALS OF REGIONAL PLANNING

Course Definition:

The course broadly covers the concept of region and regionalization, various methods of regionalization. It also covers different methods and techniques required to smoothly assess and implement the exercises of regional planning and Development.

Course objectives:

1. To improve the conceptual parameter of the learners in the field of Region, methods of regionalization, Regional planning and development.
2. To highlights the importance of regional development in the removal of regional disparities in terms of development.

UNIT	NAME	CONTENTS	L	T	P
1	Regional Concept in Geography	a) concept and type of region , regionalization b) method for formal and functional regionalization c) Hierarchy of region.	8	4	
2	Concept of Regional Planning	a) Concept and type of planning b) Historical Development of Regional Planning, principle , objectives and need of regional planning c) Geography and Regional Planning.	8	4	
3	Methods and Techniques of Regional Planning	a) Methodology of Regional Planning. b) Analytical Techniques of Regional Planning. c) Procedural Techniques of Regional Planning.	8	4	
4	Regions for Planning	a) Region and its evolution; Planning regions and its characteristics b) Planning regions of India proposed by TCPO c) Evolution, nature and scope of town planning with special reference to India, and Fundamentals of Town and Country planning.	8	4	

Suggested Readings (Course -303): Regional Planning

1. Bhat,L.S(1973) Regional Planning in India,Statistical Publishing Society ,Calcutta
2. Bhat,L.S. et al (1976) Micro-Level Planning,A Case Study of Karana I Area,Haryana K.B.Publication,New Delhi
3. Chorley,H.andHagget P. (1976) Models in Geography,Metun.London
4. Misra,R.P. et al (1974)Regional Development in India-A Strategy,Mysore.
5. Mitra.A. (1965)Levels of Regional Development,Census of India,Voll,pt I &II New Delhi

6. Raza, M (1988) Regional development, Heritage Publisher, Delhi
7. Misra R.P. et al (1980) Multi Level Planning, Heritage.

GG2D2: FUNDAMENTALS OF FLUVIAL GEOMORPHOLOGY

CREDIT 4

TOTAL MARKS 100

Fluvial geomorphology is the study of the interactions between the **physical shapes of rivers**, their **water and sediment transport** processes, and the **landforms** they create. It studies the ways that rivers move and change over time, focusing especially on how the flow of water interacts with the movement of sediment. It also considers how the movement of water, sediment and debris interacts with the fixed, immobile features of the landscape, from bedrock canyons to human-built infrastructure.

Course Objectives:

- To understand the basic concept of fluvial geomorphology.
- The focus is also to make the student aware about the various modern techniques applied in fluvio geomorphological study.
- The student will as well learn about the different process acting in a channel and about channel dynamics.

UNITS	Name	Content	L	T	P
1	Introduction to Fluvial Geomorphology.	a) Meaning and evolution of fluvial geomorphology; relation between fluvial geomorphology and hydrology. b) Modern methods and techniques in fluvial geomorphological studies. c) Sedimentological techniques.	8	4	
2	Drainage basin as a fluvial system.	a) Inputs and outputs in the basin, drainage basin as a fundamental geomorphic unit. b) Runoff estimation in the basin, factors controlling runoff and types of runoff.	8	4	
3	Channel processes	a) Concept of grade, attainment of grade, channel equilibrium. b) Forces acting in channel, velocity distribution, flow types c) Hydraulic geometry analysis: at-a-station case and downstream case, relationship of water discharge with velocity, depth and	8	4	

		width			
4	Channel patterns	a) Straight, meandering, and braided; development and causes of meandering; mechanics and causes of braiding. b) Channel changes in time and space. c) Misfit rivers and channel metamorphosis.	8	4	

Suggested Readings

1. Bhagabati, A.K., Bora, A.K. and Kar, B.K. (ed), 2001: Geography of Assam, Rajesh Publications, New Delhi.
2. Chorley, Wolman and Millerm, 1969: Fluvial Processes in Geomorphology, W.H. Freeman AndCompany, San Francisco.
3. Chorley, R.J. (ed), 1969: Water, Earth and Man, Methuen, London.
4. Chouhan, T.S., 1995: Remote Sensing: Principles and Interpretation, H.W. Freeman and Company, San Francisco.
5. Chow, V.T., 1964: Handbook of Applied Hydrology, McGraw Hill Book company, New York.
6. Folk, R.L., 1980: Petrology of Sedimentary Rocks, Hemphill Publishing Co. Austin, Tx.
7. Garde, R.J. and RangaRaju, K.G.: Mechanism of Sediment Transportation.
8. Gregory, K.J. and Walling, D.E., 1973: Drainage basin Form and Processes, Arnold, London.
9. Kanidhton, D., 1984: Fluvial Forms and Processes, Edward Arnold, London.
10. Leopold, Wolman and Miller, 1964: Fluvial Processes in Geomorphology, W. H. Freeman and Company, San Francisco.
11. Morisawa, M., 1968: Streams: Their Dynamics and Morphology, McGraw Hill Book Company, New York.
12. Mutreja, K.N., 1986: Applied Hydrology, McGraw Hill Book Company, New York.
13. Pettijohn, F. J., 1975: Sedimentary Rocks, Harper and Raw Publishers, New York.
14. Petts, G.E., and Foster, I., 1985: Rivers and Landscape, Edward Arnold, London.
15. Rao, K.L., 1975: India's Water Wealth, Orient Longman, New Delhi.
16. Sabnis, Floyd. F., 1978: Remote Sensing: Principles and Interpretation, H.W. Freeman and Company, San Francisco.
17. Schumm, S.A., 1977: The Fluvial System, Wiley Interscience, New York
18. Schumm, S.A. (ed), 1977: Drainage Basin Morphology.
19. Smith, D.I. and Stopp, P., 1978: The River Basin: An Introduction to the Study of Hydrology, Cambridge.

GG2D3: FUNDAMENTALS OF DISASTER MANAGEMENT

CREDIT 4

TOTAL MARKS 100

Course Definition:

Disaster Management is emerging globally as a full-fledged academic discipline in recent times. As a field of knowledge and practice it demands specialization to meet with the ever-dynamic challenges posed by hazards and disasters. Recognizing that academic education and training in the field of disaster management requires a multidisciplinary approach. Centre for Studies in Geography tries to solve the issues related to disaster studies as a Generic elective paper in the two years master's Programme.

Course Objectives:

- General understanding of the concept of hazards and disasters
- to provide a general concept in the dimensions of disasters caused by nature beyond the human control as well as the disasters and environmental hazards induced by anthropogenic activities
- Critical assessment of DRR with emphasis on disaster preparedness, response and recovery.

UNIT	NAME	CONTENTS	L	T	P
1	Introduction on Disaster	a) Basic concepts of Natural Disaster b) Types of Natural Hazards and Disaster c) Causes, effects and practical examples for all disasters.	10	2	
2	Introduction Man-made Disasters	a) Man-made Disaster: Fire, Industrial Pollution, Nuclear Disaster, Biological Disasters, Accidents (Air, Sea, Rail & Road), Structural failures (Building and Bridge), War & Terrorism etc. b) Causes and effects	10	2	
3	Risk : Its concept and analysis	a) Risk Reduction b) Vulnerability : Its concept and analysis c) Strategic Development for Vulnerability Reduction	10	2	
4	Case Study	a) Case Study of Natural Disaster (hurricane, Tsunami, Earth quake etc.) b) Case Study of Man-made Disasters (Nuclear disaster, Dam failure, War etc.)	10	2	

In-semester Examination 20 Marks, Internal Evaluation 20 Marks and End Semester 60 Marks

Reference books

1. Alexander David, 2000. Introduction in 'Confronting Catastrophe', Oxford University Press.
2. Berke PR, et al. Recovery after a disaster: Achieving sustainable development, mitigation, and equity. *Disasters* 1993; 17 (2): 93-109.
3. Building Resilience: Social Capital in Post-Disaster Recovery. *Contemporary Sociology* 2015; 44 (1): 30-31.
4. Coppola P Damon, 2007. Introduction to International Disaster Management, Carter, Nick 1991. Disaster Management: A Disaster Manager's Handbook. Asian Development Bank, Manil
5. Disaster Management Guidelines. GOI-UNDP Disaster Risk Reduction Programme (2009-2012).
6. Guerisse P. 2005 Basic Principles of Disaster Medical Management. *Act Anaesth. Belg*;56:395-401
7. Ingram JC, et al. Post-disaster recovery dilemmas: challenges in balancing short-term and long-term needs for vulnerability reduction. *Environmental Science & Policy* 2006; 9 (7-8): 607-13.
8. Prewitt Diaz, J.O (2004). The cycle of disasters: from Disaster Mental Health to Psychosocial Care. Disaster Mental Health in India, Eds: Prewitt Diaz, Murthy, Lakshmi Narayanan, Indian Red Cross Society Publication.
9. Phillips BD. *Disaster Recovery*. 2nd Edition. Taylor & Francis group, 2015.
10. Passerini E. Disasters as agents of social change in recovery and reconstruction. *Natural Hazards Review* 2000; 1 (2).
11. Sharman and Hansen.2015. Aim and Scope of Disaster Management. Study Guide prepared UW-DMC, University of Washington.

GG2G1: ENVIRONMENT AND DEVELOPMENT

CREDIT 4

TOTAL MARKS 100

Course Definition:

Environmental geography is the study of the characteristics features of various components of the environment, the interactions between and among the components in a geo-ecosystem in terms of ecosystem of varying spatial and temporal scales.

Course Objectives:

- To develop conceptual and theoretical ideas of environment as well as relationship between man and environment in different geo climatic regions.
- The learners will also understand the nature and intensity of some burning environmental issues at local, regional and global level along with mitigation programs and policies.

UNIT	NAME	CONTENTS	L	T	P
1	Conceptual Basis	a) Emergence of Environmental Geography as a branch of Geography and its scope and significance. b) Man Environment Relationship: Historical perspective on man's interaction with environment; population growth and environment. c) Approaches to study environment management and Environment impact assessment.	10	2	
2	Ecosystem in the context of Environmental Development	a) Ecosystem and Ecology: Meaning and Concept b) Environment and Development: Concept of environment and development. c) Concept and type of ecosystem; functioning of and energy flow in eco-system. d) Bio-geochemical cycles and biosphere as an ecosystem.	10	2	
3	Environmental Hazards	a) Environmental hazards: Meaning and types. b) Tectonic disaster and climatic hazards of the world and NE India. c) Flood hazards with special reference to the floods of the Brahmaputra River. d) Global and regional environmental programs and policies	10	2	
4	Concept of	a) Genesis and evolution of the concept of	10	2	

	Sustainable Development and Environmental Management	Sustainable development b) Sustainable development goals: Meaning, concepts and objectives. c) Carbon footprint and sustainable development. d) Concept of environmental management and its necessity.			
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In-semester Examination 20 Marks, Internal Evaluation 20 Marks and End Semester 60 Marks

References

1. Cantledge, B (ed), 1992 : Monitoring the Environment, Oxford University Press, Oxford
2. Lodha, M.R.,(ed) 1996 : Academic's Dictionary of Environment.
3. Park, C.,1997 : The Environment, Routledge, London.
4. Santra, S.C.,2011 : Environmental Science .
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6. Singh, S.,1991 : Environment Geography, PrayagPustakBhawan, Allahabad.
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9. Singh, B.R.& Mishra, S.,1996 : Environmental Law in India Issues and Responses .
10. Thomas, S.,& Siddhartha, K.,(ed)2013 : Biospere A Geography of Life.
11. Varma, P.S.&V. K. Agarwal, 1989, : Principles of Ecology, S.Chand & Co.,New Delhi.
12. Ress,J.,1985: Natural Resources, Routledge, London.

GG2G2: CLIMATOLOGY AND OCEANOGRAPHY

CREDIT 4

TOTAL MARKS 100

Course Definition:

Climatology is the scientific study of climate. It is a branch of atmospheric sciences concerned with both the description of climate and the analysis of the causes of climatic differences. Climatology also includes aspects of oceanography which is the study of the physical and biological aspects of the ocean

Course Objectives:

- To conceptualize the fundamentals of climate and weather and different climatic types.
- It also focuses on the nature and development of different atmospheric processes and whether phenomena over the surface of the earth.
- To give knowledge to the students about the various properties of oceans and its recent changes.

UNIT	NAME	CONTENTS	L	T	P
1	Basic concepts in Climatology & Hydrological Cycle	a) Insolation, Heat balance and distribution of temperature. b) Concept of hydrological cycle-Humidity, evaporation, Transpiration, Condensation and Precipitation. c) Concept of atmospheric equilibrium stability & instability.	8	4	
2	Atmospheric Circulation	a) Atmosphere Pressure, global pressure systems and general Atmospheric circulation. b) The Monsoon-its origin, mechanism and development, Indian monsoon, concepts of El-nino and LA- NINA and its impact on India c) Air mass and fronts-types and characteristics and their influence on weather and Climate	8	4	
3	Physical and Chemical properties of Sea Water	a) Temperature and density of the sea water. b) Salinity of the oceans: controls and distribution. c) Marine Deposits, formation of coral reefs.	8	4	
4	Dynamics of the Marine environment	a) Nature and formation of waves and tides. b) Sea level changes: causes and consequences. c) Impact of humans on the Marine environment	8	4	

References

1. Barry,R.G.& Chorley, R.J.1971: Atmosphere, Weather & Climate, Methuem Co.,London.
2. Critsfield,H.J.,1975:General Climatology, Prentice Hall,New Delhi.
3. Das,P.K.,1968: The Monsoon, National Book Trust,New Delhi.
4. Hobbs,J.E.,1980: Applied Climatology, Butterworth.
5. Lockwood,J.G.,1976: World Climatology-Environmental Approach, Ed. Arnold Ltd..
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7. Miller,A.A.,1953: Climatology, Dutton.
8. Menon,P.A.,: Our Weather, National Book Trust.
9. Stringer,E.N.,1982: An Introduction to Climate, International Studies.
10. Trewarha,G.T. & Horn,L.A.,1980: An Introduction to Climate, International Studies.
11. Oliver J E & Hidore J J, Climatology: an atmospheric science

GG2G3: GEOGRAPHY OF GENDER STUDIES

CREDIT 4

TOTAL MARKS 100

Course Definition:

Gender forms one of the important issues of Social Geography. To be more specific, it is one of the contemporary branches of Postmodern Geographies. Geography of Gender not only tries to impart an understanding of the gender issues in general, but also to understand gender and the related issues from a geographical perspective. As Geography of Gender forms one of the contemporary branches of Geography, this course provides an attempt to acquaint the learner with not only the theoretical understandings, but also the research methodology in the subject.

Course Objectives:

- To impart an understanding of the basic concepts and theories of feminism.
- To provide an understanding of how colonialism through resource ownership has influenced the concept of feminism in Geography.
- To theorize and understand the concept of Queer.
- To equip the learners to understand how spaces can be gendered and how gender relationships can be varied with spatial variations.
- To provide an understanding on the relationship between gender and environment and also gender and architecture.
- To equip the students with tools and methodologies to carry forward research and understanding on gender issues.

Unit	Name of Units	Contents	L	T	P
1	Introduction	a) Postmodernism and Feminism. b) Feminism and Feminist Geography. c) Women's Movements and Feminist Thought. d) Space, Place and Gender.	12		
2	Foundation	a) Feminist Theories: Liberal Feminism, Marxist Feminism, Radical Feminism and Socialist Feminism. b) Queer Theory and Queer Liberation. c) Feminist Approaches. d) The Normative and the Non-Normative.	12		
3	Post-Colonial	a) Colonialism, Post Colonialism and	12		

	Feminism	Feminism. b) Features of Post-colonial Feminism. c) Postcolonial Feminist Theories. d) A Critique on Postcolonial Feminism.			
4	Studying Gender in Geography	a) Spatial Construction of Gender; the Concept of Private Space and Public Space; the Patriarchy Debate. b) Gender, space and architecture; Gender and Development. c) The concept of Eco-Feminism; Environmental Activism in India. d) Feminist Research Methods.	12		

In-semester Examination 20 Marks, Internal Evaluation 20 Marks and End Semester 60 Marks.

References

1. Massey, Doreen (1994) Space, Place and Gender, University of Minnesota Press, Minneapolis.
2. Hasan, Zoya, (1994), (ed), Forging Identities: Gender, Communities and The State In India, New Delhi: Kali for Women.
3. McDowell, L. and Sharp, J., eds. 1999. A Feminist Glossary of Human Geography. London:Arnold.
4. McDowell, L. and Sharp, J, eds. 1997 Space/Gender/Knowledge: Feminist Readings. London: Arnold.
5. Cloke,P., Crang,P.,Goodwin,M.,(ed) (1999), Introducing Human Geographies, London: Oxford University Press.
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8. Peet,R, (1998), Modern Geographical Thought, UK: Blackwell Publishers.
9. Hubbard, Phil et.al (2005) Key Thinkers on Space and Place, Sage Publications, London, Thousand Oaks, New Delhi.
10. Mackenzie S. (1989) 'Women in the City' in Peet R. and N.Thrift (eds) New Models in Geography, volume II, Unwin, London.
11. Narrain Arvind and Gupta Alok, (2011), Law Like Love: Queer Perspective on the Law in India, New Delhi: Yoda Press.
12. Mc Dowell L, 1999, Gender, Identity and Place: Understanding Feminist Geographies, Blackwell Publishers, Oxford.
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14. Mazumdar V and N Krishnaji (eds) (2001) 'Enduring Conundrum: India's Sex Ratio', Centre for Women's Development Studies, Rainbow Publishers, Delhi.

15. Dube L. (2001) 'Anthropological Explorations in Gender: Intersecting Fields', Sage Publications, New Delhi.
16. Lefebvre, H. 1991 the Production of Space (trans by D. Nicholson-Smith) Oxford:Blackwell.
17. Boserup E.(1970) 'Women's Role in Economic Development', George Allen and Unwin, London.
18. Krishnaraj M, R Sudarshan and A Shariff(1998) Gender, Population and Development, Oxford University Press New Delhi.
19. Peet, R. and Thrift, N., (2002), New Models in Geography-Volumes I & II, London, Unwin Hyman.
20. Entrikin, J.N. 1991 The Betweenness of Place: Towards a geography of Modernity. Baltimore: Johns Hopkins University Press.
21. Hanson S. and G. Pratt (1995), 'Gender, Work and Space', Routedledge, London and New York.
22. Soja, E.W., (1997), Post Modern geographies, Rawat, New Delhi.
23. Gregory,D and J Urry (eds) 1985 Social Relations and Spatial Structures. London: Macmillan.
24. Dear, M.J and S. Flusty (eds) 2002 The Spaces of Modernity. Readings in Human Geography. Oxford: Blackwell.
25. Ardener, Shirley, (ed), (1993), Women and Space: Ground Rules and Social Maps, Berg, Oxford: Providence.
26. Pateman, C., (1989), 'Feminist Critiques of the Public/Private Dichotomy', Disorder of the Private women, Cambridge: Polity.
27. Patricia Uberoi (ed), Social Reform, sexuality and the State. New Delhi: Sage Publications.o: University of Illinois.
28. Anthony, Kathryn, (2001), Designing for Diversity: Gender, Race and Ethnicity in the Architectural Profession, Urbana, Chicag.

SEMESTER III

GG3C1: ADVANCED GEOINFORMATICS
CREDIT 4
TOTAL MARKS 100

Course Definition:

GIS and RS are computer based system used for acquisition, interpretation, manipulation and representation of Spatial and non – spatial data in different spectral bands of electromagnetic spectrum, which acts as a tool of solving various spatial problems.

Course Objectives:

- To make the students familiar with the spatial distribution and spatio-temporal variations of land and resources in India
- To acquire the knowledge of handling geospatial technology in solving spatial problems.
- To apply the modern GIS and RS technology in site selection of development facilities or projects
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UNIT	NAME	CONTENTS	L	T	P
1	Advanced Remote Sensing: Thermal and Microwave Remote Sensing:	a) Thermal Remote Sensing: Basic Principles, Thermal Infrared Radiation Properties, Interaction of Thermal Radiation with Terrain Elements and Thermal data applications b) Microwave Remote Sensing: Basic Principles, Microwave Remote Sensing and its advantages, Active and Passive Microwave Systems and Attenuation of Microwave, Surface Scattering, Platforms and sensors, Vegetation and Water response to Microwave energy e) Radar Operation, Polarization, Spatial Resolution, Radar Image Geometry, Relief Displacement, Shadows and Speckle effect, Side Looking Airborne Radar (SLAR) Operation, Synthetic Aperture Radar (SAR), Differential Interferometry, Applications	10	2	
2	Hyperspectral Remote Sensing and LIDAR	a) Hyperspectral Remote Sensing: Basic Concept, Advantages and Disadvantages, Multispectral vs. Hyperspectral Remote Sensing, Basic principles of Spectroscopy, Hyperspectral sensors and platforms,	10	2	

		<p>Sensor specifications</p> <p>b) Hyperspectral Data Processing, Information extraction and its application : Atmospheric Corrections-Empirical and Physics based Approaches, Bad band and Bad line removal; ground truthing through Spectro-radiometer, Image Classification techniques; Application in Agriculture, Water, Soil and Mining</p> <p>c) LIDAR and its applications: Basic Principles and advantages, Laser and Scanning System, The Laser Vegetation Imaging Sensor; Areas of Applications with special reference to Vegetation and Urban Infrastructure</p>			
3	Advanced Geographic Information System: GIS Data Analysis	<p>a) Data Storage and Database Modelling:: Spaghetti Model, Topological Model, Quadtree ; Hierarchical Model, Network Model, Relational Model</p> <p>b) Spatial Database Management: Concept of Spatial Database, Database Management System, Basic Concepts of Entity, Relationship and Primary Key, Database Structure</p> <p>c) Data Organization: Chain Coding, Run-length Coding, Block Coding</p> <p>d) Spatial Analysis: Types of Spatial Analysis, Measurement in GIS, Query – Query by Attributes, Spatial Queries, Attribute Based Operation, Neighbourhood Analysis, Connectivity Analysis, Overlay and Coverage Rebuilding,</p> <p>e) Data Quality in GIS: Uncertainty in GIS data, Positional and Attribute Accuracy, Logical consistency, Completeness Lineage,</p> <p>f) Errors in GIS: Sources of Errors in GIS data base: Obvious sources from natural variations & original measurements, Errors through processing, errors associated with overlaying of polygons, Data Quality parameters</p>	10	2	
4	Application of Geo- Informatics	<p>a) Introduction: Emergence of Geoinformatics technology in different application areas, Indian satellite missions with focused applications,</p> <p>b) Geo-technical Engineering & Environmental Management, Digital terrain models for selection of dam site, road, and canal construction</p> <p>c) GNSS in plate tectonic studies in Himalayas, Predicting seismicity in peninsular region through lineament studies</p> <p>d) Areas of Applications: Application in Disaster Management, Water, Soil, Urban Planning, Landuse/</p>	10	2	

		Landcover, Environmental Management e) Remote Sensing in Water resource evaluation and Watershed Management, Runoff & Soil Loss estimation based on empirical models, Remote Sensing in hydro-geomorphological studies for ground water targeting f) E-Governance: Demographic and business Applications g) Application of Geo-informatics in Tourism Management			
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In-semester Examination 20 Marks, Internal Evaluation 20 Marks and End Semester 60 Marks

Reference books

TEXT BOOKS:

- 1.Jensen J.R. (2005) Digital Image Processing: A Remote Sensing Perspective, 3rd ed., Prentice Hall.
- 2.Jensen J.R. (2007) Remote Sensing of the Environment: An Earth Resource Perspective, 2nd ed., Prentice Hall.
- 3.Joseph, George, (2003), Fundamental of Remote Sensing, University Press (India) Pvt. Ltd, Orient Longman Pte. Ltd., Hyderabad, India
- 4.Lillesand, T.M. and Kieffer, R.W., 2003. Remote Sensing and Image Interpretation, 5thEdition., Wiley, New York
- 5.Panda, B. C., 2008. Remote Sensing: Principles and Applications, Viva Books Private Limited, India

REFERENCE BOOKS:

ADVANCED REMOTE SENSING

- 1.Campbell J.B. (2002) Introduction to Remote Sensing, 3rd ed., The Guilford Press.
- 2.Cracknell A.P. (ed) Remote Sensing in Meteorology, Oceanography and Hydrology, Chichester, Ellis Horwood Limited.
- 3.Digital Elevation Model Technologies and Applications: The DEM Users Manual,
- 4.Ghassem A. Theory and Applications of Optical Remote Sensing, New York, John Wiley and Sons.
- 5.Hyperspectral Data Exploitation: Theory and Applications by Chein-I Chang,Wiley& Sons Ltd.
- 6.Hyperspectral Remote Sensing of Tropical and Subtropical Forests by Margaret Kalacska and G. Arturo Sanchez-Azofeifa., CRC Press.
- 7.Hyperspectral Remote Sensing: Principles and Applications by Marcus Borengasser, William S. Hungate, and Russell Watkins, CRC Press.
- 8.Imaging Radar (Manual of Remote Sensing, Volume 2) by Henderson F.M. and Lewis A.J. (3rd Ed.), Wiley, 1998.
- 9.Imaging with Synthetic Aperture Radar by Didier Massonnet, Jean-Claude Souyris, CRC Press, 2008.
- 10.Introduction to Microwave Remote Sensing by Iain H. Woodhouse, CRC, 2004.

11. Maune, D. F. and Bethesda, M.D. (2nd Ed.), American Society for Photogrammetry and Remote Sensing. 2007.
12. Microwave Remote Sensing: Active and Passive, from Theory Applications by Ulaby F.T., Moore R.K. and Fung A.K., Artech House Publishers, 1986.
13. Polarimetric Radar Imaging. From Basics to Applications by Lee, J.-S. and Pottier, E., CRC Press, 2009.
14. Skolnik and Merrill I. Introduction to Radar Systems, McGraw-Hill (1st ed., 1962; 2nd ed., 1980; 3rd ed., 2001).
15. Techniques and Applications of Hyperspectral Image Analysis by Hans F. Grahn and Paul Geladi, Wiley & Sons Ltd.
16. Topographic Laser Ranging and Scanning, Principles and Processing, Shan, J. and C. Toth, Taylor & Francis, 2008.
17. Understanding Synthetic Aperture Radar Images by Olivie, C. and Quegan, S. Scitech, 2004

ADVANCED GEOGRAPHIC INFORMATION SYSTEM TEXT BOOKS

1. Burrough, Peter A. and Rachael McDonnell, 1998, 'Principles of Geographical Information Systems' Oxford University Press, New York.
2. C.P.Lo and Albert K.W.Yeung 2005 "Concepts and Techniques of Geographic Information Systems" Prentice Hall of India, New Delhi.
3. Chakraborty and Sahoo, 2008, Fundamentals of Geographic Information Systems, Viva Books Private Limited, India
4. Maguire, D. J., Goodchild, M.F. and Rhind, D. M. Ed. 1991, 'Geographical Information Systems: Principles and Applications', Longman Group, U.K.

REFERENCE BOOKS:

1. A. Silberschats, Henry F. Korth "Database System Concepts", 3rd Edition, TMH, 1998
2. Bonham Carter G.F (1994) GIS for Geoscientists: Modeling with GIS Pergamon Publications.
3. Chaisman, N. 1992: Exploring Geographical Information Systems, John Wiley and Sons Inc., New York: 198p.
4. Chrisman, N.R. (1997) Exploring Geographic Information Systems. John Wiley and Sons.
5. David J Maguire, Michael F Goodchild and David W Rahind., 1991, Geographical Information System, Ed.
6. DeMers, M.N., Fundamentals of geographic information system, Wiley, New York, 1997
7. Foresman, T.W. (ed) History of GIS, Prentice-Hall, Upper saddle river, NJ, 1998
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9. Humhold. W.E., 1991. An introduction to urban geographic information system, Oxford University press, New York
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11. Ian Masser & Michael Blakemore., 1991, Handling Geographical Information: Methodology and Potential Applications, Ed.
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21. Sanghavi, Hitesh (1998) Oracle Miracles, Express computers methods, 1998.

APPLICATION OF GEOINFORMATICS

TEXT BOOKS:

1. An Introduction to Database Systems by C.J.Date, A. Kannan S. Swamynathan (8th Ed.), Pearson Education, 2009.
2. Database Management Systems by Raghu Ramakrishnan, Johannes Gehrke, McGraw-Hill, 2002.
3. Jenson, J.R. 2000. Remote Sensing of the environment – An Earth Resource Perspective, Prentice Hall Inc.
4. Lillisand, T. M. and Keifer, R. W. 1994. Remote Sensing and Image interpretation', John Willey and Sons, New York, Third Edition
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REFERENCE BOOKS:

1. An Introduction to Database Systems by C.J.Date, A. Kannan S. Swamynathan (8th Ed.), Pearson Education, 2009.
2. Bonczek, R.H., C.W. Holsapple, and A.B. Whinston, 1981. Foundations of Decision Support Systems, Academic Press, New York. Basic text on DSS.
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GG3C2: RESEARCH METHODOLOGY IN GEOGRAPHY
CREDIT 4
TOTAL MARKS 100

Course Definition:

Research methodology is a systematic investigation and comprehensive procedure to search the result of a research problem on a given phenomenon. In methodology, researcher uses various criteria for solving the research problem under investigation; therefore, methodology is the whole range of methods applied for solving the research problem.

Course Objectives:

- General understanding of the concept of research and identification of overall process of designing a research work,
- To have a deeper understanding of complete designing of research from statement of research problem to final thesis writing
- Critical assessment of research methods pertinent to technology innovation research in the field of earth science

UNIT	NAME	CONTENTS	L	T	P
1	Introduction	a) Meaning and objectives of research. b) Type of Research c) Research problem and Literature Review d) Preparation of A Research Proposal	10	2	
2	Collection and Analysis of Data	a) Sources and type of data. b) Methods of collecting primary and secondary data. c) Construction of questionnaire and schedule. d) Qualitative data Collection Methods	8	2	
3	Statistical Methods	a) Census and Sample Survey. Meaning and types of Sample Design. b) Measures of Central Tendency, and Measures of Dispersion (ANOVA, Range, Mean and Standard Deviation) c) statistical methods (Correlation and regression analysis)	12	2	
4	Hypothesis testing	a) Concept and characteristics of Hypothesis b) Procedure for Hypothesis Testing. c) Testing of Hypothesis with Example.	10	2	

In-semester Examination 20 Marks, Internal Evaluation 20 Marks and End Semester 60 Marks

Suggested Readings

1. Gosal, G.S.(1999) Survey of Research in Geography, Manak Publication, New Delhi.
2. Kothari,C.R.(199) Research methodology .Wishaw Publisher ,New Delhi
3. Kumar, Ranjit (2011) Research Methodology: A step by step guide, Sage Publication
4. Misra.H.N. & Singh, V.P.(1988) Research Methodology in Geography, Rawat Publication
5. Murthy.K.N.L. (1999) Geographical Research, Concept Publisher
6. Pal, S.K. (1995): Computing Mathematical Techniques in Geography, B.R. Publisher

GG3C3: FIELD STUDY

CREDIT 4

TOTAL MARKS 100

(The main objective of the field works is to conduct an extensive survey of a contiguous wider region and identify salient landforms; their genesis and their impact on human life, flora and fauna)

UNITS	Name	Content	L	T	P
1	Identification of Important physical features	a) Trace the prominent features of the area to be surveyed, identify salient landform features of the selected area of a topographical sheet.	4		8
2	Identification of Important socio-cultural features	a) Identify and classify the biodiversity in the area (Flora & Fauna). b) Observe of the relationship of various landforms, flora and fauna with land-use settlement structure and life style of people.	4		8
3	Survey	a) Field Survey			8
4	Report Writing	a) Plagiarism b) Writing style (MLA, APA, CHICAGO etc.) c) Final Writing of the Report d) Based on observations of the above characteristics, prepare a field survey report. The report need to be supplemented with maps, sketches, photographs, etc.	4		8

GG3D1: ADVANCED REGIONAL PLANNING

CREDIT 4

TOTAL MARKS 100

Course Definition:

The course focuses on the regional divisions of India based on physical, social and economic criteria. The course also deals with problems and prospects of specific areas: Special purpose and problem regions. It broadly covers the spatio-temporal pattern of planning processes and its role of development at local, regional and national level.

Course Objectives:

1. To enhance the learner in the field of different planning process for the development of problem region and special purpose region.
2. To conceptualize with the hierarchical order of different planning activity and its role of regional development.

UNIT	NAME	CONTENTS	L	T	P
1	Basics of Regionalization	a) Physical, Socio-economic regions of India. b) Special purpose region: river valley and metropolitan region, c) Need of Planning for special purpose region.	8	4	
2	Problem regions	a) Identification of Problem regions-basic approaches. b) Problem regions-hilly region, tribal region and regions of drought and floods; c) Strategy for Development of Problem regions.	8	4	
3	Planning Processes	a) Sectoral, temporal and spatial dimensions of planning. b) Urban policy and urban planning in India. c) Indicators of development and their data sources, measuring levels of development and disparities-India context	8	4	
4	Multilevel Planning	a) Concept and utility in the national context-stages in the evolution of multi-level planning process. b) Features and Pattern of decentralization planning in India-Panchayati raj institution and administrative structure (village, block and district) c) Regional planning strategy under Five Year Plans; Policies and programme for Village level Planning.	8	4	

Suggested Readings

1. Bhat,L.S(1973) Regional Planning in India,Statistical Publishing Society ,Calcutta
2. Bhat,L.S. et al (1976) Micro-Level Planning,A Case Study of Karana I Area,Haryana
K.B.Publication,New Delhi
3. Chorley,H.andHagget P. (1976) Models in Geography,Metun.London
4. Misra,R.P. et al (1974)Regional Development in India-A Strategy,Mysore.
5. Mitra.A. (1965)Levels of Regional Development,Census of India,VolI,pt I &II
New Delhi
6. Raza,M (1988)Regionaldevelopment,Heritage Publisher ,Delhi
7. Misra R.P. et al (1980) Multi Level Planning ,Heritage.

GG3D2: ADVANCED FLUVIAL GEOMORPHOLOGY
CREDIT 4
TOTAL MARKS 100

Course Definition:

Fluvial geomorphology is the study of the interactions between the **physical shapes of rivers**, their **water and sediment transport** processes, and the **landforms** they create. It studies the ways that rivers move and change over time, focusing especially on how the flow of water interacts with the movement of sediment. It also considers how the movement of water, sediment and debris interacts with the fixed, immobile features of the landscape, from bedrock canyons to human-built infrastructure.

Course Objectives:

- To know about the anthropogenic impact on river basin and also about the various fluvio geomorphic hazards.
- The aim is also to make the students acquire knowledge about the fluvial geomorphology of the Brahmaputra valley and about its flood geomorphology.

UNITS	Name	Content	L	T	P
1	Flood Geomorphology.	a) Flood as a geomorphic agent, flood frequency analysis, formation of floodplains. b) Analysis of palaeoflood & its relationship with palaeo-climate	8	4	
2	Human impact on river basins and fluvial systems.	a) Effects of basin changes and dam construction on catchment ecosystem. b) Human impact on the river. c) Water balance study in India.	8	4	
3	Fluvio-geomorphic hazards	a) Flood and bank erosion. b) Landslides and soil erosion with special reference to North-East India.	8	4	
4	Fluvial Geomorphology of the Brahmaputra Valley	a) Hydrology, sediment type. b) Channel pattern changes c) Bank line migration of the river Brahmaputra.	8	4	

Suggested Readings

1. Bhagabati, A.K., Bora, A.K. and Kar, B.K. (ed), 2001: Geography of Assam, Rajesh Publications, New Delhi.
2. Chorley, Wolman and Millerm, 1969: Fluvial Processes in Geomorphology, W.H. Freeman

AndCompany, San Francisco.

3. Chorley, R.J. (ed), 1969: Water, Earth and Man, Methuen, London.
4. Chouhan, T.S., 1995: Remote Sensing: Principles and Interpretation, H.W. Freeman and Company, San Francisco.
5. Chow, V.T., 1964: Handbook of Applied Hydrology, McGraw Hill Book company, New York.
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- Garde, R.J. and RangaRaju, K.G.: Mechanism of Sediment Transportation.
7. Gregory, K.J. and Walling, D.E., 1973: Drainage basin Form and Processes, Arnold, London.
- Kanidhton, D., 1984: Fluvial Forms and Processes, Edward Arnold, London.
8. Leopold, Wolman and Miller, 1964: Fluvial Processes in Geomorphology, W. H. Freeman and Company, San Francisco.
9. Morisawa, M., 1968: Streams: Their Dynamics and Morphology, McGraw Hill Book Company, New York.
10. Mutreja, K.N., 1986: Applied Hydrology, McGraw Hill Book Company, New York.
11. Pettijohn, F. J., 1975: Sedimentary Rocks, Harper and Raw Publishers, New York.
12. Petts, G.E., and Foster, I., 1985: Rivers and Landscape, Edward Arnold, London.
13. Rao, K.L., 1975: India's Water Wealth, Orient Longman, New Delhi.
14. Sabnis, Floyd. F., 1978: Remote Sensing: Principles and Interpretation, H.W. Freeman and Company, San Francisco.
15. Schumm, S.A., 1977: The Fluvial System, Wiley Interscience, New York
16. Schumm, S.A. (ed), 1977: Drainage Basin Morphology.
17. Smith, D.I. and Stopp, P., 1978: The River Basin: An Introduction to the Study of Hydrology, Cambridge.

**GG3D3: DISASTER MANAGEMENT METHODS AND
TECHNIQUES
CREDIT 4
TOTAL MARKS 100**

Course Definition:

Disaster Management is emerging globally as a full-fledged academic discipline in recent times. As a field of knowledge and practice it demands specialization to meet with the ever-dynamic challenges posed by hazards and disasters. Recognizing that academic education and training in the field of disaster management requires a multidisciplinary approach. Centre for Studies in Geography tries to solve the issues related to disaster studies as a Discipline Specific elective paper in the two years master's Programme.

Course Objective:

- To know the methods and techniques applied during the process of DisasterRisk Reduction
- Critical assessment of DRR with emphasis on disaster preparedness, response and recovery.

UNIT	NAME	CONTENTS	L	T	P
3	Disaster Preparedness	Preparedness for Hazards and Disaster a) Disaster Preparedness: Concept and Nature b) Disaster Preparedness Plan c) Prediction, Early Warnings and Safety Measures of Disaster. (FLEWS) d) Role of Information, Education, Communication, and Training, e) Role of Government, International and NGO Bodies. f) Role of IT in Disaster Preparedness g) Role of Engineers on Disaster Management.	10	2	
4	Response to Disaster	a) Introduction to disaster response b) Disaster Response Plan c) Communication, Participation, and Activation of Emergency Preparedness Plan d) Search, Rescue, Evacuation and Logistics e) Role of Government, and NGOs f) Psychological Response and Management	10	2	

		(Trauma, Stress, Rumour and Panic) g) Relief and Recovery h) Medical Health Response to Different Disasters			
3	Rehabilitation, Reconstruction and Recovery	a) Reconstruction and Rehabilitation as a Means of Development. b) Damage Assessment c) Post Disaster effects and Remedial Measures. d) Creation of Long-term Job Opportunities and Livelihood Options, e) Disaster Resistant House Construction f) Sanitation and Hygiene g) Education and Awareness, h) Dealing with Victims' Psychology, i) Long-term Counter Disaster Planning j) Role of Educational Institute.	10	2	
4	Modern Techniques in DRR	a) Application of Remote Sensing and GIS in DRR b) GIS and RS in FLOOD and Erosion c) Case Studies of Landslide and Forest Fire using GIS	10	2	

In-semester Examination 20 Marks, Internal Evaluation 20 Marks and End Semester 60 Marks

Reference books

- Alexander David, 2000. Introduction in 'Confronting Catastrophe', Oxford University Press.
- Berke PR, et al. Recovery after a disaster: Achieving sustainable development, mitigation, and equity. *Disasters* 1993; 17 (2): 93-109.
- Building Resilience: Social Capital in Post-Disaster Recovery. *Contemporary Sociology* 2015; 44 (1): 30-31.
- Coppola P Damon, 2007. Introduction to International Disaster Management, Carter, Nick 1991. Disaster Management: A Disaster Manager's Handbook. Asian Development Bank, Manil
- Disaster Management Guidelines. GOI-UNDP Disaster Risk Reduction Programme (2009-2012).
- Guerisse P. 2005 Basic Principles of Disaster Medical Management. *Act Anaesth. Belg*;56:395-401
- Ingram JC, et al. Post-disaster recovery dilemmas: challenges in balancing short-term and long-term needs for vulnerability reduction. *Environmental Science & Policy* 2006; 9 (7-8): 607-13.
- Prewitt Diaz, J.O (2004). The cycle of disasters: from Disaster Mental Health to Psychosocial Care. Disaster Mental Health in India, Eds: Prewitt Diaz, Murthy, Lakshmi Narayanan, Indian Red Cross Society Publication.
- Phillips BD. *Disaster Recovery*. 2nd Edition. Taylor & Francis group, 2015.

10. Passerini E. Disasters as agents of social change in recovery and reconstruction. *Natural Hazards Review* 2000; 1 (2).
11. Sharman and Hansen.2015. Aim and Scope of Disaster Management. Study Guide prepared UW-DMC, University of Washington.

GG3G1: HYDROLOGY (THEORY)
CREDIT 4
TOTAL MARKS 100

Course Definition:

Hydrology is the science that encompasses the occurrence, distribution, movement and properties of the waters of the earth and their relationship with the environment within each phase of the hydrologic cycle. The water cycle, or hydrologic cycle, is a continuous process by which water is purified by evaporation and transported from the earth's surface to the atmosphere and back to the land and oceans.

Course Objectives:

- To understand the nature of Hydrology
- To recognize the relationship between Hydrology and Atmosphere
- To know about the concept of hydrograph and runoff

UNITS	NAME	CONTENTS	L	T	P
1	Nature of Hydrology	a) Meaning, Scope and Relevance of Hydrology. b) Hydrologic Cycle, The Global Water Budget, India's Water Budget c) Application of Hydrology	8	4	
2	Hydrometeorology	a) Introduction, meaning and concepts. b) Constituents of the Atmosphere, Structure of the atmosphere. c) Formation of Precipitation, Types of Precipitation, Forms of Precipitation, Measurement of Precipitation.	8	4	
3	Evaporation and Evapotranspiration	a) Evaporation- Meaning and Concept, Factors affecting evaporation, Measurement of evaporation b) Evapotranspiration- Meaning and Concept, Factors affecting Evapotranspiration, Measurement of evapotranspiration.	8	4	
4	Runoff and Hydrograph	a) Meaning and Concept, Types of Runoff, Factors affecting Runoff, Estimation of Runoff.	8	4	

		b) Meaning and Concept of Hydrograph, Types of Hydrograph, Factors affecting Hydrographs..			
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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, Allahabad.
11. Sverdrup K. A. and Armbrust, E. V., 2008: *An Introduction to the World Ocean*, McGraw Hill, Boston.
12. Singh, M., Singh, R.B. and Hassan, M.I. (Eds.) (2014) Landscape ecology and water management. Proceedings of IGU Rohtak Conference, Volume 2. Advances in Geographical and Environmental Studies, Springer

**GG3G2: APPLICATION OF GEOINFORMATICS IN
PETROLEUM EXPLORATION
CREDIT 4
TOTAL MARKS 100**

Course Definition:

GIS and RS are computer based system used for acquisition, interpretation, manipulation and representation of Spatial and non – spatial data in different spectral bands of electromagnetic spectrum, which acts as a tool of solving various spatial problems. The application of geoinformatics in petroleum exploration

Course Objective:

- To understand the Fundamentals & Physics of Remote Sensing
- To understand the Remote Sensing Platforms and Sensors
- To acquire knowledge about the Digital Image Processing And Information Extraction from Satellite Images
- To understand the Fundamentals of Geographic Information System.
- To get hands on training on application of Geoinformatics in Petroleum Exploration

UNIT	NAME	CONTENTS	L	T	P
1	Introduction on Remote Sensing	a) Introduction and scope of Photo geology and Remote Sensing. Principles of remote sensing. Electromagnetic energy, Source of Electromagnetic radiation, Electromagnetic spectral region, Atmospheric windows, Electromagnetic energy – its interaction with atmosphere and Earth surface. b) Remote sensing data acquisition systems, Remote Sensing Platforms, Geostationary and sum Synchronous – Satellites sensors active sensor, Passive sensor, multi spectral scanner (MSS) , image resolution.	10	2	
2	Digital Image Processing and Image Classification	a) Digital image Processing- Introduction, Pre-processing – Geometric corrections, Radiometric corrections. Image Enhancement – Image rectification & Restoration, Contrast manipulation &	10	2	

		Stretching. Spatial feature manipulation – Spatial filtering edge enhancement. Image classification – Supervised classification- & Unsupervised classification. b) Interpretation- Key elements of image interpretation, application of remote Sensing methods for Geology, Hydrogeology, Agricultural land use and land practice, Natural Hazards. Remote Sensing for National Development.			
3	Fundamentals of GIS	a) Geographical Information System- History and Developments in Geographical Information System. GIS Terminology, Hardware and Software requirements. Overview of Current GIS Packages. Basic commands for drawing and editing lines, Polygon, Labelling and Annotations b) Geographical Information System Models and Structures- Geographical data (Spatial and Non-Spatial Data), Spatial Data Models- Raster and Vector Data Structures. Non-Spatial Data Models- Integrated data Models. Data inputting Methods of GIS and Digitization.	10	2	
4	Practicals on Application of Geoinformatics in Petroleum Exploration	a) Geometric Correction of Imageries b) Subset and Mosaicing c) Image Classification techniques d) Interpretation of imageries. e) Application of Geoinformatics in Petroleum Exploration	10	2	

In-semester Examination 20 Marks, Internal Evaluation 20 Marks and End Semester 60 Marks

Reference books

1. Remote sensing – Principles and Interpretation –Sabins F.F
2. Remote Sensing and Image Interpretation – Lillesand R.M and Kiefer
3. Remote sensing of the Environment - An Earth Resource Perspective- Jensen.
4. Image Interpretation in Geology –Drury.
5. Photo Geology – Miller. V. C
6. Remote sensing and Applications – Orient.
7. Fundamentals of Remote Sensing – George Joseph.
8. Principles of applications of Photo Geology –Shiv. N. Pandey
9. Remote sensing for Earth Resource –D. P. Rao.

10. Remote sensing Techniques for Regional Development – Banerjee.
11. A Guide to remote sensing – Dury.
12. Remote Sensing and GIS – Anji Reddy.
13. Geomorphology and Remote sensing- Jha
14. Handbook of aerial Photography and Interpretation – Rampal.
15. Remote Sensing Applications – Srinivas.
16. Sabbins, F.F., 1985: Remote Sensing Principles and Applications. Freeman.
17. Drury. S.A, 2002: Image Interpretations in Geology.
18. Allen and Unwin. Lillesand. T.M and Kieffer. R.W, 2005: Remote Sensing and Image Interpretation. Willey.
19. Paine D.P, 2004: Aerial Photography and Image Interpretation for Resource Management. Willey. Gupta. R.P, 1999: Remote Sensing in Geology. Springer Verlag.
20. P.A. Burroughs (1990), Principles of Geographical Information System for Land Resource Management, Oxford University Press.
21. Good Child, Geographical Information System- Principles, Vol.1
22. John C. Antenucci et al (1991), Geographical Information System.- A Guide to the Technology, van nostrand reinhold Publications, New York.
23. Graeme F, Bonham Carter (1994), Geographical Information System for Geoscientist – Modeling with GIS, Pergman Publications, Computer Methods in Geosciences, Vol. 13.
24. GIS by ESRI, map projections, geo- referencing spatial data, environmental system research institute inc., New York, USA.
25. Meguire, D.J. Good Child, M.F. and Rhind , D.W (1991), an Overview and Definitions of GIS, Vol.1, Geographic information System, Longman Scientist and Technical Publications.

GG3G3: GEOGRAPHY OF TRIBAL STUDIES

CREDIT 4

TOTAL MARKS 100

Course Definition:

The tribal communities or the indigenous people of our country form the core groups in our national fabric. It is these tribal communities that are even today intricately connected with the nature. As Geography is the study of the relationship between man and the environment, a geographer cannot afford to miss the connection between the tribes and geography itself. In addition to this, as tribes form a distinct community due to their distinct way of life and also due to their unique problems, tribes have been given a special mention in the Constitution of India. As such, enough of matter and complex issues have already accumulated which needs serious geographical analysis, so as to not only understand, but also to produce knowledge related to tribes and their relationship with the nature.

Course Objectives:

- Locating tribes in geographical studies.
- Understanding the meaning, concept and characteristics of tribes.
- To provide the learners with the theoretical understanding in the formation and construction of tribal communities in India.
- To learn about the migration, settlement and the geographical patterning of tribes in the country.
- To appreciate the tribal variations in the country with special reference to the varied tribal communities of North East India.
- To acquaint the learner with the nexus of tribes, development, ensuing problems and welfare policies.

Unit	Name of Units	Contents	L	T	P
1	Introduction	a) The Need of Tribal Studies in Geography. b) The Concept of Tribe. c) Characteristics of Tribes.	12		
2	Laying the Foundation	a) Tribes and the Constitution of India. b) Tribe and Ethnicity. c) Theories of Tribe: Isolation Theory, Assimilation Theory, Integration Theory and the Contemporary Theory.	12		

3	Tribes In India	a) Migration and settlement of Tribes in India. b) Geographical Distribution of Tribes in India. c) Major Tribes of India with special reference to North East India.	12		
4	Tribes and Development	a) Tribal Communities, Culture and Nature; Sustainable Development. b) Tribal Problems in India. c) Various Policies and Programmes for the Development and Welfare of the Tribal Communities in India.	12		

In-semester Examination 20 Marks, Internal Evaluation 20 Marks and End Semester 60 Marks.

References

1. Raza M and Ahmad A (1990) An Atlas of Tribal India, Concept Publishing Co, Delhi.
2. David L. Sills (1976) International Encyclopedia of Social Sciences (Vol.16, New York: MacMillan and Free Press.
3. Lucy Mair (1972) An Introduction to Social Anthropology, New Delhi: Oxford University Press.
4. S.L. Doshi and P.C. Jain (2001) Social Anthropology, Jaipur: Rawat Publications.
5. Prakash Chandra Mehta (2006) Development of Indian Tribes, New Delhi: Discovery Publishing House.
6. Sukant K. Chaudhury and Saumendra Mohan Patnaik. (2008) Indian Tribes and Mainstream, Jaipur: Rawat Publications.
7. Andre Beteille (2008) Concept of Tribe with Special Reference to India, in Sukant K. Chaudhury and Saumendra Mohan Patnaik (ed.): "Indian Tribes and Mainstream". Jaipur: Rawat Publications, pp. 21-40.
8. L.P. Vidyarthi and B.K. Rai (1976) The Tribal Culture of India, New Delhi: Concept Publishing Company.
9. A.R. Desai (1978) Tribes in Transition, in A.R. Desai (ed.): "Rural Sociology in India". Bombay: Popular Prakashan, pp. 223.
10. Ramesh Thapar (1996) Tribe, Caste and Religion in India, Delhi: Macmillan.
11. Andre Beteille (1986) The Concept of Tribe with Special Reference to India, European Journal of Sociology, Volume 27.
12. Nirmal Kumar Bose (1971) Tribal Life in India, New Delhi: National Book Trust.
13. Virginius Xaxa (2008) State, Society and Tribes: Issues in Post-Colonial India, Delhi: Dorling Kindersely (India) Pvt. Ltd.
14. Niharranjan Roy, Introductory Address, in K.S. Singh (ed.): Tribal Situation in India, Shimla, IAS.

15. G.S. Ghurye (1995) *The Scheduled Tribes*, Bombay: Popular Prakashan.
16. Rath Gobind Chandra (2006) *Nehru and Elwin on Tribal Development: Contrasting Perspective*, in Rath Gobind Chandra (ed.): "Tribal Development in India: the Contemporary Debate". New Delhi: Sage Publication, pp. 65-80.
17. Prakash Chandra Mehta (2006) *Development of Indian Tribes*, New Delhi: Discovery Publishing House.

GG3A1: PRACTICALS ON GEOINFORMATICS
CREDIT 2
TOTAL MARKS 50

Course Definition:

Familiarization with hard copy and soft copy images, Introduction to different GIS and RS software, Concept of bands and channels, True colour, false colour and standard false colour composite, Physical and cultural features identification from imageries.

Course Objective:

- Meaningful application of GIS and Remote Sensing technology in areas like environment, urban planning and flood risk assessment etc.
- Skill development in handling the instruments, tools and techniques while using geo-spatial technology
- To prepare the student for national and global employability

UNIT	NAME	CONTENTS	L	T	P
1	Image Interpretation and Preparation of Base map from Survey of India Toposheets, Use of India topographical sheets/images for delineation of different features	a) File export import/ translation, Conversion of file formats b) False colour composite and visual identification c) Image registration / Geo coding, Projection, Creating Region of Interest d) File sub setting /clipping Mosaic Air photo and Images e) Feature identification and signature curve generation f) Image Statistics, Histogram g) Using GIS/RS software on screen digitization of various Land use classes from IRS/LISS-3 FCC h) Image Enhancement Techniques (Filtering) i) Image pattern recognition – Unsupervised & supervised classification j) Remote Sensing Application: Land use & urban studies, forestry & Environ Related Aspects, Flood damage assessment, soil & crop studies, Drought assessment, Geology & Geomorphology, Groundwater prospecting (minimum four of the above)	2		10

2	Fundamentals of GIS and Introduction to a GPS	a) Visualization Tools Blend, Swipe, Flicker, Conversion: Raster - Vector -ASCII and others b) Managing Geo-database, Geo-referencing & Changing Projection c) Digitization: Point, Line, Polygon d) Managing attribute table and thematic mapping e) Map composition and representation f) Introduction to a GPS and initial setting , g) Creating codes and attribute table for GPS receiver, h) Point Data collection using GPS with different datum, i) Line data collection using GPS and measurements, j) GPS data collection for area calculation, k) Post processing of the GPS data, l) Creating attribute table in GPS pro software and Export functions, m) GPS and GIS integrations output preparation	2		10
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In-semester Examination 10 Marks, Internal Evaluation 10 Marks and End Semester 30 Marks

Reference books

1. Avery, T. Bugene - Interpretation of Aerial Photograph and Cartography.
2. Yadav, Hiral Lal – Fundamentals of Practical Geography.
3. Sharma – Remote Sensing for Resources Survey.
4. Burrough, P.A. - Principles of GIS for Land Resource Assessment.
5. Burrough, P.A. & Mc Donnel – Principles of Geographical System.
6. Haywood, I. Correlium, S. Caxer, S. – An Interoduction to Geographical Information System.
7. Lauxim, R. & Thomson, D. – Fundamentals of Spatial Information System.
8. Longley, P.A. Goodchild, M.F. etc. – Geographical Information System and Science.
9. Brice E. D. - GIS : A Visual Approach.
10. Jonson, J.N.R. – Introduction to Digital Image Processing : A Remote Sensing Perspective

SEMESTER IV

GG4C1: GEOGRAPHIC THOUGHT

CREDIT 4

TOTAL MARKS 100

Course Definition:

Geographic Thought deals with the evolution of Geography as a discipline. As such it focuses on the discipline's evolution since the classical period to the contemporary period. It also encompasses the various paradigm shifts in Geography. As geography is still seen to be evolving with time, it becomes imperative to study recent trends in the making of the discipline. Furthermore, as explanation and production of knowledge in various disciplines have their own unique methodologies, this course also focuses in the various routes and approaches which are at a geographer's disposal to study the subject.

Course Objectives:

- To impart the knowledge of the historical evolution of Geography as a discipline.
- To provide the understanding of the important paradigm shifts in Geography.
- To make the learner aware of the various routes and methodologies in the analysis of geographic problems.
- To keep the learner abreast with the contemporary geographical trends.

Units	Name of Units	Contents	L	T	P
1	Evolution of Geographic Thought	a) Classical Period: Contributions of Greek and Roman Geographers. b) Medieval Period: Arab Geographical Contributions. c) MODERN PERIOD: Contributions of Humboldt, Ritter and Darwin	12		
2	Shifting Paradigms	a) Environmentalism, Possibilism, Neo-Determinism. b) Probabilism and Cultural or Social Determinism c) Areal Differentiation and Spatial Organisation.	12		
3	Explanations in Geography	a) Routes to scientific explanation-inductive and deductive. b) Types of explanations: cognitive description, cause-effect analysis and temporal analysis.	12		

		c)	System Approaches in Geography.			
4	Contemporary Geographical Thought	a)	Positivism, Behaviouralism and Humanism.	12		
		b)	Radical Geography, Marxism and Marxist Geography.			
		c)	Postmodernism and Postmodern Geographies.			

In-semester Examination 20 Marks, Internal Evaluation 20 Marks and End Semester 60 Marks.

1. References

2. Soja, E.W., (1997), Post Modern geographies, Rawat, New delhi.
3. Cloke, P., Crang, P., Goodwin, M., (ed) (1999), Introducing Human Geographies, London: Oxford University Press.
4. Harvey, D (1969) Explanation in Geography. London: Arnold.
5. Peet, R., (1998), Modern Geographical Thought, UK: Blackwell Publishers.
6. Peet, R. and Thrift, N., (2002), New Models in Geography-Volumes I & II, London, Unwin Hyman.
7. Hartshorne, R., (2012), The Nature of Geography, Rawat, New Delhi.
8. Rubenstein, James M. (2012) Contemporary Human Geography, Pearson Education, U.S.A.
9. Gregory, D., 1978: Ideology, Science and Human Geography, Hutchin, London
10. Huntington, E., 1951 Principles in Human Geography, John Wiley & Sons, Lnc, New York
11. Johnstone, R.J. et. (eds) 1981, Dictionary of Human Geography, Basil Blackwell Oxford.
12. Johnston, R.J. 1983 : Philosophy and Human Geography, Edward Arnold, London.
13. Hartshorne, R., (1959) Perspectives on Nature of Geography, R. McNally & Co.
14. Hussain, M. (1984) Evaluation of Geography, Edward Arnold, London
15. Buttner, A and D. Seamon (eds) (1980); The Human Experience of Space and Place, London, Croonhelm.
16. Hohnstone R.J. (1988) The Future of Geography, Merhen, London
17. Minshul, R. (1970) The Changing Nature of Geography, Hutchinson University Library London.

GG4C2: REGIONAL GEOGRAPHY OF INDIA

CREDIT 4

TOTAL MARKS 100

Course Definition:

Regional geography of India throws lights of the various aspects of the country as a whole; it covers the aspects of physical geography, human aspects, cultural and social geography and also the geography of resources in India.

Course Objectives:

- To make the students familiar with the spatial distribution and spatio-temporal variations of land and resources in India
- To have a comprehensive knowledge of north eastern part of India as a distinct regional unit

UNIT	NAME	CONTENTS	L	T	P
1	Physical Basis of the Country	a) Physiographic framework and drainage system. b) Indian monsoons, cyclones, western disturbances, flood and draughts. c) Soil and vegetation.	10	2	
2	Resource Basis of the Country	a) Mineral and power resources. b) Agricultural resources-problems and prospects. c) Transport and Communication	10	2	
3	Cultural Basis of the Country	a) Cultural setting: racial and ethnic diversities, tribal areas and their problems, population: problems and policies. b) Settlements: types, pattern and morphology of rural settlements. c) Urban development, morphology of India cities, urban sprawls, slums and associated problems.	10	2	
4	North East India	a) Physiographic background of North East India-relief, soil, climate and vegetation. b) Socio-cultural background of North East India-language and religion, cultural diversities in the northeast. c) Population growth, immigration problems in the northeast India.	10	2	

In-semester Examination 20 Marks, Internal Evaluation 20 Marks and End Semester 60 Marks

Reference books

Suggestion Readings

1. Singh, R.L. (1967) A Regional Geography of India, 1967
2. Spate O.H.K & Learmonth, A.T.A. (1967) India and Pakistan: Land people and economy.
3. Sutta, A.K. India; Resources, Potentialities and Planning, 1973
4. Bhagawati, A.K et al: Geography of Assam, 2000 Publication of NEIGS, GU and Others
5. Taher, M. and Ahmed, P. (2015) North East India,

GG4C3: DISSERTATION/PROJECT WORK
CREDIT 4
TOTAL MARKS 100

Course Objectives:

- To enable the students to identify Geographic problem areas.
- To build skills on developing strategies, policies and planning through surveying and research in the area.
- To enhance the skills of scientific reporting

UNITS	Name	Content	L	T	P
1	Introduction to Report writing and Identification of Problem	a) Basics of Scientific Report Writings b) Selection of a Problem (community, administrative unit or govt. policy) c) Background of the Problem region/area, Issues and Challenge d) Visit to field	4	4	8
2	Data collection and analysis	a) Capacity Building, Motivation and Awareness on Selected Issues b) Generation of Database (Primary and Secondary) c) Collection of Geographic data (preparation of Base map)	4	4	8
3	Report Writing	a) Plagiarism b) Writing style (MLA, APA, CHICAGO etc.) c) Final Writing of the Report	4	4	8
4	Viva voce	a) Written Examination			

Students will be allotted supervisors based on availability of teacher and students interests.

End Semester 60 marks and in Semester 40 Marks

END SEM MARK DIVISION 60 Marks: {30 marks Written Exam, 20 Marks Report, 10 Viva + Note book}

IN-SEMESTER 40 :{ Seminar 10, Assignment 10, Field work 20}

GG4D1: PRACTICALS ON REGIONAL PLANNING
CREDIT 4
TOTAL MARKS 100

Course Definition:

The course focuses on various methods in socio economic regionalization for identification of under developed areas along with techniques for interpreting flow, inequality and spatial concentration of population for making efficient comparison. Additionally the course incorporates practical application of GIS technology for LULC mapping of the urban areas.

Course objective:

The basic objective of this paper to enhance the skill of learners in the field of regional planning, by means of different methods of regionalization and spatial concentration.

UNIT	NAME	CONTENTS	L	T	P
1	Methods of regionalization	a) Socio-economic regionalization using simple ranking , mean ranking and Z score standardization b) Estimation of flow of population using gravity analysis	2	-	8
2	Methods for measuring distribution of population	a) Measurement of inequality using Lorenz curve b) Measurement of concentration of population using location quotient	2	-	8
3	Techniques for population projection and concentration	a) Forecasting of urban population using arithmetic and geometric progression method b) Gini concentration ratio	2	-	8
4	Application of GIS techniques in urban studies	a) Application of GIS in urban mapping: population density, population growth, road network b) Land use land cover and urban sprawl c) Practical note book and viva voce*	4	-	14

(* including viva and notebook)

Suggested Readings

1. Bhat,L.S(1973) Regional Planning in India,Statistical Publishing Society ,Calcutta
2. Bhat,L.S. et al (1976) Micro-Level Planning,A Case Study of Karana I Area,Haryana K.B.Publication,New Delhi
3. Chorley,H.andHagget P. (1976) Models in Geography,Metun.London
4. Misra,R.P. et al (1974)Regional Development in India-A Strategy,Mysore.
5. Mitra.A. (1965)Levels of Regional Development,Census of India,Voll,pt I &II New Delhi
6. Raza,M (1988)Regionaldevelopment,Heritage Publisher ,Delhi
7. Misra R.P. et al (1980) Multi Level Planning ,Heritage.

GG4D2: PRACTICAL ON FLUVIAL GEOMORPHOLOGY
CREDIT 4
TOTAL MARKS 100

Course Definition:

Fluvial geomorphology is the study of the interactions between the **physical shapes of rivers**, their **water and sediment transport** processes, and the **landforms** they create. It studies the ways that rivers move and change over time, focusing especially on how the flow of water interacts with the movement of sediment. It also considers how the movement of water, sediment and debris interacts with the fixed, immobile features of the landscape, from bedrock canyons to human-built infrastructure.

Course Objectives:

- The students will know about the relationship of discharge with other channel variables.
- To make the students aware of the various techniques used in analysing the frequency of flood.
- Skill development in handling the instruments, tools and techniques used in studying fluvial geomorphology.

UNITS	Name	Content	L	T	P
1	Preparation of hydrographs	a) Stage-discharge hydrographs b) Unit hydrograph	4		8
2	Preparation of Sediment Rating Curve and Basin area- Discharge graph.	a) Basin area and stream discharge graph. b) Water discharge and sediment load (sediment rating curves) taking examples from the Brahmaputra and its Tributaries	4		8
3	Flood frequency analysis.	a) Plotting position method b) Log Pearson Type III distribution and c) Gumble's Extreme value distribution Method	4		8
4	Sediment Size and Channel Dynamics Analysis	a) Grain-size analysis of alluvial sediments and fluvio-geomorphic interpretation of the results b) Analysis of river channel using GIS.	4		8

5	Internal evaluation	a) Viva Voce b) Practical Assessment	Notebook			
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**DSE 403: APPLICATION OF GEOGRAPHIC INFORMATION
SYSTEM AND REMOTE SENSING IN DISASTER RISK
REDUCTION (DRR)
CREDIT 4
TOTAL MARKS 100**

Course Definition:

Disaster cannot be managed; therefore, we must use proper skill to minimize the risk of disaster in advance. Scientific tools like GIS and Remote Sensing are of immense help in reducing the risk of disaster. As a field of knowledge and practice it demands specialization to meet with the ever-dynamic challenges posed by hazards and disasters. Recognizing that academic education and training in the field of disaster management requires a scientific approach.

Course Objective:

- To know the methods and techniques applied during the process of Disaster Risk Reduction
- Application of software packages for assessment of DRR with emphasis on disaster preparedness, response and recovery.

UNIT	NAME	CONTENTS	L	T	P
3	Data Acquisition Techniques	a) Satellite data acquisition techniques and Preparation of base map) b) Data collection techniques (flood /Landslide/bank erosion etc.) c) Data source and types for Meteorological data in India	2	2	8
4	Introduction to GIS software packages	a) Introduction to open source GIS b) Application ArcGIS/ERDAS Imagine in DRR c) Georeferencing, Digitizing and creation of Layers(.shp, .kml, .img .mxd) in GIS environment	2	2	8
3	Map Production and Spatial	a) Map production in GIS environment b) Delineation of Basin Boundary	2	2	8

	Analysis	c) Spatial Analysis in GIS using ERDAS Imagine/QGIS/ ArcGIS etc.			
4	Flood/ landslide mapping	a) Flood Hazard Zonation b) Landslide Vulnerability c) FLEWS	2	2	8

In-semester Examination 20 Marks, Internal Evaluation 20 Marks and End Semester 60 Marks

Reference books

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3. Clark, Isobel and William V. Harper. 2000. Practical Geostatistics 2000, Columbus, Ohio: Ecosse North America, LLC,
4. Clarke, Keith C., Bradley O. Parks, and Michael P. Crane. 2002. Geographic Information Systems and Environmental Modeling, Upper Saddle River, NJ: Prentice Hall,
5. Collett, David 2003. Modeling Binary Data (Second Ed.), Boca Raton, FL: Chapman & Hall,.
6. Cromley, Ellen K. and Sara L. McLafferty 2002. GIS and Public Health, New York: The Guilford Press, -
7. Delwiche, Lora D. and Susan J. Slaughter 1998. The Little SAS Book: A Primer (Second Ed.), Cary, NC: SAS Publishing. –
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10. Forta, Ben. SQL in 10 Minutes, Indianapolis, IN: SAMS, 2004.
11. Gatrell, Anthony and Markku Loytonen, eds. 1998 GIS and Health, Philadelphia: Taylor and Francis, Inc.
12. GIS in State Government: Volume 1, Redlands, CA: ESRI Press, 2005
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14. Griffith, Daniel A. and Larry J. Layne, 1999. A Casebook For Spatial Statistical Data Analysis: A Compilation of Analyses of Different Thematic Data Sets, New York: Oxford Press.
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19. Koch, Tom, 2005. Cartographies of Disease: Maps, Mapping, and Medicine, Redlands, CA: ESRI Press. –
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21. Lee, Jay and David W.S. Wong, 2001. Statistical Analysis with ArcView GIS, New York: John Wiley & Sons, Inc..
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25. Melnick, Alan L. 2002. Introduction to Geographic Information Systems in Public Health, Gaithersburg, MD: Aspen Publishers, Inc..
26. Mitchell, Andy, 1999. The ESRI Guide to GIS Analysis: Volume 1: Geographic Patterns and Relationships, Redlands, CA: ESRI Press.
27. Mitchell, Andy, 2005. The ESRI Guide to GIS Analysis: Volume 2: Spatial Measurements and Statistics, Redlands, CA: ESRI Press.
28. Peters, Alan and Heather MacDonald, 2004. Unlocking the Census with GIS, Redlands, CA: ESRI Press.
29. Ralston, Bruce A, 2002. Developing GIS Solutions with Map Objects and Visual Basic, Canada: Onward Press.
30. Rubin, Donald B, 1987. Multiple Imputation for Nonresponse in Surveys, New York: John Wiley & Sons, Inc.. –
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