Applied and Advanced Geomorphology **Course Code: IGGEO22C701/PGGEO22C101**

Course Outcome: *The course has been designed to provide learners an understanding of fundamental principles, theories and process in geomorphology and the evolution of landforms in various environmental settings. After the completion of this course, students are expected to possess the skills to quantitatively use and evaluate geomorphological data with numerical, statistical and spatial technological methods. They are also expected to possess the ability to analyze relationships between physical and human aspects of environments and landscape.*

Credit-I

1. Recent Developments in Geomorphology
2. Fundamental Concepts:
   a) Uniformitarianism
   b) Geological Structures
   c) Order of Superposition
3. Multicyclic and Polygenic Evolution of Landscapes.
4. Wilson's Cycle of Landform Evolution

Credit-II

1. Earth Movements: Epeirogenesis & Orogenesis
2. Concept of Gradation – Types and Classification of weathering
3. Mass Wasting
4. Types and Classification of Mass Movements

Credit-III

1. Slope Development Theories (Allen Wood and Dalrymple's)
2. Theories of Landscape Development: Davis and Penck
3. Forces of Crustal Instability: Seismicity, Vulcanicity, Plate tectonics
4. Evolution and Structure of Himalayas: Geosynclinal and Plate tectonics

Credit-IV

1. Geomorphology for Natural Hazards: Earthquake and Landslides
2. Geomorphology for Hydrology and Mineral Exploration
3. Geomorphology for Engineering studies
4. Geomorphology for Petroleum studies

Suggested Readings:

1. *H. Strahler, & A. N. Strahler., Modern Physical Geography, John Willy & Sons, Inc. 2001.*
2. *D.S. Lal., Physical Geography, Sharda Pustak Bhawan. 2009.*
3. *Majid Hussain, Physical Geography, Anmol Publications Pvt. Ltd. 2007.*
4. *S.A, Qazi., Principals of Physical Geography, AHP Publishing Co.2004.*
5. *Satopa Mukherjee.,Understanding Physical Geography, Oriental Longman. 2002.*
6. *Savindra Singh., Physical Geography, Prayag Pustak Bhawan, 2000.*
7. *Singh,S., Geomorphology, Prayag Pustakalaya, Allahabad, 1998.*

Modern Geographical Thought **Course Code: IGGEO22C702/PGGEO22C102**

Course Outcome: *The course provides a broad overview of the development of geographical thought. It appreciates the diverse subject matter of Geography which has incorporated and developed theories and ideas from interdisciplinary contexts and also focuses on the evaluation of core elements which make up geographical thought and how these have emerged as a result of debate, controversy and innovations in geographical research. The course aims to enable the learners to evaluate and articulate the strengths and weaknesses in the philosophical basis of Geographical research and also equip them with the abilities to formulate and articulate their own perspectives on issues related to thought and practice in geography.*

Credit I

1. Changing Nature of Geography
2. Development of Geography: Greeks, Romans and Arabs
3. Chinese Contribution to Geography (Ancient Period)
4. Development of Geography in India – Ancient and Modern Period

Credit II

1. German School of Geography (Varienus, Kant, Humboldt, Ritter, Ratzel, Hettner and Albrecht Penk)
2. French School of Geography (Vidal-de-la Blache, Jean Brunches and De Morton)
3. American School of Geography (Davis, Semple, Huntington and Hartshorne)
4. British School of Geography (Mackinder, Geddes and Stamp)

Credit III

1. Soviet Union School of Geography (Dokuchaiev, Voeikov and Anuchin)
2. Paradigm shift in Geography: Ancient to Post-Modern Period)
3. Quantitative Revolution in Geography
4. Positivism in Geography

Credit IV

1. Philosophical Concepts: Pragmatism, Radicalism, Idealism, Realism
2. Humanistic and Behavioral Approach
3. Concept of Social Wellbeing
4. Darwin's Impact on Geography

Suggested Readings:

1. *Dickenson, R.E., The Makers of Modern Geography, Routledge, London. 1969.*
2. *Dikshit, R.D., Geographical Thought, A Contextual History of Ideas, IPH, New Delhi. 1999.*
3. *Dikshit, R.D., Art and Science of Geography, 1994.*
4. *Freeman T.W., Hundred Years in Geography, 1961.*
5. *Hartshone, R., The Nature of Geography, Lancaster, 1935.*
6. *Hartshone, R., Perspectives on Nature of Geography. Rondo Macrolly, Chicago, 1959.*
7. *Husain, M., Evolution of Geographical Thought, Rawat Publications, Jaipur. 1984.*
8. *James, P.E., All Possible World - A history of Geographical Ideas, The Odyssy Press, New York 1972.*
9. *Jenson, H., Geography-Its History and Concepts, Harper Publishers, New York, 1981.*
10. *Lalita, R., Geographical Thought – A Systematic record of evolution, Concept Publishing, New Delhi, 2008.*
11. *Stodard, D.R. Darwin's impact on Geography, A.A.A.G.Vol.58, 1966.*
12. *Tozer, H.F., History of Ancient Geography, Cambridge, 1951*

Quantitative Techniques in Geography **Course Code: IGGEO22C703/PGGEO22C103**

Course Outcome: *The course is aimed to introduce the foundational skills of how to generate and display the quantitative and qualitative spatial and non-spatial data to solve Earth and Space science problems, and how to gain an appreciation for the processes that operate at these Spatio-temporal scales. The students will develop hands on computer algorithms and digital image processing techniques. The course will help the students to identify the specific data and methodologies for effective mapping and evaluation of natural resources. Moreover, the application of geospatial technologies for hazard mitigation and management is the core concern of the curriculum.*

Credit I

1. Data and its types
2. Measures of Central tendency
3. Measures of Dispersion (Mean Deviation, Standard Deviation , coefficient of variation and Variance)
4. Measures of Inequality (Lorenz Curve and Gini's Coefficient)

Credit II

1. Measures of Skewness
2. Sampling: Laws and Types
3. Hypothesis: Types and Testing (t and z Test)
4. Trend analysis: Mann Kendall, ANOVA

Credit III

1. Multiple Correlation
2. Regression and line of Best fit
3. Time series: Moving Average, LSM
4. Spatial gradient analysis, Wentworth's method of slope analysis

Credit IV

1. Statistical software's: Microsoft Excel, SPSS
2. Construction of Composite Index (Bhatia and Khusroos Method)
3. Crop combination analysis (Weaver's, Rafiullah's and Nelson's method)
4. Statistical Analysis: Mean, Median, Mode, Correlation and Regression (Excel and SPSS)

Suggested Readings:

1. *Archer, J.E and Dalton, T. H., Field Work in Geography, E. T. Bastsford Ltd., London, 1968.*
2. *Ishtiaq, M., A text Book of Practical Geography, Heritage Publishing House, New Delhi, 1989.*
3. *Johnston, R. J., Multivariate Statistics in Geography. Longman, London, 1978.*
4. *Jones, P. A,. Field work in Geography, Longman, London, 1968.*
5. *Keates, J. S., Cartographic Design and Production, Longman, London, 1973.*
6. *Mishra, R. P. & Ramesh, A., Fundamentals of Cartography, Concept Publishing Company, New Delhi, 1969.*
7. *Monkhouse, F. J., Maps and Diagrams, Methuen & Co., London, 1967.*
8. *Nayer, N. B., Encyclopedia of Surveying, Maps and Remote Sensing, Rawat Publishers, New Delhi, 1996.*
9. *Sarkar, A., Practical Geography, Sangam Books, New Delhi, 1997.*
10. *Singh, L.R., Elements of Practical Geography, Kalyani Publishers, New Delhi, 1997.*
11. *Summer, G., Mathematics for Physical Geographers, 1978.*
12. *Yeats, M. H., An Introduction to Quantitative Analysis in Human Geography, 1974.*

Economic Geography **Course Code: IGGEO22E701/PGGEO22E101**

***Course Outcome**: The course aims at providing students with tools, models and methods which are useful in understanding economic phenomenon with reference to the changing geographical attributes. At the end of the course, the students will be able to identify and measure factors responsible for establishment and localization of industry at national and global level. The course will enable students to understand various aspects manufacturing, clustering and agglomeration dynamics, to evaluate the role of different attractive and repulsive forces within relevant models to explain the international flows of goods, capital and work force.*

Credit I

1. Introduction to Economic Geography
2. Economic Development – Indicators; Human Happiness Index
3. Economic Infrastructure (Transport) and SEZ
4. Rostov's Model of Growth

Credit II

1. Economic activities and their classification
2. Factors of location of economic activities
3. Economic location theories- Weber, Smith and Losch
4. Agricultural land use theories- Ricardo and Von Thunen

Suggested Readings:

1. *A.M. Bagulia., Encyclopedia of Economic Geography; Wiley Blackwell Companion*
2. *B.W Hodder & Roger Lee. Economic Geography, Mutheun & Co Ltd. 1974*
3. *Chrales Redway Dryer., Elementary of Economic Geography, Wiley Blackwell Companion.*
4. *Cumbers Mackinnon., Introduction to Economic Geography: Globalization, Uneven Development &*
5. *J G Bartholomew., Atlas of Economic Geography, Wiley Blackwell Companion*
6. *James Franklin Chamber., Geography: Physical, Economic, Regional, Wiley Blackwell companion*
7. *K. Siddhartha., Economic Geography; Kitab Mahal, 2016.*
8. *Peter E. Llyod & Pter Dikcken, Location in Space: A Theoretical Approach to Economic Geography, Harper and Row Publishers, 1972*
9. *Roy, P., Economic Geography-A Study of Resources, New Central Book Agency Ltd, Calcutta, 1997*
10. *T. C Sharma., Economic Geography of India, Rawat Publishers, 2013.*
11. *Trevor J. Barnes, Jamie Peck & Eric Sheppard., Economic Geography, Wiley Blackwell Companion.*
12. *Trevor J. Barnes., Reading Economic Geography, Wiley Blackwell Companion.*
13. *Truman A. Hartshorne and John. W. A., Economic Geoghraphy, Prentice Hall of India, 2000*
14. *Uma Kapila., Indian Economy Performance and Policies (16th edition), Academic Foundation, 2015.*

Resource Geography **Course Code: IGGEO22E702/PGGEO22E102**

***Course Outcome**: The course aims at providing students with tools, models and methods which are useful in understanding economic phenomenon with reference to the changing geographical attributes. At the end of the course, the students will be able to identify and measure factors responsible for establishment and localization of industry at national and global level. The course will enable students to understand various aspects manufacturing, clustering and agglomeration dynamics, to evaluate the role of different attractive and repulsive forces within relevant models to explain the international flows of goods, capital and work force.*

Credit I

1. Concept and Classification of Resources
2. Water and Energy Resources in India
3. Resources – Conservation and Planning
4. Role of Technology in Resource development

Credit II

1. Resource Regions of India
2. Food security – Global and Regional
3. Sustainable Development
4. Impact of Resource Utilization on Environment

Suggested Readings:

1. *James Franklin Chamber., Geography: Physical, Economic, Regional, Wiley Blackwell companion*
2. *Peter E. Llyod & Pter Dikcken, Location in Space: A Theoretical Approach to Economic Geography, Harper and Row Publishers, 1972*
3. *Roy, P., Economic Geography-A Study of Resources, New Central Book Agency Ltd, Calcutta, 1997*
4. *T. C Sharma., Economic Geography of India, Rawat Publishers, 2013.*
5. *Trevor J. Barnes, Jamie Peck & Eric Sheppard., Economic Geography, Wiley Blackwell Companion.*
6. *Trevor J. Barnes., Reading Economic Geography, Wiley Blackwell Companion.*
7. *Truman A. Hartshorne and John. W. A., Economic Geoghraphy, Prentice Hall of India, 2000*
8. *Uma Kapila., Indian Economy Performance and Policies (16th edition), Academic Foundation, 2015.*

Geography of Urban Environment – I **Course Code: IGGEO22E703/PGGEO22E103**

Course Outcome: *The course comprises of two credits which allows students exposure to the emerging urban scenario at national and international level. Indian cities are growing at a rapid pace in terms of their demographic and spatial size and functional activities. Urban growth has been lopsided one skewed in favour of large metropolitan cities associated with serious environmental problems. They need constant attention for their future expansion and management to improve liveability. This course helps students to develop professional capacities and skills to address these complex problems like delimitation of city limits and influence areas, land use planning with a focus on locational planning of urban utilities, preparation of town plans and spatial analysis of environmental problems to improve quality of urban life.*

Credit I

1. Urban environment – Concept and Components
2. Physical expansion of city: Urban Sprawl, RUF.
3. Ribbon Development and Conurbation
4. Urban Environment Problems: Health, Green Spaces, Heat Islands.

Credit II

1. Concept of Urban Sustainability
2. Urbanization policy and planning
3. RS & GIS application for urban studies
4. Himalayan urban centers: Srinagar and Leh

Suggested Readings:

1. *David, Herbert., Urban Geography – A Social Perspective, David and Charles, Newton Abbot London – Vancouver, 1972.*
2. *Gans J. Herbert., The Urban Villagers: Group and Class in the Life of Italian-Americans, Blackwell Publications, New York, 1982.*
3. *Hall, Tim., Urban Geography, Routledge Contemporary Human Geography Series, 2011.*
4. *Kaplan, D.H, and Hollaway Steven., Urban Geography, Wiley Publishers, 2012.*
5. *Knox, Paul L., and McCarthy, Linda M., Urbanization: An Introduction to Urban Geography, Pearson New International Edition, 2011.*
6. *Laves, Lowenstein K., Urban Studies – An Introductory Reader (2nd Edition), the Free Press Collier Macmillan Publisher, Third Avenue, New York, 10022, 1977.*
7. *Mandal, R.B., Urban Geography – A Text Book, Concept Publishers, New Delhi – 110054, 2001*
8. *Markanday, K and Reddy G., Urban Growth Theories and Settlement Systems of India, Concept Publishing Company, 2011.*
9. *Ray, Northam. M., Urban Geography (2nd Edition), John Willey and Sons, 1979.*
10. *Siddhartha, K and Mukherje, S., Cities, Urbanization and Urban System, Kasalaya Publications, New Delhi, 2001.*
11. *Siddhartha, K., Models in Regional Planning, Kasalaya Publications, New Delhi, 2008.*
12. *Verma, L.N., Urban Geography, Black Swan Publications, New Delhi, 2001.*
13. *Weng, Qahio and Quattrochi, D.A., Urban Remote Sensing, CRC Press, Taylor and Francis Group, London, 2007.*
14. *Wilson, A.G., Urban and Regional Models in Geography and Planning, John Willey and Sons, London. 1975.*

Biogeography **Course Code: IGGEO22E704/PGGEO22E104**

***Course Outcome**: The focus of this paper is to study the intricate relationship between geography and biology. It also broadens the understanding about Biodiversity, its conservation and management. This course also provides a deep understanding about various factors which influence the distribution and dispersal of species. It also enables the students to understand by geographic template and patterns along with biodiversity gradients across the globe.*

Credit I

1. Principles and meaning of Biogeography
2. Elements of Biogeography
3. Speciation, Diversification, Extinction
4. Dispersal – Concept and Processes

Credit II

1. Ecosystem – Introduction and Types.
2. Biome – Introduction and Types.
3. Concept of Biodiversity.
4. Global Environmental Change – Permafrost Region

Suggested Readings:

1. *E.O. Wilson and R. H Macarther., The Theory of Island Biogeography, Princeton University Press, 1976.*
2. *James Brown., Biogeography – An Ecological and Evolutionary Approach, Sinauer Associates Inc; 3rd edition, 2005.*
3. *M.V. Limolinov, & B. R. Riddle, Biogeography, Sinauer Associates Inc. Massachusetts USA, 2005.*

Sustainable Development **Course Code: IGGEO22E705/PGGEO22E105**

Course Outcome: *The course introduces the students to the concept of Sustainable Development. Students will have an understanding of the carrying capacity of ecosystems as related to providing for human needs. At the end of course, students will be able to apply concepts of sustainable development to address sustainability challenges in a global context. Students will identify, act on, and evaluate their professional and personal actions with the knowledge and appreciation of interconnections among economic, environmental and social spheres.*

Credit I

1. Concept and characteristics of Sustainable Development
2. United Nations Sustainable Development Goals (UNSDG's)
3. Principles of Ecological and Environmental Sustainability
4. Sustainable Development in India

Credit II

1. Carrying Capacity with respect to Himalayas
2. Carbon and Ecological Footprint analysis
3. Present Global Environmental Concerns.
4. Environmental Impact Assessment.

Suggested Readings:

1. *Jaffrey D. Sachs., The Age of Sustainable Development, Columbia University Press, 2015.*
2. *Jennifer A. Elliot., An Introduction to Sustainable Development, Routledge Publishers, 2015*
3. *K.V. Sundaram., Sustainable Development and Sustainable Life Styles, Northern Book Centre, 2003.*
4. *M.C Dash., Concepts of Environmental Management for Sustainable Development, I.K International Publishing House Pvt. Ltd. 2013.*
5. *Peter Rogers., An Introduction to Sustainable Development, Routledge Publishers, 2007*
6. *R.B Singh., Environment and Sustainable Development: Emerging Challenges, World Focus. 2017*
7. *Teri., Global Sustainable Report 2015: Climate Change and Sustainable Development, Oxford University Press, 2015.*

Disaster Management **Course Code: IGGEO22G701/PGGEO22G101**

Course Outcome: *This course focuses on the basics of disaster management. The students are expected to gain comprehensive knowledge about the early warning systems, various preparedness and mitigation strategies.*

Credit-I

1. Disaster Management- Concept
2. Disaster Management Cycle
3. National Policy on Disaster Management
4. Disaster Management Act, 2005

Credit -II

1. International Decade for Natural Disaster Reduction (IDNDR) (1990's)
2. Yokohama Declaration (1994)
3. Hyogo Framework for Action (HFA, 2005-2015)
4. Sendai Framework for Disaster Risk Reduction (2015-2030)

Suggested Readings:

1. *Anil K. Gupta,2016, Resource Book on Chemical (Industrial) Disaster Management*
2. *Bryant Edwards, 2005, Natural Hazard, Cambridge University Press.*
3. *Donald Hyndman and David Hyndman, 2009, Natural Hazards and Disasters, Brooks/Cole.*
4. *Edward A. Keller and Robert .H. Blodgett, 2008, Natural Hazards, Pearson Prentice Hall.*
5. *G. K. Gosh, Disaster Management, A.P.H. Publishers.*
6. *Geological Hazards www.nidm.gov.in*
7. *Hydro-meteorological Hazards www.nidm.gov.in*
8. *K. K. Singh, Lotfi Aleya and Vinod Singh, Disaster Management, Motilal Banarsidass Publishers Private Limited.*
9. *Rajesh K. Yadav et. al.Encyclopedia of Disaster and Hazards Management, Oxford Book Company*
10. *Vogelbacher, 2013, Flood Disaster Risk Management - Hydrological Forecasts - Requirements and Best*

Geography of Jammu and Kashmir **Course Code: IGGEO22O701/PGGEO22O101**

Course Outcome: *This course introduces the students to the distinct geographical characteristics of the Jammu & Kashmir. It provides the necessary inputs to the students belonging to various disciplines of earth and environment sciences to explore their interests within the broad geographical domain of the UT. This course has been conceptualized to address the requirements of a large segment of students interested in various competitive examinations.*

Credit-I

1. Physiography of J&K
2. Drainage of J&K – Jhelum, Chenab and Indus
3. Climate of J&K
4. Flora and Fauna of J&K - A Brief Account

Credit -II

1. Population – Density and Growth
2. Agriculture of J&K with Special reference to Horticulture
3. Tourism in J&K with Special reference to Tourist Destination in J&K
4. Energy Resources of J&K (Hydel and Geothermal)

Suggested Readings:

1. *Drew, F .K., The Territories of India, Kashrnir State. Standard Press London, 1979.*
2. *Gazetter of Kashmir and Ladakh, 1890.*
3. *Lawrence, S.W., The Valley of Kashrnir, Oxford University Press, 1895.*
4. *Raina, A.N., Geography of Jammu and Kashrnir, National Book Trust, New Delhi, 1971.*
5. *Qazi, S.A., Geography of India with Special Reference to J&K State, APH Publishing Co. 2000.*
6. *Majid Hussain., Systematic Geography of Jammu and Kashmir, Rawat Publications, 2000.*
7. *R. L. Singh., India- A Regional Geography, National Geographical Society of India, 2003.*

Advanced Climatology **Course Code: IGGEO22C801/PGGEO22C201**

Course Outcome: *The course is aimed to broaden the understanding of basic concepts of climatology and its geographical significance along with knowledge of earth's atmosphere with respect to structure, composition and distribution of temperature over earth surface. At the end of course, the students will be having a fair knowledge about elements and factors influencing climate of a region.*

Credit-I

1. Evolution of Earth's Atmosphere
2. Paleoclimatology – Concept and Importance
3. Insolation and Temperature: Factors and Distribution
4. Atmospheric Moisture: Humidity and Precipitation

Credit-II

1. Polar vortex and ozone hole
2. Clouds – formation and types
3. Global Circulation Models
4. Climatic Classification: a) Koeppen b) Thornthwaite

Credit-III

1. Monsoon: Origin and Mechanism
2. Classical and modern theories of monsoon
3. Jet Streams
4. Western Disturbances-Origin and Significance

Credit-IV

1. El- Nino, Southern Oscillation, La – Nina; NAO
2. Climatic Changes; Evidences & Indicators
3. Theories of Climatic Change:
   a) Milutin Milankovitch Theory
   b) Carbon Dioxide Hypothesis,
4. Impact of Climate Change on Environment.

Suggested Readings:

1. *A.K. Barua., Climatology, Dominant Publishers and Distributors, 2005.*
2. *Anthony J. Vega & Robert V. Rohil., Climatology, 2008.*
3. *Critchfield, H., General Climatology, Prentice Hall, NewYork, 1975.*
4. *Edward Aguada: & J. E. Brat., Understanding Weather and Climate- Pearson International 2016.*
5. *Fedrick K. Lutgen., The Atmosphere: An introduction to Meteorology, Princeton Hall, 2006.*
6. *J.T. Houghton., Global warming a complete briefing (5Ed.), Cambridge University Press, 2015.*
7. *S.K. Paneersalvam., Global warming and Climate Change, AHP Publishing Co, 2012*
8. *Stringer, E.T., Foundation of Climatology, Surjeet Publication, Delhi,*

Remote Sensing & GIS **Course Code: IGGEO22C802/PGGEO22C202**

Course Outcome: *Students will acquire knowledge regarding the use of modern tools and technology like RS, GIS and GPS in geographical studies and can apply this knowledge in any field of study. The Students can acquire a broad knowledge regarding natural resources, various sensors and can developed idea about aerial photographs, satellite imagery etc. Through this course students can develop their base regarding the practical use of advanced technology in different field of geography through which they can prepare more accurate and precise maps of different cultural and physical features.*

Credit – I

1. Remote Sensing – Concept, Historical Developments, EMR and EMS
2. Remote Sensing Sensors and Satellite Systems – IRS, LANDSAT
3. Remote Sensing Satellites – Orbit and Scanning Mechanism
4. Resolution- Concept, types and Importance

Credit – II

1. Interaction of EMR with atmosphere and other Earth's features
2. Aerial photography, types of aerial photographs, flight procedures, scale.
3. Image Interpretation – Elements and Importance, Use of Ancillary Information for image interpretation
4. Image Distortion and Correction – Geometric and Radiometric; Image Classification and Ground Truthing

Credit – III

1. GIS – Definition, Components and Recent trends
2. GIS Data – Structure, Format and Dimensions
3. Geographic and Projected Coordinate Systems (UTM Grid System)
4. Digital elevation model – Concept & Uses.

Credit - IV

1. Data models in geographical information system (GIS)
2. Toposheet – Reading and Nomenclature
3. Interpolation – Types, Advantages and disadvantages
4. Application of GIS and remote sensing in Resource Management, Forestry, Snow and Glacier, Wetland Management and Disaster Management

Suggested Readings:

1. *Campbell, J.B., Introduction to Remote Sensing, (2nd ed.), Taylor and Francis, London, 1996.*
2. *Curran, P., Principles of Remote Sensing, Longman, London, 1985.*
3. *Fazal S. and Rahman A., GIS Terminology, New Age International Publishing, New Delhi, 2007.*
4. *Fazal S., GIS Basics, New Age International Publishing, New Delhi, 2008.*
5. *Fazal S., Remote Sensing Basics, Kalyani Publishers, New Delhi, 2009.*
6. *Jenson, J.R., Remote Sensing and Environment. Pearson India, 2013.*
7. *Joseph George., Fundamentals of Remote Sensing, (2nd Ed.) University Press, Hyderabad, 2005.*
8. *Kumar, S., Basics of Remote Sensing and GIS, Laxmi Pub, 2005.*
9. *Lo, C.P. and Yeung AKW., Concepts and Techniques of GIS (2nd ed.), Prentice Hall of India, New Delhi, 2006*
10. *Leick. A., GPS Satellite Surveying (2nd ed.), John Wiley and Sons, New York, 2003.*
11. *Lillesand T.M and Keifer R.W., Remote Sensing and Image Interpretation (6th Ed.) John Wiley and Sons, New York, 2008.*
12. *N. K. Agarwal., Essentials of GPS, Spatial Network Pvt. Ltd, 2004.*

Remote Sensing and GIS Techniques **Course Code: IGGEO22C803/PGGEO22C203**

***Course Outcome**: This course provides the necessary skills, aptitude and training to the students in various geospatial technologies. It prepares the students adequately in different techniques of image interpretation and analysis. The practical course provides hands on exposure to our students in various remote sensing and GIS softwares. The student is professionally well equipped to work independently or in team for providing solutions to problems in a GIS environment*

Credit – I

1. Familiarization with Image Processing software
2. Import and export of Toposheet, satellite and other data to various formats
3. Geo-referencing of data- image to image, image to maps
4. Layer Stacking of Multispectral Imagery, Image mosaic, Resolution merge and Subset of image

Credit – II

1. Displaying individual pixel value and image information
2. Band Rationing; Principal Component Analysis
3. Classification – supervised and unsupervised
4. Accuracy Assessment, Change detection

Credit – III

1. Overview of GIS software
2. Geo-referencing, Assigning suitable Projection and Rectification, Digitizing, Linking spatial & non-spatial data entry
3. Polygon Analysis - Dissolve, Clip, Split, Erase, Merge, Spatial Adjustment
4. Point, Line and Area Surface analysis, Symbolization, Labeling, Map layout and Output

Credit – IV

1. Buffer Analysis, Overlay Analysis
2. Interpolation: IDW, Kriging, Spline
3. Data Conversion – Raster to Vector and vice versa, Vector to KML and vice versa, Table to excel
4. Digital Elevation Model – Slope, Aspect, Contour

Suggested Readings:

1. *Campbell, J.B., Introduction to Remote Sensing, (2nd ed.), Taylor and Francis, London, 1996.*
2. *Curran, P., Principles of Remote Sensing, Longman, London, 1985.*
3. *Fazal S. and Rahman A., GIS Terminology, New Age International Publishing, New Delhi, 2007.*
4. *Fazal S., GIS Basics, New Age International Publishing, New Delhi, 2008.*
5. *Fazal S., Remote Sensing Basics, Kalyani Publishers, New Delhi, 2009.*
6. *Jenson, J.R., Remote Sensing and Environment. Pearson India, 2013.*
7. *Joseph George., Fundamentals of Remote Sensing, (2nd ed.) University Press, Hyderabad, 2005.*
8. *Kumar, S., Basics of Remote Sensing and GIS, Laxmi Pub, 2005.*
9. *Lo, C.P. and Yeung AKW., Concepts and Techniques of GIS (2nd ed.), Prentice Hall of India, New Delhi, 2006*
10. *Leick. A., GPS Satellite Surveying (2nd ed.), John Wiley and Sons, New York, 2003.*
11. *Lillesand T.M and Keifer R.W., Remote Sensing and Image Interpretation (6th ed.) John Wiley and Sons, New York, 2008.*
12. *N. K. Agarwal., Essentials of GPS, Spatial Network Pvt. Ltd, 2004.*
13. *Sabins, J.F.F., Remote Sensing: Principles and Interpretation, W.H. Freeman & Co., New York, 1997*
14. *Sabins, F.F., Remote Sensing: Principles and Interpretation. Freeman, New York, 1986.*
15. *Siegal, B.S. and A.R Gillespie., Remote Sensing in Geology, Wiley, New York, 1980*

Social Geography **Course Code: IGGEO22E801/PGGEO22E201**

Course Outcome: *This course provides a broad overview of the key concepts and approaches in social geography and examines the contested politics of place-making as a social practice. This course also enables the students to explore the relations between social identity and the production of geographical space and critically analyse and contribute to contemporary scholarship in social geography.*

Credit I

1. Concept and Development of Social Geography
2. Processes and Patterns of Social significance
3. Approaches to social geography
4. Social groups-classification and characteristics

Credit II

1. Society-concept and Characteristics
2. Social Change: Nature and Factors
3. Social problems in India with special emphasis on gender discrimination
4. Concept of Social well-being and its measurement

Suggested Readings:

1. *Jones Emrys, and Eyles John., An Introduction to Social Geography, Oxford University Press, 1977.*
2. *Aijazuddin Ahmed., Social Geography, Rawat Publications, New Delhi, 1999.*
3. *Smith David., Geography - A Welfare Approach, Edward Arnold, 1977.*
4. *Knox P. L., Social Well-being: A Spatial Perspective, Oxford University Press, London, 1975.*
5. *Jordan and Lester, G., The Human Mosaic Harper Row, New York, 1978.*
6. *Massey et a., Human Geography today, Polity Press, Cambridge, 1999*
7. *Mukerjee, A. B. & Aijazuddin Ahmed., India Culture Society's Economy, Inter India Publications, New Delhi, 1985.*

Cultural Geography **Course Code: IGGEO22E802/PGGEO22E202**

Course Outcome: *This course provides a broad overview of the key concepts and approaches in cultural geography and examines the contested politics of place-making as a social and cultural practice. This course also enables the students to explore the relations between social identity and the production of geographical space and critically analyse and contribute to contemporary scholarship cultural geography. This course is aimed at making students understand and develop the ability to critically assess the material and symbolic aspects of cultural landscapes.*

Credit I

1. Introduction and Development of Cultural Geography
2. Evolution of culture
3. Major cultural realms of the world
4. Culture: Convergence, Divergence, Acculturation and Assimilation

Credit II

1. Tribes of India (Gujjars and Bakarwals, Nagas and Santhals) – Economy, Society and Culture
2. Problems of Indian tribal areas
3. Folk culture: Folklore Region
4. Cultural Hearth – Classification and Distribution

Suggested Readings:

1. *Smith David., Geography - A Welfare Approach, Edward Arnold, 1977.*
2. *Knox P. L., Social Well-being: A Spatial Perspective, Oxford University Press, London, 1975.*
3. *Crong Mike., Cultural Geography, Routledge Publications, London, 1998.*
4. *Jordan and Lester, G., The Human Mosaic Harper Row, New York, 1978.*
5. *Massey et a., Human Geography today, Polity Press, Cambridge, 1999*
6. *Mukerjee, A. B. & Aijazuddin Ahmed., India Culture Society's Economy, Inter India Publications, New Delhi, 1985.*

Geography of Urban Environment – II **Course Code: IGGEO22E803/PGGEO22E203**

Course Outcome: *The course comprises of two credits which allows students exposure to the emerging urban scenario at national and international level. Indian cities are growing at a rapid pace in terms of their demographic and spatial size and functional activities. Urban growth has been lopsided one skewed in favour of large metropolitan cities associated with serious environmental problems. They need constant attention for their future expansion and management to improve liveability. This course helps students to develop professional capacities and skills to address these complex problems like delimitation of city limits and influence areas, land use planning with a focus on locational planning of urban utilities, preparation of town plans and spatial analysis of environmental problems to improve quality of urban life.*

Credit I

1. Urban Ecological Models: C.B.D. & Burgess's Model
2. Concept of Garden City and its Relevance in city planning
3. Concept of Global city & Liveable city
4. Eco-city approach and its environmental dimension

Credit II

1. Environmental concerns of Urban transportation
2. Indicators of Urban Environmental Quality: Air & Water (case study Delhi)
3. Urbanization and community health - Diseases and Epidemics
4. Natural disasters and their Impacts on Urban Environment

Suggested Readings:

1. *David, Herbert., Urban Geography – A Social Perspective, David and Charles, Newton Abbot London – Vancouver, 1972.*
2. *Gans J. Herbert., The Urban Villagers: Group and Class in the Life of Italian-Americans, Blackwell Publications, New York, 1982.*
3. *Hall, Tim., Urban Geography, Routledge Contemporary Human Geography Series, 2011.*
4. *Kaplan, D.H, and Hollaway Steven., Urban Geography, Wiley Publishers, 2012.*
5. *Knox, Paul L., and McCarthy, Linda M., Urbanization: An Introduction to Urban Geography, Pearson New International Edition, 2011.*
6. *Laves, Lowenstein K., Urban Studies – An Introductory Reader (2nd Edition), the Free Press Collier Macmillan Publisher, Third Avenue, New York, 10022, 1977.*
7. *Mandal, R.B., Urban Geography – A Text Book, Concept Publishers, New Delhi – 110054, 2001*
8. *Markanday, K and Reddy G., Urban Growth Theories and Settlement Systems of India, Concept Publishing Company, 2011.*
9. *Ray, Northam. M., Urban Geography (2nd Edition), John Willey and Sons, 1979.*
10. *Siddhartha, K and Mukherje, S., Cities, Urbanization and Urban System, Kasalaya Publications, New Delhi, 2001.*
11. *Siddhartha, K., Models in Regional Planning, Kasalaya Publications, New Delhi, 2008.*
12. *Verma, L.N., Urban Geography, Black Swan Publications, New Delhi, 2001.*
13. *Weng, Qahio and Quattrochi, D.A., Urban Remote Sensing, CRC Press, Taylor and Francis Group, London, 2007.*
14. *Wilson, A.G., Urban and Regional Models in Geography and Planning, John Willey and Sons, London. 1975.*

RURAL DEVELOPMENT **Course Code: IGGEO22E804/PGGEO22E204**

***Course Outcome**: The Programme has been framed to provide an understanding and experience of different aspects of Rural Development. It is to provide a holistic perspective of schemes/programmes of central govt. in general and state govt. in particular as bulk of the population of the country is still concentrated in rural areas. It aims to develop expertise in planning and management of rural development programmes with a focus on participatory development. This will open a plenty of career opportunities for the candidates interested in this field.*

Credit I

1. Rural Development: Concept, Approaches & Strategies
2. Rural Development: Influencing Factors.
3. Panchayati Raj Institutions (PRIs): Evolution, Structure & Functions
4. Rural Development under Five Year Plans
5. Rural Community Facilities & Services

Credit II

1. Rural Housing in India: Problems & Solutions.
2. Rural Empowerment Programmes: Bharat Nirman, Provisions of Urban Amenities in Rural Area (PURA)- Features & Challenges.
3. Rural Social Infrastructure: Issues, Problems & Remedies.
4. Rural Poverty & Poverty Alleviation Programmes.
5. Rural Communication & Information Communication Technology: Issues & Problems.

Suggested Readings:

1. *A.Vinayak Reddy and M. YadagiraCharyulu, Rural Development in India : Policies and Initiatives, New Century Publications, New Delhi, 2009.*
2. *George H. Axinn and nancy W. Axinn., Collaboration in International Rural Development, Sage Publication, New Delhi, 1997.*
3. *Katar Singh., Rural Development, principles, polices and Management, Sage Publication, New Delhi,1986.*
4. *Laxmi Devi., Encyclopedia of rural Development (set of 5 vol.) Anmol Publications Pvt. Ltd. New Delhi.*
5. *N.Lalitha, Rural Development in India: Emerging Issues and Trends- Dominant Publishers, Delhi, 2004.*
6. *Ram K. Parma., Policy Approach to Rural Development, Print well, Jaipur., 1996.*
7. *Venkatta Reddy. K., Rural Development in India, Himalaya Publishing House, New Delhi. 200*

Fluvial Geomorphology **Course Code: IGGEO22E805/PGGEO22E205**

Course Outcome: *The course aims to develop an understanding of various fluvial processes and the factors influencing their operation, development and human-fluvial system Interaction. The students will also learn some practical aspects of bank erosion assessment and discharge measurement etc. The course will imbibe interest among the students to pursue this branch of Physical Geography which has considerable applications in engineering, disaster management and other related fields.*

Credit I

1. Introduction to Fluvial Geomorphology-Modern approaches
2. Drainage Basin- as a Geomorphic unit
3. Drainage Systems: Types of drainage patterns
4. Morphometry of Drainage Basin

Credit II

1. Stream Flow Sources: Surface, Subsurface and Groundwater Flow
2. Sediment Transport: Dissolved or Suspended and Bed load
3. Humans and fluvial system
4. Fluvial Landforms – Erosional and Depositional

Suggested Readings:

1. *Bloom Arthur L., Geomorphology: A systematic Analysis of Late Cenozoic Landscape. III Edition; Pearson Education, 2001*
2. *Charleton R. O, Fundamentals of Fluvial Geomorphology, Special Indian Edition Routledge Publishers, 2008)*
3. *Edward Keller, Environmental Geology. Meril Publishers, 1978*
4. *Frank Process & Ramon & Seiver, Understanding Earth, Freeman Publishers, 1999.*
5. *Montgomery Carla W., Environmental Geology, McGraw-Hill 9th Edition 2008*
6. *Newson MD and Hanwell JD., Systematic Physical Geography. MacMillan Publishers, 1981*
7. *Qazi S. A., Principles of Physical Geography, APH Publishers, 2004*
8. *Raghunath HM., Hydrology -Principles Analysis and Design, 3rd Edition, New Age Publishers, 2014.*
9. *Richard Keith., Rivers: Form and Process in Alluvial Channels, Mechuen & Co. Publishers, 1982*
10. *Strahler A.N., The Earth Science. 3rd Edition, Harper & Row Publishers, 1971.*
11. *Strahler Alan., Introducing Physical Geography., Wiley and Sons, 2011*

Political Geography **Course Code: IGGEO22E806/PGGEO22E206**

Course Outcome: *This course provides students with a comprehensive understanding of the concepts, theories, methods, principles and models of geographic thought appropriate for analysing politics and political relations. This course enables students to use geography in order to gain an understanding of global political actions, related military, ethnic, or religious conflicts, cultural practices, economic relationships, and resource use decisions with interregional or international implications.*

Credit I

1. Concept of State, Nation and Nation state
2. Global strategic views of Heartland and Rimland
3. Concept of Boundaries, Frontier and Buffer zones
4. Geopolitical blocks and global trade blocks-concept and present scenario

Credit II

1. Geopolitical Significance of Indian ocean
2. International Boundary of India and its Problems
3. Geopolitics of SAARC Region
4. Water Resource Sharing: Disputes (Indus, Brahmaputra, Kaveri)

Suggested Readings:

1. *Agnew J., Political Geography: A reader London: Arnold, 1997.*
2. *Cox KR, Low M. & Robinson J., Handbook of Political Geography, London, 2008.*
3. *Edward, F., Modern Political Geography, Brown Company Publishers, 1975.*
4. *Harvey, D., Justice, Nature and the Geography of difference, Oxford Blackwell, 1996.*
5. *Hussain, M., Political Geography, Anmol Publishers, New Delhi, 1994.*
6. *John Agnew, Political Geography Reader, Arnold Hodder, 1995.*
7. *Johnston, R.J., Political, Electoral and Spatial Systems Oxford: Clarendon Press, 1979.*
8. *Painter, J., Politics, Geography and 'Political Geography': A Critical Perspective London, 1995.*
9. *Peter, J. Taylor., Political Geography, Long man Group, England, 1985.*
10. *Spykman, N. J., The Geography of the Peace, New York: Harcourt, Brace and Co.1944.*
11. *Sutton, I., 'The Political Geography of Indian Country' American Indian Culture and Research Journal, 1991*
12. *Taylor P.J & Flint C., Political Geography: World-Economy, Nation-state and Locality, Harlow: Pearson Education Limited, 2007*

Regional Planning & Development – I* **Course Code: PGGEO22E207**

Course Outcome: *The course provides a holistic approach to create and disseminate knowledge to the students about environmental problems at local, regional and global scale and also provides practical training on modern instrumentation and analytical techniques for environmental analyses and more importantly sensitizes the students towards environmental concerns, issues, and impacts of climate change and related mitigation strategies. The course enables the learners to apply their knowledge for efficient decision-making, environmental management and sustainable development.*

Credit-I

1. Concept of Region
2. Types of Regions
3. Approaches to Delineation of Region
4. Relevance of Regional Planning in Regional Development

Credit-II

1. Planning Processes: Concept
2. Types of Planning a) Sectoral and Spatial
3. Short Term and Long Term planning
4. Concept of Multi-Level Planning -Approaches

Suggested Readings:

1. *Agarwal, A.G., Urban and Regional Models in Geography and Planning, John Wiley and Sons, 1974.*
2. *Campbell, S. and Frankenstein, S., Planning Theory, Blackwell Publishers, 1997.*
3. *Campbell, S., and Feinstein, S. Readings in Planning Theory, Blackwell Publishers, 1997.*
4. *Carter, Harold., The Study of Urban Geography, Edward Arnold Publishers Ltd., 1982.*
5. *Chadwick, George., A Systems view of Planning, Pergamum Press Oxford, New York., 1978.*
6. *Clout, H.D., Rural Geography, Pergamum Press Oxford, New York. 1984.*
7. *Gary Hack, et al. Local Planning: Contemporary Principles and Practice, Oxford Press London, 2009.*
8. *Heredero, J.M., Rural Development and Social Change, Monahan Press Gujarat, 1979.*
9. *Hugget, Richard., System Analysis in Geography, Clarendon Press Oxford, 1980.*
10. *Issard, Walter., Methods of Regional Analysis, The M.I.T Press, 1976.*

Ecology and Environment* **Course Code: PGGEO22E208**

Course Outcome: *The course provides a holistic approach to create and disseminate knowledge to the students about environmental problems at local, regional and global scale and also provides practical training on modern instrumentation and analytical techniques for environmental analyses and more importantly sensitizes the students towards environmental concerns, issues, and impacts of climate change and related mitigation strategies. The course enables the learners to apply their knowledge for efficient decision-making, environmental management and sustainable development.*

Credit I

1. Ecological adaptations
2. Ecological successions
3. Trophic Levels, Ecological Niche, Ecological Pyramid
4. Energy Flow Models (U & Y shaped)

Credit II

1. Biogeochemical Cycle (Nitrogen and Carbon Cycle)
2. Biogeographic patterns-Cosmopolitanism and Endemism
3. Ecological Footprint and Green Economy
4. International Legal Framework: Stockholm 1972, Kyoto protocol, Earth summit 1992, Paris Agreement

Suggested Readings:

1. *Chapman and Reiss; Ecology Principles and Applications, Cambridge University Press, 1999.*
2. *E.P. Odum, Fundamentals of Ecology, Thomas Business Information India Pvt. Ltd. 2006*
3. *John L. Harper., Ecology-From Individuals to Ecosystems, Wiley Blackwell.*
4. *P.D. Sharma., Ecology and Environment (11th Edition), Rastogi Publications, 2005.*
5. *Paul Lauris and W.G. Mosely., An Introduction to Human - Environmental Geography, Whiley Blackwell, 2013.*

Disaster Vulnerability in India **Course Code: IGGEO22G801/PGGEO22G201**

***Course Outcome**: This course focuses on the basics of disaster management with special reference to India. The students are expected to gain comprehensive knowledge about the Vulnerabilities and types of disasters in India & early warning systems, various preparedness and mitigation strategies.*

Credit I

1. Vulnerability: Meaning and Concept
2. Perception of Vulnerability.
3. Physical, Social and Economic Vulnerability
4. Indicators of Vulnerability

Credit II

1. Hazard and Vulnerability Profile of India
2. Earthquake
3. Floods
4. Landslides

Suggested Readings:

1. *Anil K. Gupta,2016, Resource Book on Chemical (Industrial) Disaster Management*
2. *Bryant Edwards, 2005, Natural Hazard, Cambridge University Press.*
3. *Donald Hyndman and David Hyndman, 2009, Natural Hazards and Disasters, Brooks/Cole.*
4. *Edward A. Keller and Robert .H. Blodgett, 2008, Natural Hazards, Pearson Prentice Hall.*
5. *G. K. Gosh, Disaster Management, A.P.H. Publishers.*
6. *Geological Hazards www.nidm.gov.in*
7. *Hydro-meteorological Hazards www.nidm.gov.in*
8. *K. K. Singh, Lotfi Aleya and Vinod Singh, Disaster Management, Motilal Banarsidass Publishers Private Limited.*
9. *Rajesh K. Yadav et. al.Encyclopedia of Disaster and Hazards Management, Oxford Book Company*
10. *Vogelbacher, 2013, Flood Disaster Risk Management - Hydrological Forecasts - Requirements and Best*

Geography of India **Course Code: IGGEO22O801/PGGEO22O201**

Course Outcome: *This course introduces the students to the distinct geographical characteristics of India. It provides the necessary inputs to the students belonging to various disciplines of earth and environment sciences to explore their interests within the broad geographical domain of the country. This course has been conceptualized to address the requirements of a large segment of students interested in various competitive examinations.*

Credit-I

1. India – its space relationships
2. Physical Divisions of India
3. Drainage (Peninsular & Himalayan)
4. Climate & natural Vegetation

Credit -II

1. Population – Density and Growth
2. Soil – Types & Distribution
3. Land resource & utilization
4. Indian Agriculture – Characteristics.

Suggested Readings:

1. *Spate, O.H.K., India and Pakistan, Mac Million & Co. 1967.*
2. *Singh, R.L., India, Regional Geography, Banarus Hindu University, 1987*
3. *Qazi, S.A., Geography of India with special reference to J&K State, APH Publishing Co. 2000.*
4. *R. L. Singh, India- A Regional Geography, National Geographical Society of India 2003*
5. *Chandra Vijay Purty, Geography of India, ABD Publishers.*
6. *Hussain. M; Geography of India, 2nd Ed. Tata Mcgraw Hill, 2011*
7. *D.R Khullar, India- A Comprehensive Geography, Kalyani publishers, New Delhi, 2011.*
8. *Husain M., Geography of India, Mc Graw Hill Publications, U.P., 2017.*
9. *Kaul. A. K., Studies In Geography of Jammu & Kashmir, Rawat Publications, Jaipur 2014.*
10. *Husain M., Indian & World Geography, McGraw Hills, 2011.*

Glaciology and Hydrology **Course Code: IGGEO22C901/PGGEO22C301**

***Course Outcome**: This course is a specialized course of Physical Geography wherein students will be introduced to glacial and hydrological Sciences. The course has been conceptualized to encourage students to understand the glaciers as repositories of water resources, their importance in shaping various types of landforms, their dynamic nature and behaviour of these glaciers to changing climatic regimes. This course also makes the learners to understand the basic concepts of hydrology, groundwater, aquifer, rainwater harvesting and other dimensions of hydrology.*

Credit-I

1. Glaciers: Origin and Classification
2. Glacial Ice Movement
    a) Basal flow
    b) Internal deformation
3. Application of Remote Sensing in Glacial Studies

Credit-II

1. Glacial Erosion.
    a. Ice and melt water.
    b. Mechanical and Chemical processes of erosion.
2. Development of Erosional land forms.
3. Depositional processes
    a. Stratified and non-stratified.
    b. Drifts – Morphodynamics of moraines
4. Depositional Features

Credit III

1. Definition and system approach in hydrology
2. Groundwater: origin, occurrence, quality and movement
3. Aquifers and types
4. Rainwater Harvesting Models

Credit IV

1. Drainage basin as a hydrological unit (Indus System)
2. Runoff: controlling factors- infiltration, evaporation and transpiration
3. Hydrological analysis: unit hydrograph- derivation of unit hydrograph
4. Interlinking of Indian rivers- Problems and Prospects

Suggested Readings:

1. *Kaushik Pradepika., Geomorphological Studies of the Himalayan Glaciers in Brief, Lambat Academic Press, 2013.*
2. *Naseerudin ahmad and Sarwar, Rais., Himalyan Glaciers, APH Publishing House, 1998.*
3. *Micheal Hambrey and Jueg Alean., Glaciers (2nd edition), 2004.*
4. *Doug Benn and David J.A.Evans., Glaciers and Glaciation (2nd ed.), Hodder Arnold Publication, 2010.*
5. *Ireneo Peter Martui., Geomorphological and Geology, 2001.*
6. *Andrew D. Ward and Stanley Trimble., Environmental Hydrology (2nd ed.), Lewis Publishers, 2004.*
7. *Chow V.T., Applied Hydrology, Tata McGraw Hill Publishing Co, 1988.*
8. *Hendriks Martin., Introduction to Hydrology. Oxford University Press, London, 2010.*
9. *Patra K.C., Hydrology and Water Resources Engineering, Narosa Publishing House, 2010.*

Socio – Economic and Geomorphic Field Studies **Course Code: IGGEO22C902/PGGEO22C302**

***Course Outcome**: The main objective of the fieldwork is to conduct an extensive survey of a contiguous wider region and identify salient landforms; their genesis and their impact on human life, flora and fauna. It also provide the students with the understanding of ground reality of a chosen area of study by observation; mapping of land quality, land use and cropping pattern and conducting extensive Socio-economic survey of the households with the help of a specially prepared questionnaire. This paper will be a basic training course for the students for research and will enable them to understand the importance and strategies for field studies. For the practical purpose & real time experience, one month field studies outside UT has been made mandatory.*

Credit-I:

1. Significance of field tour in Geography
2. Geomorphic field study – concept and importance
3. Socio-economic field survey – concept and importance
4. Integration of Socio – economic Attributes

Credit-II:

1. Collection of data – sources of data: Primary and Secondary
2. Entering the data in Excel or SPSS software
3. Processing – editing, classification and tabulation
4. Data analysis – (Appropriate techniques)

Credit-III:

1. Creation of Study Area Map.
2. Interpretation of topographic maps of study area.
3. Formulation of a detailed questionnaire for the conduct of socio – economic field survey.
4. Collect demographic, social and economic data of the villages / towns from census reports to study the temporal changes in the profile of such characteristics.

Credit-IV:

1. Conduct a Geomorphic Field survey of the area and identify and analyze dominant geomorphic processes and features. ***(One Month Field Study outside UT of J&K)***
2. Conduct a household socio – economic survey of the study area with a structured questionnaire.
3. Supplement the information by personal observations and perceptions of the study area.
4. Based on field study of the study area, prepare a detailed field survey report.
5. Supplement the report with photographs, sketches, maps and diagrams.

Every student needs to participate in fieldwork and prepare a field report according to the following guideline, failing which he/she will not be evaluated.

1. Each student will prepare a report based on primary data collected from field survey and secondary data collected from different sources.
2. Students will select either one rural area or an urban area for the study, with the primary objective of evaluating the relation between physical and cultural landscape.
3. A specific problem or a special feature should be identified based on which, the study area will be selected.
4. The report should be typed in Times New Roman, Font Size 12 and Spacing 1.5 in English on A4 size paper in candidate's own words within 5,000 words (Introductory Chapter: 1000 words; Physical Aspects: 1500 words;
5. Socio-economic Aspects: 1500 words; Concluding Chapter: 500 words, approximately) excluding tables, photographs, maps, diagrams, references and appendices.
6. Photographs, maps and diagrams should not exceed 20 pages.
7. Three copies of the bound report, duly signed by the concerned teacher and HoD shall be submitted in the Department one week prior to examination.

The field work and post-field work will include:

a. Collection of primary data on physical aspects (relief and soil) of the study area.
b. Students should use survey instruments like Prismatic compass, Dumpy level, Abney level, Clinometer, Total station etc. wherever necessary.
c. Collection of soil samples from different land cover land use regions of the study area for determining pH and NPK values with help of a soil kit.

d. Collection of socio economic data at the household level (with the help of a questionnaire) in the selected study area.
e. Plot to plot land use survey for preparation of a land use map, covering whole or part of the selected area.
f. Visit to different organizations and departments for collection of secondary data.
g. Any other survey relevant to the objective of the study.

8. The Field Report should contain the following sections (a–e).
   a. ***Introduction:*** Study area extent and space relations, reasons for selection of the study area on the basis of a specific problem or special feature, objectives, methods of data collection, analyses and presentation, sources of information, etc.
   b. ***Physical aspects:*** Lithology and geological structure, relief, slope, drainage, climate, soil, vegetation, environmental issues, proneness to natural hazards, etc.
   c. ***Socio-economic aspects:***
      i. **Population attributes:** number, sex ratio, literacy, occupational structure, ethnic and religious composition, language, per capita income, etc.
      ii. **Settlement characteristics:** Number of houses, building materials, number and size of rooms, amenities, etc.
      iii. **Agriculture:** General land use, crop-combination, use of fertilizer and irrigational facilities, production and marketing etc.
      iv. **Other economic activities:** Fishing, horticulture, brick-making, household and other industries, etc.
   d. ***Conclusions:*** Relation between physical and cultural landscape. Evaluation of problems and prospects. General recommendations.
   e. ***Bibliography***.
9. The students will prepare (i) a chorochromatic land use land cover map on the basis of plot to plot survey; (ii) a profile of 250–1000 m, surveyed and plotted, with different land use land cover superimposed on it.
10. All sections of the report should contain relevant maps, diagrams and photographs using primary and secondary data, clearly citing sources.
11. All surveys should pertain to the objective of the study. Surveys not relevant for establishing the relation between physical and cultural landscape should be avoided.
12. Marks division: 60 on report + 20 on viva-voce +20 Internal = 100

Suggested Readings:

1. *Gopal Singh., Map World and Practical Geography, Vikas Publishing House, 2000.*
2. *Pal, S.K., Statistics for Geographers- Techniques and App1ications, Concept, New Delhi, 1998.*
3. *Robinson, et al., Elements of Cartography, John Wiley and Sons, U.S.A, 1995.*
4. *Sarkar, A.K., Practical Geography: A Systematic Approach, Oriental Longman, Calcutta, 1997.*
5. *Singh, R.L, and Dutt, P.K., Elements of Practical Geography, Kalyani Publishers, New Delhi, 1979.*

Advanced Surveying and GPS Applications **Course Code: IGGEO22C903/PGGEO22C303**

Course Outcome: *The main objectives of this course is aimed at making the students to know about the significance of advanced surveying in field measurements in terms of utility and precision of data collection and to learn on the principles of Electronic distance measurements, Total station, GPS and their accuracy. The course enables the students to know in detail the concepts of coordinate systems, Map projections, GPS, its working principles, data collection, data processing and analysis.*

Credit-I:

1. Introduction to surveying
2. Surveying Instruments – Theodolite, Total Station
3. Total Station - Functions and Characteristics
4. Measuring angles, distances and heights

Credit-II:

1. Preparation of Site Plan
2. Length determination
3. Creating contour maps
4. Data processing and analysis

Credit-III:

1. Global Positioning System (GPS): Uses and Measurements
2. GPS Structure (Segments)
3. Fundamentals of GPS positioning
4. Types of GPS Survey and sources of Error

Credit-IV:

1. Introduction and overview of Google Earth
2. Preparation of Point, line and polygon features in Google Earth
3. Detailed study of contour maps (identification of geomorphic features)
4. Interpretation of topographical maps (two different areas)

Suggested Readings:

1. *Kali Charan Sahu., Textbook of Remote Sensing and Geographic Information System, Atlantic Publishers and Distributors, 2008.*
2. *B.C. Panda., Remote Sensing- Principles and Applications, Viva Books, 2008.*
3. *Jensen., R Fundamentals of Remote Sensing. Shree Maitree Printech Pvt Limited Noida, 2007.*
4. *Gopal Singh., Map World and Practical Geography, Vikas Publishing House, 2000.*

Population Geography **Course Code: IGGEO22E901/PGGEO22E301**

***Course Outcome**: The course is meant to provide an understanding of spatial and structural dimensions of population and the emerging issues. The course is further aimed at familiarizing the students with global and regional level problems and also equips them for comprehending the Indian situation. The course is aimed to introduce the foundational skills of how to generate and display the quantitative and qualitative spatial and non-spatial data to solve Earth and Space science problems, and how to gain an appreciation for the processes that operate at these Spatio – temporal scales*

Credit-I

1. Population Geography: Evolution & Subject Matter.
2. Population Theories: Malthus, Neo Malthusianism, Demographic Transition
3. Factors Influencing Growth, Distribution & Density of Population
4. Population Dynamics of India and J&K
5. Population Projection Techniques

Credit-II

1. Fertility: Determinants & World Patterns.
2. Mortality: Determinants & World Patterns.
3. Migration: Measures, Determinants & Consequence.
4. Human Development: Concept of Human Development Index & its Components.
5. Population Challenges in Developed & Developing Countries (Ageing & Declining Sex Ratio)

Suggested Readings

1. *R. K. jain, A Textbook of Population Studies, Astha Publishers and Distributors, 2014.*
2. *Hans Raj, Fundamentals of Demography, Surjeet Publications.*
3. *Peters, Plarkin, Population Geography: Problems, Cooncepts, Prospects, Kendell Hut Publishing, 1979.*
4. *Hasan, I, Population Geography, Rawat Publications., 2006.*
5. *Chandna, R, Geography of Population, Concept, Determinants, Patterns, Kalyani Publications.*
6. *Kayasthi, SL., Geography of Population, Rawat Publications, 1998.*

Settlement Geography **Course Code: IGGEO22E902/PGGEO22E302**

Course outcome: *The course also aims to impart knowledge of concepts and theoretical framework relating to settlement geography, which makes possible the students in building capacity to use theoretical and empirical advancements to develop strategies, policies and programmes to meet challenges of housing problems.*

Credit III

1. Nature & Scope of Settlement Geography
2. Evolution, Size & Growth of Human Settlement; Diffusion of Settlements
3. Site & Situation Factors in the Development of Settlements
4. Rural Settlement, Patterns & Forms
5. Urban Settlements: Emerging Issues & Challenges

Credit IV

1. Classification of Settlements.
2. Theories of the Morphological Structure of Cities: Concentric Zone, Sector Theory, Multi- Nuclei Theory.
3. Social Area Analysis Model & Exploitative Model.
4. Origin of Towns & Cities.
5. Settlement & Environmental Interface

Suggested Readings:

1. *Bhende, A.A. and Kanetkar, T., Principles of Population Studies, Himalayan, 1978.*
2. *Bose, A. (ed.)., Population in India's Development, 1947-2000. Vikas Publications, New Delhi, 2001.*
3. *Carter, H., The Study of Urban Geography, Edward Arnold, London, 1975.*
4. *Daniel, P., Geography of Settlement. Rawat Publications., Jaipur and New Delhi, 2002.*
5. *Ehrlich, P.R. and Ehrlich, A.H. , Ecoscience: Population, Resources, Environment. 6th ed. W.H. Freeman and Company, San Francisco, 1996.*
6. *Eidt, R. C., Singh, K. N. and Singh, Rana, P.B., (eds.), Man, Culture and Settlement. Kalyani Publishers., New Delhi, 1977*
7. *Ghosh, S., A Geography of Settlements. Orient Longman, Kolkata, 1999.*
8. *Hudson, F. S., A Geography of Settlements. MacDonald and Evans, New York, 1976.*
9. *Mitra, A., Report on House Types and Village Settlement Patterns in India. Publication Division, Govt. of India, New Delhi, 1960.*
10. *Mosley, M.J., Rural Development: Principles and Practice. Sage Publication, London, 2005.*
11. *Oliver, P., Dwellings. The House across the World. University of Texas, 1987.*
12. *Singh, K.N. and Singh, D.N., (eds.) Population Growth, Environment and Development. EDSC, Varanasi, 1992.*
13. *Singh, R.Y., Geography of settlements. Rawat Publications., Jaipur and New Delhi, 2003.*
14. *Srinivasan, K, and Vlassoff, M., Population Development Nexus in India: Challenges for the New Millennium. Tata McGraw Hill, New Delhi, 2001.*
15. *Woods, R., Population Analysis in Geography, Longman, London, 1979.*

Agricultural Geography **Course Code: IGGEO22E903/PGGEO22E303**

Course Outcome: *The main aim of the course is to familiarize the students with the concept, origin, and development of agriculture; to examine the role of agricultural determinants towards changing cropping patterns, productivity and diversification. The course further aims to familiarize students with the application of various models and classification schemes of agricultural productivity. At the end of course, the students will be able to get updated knowledge of agriculture related contemporary issues and strategies.*

Credit-I

1. Agricultural Geography: Development & Approaches
2. Factors Affecting Agriculture: Physical, Socio-economic, Environmental, Technological & Institutional
3. Cropping Pattern, Diversification, Specialization & Commercialization of Crops
4. Agricultural Productivity & Production: Measurement & Determinants
5. Regional Variation in Agricultural Productivity

Credit-II

1. Agricultural Systems of the World: Whittlesey's Classification
2. Agricultural Land Use Model: Von Thuenen, Modification and Relevance
3. Agricultural Regions of India: Agro-climatic & Crop Combination Regions
4. Problems of Indian Agriculture: Management and Planning
5. Food Security & Food Aid Programmes in India, Food Deficit & Surplus Regions, Nutritional Index

Suggested Readings:

1. *Hussain, M., Systematic Agricultural Geography, Rawat Publications, Jaipur, 1996.*
2. *Ilbery. B. W., Agricultural Geography, Oxford University Press, Oxford, 1985.*
3. *Singh, J. and Dhillon, S.S., Agricultural Geography, Tata McGraw Hill, New Delhi, 1984.*
4. *Singh, Jasbir., Agricultural Geography, 3rd edition, Oxford, New Delhi, 2003.*
5. *Symons, L., Agricultural Geography, G. Bells, London, 1967.*
6. *Grigg, D.B., The Agricultural Systems of the World: An Evolutionary Approach, Cambridge University Press, Cambridge, 1978.*
7. *Morgan, B.W. and Munton, J.C., Agricultural Geography, Methuen, London, 1971.*
8. *Shafi, M., Agricultural Productivity and Regional Imbalances, Concept, New Delhi, 1984.*
9. *Singh, Jasbir., Dynamics of Agricultural Change, Oxford, New Delhi, 1990.*
10. *Tarrant, J.R., Agricultural Geography, Davis and Charles, Newton Abbot, 1974.*
11. *Whealler, K.E., Ladley, A.M. and Leong, F.C., Studies in Agricultural Geography, Bland Educational, London, 1970.*

Watershed Management **Course Code: IGGEO22E904/PGGEOE304**

Course Outcome: *The main aim of the course is to introduce students to concept of Watershed Management. The course emphasizes on identifying watershed as an ideal planning unit wherein a student realizes the importance of equitable and judicious management of resources in a region. The course is intended for students interested in the sustainable management of watershed applying earth observation and GIS.*

Credit-I

1. Watershed: Meaning. Concept and Characteristics
2. Watershed: A Planning Unit
3. Watershed Delineation
4. Watershed Codifications

Credit-II

1. Watershed Management: Concept and Approaches, Integrative and Consortium Approach
2. Watershed Management Strategies. Preventive and Restorative
3. Watershed Modeling
4. Application of Remote Sensing and GIS in Watershed Studies

Suggested Readings:

1. *Asish Ghosh., Natural Resource Conservation and Environmental Management, APH Publishing Corporation, Ansari Road New Delhi, 2003.*
2. *M.K. Maitra., Watershed Management Project Planning, Development and Implementation, OMEGA Scientific Publishers, 2001.*
3. *S. Chandra., Water Resources of Himalaya in Himalayan Ecosystem, Ed DN Tiwari IBD Dehradun,1995.*
4. *S.S. Negi., Natural Resource Management in the Himalayas-Land Water and Environmental Management, APH Publishing Corporation, Ansari Road New Delhi, 2003*
5. *T.N. Khoshoo., Environmental Priorities in India and Sustainable Development, 1986.*

Soil Geography **Course Code: IGGEO22E905/PGGEOE305**

***Course Outcome**: The course provides a broad overview of the soil forming factors and related processes, properties of soils, soil organic matter, soil nutrients, techniques of soil survey and soil classifications. It also addresses various aspects of soil erosion, land degradation and methods of soil conservation. The Course trains the students in soil surveys and soil resource mapping which are essential component of sustainable soil management practices.*

Credit-I

1. Soil: An Introduction
2. Factors Influencing Soil Formation
3. Processes of Soil Formation – Soil Profile
4. Physical and Chemical properties of Soil

Credit-II

1. Soil Classification- Zonal Scheme
2. USDA System of soil Classification
3. Soil Loss Models-USLE, RUSLE
4. Soil Conservation and its Significance

Suggested Readings:

1. *Daniel Hillel., Soil in the Environment; Crucible of Terrestrial Life, Academic Press, 2007.*
2. *Edward J. Plaster; Soil Science & Management, Delmar Cengage Learning; 6th edition, 2013.*
3. *Garrison Sposito., The Chemistry of Soils, Oxford University, 1989.*
4. *James B. Nardi., Life in the Soil: A Guide for Naturalists and Gardeners, University of Chicago Press, 2007.*
5. *Nyle Briday., The Nature and Properties of soil, Macmillon Publishing Company USA 1990.*

Land – Use Planning **Course Code: IGGEO22E906/PGGEOE306**

Course Outcome: *Improper land use planning is among the primary factors influencing exposure and vulnerability of communities. The course covers the important principles, methods and techniques of land use planning. The course also focuses on factors and drivers governing the land use change. At the end of course learners will be having a functional and integrated understanding of the dynamics of urban and rural land use and demonstrate how to effectively utilize policies and planning instruments to manage urban growth and achieve sustainable, equitable and efficient development outcomes.*

Credit-I

1. Land Use Planning: Concept, Objectives & Principles
2. Land Use Planning: Methods & Techniques
3. Land Use Planning for Sustainable Land Management (SLM)
4. Hazard Sensitive Land Use Planning
5. Land Use Planning in India & Legal Provisions

Credit-II

1. Factors Governing Land Utilization
2. Drivers of Land Use Changes
3. Land Capability Classification
4. Land Suitability, Land Sensitivity & Land Reclamation
5. Rural & Urban Land Use Planning

Suggested Readings:

1. *Edward S. Kaiser and F. Stuart Chapin, 1957, Urban Land Use Planning, 4th Edition.*
2. *Hok-Lin Leung, 2003, Land Use Planning Made Plain, University of Toronto Press.*
3. *Jane Silberstein, M.A., and Chris Maser, 2013, Land-Use Planning for Sustainable Development, Second Edition, CRC Press.*
4. *John Randolph, 2004, Environmental Land Use Planning and Management.*
5. *Julian Conrad Juergensmeyer and Thomas E Roberts, 2003, Land Use Planning and Development Regulation Law, Thomas West.*
6. *Philip R. Berke, David R Godschalk, 2006, Urban Land Use Planning, 5th Ed., University of Illinois Press.*
7. *T. William Patterson, 1979, Land Use Planning, Techniques of Implementation, Van Nostrand Reinhold Company.*

Regional Planning & Development-II* **Course Code: PGGEO22E307**

***Course outcome**: Course is designed to analyse the existing spatial distribution and exploitation pattern of regional resource structures, levels of sectoral development, regional imbalances and sustainable regional developmental strategies to address the issues of regional imbalances and disparities. The focus of the course is to impart knowledge, understanding and skills necessary to practice professionally as a regional/spatial planner. Course enables the students to formulate/prepare short term regional developmental plans at micro-spatial scale.*

Credit-I

1. Development: Concept & Measurement
2. Rostow's Stage Theory of Growth
3. Growth Pole Theory
4. Regional Income Inequality Model
5. Core Periphery Model

Credit-II

1. Measurement of Levels of Regional Development & Disparities
2. Construction of Composite Index
3. Levels of Regional Development & Disparities in India with special Reference to J&K
4. Planning Initiatives for Balanced Regional Development in India
5. Emerging Corridors of Development in India

Suggested Readings:

1. *Mehta, A., Economic theory and Planning, University Oxford Press, 1974.*
2. *Mishra, R.P., Regional Planning and Development, Heritage Publishers, New Delhi, 1990.*
3. *Mishra, R.P., Regional planning Concepts, Techniques, Policies and Case Studies, Concept Publishing Company, New Delhi, 1992.*
4. *Mumford, Lewis., The City in History: Its Origins, Its Transformations, and Its Prospects 1972.*
5. *Siddhartha, K., Models in Regional Planning, Kasalaya Publications, New Delhi, 2008.*
6. *Siddhartha, K., Regional Planning of India, Kasalaya Publications, New Delhi, 2007.*
7. *Singh, R.L., India- A Regional Geography, National Geographical Society of India, Varanasi, 2003.*
8. *Sundram, K.V., Geography and Planning, Concept Publishing Company, New Delhi, 1985.*
9. *Todara, Michel P., and Smith, Stephen, C. Economic Development (12th ed.), Pearson Publishers, 2014.*

Oceanography* **Course Code: PGGEO22E308**

***Course Outcome**: The objective of the course is to give an overview of the science of oceanography and to identify reasons why sustainable practices regarding ocean resources are important. The students will analyze atmospheric and oceanic circulation systems as well as their interconnections and driving forces and the principles involved in the generation of waves and tides and evaluate their effects on coastal processes and marine ecosystems. At the end of the course, the students will assess the consequences of rise in sea-level on the coastal zone and society and possible mitigation and adaptation strategies and can pursue career/ research opportunities in this applied field.*

Credit-I

1. Introduction to Oceanography
2. Ocean Bottom Relief
3. Waves & Tides
4. Ocean Currents & Salinity
5. Sea Surface Temperature & Ocean Conveyer Belts

Credit-II

1. Oceans as Store-houses of Non-conventional Sources of Energy
2. Ocean Hazards: Tsunami & Cyclone
3. Law of the Sea & Exclusive Economic Zone
4. Climate Change & Oceans: Ocean Acidification & Coral Bleaching
5. Recent Technologies in Ocean Bathymetry

Suggested Readings:

1. *Davis, R.J.A., Oceanography-An Introduction of the Marine Environment. Win C. Brown, Lowa, 1986.*
2. *Douglas A. Segar., Introduction to Ocean Science, Wadsworth Pub., London, 1998*
3. *Grald, S., General Oceanography-An Introduction, John Wiley & Sons, New York, 1980.*
4. *Hussain, T. and Tahir, M., Oceanography, Jawahar, New Delhi, 2012.*
5. *Hussain Majid, Physical Geography, Anmol Publications, 2007*
6. *King, C.A.M., Oceanography for Geographers, Earnold, London, 1975.*
7. *Kings, C.A.M., An Introduction to Oceanography, McGraw, New York, 1969.*
8. *Paul R. Pinet, Oceanography, Jones and Bartelett Publishers, 1998. .*
9. *Siddhartha, K., Oceanography-A Brief Introduction, Kisalya Pub., New Delhi, 2013.*
10. *Singh, S., Physical Geography, Prayag Pub., Allahabad, 2013.*
11. *Strahaler, A.H., Introducing Physical Geography, Wiley Pub, 2013.*
12. *Trujillo, A.P & Thurnman, H.V., Essentials of Oceanography, Prentice Hall, 2016.*
13. *Trujillo, A.P. & Thurnman, H.V., Introductory Oceanography, Prentice Hall, 2010.*

CLUSTER UNIVERSITY SRINAGAR

HYDROLOGY **Course Code: IGGEO22G901/PGGEO22G301**

Course Outcome: *This course is a specialized course of Physical Geography wherein students will be introduced to glacial Science. The course has been conceptualized to encourage students to understand the glaciers as repositories of water resources, their importance in shaping various types of landforms, their dynamic nature and behaviour of these glaciers to changing climatic regimes.*

Credit I

1. Definition and system approach in hydrology
2. Groundwater: origin, occurrence, quality and movement
3. Aquifers and types
4. Rainwater Harvesting Models

Credit II

1. Drainage basin as a hydrological unit (Indus System)
2. Runoff: controlling factors- infiltration, evaporation and transpiration
3. Hydrological analysis: unit hydrograph- derivation of unit hydrograph
4. Interlinking of Indian rivers- Problems and Prospects

Suggested Readings:

1. *Andrew D. Ward and Stanley Trimble., Environmental Hydrology (2nd ed.), Lewis Publishers, 2004.*
2. *Chow V.T., Applied Hydrology, Tata McGraw Hill Publishing Co, 1988.*
3. *Hendriks Martin., Introduction to Hydrology. Oxford University Press, London, 2010.*
4. *Patra K.C., Hydrology and Water Resources Engineering, Narosa Publishing House, 2010.*
5. *Jain S.K., Agarwal P.K. and Singh V.P., Hydrology and Water Resources of India, Springer, The Netherlands, 2007.*
6. *Raghunath H.M., Hydrology, Newage International (P) Ltd., New Delhi, 2006.*
7. *Shaw E.M., Hydrology in Practice, 3rd Ed, Routledge, 2004.*
8. *Singh V.P., Elementary Hydrology, Prentice Hall, Englewood, New Jersey, 1993.*
9. *Suresh R., Watershed Hydrology, Standard Publishers Distributors, New Delhi, 2005.*
10. *Ward A.D. and Elliot W.J. (eds.) Environmental Hydrology, Lewis Publishers, 1995.*
11. *Madan Mohan das and Mimi Das Saikia., Hydrology, Prentice Hall of India, 2013.*
12. *Timothy, Davie., Fundamentals of Hydrology, Routledge, Taylor and Francis Group, U.K. 2003.*
13. *Todd, D.K., Groundwater Hydrology. John Wiley & Sons Inc. 2009.*

World Geography **Course Code: IGGEO22O901/PGGEO22O301**

***Course Outcome**: This course aims to promote a broad understanding of landforms, climate and drainage patterns at global level. It also deals with global distribution of industry, minerals, and agricultural and population resource regions. This course has been conceptualized to address the requirements of a large segment of students interested in various competitive examinations.*

Credit I: ASIA

1. Relief
2. Climate
3. Drainage
4. Population – Distribution, Density & Growth

Credit II: EOROPE

1. Relief
2. Climate
3. Drainage
4. Population – Distribution, Density & Growth
5. European Union – A brief outline

Suggested Readings:

1. Clark, Earl & Danel Rockman Bergsmark., Modern World Geography, J.B. Lippincott Company, 2009.
2. Bradley, John Hudgon., World Geography; Gin & Co.
3. Gautam, Alka., Regional Geography of the World, 2018
4. Khullar, D. R., World Geography, Acess Publishing, 2016.
5. Kumar, Mahesh., World Geography, Cosmos Publications, 2020
6. Hussain, Majid: World Geography; Rawat Publication, 2012.
7. Hussein, Majid., Indian and World Geography, 5th Ed. TataMcGrah Hills, New Delhi, 2020
8. Sharma, Vivek and Singh, Deepika, Magbook India and World Geography, Arihant Pubilcations, 2020
9. Simon Adams: Geography of the world; Dorling Kindersly, 2006.

Course Outcome:

Credit I

1. Research, Scientific Research-Concept & Characteristics, Approach to research
2. Identification of the Problem, Assessing the status of the Problem.
3. Formulating the objectives, preparing the design, experimental or otherwise.
4. Literature Review

Credit-II

1. Concept of Hypothesis.
2. Hypothesis Formulation.
3. Types of Hypothesis.
4. Hypothesis Testing.

Credit-III

1. Types of sources material- Primary, secondary & experimental data.
2. Generation of primary data & its methods- Sampling
3. Designing of structured questionnaire, Validation of questionnaire, Processing & Analysis of Data.
5. Report writing – Format, Citations, Design of Chapters, Inferences, Findings and Conclusion, Bibliography & Webliography.

Credit-IV

1. Philosophy and Methodology in Geography
2. Recent research approaches in Geography
3. Scientific explanation in geographical research and types of explanations.
4. Concept, meaning & Framework of Models.

Paper Review/Book Review/ Literature Review **Course Code: IGGEO22C1002/PGGEO22C402**

***Course Outcome**: This course aims to promote a broad understanding of landforms, climate and drainage patterns at global level. It also deals with global distribution of industry, minerals, and agricultural and population resource regions. This course has been conceptualized to address the requirements of a large segment of students interested in various competitive examinations.*

Project/ Dissertation **Course Code: IGGEO22C1003/PGGEO22C403**

***Course Outcome**: This course aims to promote a broad understanding of landforms, climate and drainage patterns at global level. It also deals with global distribution of industry, minerals, and agricultural and population resource regions. This course has been conceptualized to address the requirements of a large segment of students interested in various competitive examinations.*