Learning Outcome-based Curriculum Framework

(LOCF)

M. A. /M.Sc. Post-Graduate Programme in Geography

2020

Department of Geography

Manipur University,

Cabchipur-705003

Manipur

About The Department

Geography was introduced at the post-graduate and research levels in the Manipur University in 1984. Since then, the University has been offering M.A./M.Sc. and Ph.D. degrees in the Manipur University. Initially, Geography was together with Geology in the Department of Earth Sciences up to 1992, after which the University constituted a full-fledged department and which subsequently, moved to its present building (formerly of CEDTI) located between the Physics Department and Manipur University Library. The Department got infrastructure development from the FIST-DST in 2003.

M.A/M.Sc. Geography Course Programme in The Department – The intake capacity is 40 (forty) being admitted from both arts and science streams to the MA/MSc programme of two years comprising of four semesters. The Department is teaching papers covering - physical and human geography branches along with the practicals for the total marks of 2400 in which Remote Sensing as specialised one. The papers offered are geomorphology, hydrology, climatology, geographical thought, resource management, Medical geography, population and settlement geography, geography of NE India, regional planning, remote sensing etc. The department has scope to strengthen the remote sensing and GIS lab. and computer networking facilities. Besides the theory and practical classes, students are also taken to the field for observations and surveys for writing reports.

Teaching is performed on the following lines :

i) Explanation and demonstration
ii) Visiual and Digital Image Interpretation
iii) Identification of geographical objects and their location using GPS
iv) Field work in which students generate field based data
v)Audio Visual aids using LCD Projector in the class room

Future Plan of the Department of Geography

The milestone of the perspective plan of the department is to impart geographical knowledge to the students with the new technologies of Remote Sensing, GIS, GPS, Automatic Cartography and the study of Geomorphology, Hydrology and Climatology. With the increase of manpower for specialization, this will strengthen interdisciplinary approach with the advance study of geography in the country.

Objectives of Course Programme

The MA/MSc. programme in Geography offered by the department aims at imparting knowledge to the students which can empower themselves to handle and analyse the spatio-temporal issues occurred across the world.

Programme Specific Outcomes

After the completion of this course programme in a period of two years students will gain a comprehensive knowledge which makes them to engage in critical thinking skills on the issues related to both physical and human and their relationships.

Credit Requirements

Each course shall carry 4 credits and the total credits per semester shall be 24 credits. The total credit requirement for this postgraduate programme is 96 credits including credits earned from other departments as optional papers.

Each course will carry100 marks of which 25 marks shall be allotted to internal assessment based on tests, seminar, assignment, classroom participation. The remaining 75 marks in each paper will be awarded based on a written examination at the end of each semester.

Course Structure

Credit Distribution for M.A./ M.Sc. Course Programme in Geography

Sl. No.	Papers	Total No. of Papers	Credits	Total Credits
1	Core Course	21	04	84
2	Elective Course	01	04	04
3	Optional Course	02	04	08
				96

Semester wise Course and Credit Distribution

FirstYear

First Semester

Paper Code	Title of paper	Credits	Course
GG/411	Geomorphology	4	Core
GG/412	Geographic Thought	4	Core
GG/413	Natural Resources Management	4	Core
GG/414	Regional Geography of North-East India	4	Core
GG/415(P)	Quantitative Technique	4	Core
GG/416(P)	Geomorphplogical Mapping and Interpretation	4	Core
Total	6	**24**	

Second Semester

Paper Code	Title of Paper	Credit	Corse
GG/421	Climatology	4	Core
GG/422	Oceanography	4	Core
GG/423	Population Geography	4	Core
GG/424	Geography and Ecosystem	4	Core
GG/425(P)	i. Population Mapping ii. Climatology Practical	2 2	Core Core
GG/426(P)	Research Methodology Field Work Report (Physical)	2 2	Core Core
Total	6	**24**	

Second Year

Third Semester

Paper Code	Title of Paper	Credit	Corse
GG/531	Hydrology	4	Core
GG/532	Regional Development and Planning	4	Core
GG/533	Photogrammetry	4	Elective
GG/534	**Select one from other Departments**	4	Optional
GG535(P)	Spatial Analysis	4	Core
GG536(P)	Soil and Hydrological Analysis Survey: Dumpy level, Theodolite, Total Station	**3** **1**	Core Core
Total	6	**24**	

Elective course in third semester is limited to GG/533- Photogrammetry

Open elective or the course which can be opted by the students of other department is limited to GG/534- Agricultural Geography

Fourth Semester

Paper Code	Title of Paper	Credit	Corse
GG/541	Political Geography	4	Core
GG/542	Satellite Remote Sensing & Geographic Information System(GIS)	4	Elective
GG/543	Urban Geography	4	Core
GG/544	**Select one from other departments**	4	Optional
GG/545(P)	Remote Sensing and Photogrammetry	4	Core
GG/546(P)	i. GIS ii. Field Work Report (Socio-economic)	2 2	Core Core
Total	6	**24**	

Elective course in third semester is limited to GG/542- Satellite Remote Sensing and Geographic Information System(GIS)

Open elective or the course which can be opted by the students of other department is limited to GG/544- Rural Settlement Geography

First Semester

Semester I – Core Course

GG/411: Geomorphology

Course Objectives: 1) The course aims to understand the relationship between landscape form and processes.

2) Understanding the basic geomorphological principles and fundmental Concepts.

3) Application of geomorphic knowledge couple with models and data in various type of studies .

Course Learning Outcome:

1) Explain basic principles for development of landforms through time.

2) Make an initial geomorphological fieldwork.

3) Learn the techniques of geomorphological analysis.

Course Contents

Unit I: Evolution of geomorphic thought, Fundamental concepts of geomorphology, Concept of climatic geomorphology; Bases of geomorphological processes-physical, chemical, biological and human, Drainage basin as a fundamental geomorphic unit.

Unit II: Normal cycle of erosion and its characteristics landforms, Interception in the cycle, concept of polycyclic; Slope evolution, slope development and processes, slope classification and mapping

Unit III: Soil forming processes, physical and chemical properties of soils. Development of soil profile and genetic classification of soils. Major landforms associated with fluvial, glacial, aeolian and karst region.

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Unit-IV Applied geomorphology – application of Geomorphic mapping for terrain evaluation, digital elevation model (DEM), land capability and land suitability classification, Urban geomorphology; Hydro geomorphology; Regional geomorphology of Applaichian, Chotanagpur and Meghalaya plateau.

Suggested Readings:

Bloom, A.L: **Geomorphology – A Systematic Analysis of Late Canezoic Landforms**, Prentice Hall Englewood Cliffs N.J. 1978

Chorley, R.J.: **Spatial Analysis in Geomorphology**, Methuen, London, 1972

Cooke, R.U. and Doornkamp, J.C.: **Geomorphology in Environmental Management – An Introduction**, Clarendon Press, Oxford, 1974

Dayal, P.: **A Text Book of Geomorphology**, Patna, 1990
Dury, G.H.: **The Face of the Earth**, Penguin Harmondsworth, 1959
Fairbridge, R.W.: **Encyclopaedia of Geomorphology,** Reuinholdts, New York, 1968
Garner, H.F.: **The Origin of landscape – A Synthesis of Geomorphology**, Oxford University Press, London, 1974.
Goudie, A.: **The Nature of the Environment**, Oxford & Blackwell, London,1993
Melhorn, W.N.(ed): **Theories of Landform Development**, George Allen & Unwin, London, 1981
Mitchell, C.W.: **Terrain Evaluation**, Longman, London, 1973.
Ollier, C.D.: **Weathering**, Longman, London, 1979.
Pitty, A.F.: **Introduction to Geomorphology**, Methuen, London, 1971.
Skinner, B.J.& Porter, S.C.: **The Dynamic Earth,** John Wiley, New York, 1995.
Sparks, B.W.: **Geomorphology**, Longman, London, 1960.
Sharma, H.S.(ed): **Perspectives in Geomorphology**, Concept, New Delhi, 1980.
Singh, S.: **Geomorphology**, Prayag Publication, Allahabad, 1998.
Stoddart, D.R.(ed): **Process and Form in Geomorphology**, Routledge, New York, 1996.
Thornbury, W.D.: **Principles of Geomorphology**, John Wiley, New York,1960.

First Semester

Semester I – Core Course

GG/412: Geographic Thought

Learning Objectives

1. To provide in-depth knowledge of the nature of geographic thought in important ancient civilizations.
2. Exposing students to the developments in European academia which eventually laid the foundations of modern geography as we know it today.
3. To critically appreciate and understand the emergence of different perspectives in geographic thought in Anglo-American geography after 1945 AD.
4. To theoretically acquaint students with new ideas, theory and tools of modern geography.

Course Learning Outcomes

After the completion of the course,students will be able to

1. Relate ancient geographic thoughts with the nature of modern geography
2. Critically evaluate the socio-economic and academic contexts in which key geographers worked.
3. Understand the origins of the dualities and dichotomies within the field of geography, and whether they truly constitute dichotomies.
4. Realise that the philosophical base of Geography is provided by geographic thoughts.

Course Content

Unit I: Ancient Geographic Thoughts: Contributions of Indian, Greek, Roman and Arab geographers.

Unit II: Emergence of modern geography: Contribution of Varenius, Emmanuel Kant, Carl Ritter and Humboldt; Contributions of German, French, British and American Schools.

Unit IV: Dichotomies in Geography: Ideographic and Nomothetic, Positivism and empiricism. Recent trends in geography: quantitative revolution in geography, behavioural, humanistic and radical geography and welfare geography.

Unit V: Areal differentiation, post- modern geography,applied geography concept of models in geography and their classification.

Suggested Readings:

Abler, Ronald; Adams, John S.Gould, Peter: **Spatial Organization: The Geographer's View of the World**, Prentice Hall, N.J., 1971.

Ali.S.M.: **The Geography of Puranas**, Peoples Publishing House, Delhi, 1966.

Amedeo, Douglas: **An Introduction to Scientific Reasoning in Geography**, John Wiley, U.S.A., 1971.

Board, C et al: **Progress in Geography**, Vols I-VIII, Edward Arnold, London, 1970

Bunge, W: **Theoretical Geography**, **Lund Studies in Geography**, The Royal University of Lund, Sweden, 1962

Dishit, R.D. (ed.): **The Art & Science of Geography Integrated Readings**, Prentice Hall of India, New Delhi, 1994.

Gould, J.R: **An Introduction to Behavioural Geography**, Oxford, 1980

Gregory, D: **Geographical Imaginations**, Blackwell, Cambridge, Mass, 1994

Hartshorne, R.: **Perspectives on Nature of Geography**, Rand McNally & Co., 1959.

Harvey, D: **Explanations in Geography**, Edward Arnold, London, 1969

Jensen A Holt: Geography**: History and Concepts**,SAGE Publications, 2018

Husain, M.: **Evolution of Geographic Thought**, Rawat Publishing, Jaipur, 1984.

James, P.E: **All Possible Worlds: A History of Geographical Ideas**, New York, 1972

Johnston, R.J.: **Philosophy and Human Geography**, Edward Arnold, London, 1983.

Johnston, R.J.: **The Future of Geography**, Methuen, London, 1988.

Minshull, R.: **The Changing Nature of Geography**, Hutchinson University Library, London, 1970.

Sauer, C.O: **Land Life**, University of California, Berkley, 1963

Soja, Edward: **Post Modern Geographies**, Verso, London, 1989

First Semester

Semester I – Core Course

GG-413: Natural Resources Management

Course Objective:

1 Creating awareness about resource availability, accessibility, problem of resource utilization, sustainable use.

2 Spatial distribution of natural resources.

3 Sustainable resource management and natural hazard management.

Course Learning Outcome:

1 At the end the course student should learn importance of natural resources.

2 Resource appraisal for decision making policy.

3Integrating resource development and its application

Course Content

Unit I: Concept, models and approaches to natural resource management; Problems of resource utilization; population pressure; development and resource use; natural hazard and risk management.

Unit II: Use and misuse of resources: Global and Indian scenario; prospects of various resources; soil, water, mineral and forests; Conservation and management of resources.

Unit III: Resource appraisal and policy making: land resources, geophysical, geochemical geobotanical; use of GIS and remote sensing in resource appraisal for decision making policy.

Unit IV: Resource development: Sustainable resource management, integrated resource development and its application.

Suggested Readings:

Adams, W.M.: **Green Development: Environment and sustainability in the third world**, Routledgen & champman Hall, New York, 1990

Granfelt, T.R., **Managing the Globalised Environment**, J.&L. Composition Ltd. New York, 1999

Holechek, J.L. et al: **Natural Resources: Eulogy Economics & Policy,** Prentice Hall, New Jersey, 2000

Hooja, R & Joshi, R, : **Desert drought and Development, Studies inResource management and sustainability**; Rawat publication, Jaipur, 1994

Howard, M.C. (ed), **Asia's Environment Crisis**, Westview Press, Proulder, 1993.

Kates, R.W. & Burton, I (eds): **Geography, Resources and Environment**, Vol I &II, University of Chicago Press, Chicago, 1986

Newson, ; M.D. **Land , water & development: River Basin System & Management**, Routledge London, 1991.
Owen, S. & Owens, P.L. **Environment Resources and Conservation**, Cambridge University press, New York, 1991
Rees, J. : **Natural Resources: Allocation, Economics and policy**, Methuen, London, 1988
Redcliff, M.: **Sustainable Development: Exploring the Contradiction**, Methuen, London, 1987
Simmons,I.G. : Earth , air and water: **Resources and Environment in late 20th century**, Edward Arnold, New York, 1991
Thoman, Alan et.al: **Environmental Policies & NGO influence**, Routledge, London,
Hamilton, F.E.I.: **Spatial Perspectives on Industrial Organization and Decision Making**, John Wiley, New York, 1974.
. Hamilton, I.(ed.): **Resources and Industry**, Oxford University Press, New York, 1992.
Isard, W.: **Location and Space Economy**, MIT Press, Cambridge,1956
Losch, A: **The Economics of Location**, New Haven, 1954
Pachuri, R.K. **Energy and Economic Development in India**, Praeger, New York, 1977.
Robertson, D.(ed.): **Globalisation and Environment**, E.Elgar Co., U.K., 2001.

First Semester

Semester I – Core Course

GG-414 : Regional Geography of North-East India

Course Content

Course Objectives:

1. To introduce the location and formation of eight NE states in the light of politico-historical perspective.
2. To discuss the physical and cultural aspects of NE region, its natural beauty, magnificent biodiversity and full of natural resources.
3. The dialogue on state specific development predicaments are highlighted among the students.

Course Learning Outcome:

1. It will help to understand the uniqueness of the NE states in terms of physical and cultural aspects compared to the mainland India.
2. This course will focus on the potentiality of the NE States to the future growth of Indian economy, and important in geostrategic perspective.

Unit I: Location and politico-administrative units, physical characteristic: relief, climate, drainage, soil and vegetation; Natural resources: coal, natural gases, petroleum, forest and water.

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Unit II: Population: population growth and distribution, migration, population characteristics, trends of urbanization, characteristics of urban centres.

Unit III: Agriculture: Types of farming, cropping pattern, agriculture efficiency, agricultural modernization (problems and prospects)

Unit IV: Transport, trade & commerce, industrial development, study of Imphal valley, Cachar valley and Brahmaputra valley.

Suggested Readings:

Centre for Science & Environment : **State of India's, Environment**, New Delhi, 1988

Deshpande C.D.: **India: A Regional Interpretation**, ICSSR & Northern Book Centre, 1992.

Dreze, Jean & Amartya Sen (ed.): **India Economic Development and Social opportunity** : Oxford University Press, New Delhi, 1996.

Gopala Krishnan, R.: **Geography of India**, Jawahar, Delhi, 2001

Kundu A. Raza Moonis: **Indian Economy: the Regional Dimension**. Spectrum Publishers, New Delhi, 1982.

Robinson, Francis: **The Cambridge Encyclopaedia of India, Pakistan, Bangladesh, Sri Lanka, Nepal, Bhutan & Maldives,** Cambridge University Press, London, 1989.

Spate OHK & ATA Learmonth: **India & Pakistan,** Methuen, London. 1967.

Singh R.L. (ed.): **India-A Regional Geography,** National Geographical Society, India, Varanasi, 1971.

Taher, M and Ahmed, P: **Geography of North East India**, Mani-Manil Prakash, Guwahati, 2000.

Tirtha R. & Gopal Krishna: **Emerging India**, Reprinted by Rawat Publications, Jaipur, 1996.

First Semester

Semester I – Core Course

GG-415(P) : Quantitative Techniques

Course Content

Course Objectives:

1. To introduce the students with data acquisition methods and techniques.
2. To train the students to the data analysis with the help of different descriptive and inferential statistical techniques.
3. To familiarise the students with statistical packages with different statistical techniques and adopting multivariate models with data sets.

Course Learning Outcome:

1. This practical course helps to understand the use of statistical techniques in daily life.
2. This course will univocally guide the students- when and where, which statistical techniques will be used to explore the pinpoint information or facts.

3. Students trained with quantitative Techniques will help to be absorbed in different project works.

Significance of statistical techniques in geographic studies; Frequency distribution; Graphic representation; Central tendencies – mean, median and mode; Measures of dispersion and skewness; Correlation and regression analysis, Multivariate analysis.

Basic principles of probability; Sampling techniques – random and systematic; Tests of significance ; Chi-square test, students' T-test, and F-test; Time series analysis : Trend devices; characteristics and components of a computer system.

Suggested Readings:

Blackwell, B: **Statistics in Geography**, Basil Blackwell Ltd., 1988

David Unwin: **Introductory Spatial Analysis**, Methuen, London, 1981.

Elhance, D.N: **Fundamental of Statistics**, Kitab Mahal, Allahabad, 1972

Eyles, J. and Smith, D.M. (eds): **Quantitative Methods in Human Geography**, Polity Press, Oxford, 1988.

Gregory, S. **Statistical Methods and the Geographer**, Longman, London, 1978.

Hagget, P. and Mc Cullagh, P: **Locational Analysis in Human Geography**, Arnold, London, 1965.

Hammond R and P.S. McCullagh**: Quantitative Techniques in Geography : An Introduction**, Clarendan Press, Oxford, 1974.

John P.Cole and Cuchlaine A. M. King: **Quantitative Geography**, John Wiley, London, 1968.

Johnston R.J**: Multivariate Statistical Analysis in Geography**, Longman, London, 1973.

King, L.J.: **Statistical Analysis in Geography**, Prentice Hall, Englewood Cliff, N.J.

Koutsoyiannis: **Theory of Econometrics**, Mcmillan, London, 1973.

Mahmood, A: **Statistical Methods in Geographical Studies**, Rajesh Publications, New Delhi, 1999.

Maurice Yeats: **An Introduction to Quantitative Analysis in Human Geography**, McGraw Hill, New York, 1974.

Mc Cullagh, P.: **Data Use and Interpretation (Science in Geography Series, Part-4**), Oxford University Press, Oxford, 1988.

Pal, S.K.: **Statistics for Geoscientists: Techniques and Applications**, Concept Publication, New Delhi, 1999.

Peter Haggett, Andrew D.Cliff, & Allan Frey: **Location Methods**, Vol. I and II, Edward Arnold, London, 1977.

Smith, D.M.: **Patterns in Human Geography**, Penguin Book, 1975.

First Semester

Semester I – Core Course

GG-416(P) Geomorphological Mapping & Interpretation

Course Objectives:

1 To know diverse methods of analysing and interpreting geographical and geological data.

2 To develop an understanding of how this knowledge may be applied in practice.

Course Learning Outcome:

1All these techniques are applicable in decision making policy of any development planning on any form of land surface.

Course Content

Interpretation of geological maps : drawing of profiles, Determination of dip and strike, Measurement of thickness of beds; Interpretation of geological history and correlation of topography with structure.

Drawing and analysis of slope and terrain; Drawing of altimetric histogram and its geomorphological interpretation;

Preparation of long and cross profiles of river valleys, mountainous regions and plateaus; Hyposographic, clinographic and altimetric frequency curves, Slope maps according to Robinson, Raisz & Henry, and Strahler.

Drainage basin analysis; determination of linear, aerial and relief attributes of drainage basins and their relationships.

Preparation of geomorphological map; Russian, French and Polish methods.

Suggested Readings:

Birch, T.W: **Maps – Topographical & Statistical**, Clarendon press, Oxford, 1954

Chow, V.T.: **Handbook of Applied Hydrology**, Mc Graw Hill Book Company, New York, 1964

Dake, C.L. & Brown: **Interpretation of Topographic & Geologic Maps**, McGraw Hill, New York, 1974

Garnet, Alice : **Geographical Interpretation of Topographical Maps**

Gondie, A.: **Geomorphological Techniques**

King, C.A.M.: **Techniques in Geomorphology**, Arnold, London, 1960

Miller, A.A.: **The Skin of the Earth**

Misra, R.P. & Ramesh, A.: **Fundamentals of Catography**

Monkhouse, F.J. & Wilkinson, H.R.: **Maps and Diagrams**, Methuen and Co.Ltd., New York, 2000

Raisz, Erwin: **Principles of Cartography**, Mc Graw Hill, New York, 1962

Robinson, A.H. & Other : **Elements of Cartography**, John Wiley & Sons, New York

Singh, R.L.: **Elements of Practical Geography**, Kalyani Publishers, Delhi, 1979

Second Semester

Semester II – Core Course

GG-421: Climatology

Course Objectives

1Make students understand the nature and scope of modern study of climate by imparting latest knowledge about the basic thermal and dynamical atmospheric processes operating at different spatial and temporal scales.

2To explain weather generation systems of the atmosphere and how they influence climate of the world and regions in the long term.

3To explore the typology of world's climates through critical study of authoritative climate classification schemes.

4 Instilling greater scientific awareness about the causes and consequences of the modern climate change to enable students to formulate informed mitigation and adaptive responses.

Course Learning Outcomes

1Acquire advanced knowledge about the workings of the atmosphere and the interconnections inherent in the climate system.

2 Develop thorough understanding of weather systems including monsoon and their critical roles in producing global and regional weather and climate patterns.

3 Have skills to accurately classify climate types from any available climate data.

4Students will learn about the human induced changes to the earth's atmosphere which pose threats to the sustenance of human and biophysical systems requiring urgent policy responses.

Course Content

Unit I: Nature and scope of climatology, Evolution of atmosphere, Composition and structure of atmosphere; Elements of weather and climate; Insolation, heat balance of the earth and distribution of temperature

Unit II: Atmospheric pressure and winds; Wind system, monsoon winds and local winds; Jet stream; Atmospheric moisture, and precipitation; Air masses and fronts; Cyclones and anti cyclones.

Unit III: Climates of the world- tropical, temperate, frigid, desert and mountain climates; Classification of world climate (Koppen/Thornwaite/Trewarth).

Unit IV : Climate archives; biotic, geological and geochemical climate data and climate models; Tectonic scale climate change; orbital scale climate change ; climate change during the last 1000years and since 1850 AD. Impacts and mitigations .

Suggested Readings:

Barry, R.G. and Chorley, R.J.: **Atmosphere, Weather and Climate**, Methuen Co.Ltd., London, 1971.

Barry, R.G. & Chorley P.J.: **Atmosphere, Weather and Climate**, Routledge, London and New York, 1998.

Blair, T.A.: **Climatology General and Regional**, Prentice Hall, New York, 1942

Blair, T.A.: **Weather Elements**, Prentice Hall, 1954

Chorley, R.J.: **Earth, Water and Man**, Methuen and Co., London

Critchfield, J.H.: **General Climatology**, Prentice Hall, India, New Delhi, 1993.

Crowe, P.R.: **Concept in Climatology**, Longmans, London, 1971

Das, P.K.: **Monsoons**, National Book Trust, New Delhi, 1987.

Fein, J.S. and Stephens, P.N. **: Monsoons**, Wiley Interscience, 1987.

Griffith, J.F.: **Applied Climatology**, Oxford University Press, 1966

Hobbs, J.E.: **Applied Climatology**, Butterworths, 1980

India Met. Deptt.: **Climatological Tables of Observatories in India**, Govt.of India, 1968.

Lal, D.S.: **Climatology**, Chattanya Publications, Allahabad, 1986.

Lydolph, P.E.: **The Climate of the Earth**, Rowman, 1985.

Menon, P.A.: **Our Weather**, N.B.T., New Delhi, 1989.

Peterson, S.: **Introduction to Meteorology**, McGraw Hill Book, London, 1969.

Robinson, P.J.& Henderson S.: **Contemporary Climatology**, Nenlow, 1999.

Robinson P.J. and Petty A.(ed): **Applied Climatology –Principles and Practices**, Routledge, London, 1997.

Rumney, George, R**.: Climatology and World's Climates**, McMillan, London, 1968

Ruddiman,W.F.: **Earth's Climate Past and Future ,WH Freeman,** 2009

Stringer, E.N.: Hoirn, L.A.: **An Introduction to Climate**, International Series, 1982, 1980

Thompson, R.D. & Perry, A.(ed.): **Applied Climatology, Principles and Practice,** Routledge, London, 1997.

Trewartha, G.T. &L.H.Horn: **An Introduction to climate**, McGraw Hill Book Company, 1980.

Gates, E.S.: **Meteorology and Climatology**, Harrap Ltd., London, 1982.

Oliver, T.K. and Hidare: **Climatology and Introduction**, Bell and Howell Company, London, 1984.

Second Semester

Semester II – Core Course

GG-422 : Oceanography

Learning Objectives:

1This course seeks will teach students about the historical evolution of oceanography and how its scope continues to expand in the light of ever accumulating scientific knowledge of geophysical aspects of earth's oceans.

2 Students will explore different properties and movements of sea water and how these interact with the atmosphere.

3Develop a deeper understanding of the relationship between the marine environmental

conditions and marine organisms.

Learning Outcomes:

1Learn the important role played by discoveries in different branches of earth sciences in expanding our knowledge about the ocean and its various characteristics.

2 Have deeper knowledge of coupled ocean and atmosphere systems.

3Acquire the ability to discern the nature of marine ecology and ecosystems as an integral component of earth's biosphere.

Course Content

Unit I: Nature and scope of oceanography – History of oceanography; distribution of land and water; major features of ocean basins; continental margin and deep-ocean basins; earth structure and Plate tectonics; marine sediments.

Unit II: Physical and chemical properties of sea water; Interlink between atmospheric circulation and circulation patterns in the oceans; Surface currents; thermohaline, waves and tides.

Unit III: Major marine environments: bio-geochemical cycles in the ocean, biozones, types of organisms; food and mineral resources of the sea; Coastal: estuaries, deltas, barrier island, rocky coasts – Open: reefs, continental-shelf, continental – slope and deep, pelagic environment and floor of the ocean basins.

Unit IV: Impact of humans on the marine environment. Law of the sea; exclusive economic zone, marine deposits and formation of coral – reefs.

Suggested Readings:

Davis, Richard J.A.: **Oceanography – An Introduction to the Marine Environment**, Wm. C. Brown lowa, 1986

Duxbury, C.A. and Duxbury B.: **An Introduction to the world's oceans** – C. Frown, lowa 2nd ed. 1996.

Garrison, T.: **Oceanography – An Introduction to Marine Science**, Books/Cole, Pacific Grove, USA, 2001.

Growss, M.Grant: **Oceanography, a View of the earth**, Prentice Hall Inc. New Jersy, 1987.

King, C.A.M. **Oceanography for Geographers**, 1962.

Sharma, R.C. : **The Oceans, Rajesh Publications**, New Delhi, 1985.

Ummerkutty, A.N.P. : **Science of the Oceans and Human Life**, NBBT, New Delhi, 1985.

Second Semester

Semester II – Core Course

GG-423 : Population Geography

Course Objectives:

1. This course introduces basic components of population study, such as fertility, mortality and migration, and their measures, spatial distribution, size, composition and growth.
2. It provides insight into the population growth and development nexus, classical and modern theories and population policies.
3. Contemporary socio-economic issues like gender inequality, ageing, reproductive health, hunger and undernourishment, are also brought in the gamut of discussion.

Course learning Outcomes:

1. This course helps to understand the importance of population dynamics - fertility, mortality and migration, and social implication of their changing size and composition.
2. This course familiarises the students about social institutions, customs, gender, caste, religion, and aware the issues adhere to these within the states as well as national level.
3. Students get an understanding of population growth, workforce supply and demographic dividend; appreciation of family planning programmes and the role of different stakeholders.

Course Content

Unit-I: Nature, Scope and Significance to Study Population Geography. Sources of Population Data: Censuses, Vital Registration, and Sample Surveys. World Population: Growth and Distribution. Population Growth in India and Growth Differential in Indian States/UTs. Theories in Population Growth: Malthusian, Marxist and Socialist View, Neo-Malthusian, and Demographic Transition Model (DTM).

Unit-II: Age-Sex Structure and Its Implications. Nuptiality and Squeeze in India. Socioeconomic Consequences of Aging;
Social Security for Elderly in India. Workers and Work Participation Rate in India.

Unit-III: Fertility: Basic Measures; Levels, Trends and Patterns in India.
Mortality and Health: Measures of Mortality; Epidemiological Transition; Global Pattern of Causes of Death. Concepts, Measures, and Importance of Migration with Special Reference to Labour Migration in India. Theories of Migration: E.G. Ravenstein, Everett S. Lee, Wilbur Zelinsky, W. Arthur Lewis, and Harris-Todaro.

Unit-IV: Population, Environmental and Development: Concepts of Under Population and Over Population.

Environmental Protocols with Special Reference to India.Hunger and Undernourishment. Population Policies in India.

Suggested Readings:

Bhende A. and Kanitkar T.,**Principles of Population Studies**, Himalaya Publishing House, 2000

Srinivasan, K., **Population Concerns in India: Shifting Trends, Policies and Programs**. Sage, India, 2017

Bilasborrow, Richard E and Daniel Hogan: **Population and Deforestation in the Humid Tropics**, **International Union for the Scientific Study of Population**, Belgium, 1999.

Boque, D.J. : **Principles in Demography**, John Wiley, New York, 1969.

Bose, Ashish et. al. : **Population in India's Development (1947-2000)**; Vikash Publishing House, New Delhi, 1974.

Census of India: India : **A State Profile**, 1991.

Chandra, R.C.: **Geography of Population; Concept, Determinants and Patterns**, Kalyani Publishers, New York, 2000.

Clarke, John I**.: Population Geography**, Pergamon Press, Oxford 1973.

Crook, Nigel: **Principles of Population and Development**, Pergamon Press, New York, 1997.

Daugherty, Helen Gin, Kenneth C.W. Kammeyir: **An Introduction to Population** (Second Edition), The Guilford Press, New York, London, 1998.

Garnier, B.J.: **Geography of Population**, Longman, London, 1970.

Kochhar, Rajesh: **The Vedic People: Their History and Geography,** Orient Longman Ltd., New Delhi, 2000.

Mamoria, C.B. : **India's Population Problem**, Kitab Mahal New Delhi, 1981.

Mitra, Ashok, **India's Population : Aspects of Quality and Control**. Vol.I &II, Abhinar Publications, New Delhi, 1978.

Premi, M.K., **India's Population: Heading Towards a Billion**, B.R. Publishing Corporation, 1991.

Srinivasan, K. and M. Vlassoff. **Population Development Nexus in India: Challenges for the New Millennium**. Tata McGraw Hill, New Delhi, 2001.

Srinivasan, K. **Basic Demographic Techniques and Applications**, Sage Publications, New Delhi, 1998.

Sundaram K.V. and Sudesh Nangia, (ed.), **Population Geography, Heritage Publications**, Delhi, 1986.

UNDP: **Human Development Report**, Oxford University Press, Oxford 2000.

United Nations: **Methods for Projections of Urban and Rural Populations**, No.VIII, New York 1974.

Woods, R**. Population Analysis in Geography**, Longman, London 1979.

Zelinsky Wilbur, A**. Prologue to Population Geography**, Prentice Hall, 1966.

Second Semester

Semester II – Core Course

GG-424 : Geography and Ecosystem

Course Objectives:

1 Various dimensions of the ecosystems, their spatial distribution.
2 Anthropogenic interventions and resultant impacts on various ecosystems.
3 Understanding of environmental laws

Course Learning Outcome:

1 Detailed exposure to the concept of ecosystem, processes, theories and concepts.
2 In-depth knowledge of anthropogenic interventions and impacts, conservation strategies and planning.
3 Evaluation and achievement of different environmental programs, policies and legislations.

Course Content

Unit I: Concept of ecology and ecosystem; Geography as human Eco-system form and function: trophic level, ecological pyramids, ecological niche, energy and nutrients in the ecosystem, food chains and food webs.

Unit II: Major terrestrial ecosystem of the world: Agriculture, forests, grasslands and deserts, carrying capacity of the earth.

Unit III: Man-environment relationship: Resource use and ecological imbalance with reference to soil, forests, and energy resources; Biodversity, Preservation and conservation of the ecosystem, ecology of tropical farming system, mountain ecosystem with special reference to hills of North- East India.

Unit IV: Environmental legislation: The Stockholm Conference, the Earth Summit, Environmental laws in India (the Wild Life Act. Water Act, Forest Act, Environment Protection Act and National Environment Tribunal Act).

Suggested Readings:

Arbill, R. : **Man and Environment : Crisis and Strategy of Choice**, Penguin, Harmondsworth, 1967.

Berril, N.J. : **Inherit the Earth – The Story of Man and Changing Planet** Fawcett, Greenwich, Connecticut, 1967.

Botkin, Daniel B. and Keller., Edward A. : **Environmental Studies**, Charles E. Merril Publishing Co., Columbus, Dhio, 1987.

Marsh, C.P. : **Man and Nature**, Harvard, 1967.

C.S.E. **The State of India's Environment – A Citizen's Report**, Centre for Science and Environment, New Delhi, 1982.
C.S.E. : **The State of India's Environment – The 2nd Citizen's Report**, Centre for Science and Environment, New Delhi, 1984.
Dasman, R.F.: **Environmental Conservation**, John Wiley & Sons, New York, 1972.
Detwyler J.R**.: Man's Impact on Environment**, John Wiley & Sons, New York, 1975.
Odun, E.P. : **Fundamentals of Ecology**, Prentice Hall
Duffey, E.: **Conservation of Nature**, Collins., London, 1970.
Edington, J.M. and Edington, M.A.: **Ecology and Environmental Planning**, Chapman and Hall, London, 1977.
Harvey, B. and Hallet, J.D.: **Environment and Society: An Introductory Analysis**, Macmillan, London, 1977.
Hewitt, K & Hare, F.K. : **Man and Environment : A Conceptual Frame Work**, Commission on College Geography Resource, Paper 20, 1973; (AAG).
Park C.C. : **Ecology and Environmental Management**, Butterworths, London, 1980.
Sherlock, R.L. : **Man as a Geological Agent**, Witherby, London, 1922.
Thomas, W.L. (ed.): **Man's Role in Changing the Face of the Earth**. University of Chicago Press, Chicago, 1956.
Kormondy, E.J. : **Concept of Ecology**, Prentice Hall, 1989
Smith, R.L.: **Man and his Environment: An Ecosystem Approach**, Harper & Row, London, 1992
Singh, S.: **Environmental Geography**, Prayag publication, Allahabad, 1991

Second Semester

Semester II – Core Course
GG-425(P): i) Population Mapping
ii)Climatology Practical

Course objectives:

1 Apply and understand the various forms of representation of population Attributes

2 Equipping students with skills in handling and analytical investigation of climatological data with the use of advance graphs and relevant statistical tools to discern long term patterns in climate.

Learning Outcomes:

1Measurement of basic demographic equation, fertility, migration,etc.

2 Apply and measurement of various climatological data in different field of studies

Course Content

i) Measures of Population Change: Absolute and Percentage; Linear Growth Rate, Geometric Growth Rate and Exponential Growth Rate. Population Composition: Age-Sex Pyramid, Dependency Ratio, and Median Age.

ii.) Basic Demographic Equation. Measures of Fertility: Total Fertility Rate (TFR), Gross Reproduction Rate (GRR) and Net Reproduction Rate (NRR). Construction of Abridged Life Table. Measuring Internal Migration: Intercensal Migration, and Indirect Measures of Net Migration. Population Projection.

ii) Climatology practical

Exercises on: Climate normal calculation, Hythergraph, Climograph, Determination of climatic types from climatic data, Temperature anomaly, Trend : parametric (linear) and non-parametric (Mann-Kendall technique,) and dispersion calculations; Variability of rainfall; Rainfall dispersion graph and Rainfall anomaly Index.

Suggested Readings

Srinivasan. K.,**TrainingManual on Demographic Techniques.** ORGI&UNFPA. 2014.

Siegel, J.S. & Swanson, D.A., **The Methods and Materials of Demography**.Elsevier Academic Pres,California, 2004.

Preston,S.,Heuveline,P.&Guillot,M., **Demography:Measuring and Modeling Population Processes,**Blackwell,2000

Srinivasan, K.**Basic Demographic Techniques and Applications.** SAGE, India, 1997.

Gates, E.S., **Meteorology and Climatology**, Harrap, London, 1972

Hammond, R. & Mc Cullagh, P., **Quantitative Techniques in Geography**, Clarendon Press, Oxford, 1965.

Horn, L.H., **An Introduction to Climate**, Mc Graw Hill Book Company, New Delhi, 1980.

Mishra, R.P., **Fundamentals of Cartography**, Prasaranga, University of Mysore, 1969.

Monkhouse, F.J. & Wilkinson, H.R., **Maps and Diagrams**, Methuen and Co., Ltd, 1971.

Singh, R.L., **Elements of Practical Geography**, Students Friends,, Allahabad, 1968.

Singh, R.N. & Kanauja, L.R.S., **Mapwork and Practical Geography**, Central Book Depot, Allahabad, 1963.

Trewartha, G.T. & Horn, L.H., **An Introduction to Climate**, Mc Graw Hill Book Company, New Delhi, 1980.

Second Semester

Semester II – Core Course

GG-426(P) :Research Methodology and Field Work- Survey Report (Physical)

Course Objectives:

1 The course examines the questions related to data collection, methods and its analysis.

2 The students will be able to do field work through practical experience and get skills of data collection methods and processing and analysis of obtained data.

Course Learning Outcomes:

1 The students will be able to understand basic concepts of field research methods and research design in geography.

2 The students will be able to write dissertation based on field work on given topic.

i. Research Methodology

Planning a geographic research project, Types of data, Methods of data collection, Methods of field work .

Preparation of questionnaire; sampling, techniques for primary data collection; data processing, representation, Analysis and interpretation of data, methods of references and bibliography

ii. Field work –survey report.

Field Survey Report – In consultation with their guide/teacher, the students will conduct a detailed field work to prepare a field report or project report on the basis of collected data and information for their examination. The survey
should based on the observation, measurement and collection of data. The field report should be prepared with quantitative techniques and meaningful analysis.

Suggested Readings:

Ackoff, R.L., **The Design of Social Research**, University of Chicago Prress, Chicago, 1961.

Kothari, C.R., **Research Methodology: Methods and Techniques,** 2nd edition, Wiley Eastern Ltd., New Delhi, 1993.

Miller, D.C., **Hand book of Research Design and Social Management**, 3rd. Edition, David Mekay Company. Inc. New York, 1977.

Mishra, R.P. **Research Methodology: A Hand Book**, Concept Publishing Company, New Delhi, 1981.

Mishra, H.N. & Singh, V.P., **Research Methodology in Geography**, Concept Publishing Company, New Delhi, 1998.

Selltiz, C. et al : **Research Methods in Social Relations**, Rinehart and Winston, Inc., New York, 1959

Sharma, B.A.N. et. al. **Research Methods in Social Sciences**, Sterling Publishers, New Delhi, 1983.

N.B. The objective of the field work is to conduct survey of a selected region/area and study micro geomorphic features, weather elements, local environment, pattern of land use, human life, etc.

Third Semester
Semester III –Core Corse
Paper GG-531: Hydrology

Course Objectives:

1This course give a holistic view of the water environments i.e., hydrology seen as a water carrier in nature with human influence.

2To know diverse methods of collecting the hydrological information, which is essential to understand surface and groundwater hydrology?

3To develop an understanding of how this knowledge may be applied in practice in an economic and environmentally sustainable manner.

Course Learning Outcome:

1 Apply the water balance equation to various hydrological problems in time and space.

2 Describe how components of the water cycle are influenced by human activities.

3 Analyse hydrological data in order to evaluate water resource management in an area.

Unit I: Hydrological cycle, distribution of earth's water, water balance concept and its quantitative explanation; Human interference in the hydrological cycle.

Unit II: Surface water hydrology: Precipitation, evaporation run-off infiltration, surface run-off, urban flooding; Drainage basin characteristics : drainage basin/watershed; measurement of water discharge, morphometric analysis.

Unit III: Ground water – Recharge and discharge of ground water occurrence and types, hydraulic conductivity, fluctuation of groundwater, quality of water.

Unit IV: Application of remote sensing in hydrological studies, water pollution watershed management, conservation of water resources, uses and demands

Suggested Readings:

Addison, H**. Land, Water and Flood**, Chapman and Hall, London 1961

Chorley, R.J.(ed.) : **Introduction to Physical Hydrology**, Methuen, London, 1969.

Chorley, R.J.: **Water, Earth and Man**, Methuen, London, 1967.

Dakshinamurthy, C. et al., **Water Resources of India and Their utilisation in Agriculture**, Indian Agriculture Research Institute, New Delhi, 1973.

Jones, J.A.A.: **Global Hydrology: Processes, Resources and Environmental Management**, Longman, London 1997.

Matter, J.R., **Water Resources, Distribution, Use and Management**, John Wiley, Marylane, 1984

Singh, R.A. and Singh S.R.: **Water Management Principles and Practices**, Tara publication, Varanasi, 1972.

Todd, D.K.: **Ground Water Hydrology**, John Wiley, New York, 1959.

Third Semester

Semester III – Core Course

Paper GG-532 : Regional Development and Planning

Learning Objectives:

1Learn the concepts of regions, regional development and regional planning to understand the relevance of geography in regional planning.

2To explore the ideas of measuring development by defining development as a multi-dimensional concept.

3Critical assessment of reasons for the success and failure of various regional development strategies adopted by India at different periods since independence.

Course Learning outcomes:

1Aware that uneven regional development is a real problem, and requires geographical insights to fully comprehend and solve the problem.

2Skillful in measurementof development for formulating regional development plans.

3Well versed with regional development theories (RGT) and techniques and also about their limitations when applied in different economic contexts.

Course content

Unit I: Concept of region, regional development and planning, Approaches to regional Development and planning, Geography and its role in regional development and planning.

Unit II: Concept of Development: – its social, economic, environment, and cultural dimensions, Indicators of development, Resource base development, regional disparities in development.

Unit III: Economic and planning regions, Methods of regionalization; Theories of regional development – Central place theory, Growth pole theory and Growth centre strategy, Economic Base Theory, Decentralization of planning.

Unit IV: Regional development strategy of India – India's five year plans, Integrated area development approach, micro-level planning and multi-level planning in India. Regional planning for tribal, agricultural, industrial and urban development, River basin planning, Damodar valley region, Metropolitan planning and Loktak Development Authority.

Suggested Readings:

Albert, R. et. al. : **Spatial Organization : The Geographer's View of the world**, Prentice Hall, N.J., 1971

Banerjee, A. and Kar. B.: **Economic Planning and Development of North Eastern States**, Kanishka Publications, New Delhi, 1999.

Bhat, L.S. et. al.: **Micro-level Planning: A Case Study of Karnal Area, Haryana**, Concept Publishing Co., New Delhi, 1976

Chorley, R.J. & Hagget, R.: **Models in Geography**, Methuen, London, 1967
Christaller, W.: **Central Places in Southern Germany**, Prentice Hall, Englewood, Cliffs, New Jersey, 1966
Deb, B.J.: **Regional Development in North East India**, Reliance Publications, New Delhi, 1995
Freeman, T.W. : **Geography and Planning**.
Friedman, J. & Alonso, W. : **Regional Development and Planning – A Reader**, MIT Press, Cambridge, 1969
Friedman, J.: **Utilization, Planning and National Development**, Bererly Hills, Sage Publications, 1973
Glasson, J.: **An Introduction to Regional Planning**, Hutchinson Educational Ltd., London, 1974
Glikson, A. : **Regional Planning and Development**.
Guha, P. and Sdasyuk, G.: **Economic Regionalisation of India**, Census of India, 1961, Monograph, No.7, 1968
Hilhorst, J.G.M. and Dunharm, D.M.: **Issues in Regional Planning**, Institute of Social Studies, The Hague, 1971
Kuklinski, A.R.(ed) : **Growth Poles and Growth Centres in Regional Development**, Mouton, The Hague, 1972
Mahesh Chand & Puri, V.K. : **Regional Planning in India.**
Misra, R.P.(ed) : **Regional Planning : Concepts, Techniques, Policies and Case Studies**,
Concept Publications, New Delhi, 1992
Misra, R.P. et. al. : **Multilevel Planning**, Heritage, Delhi, 1980
Mohapatra, A.C. and Rootray, J.K. : **Regional Development and Planning**, Rawat, Jaipur, 1998
Mukherjee, A.: **Methodology and Database for Decentralised Planning**, Heritage, New Delhi, 1991
Nair, K.R.S: **Regional Experience in a Developing Economy**, Wiley Eastern, New Delhi, 1982
Raza, M.(ed): **Regional Development**, Heritage, Delhi, 1988.
Sen, L.K. (ed.) : **Reading in Micro-level Planning & Rural Growth Centres**, NICD, Hyderabad, 1972
Sundaram, K.V.(ed.) : **Geography and Planning**.

Third Semester

Semester III – Elective Course

Paper GG-533 : Photogrammetry

Course objectives:

1Introduction to aerial photographs, geometry and properties of photograps.

2 Familiarities of different elements of photo interpretation.

3 Aware of basic information and specification of aerial photographs

Course Learning outcome:

1 Understanding the multiple application of various types of aerial photographs

2 Understanding and capability to use aerial photographs in major studies like Land use planning and soil mapping.

Course content

Unit I: Introduction and Definitions; Aerial camera lens aerial film negatives and types of aerial photographs; Geometry of aerial photographs; scale of photographs; Image displacement of aerial photographs; Measurement of height differences from aerial photographs, Parallax formula, Control for mapping from photographs

Unit II: Basic information and specifications for aerial photographs; Planning and execution of photographic flights; Completion of photographic task; Procurement, cost and security of aerial photography, Procedures for mapping of natural resources.

Unit III: Photo/Image interpretation; Visibility of objects; Elements of Image/photo interpretation; Techniques of image interpretation; Interpretation of keys, The use of Multi-images in image interpretation.

Unit IV: Application of aerial photo interpretation technique in geography: Land form analysis, Landuse analysis, Soil mapping; Geology aerial remote sensing in mineral exploration.

Suggested Readings:

American Society of Photogrammetry**: Manual of Remote Sensing**, ASP, Falls Church, V.A. 1983.

Barrett E.C. and L.F. Curtis**: Fundamentals of Remote Sensing and Air Photo Interpretation**, Mcmillan, New York, 1992.

Colwell, R.N.: **Manual of Remote Sensing, vol.I & II**, American Society of Photogrammetry, 1983

Compbell J.: **Introduction to Remote Sensing**, Guilford, New York, 1989.

Curran, Paul J.: **Principles of Remote Sensing**, Longman, London, 1985.

Gautam, N.C.: **Urban Landuse Study through Aerial Photo-interpretation Techniques**, Pink Publishing House, Mathura, 1970

Hord R.M.: **Digital Image Processing of Remotely Sensed Data**, Academic, New York, 1989.

Luder D**.: Aerial Photography Interpretation: Principles and Application**, McGraw Hill, New York, 1959.

Pratt W.K. **Digital Image Processing**. Wiley, New York, 1978.

Rao D.P. (eds.): **Remote Sensing for Earth Resources**, Association of Exploration Geophysicist. Hyderabad, 1998.

Thomas M. Lillesand and Ralph W.Kefer, **Remote Sensing and Image Interpretation**, John Wiley & Sons, New York, 1994.

Third Semester

Semester III – CBCS Course

Paper GG-534 : Agricultural Geography

Course Objectives:

1 This course attempts to introduce the students to the nature and origin of agriculture and its regions.

2The course examines the questions related to agricultural development and productivity in India.

3It also critically evaluates the environmental consequences and emerging perspective and policies and interventions aimed at sustainable agriculture

Course Learning Outcomes:

1 The students will be able to understand and analyse the historical perspective of agriculture.

2 The students will be able to analyse the agriculture development and productivity and its impacts on various sectors

3 The students will be able to get updated knowledge of contemporary issues and strategies.

Course content

Unit I: Nature and scope of agricultural geography, Origin and dispersal of agriculture, Approaches to the study of agricultural geography.

Unit II: Physical and non-physical factors of agricultural practices; Inputs of agriculture and environmental factors of agricultural production.

Unit III: Agricultural systems of the world; Agricultural regionalization Methods. Agricultural efficiency, Carrying capacity of land, Regional imbalances in crop production and dietary deficiency.

Unit IV: Agricultural regions of India, Green revolution, Land holding and land tenure system, Shifting cultivation in North-east India; Models of agricultural location; Principles of agricultural landuse planning, land capability classification.

Suggested readings (from page 113 of UGC model and old syllabus)

Bayliss Smith, T.P.: **The Ecology of Agricultural Systems**. Cambridge University Press, London, 1987.

Berry,B.J.L.et.al.: **The Geography of Economic Systems**. Prentice Hall, New York, 1976.

Brown, L.R.: **The Changing World Food Prospects – The Nineties and Beyond**. World Watch Institute, Washington D.C., 1990.

Dyson, T.: **Population and Food – Global Trends and Future Prospects**, Routledge, London, 1996.

Gobind, Nalini **: Regional Perspective and Agricultural Development**, Concept, Delhi, 1986

Gregor, H.P. : **Geography of Agriculture**. Prentice Hall, New York, 1970.
Grigg,D.B. : **The Agricultural Systems of the World**. Cambridge University Press, New York, 1974.
Hartshorn, T.N. and Alexander, J.W. : **Economic Geography**, Prentice Hall, New Delhi, 1988.
Hussain, M.: **Agricultural Geography**, Inter-India Publication, Delhi, 1979
Mannion, A.M. : **Agriculture and Environment Change**. John Wiley, London, 1995.
Morgan W.B. and Norton, R.J.C.: **Agricultural Geography**, Mathuen, London, 1971.
Morgan, W.B. : **Agriculture in the Third World – A Spatial Analysis**. Westview Press, Boulder, 1978.
Sauer, C.O. : **Agricultural Origins and Dispersals**. M.I.T. Press, Mass, U.S.A., 1969.
Singh, J. and Dhillon, S.S. : **Agricultural Geography**, Tata McGraw Hill Pub., New Delhi, 1988.
Shafi Mhd: Agricultural Geography, , 2008
Symons, L.: **Agricultural Geography,** G. Bells and Sons, London, 1967
Tarrant, J.R. : **Agricultural Geography**. Wiley, New York, 1974.
Whealer, K.E., A.M. Ladley and P.G. Leong : **Studies in Agricultural Geography**, Bland Educational, London, 1970

Third Semester

Semester III – Core Course
Paper GG-535(P) : Spatial Analysis

Course Objectives:

1 This course studies the concept of statistics and its geographical applications.
2 It lays the foundation of quantitative techniques to the students for spatial analysis.
3 It will enhance the ability to interpret data statistically.

Course Learning Outcomes:

1The students will learn various statistical skills.
2The students will know how the statistical theories and functions will be applied in geography.
3 The students will learn about the significance test to strengthen their argument with facts and represent data.

Exercises on Gravity and potential models and their applications, distribution of Trade hinterland area of central places, Network analysis – detour index, road connectivity, alfa, beta and gamma indices and Distant–decay relationship.

Spatial distribution of crops and cropping pattern – crop combination, crop concentration, crop diversification, crop intensity, agricultural efficiency.

Distribution of settlements showing dot and pie diagrams. Density of settlement, Determination of spacing of settlement, Functional classifiation of towns, Nearest neighbour index; Rank-size relationship, Determination of settlement hierarchy.

Suggested Readings:

Berry, B.J.L. & Marble, D.F.: **Spatial Analysis: A Reader in Statistical Geography**, Prentice Hall Inc., 1968.
Chorley, R.J. & Haggett, P(eds.): **Models in Geography**, Methuen, London, 1967.
Haggwett, P. & Mc Cullagh, P.: **Locational Analysis in Human Geography**, Arnold, London, 1965.
Mahmood, Aslam : **Statistical Methods in Geographical Studies**, Rajesh publication, New Delhi, 1976.
Monkhouse, F.J. & Wilkinson, H.R.: **Maps and Diagrams**, Methuen and Co. Ltd., 1971.
Smith, D.M. : **Patterns in Human Geography**, Penguin Books, 1975.
Yeates, M.M. : **An Introduction to Quantitative Analysis in Human Geography**, Mc Graw Hill Inc. 1974.

Third Semester

Semester III – Core Course
Paper GG-536(P) : i) Soil & Hydrological Analysis
ii) Survey: Dumpy level/ Theodolite/ Total station

Course objectives:

1Apply the water balance equation to various hydrological problems in time and space.
2 Analyse hydro-meteorological data for better water resource management in an area.
3 Surveying by using instruments.

Learning outcome:

1Determination of Effective Uniform Depth of Precipitation to represent rainfall data in various studies.
2 Measurement of porosity levels of different types of soils

Course content

a) Drainage basin analysis – shape of the basin, Drainage density, Drainage frequency.
Measurement of discharge of stream at various points and explanation of the variation.
Determination of effective uniform of depth of precipitation using i) Arithmatical Mean, ii) Isohytal and iii) Theissen Method.
Plotting data on a graph and explanation of the relationship between discharge and rainfall.
Drawing of unit hydrograph with given data and interpretation of the graph.
Measurement of percentage of load carried by a stream i) by volume and ii) by weight.
Determination of coefficient of permeability and ii) hydraulic conductivity of a given sample of soil.
Grain size analysis load carried by stream; Density analysis of load carried by stream.
Hydraulic conductivity by lab. & field methods, Darchy's law.
Soil permeability measurement.

b) Preparation of profiles and themetic maps (built-up areas, road network, land configuration,etc.) by using survey instruments.

Suggested Readings:

Bruce and Clark: **Introduction to Hydrometeorology**, Pergamon Press, London, 1959

De Wiest, R.J.M.: **Geohydrology**, John Wiley, 1965

Gondie, A. et al: **Geomorphological Techniques**, Union Hyman, London, 1990.

Karanth, K.R.: **Groundwater Assessment : Development and Management**, Tata McGraw Hill, New Delhi, 1987

Raghunath, H.M**.: Hydrology**, Wiley Eastern, Ltd. New Delhi, 1985

Rao, K.L.: **India's Water Wealth**, Orient Longman, New Delhi, 1979

Reddi, R.J.: **The Textbook of Hydrology**, Laxmi Publishers, New Delhi, 1999

Singh, R.A. and Singh, S.R.: **Water Management: Principles and Practices**, Tara publications, Varanasi, 1979

Smith, K.: **Water in Britain: A Study in Applied Hydrology and Resource Geolography**, Mc Millan, London, 1972

Tebbut, T.H.Y.(ed) : **Advances in Water Engineering**, Elsevier Applied Science publication, London, 1985

Thonthwaite and Mather : **The Water Balance**, Publication in Climatyology, vol.viii, No.I. 1955.

Fourth Semester

Semester IV – Core Course

Paper GG-541 : Political Geography

Course Objectives:

1. To critically understand the concepts of state, nation and nation-state, and forms of governance, such as Colonialism, Decolonization, Neo-colonialism, and Federalism.
2. This course introduces the students with concepts of geopolitics, geostrategic views, and significance of political and economic blocs.
3. Election geography and Indian geopolitical issues – boundary disputes, national and international water disputes, and separatist movement - are also discussed in details.

Programme Outcomes:

1. This course helps to understand Indian political structure, democracy, electoral geography and resource conflicts.
2. It apprehends the students about the nation, nationalism and differences between state and governments and their roles to the citizen's welfare.
3. Understand the students to the dialogue on Indian diplomatic relations and power, and geopolitical strategies, especially in South-East Asia and the Indian Ocean Region.

Course content

Unit I: Nature, Scope and Content of Political Geography. Approaches to the Study of Political Geography: Hartshorne's Functional Approach; Jones' Unified Field Theory; and Wallerstein's World-Systems Theory. Political geography in the era of Globalisation.

Unit II: Concepts of Political Geography: State, Nation and Nation-State; Territory, Territoriality and Sovereignty; core and periphery concepts; Frontiers and Boundaries; Enclaves and Exclaves. Location, Shape and Size of State: Buffer States and Land Locked States; Strait, chokepoints. Forms of Governance: Colonialism, Decolonization, Neocolonialism, and Federalism. Significance of Political and Economic Blocs.

Unit III: Concepts of Geo-politics: Ratzel's Organic Concept of State. Critical Geopolitics. Geo-strategic Views: Mahan's Sea Power Theory; Mackinder's Geographical Pivot and Heartland Theory; Spykman's Rim Land Theory. Geo-politics in South-East Asia. Geopolitical Significance of Indian Ocean Region.

Unit IV: Electoral Geography: Approaches to Study of Electoral Geography; Geographic Influences on Voting Pattern; Electoral Abuse, Malapportionment, and Gerrymandering. Boundary Dispute and Geo-Political Setting of India. National and International Water Disputes of India. Geopolitics of North-East India.

Suggested Readings:

De Blij, H. J., &Glassner, M., **Systematic Political Geography**. John Wiley, New York, 1968.

Sudeepta, A.,**Political Geography. Rawat, 1997.**

Dikshit, R. D.,**Political Geography: A Contemporary Perspective**. Tata Mc Graw Hill, New Delhi,1996.

Dikshit, R.D. **Political Geography**, New Delhi, 2004

Dikshit, R.D. **Political Geography, a Century of Progress**, New Delhi, 1999.

Taylor, P., **Political Geography**. Longman, London, 1985.

Hazarika, J., **Geopolitics of North-East India: Strategical Study**. Gyan Publishing House, New Delhi, 1996.

Taylor, P. J. &Flint, C., **Political Geography World-Economy, Nation-State and Locality**. Routledge, 2019.

Taylor,P.,**Political Geography**, London, 1985.

Fourth Semester

Semester IV –Elective Course

GG-542 : Satellite Remote Sensing & Geographical Information System

Learning Objectives:

1This course aims to teach students the fundamental concepts related to satellite remote sensing in optical, thermal and microwave bands & GIS.

2Will apprise the students to the essentials of digital image processing techniques.

3Understanding the fundamentals elements of GIS and its relationship with remote sensing.

Learning Outcomes

1Students will show good knowledge about the theory of remote sensing and GIS.

2In-depth understanding of the relative advantages and disadvantages of using remote sensing at numerous electromagnetic regions.

3Students will demonstrate the ability to independently pursue research using remote sensing GIS techniques in different branches of geography where application of spatial technology is relevant.

Unit I: Historical development of Remote Sensing as a technology, Physical bases of remote sensing: Electromagnetic energy, Energy interactions in the atmosphere and earth surface features, Sensor platforms, orbital characteristics, Sensor packages and satellite data distribution; Remote Sensing data forms and their interchange ability

Unit II: Numerical data processing: Image correction; Image enhancement; Principles of basic concepts of Thermal and micro wave sensing system; Image classification procedure: unsupervised and supervised method; Ground data and training set manipulation.

Unit III: Regionalization of terrain from remotely sensed data, Application of remote sensing in geological mapping, Landuse/landcover mapping, mapping of soils and landforms; Remote Sensing as a means of environmental conservation and resource management.

Unit IV: Remote Sensing and Geographic Information System; Components of GIS, Database structures; Data input and output; GIS in urban planning; Geological application of GIS.

Suggested Readings:

American Society of Photogrammetry: **Manual of Remote Sensing**, ASP, Falls Church, V.A. 1983.

Barrett E.C. and L.F. Curtis: **Fundamentals of Remote Sensing and Air Photo Interpretation**, Mcmillan, New York, 1992.

Clarke, K.C., Parks, B.O., M.P. Crane (Ed): **Geographic Information Systems and Environmental Modelling**, Prentice Hall of India, New Delhi, 2002
Compbell J.: **Introduction to Remote Sensing**, Guilford, New York, 1989.
Curran, Paul J.: **Principles of Remote Sensing**, Longman, London, 1985.
Fraser Taylor, D.R.: **Geographic Information Systems**, Pergamon Press, Oxford, 1991
Hord R.M.: **Digital Image Processing of Remotely Sensed Data**, Academic, New York, 1989.
Lillesand T.M. & R.W.Keifer: **Remote Sensing and Image Interpretation**, John Wiley & Sons, New York (Fourth Ed), 1999
Luder D.: **Aerial Photography Interpretation: Principles and Application**, McGraw Hill, New York, 1959.
Maquire D.J.M.F. Goodchild & D.W. Rhind(eds), **Geographic Information Systems: Principles and Application**, Taylor & Francis, Washington, 1991
Peuquet D.J. and D.F. Marble, **Introductory Reading in Geographic Information Systems**, Taylor & Francis, Washington, 1990
Pratt W.K. **Digital Image Processing**. Wiley, New York, 1978.
Rao D.P. (eds.): **Remote Sensing for Earth Resources**, Association of Exploration Geophysicist. Hyderabad, 1998.
Sabins, Floyd, F**.: Remote Sensing Principles and Interpretation (Third Ed)**, W.H. Freeman and Company, New York, 2000
Star J and J. Ester, **Geographic Information Systems: An Introduction**, Prentice Hall, Englewood Cliff, New Jersey, 1994
Thomas M. Lillesand and Ralph W.Kefer, **Remote Sensing and Image Interpretation**, John Wiley & Sons, New York, 1994.

Fourth Semester

Semester IV – Core Course
Paper GG-543 : Urban Geography

100 Marks/4 Credit

Course Objectives:

1 To introduce the students with concepts of urbanisation, its trends and pattern, and the components of its growth.

2 To discuss the urban land use and land cover models, urban hierarchy, urban morphology and rural-urban interactions.

3 To analyse the contemporary urban issues focusing on Indian cities.

Course learning Outcomes:

1This course provides an overview of the contribution of urban to the economic growth in India.

2 It helps the students to explore the processes of urban growth and the role of countryside to same, urban culture and heterogeneity, and urban issues and planning.

Course content

Unit I: Nature and scope of urban geography, approaches and recent trends, origin and growth of urban settlements during ancient and medieval and modern periods

Unit II: Classification of towns, urban functions, basic and non-basic functions, functional classification of urban settlements. urban economy, Urban morphology, city regions, umland, periphery, urban- rural contrast, urban-rural continuum.

Unit III: Urbanization , trends of urbanization in developed and developing countries; Process of urbanization , urban primacy, centralisation and decentralisation, urbanisation in the North-east India.

Unit IV: Urban issues: Urban poverty, slums, pollutions , solid waste, urban health, transportation, housing and urban infrastructure; Urban policy and planning: urban renewal, globalisation and urban planning in the third world countries.

Suggested Readings

Alam, S.M.: **Hyderabad – Secunderabad Twin Cities,** Asia Publishing House, Bombay, 1964.

Berry, B.J.L. and Horton F.F. **Geographic Perspectives on Urban Systems**. Prentice Hall, Englewood Cliffs, New Jersey, 1970.

Carter: **The Study of Urban Geography**, Edward Arnold Publishers, London, 1972.

Chorley, R.J.O., Haggett P. (ed.): **Models in Geography**, Methuen, London, 1966.

Dickinson, R.E.: **City and Region**, Routledge, London, 1964.

Dickinson, R.E.: **West European City**, London, 1952

Dwyer,D.J. (ed.): **The City as a Centre of Change in Asia**, University of Hong Kong Press, Hongkong, 1971.

Garnier, J.B. and Chabot, G.: **Urban Geography**, Longman, 1967

Gibbs J.P.: **Urban Research Methods**, D.Van Nostrand Co. Inc. Princeton, New Jersey, 1961.

Hall P.: **Urban and Regional Planning**, Routledge, London, 1992.

Hauser, Phillip M. and Schnore Leo F. (ed.): **The Study of Urbanisation**, Wiley, New York, 1965.

James, P.E. and Jones C.F. (eds.): **American Geography, Inventory and Prospect**, Syracuse University Press, Syracuse, 1954.

Kundu, A.: **Urban Development and Urban Research in India**, Khanna Publication, 1992.

Meyor, H.M. Kohn C.F. (eds.): **Readings in Urban Geography**, University of Chicago Press, Chicago, 1955.

Mumford, L.: **Culture of Cities**, McMillan & Co., London, 1958.

Nangia, Sudesh: **Delhi Metropolitan Region: A study in settlement geography**, Rajesh Publication, 1976.

Rao V.L.S.P. : **Urbanisation in India: Spatial Dimensions**. Concept Publishing Co., New Delhi Concept, New Delhi.
Rao V.L.S.P.: **The Structure of an Indian Metropolis: A Study of Bangalore**, Allied Publishers Bangalore, 1979.
Singh K. and Steinberg F. (eds.): **Urban India in Crisis**, New Age Interns, New Delhi, 1998.
Singh, R.L.: **Banaras : A Study in Urban Geography**, Banaras, 1955
Smiles A.E.: **The Geography of Towns**, Hutchinnson, London, 1953.
Taylor, G.: **Urban Geography**, Methuen, 1951
Tewari, Vinod K., Jay A. Weinstein, VLSPrakasa Rao (editors**): Indian Cities: Ecological Perspectives**, Concept, 1986.

Fourth Semester

Semester IV – CBCS Course
Paper GG-544 : Rural Settlement Geography

Course Objectives:

1 Understand the human settlement system
2 Understanding the functional characteristics and prevailing issues of rural India
` 3 Appraisal of elements of cultural landscape of rural settlement with special reference to India.

Course Learning Outcome:

1 Capable to identify how human beings have habitation pattern.
2 Familiarity with the rural landscape and its surroundings
3 It will acknowledge and perceive the actual happening of rural environment

Course content

Unit I: Nature and scope settlement geography. Approaches to rural settlement geography ; human settlement as a system. Histogenesis of rural settlements: spatio-temporal dimensions and sequent occupance.
Distribution of Rural settlements: size and spacing of rural settlements.

Unit II: Types, forms and Patterns of rural settlements: cause and effect; Functional classification of rural settlements; Central places and rural service centres: their nature, hierarchy and functions

Unit III: Social issues in rural settlements: poverty, housing and shelter, deprivation and inequality,Rural-urban interaction. Environmental issues in rural settlements: access to environmental infrastructure: water supply, sanitation, drainage, occupational health hazards.

Unit IV:Cultural landscape elements in rural settlements in different geographicalenvironments with special reference to India: House types and field patternsOrigin, evolution, size, socio-spatial structure of Indian villages.

Suggested Readings

Alam,S.M.et.al.P **Settlement System of India**, Oxford and IBH 2. Publication Co, New Delhi, 1982.
Brook, J.O.M. and Welb, J.W.: **Geography of Mankind**, McGraw Hill, London, 1978.
Chisholm, M.: **Rural Settlements and Land Use**, John Wiley, New York, 1967.
Clout, H.D.: **Rural Geography**, Permagon, Oxford, 1977.
Daniel, P. and Hopkinson, M.: **The Geography of Settlement**, Oliver & Byod, Edinburgh, 1986.
Grover, N.: **Rural Settlements – A Cultural Geographical Analysis**, Inter-India Publication, Delhi, 1985.
Hudson, F.S.: **A Geography of Settlements**, MacDonald & Evans., New York, 1976.
Mitra, A.: **Report on House Types and Village Settlement Patterns in India**. Publication Development, Govt. of India, Delhi, 1960.
Ramchandran, H.: **Village Clusters and Rural Development**, Concept Publication, New Delhi, 1985.
Rao, E.N.: **Strategy for Integrated Rural Development**, B.R. Publication Cor., Delhi, 1986.
Rappoport, A.: **House Form and Culture**, Prentice Hall, New Jersey, 1969.
Sharma, R.C.: **Settlement Geography of an Indian Desert**, K.B. Publications, 1972
Sen, L.K. (ed.): **Readings in Micro-Level Planning and Rural Growth Centres**, National Institute of Community Development, Hyderabad, 1972.
Singh, R.L. and Singh, K.N. (eds): **Readings in Rural Settlement Geography**, B.H.U., Baranasi
Singh, R.Y.: **Geography of Settlements**, Rawat, Jaipur, 1998
Srinivas, M.N.: **Village India**, Asia Publication House, Bombay, 1968.
Wanmali, S.: **Service Centres in Rural India**, B.R. Publication Cor., New Delhi, 1983.
Uelko, M.J. et al: **Man, Settlement and Urbanisation**, Duckworth, 1972

Fourth Semester

Semester IV – Core Course
Paper GG-545(P) : Remote Sensing and Photogrammetry

Course Objectives:

1To develop an understanding of remote sensing and photogrammetry.
2 To develop basic skills to interpret remote sensing images and aerial photographs for various applications in geography.
3 Generating quantitative data from remotely sensed data aerial photographs and measuring

Course Learning Outcomes:

1Overall understanding of potential of Remote Sensing and aerial photographs
2 Understanding of image interpretation with various types of data.
3 Preparation of thematic maps and use it integrated applications in various

domains of Geography.

Course content

Stereo test and study of different types of aerial photos, Orientation of stereo-model under mirror stereoscope and analysis of aerial photographs, Preparation of base map; Determinant of photo-scale, Determination of heights and slopes, Preparation of drainage and geomorphological maps from aerial photographs, preparation of forest and landuse/landcover mapping from aerial photographs.

Visual interpretation of satellite data for landuse and forest mapping, Visual interpretation of satellite data for geomorphological and drainage mapping for watershed analysis, Study of image processing system, Display of raw data, Histogram analysis, Enhancement of data classification.

Suggested Readings:

American Society of Photogrammetry **: Manual of Photographic Interpretation**, Banta Publishing Co., Menastha, Wisconsin, 1960

Anderson, J.R. et al: **A Landuse/Landcover Classification System for Uses with Remote Sensing Data**, USGS – Professional Paper, 1976

Avery, T.E. : **Interpretation of Aerial Photographs**, Burgess Publishing Co., Minnupolis, 1963

Barrett, E.C. & Curtis, L.F.: **Introduction to Environmental Remote Sensing**, Champman Hill, London, 1976

Estes, J.E. & Senger, L.W. : **Remote Sensing Techniques for Environmental Analysis**.

Killford, W.K.: **Elementary Air Survey**, Pitman, London, 1963

Latman, L.H. & Ray, R.G. : **Aerial Photographs in Field Geology**.

Lo, C.P.: **Geographical Applications of Aerial Photography**, David and Charles (pub) Ltd., North Vancarver, 1976

Luder, D. : **Aerial Photographic Interpretation : Principles and Application,** Mc Graw Hill, New York, 1959

Nag, P.(ed): **Thematic Cartography and Remote Sensing**, Concept publishing Co., New Delhi, 1992

Narayan, L.R.A.: **Remote Sensing and its Applications**, University press (India) Ltd., Hyderabad, 1999

Pandey, S.N. : **Principles and Applications of Photogeology**.

Patel, A.N. and Singh, S.: **Principles of Remote Sensing**, Scientific Publishers, Jodhpur.

Reevas, R.G. : **Manual of Remote Sensing vol.I & II**.

Smith, H.T.V.: **Aerial Photographs and their application**.

Spurr, S.H. : **Photogrammetry and Photo Interpretation**.

Tomar, M.S. & Maslekar, A.R.: **Aerial Photographs in Landuse and Forest Surveys**.

U.S.Dept.of Interior/**Geological Survey: Studying the Earth from Space.**

Wolf, P.R. : **Elements of Photogrammetry,** Mc Graw Hill, New York, 1974

Fourth Semester

Semester IV – Core Course

Paper GG-546(P) : GIS and Field Work (Socio-economic)

Course Objectives:

1 To make students acquainted with standard GIS techniques through hands-on practical exercises

2 To enable students to use GIS as a decision support system for different geographical applications

3 Understanding generation of data from the field.

Learning Outcomes:

1 Understanding of geospatial data management and analysis functions

2 Understanding of analytical modelling with GIS

3 Data processing and preparation of field report

Course content

i. GIS

Introduction to GIS Software, Data import(scanned maps, satellite images, and other sources), point map generation, Geo-referencing(direct and image to image); Data Input – On screen Digitization – Creation of Point, Line and Polygon layers; Spatial Data Analysis; Preparation of Non-Spatial Data, Linking Spatial and Non-Spatial data, Attribute data input and Measurement of Distance, Area, Map compilation and Design, layout

Data Conversion – Vector to Raster and Raster to Vector, Spatial and Non spatial Query and Analysis

Vector operations - Overlay analysis, Clip, Erase, Identity, Union, Intersection; Proximity Analysis: Buffering; Summary Statistics, Calculation of Area, Perimeter and distance; Raster Data Exploration: Query Analysis - Local operations; Reclassification, Logical operations, Filtering, Statistical Operations; Case study/Application based assignment

ii. Field Work (Socio-Economic)

In consultation with their guide/teacher, the students will conduct a detailed survey of a selected area/village/block to prepare a field report or project report for their examination. The survey should base on prepared schedule questionnaire. The field report should be prepared with quantitative techniques and meaningful analysis.

NOTE :The practical papers including field report of MA/MSc.final geography shall be examined by the internal and external examiners.

Suggested Readings:

Anderson, J. et.al. : **Thesis and Assignment Writing**.

Archer, J.E. & Dalton, T.H. : **Field Work in Geography**.

Elhance, D.N. : **Fundamentals of Statistics**, Kitab Mahal, Allahabad, 1972

Garnett, A.: **Geographical Interpretation of Topographical Maps**, Harrapa and Co., London, 1945

Hammond, R. & Mc Cullagh, P., **Quantitative Techniques in Geography**, Clarendon Press, Oxford, 1965.

Hody Kess, A.G.: **Maps for Books and Theses**, David and Charles, New York, 1970

Johnes, T.A. **: Field Work in Geography**.

Kothari, C.R.: **Research Methodology**, Wishva Prakashan, New Delhi, 1975

Misra, G.K.: **Block Level Planning**

Mishra, R.P., **Fundamentals of Cartography**, Prasaranga, University of Mysore, 1969.

Monkhouse, F.J. & Wilkinson, H.R., **Maps and Diagrams**, Methuen and Co., Ltd, 1971.

Sharma, B.A.V.et.al.: **Research Methods in Social Sciences**.

Sinha, B.N.: **Sirsi – An Urban Study in Application of Research Models**.

Singh, R.L., **Elements of Practical Geography**, Students Friends, Allahabad, 1968

Stoddart, R.H.: **Field Techniques and Research Methods in Geography**, Kundall Hunt Publication, Dubuque, 1982.