Syllabus

M.Sc. (Geography)

(w.e.f. 2016-17)

DEPARTMENT OF GEOGRAPHY

Central University of Haryana
Mahendergarh

CENTRAL UNIVERSITY OF HARYANA
Master of Science in Geography (Comprehensive structure)

1. Core Course (CC)
(Exclusive for Geography students)

Sl.No.	Course code	Course title	L	S	P	Credit
1.	SEE GEO 1 1 01 C 4105	Geographical Thought	4	1	0	5
2.	SEE GEO 1 1 02 C 4105	Quantitative Techniques in Geography	4	1	0	5
3.	SEE GEO 1 1 03 C 4105	Geomorphology	4	1	0	5
4.	SEE GEO 1 1 04 C 2125	Practical I: Practical Geography: Interpretation of Topographical Sheets and Morphometric Analysis	2	1	4	5
5.	SEE GEO 1 2 05 C 4105	Climatology	4	1	0	5
6.	SEE GEO 1 2 06 C 4105	Contemporary Human Geography	4	1	0	5
7.	SEE GEO 1 2 07 C 4105	Advanced Geography of India	4	1	0	5
8.	SEE GEO 1 2 08 C 2125	Practical II: Field Work and Report Writing	2	1	4	5
9.	SEE GEO 1 3 09 C 4105	Interdisciplinary Research Methods and Techniques	4	1	0	5
10.	SEE GEO 1 3 10 C 4105	Fundamentals of Remote Sensing and GIS	4	1	0	5
11.	SEE GEO 1 3 11 C 2125	Practical IV: Interpretation of Aerial Photographs & Satellite Images and Thematic Mapping	2	1	4	5

2. Generic Elective Course (GEC)
(Offered to other departments)

Sl.No.	Course code	Course title	L	S	P	Credit
1.	SEE GEO 1 1 01 GE 3104	Population and Development	3	1	0	4
2.	SEE GEO 1 1 02 GE 3104	Biogeography	3	1	0	4
3.	SEE GEO 1 2 03 GE 2024	Practical III: Computer Aided Statistical Diagrams and Data Processing (compulsory)	2	0	4	4
4.	SEE GEO 1 3 04 GE 3104	Geography of Natural Hazards and Disasters	3	1	0	4
5.	SEE GEO 1 3 05 GE 3104	Cultural Geography	3	1	0	4
6.	SEE GEO 1 3 06 GE 3104	Soil Geography	3	1	0	4

3. Discipline Centric Elective Courses (DCEC)
(Offered to the students from Geography and other departments)

Sl. No.	Course code	Course title	L	S	P	Credit
1.	SEE GEO 1 2 01 DCEC 3104	Urban Geography	3	1	0	4
2.	SEE GEO 1 2 02 DCEC 3104	Natural Resource Management	3	1	0	4
3.	SEE GEO 1 2 03 DCEC 3104	Hydrology and Resource Management	3	1	0	4
4.	SEE GEO 1 3 04 DCEC 0202	Assignment based Seminar Paper (compulsory)	0	2	0	2

5.	SEE GEO 1 3 05 DCEC 3104	Population Geography	3	1	0	4
6.	SEE GEO 1 3 06 DCEC 3104	Regional Development and Planning	3	1	0	4
7.	SEE GEO 1 3 07 DCEC 3104	Oceanography	3	1	0	4

4. Skill Enhancement Elective Course
(Compulsory and exclusively for Geography students)

S.No.	Course code	Course title	L	S	D	V	Credit
1.	SEE GEO 1 4 01 SEEC 0066	Field based Dissertation (including viva voce)	4	2	12	6	24
2.	SEE GEO 1 4 02 SEEC	Self-Study Course	-	-	-	-	

- **Note: L: Lecture; S: seminar; P: Practical; D: Dissertation; V: Viva Voce**
- **Core Course (CC)**
  (Exclusive for Geography students)
- **Generic Elective Course (GEC)**
  (Offered to other departments)
- **Discipline Centric Elective Courses (DCEC)**
  (Offered to the students from Geography and other departments)
- **Skill Enhancement Elective Course (SEEC)**
  (Exclusively for Geography students)

Master of Science in Geography (Semester-wise structure)

Semester I

S. No.	Course code	Course title	L	S	P	Credit
1.	SEE GEO 1 1 01 C 4105	Geographical Thought	4	1	0	5
2.	SEE GEO 1 1 02 C 4105	Quantitative Techniques in Geography	4	1	0	5
3.	SEE GEO 1 1 03 C 4105	Geomorphology	4	1	0	5
4.	SEE GEO 1 1 04 C 2125	Practical I: Practical Geography: Interpretation of Topographical Sheets and Morphometric Analysis	2	1	4	5
5.	**To be taken from other department**		3	1	0	4
Generic Elective Course (GEC) (offered to other departments)						
6.	SEE GEO 1 1 01 GE 3104	Population and Development	3	1	0	4
7.	SEE GEO 1 1 02 GE	Biogeography	3	1	0	4

	3104					
Total Credits 24						

Note: Course no. 6 and 7 are exclusively for other departments

Semester II

S. No.	Course code	Course title	L	S	P	Credit
1.	SEE GEO 1 2 05 C 4105	Climatology	4	1	0	5
2.	SEE GEO 1 2 06 C 4105	Contemporary Human Geography	4	1	0	5
3.	SEE GEO 1 2 07 C 4105	Advanced Geography of India	4	1	0	5
4.	SEE GEO 1 2 08 C 2125	Practical II: Field Work and Report Writing	2	1	4	5
5.	SEE GEO 1 2 03 GE 2024	Practical III: Computer Aided Statistical Diagrams and Data Processing	2	0	4	4
6.	***Any one of the following three courses***		3	1	0	4
	SEE GEO 1 2 01 DCEC 3104	Urban Geography				
	SEE GEO 1 2 02 DCEC 3104	Natural Resource Management				
	SEE GEO 1 2 03 DCEC 3104	Hydrology and Water Resource Management				
Total Credits 28						

Semester III

S. No.	Course code	Course title	L	S	P	Credit
1.	SEE GEO 1 3 09 C 4105	Interdisciplinary Research Methods and Techniques	4	1	0	5
2.	SEE GEO 1 3 10 C 4105	Fundamentals of Remote Sensing and GIS	4	1	0	5
3.	SEE GEO 1 3 11 C 2125	Practical IV: Interpretation of Aerial Photographs & Satellite Images and Thematic Mapping	2	1	4	5
4.	SEE GEO 1 3 04 DCEC 0202	Assignment based Seminar Paper (compulsory)	0	2	0	2
5.	***To be taken from other department***		3	1	0	4
Generic Elective Course (GEC) (offered to other departments)						
	SEE GEO 1 3 04 GE 3104	Geography of Natural Hazards and Disasters	3	1	0	4
	SEE GEO 1 3 05 GE 3104	Cultural Geography	3	1	0	4
	SEE GEO 1 3 06 GE 3104	Soil Geography	3	1	0	4
6.	***Any one of the following Three DCEC courses***		3	1	0	4

	SEE GEO 1 3 05 DCEC 3104	Population Geography	
	SEE GEO 1 3 06 DCEC 3104	Regional Development and Planning	
	SEE GEO 1 3 07 DCEC 3104	Oceanography	
			Total Credits 25

Note: Courses under sl. no. 5 is exclusively for Students of other Department

Semester IV

Skill Enhancement Elective Course (Compulsory and exclusively for Geography students)

S. No.	Course code	Course title	L	S	D	V	Credit
1.	SEE GEO 1 4 01 SEEC 0066	Field Based Dissertation (including viva voce)	4	2	12	6	24
2.	SEE GEO 1 4 02 SEEC	Self-Study Course	-	-	-	-	

Total Credits: 24+28+25+24 = 101

Semester I

M.Sc. Geography Semester I

Course: Geographical Thought (SEE GEO 1 1 01 C 4105)

Credit - 5

Course Outline

Unit I

Evolution of Geographic Thought: Changing paradigms – Environmentalism, Possibilism, areal differentiation, spatial organisation

Unit II

Theory in Geography: structure, nature, type and applications in geography; human-environment interactions. Philosophical debates in Contemporary Geography: Critical understanding of positivism, behaviouralism, Marxism, Structuralism, post-structuralism and post-modernism.

Unit III

Methods in Geographical Analysis: Epistemology of geography, critical assessment and debates on quantitative, qualitative, field and cartographic methods in geography

Unit IV

Future of Geography: changing nature, concepts, approaches and methodologies of geography in a Globalising World, Progress and Contributions in Indian Geography

Recommended Readings:

1. Bhaskar, R. (1978): **A Realist Theory of Science**, Hassocks, Sussex.
2. Bhaskar, R. (1989): **Reclaiming Reality: A Critical Introduction to Contemporary Philosophy**, Verso, London.
3. Bunge, W. (1966): **Theoretical Geography**. Lund Studies in Geography, Series C., no.1, Lund, Sweden.
4. Buttimer, A. and Seamon, D. (ed.) (1980): **The Human Experience of Space and Place**, Croonhelm, London.
5. Castree, R., Rogers A. and Sherman D. (2005): Q**uestioning Geography: Fundamental Debates**. Blackwell, Oxford.
6. Clifford, N.J. (2002): T**he Future of Geography: when the whole is less than the sum of its parts**, Geoforum, Vol. 33, 431-436.
7. Cresswell, T. (2014): **Geographic Thought: A Critical Introduction**, Blackwell, New York.
8. Dikshit, R.D. (2010): **Geographical Thought**, Prentice-Hall, New Delhi.
9. Haggett, P. and Cliff, A.D. and Frey, A. (1977): **Locational Analysis in Human Geography**, Arnold, London.
10. Hartshorne R. (1939): **The Nature of Geography**, AAG, New York.
11. Harvey, D. (1969): **Explanation in Geography**. Arnold, London.
12. Harvey, D. (1973): **Social Justice and the City**, John Hopkins University, Baltimore.
13. Holt-Jensen A. (1999): ***Geography– History and Concepts***, Sage, London.
14. Johnston, R., Gregory D., Pratt G., Watts, M. and Whatmore, S. (2009): **The Dictionary of Human Geography**, Blackwell, New York.
15. Johnston, R.J. and Sidaway, J.D. (2004): **Geography and Geographers**, Arnold, London.
16. Peet, R. (1998): **Modern Geographical Thought**, Wiley-Blackwell, New York.

M.Sc. Geography Semester I
Course - Quantitative Techniques in Geography
(SEE GEO 1 1 02 C 4105)

Credit – 5

Course Outline

Unit I

Geography and Statistics; Significance of Statistics in geographical studies; Types of Data; levels of data measurement. Sampling: basic concepts, sample units and design, sampling frame and procedures, standard error and sample size, testing the adequacy of samples.

Unit II

Measures of Central Tendency and their significance; Centrographic techniques: mean centre, median centre and standard distance.

Measures of dispersion and concentration: Range, quartile deviation, mean deviation, standard deviation; coefficient of variation, Lorenz Curve and Gini's Coefficient; location Quotient.

Unit III

Bivariate Analysis: Forms of relation and measuring the strength of association and relation-construction and meanings of scatter diagram; Spearman's Rank Difference and Karl Pearson's Product Moment Correlation Coefficients

Unit IV

Regression analysis- regression equations, construction of regression line-interpolation, prediction, explanation; residual-statistical tests of significance of the estimates; computation of residuals and mapping.

Hypothesis Testing: Needs and types of hypotheses-goodness of fit and significance and confidence levels-parametric and non-parametric procedures: contingency tables, Chi-square test, t-test, Mann-Whitney U test, Analysis of Variance (ANOVA)

Recommended Readings:

1. David, U. (1981): ***Introductory Spatial Analysis***, Methuen, London.
2. Ebdon, D. (1983): ***Statistics in Geography: A Practical Approach***, Blackwell, London.
3. Gregory, S. (1978): ***Statistical Methods and the Geographer*** (4th Edition), Longman, London.
4. Gregory, S. (1978): ***Statistical Methods and the Geographer***, Longman, London.
5. Gupta, S.P. (2010): **Statistical Methods**, Sultan Chand and Sons, Latest Edition.
6. Haggett, P., Andrew D. C., & Allan F. (1977): ***Location Methods***, Vols. I and II, Edward Arnold, London.
7. Hammond, R. and McCullagh, P.S. (1974), ***Quantitative Techniques in Geography: An Introduction***, Clarendan Press, Oxford.
8. John P. Cole and Cuchlaine, King, A. M. (1968): ***Quantitative Geography***, Wiley, London.
9. Johnston R. J. (1973): ***Multivariate Statistical Analysis in Geography***, Longman, London.
10. Mathews, J.A. (1987): ***Quantitative and Statistical Approaches to Geography*****,** Practical Manual, Pergamon, Oxford.
11. Pal, S.K. (1998): ***Statistics for Geoscientists; Techniques and Applications***, Concept Publishing, New Delhi.
12. Peter J. T. (1977): ***Quantitative Methods in Geography***, Houngton Mifflin, Boston.
13. Smith, D. M. (1975): ***Patterns in Human Geography***, Penguin, Harmonsworth.
14. Yeates, Mauris (1974): ***An Introduction to Quantitative Analysis in Human Geography***, McGraw Hill, New York.

M.Sc. Geography Semester - I
Course - Geomorphology (SEE GEO 1 1 03 C 4105)

Credit – 5

Course Outline

Unit I

Concepts and Approaches: Fundamental Concepts, Concepts of time: cyclic, graded and steady state, concept of morphogenetic regions, concept of dynamic equilibrium, approaches in geomorphology, recent trends in geomorphology

Unit II

Geomorphic Processes and Landforms: Earth movements, Plate Tectonic and Sea floor Spreading, Weathering and Mass Movements, Dynamics of fluvial, glacial, aeolian, marine, and karst processes; Landforms: Climatic, Tectonic, Erosional and depositional Landforms

Unit III

Theories and Techniques: Theories of Hill slope evolution, Erosion surfaces; Systems in geomorphology; Models in geomorphology

Unit IV

Applied Geomorphology: nature and objectives, geomorphic hazards and mitigation measures, Application of geomorphological knowledge in mining, constructions and other human activities

Recommended Readings:

1. Bloom, A.L. (1992): ***Geomorphology***, Second Edition, Prentice Hall of India, New Delhi.
2. Chorley, R.J. (1972): ***Spatial Analysis in Geomorphology***, Methuen, London.
3. Cooke, R.U. and Doornkamp, J.C. (1974): ***Geomorphology in Environmental Management—An Introduction***, Clarendon Press, Oxford.
4. Dayal, P. (1990): ***A Text Book of Geomorphology***, Shukla Book Depot, Patna.
5. Dury, G.H. (1959): ***The Face of the Earth***, Penguin, Harmondsworth.
6. Fairbridge, R.W. (1968): ***Encyclopedia of Geomorphology***, Reinholdts, New York.
7. Husain, M. (2002): ***Fundamentals of Physical Geography***, Second Edition, Rawat Publications, Jaipur.
8. McKnight, T. L. (1987): ***Physical Geography: A Landscape Appreciation*****,** Second Edition, Prentice Hall, New Jersey.
9. Olliver, C.D. (1979): ***Weathering***, Longman, London.
10. Pitty, A.F. (1971): ***Introduction to Geomorphology***, Methuen, London.
11. Sharma, H.S. (ed.) (1980): ***Perspectives in Geomorphology***, Concept, New Delhi.
12. Singh, S. (1993): ***Physical Geography*****,** Prayag Pustak Bhawan, Allahabad.
13. Singh, S. (1998): ***Geomorphology***, Prayag Pustak Bhawan, Allahabad.
14. Skinner, B.J. & Porter, S.C. (1995): ***The Dynamic Earth***, John Wiley, New York.
15. Sparks, B.W. (1960): ***Geomorphology***, Longman, London.
16. Stoddart, D.R. (ed.) (1996): ***Process and Form in Geomorphology***, Routledge, New York.

17. Strahler, A.H. and Strahler, A.N. (2006): ***Modern Physical Geography***, Fourth Edition, Willey-India, New Delhi.
18. Strahler, A.N. (1988): ***Earth Sciences***, Harper & Row, New Delhi.
19. Thornbury, W.D. (1991): ***Principles of Geomorphology***, (Indian Reprint), John Wiley, New Delhi
20. Wooldridge, S.W. and Morgan, R.S. (1991): ***An Outline of Geomorphology***, Orient Longmans, Calcutta.

M.Sc. Geography Semester - I

Course:

Practical I: Interpretation of Topographical Sheets and Morphometric Analysis

(SEE GEO 1 1 04 C 2125)

Credit - 5

Course Outline

Unit I

Toposheet Interpretation: Basic information on Topographical sheets, Preliminary information, Conventional Signs, Interpretation of Relief, Drainage, Settlements, Land-use, Vegetation and Transport network on Toposheets (at least 12 Exercises).

Unit II

Morphometric Analysis of Drainage basin- its geographical significance; Basin morphometry of fluvially originated drainage basin

Linear Aspects: Stream ordering based on Horton and Strahler, Bifurcation ratio

Areal Aspects: Geometry of basin shape, Basin Perimeter, Length and Area, Stream frequency and Drainage density.

Relief Aspects: Hypsometric analysis- Hypsometric curve and Integral Hypsometric curve, Clinographic analysis, Altimetric analysis,

Slope Analysis- Average Slope (Wentworth's method), Relative Relief (Smith's method), Dissection Index,

Profile Analysis - Longitudinal profile

Recommended Readings:

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 Mannual**, 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. Yadav, H.L. (2002): ***Prayogatamak Bhoogol Ke Aadhar***, Radha Publications, New Delhi.

M.Sc. Geography Semester I
Course - Population and Development (SEE GEO 1 1 01 GE 3104)

Credit - 4

Course Outline

Unit I

Conceptual Frame: Population as resource; Population and development: a debate; Population and ecosystem; Demographic transition.

Unit II

Historical Background and Characteristics: History of human population; Relationship between population, food and energy; Debate on The Limits to Growth; Population characteristics: developed and developing countries (case study of India).

Unit III

Problems and Policies: Optimum population; Family welfare and planning; Population policies in developed and developing countries (case study of India).

Unit IV

Population-Development Conflict: Concepts of rich and poor worlds and their global perspectives; Neo-Malthusian theory; Future perspectives: Growth scenario and relationship with development.

Recommended Readings:

1. Champion, T. (ed.) (1993): **Population Matters**. Paul Chapman, London.
2. Ehrlich, P.R. and Ehrlich, A.H. (1996): **Eco-science: Population, Resources and Environment**., W.H. Freeman and Company, San Francisco.
3. Firor, J. and Jacobsen, J. E. (2003): **The Crowded Greenhouse: Population, Climatic Change and Creating a Sustainable World**. Universities Press, Hyderabad.
4. Haggett, P. (2001): **Geography, A Modern Synthesis**. Harper & Row, New York.
5. Hammett, C. (eds.) (1996): Social Geography: A Reader, Arnold, London.
6. Meadow, D.H., Meadows D.L., Randers J., and Behrens W.W. III. (1973): **The Limits to Growth. I Report of the Club of Rome**. The New American Library, New York.
7. Meadows, D.H., Meadows, D.L. and Randers, J. (1992): **Beyond the Limits - Confronting Global Collapse, Envisioning a Sustainable Future. (A sequel to The Limits to Growth)**. Chelsa Green Publishers, Post Mills VT, USA.
8. Mesarovic, M. and Pester, E. (1974): **Mankind at the Turning Point. II Report of the Club of Rome.** The New American Library, New York.
9. Middleton, N. and O'Keefe, P. (2001): **Redefining Sustainable Development,** Pluto Press, London.
10. Ross, J. A. (ed.) (1982): **International Encyclopaedia of Population,** Free Press, New York.
11. Sharma, P.R. (ed.) (1991): **Perspectives on the Third World Development**. Rishi Publications., Varanasi.
12. Simon, J.L. (1977): **The Economics of Population Growth,** Princeton University Press, Princeton.

13. Thakur, B. (ed.) (2004): **Population, Resources and Development**. Vol. II, Perspectives in Resource Management in Developing Countries. Concept, New Delhi.
14. Tinbergen, J. (1976): **RIO. Reshaping the International Order. III Report of the Club of Rome**. The New American Library, New York.

M.Sc. Geography Semester I
Course - Biogeography (SEE GEO 1 1 02 GE 3104)

Credit - 4

Course Outline

Unit I
Biogeography– Development and scope; Biosphere- definition, nature and composition; Environment, Habitat and Plant-animal association.

Unit II
Biogeochemical cycles - the hydrological cycle, the carbon cycle, the oxygen cycle, the nitrogen cycle, the phosphorous cycle and the sediment cycle.

Unit III
Ecosystem - Meaning, types, components and functioning of ecosystem; Evolution of living organism and factors influencing their distribution on the earth; Biomes- Meaning and types.
Elements of plant geography, distribution of forests and major communities; Plant successions in newly formed landforms; National Forest Policy of India; Conservation of Biotic Resources.

Unit IV
Bio-geographical realms: Zoogeography and Zoogeographical realms; Zoogeography and its Environmental Relationship; Palaeo-botanical and Palaeo-climatological records of environmental change in India.

Recommended Readings:

1. Agarwal, D.P. (1992): ***Man and Environment in India through Ages***, Books & Books, New Delhi.
2. Bradshaw, M.J. (1979): ***Earth and Living Planet***, ELBS, London.
3. Cox. C.D. and Moore, P.D. (1993): ***Biogeography: An Ecological and Evolutionary Approach*** (Fifth Edition), Blackwell.
4. Gaur, R. (1987): ***Environment and Ecology of Early Man in Northern India***, R.B. Publication, New Delhi.
5. Hoyt, J.B. (1992): ***Man and the Earth***, Prentice Hall, U.S.A.
6. Huggett, R.J. (1998): **Fundamentals of Biogeography**, Routledge, New York.
7. Illics, J. (1974): ***Introduction to Zoogeography***, Mcmillian, London.
8. Khoshoo, T.N. and Sharma, M. (ed.) (1991): ***Indian Geosphere- Biosphere,*** Har-Anand Publication, Delhi.

9. Lapedes, D.N. (ed.) (1974): **Encyclopedia of Environmental Science**, McGraw Hill, New York.
10. Mathur, H.S. (1998): ***Essentials of Biogeography***, Anuj Printers, Jaipur.
11. Pears, N. (1985): ***Basic Biogeography***. 2nd ed., Longman, London.
12. Simmon. I.G. (1974): ***Biogeography, Natural and Cultural***, Longman, London.
13. Tivy, J. (1992): ***Biogeography: A Study of Plants in Ecosphere*****,** 3rd Edition. Oliver and Boyd, U.S.A.

Semester II

M.Sc. Geography Semester - II

Course - Climatology (SEE GEO 1 2 05 C 4105)

Credit – 5

Course Outline

Unit I

Nature and Scope of Climatology, Climatic elements – atmospheric temperature, pressure, moisture: forms of condensation and precipitation, general atmospheric circulations and processes, jet stream.

Unit II

Weather system and disturbances – Concept of atmospheric stability, Air mass, fronts, Cyclones, Tornades; Ocean atmospheric interaction- EI Nino, ENSO, Monsoon winds (case study of India).

Unit III

Global climate system – Approaches to climatic classification; Classification of Koppen, and Thornthwaite, Major climates of the world – tropical, Temperate and polar.

Unit IV

Climatic changes – evidences, causes, global warming, Impact of Global Warming.

Recommended Readings:

1. Menon, P.A. (1989), ***Our Weather***, N.B.T., New Delhi.
2. Das, P.K. (1987), ***Monsoons,*** National Book Trust, New Delhi.
3. Fein, J.S. and Stephens, P.N. (1987), ***Monsoons,*** Wiley, London.
4. Peterson, S. (1969), ***Introduction to Meteorology***, McGraw Hill Book, London.
5. Thompson, R.D. and Perry, A. (ed.) (1997), ***Applied Climatology: Principles and Practice,*** Routledge, London.
6. Barry, R.G. and Chorely, R.J., (2004), **Atmosphere, Weather and Climate**, Methuen, London.
7. Bhutani S., (2000), **Our Atmosphere**, Kalyanai Publishers, New Delhi.
8. Critchfield, H.J. (1987), **Climatology**, Prentice Hall, New Delhi.
9. Griffith, J.F. and Driscell, D.M. (1982), **Survey of Climatology**, Charles Merril, New York.
10. Lal, D.S. (1993), **Climatology**, Chaitanya Publishing House, Allahabad.
11. Riehl, H. (1968), **Introduction to Atmosphere**, McGraw Hill, New York.
12. Robinson, P.J. and Sellers, H. (1986), **Contemporary Climatology**, Longman, London.
13. Trewartha, G.T. (Latest edition) **Introduction to Climate**, McGraw Hill, New York.

M.Sc. Geography Semester - II
Course: Contemporary Human Geography (SEE GEO 1 2 06 C 4105)

Credit - 5

Course Outline

Unit I

Introduction to Human Geography: changing views, concerns and deliberations. Human Geography and Social perspectives: Analytical understanding of social theory and human Geography

Unit II

Space and place: Format of space, changes in space; comparative structure of space and place; social development of space and time; Ethics of space and place

Unit III

Geography of difference and separation: Geographies of identity and difference related to class, religion, caste, gender and location; social justice and political geography of difference.

Geographic system of power: Spatial meaning and definitions of power; changing spatio-social interactions and power; geopolitics of power-territoriality and globalization

Unit IV

Geography of progress: meaning, definitions and approaches; construction of progress indicators; linking globalisation and new types of development; local efforts towards progress.

Geography of movements: logic and ways to social movements; forms of social security; social-environmental movements in India.

Recommended Readings:

1. Agnew, J.A and Corbridge, S. (1995): ***Masterering Space: Hegemony, Territory and International Political Economy***. Routledge, London.
2. Allen J. S. & Gioacchino G. (2007): ***Development on the Ground.*** Rutledge, London.
3. Benko, G. and Strohmayer, U. (1997): *Sp**ace and Social Theory: Interpreting Modernity and Postmodernity**,* Blackwell, London.
4. Bhabha, H. (1994): ***The Location of Culture.*** Routledge, New York.
5. Callinicos, A. (1999): ***Social Theory: A Historical Introduction***. Quality press, Cambridge.
6. Corbridge, S., Martin, R. and Thrift, N. (1997): ***Money, Power and Space***, Blackwell, Oxford.
7. Derek, G., Martin, R., and Smith, G. (1994): ***Human Geography: Society, Space and Social Science***. Macmillan publishers, Cambridge.
8. Diani, M. (1992): **The concept of social movement**. *The Sociological Review*, Vol. 40.
9. Harvey, D. (1996): ***Justice, Nature and Geography of Difference*****,** Blackwell Publishers, Cambridge.
10. Heilbron, J. (1995): ***The Rise of Social Theory***. Cambridge University Press. Cambridge.
11. Johnston, R.J. (1991): ***A Question of Place: Exploring the Practice of Human Geography***. Blackwell, New York.

M.Sc. Geography Semester - II
Course - Advanced Geography of India (SEE GEO 1 2 07 C 4105)

Credit – 5

Course Outline

Unit I
Introduction: Geological structure and Physiographic Regions, Drainage Systems, Climatic Characteristics, Natural Vegetation and Soil

Unit II
Agriculture: nature, problems and prospects; Infrastructure: irrigation, power, fertiliser, HYV seeds and farm technology; Green revolution and its socio-economic and ecological implications; Recent trends in agriculture
Industry: New industrial policy: Globalisation and liberalisation; Industrial complexes and industrial regions

Unit III
Growth, distribution and density of population; Population characteristics and composition (Literacy, Sex, Age, work structure, etc.); Population problems and policies

Unit IV
Contemporary Issues: Environmental Pollution and degradation, Regional Disparities in regional Development, globalization and Indian Economy, Development of transport and Information technology and its impact on society and economy

Recommended Books:

1. Centre for Science & Environment (1988): ***State of India's, Environment***, New Delhi.
2. Deshpande, C.D. (1992): ***India: A Regional Interpretation***, ICSSR & Northern Book Centre, New Delhi.
3. Dreze, J. & Sen A. (ed.) (1996): ***India's Economic Development and Social Opportunity,*** Oxford University Press, New Delhi.
4. Gautam, A. (2009): ***Advanced Geography of India,*** Second Edition, Sharada Pustak Bhawan, Allahabad.
5. Husain, M. (2008): ***Geography of India,*** Tata McGraw-Hill, New Delhi.
6. Khullar, D.R. (2006): ***India: A Comprehensive Geography***, Kalyani Pub., New Delhi.
7. Kundu A. and Raza, M. (1982): ***Indian Economy: The Regional Dimension***. Spectrum Publishers, New Delhi.
8. Robinson, F. (1989): ***The Cambridge Encyclopedia of India, Pakistan, Bangladesh, Sri Lanka, Nepal, Bhutan & Maldives,*** Cambridge University Press, London.
9. Singh R.L. (ed.) (1971): ***India-A Regional Geography,*** National Geographical Society of India, Varanasi.
10. Spate, O.H.K. & Learmonth, A.T.A. (1967): ***India & Pakistan***, Methuen, London.
11. Tirtha R. & Krishan, G. (1996): ***Emerging India***, Rawat, Jaipur.
12. Tiwari, R.C. (2010): ***Geography of India,*** Prayag Pustak Bhawan, Allahabad.

M.Sc. Geography Semester - II
Course - Practical II: Field Work and Report Writing
(SEE GEO 1 2 08 C 2125)

Credit – 5

Course Outline

Unit I

Sources of data; Collection of primary data: methods of primary data collection – observation method, interview method, through questionnaire, through schedule and other methods; questionnaire and schedule; processing and analysis of data.

Unit II

Field work and report writing: Identification of research problem; preparing research design; data collection through field visit; Report writing.

Recommended Readings:

1. Dey, I. (1993): **Quantitative Data Analysis**, Routledge, London.
2. Eyles, J. and David M.S. (1988): **Qualitative Methods in Human Geography**, Polity Press, Oxford.
3. Gupta, S.P. (2010): **Statistical Methods**, Twenty Fifth Edition, Sultan Chand & Sons, New Delhi.
4. Kidder, L.H. (1981): **Research Methods in the Social Relations**, Fourth Editions, Hault-Saunders International Editions.
5. Kitchin, R. and Nicholas J.T. (2002): **Conducting Research in Human Geography**, Prentice Hall, London.
6. Krishnaswamy, and Ranganatham (2005): **Methodology of Research in Social Sciences**, Himalayan Publishing House, New Delhi.
7. Limb, M. and Claire D. (2001): **Qualitative Methodologies for Geographers**, Arnold, London.
8. Robinson, G.M. (1998): **Methods and Techniques in Human Geography**, John Wiley, New York.
9. Sadhu, A.N. and Singh, A. (1983), **Research Methodology in Social Sciences**, Second Edition, Himalayan Publishing House, New Delhi.
10. Scale, Clive (ed.) (2008): **Social Research Methods**, (India Edition), Routledge, London.
11. Somekh, B. and Cathy L. (eds.) (2005): **Research Methods in the Social Sciences**, Vistaar Publications, New Delhi.
12. Tondon, B.C. (1979): **Research Methodology in the Social Sciences**, Chaitanya Publishing House, Allahabad.

M.Sc. Geography Semester - II
Course - Practical III: Computer Aided Statistical Diagrams and Data Processing
(SEE GEO 1 2 03 GE 2024)

Credit – 4

Course Outline

Unit I

Introduction to computer: Components of Computer - Hardware and Software); Use of Computers in Geography. Introduction to MS-Excel : Drawing of line graph, Bar Diagram, Pie diagram, Scatter diagram, (changes from colour to different shade patterns, placement of Legend, different weight to X and Y coordinates, Placement of Headings and Sub-headings, Font Size, Style, Bold and Italics.

Unit II

Data Processing: Students are required to learn data analysis using any software preferably SPSS (Statistical Package for Social Sciences). They are expected to learn statistical methods and techniques through computer.

SPSS: Introduction, managing Data, frequencies and cross tabulation, Graphs, Central Tendencies, Measures of Distribution, Measures of Asymmetry, Estimation and Hypothesis Testing, Statistical Dependence, Correlation and Regression

Recommended Readings:

1. Etheridge, D. (2010): ***Excel Data Analysis,*** Wiley, New York
2. Field, A. (2013): ***Discovering Statistics using IBM SPSS Statistics,*** Sage Publication.
3. http://**www.pearsonhighered.com**/george/SPSS_21_Step_by_Step_Answers_to_Selected_Exercises.pdf
4. Khullar, D.R. (2001): ***Essentials of Practical Geography***, Second Edition, New Academic Publishing Co., Jalandhar.
5. Landau, S. and Everitt B.S. (2004): ***A Handbook of Statistical Analyses using SPSS***, Chapman & Hall, London
6. Linoff, G.S. (2007): ***Data Analysis Using SQL and Excel***, Wiley, New York
7. Sharma, J.P. (1996): ***Prayogik Bhoogol***, Rastogi Publications, Meerut.
8. Singh, R.L. (1979): ***Elements of Practical Geography***, Kalyani Publishers, New Delhi.

M.Sc. Geography Semester - II
Course - Urban Geography (SEE GEO 1 2 01 DCEC 3104)

Credit – 4

Course Outline

Unit I

Urban Geography - Definition, nature and scope; different approaches and recent trends in urban geography; Origin and growth of urban places; classification of urban settlements, Aspects of urban places: Location, site and situation; Major processes of urban growth and change; Urban economic base: Basic and non-basic functions

Unit II

Urban Systems: Concept of National Urban System, Central Place Theory of Christaller and Losch; the rank-size distribution of cities; Primate City distribution, Diffusion theories

Organization of urban space: urban morphology and land use structure, city-region relations, urban sprawl, umland and periphery; rural-urban fringe, Theories of city structure (Burgess, Hoyt, Harris and Ullman, Mann, White)

Unit III

Urbanization: definition and measures of urbanization, factors affecting urbanization, cycle of urbanization; Regional aspects of world urbanization; Patterns and trends of urbanisation in India.

Unit IV

Contemporary urban issues: urban poverty; urban renewal; slums; transportation; housing; urban infrastructure; urban finance; environmental pollution; urban crime

Urban policy and planning: Concept and History of urban planning, urban land use planning, Urban Policy and programmes in India.

Recommended Readings:

1. Alam, S.M. (1964): **Hyderabad-Secunderabad Twin Cities**, Asia Publishing House, Bombay.
2. Bala, R. (1986): **Urbanisation in India**, Rawat, Jaipur.
3. Bansal, S.C. (2010): **Urban Geography**, Meenakshi Prakashan, Meerut.
4. Berry, B.J.L. and Horton F.F. (1970): **Geographic Perspectives on Urban Systems**, Prentice Hall, New Jersey.
5. Cadwallader, M. (1986): **Urban Geography**, Prentice Hall, New Jersey.
6. Carter, H. (1995): **The Study of Urban Geography** (4th Edition), Arnold, London.
7. Chorley, R.J. and Haggett, P. (1966): **Models in Geography**, Methuen, London.
8. Dickinson, R.E. (1964): **City and Region**, Routledge, London.
9. Dwyer, D.J. (1971): **The City as a Centre of Change in Asia**, University of Hong Kong Press, Hongkong.
10. Hall P. (1992): **Urban and Regional Planning**, Routledge, London.
11. Hauser, P.M. and Schnore L.F. (ed.) (1965): **The Study of Urbanisation**, Wiley, New York.
12. James, P.E. and Jones C.F. (ed.) (1954): **American Geography: Inventory and Prospect**, Syracuse University Press, Syracuse.
13. Kundu, A. (1992): **Urban Development and Urban Research in India**, Khanna Publication, New Delhi.

14. Mayer, H.M. and Kohn, C.F. (ed.) (1958): **Readings in Urban Geography**, University of Chicago Press, Chicago.
15. Mumford, L. (1958): **Culture of Cities**, McMillan, London.
16. Nangia, S. (1976): **Delhi Metropolitan Region: A Study in Settlement Geography**, Rajesh Publication, New Delhi.
17. Pacione, M. (2010): **Urban Geography- A Global Perspective**, Routedge, London.
18. Prakasa Rao, V.L.S. (1979): **The Structure of an Indian Metropolis: A Study of Bangalore**, Allied Publishers, Bangalore.
19. Prakasa Rao, V.L.S. (2003): **Urbanisation in India: Spatial Dimensions**, Concept, New Delhi.
20. Ramachandran, R. (1989): **Urbanisation and Urban Systems in India**, Oxford, New Delhi.
21. Rao, B.P. and Sharma, N. (2001): **Urban Geography** (Hindi Edition), Vasundhra Prakashan, Gorkhpur.
22. Singh, K. and Steinberg, F. (ed.) (1998): **Urban India in Crisis**, New Age International, New Delhi.
23. Smailes, A.E. (1953): **The Geography of Towns**. Hutchinson, London.
24. Tewari, V.K., Weinstein, J.A.; Prakasa Rao, V.L.S. (ed.) (1986): **Indian Cities: Ecological Perspectives**, Concept, New Delhi.

M.Sc. Geography Semester - II
Course - Natural Resource Management (SEE GEO 1 2 02 DCEC 3104)

Credit – 4

Course Outline

Unit I

Nature, scope and significance of the Geography of Resource, Definition and concept of Resources, Classification of Resources

Unit II

Models of Natural Resources Process: Zimmermann's Primitive and Advance Models of natural resource process, Kirk's Decision Model, Brookfield System Model.

Unit III

Use and Misuse of Resources: Soil Resource, Water Resource, Forest Resource and Mineral Resources, Future prospects of Natural resources

Unit IV

Conservation and Management of Natural Resources: Meaning and Concept of conservation of Natural Resources, Resources Conservation and Management Methods of Natural resources: Soil Resource, Water Resource, Forest Resource and Mineral Resources, Problems of Natural Resource Management in India.

Recommended Readings:

1. Borton, I. and Kates, R.W. (1984): **Readings in Resource Management and Conservation**, University of Chicago Press, Chicago.
2. Bruce, M. (1989): **Geography and Resource Analysis**, John Wiley, New York.
3. Eliot Hurst, M.E. (1972): **A Geography of Economic Behaviour: An Introduction**, Duxbury Press, California.
4. Guha, J.L. and Chattroj, P.R. (1994): **Economic geography- A Study of Resources**, The World Press, Calcutta
5. Martino, R.L. (1969): **Resource Management**, McGraw Hill, London.
6. Negi, B.S. (2000): **Geography of Resources**, Kedar Nath and Ram Nath, Meerut.
7. Owen, O.S., (1971), **Natural Resource Conservation: A Ecological Approach**, McMillion, New Delhi.
8. Raja, M. (1989): **Renewable Resource Development**, Concept, New Delhi.
9. Ramesh, A. (1984): in **Resource Geography** (Ed.) R.P. Misra, Contribution to Indian geography, Heritage Publishers, New Delhi.
10. Singh, A. and Raja, M. (1982): **Geography of Resources and conservation** (Hindi Edition) Pragati Parkashan, Meerut.
11. Zimmermann, E.W. (1951): **World Resources and Industries**, Harper, New Delhi.

M.Sc. Geography Semester - II
Course - Hydrology and Water Resource Management
(SEE GEO 1 2 03 DCEC 3104)

Credit – 4

Course Outline

Unit I

Bases of Hydrology: Meaning, scope, approach and development of Hydrology; Hydrological cycle; Man's influence on the hydrological cycle; Precipitation types, characteristics and measurements; Interception; Evaporation: factors affecting evaporation from free water surface and soil; Evapotranspiration: estimation and its control

Unit II

Water and Its Disposition. Soil moisture and its zones; Infiltration; Groundwater: occurrence, storage, recharge and discharge; Runoff: its sources and components, factors affecting runoff; River regimes; floods and droughts; Hydrograph: components and separation, water balance: measures and time-space characteristics

Unit III

Water as a resource: Factors affecting water resources development, Water Resource Problems: water demand and supply, water quality, interstate water disputes, institutional and financial constraints, eco-hydrological consequences of environmental degradation

Unit IV

Water Resource Management: social and institutional considerations in water management, water quality management and Pollution control, water management in urban areas, watershed management, conjunctive use of surface and ground water

Recommended Readings:

1. Abbas, B.M. (1982): **The Ganges Water Dispute**, Vikas Publishing House, New Delhi.
2. Aggarwal, A. (1991): **Floods, Floodplains and Environmental Myths**, Centre for Science and Environment, New Delhi.
3. Andrew. D.W. and Stanley, T. (2004): **Environmental Hydrology**, 2nd edition, CRC Press, Allahabad.
4. Bhattacharya, S.K. (1988): **Urban Domestic Water Supply in Developing Countries**, CBS Publishers & Distributors, Delhi.
5. Bilas, R. (1988): **Rural Water Resource Utilization and Planning**. Concept, New Delhi.
6. Brutsaert, W. (2005): **Hydrology: An Introduction**, Cambridge University Press.
7. Davie, T. (2008): **Fundamentals of Hydrology**, Routledge, London.
8. Karanth, K.R. (1988): **Ground Water: Exploration, Assessment and Development**, Tata-McGraw Hill, New Delhi.
9. Mahajan, G. (1989): **Evaluation and Development of Groundwater**, Ashish Publishing House, New Delhi.
10. Palanisami, K. (1984): **Integrated Water Management: The Determinants of Canal Water Distribution in India: A Micro Analysis**, Aricole, New Delhi.

11. Rai, V.K. (1993): **Water Resource Planning and Development**, Deep & Deep Publication, New Delhi
12. Ramaswamy, C. (1985): **Review of floods in India during the past 75 years: A Perspective**. Indian National Science Academy, New Delhi.
13. Rao, K.L. (1982): **India's Water Wealth,** 2nd edition, Orient Longman, Delhi,.
14. Reddy, J.P. (1988): **A Textbook of Hydrology**. Laxmi Publication, New Delhi.
15. Singh, M.B. (1999): **Climatology and Hydrology**. Tara Book Agency, Varanasi. (In Hindi).
16. Singh, V.P. (1995): **Environmental Hydrology,** Kluwar Academic Publications, The Netherlands.
17. Todd, D.K. (1980): **Groundwater Hydrology**. John Wiley, New York.
18. Ward, R.C. and Robinson, M. (2000): **Principles of Hydrology**. McGraw Hill, New York.
19. Warren Viessman Jr. and Gary L. Lewis, (2002): **Introduction to Hydrology**, Prentice Hall, New York

Semester III

M.Sc. Geography Semester - III

Course - Interdisciplinary Research Methods and Techniques

(SEE GEO 1 3 09 C 4105)

Credit – 5

Course Outline

Unit I

Introduction to research in Geography: Concept and significance of research in geography; Philosophy and methods; Naturalism and anti-naturalism; realism and idealism.

Unit II

Scientific Research; Inductive and deductive approaches; Research design; Formulation of research problem; Development and testing of hypothesis; Techniques of data collection; Sampling and field survey.

Unit III

Qualitative research: Qualitative research design; Case study; Ethnography; Phenomenology and participatory research.

Unit IV

Data Analysis, interpretation and report writing: Data classification and tabulation; Data analysis and interpretation; Writing thesis, project report and research paper. Scientific journals (impact factor, citation), Ethics in scientific research

Recommended Readings:

1. Ahuja, R. (2001): **Research Methods**, Rawat, New Delhi.
2. Bhattacharyya, D. K. (2005): **Research Methodology**, Excel Books, New Delhi
3. Blackburn, J. and Holland, J. (ed.) (1998): **Who Changes? Institutionalising Participation in Development.** IT Publications, London.
4. Blaxter, L., Hughes, C. and Tight, M. (1996): **How to Research**. Open University Press, Buckingham.
5. Crang, Mike 1999. **Cultural Geography**. Routledge, London.
6. Daniels, P., Bradshaw, M., et al. (2000): **Human Geography: Issues for the 21st Century**. Prentice Hall, London, Indian reprint, 2003.
7. Denzin, N. K. and Lincoln, Y.S., (eds.) (2000): **Handbook of Qualitative Research**, Sage London.
8. Dikshit, R. D. (2003): **The Art and Science of Geography: Integrated Readings**. Prentice-Hall, New Delhi.
9. Dorling, D. and Simpson, L. (ed.) (1999): **Statistics in Society**. Edward Arnold, London.
10. Eyles J. and Smith D. M. (1988): **Qualitative Methods in Human Geography**, Polity Press, Cambridge.
11. Fisher, P. and Unwin, D., (ed.) (2002): **Virtual Reality in Geography**. Taylor & Francis, London.
12. Flowerdew, R. and Martin, D. (ed.) (1997): **Methods in Human Geography: A Guide for Students Doing a Research Project**. Longman, Harlow.
13. Gomez, B. and Jones, J. P. III (2010): **Research Methods in Geography: A Critical Introduction**, John Wiley, New York.

14. Goudie, A. (Ed) (2004): **Encyclopedia of Geomorphology**, Routledge, London.
15. Gregory, D., Johnston, R., Pratt, G., Watts, M. and Whatmore, S. (2009): **The Dictionary of Human Geography**, Wiley-Blackwell, Singapore.
16. Hay, I. (ed.) (2000): **Qualitative Research Methods in Human Geography**. Oxford University Press, New York.
17. Henn, M., Mark W., and Nick F. (2006): **A Short Introduction to Social Research**, Vistaar Publications, New Delhi.
18. Kitchin, R. and Fuller, D., (2003): **The Academic's Guide to Publishing**, Vistaar Publications, New Delhi
19. Kitchin, R. and Tate, N., (2001): **Conducting Research into Human Geography. Theory, Methodology and Practice**. Prentice-Hall, London.
20. Limb, M. (2001): **Qualitative Methodologies for Geographers: Issue and Debates**. Edward Arnold, London.
21. Lofland, J. and Lofland, L.H. (1995): **Analysing Social Setting. A Guide to Qualitative Observation and Analysis**. Wadsworth, Belmont, CA.
22. Longley, P., Goodchild, M.F., Maguire, D. and Rhind, D. (1999): **Geographic Information Systems: Principles, Techniques, Management, Applications**. John Wiley, New York.
23. Mikkelsen, B. (2005): **Methods for Development Work and Research: A New Guide for Practitioners**. Sage, London.
24. Montello, D. and Sutton, P. (2013): **An Introduction to Scientific Research Methods in Geography and Environmental Studies**, Sage, London.
25. Warf, B. (Ed.) (2006): **Encyclopedia of Human Geography**, Sage Publications, London.

M.Sc. Geography Semester - III
Course - Fundamentals of Remote Sensing and GIS
(SEE GEO 1 3 10 C 4105)

Credit – 5

Course Outline

Unit I

Fundamentals: Remote sensing: definition and scope; Electro-magnetic radiation, Remote sensing regions and bands; Spectral signature; Types of remote sensing

Unit II

Aerial Photographs and Satellite Imagery.: Aerial photos: types, scale, resolution; Geometric properties of aerial photos; Stereoscopy; Stereoscopic parallax; Relief displacement, General orbital characteristics of remote sensing satellites; General characteristics of remote sensing sensors; Characteristics of MSS, HRV, LISS; Characteristics of raw remote sensing data

Unit III

Interpretation and Application: Elements of image interpretation; Image processing techniques: Visual and digital; Remote sensing data: pre-processing operations, enhancements and classifications; Application of Remote Sensing

Unit IV

GIS: Definition, and Components, Geographical data: types and characteristics; Spherical and plane coordinate systems in GIS; geo-referencing, Digital representation of geographic data: Data structure, spatial data model, raster and vector models; GIS data standards: concepts and components; Integration of Remote sensing and GIS; GIS project design and planning methodologies; GIS data base management systems; Applications of GIS

Recommended Readings:

1. Girard, M.C. and Girard, C.M. (2003): **Processing of Remote Sensing Data**. Oxford, New Delhi.
2. Bhatta, B. (2010), **Remote Sensing and GIS**, Oxford University Press, New Delhi.
3. Bonham, Carter G.F. (1995): **Information Systems for Geoscientists – Modelling with GIS**. Pergamon, Oxford.
4. Burrough, P.A. and McDonnell, R. (1998): **Principles of Geographic Information Systems**. Oxford University Press, Oxford.
5. Campbell, J. B. (2002): **Introduction to Remote Sensing**. Taylor & Francis, London.
6. Chang, K.T. (2003): **Introduction to Geographic Information Systems**. Tata McGraw Hill, New Delhi.
7. Chauniyal, D.D. (2004): **Remote Sensing and Geographic Information Systems**. (in Hindi). Sharda Pustak Bhawan, Allahabad.
8. Cracknell, A. and Hayes, L. (1990): **Remote Sensing Year Book**, Taylor & Francis, London.
9. Curran, P.J. (1985): **Principles of Remote Sensing**, Longman, London.
10. Deekshatulu, B.L. and Rajan, Y.S. (ed.) (1984): **Remote Sensing**. Indian Academy of Science, Bangalore.

11. Demers, M.N. (2000): **Fundamentals of Geographic Information Systems**. John Wiley, Singapore.
12. ESRI (1993): **Understanding GIS**. Redlands, USA
13. Floyd, F. and Sabins, Jr. (1986): **Remote Sensing: Principles and Interpretation**, W.H. Freeman, New York.
14. Fraser Taylor, D.R. (1991): **Geographic Information Systems**. Pergamon Press, Oxford.
15. George, J. (2003): **Fundamentals of Remote Sensing**. Universities Press, Hyderabad.
16. Glen, E.M. and Harold, C.S. (1993): **GIS Data Conversion Handbook**. Fort Collins, Colorado.
17. Goodchild, M.F.; Park, B.O. and Steyaert, L.T. (ed.) (1993): **Environmental Modelling with GIS**. Oxford University Press, Oxford.
18. Guham, P.K. (2003): **Remote Sensing for Beginners**. Affiliated East-West Press, New Delhi.
19. Guptill, S.C., and Morrison, J.L. (1995): **Elements of Spatial Data Quality**. Elsevier, Oxford.
20. Hallert, B. (1960): **Photogrammetry**, McGraw Hill, New York
21. Harry, C.A. (ed.) (1978): **Digital Image Processing**, IEEE Computer Society, California.
22. Heywood, I. (2003): **An Introduction to Geographical Information Systems**. 2nd edition, Pearson, Singapore.
23. Hord, R.M. (1982): **Digital Image Processing of Remotely Sensed Data**, Academic Press, New York.
24. Leuder, D.R. (1959): **Aerial Photographic Interpretation: Principles and Application**. McGraw Hill, New York.
25. Lillesand, T.M. and Kiefer, R.W. (2000): **Remote Sensing and Image Interpretation.** John Wiley, New York.
26. Lo, C.P. and Yeung, A.K.W. (2002): **Concepts and Techniques of Geographic Information Systems**. Prentice Hall, New Delhi.
27. Longley, P. and Batty, M. (eds.) (1996): **Spatial Analysis: Modelling in a GIS Environment**. Geo-Information International, Cambridge.
28. Longley, P., Goodchild, M.F., Maguire, D. and Rhind, D. (1999): **Geographic Information Systems. Principles, Techniques, Management, Applications**. John Wiley, New York.
29. Maguirre, D.J.; Michael F.G. and David W. R. (1999): **Geographical Information Systems: Principles and Application**. Geo Information International, Vol. 2, Longman Publication, New York.
30. Martin, D. (1996): **Geographic Information Systems: Socio-economic Implications**. Routledge, London.
31. Michael F. G. and Karan K.K. (ed.) (1990): **Introduction to GIS.** NCGIA, Santa Barbara, California.
32. Nag, P. (ed.) 1992: **Thematic Cartography and Remote Sensing**, Concept, New Delhi.
33. Ralston, B. A. (2002): **Developing GIS Solutions with Map Objects and Visual Basic**, Thompson Learning, Singapore.
34. Reddy, M.A. (2001): **Textbook of Remote Sensing and Geographic Information Systems.** B. S. Publications., Hyderabad.
35. Reeves, R.G. (ed.) (1983): **Manual of Remote Sensing**, Vols. 1 & 2, American Society of Photogrammetry and Remote Sensing, Falls Church, Virginia.

36. Ripple, W. J. (ed.) (1989): **Fundamentals of Geographic Information Systems: A Compendium**. ASPRS/ ACSM, Falls Church.
37. Siddiqui, M.A. (2005): **Introduction to Geographical Information Systems**, Sharda Pustak Bhawan, Allahabad. (in Hindi)
38. Siegel, B.S. and Gillespie, R. (1985): **Remote Sensing in Geology**, John Wiley, New York.
39. Silver, M. and Balmori, D. (eds.) (2003): **Mapping in an Age of Digital Media**. Wiley, New York.
40. Spurr, R. (1960): **Photogrammetry and Photo Interpretation**, Roland Press, London.
41. Star, J. and Estes, J. (1990): **Geographic Information Systems – An Introduction**. Prentice-Hall, New Jersey.
42. Survey of India, (1973): **Photogrammetry**, Survey of India, Dehradun.
43. Swain, P.H. and Davis, S.M. (ed.), (1978): **Remote Sensing: The Quantitative Approach**. McGraw Hill, New York.
44. Worboys, M.F. (1995): **GIS: A Computing Perspective**. Taylor & Francis, London.

M.Sc. Geography Semester - III
Course - Practical IV: Interpretation of Aerial Photographs & Satellite Images and Thematic Mapping (SEE GEO 1 3 11 C 2125)

Credit – 5

Course Outline

Unit I

Stereo Vision Test, Determination of scale on an aerial photograph; Measurement of height of an object on single vertical aerial photograph; Parallax bar measurement and height determination; Preparation of stereogram, stereo-triplet and mosaic from aerial photographs.

Unit II

Interpretation of Aerial photographs: Identification, mapping and interpretation of Natural and Cultural features (at least two exercises), Interpretation of a Satellite Image (Landsat, LISS III, LISS IV, Cartosat etc.): Identification, mapping and interpretation of Natural and Cultural features (at least two exercises)

Unit III

Comparison of features on Panchromatic, True Colour and False Colour Composite images and Preparation of interpretation keys

Unit IV

Thematic Mapping with any Software: Geo-referencing; creation of PGDB, creation of shape files; on-screen digitization of polygons, points and lines and adding attributes, (at least one exercise each on Point, line and polygon features)

Recommended Readings:

1. Heywood, l., et al. (2002): ***Geographical Information Systems*** (Second edition), Pearson Education, Delhi.
2. Lillesand, T.M. and Kiefer, R.W. (2002): ***Remote Sensing and Image Interpretation***, John Wiley, New York.
3. Nag. P. and Kudrat M. (1998): ***Digital Remote Sensing***, Concept, New Delhi.
4. Rampal, K.K. (1999): ***Handbook of Aerial Photography and Interpretation***, Concept, New Delhi.
5. Robbert, G.R. et al. (ed.) (1981): ***Manual of Remote Sensing***, Fourth Edition, Vol. I & II, American Society of Photogrammetry, Falls Church, U.S.A.
6. Sabins, F.F. (1986): ***Remote Sensing-Principles and Interpretation***, Second Edition, WH Freeman, New York.
7. Sharma, J.P. (1996): ***Prayogic Bhoogol*****,** Rastogi Publicatoins, Meerut.
8. Wolf, Paul R. (1983): ***Elements of Photogrammetry,*** 2nd Ed., McGraw-Hill, New York.

M.Sc. Geography Semester - III
Course - Assignment based Seminar (SEE GEO 1 3 04 DCEC 0202)

Credit - 2

M.Sc. Geography Semester - III
Course - Geography of Natural Hazards and Disasters (SEE GEO 1 3 04 GE 3104)

Credit – 4

Course Outline

Unit I

Concept of Hazards, Risk, Vulnerability and Disaster. Types of Hazards: Natural (Tectonic Hazards – Earthquakes and Volcanoes; Hydrological Hazards – Floods and Droughts.

Unit II

Regional Dimension of Natural Hazards: Occurrence and Trends. (Tectonic Hazards – Earthquakes and Volcanoes; Hydrological Hazards – Floods and Droughts.

Unit III

Disaster Losses and Impact – Displacements, Livelihood. Economy and Infrastructure, and Health.

Unit IV

Mitigation and Management: Plans and Policies. Role of Remote Sensing, GIS and GPS in Disaster Management

Recommended Readings:

1. Allan, S., Adam, B. and Carter, C. (ed.), (2000): **Environmental Risks and the Media**, Routledge, London.
2. Ambala-Bertrand, J.M. (1993): P**olitical Economy of Large Natural Disasters: With Special Reference to Developing Countries**, Claredon Press, Oxford.
3. Blaikie, P., Cannon, T., Davis, I. (1994): **At Risk: Natural Hazards, People's Vulnerability, and Disasters**, Routledge, London.
4. Burton, I., Kates, R.W. and White, G.F., (1993): **Environment as Hazards**, 2nd edition, Guilford Press, New York.
5. Godschalk, D.R. et al. (1999): **Natural Hazard Mitigation Recasting Disaster Policy and Planning**, Island Press, Washington, D.C.
6. Hewitt, K., (1997): **Regions of Risk: A Geographical Introduction to Disasters**, Longman, London.
7. Hood, C. and Jones, D.K.C. (ed.): (1996), **Accident and Design: Contemporary Debates in Risk Management**, UCL Press, London.
8. Kasperson, J.X., Kasperson, R.E. and Turner, B.L. (1995): **Regions at Risk: Comparisons of Threatened Environments**, United Nation University Press, Tokyo.
9. Paraswamam, S. and Unikrishnan, P.V. (2013): **India Disaster Report**, Oxford University Press, New Delhi

10. Quarantelli, E.L. (ed.) (1998): **What is a Disaster? Perspective on the Question**, Routledge, London.
11. Schneid, T. and Collins, L. (1998): **Disaster Management and Preparedness**, Lewis Publishers, Washington DC.
12. Schneider, S.K. (1995): **Flirting with Disaster: Public Management in Crisis Situations**, M.E. Sharpe, New York.
13. Smith, K. (1996): **Environmental Hazards; Assessing Risk and Reducing Disaster**, Routledge, London.

M.Sc. Geography Semester - III
Course - Cultural Geography (SEE GEO 1 3 05 GE 3104)

Credit -4

Course Outline

Unit I

The Nature, Scope, approaches in Cultural Geography. The Historical development of cultural Geography. Themes in cultural Geography - The Cultural Region. Functional, Formal. Perceptual, Determinism and Possibilism

Unit II

Environment and Culture : Culture Areas & Cultural Realms of the world and its relationship with environment, Elements of cultural expressions. Folk Culture its Revival. Cultural Adaptation and Environmental perception

Unit III

Spatial structure. Focuses on similarities and differences of various cultures with respect to racial, ethnic, religious, linguistic, demographic, and organizational characteristics in Indian context

Unit IV

Human races, Habitat economy and Society of tribal groups. Racial Elements in India's Population; Tribes of India (Bhil, Gond, Toda, Naga); Tribes of World (Eskimo, Pigmy, Bushman); Patterns of popular Culture and Cultural fusion.

Recommended Readings:

1. Ahmad, A. (1999): **Social Geography**, Rawat Publication, New Delhi.
2. Dreze J. and Sen, A. (1996): **Economic Development and Social Opportunity**, Oxford University press, New Delhi.
3. Dubey, S.C., (1991): **Indian Society**, National Book Trust, New Delhi.
4. Erin H. Fouberg, Alexander B. Murphy, Harm J. de Blij, (2012): **Human Geography: People, Place, and Culture**. John Wiley, New York.
5. Gregory, D. and Larry, U.J. (ed.), (1985): **Social relations and Spatial Structures**, McMillan, London.
6. Haq, M. (2004): **Reflection on Human Development**. Oxford University Press, New Delhi.
7. Maloney, C. (1974): **People of South Asia**, Winston, New York.
8. Planning Commission (1981): **Report on Development of Tribal areas**. Government of India, New Delhi.
9. Rao, M.S.A. (1970): Urban Sociology in India. Orient Longman, Delhi.
10. Rao, S. (1958): **Personality of India: Pre and Proto Historic Foundation of India and Pakistan**, M.S. University, Baroda, Vadodara.
11. Schwartzberg J. (1978): **An Historical Atlas of South Asia**. University of Chicago Press, Chicago.
12. Sen, A. and Dreze J. (1996): **Indian Development: Selected Regional Perspectives**. Oxford University Press, New Delhi.
13. Smith, David, 1977, **Geography: A Welfare Approach**. Edward Arnold, London.
14. Sopher, D. (1980): **An Exploration of India**. Cornell University Press, New York.

M.Sc. Geography Semester - III
Course – Soil Geography (SEE GEO 1 3 06 GE 3104)

Credit – 4

Course Outline

Unit I
Introduction to soil geography and pedology, factors and Processes of soil formation and development; Soil Profile; Soil catena, podzolization, laterisation, calcification and gleezation and salinization

Unit II
Soil organisms, Physical and Chemical properties of soils

Unit III
Genetic and Taxonomic classification of soils, their characteristics and world patterns. Land capability classification, Evaluation of land and soil: Parametric and non-parametric systems, soil survey

Unit IV
Soil problems and management: Soil erosion and degradation. integrated soil and water management; Methods of Soil reclamation, quality enhancement and management

Recommended Readings:

1. Backman, H.O and Brady, N.C. (1960): ***The Nature and Properties of Soils***, McMillan, New York.
2. Basile, R.M. (1971): ***A Geography of Soils***, William C. Brown, Dubuque, Ia.
3. Bennet, Hugh H. (1981): ***Soil Conservation***, McGraw Hill, New York.
4. Bunting, B.T. (1973): ***The Geography of Soils***, Hutchinson, London.
5. Clarke, G.R. (1957): ***Study of the Soil in the Field***, Oxford University Press, Oxford.
6. De, N.K. and Ghos, P. (1993): ***India: A Study in Soil Geography***, Sribhumi Publishing Co., Calcutta.
7. Foth, H.D. and Turk, L.M. (1972): ***Fundamentals of Soil Science***, John Wiley, New York.
8. Gardiner, J. S. (1977), ***Physical Geography***, Harper's College Press, New York.
9. Rajan, G.S.V. and Rao G.H.G. (1978): ***Studies on Soils of India***, Vikas, New Delhi.
10. Khan T.O. (2013): **Soil: Principles, Properties and Management**, Springer, New York
11. McBride, M.B. (1999): ***Environmental Chemistry of Soils***, Oxford University Press, New York.
12. Mcknight, T.L. (1987): ***Physical Geography: A Landscape Appreciation*** *(2nd Ed.)*, Prentice Hall, Englewood Cliffs, N.J.
13. Nye, P.H. and Greene, D.J. (1960): ***The Soil under Shifting Cultivation*** Commonwealth Bureau of Soil Science, Technical Communication, No. 51; Harpender, England.
14. Raychoudhuri, S.P. (1958): ***Soils of India***, ICAR, New Delhi.
15. Russell, E.J. (1961): ***Soil Conditions and Plant Growth***, Wiley, New York.
16. Steila, D. (1976): ***The Geography of Soils***, Prentice Hall, New Jersey.

M.Sc. Geography Semester - III
Course - Population Geography (SEE GEO 1 3 05 DCEC 3104)

Credit – 4

Course Outline

Unit I
Concepts, scope and methodology of population geography; Sources of population data with particular reference to India, concept of Human Development

Unit II
Theories of Population: Pre-Malthus, Malthusian and Modern Theories

Unit III
Population dynamics: Measurement, theories, trend and pattern of Fertility, Mortality and Migration

Unit IV
(i) Population Profile of World and India: Population Distribution and Characteristics
(ii) Population issues, problems, and Policies - Population and Resource; Population resource regions; Population and Environment

Recommended Readings:

1. Beaujen- Garnier, J. (1966): ***Geography of Population***, Longman, London
2. Bhende, A. and Kanitkar, T. (2006): ***Principles of Population Studies***, latest Edition, Himalaya Publishing House, Mumbai.
3. Bilasborrow, R.E. and Daniel H. (1999): ***Population and Deforestation in the Humid Tropics***, International Union for the Scientific Study of Population, Belgium.
4. Bogue, D.J. (1969): ***Principles in Demography***, John Wiley, New York.
5. Bose, A. *et al*. (1974): ***Population in India's Development (1947-2000),*** Vikas Publishing House, New Delhi.
6. Chandana, R.C. (2008): ***Geography of Population: Concepts, Determination and Patterns***, latest edition, Kalyani Publishers, New Delhi.
7. Clarke, J.I. (1992): ***Population Geography***, Second Edition, Pergamon Press, Oxford England.
8. Crook, N. (1997): ***Principles of Population and Development***, Pergamon, New York.
9. Daugherty, H.G., Kenneth C.W.K. (1998): ***An Introduction to Population*** (Second Edition), The Guilford Press, New York, London.
10. Garnier, B.J. (1970): ***Geography of Population***, Longman, London.
11. Mamoria C.B. (1981): ***India's Population Problems***, Kitab Mahal, New Delhi.
12. Mitra, A. (1978): ***India's Population: Aspects of Quality and Control***. Vol. I & II, Abhinav Publications, New Delhi.
13. Premi M.K. (1991): ***India's Population: Heading Towards a Billion***, B.R. Publishing, New Delhi.

M.Sc. Geography Semester - III
Course - Regional Development and Planning
(SEE GEO 1 3 06 DCEC 3104)

Credit – 4

Course Outline

Unit I

Fundamentals: Concept, nature and scope of Regional Planning; Different approaches to regional planning; Planning regions: concept and types; Planning regions of India; Regional policies in India

Unit II

Conceptual Outlook: Regional planning and national development; Economic development and regional development; Regional economic complexes; Inter-regional and intra-regional functional interactions; Regional disparities in India

Unit III

Approaches: Approaches to integrated regional planning at different levels: local, regional and national; Multi-level planning in India: State, District and Block level planning; Planning for tribal, agricultural, industrial and urban (metropolitan) regions

Unit IV

Development Perspective: Service and market centres planning; Growth centre and regional development with reference to India and France; Decentralised planning: themes and issues; Regional Planning: Development Strategies in the 21st century

Recommended Readings:

1. Bhatt, L.S. (1972): **Regional Planning in India**, Statistical Publishing Society, Calcutta.
2. Bhatt, L.S. et al. (ed.) (1982): **Regional Inequalities in India**, Society for the study of Regional Disparities, New Delhi.
3. Blunder. J. et al. (1973): **Regional Analysis and Development**, Harper & Row, London.
4. Chand, M. and Puri, V.K. (1985): **Regional Planning in India**, Allied Pub., New Delhi.
5. Chandna, R.C. (2000): **Regional Planning: A Comprehensive Text,** Kalyani Publishers, New Delhi.
6. Chaudhuri, J.R. (2001): A**n Introduction to Development and Regional Planning with special reference to India,** Orient Longman, Hyderabad.
7. Coates, B.R. and Johnston R.J. (1977): **Geography and Inequality**, Oxford University Press, Oxford.
8. Cowen, M.P. and Shenton, R.W. (1996): **Doctrines of Development,** Routledge, London.
9. Doyle, T. and McEachern, D. (1998): **Environment and Politics,** Routledge, London.
10. Friedmann, J. (1992): **Empowerment: The Politics of Alternative Development,** Blackwell, Cambridge MA.
11. Friedmann, J. and Alonso, W. (ed.) (1973): **Regional Development and Planning,** MIT Press, Cambridge Massachesetts.

12. Hettne, B.; Inotai, A. and Sunkel, O. (ed.) (1999–2000): **Studies in the New Regionalism**, Vol. I-V, Macmillan Press, London.
13. Isard, W. (1960): **Methods of Regional Analysis,** MIT Press, Cambridge, MA.
14. Kane, M. and William M.K.T. (2007): **Concept Mapping for Planning and Evaluation**, Sage, London.
15. Kuklinski, A.R. (1972): **Growth Poles and Growth Centres in Regional Planning**, Mouton and Co., Paris.
16. Kuklinski, A.R. (ed.) (1975): **Regional Development and Planning: International Perspective**, Sijthoff-Leydor.
17. Leys, C. (1996): **The Rise and Fall of Development Theory**, Indian University Press, Bloomington.
18. Mahapatra, A.C. and Pathak, C.R. (eds.) (2003): **Economic liberalisation and Regional Disparities in India. Special Focus on the North Eastern Region,** Star Publishing House, Shillong.
19. Misra, R.P. (ed.) (1992): **Regional Planning: Concepts, Techniques, Policies and Case Studies**, 2nd edition. Concept, New Delhi.
20. Misra, R.P. and Natraj, V.K. (1978): **Regional Planning and National Development,** Vikas, New Delhi.
21. Misra, R.P., Sundaram, K. V. and Pradasa Rao, V.L.S. (1976): **Regional Development Planning in India,** Vikas Publishers, New Delhi.
22. Moseley, M.J., (1974): **Growth Centres in Spatial Planning**, Pergamon Press, Oxford.
23. Närman, A. and Karunanayake, K. (eds.) (2002): **Towards a New Regional and Local Development Research Agenda**, Dept. of Geography, Göteborg University (Sweden), series B, No.100.
24. Norgaard, R.B. (1994): **Development Betrayed. The End of Progress and a Co-evolutionary Re-visioning of the Future**, Routledge, London.
25. Pathak, C.R. (2003): **Spatial Structure and Processes of Development in India,** Regional Science Association, Kolkata.
26. Raza, M. (1988): **Regional Development**, Heritage, New Delhi.
27. Sanyal, B.M. (2001): **Decentralised Planning: Themes and Issues,** Concept, New Delhi.
28. Sen, A. (1999): **Development as Freedom**, Oxford University Press, Oxford.
29. Sen, A. and Dreze, J. (ed.) (1996): **Indian Development: Selected Regional Perspectives,** Oxford University Press, Oxford.
30. Sharma, P.V., Rao, V.L.S., and Pathak, C.R. (ed.) (2000): **Sustainable Regional Development (with special reference to Andhra Pradesh)**, Regional Science Assocation, Kolkata.
31. Smith, D. and Närman, A. (ed.) (1999): **Development Theory and Practice: Current Perspectives on Development and Development Co-operation**, Longman, London.
32. Stöhr, W.B. and Taylor, D.F.R. (eds.) (1981): **Development from Above and Below? The Dialectics of Regional Planning in Developing Countries**, John Wiley, Chichester.
33. Sundaram, K.V. (1997): **Decentralized Multilevel Planning: Principles and Practice (Asian and African Experiences),** Concept, New Delhi.
34. Sundaram, K.V. (2004): **The Trodden Path: Essays on Regional and Micro Level Planning**, Anaunya Publications, New Delhi.
35. Sundram, K.V. (1977), **Urban and Regional Planning in India**, Vikas Publishig House, New Delhi.

36. Toye, J. (1987): **Dilemmas of Development. Reflections on the Counterrevolution in Development Theory and Policy,** Blackwell, Oxford.
37. Verhelst, T. (1990): **No Life without Roots – Culture and Development,** Zed Books, London.
38. World Bank (2000): **Entering the 21st Century. World Development Report**, Oxford University Press, Oxford.
39. Yugandhar, B N. and Mukherjee, A. (ed.) (1991): **Readings in De-centralised Planning (with special reference to District Planning)**, vol. I & II, Concept, New Delhi.

M.Sc. Geography Semester - III
Course - Oceanography (SEE GEO 1 3 07 DCEC 3104)

Credit – 4

Course Outline

Unit I

Introduction: Nature and scope of oceanography; Impact of Human activities on the Marine environment, Origin of ocean basins: Wegner's drift hypothesis, sea floor spreading and Plate Tectonics

Unit II

Major topographic features of ocean basins: continental shelf, slope, ridge and deeps, abyssal plains; submarine canyons; Marine Sediments; configuration of ocean floors of Indian Ocean and Atlantic Ocean

Unit III

Physical and chemical Properties: heat, temperature, density, light, sound, chemical composition of sea water, salinity, residence time; Oceanic processes: Interlink between atmospheric and ocean; Upper and Deep ocean circulation; currents, waves, tides and tsunami

Unit IV

Oceanic life and Resources: types of Organisms; coral reefs - origin and distribution, Major Marine Environments: Coastal: estuaries, deltas; Deep sea environment; Marine Resources: Food, Mineral and Energy

Recommended Readings:

1. Davis, R.J.A. (1986): **Oceanography - An Introduction to the Marine Environment**, C. Brown, Iowa.
2. Denny, M. (2008): **How the Ocean Works: An introduction to Oceanography**, Princeton University Press, New Jersey.
3. Duxbury, C.A and Duxbury, B. (1996): **An Introduction to the world's Oceans**, 2nd Edition, C. Brown, Iowa.
4. Garrison, T. (1995): **Essentials of Oceanography**, Wards worth, London.
5. Garrison, T. (2001): **Oceanography - An Introduction to Marine Science**, Cole Pacific Grove, USA.
6. Gross, M. Grant (1987): **Oceanography: A View of the Earth**, Prantice - Hall Inc. New Jersy.
7. Kennel, J.P. (1982): **Marine Geology**, Prentice Hall, New Jersey.
8. Kerhsaw, S. (2004): **Oceanography: An Earth Science Perspective**, Routledge, London.
9. Sharma, R.C. (1985): **The Oceans**, Rajesh Publications, New Delhi.
10. Sharma, R.C. and Vatal, V. (1986): **Oceanography for Geographers**, Chatanaya Publishing, Allahabad.
11. Shepart, F. (1969): **The Earth beneath the Sea**, Athneum, New York.
12. Sieboldt, E. and W.H. Berger (1994): **The Sea Floor**, 2nd ed., Freeman, New York.
13. Stopmmel, H. (1987): **A View of the Sea**, Princeton University Press, New Jersey.
14. Ummerkutty, A.N.P. (1985): **Science of the Oceans and Human Life**, NBT, New Delhi.
15. Von, A.W.S. (1962): **An Introduction to Physical Oceanography**, Addison, New York.

Semester IV

M.Sc. Geography Semester – IV
Course: Field Based Dissertation (including viva voce)
(SEE GEO 1 4 01 SEEC 0066)

Credits: 24

M.Sc. Geography Semester – IV
Course: Self-Study Course (SEE GEO 1 4 02 SEEC)

Non Credit Course