M.A. / M.Sc. in GEOGRAPHY

First Year (Previous)

The previous year consists of two semesters, called the first and second semester. In each of these semesters, there will be five core/elective papers and a mandatory Elective Non-credit course to be taken any two out of four semester Master programme. Evaluation of performance in these papers will be based on internal evaluation as well as written examination. There will be 30% internal evaluation and 70% written examination. The internal evaluation in each paper will be based on regularity, punctuality and class test.

The written papers will be of 4 credits (maximum 70 marks), except were stated otherwise. Their examinations will be held in the months of December and May respectively. Each paper will be of three hours duration.

Semester-I

Paper	Course	Paper Code	Title of the Paper
Paper-1		GEO81DC00104	Geographic Thought: Concept and Issues
Paper-2		GEO811DC0204	Geomorphology
Paper-3	DBCC	GEO81DC00304	Remote Sensing (Theory)
Paper-4		GEO81DC00402	Remote Sensing (Practical)
Paper-5		GEO81DC00502	Statistical Techniques in Spatial Analysis
		Open Elective (Interdisciplinary in nature) From the Discipline/ Swayam/MOOC (any **one** from the list of options to be taken from the Other Department)	
Paper-6	OEIC	GEO81OE00104	Geography of South Asia
		GEO81OE00204	Geography of India
		GEO81OE00304	Contemporary Human Geography
		Mandatory Elective Non-Credit Course (Equivalent to 02 Credits)	
	MENC (Noncredit)	Indian Knowledge System in concerned Discipline/ Subject/Yoga, Health & Mental Wellbeing/ Instrumentation/ Entrepreneurship/ SWAYAM Approved courses	

Semester-II

Paper	Course	Paper Code	Title of the Paper
Paper-1		GEO82DC00604	Research Methodology
Paper-2	DBCC	GEO82DC00704	Climatology
Paper-3		GEO82DC00804	Geographical Information Science (Theory)
Paper-4		GEO82DC00902	Geographical Information System (Practical)
Paper-5		GEO82DC01002	Advanced Field Tools Techniques (Practical)
		Core Elective (Any **one** of the following)	
Paper-6		GEO82DE00104	Settlement Geography
		GEO82DE00204	Agricultural Geography
		GEO82DE00304	Social Geography
	DBCE	GEO82DE00404	Political Geography
		GEO82DE00504	Geography of Transport
		GEO82DE00604	Economic Geography
		GEO82DE00704	Geography of Tourism
		Mandatory Elective Non-Credit Course (Equivalent to 02 Credits)	
	MENC (Noncredit)	Indian Knowledge System in concerned Discipline/ Subject/Yoga, Health & Mental Wellbeing/ Instrumentation/ Entrepreneurship/ SWAYAM Approved courses	

M.A./M.Sc. in Geography
Second Year (Final)

The final year consists of two semesters, called the third and fourth semester. In each of these semesters, there will be five core/elective papers. Evaluation of performance in these papers will be based on internal evaluation as well as written examination. There will be 30% internal evaluation and 70% written examination. The internal evaluation in each paper will be based on regularity, punctuality and class test.

Semester-III

Paper	Course	Paper Code	Title of the Paper
Paper-1	DBCC	GEO91DC01104	Population Geography
Paper-2		GEO91DC01204	Dissertation
Paper-3		GEO91DC01302	Field work and Investigation
Paper-4		GEO91DC01402	Introduction to Machine Learning
		Core Elective (Any **one** of the following)	
Paper-5	DBCE	GEO91DE00804	Hydrology and Water Resource Management
		GEO91DE00904	Advanced Geography of India
		GEO91DE01004	Geography of Health and well being
		GEO91DE01104	Rural Development
		GEO91DE01204	Urban Governance and Planning
		GEO91DE01304	Geography of Heritage Conservation
		GEO91DE01404	Geography of Geo Parks and Geo Tourism
		GEO91DE01504	Environment hazards and disaster risk reduction
		OEIC to be offered for the Other department	
Paper-6	OEIC	GEO91OE00404	Introduction to Climate Change
		GEO91OE00504	Spatial Information System
		GEO91OE00604	Physical Geography
		Mandatory Elective Non-Credit Course (Equivalent to 02 Credits)	
	MENC Noncredit	Indian Knowledge System in concerned Discipline/ Subject/Yoga, Health & Mental Wellbeing/ Instrumentation/Entrepreneurship/ SWAYAM Approved courses	

Semester-IV

Paper	Course	Paper Code	Title of the Paper
Paper-1	DBCC	GEO92DC01504	Environment & Sustainable Development
Paper-2		GEO92DC01608	Dissertation
		Core Elective (Any **one** of the following)	
Paper-3	DBCE	GEO92DE01604	Oceanography
		GEO92DE01704	Climate Change and Adaptations
		GEO92DE01804	Regional Planning and Development
		GEO92DE01904	Soil Geography
		GEO92DE02094	Gender Geography
		GEO92DE02104	Introduction to Demographic Methods
		GEO92DE02204	Cultural Geography
		GEO92DE02304	Urbanization and Urban System
		GEO92DE02404	Natural Resource Management
		Mandatory Elective Non-Credit Course (Equivalent to 02 Credits)	
	MENC (Noncredit)	I K S in concerned Discipline/ Subject/Yoga, Health & Mental Wellbeing/ Instrumentation/Entrepreneurship/ SWAYAM Approved courses	

SEMESTER-I
(DBCC)

GEOGRAPHIC THOUGHT: CONCEPT AND ISSUES

Course Title: Geographic Thought: Concept and Issues	**L**	**T**	**P**	**Cr**
Course Code: GEO81DC00104	4	-	-	4

Total Hour: 60 Hours

Course Learning Outcome (CLO): At the completion of the course, the student will be able to:

CLO1: describe the theoretical traditions and contemporary lines of thought of the discipline.
CLO2: analyse the philosophical and methodological standpoints of leading geographers.
CLO3: explain the continuities in geographic thought over time.
CLO4: comprehend the debates and issues that geographers have wrestled with for decades.
CLO5: Explain and analyse the contemporary geographical thought.

Unit/Hours	**Content**	**Mapping with CLO**
Unit I / 15 Hours	**Emergence of the discipline: historical development** Historical Development: Contribution of major proponents in geography in the ancient world (the Greeks, the Romans and Indians); Development of Geography during the Middle Ages Reformation, Age of Enlightenment and pre-Modern geographies (Varenius and Kant); Age of Discovery and Exploration. **Learning activities:** Assignment writing, Quiz/test	CLO1
Unit II / 15 Hours	**Emergence of modern Geography** The field of Geography: its place in the classification of Sciences Epistemology of geography; Nineteenth Century Geography: Ritter and Humboldt; Ratzel, Semple, Huntington and Taylor - Environmental Determinism; Possibilist School; La Blache, Brunhes and the French school; Influence of Darwinism on Geography. **Learning activities:** Paper reading/ Group discussion/Quiz/test	CLO2 CLO3
Unit III / 15 Hours	**Towards scientific explanation and theory building** Early 20th Century Geographies: Sauer--Cultural School; Hartshorne—Regional School (areal differentiation); Exceptionalism and the Schaefer-Hartshorne debate; Concept of region; Critical assessment and debates on Spatial science; Dualisms—Regional Vs. systematic, Physical vs. Human; Positivism in Geography, Quantitative Revolution and Logical Positivism **Learning activities:** Paper reading /Quiz/test/ debate	CLO4
Unit 4/ 15 Hours	**Contemporary geographical thought** Behaviouralism and Humanistic Geography; Radical and Marxist Geography, Gender and Feminist Geography, Postmodernism and beyond; Changing methodologies of geography in the Globalising World. **Learning activities:** Paper reading (As given in the suggested paper/article list), Group discussion/ debate	CLO5

Suggested/ Recommended readings:

1. Castree, Noel, Alisdair Rogers, and Douglas Sherman, (2005). Questioning geography: fundamental debates, (edited). Boston: Wiley-Blackwell
2. Cresswell, Tim. (2012). *Geographic Thought: A Critical Introduction.* Malden, MA: Wiley Blackwell

3. Dikshit, R. D. (2018): *Geographical Thought. A Critical History of Ideas*. 2nd Edition. Prentice-Hall of India, New Delhi.
4. Hartshorne R. (1939): The Nature of Geography, AAG, New York.
5. Harvey, D. (1969). *Explanation in Geography*. Arnold, London
6. Hussain, M. (2014). *Evolution of Geographical Thought*. 6th edition. Rawat Publisher.
7. Livingstone, David. (1992). *The Geographical Tradition: Episodes in the History of a Contested Enterprise*. Oxford: Blackwell.
8. Peet, R. (1998). *Modern Geographical Thought*. Wiley-Blackwell, New York.
9. Soja, Edward. (1989). *Post-modern Geographies, Verso.* London. Reprinted 1997: Rawat Publ., Jaipur, and New Delhi.
10. Tuan, Yi-Fu. (1977). *Space and Place: The Perspective of Experience*. Minneapolis: University of Minnesota Press, Introduction, Epilogue.

Suggested papers/articles:

1. Schaefer, Fred. (1953). Exceptionalism in Geography: A Methodological Examination. *Annals of the American Association of Geographers* 43: 226–49.
2. Wilson, Robert. (2005). Retrospective Review: Man's Role in Changing the Face of the Earth. *Environmental History* 10 (3), 564-66.
3. Meinig, D W. (1983). Geography as an Art. *Transactions of the Institute of British Geographers* 8: 314–28.
4. Hawkins, Harriet, et al. (2015). What might the geohumanities do? Possibilities, practices, publics, and politics. *GeoHumanities* 1 (2): 211–32.
5. Harvey, David. (1984). On the History and Present Condition of Geography: An Historical Materialist Manifesto. *The Professional Geographer* 3: 1–11.
6. Butler, Judith. (2011). Your Behavior Creates Your Gender. Big Think. http://bigthink.com/videos/your-behavior-creates-your-gender.
7. Domosh, Mona. (1991). Toward a feminist historiography of geography. *Transactions of the Institute of British Geographers*. 16 (1): pp. 95–104.
8. Commentary by David Stoddart and Domosh's response: Transactions of the Institute of British Geographers 16(4): 484–490.

Websites/web references:

1. https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=17

(DBCC)
GEOMORPHOLOGY

Course Title: Geomorphology	**L**	**T**	**P**	**Cr**
Course Code: GEO81DC00204	4	-	-	4

Total Hour: 60 Hours

Course Learning Outcomes (CLO): At the completion of the course, the student will be able to:

CLO1: Explains basic concepts of landforms and their development through time.
CLO2: An understanding of landscape forms and processes.
CLO3: To have an understanding of how the material is transported both by geomorphic processes.
CLO4: Familiarity and experience applying fundamental concepts in physical systems.
CLO5: Learn the techniques of geomorphological analysis.

Unit/Hours	**Content**	**Mapping with CLO**

Unit I / 15 Hours	Geomorphology: Fundamental concepts in geomorphology, Development of Modern Geographic Thought, scopes of geomorphology. Mountains, plateaus, hills: types and origin. Theory of Isostasy. Mountain Building Theories. Fundamental concepts vs modern trends or recent trends in Geomorphology. **Learning activities:** Assignment writing	CLO1
Unit II / 15 Hours	Geomorphic Processes and landforms: Gradational and Aggradational processes: concept of slope, erosion and mass wasting. Weathering: Physical and chemical Process. Cycle of Erosion - Concepts of Davis and Penck. Geomorphic landform: fluvial, glacial, Aeolian, coastal and karst. **Learning activities:** Quiz; Students' presentation/Group discussion	CLO1 CLO2
Unit III / 15 Hours	Evolution of the earth and Earth's internal structure; composition and characteristics. Rocks: types, formation and characteristics. Plate Tectonics and Continental drift theory. Earth Movements and structures or forms. **Learning activities:** Paper reading, case study.	CLO2 CLO3
Unit IV/ 15 Hours	Application in Various Fields. Geomorphic hazards and mitigation measures, Geomorphology and economic deposits, Geomorphology in engineering construction, Geomorphology in groundwater studies, Soils and geomorphology. **Learning activities:** Case study/Group discussion	CLO4 CLO5

Suggested/ Recommended readings:

1. Anderson, R.S. and Anderson, S.P. 2010. Geomorphology: The Mechanics and Chemistry of Landscapes, Cambridge University Press, Cambridge.
2. Bierman, P.R. and Montgomery, D.R. 2014. Key Concepts in Geomorphology, Macmillan Education, New York.
3. Bloom, A.L. 2003. Geomorphology: A Systematic Analysis of Late Cenozoic Landforms, Prentice-Hall of India, New Delhi.
4. Huggett, R.J. 2011. Fundamentals of Geomorphology, Routledge, New York.
5. Kale, V.S. and Gupta, A. 2001. Introduction to Geomorphology, Orient Longman, Hyderabad.
6. Singh, S. (2004): Geomorphology. Prayag Pustak Bhawan, Allahabad.
7. Sparks, B.W. (1986): Geomorphology. Longmans, London.
8. Thornbury, W.D. (2005): Principles of Geomorphology. John Wiley and Sons, New York.

(DBCC)
REMOTE SENSING (Theory)

Course Title: Remote Sensing (Theory-Core)	**L**	**T**	**P**	**Cr**
Course Code: GEO81DC00304	4	-	-	4

Total Hour: 60 Hours

Course Learning Outcomes (CLO): At the completion of the course, the student will be able to:

CLO1: This paper shall enable the students to understand fundamental issues related to remote sensing, its development and types.

CLO2: This course shall enable the students to comprehend about aerial photography, satellite remote sensing, EMR and sensors

CLO3: Students shall be well-versed with the interpretation and applications of remote

sensing, and GPS.
CLO4: Overall understanding of potential of Remote Sensing.

Unit/Hours	Content	Mapping with CLO
Unit I / 15 Hours	Remote Sensing: Introduction to remote sensing: history, process, and types. Introduction to electromagnetic radiation: EMR theory, spectral bands, blackbody radiation. Introduction to EMR interaction with earth surface: EMR process, spectral signature, spectral reflectance curve, EMR with soil, water, vegetation, land, and atmosphere, atmospheric windows Characteristics. Global Positioning System (GPS) – Principles and application **Learning activities:** Assignment writing	CLO1
Unit II / 12 Hours	Remote Sensing platforms: ground-borne, air-borne and space borne, orbital characteristics. Type of remote sensing satellites: geostationary and sun-synchronous, active, passive. Remote sensing satellite sensors: whiskbroom and push broom, scanner, and camera. Remote sensing satellite data products: IRS, LANDSAT, Sentinel, SPOT, IKONOS, Quick bird, world view, microwave, and hyperspectral data. **Learning activities:** Students' presentation/Group discussion	CLO1 CLO2
Unit III / 18 Hours	Aerial Photography: Characteristics, history of Aerial photography, Flight planning and execution, Aerial camera and film, Geometry of Aerial Photographs, Basic photogrammetry: determination of scale, parallax, orthophoto, relief displacement, 3-dimensional features etc. Basic photogrammetry: determination of scale, parallax, orthophoto, relief displacement, Stereoscopy, Element of aerial photo interpretation. **Learning activities:** Paper reading, Students presentation/ Group discussion	CLO2 CLO3
Unit 4/ 15 Hours	Introduction to visual image interpretation, Introduction to digital image processing, Introduction to ground truthing and uncertainty analysis, Introduction to change detection analysis. Application of Remote Sensing: Soil, Water, Forest, and Urban etc **Learning activities:** Case studies	CLO4 CLO5

Suggested/ Recommended readings:

1. Campbell J. B. (2007). *Introduction to Remote Sensing*, Guildford Press.
2. Jensen J. R. (2004) *Introductory Digital Image Processing: A Remote Sensing Perspective*, Prentice Hall.
3. Joseph, G. (2005). *Fundamentals of Remote Sensing*. Delhi, India: United Press India.
4. Lillesand, T.M., Kiefer, R.W. and Chipman, J.W. 2004. *Remote Sensing and Image Interpretation*, 5th Edition, Wiley.
5. Nag P. and Kudra, M., 1998: *Digital Remote Sensing*, Concept, New Delhi.
6. Sabins, F.F. 2007. *Remote Sensing: Principles and Interpretation*, 3rd Edition, Waveland Press.

(DBCC)

REMOTE SENSING (Practical)

Course Title: Remote Sensing (Practical)	**L**	**T**	**P**	**Cr**
Course Code: GEO81DC00402	-	-	2	2

Total Hour: 60 Hours

Course Learning Outcomes (CLO): At the completion of the course, the student will be able to:

CLO1: To make students acquainted with standard digital image processing techniques through hands-on practical exercises

CLO2: Perform image pre-processing, enhancement and classification and visual interpretation of images;

CLO3: To enable students to extract land-use/land-cover and other valuable information from the digital remote sensing images for different geographical applications

Unit/Hours	**Content**	**Mapping with CLO**
Unit I / 15 Hours	Aerial photography: Basic aerial photo interpretation: scale determination, mosaicking and interpretation.	CLO1
Unit II / 15Hours	Remote sensing data mining: downloading and familiarization of satellite imagery, aerial photograph, reading metadata and basic characteristics of images and aerial photograph.	CLO1 CLO2
Unit III / 15 Hours	Digital Image Processing: Pre-processing, Enhancement, Filtering; Band Ratio, Image Classification; Supervised and Un-supervised,	CLO2 CLO3
Unit 4/ 15 Hours	Application of Remote Sensing: Urban, Agriculture, Water and Vegetation, Change detection analysis: Image-based and map-based approach. Case studies: land use mapping land use change analysis, urban growth monitoring, forestry etc.	CLO4 CLO5

Suggested/ Recommended readings:

1. Canty, M.J. 2014. *Image Analysis, Classification and Change Detection in Remote Sensing*, 3rd Edition, CRC Press.
2. Lavender, S. and Lavender, A. 2015. *Practical Handbook of Remote Sensing*, CRC Press.
3. Liang, S. 2004. *Quantitative Remote Sensing of Land Surfaces*, Wiley.
4. Mather, P. M. and Koch, M. 2011. *Computer Processing of Remotely Sensed Images: An Introduction,* 4th Edition, Wiley-Blackwell.
5. Richards, J.A. 2013. *Remote Sensing Digital Image Analysis: An Introduction*, Springer.
6. Tso, B. and Mather, P.M. 2009. *Classification Methods for Remotely Sensed D*ata, 2nd Edition, CRC Press.

(DBCC)
STATISTICAL TECHNIQUES IN SPATIAL ANALYSIS (Practical)

Course Title: Statistical techniques in spatial analysis	**L**	**T**	**P**	**Cr**
Course Code: GEO81DC00502	2	-	-	2

Total Hour: 60 Hours

Course Learning Outcomes (CLO): At the completion of the course, the students will be able to:

CLO1: understand statistics for analysis
CLO2: analysis of correlation and regression
CLO3: measure and analysis of spatial pattern and network
CLO4: learn to develop hypothesis
CLO5: learn to test and explain hypothesis

Unit/Hours	**Content**	**Mapping with CLO**
Unit I / 15 Hours	**Introduction** Statistics: Descriptive and Inferential Statistics; Introduction of Nominal, Ordinal, Ratio and Interval data; Measures of central tendency (Mean, Median, Mode); Mean deviation and standard deviation; Methods of normalization **Learning activities:** Assignment writing	CLO1
Unit II / 15 Hours	**Correlation, regression and probability** Rank order and product moment correlation; Liner regression; Multi-linear regression; Logistic regression; Residuals and Standard error of estimate; Probability Theory: Normal, Binomial and Poisson distribution **Learning activities:** Students' presentation/Group discussion	CLO2
Unit III / 15Hours	**Pattern and network analysis** Nearest Neighbour Analysis; Gini's Co-efficient; Lorenz curves; Location quotient; Network as a Graph; Alfa, Beta and Gamma Index of Connectivity; Accessibility by Detour Index **Learning activities:** Case study/ Assignment writing	CLO3
Unit 4/ 15 Hours	**Hypothesis testing** Concept of hypothesis; Parametric Hypothesis tests: t-test; Z-test and Analysis of Variance (ANOVA): Objectives, One-way and Two-way; Nonparametric Hypothesis tests: Chi-Square, Mann-Kendall (MK) test and Kruskal-Wallis Test **Learning activities:** Case study /Group discussion	CLO4 CLO5

Suggested/ Recommended readings:

1. Alvi, Z. (2014). *Statistical Geography Methods and Applications*. Rawat Publications.
2. Gregory, S. (2014). *Statistical methods and the geographer*. Routledge.
3. Rogerson, P. A. (2019). *Statistical methods for geography: a student's guide*. Sage.
4. Clark, W.A.V and Hosking, P.L. (1986). *Statistical Methods for Geographers*, Wiley and Sons.
5. Cole, J. P., & King, C. A. (1968). *Quantitative geography: Techniques and theories in geography* (No. 91: 51 COL).
6. Hammond, R. and McCullagh, P. (1991). *Quantitative Techniques in Geography*. Clarendon Press, Oxford.
7. Spiegel, M.R. and Stephens, L.J. (2000). *Theory and Problems of Statistics*. Tata McGraw-Hill Publishing Company Limited, New Delhi.

8. Walford, P. (1995). *Geographical Data Analysis*. John Wiley and Sons Inc., New York.
9. Yeates, M. (1974). *An introduction to Quantitative Analysis in Human Geography*. McGraw-Hill.
10. Mahmood, A. (1998). *Statistical Methods in Geographical Studies*. Rajesh Publication.
11. Kurtz, N.R. (1983). *Introduction to Social Statistics*. McGraw-Hill International Book Company, Auckland.
12. Silk, J. (1979). *Statistical techniques in Geography*. George Allen and Unwin, London.
13. Matthews, J. A. (2013*). Quantitative and statistical approaches to geography: a practical manual*. Elsevier.
14. Briggs, W. (2016). *Uncertainty: the soul of modelling, probability & statistics*. Springer.
15. Burt, J. E., Barber, G. M., & Rigby, D. L. (2009). *Elementary statistics for geographers*. Guilford Press.
16. Ebdon, D. (1991). *Statistics in geography: A practical approach-revised with 17 programs*. Wiley-Blackwell.
17. Cressie, N.A.C. (1991). *Statistics for Spatial Analysis*. Wiley, New York.
18. Tayler, P.J. (1977). *Quantitative Methods in Geography: An Introduction to Spatial Analysis*. Houghton Mifflin Company Boston, London.

(OEIC)
GEOGRAPHY OF SOUTH ASIA

Course Title: Geography of South Asia	**L**	**T**	**P**	**Cr**
Course Code: GEO81OE00104	4	-	-	4

Total Hour: 60 Hours

Course Learning Outcomes (CLO): At the completion of the course, the students will be able to:

CLO1: explain the south Asian as reason its social formation and urbanization

CLO2: to appreciate Geo strategic space and Indian ocean reason

Unit/Hours	**Content**	**Mapping with CLO**
Unit I / 15 Hours	South Asia/South East Asia as a region: geography, polity, history and economy; South Asia as a concept. **Learning activities:** Assignment writing	CLO1 CLO2
Unit II / 15 Hours	Social formations in South Asia/South East Asia: Caste, religion, gender and sexuality, kinship and marriage. **Learning activities:** Students' presentation/Group discussion	CLO1 CLO2
Unit III / 15 Hours	South Asian/ South East Asians Urbanisms and Urbanization: Origins and post-colonial development and urbanization, Neo liberal globalization/urbanisation. **Learning activities:** case study/ Assignment writing	CLO1 CLO2
Unit 4/ 15 Hours	South Asia/South East Asia: Geo Strategic space, Indian Ocean Region and evolving role of the Indo-Pacific, Expanding Geography; South Asia in global context: migration and Diaspora, security and regional cooperation **Learning activities:** Case study /Group discussion	CLO1 CLO2

Suggested/ recommended readings:

1. Chia Lin Sien (ed.) Southeast Asia Transformed: A Geography of Change. Singapore: Institute of Southeast Asian Studies, 2003.
2. Dick, Howard and Peter Rimmer. Cities, Transport, and Communications: The Integration of Southeast Asia Since 1850. New York: Palgrave Macmillan, 2003.
3. Fisher, Charles. Southeast Asia: A Social, Economic and Political Geography London: Methuen, 1964 or 1966, 2nd ed. (The classic work on the geography of Southeast Asia)
4. Fryer, Donald. Emerging Southeast Asia: A Study in Growth and Stagnation New York: Wiley-Halsted, 1980, 2nd ed.
5. Gupta, Avijit. The Physical Geography of Southeast Asia. Oxford : Uni9versity Press, 2005 GB 295 .P49 2005
6. Rigg, Jonathan. Southeast Asia: The Human Landscape of Modernization and Development. London and New York: Routledge, 2003, 2nd edition.
7. Rimmer, Peter. Pacific Rim Development : integration and globalization in the Asia-Pacific region. 1997.
8. Dick, Howard and Peter Rimmer. Cities, transport, and communications : the integration of Southeast Asia. Palgrave, 2003.

(OEIC)
GEOGRAPHY OF INDIA

Course Title: Geography of India (Core)	**L**	**T**	**P**	**Cr**
Course Code: GEO81OE00204	4	-	-	4

Total Hour: 60 Hours

Course Learning Outcomes (CLO): At the completion of the course, the student will be able to:

CLO1: explain geopolitical importance of the Indian sub-continent.
CLO2: do to utilize resource optimally on the basis of resource based of India.
CLO3: analyse the pattern and level of development in India

Unit/Hours	**Content**	**Mapping with CLO**
Unit I / 15 Hours	Nomenclature, Geopolitical Significance of India's Location; The importance of Indian Ocean; Geological Origin & Evolution of India's Mountains, Plateaus, Plains, and Coast; Origin of River Systems of India. **Learning activities:** Assignment writing, Quiz	CLO1
Unit II / 15 Hours	Climate classification: Koppens, Trewartha, Thornthwaite's modified; Agro-Climatic Regions, Agro-ecological regions Sustainable Agriculture, Role of Green Revolution & Bio technology in agriculture; New Trends in Indian Agriculture , The New Agricultural Policy. **Learning activities:** Quiz/presentation/Group discussion	CLO1 CLO2
Unit III / 15 Hours	Energy and economy, Emerging energy scenario in India; Land Use Patterns Mineral resource regions; Population Characteristics. Population Resource Regions; Regional distribution of Urban population; Industrial Regions & Industrial Complexes. Industrial Policies & Trend of Industrialization; Impact of Globalization on Indian Economy; **Learning activities:** Assignment writing, presentation	CLO2 CLO3

Unit 4/ 15 Hours	Planning Regions of India: Delimitation and Salient Features; Regional Development and Disparities; Special Economic Zones; Problems & Prospects of Backward Regions (A Case study of Bihar). **Learning activities:** Case study, Report reading/ Presentation	CLO4 CLO5

Suggested/ Recommended readings:

1. Chauhan P.R. (2001): Bharat Ka VrihatBhoogol, Vasundhara Prakashan, Gorakhpur.
2. Gautam, Alka (2001): Geography of India, Sharda Pustak Bhawan, Allahabad.
3. Govt. of India : Economic Survey, Ministry of Finance, New Delhi (Different Issues)
4. Hussain, Majid (2008): Advance Geography of India, Tata Mc Graw Hill, New Delhi.
5. Johnson, B.L.C. (1983): Development in South Asia, Penguin Books, Harmondsworth.
6. Khullar, D.R. (2006): India: A Comprehensive Geography, Kalyani Pub., New Delhi.
7. Sharma, T. C. (2003): India: Economic and Commercial Geography, Vikas Publication., New Delhi.
8. Singh, J. (2003): India: A Comprehensive and Systematic Geography, Gyanodaya Prakashan, Gorakhpur.
9. Singh, R. L. (ed.) (1971): India. A Regional Geography, National Geographical Society of India, Varanasi.
10. Tiwari, R. C. (2007): Geography of India, PrayagPustak Bhawan, Allahabad
11. Singh, M. B. (2002): Physical Geography. Tara Book Agency, Varanasi. (In Hindi).
12. Singh, S., (1998): Geomorphology. Prayag Pustak Bhavan, Allahabad.
13. Sparks, B.W., (1986): Geomorphology. Longman, London. New York.

(OEIC)
CONTEMPORARY HUMAN GEOGRAPHY

Course Title: Contemporary Human Geography	**L**	**T**	**P**	**Cr**
Course Code: GEO81OE00304	4	-	-	4

Total Hour: 60 Hours

Course Learning Outcomes (CLO): At the completion of the course, the student will be able to:

CLO1: understand fundamental philosophical assumptions and concepts of human geography

CLO2: validate an advanced understanding of contemporary debates in Geography.

CLO3: validate knowledge of key concepts and contribution of seminal thinkers and theorist in the field of Human Geography

CLO4: understand how theoretical frameworks shape fieldwork

CLO5: validate how to conduct in-depth fieldwork.

Unit/Hours	**Content**	**Mapping with CLO**
Unit I / 15 Hours	**Geography and Theory:** Ontology, Epistemology, Ideology, Methodology**;** The theory of knowledge; Indigenous knowledge system**;** Definitions of Human Geography**;** Fundamental Concepts of Human Geography; Nature, Space, Place and time. **Learning activities:** Assignment writing/ discussions	CLO1 CLO2

Unit II / 15 Hours	Contemporary trends in Human Geography: Cultural Turn; Critical Geographies –Geographies of domination and resistance; Postmodern Geographies – Speaking from the margins; Post Structural Geographies – Power Politics of Representation, Identity and Difference **Learning activities:** discussion and debates	CLO2 CLO3
Unit III / 15 Hours	The Practice of contemporary Human Geography: Geographies of body: Performativity, Representation and Sensory sites; Geographies of text: Theorising the landscape; Geographies of Governance: Citizenship, governance and social justice; Geographies of Globalisation: Space, time and mobility. Geography and empowerment. **Learning activities:** discussion and debates /Report reading	CLO3 CLO4
Unit IV/ 15 Hours	Field work in contemporary Human Geography: Looking the field through theory – Objectivity and subjectivity; Power relations in the field; Interpretations; Group field work project and report **Learning activities:** discussion/Presentation/Field Work	CLO4 CLO5

Suggested/ Recommended readings:

1. Agnew, John et. al. (ed.) (1996), Human Geography, Blackwell Publishers London. Bonnet, Alastair (2008) What is Geography? Sage, New Delhi.
2. Cloke, Paul and Johnston, Ron (2005) Spaces of Geographical Thought, Sage, London. DeLyser, S. Herbert, S. Aitken, M.Crang, and L.McDowell (2010) The SAGE Handbook of Qualitative Geography. Los Angeles, CA: SAGE.
3. Dickinson, R.E. (1969), The Makers of Modern Geography, London. Dictionary of Human Geography
4. Dikshit, R.D. (1999), Geographical Thought - A Contextual History of Ideas, Prentice Hall of India, New Delhi.
5. Dikshit,Aitken Stuart & Gill Valentine ed. (2006) Approaches to Human Geography, Sage, London.
6. Hartshorne, R. (1959), Perspective on Nature of Geography, Rand McNally& Co. Harvey, David (1969), Explanation in Geography, Edward Arnold, London.
7. Harvey, David (1990) The Condition of Postmodernity, Blackwell, London. Harvey, Miltan E and Brian P. Holly (1981), Themes in Geographic Thought, Croom Helm, London.
8. Hubber, Phil et. al. (2002), Thinking Geographically: Space Theory and Contemporary, Human Geography, Continuum, New York.
9. Introducing of Human geography, Clock, Crank and Goodwin (2014)
10. James P.E. and Martin J. Geoffret (1972) All Possible Worlds, John Wiley and Sons ,New York. Johnston, R.J. (1988) The Future of Geography, Methuen, London.
11. Johnston, R.J. (2004) Geography and Geographers, Arnold London. Key thinkers in Geography of Space and Place.
12. Peet, Richard (2003) Radical Geography, (Indian Reprint), Rawat Publication, New Delhi. Peet, Richard (1998) Modern Geographical Thought, Oxford Blackwell.
13. Soja, Edward W. (1997) Postmodern Geographies, Indian edn. Rawat Publications, New Delhi.
14. Unwin, Tim (1992) The place of Geography, Pearson Education Limited, Essex.

SEMESTER-II

(DBCC)
RESEARCH METHODOLOGY

Course Title: Research Methodology

L	T	P	Cr
4	-	-	4

Course Code: GEO82DC00604

Total Hour: 60 Hours

Course Learning Outcomes (CLO): At the completion of the course, the student will be able to:

CLO1: The students will be able to understand basic concepts of field research methods and research design in geography.

CLO2: 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.

CLO3: The students will be able to write dissertation based on field work on given topic.

Unit/Hours	Content	Mapping with CLO
Unit I / 15 Hours	Conceptual framework: Introduction to Geographical Research: Concept, Significance, Types and Approaches to Research in Geography; Literature survey; research proposal framework, referencing/bibliography; Research Ethics, Plagiarism; Limitations. **Learning activities:** Assignment writing	CLO1
Unit II / 15 Hours	Research Design: Steps, Identification and formulation of Research Problem; Research questions; Hypothesis formulation, Objectives formulation and research methodology. **Learning activities:** presentation/Group discussion	CLO1 CLO2
Unit III / 15 Hours	Data Sources and Methods of Data Collection: Nature of Data: qualitative and quantitative, Primary Data: Field survey, Selection of sample, Questionnaire(Open/ Closed / Structured / Non-Structured); Interview with Special Focus Group Discussions;, Observation(Participant / Non Participant), Space Survey (Transects and Quadrants, Constructing a Sketch & Mental map); Secondary Data, Data Representation Techniques **Learning activities:** Paper reading, literature/article review	CLO2 CLO3
Unit 4/ 15 Hours	Data Analysis: Processing of Data; tabulation, graphic presentation and analysis of Data; Referencing; Designing the Dissertation & Field Report – Aims and Objectives, Methodology, Analysis, Interpretation and Writing the Dissertation & Report. **Learning activities:** Case study, report reading	CLO4 CLO5

Suggested/ recommended readings:

1. Black, James A. and Champion, D.J. 1976. *Methods and Issues in Social Research,* John Wiley and Sons, New York.
2. Creswell, J., (1994). *Research Design: Qualitative and Quantitative Approaches.* UK: Sage Publications.
3. Dikshit, R. D. (2003). *The Art and Science of Geography: Integrated Readings*. New Delhi, India: Prentice-Hall of India.

4. Evans, M. (1988). *Participant Observation: The Researcher as Research Tool*. In Eylesand, J and D. Smith (eds). *Qualitative Methods in Human Geography*. Cambridge, UK: Polity.
5. Gopal, Krishan and Singh, Nina, 2016. *Researching Geography: The Indian Context*. Routledge, Delhi.
6. Misra, R. P. 2015. *Research Methodology: A Handbook,* Concept Publishing Company, New Delhi.
7. Mukherjee, Neela. (1993). *Participatory Rural Appraisal: Methodology and Application.* Delhi, India: Concept Publs. Co.

(DBCC)
CLIMATOLOGY

Course Title: Climatology	**L**	**T**	**P**	**Cr**
Course Code: GEO82DC00704	4	-	-	4

Total Hour: 60 Hours

Course Learning Outcomes (CLO): At the completion of the course, the student will be able to:

CLO1: comprehend the atmosphere dynamics and climatic processes
CLO2: enlist the processes that drive the general global as well as regional circulation.
CLO3: understand the mechanism of ISM
CLO4: gain knowledge on classification of climatic region
CLO5: analyse method of interpretation of weather symbols, and the contemporary climatic issues.

Unit/Hours	**Content**	**Mapping with CLO**
Unit I / 15 Hours	**Introduction to climatology** Fundamentals of climatology; Earth's Atmosphere: Evolution, Structure and Composition; Solar radiation and Terrestrial radiation; Variation, distribution and effect on atmosphere; Greenhouse effect and global heat budget; Temperature: concept, measurement, scales, daily and annual cycles of temperature; vertical distribution; world distribution. **Learning activities:** Assignment writing	CLO1
Unit II / 15 Hours	**Atmospheric dynamics** Stability and instability in atmosphere; Cloud: Type and formation; Atmospheric moisture and precipitation: Concept and measurement of atmospheric moisture; Condensation - forms of condensation; adiabatic temperature changes; Formation and types of precipitation; global distribution of precipitation. **Learning activities:** Quiz; Students' presentation/Group discussion	CLO1 CLO2
Unit III / 18 Hours	**Wind circulation and Monsoon** Wind circulation Models of general circulation of the atmosphere: Jet stream, Air masses and fronts, characteristics, movements, frontogenesis; Tropical cyclones; mechanism and characteristics; Genesis of Indian Monsoon and the causes of its variability; Oscillations: El Nino southern Oscillation; Indian Ocean and dipole. Western disturbances. **Learning activities:** Paper reading, case study; Movie	CLO2 CLO3

Unit 4/ 12 Hours	**Climatic Classification and applied climatology** Classification of climates: Empirical and generic; Climatic classification with special reference to Koppen or Thornthwaite (any one); Urban microclimate; Indian Meteorological Department and All India Weather Forecast. **Learning activities:** Case study, IMD report reading/ familiarisation with weather apps, Test	CLO4 CLO5

Suggested/ recommended readings:

1. Ahrens, C. Donald. (2016). Meteorology Today: An Introduction to Weather, Climate and the Environment, (11th Edition). Boston : Thomson Brook/Cole
2. Critchfield, H. J. (2008). *General Climatology*, Pearson Education India.
3. Frank Press and Raymond Siever (2003). *Understanding Earth*. W.H.Freeman & Co Ltd.
4. Kusky, T. (2017). *The encyclopedia of earth science*, Viva book private limited.
5. Lal, D.S. (1998). 'Climatology', Chaitanya Publishing House, Allahabad.
6. Singh, S. (2017). *Physical Geography*, Allahabad: Prayag Pustak Bhavan.
7. Strahler, A.N. (2013). *An Introduction to Physical Geography*, UK: John Wiley & Sons.
8. Roy, R. (2013). *Introduction to general climatology,* New Delhi: Anmol publication private limited.
9. Veena (2009). *Understanding earth science*, Delhi: Discovery.
10. Wallace JM and Hobbs PV: Atmospheric Science -An Introductory Survey, Academic Press.

Website/web references:

1. IMD: http://www.imd.gov.in/pages/main.php
2. NASA Earth Observatory: https://earthobservatory.nasa.gov/?eocn=topnav&eoci=logo
3. https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=17
4. https://www.youtube.com/watch?v=ooZfziqY1Hk
5. https://www.tropmet.res.in/
6. https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=14

(DBCC)
GEOGRAPHICAL INFORMATION SYSTEM (Theory)

Course Title: Geographical Information System (Theory)	**L**	**T**	**P**	**Cr**
Course Code: GEO82DC00804	4	-	-	4

Total Hour: 60 Hours

Course Learning Outcomes (CLO): At the completion of the course, the student will be able to:

CLO1: Understanding of geospatial data management and analysis functions
CLO2: Understanding of analytical modelling with GIS
CLO3: Understanding of thematic map designing using GIS
CLO4: Understanding of GIS analysis workflow and integrated applications in various domains of Geography

Unit/Hours	**Content**	**Mapping with**

		CLO
Unit I / 15 Hours	Concept and definition of GIS, History and development of GIS technology, Applications of GIS in various sectors: Geographic information System database: data types (map, attributes, image data) and structure; Spatial and non-spatial data **Learning activities:** Assignment writing	CLO1
Unit II / 15 Hours	Geo-referencing; Map projection. Data entry and preparations (inputs, editing and attributing); Spatial analysis: overlay, buffer and proximity, network analysis; Contours and spot heights; Determination of slope and hill shading; Data interpolation: point and line data; Output generation and layouts. **Learning activities:** presentation/Group discussion	CLO1 CLO2
Unit III / 15 Hours	Introduction to Geodatabase, Geodatabase models, Introduction to Geodatabase in open source and commercial software. **Learning activities:** Paper reading, presentation/ Group discussion;	CLO2 CLO3
Unit 4/ 15 Hours	Introduction to GNSS; Concepts and types. Sources of Errors and resolving of errors. Introduction to GPS; Concepts and types. Segments of GPS; Collection of GCPs. Introduction to DGPS, wide area augmentation system (WAAS). Application of GIS and GPS: Natural Resource Management: Land use/Land-cover; Soil; Vegetation; Water; Air; Urban Sprawl. **Learning activities:** presentation/Group discussion/ Case studies	CLO4 CLO5

Suggested/ Recommended readings:

1. Burrough, P.A. and McDonnell, R.A. 1998. *Principles of Geographic Information Systems*, Oxford University Press.
2. Chang, K-t. 2006. *Introduction to Geographic Information Systems*, Tata McGraw-Hill.
3. DeMers, M. 2009. *Fundamentals of Geographic Information Systems*, 4th Edition, John Wiley & Sons.
4. Heywood, I., Cornelius, S., Carver, S. 2011. *An Introduction to Geographic Information Systems,* 4th Edition, Pearson Education.
5. Longley, P.A., Goodchild, M., Maguire, D.J. and Rhind, D.W. 2010. *Geographic Information Systems and Science*, 3rd Edition, Wiley.

(DBCC)

GEOGRAPHICAL INFORMATION SYSTEM (Practical)

Course Title: Geographical Information System (Practical)	**L**	**T**	**P**	**Cr**
Course Code: GEO82DC00902	-	-	2	2

Total Hour: 30 Hours

Course Learning Outcomes (CLO): At the completion of the course, the student will be able to:

CLO1: Develop basic understanding and hands-on on GIS software and GPS ;

CLO2: Understand GIS Data Structures and GIS Data Analysis ;

CLO3: Apply GIS for natural resource management, urban and land use land cover study;

CLO4: Perform preparing different maps integrating spatial and non-spatial data;

Unit/Hours	Content	Mapping with CLO
Unit I / 6 Hours	Data Creation: Geo-referencing Maps/Images, Digitization of Raster Map: Point, Line and Polygon Features; enhancement, editing, creation of different layers. **Learning activities:** Assignment writing	CLO1
Unit II / 8Hours	Data Extraction and Integration: Extract Information through point-based feature, line based feature and polygon based feature; Preparation of Attribute Tables, Editing and Joining Tables, Analyzing Attribute Data: Calculating Area, Perimeter, and Length. **Learning activities:** Students' presentation/Group discussion	CLO1 CLO2
Unit III / 8 Hours	Spatial Representation: Symbolizing and Map Layouts; Basic Analysis in GIS: Buffering, Overlay and Query Building. **Learning activities:** Paper reading, presentation, case studies	CLO2 CLO3
Unit 4/ 8 Hours	Applications of GIS: land use mapping, monitoring and management, Urban Sprawl Analysis; Forest Monitoring; Soil; Water; Air etc., GPS Applications. Collection of ground control points using hand held GPS receiver; transferring data from GPS receiver to PC. **Learning activities:** Case studies	CLO4 CLO5

Suggested/ Recommended readings:

1. Chang, K-t. 2006. *Introduction to Geographic Information Systems,* Tata McGraw-Hill.
2. Fisher, P. and Unwin, D.J. 1995. *Re-presenting GIS,* John Wiley.
3. Heywood, I., Cornelius, S., Carver, S. 2011. *An Introduction to Geographic Information Systems*, 4th Edition, Pearson Education.
4. Kresse, W. and Danko, D.M. (eds.), 2012. *Springer Handbook of Geographic Information*, Springer.
5. Law, M. and Collins, A. 2018. *Getting to Know ArcGIS Desktop*, 5th Edition, ESRI Press.
6. Peterson, G.N. 2009. *GIS Cartography, A Guide to effective map designing*, CRC Press.

(DBCC)

ADVANCED FIELD TOOLS AND TECHNIQUES (Practical)

Course Title: Advanced Field Tools and Techniques	**L**	**T**	**P**	**Cr**
Course Code: GEO82DC01002	-	-	2	2

Total Hour: 60 Hours

Objectives :

This course is designed to acquaint students with the various dimensions of field work and its role in geographical studies. It will also acquaint student's detailed understanding of different field techniques and application of different field tools and understanding of the report writing.

Course Learning Outcomes (CLO): At the completion of the course, the student will be able to understand:

CLO1: Importance and ethics of Field Techniques

CLO2: Various Qualitative and Quantities Techniques of Geographical Analysis.
CLO3: Geographical tools for data collection, analysis and representation.
CLO4: Field report writing

Unit/Hours	Content	Mapping with CLO
Unit I 15 Hours	Field Work in Geographical Studies – Role, Value, Data and Ethics of Field-Work; Defining the Field and Identifying the Case Study – Rural / Urban / Physical / Human / Environmental. **Learning activities:** Assignments	CLO1
Unit II 15 Hours	Data Collection and Techniques: Type and Sources of Data; Methods of Collection; Data Analysis: Qualitative Data Analysis; Quantitative Data Analysis; Data Representation Techniques. Merits, Demerits and Selection of the Appropriate Technique; Observation (Participant / Non-Participant), Questionnaires (Open/ Closed / Structured / Non-Structured); Interview with Special Focus Group Discussions; Space Survey (Transects and Quadrants, Constructing a Sketch). **Learning activities:** File work	CLO1 CLO2
Unit III 15 Hours	Use of Field Tools – Collection of Material for Physical and Socio-Economic Surveys. **Learning activities:**	CLO2 CLO3
Unit IV 15 Hours	Designing the Field Report – Aims and Objectives, Methodology, Analysis, Interpretation and Writing the Report. **Learning activities:** Case Studies	CLO3 CLO4

Suggested/ Recommended readings:

1. Creswell, J., (1994). *Research Design: Qualitative and Quantitative Approaches.* UK: Sage Publications.
2. Dikshit, R. D. (2003). *The Art and Science of Geography: Integrated Readings*. New Delhi, India: Prentice-Hall of India.
3. Mukherjee, Neela. (1993). *Participatory Rural Appraisal: Methodology and Application.* Delhi, India: Concept Publs. Co.
4. Robinson, A. (1998). *Thinking Straight and Writing That Way*. In Pryczak, F. and Bruce, R. P. eds.. *Writing Empirical Research Reports: A Basic Guide for Students of the Social and Behavioural Sciences*. Los Angeles, USA: Routlege.
5. Special Issue on "Doing Fieldwork" *The Geographical Review* 91:1-2 (2001).
6. Evans, M. (1988). *Participant Observation: The Researcher as Research Tool*. In Eylesand, J and D. Smith (eds). *Qualitative Methods in Human Geography*. Cambridge, UK: Polity.
7. Mukherjee, N. (2002). *Participatory Learning and Action: with 100 Field Methods*. Delhi, India: Concept Publs. Co.
8. Stoddard, R. H. (1982). *Field Techniques and Research Methods in Geography*. USA: Kendall/Hunt.
9. Wolcott, H. (1995). *The Art of Fieldwork*. CA, USA: Alta Mira Press.

(DBCE)

SETTLEMENT GEOGRAPHY

Course Title: Settlement Geography	**L**	**T**	**P**	**Cr**
Course Code: GEO82DE00104	4	-	-	4

Total Hour: 60 Hours

Course Learning Outcomes (CLO): At the completion of the course, the student will be able to:

CLO1: understand fundamental philosophical assumptions and concepts of human geography

CLO2: validate an advanced understanding of contemporary debates in Geography.

CLO3: validate knowledge of key concepts and contribution of seminal thinkers and theorist in the field of Human Geography

CLO4: understand how theoretical frameworks shape fieldwork

CLO5: to validate how to conduct in-depth fieldwork.

Unit/Hours	**Content**	**Mapping with CLO**
Unit I / 15 Hours	Evolution and growth of human settlement, Theories of evolution of Settlements; Spatial and temporal trends in size and growth of settlements. Spatial distribution: Pattern and types of Rural settlements **Learning activities:** Assignment writing/ discussion	CLO1 CLO2
Unit II / 15 Hours	Settlements structure: Morphological structure of cities, Empirical and theoretical models (Burgess,Hoyt and Harris & Ullman). Functional classification of urban centers. City region and rural-urban fringe **Learning activities:** discussion and debates / Presentation on thinkers and their contribution	CLO2 CLO3
Unit III / 15 Hours	Functional typology of villages; Social, Economical, Cultural factors influencing the dynamics of settlement structure. Settlement hierarchy: Theories of Christaller and Losch (CPT) and their application to settlement hierarchy. Factors contributing to settlement hierarchy. Measurement of centrality and hierarchy. **Learning activities:** discussion and debates /Report reading	CLO3 CLO4
Unit IV/ 15 Hours	Issues, Perspectives and policies on population and human settlements. Interface between human settlements and environment. Contemporary urban issues: Urban renewal, urban sprawl, slums, green belts, garden cities. Transformation and planning of Indian Village. **Learning activities:** discussion and debates /Presentation/Field Work	CLO4 CLO5

Suggested/ recommended readings:

1. Ambrose, Peter1970: Concepts in Geography Vol.-I Settlement Pattern, Longman.
2. Baskin, C., (Translator), Central Places in Southern Germany, Prentice-Hall Inc.
3. Haggett, Peter, Andrew D. Cliff and Allen Frey (editor), 1979: Locational Models

Arnold Heinemann.
4. King, Leslie, J. 1986: Central Place Theory, Saga Publications, New Delhi.
5. Mayer, M. Harold and Clyde F. Kohn (editors) 1967: Readings in Urban Geography, Central Book Depot, Allahabad.
6. Nangia, Sudesh, 1976: Delhi Metropolitan Region, K.B. Publications, New Delhi.
7. Prakasa, Rao, V.L.S., 1983: Urbanisation in India; Spatial Dimensions, Concept Publishing Co., New Delhi.
8. Ramachandran, R., 1992: Urbanisation and Urban Systems in India, Oxford University Press, New Delhi.
9. Singh R.L. and Kashi Nath Singh (editors) 1975: Readings in Rural Settlement Geography, National Geographical Society of India, Varanasi.
10. Srinivasan, K. and M. Vlassoff, (editors), 2001: Population-Development Nexus in India: Challenges for the New Millennium, Tata McGraw-Hill Publishing Co. Ltd., New Delhi.
11. Ucko, M.J., Ruth Tringham and G.W. Dimbleby (editors) 1972: Man, Settlement and Urbanism, Duckworth.

(DBCE)
AGRICULTURAL GEOGRAPHY

Course Title: Agricultural Geography	**L**	**T**	**P**	**Cr**
Course Code: GEO82DE00204	4	-	-	4

Total Hour: 60 Hours

Course Learning Outcomes (CLO): At the completion of the course, the student will be able to:

CLO1: Comprehend the students to the nature and origin of agriculture and its regions.
CLO2: Understand and analyse the historical perspective of agriculture.
CLO3: Examine the level of agricultural development and productivity in India.
CLO4: Evaluates the environmental consequences and emerging perspective and policies and interventions aimed at sustainable agriculture.
CLO5: Update knowledge of contemporary issues and strategies.

Unit/Hours	**Content**	**Mapping with CLO**
Unit I / 15 Hours	Agricultural Geography: Nature & scope, Origin and dispersal of agriculture – Major theories of origin of agriculture. Models and Regions in Agricultural Geography: Bases of classification; normative models; Regionalisation: Concept and criteria; Agricultural regions of India. **Learning activities:** Assignment writing	CLO1
Unit II / 15 Hours	Agricultural Development and Productivity in India: Concept, Criteria of agricultural development; Agricultural Productivity: Concept and Determinants, Regional imbalances, Socio-economic and human health consequences. **Learning activities:** Quiz; Students Group discussion	CLO1 CLO2
Unit III / 15 Hours	Environmental Consequences of Agriculture in India: Concept, process, regional patterns and consequences: groundwater depletion and contamination; salinity and alkalinity, deterioration of soil fertility and soil erosion; Case Studies. **Learning activities:** Paper reading, case study.	CLO2 CLO3

Unit 4/ 15 Hours	Emerging Perspectives in Agriculture and Government Initiatives: Sustainable urban agriculture, food security and safety, national agriculture policy.	CLO4 CLO5

Learning activities: Report writing

Suggested/ recommended readings:

1. Burch, D., Gross, J. and Lawrence, G. (eds.), 1999. Restructuring Global and Regional Agriculture, Ashgate Publishing Company, Burlington.
2. Cakmak, I. and Welch, R. M. (eds), 2009. Impacts of agriculture on Human Health and Nutrition, EOLSS Publications, UK.
3. Grigg, D.B., 1984: Introduction to Agricultural Geography, Hutchinson, London.
4. Hussain, M. (2006): Systematic Agricultural Geography, Reprinted, Rawat Publications, Jaipur.
5. Mohammad, N. 1992. New Dimension in Agriculture Geography, Vol. I to VIII, Concep Publishing Company, New Delhi.
6. Mohammad, N. and Rai, S.C. 2014. Agricultural Diversification and Food Security in the Mountain Ecosystem, Concept Publishing Company, New Delhi.
7. Shafi, M. 2006. Agricultural Geography. Pearson Education, Delhi.
8. Singh, J., and Dhillon, S.S. 1994. Agricultural Geography, Tata McGraw Hill, New Delhi.
9. Singh, R. B. 2000. Environmental Consequences of Agricultural Development: A Case Study from the Green Revolution state of Haryana, India, Agriculture, Ecosystems and Environment 82, 97–103.
10. Tiwari, R. and Singh, B. 1994. Krishi Bhoogol, Prayag Pustak Bhandar, Allahabad. (Hindi).).

(DBCE)
SOCIAL GEOGRAPHY

Course Title: Social Geography

L	**T**	**P**	**Cr**
4	-	-	4

Course Code: GEO82DE00304

Total Hour: 60 Hours

Course Learning Outcomes (CLO): At the completion of the course, the student will be able to:

CLO1: Locate the sub discipline of Social Geography within the discipline
CLO2: critically understand the key concepts of Social Geography
CLO3: to demonstrate knowledge of key methods in analysing cultural geography
CLO4: apply concepts and evaluate emerging issues in contemporary social context.

Unit/Hours	**Content**	**Mapping with CLO**
Unit I / 15 Hours	Nature Scope and Significance of Social Geography; Space and society: Understanding society and its structure and process; geographical bases of social formations; contribution of social geography to social theory; power relations and space.	CLO1 CLO2
	Learning activities: Assignment writing/ discussion	
Unit II / 15 Hours	Towards a social geography of India; Social differentiation and region formation; evolution of socio-cultural regions of India; bases of social region formation; role of race, caste, ethnicity; religion and languages; Indian unity and diversity; social	CLO2 CLO3

	transformation and change in India. **Learning activities:** discussion/ Assignments	
Unit III / 15 Hours	Social well-being: Concepts of social well-being, physical quality of life, Human development; measurement of human development with social, economic and environmental indicators; Rural urban deprivation in India with respect to health care; education and shelter; deprivation and discrimination issues relating to women and under privileged groups; Patterns and bases of rural and urban society. **Learning activities:** Discussion and debates/ Assignment	CLO3 CLO4
Unit IV/ 15 Hours	Public policy and social planning in India; review of Five-year Plans and area plans towards social policy in India; Strategies to improve social well-being in tribal, hill, drought and flood prone areas; Social and environmental impact assessment of development projects. **Learning activities:** discussion and debates /Presentation/Field Work	CLO4 CLO5

Suggested/ recommended readings:

1. Ahmad, A. 1999. Social Geography, Rawat Publication, New Delhi, 2019
2. Ahmed, A. 1993. (ed) Social Structure and Regional Development: A Social Geography. Perspective, Rawat Publications, Jaipur
3. Anderson, K. Domosh,M., Pile, S., Thift, N (eds). 2002. Handbook of Cultural Geography. Sage
4. Cosgrove Denis (1984) Social Transformation and Symbolic Landscape, Croom Helen, London.
5. Crang, Mike.1998. Cultural Geography, Routledge, London Feasibility reports. By KILA
6. Pannikar, K.M. 1959. Geographical Factors in Indian History, Bharatiya Vidya Bhavan, Bombay
7. Rachel, Pain. (eds). Introducing Social Geographies, Arnold Hodder group, London &Oxfod University Press
8. Raza, M. and Ahmed, A. 1990. An Atlas of Tribal India, Concept Publishing Co, Delhi.
9. Robertson Iaian and Penny Richards, .2003. Studying Cultural Landscapes, Oxford University Press, London and New York.
10. Sauer, C.O.1925.The Morphology of Landscape. University of Carlifornia Publication, Geography
11. Singh, K.S. 1993. People of India Vol I to XI, Oxford University Press, New Delhi.
12. Sopher, D. (ed.) 1980. An Exploration of India: Geographical Perspectives on Society and Culture, Cornell Press, New York.

(DBCE)
POLITICAL GEOGRAPHY

Course Title: Political Geography	**L**	**T**	**P**	**Cr**
Course Code: GEO82DE00404	4	-	-	4

Total Hour: 60 Hours

Course Learning Outcomes (CLO): At the completion of the course, the student will be able to:

CLO1: Students will be able to develop the understanding on the concepts related to the anatomy of the state based on the current philosophy and established theories.
CLO2: Students will be able to explain the spatial processes involved in the success of the federalism and electoral geography.
CLO3: Students will be able to explain the Geopolitical Setting of India in relation to the neighbours and its significance in the world regional settings.
CLO4: Students will be able to evaluate the characteristics territorial bases of the state with respect of its neighborhood.
CLO5: Students will be able to analyze geographical factors determining the election results and the formation of constituencies as well as the major characteristics of politico electoral regions of India.
CLO6: Students will be able to explain the relevance of geographical peculiarities determining India as a territory (Political unit)

Unit/Hours	**Content**	**Mapping with CLO**
Unit I / 15 Hours	Nature and Scope of Political Geography; Political Geography as the Politics of Place; Evolution and Development of Geography; Recent trends in Political Geography; Contribution of German, British and American Scholars. **Learning activities:** Assignment writing/ discussion and debates	CLO1
Unit III 15 Hours	Concept of nation and state; Spatial Factors and Anatomy of State: Core Areas and Capitals; geopolitics; politics of world resources; Geo-strategic views: Mahan, Mackinder, Spykman, and Deseveresky; Geopolitical World Orders; Formation of Frontiers and Boundaries, Border Lands, Buffer States and Land-Locked State. Geopolitical Setting of India; Significance of Indian Ocean; Political Geography of Ocean: Maritime Boundaries, delimitations: principles and problems, International law of the sea. Mahan's Sea Power concept. Evolution of Federalism, Origin and Success of Federalism in India. **Learning activities:** discussion and debates /Report reading	CLO1 CLO2
Unit III / 15 Hours	Electoral Geography: methods of studying electoral geography, Geographical influence in voting. Geography of Electoral support and Representation: Constituencies and their evolution. Case Studies of Indian Elections. Reading the emerging politico electoral regions of India. **Learning activities:** discussion and debates /Report reading	CLO3 CLO4 CLO5

Unit IV/ 15 Hours	Geographical Factors in India's Political Spectrum.; Role of terrain, Rivers and sea coasts in shaping political history; Geography of internal conflicts and problems of Nation Building: Religious and linguistics conflicts, separatist movements, river water disputes. The International Boundary of India and related issues. India's political alliance. Regional Co-operations – SAARC, ASEAN, European Union. **Learning activities:** discussion and debates /Presentation/Field Work	CLO4 CLO5 CLO6

Suggested/ recommended readings:

1. Adhikari, S. (2005): Political Geography of India, Sharada Pustak Bhawan, Allahabad
2. Adhikari, S. 1997. Political Geography, Rawat publications, Jaipur and Delhi
3. Agnew, J. 2002. Making Political Geography, Arnold, London
4. Agnew, J., Mitchell, K. and Toal, G. eds.2003.A Companion to Political Geography, Blackwell, Oxford
5. Cohen, S. .1964. Geography and Politics in a World Divided, Random House, NY.
6. Cox, K.R., .2002.Political Geography: Territory, State and Society, Wiley-Blackwell, Chichester
7. Cox, K.R., Low, M. and Robinson, J. 2008. The SAGE Handbook of Political Geography, SAGE Publications Ltd., London
8. Deshpande, C.D., 1992: India: A Regional Interpretation, I.C.S.S.R, New Delhi
9. Dikshit, R.D. (1989): Political Geography: A Contemporary Perspective, Tata Mc Graw Hill, New Delhi.
10. Dikshit, R.D. 2000. Political Geography: A Contemporary Perspective, Prentice-Hall, New Delhi
11. Dikshit, S.K. (2007): Rajnitik Bhoogol Avam Bhurajniti, Vishwavidyalaya Prakashan, Varanasi.
12. Dwivedi, R.L. (1980): Political Geography, Chaitanya Publishing House, Allahabad.
13. Gallaher, C., Dahlman, C.T., Gilmartin, M., Mountz, A. and Shirlow, P. (2009): Key Concepts in Human Geography: Key Concepts in Political Geography, SAGE Publications Ltd., London
14. Glassner, M., .1993. Political Geography, John Wiley & Sons, New York
15. Glassner, M.L. & Blij, H.J.de (1968): Systematic Political Geography, John Wiley, New York.
16. John, R. S. (2002): An introduction to Political Geography, Taylor & Francis.
17. Jones, M., .2004. An Introduction to Political Geography: Space, Place and Politics, Routledge, London
18. Painter, J. and Jeffrey, A. 2009. Political Geography, SAGE Publications Ltd., London
19. Painter, Joe (1995) Politics, Geography and 'Political Geography': A Critical Perspective. London: Arnold
20. Pannikar, K.N. 1955. Geographical Factors in India's History, Bharatiya Vidya Bhavan, Bombay.
21. Prescott, J.R.V. 1972. The Political Geography, Methuen, London
22. R.D. 1987. Political Geography and Geopolitics, Tata McGraw Hill, New Delhi
23. Sinha, Manorama (1995): Political Geography, Horizon Publication, Allahabad.
24. Taylor, P. and Flint, C. 2000. Political Geography, Pearson Education, Harlow, Essex
25. Weiner M and J Osgoodfield (eds.), 1975. Electoral Politics in the Indian States, Centre for International Studies, MIT

(DBCE)
GEOGRAPHY OF TRANSPORT

Course Title: Transport Geography	**L**	**T**	**P**	**Cr**
Course Code: GEO82DE00504	4	-	-	4

Total Hour: 60 Hours

Objectives :

This course is designed to acquaint students with the role and significance of 'transport' in geography, facets of transport network and various measurement of accessibility. It covers broad understanding of Regional and Urban transportation systems. The course also encompasses various challenges related to Metropolitan Transport management and recent innovative management techniques.

Course Learning Outcomes (CLO): At the completion of the course, the student will be able to understand:

CLO1: Conceptual understanding of Transport Geography
CLO2: Dynamics of Regional transport
CLO3: Dynamics of Urban Transport
CLO4: Metropolitan/Mega cities Transport Management

Unit/Hours	**Content**	**Mapping with CLO**
Unit I 15 Hours	**Transport Geography**: Concept, Mean & modes. History of transport expansion in India; dynamic relationship between transport and spatial readjustment, role of transport as a lead sector. **Learning activities:** Assignments	CLO1
Unit II 15 Hours	**Dynamics of Regional Transport**: Factors related to regional transport expansion, various measures of accessibility (graph theory), transport and regional structure of Indian Economy. Regional Connectivity - RRTS, Bullet train, Expressways/Green Corridor, Waterways, and Freight Corridor. **Learning activities:** File work	CLO1 CLO2
Unit III 15 Hours	**Urban Transport**: Characteristics of urban transport, Profile of urban transport facilities, traffic in towns, transport services and urban land use pattern, role of intermediary transport modes, modal split, issues and challenges of urban transport. **Learning activities:** Documentary	CLO2 CLO3
Unit 4 15 Hours	**Metropolitan Transport Management**: smart cities, integrated transport planning, landuse planning, public transport system, green modes, fare collection system, e-governance. Recent Developments in Urban Transportation system - BRTS, Metrorail, Skybus, Hyper loop, Pod taxi. Case studies: Delhi, Ahmadabad and Gaya. **Learning activities:** Case Studies	CLO3 CLO4

Suggested/ Recommended readings:

1. Berry, B.J.L *et a.,* 1966. *Essays on Commodity Flow and Spatial Structure of Indian Economy*, Department of Geography, Chicago.
2. Berry, B.L.J. and Marble, D.F. (eds.) 197). *Spatial Analysis: A Reader in Statistical Geography*, Prentice Hall.
3. Cooley, C.H. 1994. The Theory of Transportation, in Hurst, M.E. (ed.) *Transportation geography: Comments and Reading*, Mc Graw Hill, 15-29.

4. Singh, K.N. 2003. Transport Geography, Gyanodaya Prakashan, Gorakhpur, p. 180
5. Singh, K.N. 1988. Transport Network in Rural Development, Institute of Rural Eco-development, IRED, Gorakhpur, p. 380.
6. Gautam, P.S. 1992. *Transport Geography of India: A Study of Chambal Division, M.P.,* Mittal Publications, New Delhi
7. Haggett, P. 1965. Locational Analysis in Human Geography, London.
8. Haggett, P. and Chorley, R.J. 1969. *Networks Analysis in Geography*, London.
9. Kansky, K.J., 1963. *Structure of Transportation Networks: Relationships between Network Geometry and Regional Characteristics,* University of Chicago, Department of Geography, Research Paper, Chicago, 84.
10. Nagar, V.D. and Gautam S. 1964. *Principles and Problems of Indian Transport*, Kailash Pustak Sadan, Gwalior.
11. Owen, W. 1968. *Distance and Development: Transport and Communications in India*, Washington.
12. Raza, M. and Aggarwal, Y. 1986. *Transport Geography of India,* Concept Publishing Company, New Delhi.
13. White, H. P. and Senior, M.L. 1983. *Transportation Geography,* Longman Inc. New York.
14. Ashton, W.D., 1966. *The Theory of Traffic Flow*, Methuen , London

(DBCE)
ECONOMIC GEOGRAPHY

Course Title: Economic Geography	**L**	**T**	**P**	**Cr**
Course Code: GEO82DE00604	4	-	-	4

Total Hour: 60 Hours

Course Learning Outcomes (CLO): At the completion of the course, the student will be able to:

CLO1: explain nature of economic geography and able to understand the key drivers of economic change.

CLO2: evaluate critically how different theories and models are applicable in the economic development of different regions.

CLO3: explain changing concept of development, world trade patterns and theory on international trade.

CLO4: analyze how the economy is organized within the power space relation.

Unit/Hours	**Content**	**Mapping with CLO**
Unit I / 15 Hours	Nature and scope, Methods & Approaches of study, Recent trends in Economic Geography. Basis of economic processes- Production, exchange and consumption. Classification of economic activities; Factors of localization of economic activity **Learning activities:** Assignment writing/ Presentation	CLO1
Unit II / 15 Hours	Classification of industries, Importance of manufacturing ; Principles of Industrial Location Profit maximization, Least cost location, Substitution, Interdependence, Territorial production complexes; Factors of Industrial Location, Industrial Location Theories– Weber Hoover, Losch and Rostows model: Industrial Regions of the World and India; Industrial decentralization and Industrial Policies.	CLO1 CLO2

	Learning activities: Case study/Exercises/Report reading	
Unit III / 15 Hours	Mode of transportation and transport cost; accessibility and connectivity, topology of market, network in rural society, market system in urban economy, role of market in the development of trade and commerce. Significance of Trade in National and International Economy – WTO, TRIPS, TRIMS, ASEAN, Concept of EPZs & SEZs.	CLO2 CLO3
	Learning activities: Case study/Exercises/Report reading	
Unit IV/ 15 Hours	Factors influencing the international trade, Modern Theory of International trade, World Trade Pattern, Concept of Globalization, Liberalization and Privatization. Commodity chain approach, the universalization of technology, the space shrinking technologies, product and process technologies, knowledge economy, creative classes, the uneven geography of technology creation.	CLO2 CLO3 CLO4
	Learning activities: Case study/Presentation/Field Work	

Suggested/ recommended readings:

1. Alexander J. W.,1963: Economic Geography, Prentice-Hall Inc., Englewood Cliffs, N.J.
2. Alexander, J.W. (2012): Economic Geography, Prentice Hall of India, New Delhi.
3. Bagchi-Sen S. and Smith H. L., 2006: Economic Geography: Past, Present and Future, Taylor and Francis.
4. Berry, B.J.L. et al. (1976): Geography and Economic Systems, Prentice Hall, Englewood Cliff.
5. Coe N. M., Kelly P. F. and Yeung H. W., 2007: Economic Geography: A Contemporary Introduction, Wiley-Blackwell.
6. Combes P., Mayer T. and Thisse J. F., 2008: Economic Geography: The Integration of Regions and Nations, Princeton University Press.
7. Gautam, A. 2010. Advanced Economic Geography. Sharda Pustak Bhawan, Allhabad. Hodder B. W. an
8. Haggett, P. (1966): Locational Analysis in Human Geography, St. Martin's Press, NY.
9. Hudson, R. 2005. Economic Geography. Sage Publication, New Delhi. Jones & Darkenwald (1960) : Economic Geography, New York
10. Knowled, R. and Wareing, J. 1992. Economic and Social Geography. Rupa and Company, Calcutta.
11. Knox, P. 2003. The Geography of World Economy. Arnold, London.
12. Knox, P. and J. Agnew (1998): The Geography of the World Economy. Arnold, London.
13. Lee R., 1974: Economic Geography, Taylor and Francis.
14. Naresh Kumar (1991) Geography of Transportation, Concept Publications.
15. Rostov, W.W. (1960): The Stages of Economic Growth, Cambridge Univ. Press, London.
16. Saxena, H.M. 2013. Economic Geography. Rawat Publications, Jaipur.
17. Sharma T.C. and Countinho. O (1998) – Economic and Commercial Geography of India, Vikas Publishing house, Delhi.
18. Singh, K.N and Siddiqui, A (2012): Economic Geography, Prayag Pustak Bhawan, Allahabad
19. Singh, K. N. & Singh, J. (1996): Arthik Bhoogol Ke Mooltatva, Gyanodaya Prakashan, Gorakhpur.
20. Smith, G.H. (2000): Conservation of Natural Resources, John Wiley, New York.
21. Wheeler, J.O. et.al. (1995): Economic Geography, John Wiley, New York. Willington D. E., 2008: Economic Geography, Husband Press.
22. World Bank (2009): World Development Report, Washington D.C.

(DBCE)
GEOGRAPHY OF TOURISM

Course Title: Geography of Tourism (Core Elective)	**L**	**T**	**P**	**Cr**
Course Code: GEO82DE00704	4	-	-	4

Total Hour: 60 Hours

Course Learning Outcomes (CLO): At the completion of the course, the student will be able to:

CLO1: understand fundamental concepts of Tourism.
CLO2: evaluate socio-cultural, economic and environmental impacts of tourism
CLO3: design sustainable tourism management plan using GIS for tourism development
CLO4: understand spatial distribution of resources in the evolution of tourism

Unit/Hours	**Content**	**Mapping with CLO**
Unit I / 15 Hours	Basics of tourism: Definition, nature, scope and historical development; Tourism as leisure & recreation; Elements, types and forms of tourism; Factor influencing tourism: historical, physical, socio-cultural and economic **Learning activities:** Assignment writing/ discussion	CLO1 CLO2
Unit II / 15 Hours	Infrastructure and Support system: Transport and communication facilities; Accommodation and supplementary accommodation; Tourist circuits, travel agencies and tour operators; Tour planning and role of guides **Learning activities:** discussion and debates	CLO2 CLO3
Unit III / 15 Hours	Tourism in India: Tourism potentials in India; Places of tourist attraction in Eastern Region of India; Tourism as an Industry in India; Positive and negative impacts: Socio-economic, political and environmental **Learning activities:** discussion and debates /Report reading	CLO3 CLO4
Unit IV/ 15 Hours	Tourism Development: International tourism institutions and organizations; Sustainable tourism, problem and prospects; National Tourism Policy**;** Role of foreign capital and impact of globalization on tourism. Tourism impact assessment: Ganga Plain, Hilly, Mountainous areas, and coastal tourism -application of GIS in tourism research. (A case studies of Bihar Tourism) **Learning activities:** discussion /Presentation/Field Work	CLO4 CLO5

Suggested/ recommended readings:

1. Bhatia A.K. 1996: Tourism Development: Principles and Practices. Sterling Publishers,New Delhi.
2. Bhatiya, A.K.,1991: International Tourism - Fundamentals and Practices, Sterling, New Delhi
3. Chandra R.H. 1998: Hill Tourism: Planning and Development, Kanishka Publishers, New Delhi,.
4. Hunter C and Green H., 1995: Tourism and the Environment: A Sustainable Relationship, Routledge, London.
5. Inskeep. E, 1991: Tourism Planning: An Integrated and Sustainable Development

Approach, Van Nostrand and Reinhold, New York,
6. Kaul R.K. 1985: Dynamics of Tourism & Recreation. Inter-India, New Delhi.
7. Robinson, H. 1996: A Geography of Tourism. Macdonald and Evans, London,
8. Sharma J.K. (ed.) 2000: Tourism Planning and Development - A new perspective, Kanishka Publishers, New Delh.
9. Shaw G. and Williams A.M. 1994: Critical issues in Tourism-A Geographical Perspective, Oxford: Blackwell.
10. Sinha P. C. (ed.) 1998: Tourism Impact Assessment, Anmol Publishers, New Delhi.
11. Voase R. 1995: Tourism: The Human Perspective Hodder & Stoughton, London.

SEMESTER-III

(DBCC)
POPULATION GEOGRAPHY

Course Title: Population Geography	**L**	**T**	**P**	**Cr**
Course Code: GEO91DC01104	4	-	-	4

Total Hour: 60 Hours

Objectives:

This course is designed to geography students to understand basic concepts, data sources and scenario of population. The course examines various aspects of composition and contemporary population problems. This course also covers population theories, policies and family planning programmers.

Course Learning Outcomes (CLO): At the completion of the course, the student will be able to:

CLO1: explain the meaning, scope, and approaches to studying population geography and data sources.
CLO2: comprehend population Scenario.
CLO3: Learn major theories of population geography and population composition.
CLO4: understand different forms of migration and approaches to population policies.

Unit/Hours	**Content**	**Mapping with CLO**
Unit I/ 15 Hours	**Conceptual Background** Meaning and Scope of Population Geography Approaches-Systematic, Regional, Historical, Behavioural, Welfare & System, Development of Population Geography, Sources of Population Data, Reliability & Comparability of Secondary data, Assessment of quality data. **Learning activities:** Assignment writings, Discussions	CLO1
Unit II / 15 Hours	**Population Scenario** Distribution and Density of Population, World Pattern of Population, Population Explosion, Concepts of 'under', 'over' and 'optimum' population, Distribution & Growth of India's population. **Learning activities:** Quiz, Group Discussion	CLO2
Unit III / 15 Hours	**Population Theories& Composition** Pre-Malthusian Views, Malthusian Theory, Neo-Malthusianism, Demographic Transition Theory, Biological Theories of Population, Social Theories of Population. Age Sex composition, Population Pyramid, Dependency Ratio, Social and Economic Composition, Literacy, Urbanization. **Learning activities:** Assignments, Multimedia	CLO3
Unit 4 / 15 Hours	**Contemporary Problems & Policies** Migration: Types, Causes, Consequences, and Laws. India's Population Policies and Family Planning Programme. **Learning activities:** Assignments, Presentation	CLO4

Suggested/ Recommended readings:

1. Bhende, Asha A. and Tara Kanitkar, (2011). ***Principles of Population Studies***. Bombay: Himalaya Publishing House.
2. Chandana, R.C. and Sidhu, M.S. (2013). Population Geography, Kalyani Publications, Delhi

3. Hiralal, Yadav (2000). Jansankhya Bhoogol, Radha Publications, New Delhi.
4. Panda, B.P. (1991). Population Geography (in Hindi), Madhya Pradesh Hindi Granth Academy, Bhopal.
5. Srinivasan K., (1998). ***Basic Demographic Techniques and Applications.*** New Delhi: Sage Publications.

(DBCC)
DISSERTATION

Course Title: Dissertation (Part-I)	**L**	**T**	**P**	**Cr**
Course Code: GEO91DC01204	**4**	**-**	**-**	**4**

Course Learning Outcomes (CLO): On completion of the course, the student will be able to:
CLO1: Relate the theoretical knowledge gained in lectures to practical studies in field
CLO2: Explore different literature databases for literature review.
CLO3: design research methods to implement theoretical and laboratory knowledge to field studies
CLO4: write a synopsis on a relevant theme of research in Geography.

Contents
The students are required to submit a dissertation proposal / synopsis of the research work to be carried for the fulfilment of M.A./M.Sc. dissertation. It will have following components:

(a) Origin of the research problem
(b) literature review
(c) Research questions
(d) Objective of the research work.
(e) Methodology of the work
(f) Expected Outcome

Mode of Transaction: Demonstration, Experimentation, Tutorial

Evaluation Criteria:
The evaluation of dissertation proposal in the third semester will carry 50% weightage by supervisor and 50% by HoD and senior-most faculty of the department which include Dissertation proposal and Presentation.

(DBCC)
FIELD WORK AND INVESTIGATION

Course Title: Field Work and Investigation	**L**	**T**	**P**	**Cr**
Course Code: GEO91DC01302	2	-	-	2

Total Hour: 60 Hours

Course Learning Outcomes (CLO): At the completion of the course, the student will be able to:
CLO1: understand fundamental concepts and issues related to field work in geographical studies.
CLO2: comprehend about field work and field techniques.
CLO3: Students shall be well-versed with the development of questionnaire and writing the field report.

Unit/Hours	**Content**	**Mapping with CLO**

Unit I / 15 Hours	Field Work in Geographical Studies – Role, Value and Ethics of Field-Work. **Learning activities:** Assignment writing	CLO1
Unit II / 15 Hours	Defining the Field and Identifying the Case Study – Rural / Urban / Physical / Human / Environmental. **Learning activities:** Quiz; Students' presentation/Group discussion/ Case study	CLO1 CLO2
Unit III / 15 Hours	Data Collection: Type and Sources of Data; Transit observation, quadrant observation, Mental Map Field tools: Thermometer, Tape, Soil and Water testing kit, Compass, Altimeter, Barometer, GPS, Camera, Video recorder, Voice recorder. **Learning activities:** Paper reading, case studies	CLO2 CLO3
Unit 4/ 15 Hours	Designing the Field Report – Aims and Objectives, Methodology, Analysis, Interpretation and Writing the Report. **Learning activities:** Case studies	CLO4 CLO5

Suggested/ recommended readings:

1. Evans M. (1988) Participant Observation: The Researcher as Research Tool. In *Qualitative Methods in Human Geography*, (eds). J. Eyles and D. Smith, Polity. Mukherjee, Neela 1993. Participatory Mukherjee, N. (2002). *Participatory Learning and Action: with 100 Field Methods*. Delhi, India: Concept Publs. Co.
2. Rural Appraisal: Methodology and Application. New Delhi, India: Concept Publs. Co.
3. Robinson A. (1998). Thinking Straight and Writing That Way. In *Writing Empirical Research Reports: A Basic Guide for Students of the Social and Behavioural Sciences*, eds. by F. Pryczak and R. Bruce Pryczak, Publishing: Los Angeles.
4. Stoddard, R. H. (1982). *Field Techniques and Research Methods in Geography*. USA: Kendall/Hunt.
5. Wolcott, H. (1995). *The Art of Fieldwork*. CA, USA: Alta Mira Press.

(DBCC)
INTRODUCTION TO MACHINE LEARNING

Course Title: Introduction to Machine Learning	**L**	**T**	**P**	**Cr**
Course Code: GEO91DC01402	2	-	-	2

Total Hour: 30 Hours

Course Learning Outcomes (CLO): At the completion of the course, the student will be able to:

CLO1: understand concept of big data, artificial intelligence and machine learning
CLO2: acquire knowledge of different machine learning algorithms for application
CLO3: learn various techniques of accuracy assessment of predictive models
CLO4: learn about R software
CLO5: develop skill on programming

Unit/Hours	**Content**	**Mapping with CLO**
Unit I / 6 Hours	**Introduction** Big Data and Spatial Big Data; Artificial Intelligence; Machine learning; Types of machine learning: Supervised, Unsupervised, Semi- supervised, Reinforcement **Learning activities:** Assignment writing	CLO1

Unit II / 8 Hours	**Overview on machine learning algorithms** Introduction of machine learning algorithms; Concepts of some machine learning algorithms: Decision Tree, Random Forest, Support Vector Machine, Artificial Neural Network, k-Nearest Neighbour (KNN) **Learning activities:** Group discussion	CLO2
Unit III / 8 Hours	**Techniques of accuracy assessment** Mean Absolute Error (MAE); Mean Squared Error (MSE); Confusion Matrix (Error Matrix); Area under Curve; Kappa Coefficient **Learning activities:** Case study /Test	CLO3
Unit 4/ 8 Hours	**Introduction of R software and Programming** Basics in R; Data Structures in R; Inbuilt Functions; Flow Control Statements; User defined Functions; Data manipulation; Data Visualization **Learning activities:** Test/ Group discussion	CLO4 CLO5

Suggested/ recommended readings:

1. Alpaydin, E. (2020). *Introduction to machine learning*. MIT press.
2. Smola, A., & Vishwanathan, S. V. N. (2008). *Introduction to machine learning*. Cambridge University, UK.
3. Kubat, M., & Kubat. (2017). *An introduction to machine learning (Vol. 2)*. Cham, Switzerland: Springer International Publishing.
4. Mitchell, T. M., & Mitchell, T. M. (1997). *Machine learning (Vol. 1, No. 9)*. New York: McGraw-hill.
5. Alpaydin, E. (2021). *Machine learning*. MIT Press.
6. DasGupta, A. (2011*). Probability for statistics and machine learning: fundamentals and advanced topics (pp. 1057-7149)*. New York: Springer.
7. Kelleher, J. D., Mac Namee, B., & D'arcy, A. (2020). *Fundamentals of machine learning for predictive data analytics: algorithms, worked examples, and case studies*. MIT press.
8. Kabacoff, R.I., 2015. *R in action: data analysis and graphics with R*. Simon and Schuster.
9. Dorman, M. (2014). *Learning R for geospatial analysis*. Packt Publishing Ltd.
10. Oyana, T. J. (2020). *Spatial Analysis with R: Statistics, Visualization, and Computational Methods*. CRC press.

(DBCE)
HYDROLOGY AND WATER RESOURCE MANAGEMENT

Course Title: Hydrology & Water Resource Management	**L**	**T**	**P**	**Cr**
Course Code: GEO91DC01204	4	-	-	4

Total Hour: 60 Hours

Course Learning Outcomes (CLO): At the completion of the course, the student will be able to:

CLO1: This paper gives an overview of the water environments, importance of water in human life

CLO2: To know diverse methods of collecting the hydrological information,

CLO3: Describe how components of the water cycle are influenced by human activities.

CLO4: Analyse hydrological data in order to evaluate water resource management in an area.

CLO5: understand, how this knowledge may be applied in a sustainable manner.

Unit/Hours	Content	Mapping with CLO
Unit I / 15 Hours	Bases of Hydrology: Nature, scope and development of Hydrology; Hydrological cycle; Man's Influence on the hydrological cycle; Precipitation: formation process, types, characteristics and measurements. Learning activities: Assignment writing	CLO1
Unit II / 15 Hours	Surface Water Hydrology: River basin and problems of regional hydrology, sources of stream flow, streamflow hydrograph, stream flow measurement, rainfall-runoff relationships, flow duration curve, surface water resource of India, wetlands hydrology. Learning activities: Group discussion	CLO1 CLO2
Unit III / 15 Hours	Groundwater Hydrology: Divisions of subsurface water, formations according to their water-bearing properties, types of aquifer and aquifer properties, geological formations as aquifers, groundwater monitoring, groundwater resource estimation. Learning activities: Paper reading, Quiz.	CLO2 CLO3
Unit 4/ 15 Hours	Water Resource Planning, Management and Policy: Water resources management (demand and supply side), watershed management, water harvesting, national water policy. Learning activities: Case study, report reading and writing.	CLO4 CLO5

Suggested/ recommended readings:

1. Andrew, D. W. and Trimble, S. 2004. Environmental Hydrology, 2nd Edition, Lewis Publishers, CRC Press.
2. Beek, E., Loucks, P.D. 2005. Water Resource Systems Planning and Management: An Introduction to Methods, Models and Applications, UNESCO, Paris.
3. Bhattacharya, S.K. 1988. Urban Domestic Water Supply in Developing Countries, CBS Publishers, CR Distributors, Delhi.
4. Chow, V.T., Maidment, D.R. and Mays, W.L. 1988. Applied Hydrology, McGraw-Hill International Editions, McGraw-Hill Book Company, New York.
5. Jain, S.K., Aggarwal, P.K. and Singh, V.P. 2007. Hydrology and Water Resources of India, Springer, The Netherlands.
6. Raghunath H.M. (2006): Hydrology. New Age International (P) Ltd., New Delhi.
7. Rai, S.C. 2017. Hydrology and Water Resources: A Geographical Perspective, Ane Book Pvt. Ltd., New Delhi.
8.Reddy, J. P. (1988): A Textbook of Hydrology. Laxmi Publication., New Delhi. 4th edition.
9. Singh, V.P. 1995. Environmental Hydrology, Kluwar Academic Publications, The Netherlands.
10. Todd, D.K. (1959): Ground Water Hydrology, Toppan Company Ltd., Tokyo, Japan.

(DBCE)
ADVANCED GEOGRAPHY OF INDIA

Course Title: Advanced Geography of India	**L**	**T**	**P**	**Cr**
Course Code: GEO91DE00904	4	-	-	4

Total Hour: 60 Hours

Course Learning Outcomes (CLO): At the completion of the course, the student will be able to:

CLO1: explain geopolitical importance of the Indian sub-continent.
CLO2: utilize resource optimally on the basis of resource based of India.
CLO3: analyse the pattern and level of development in India

Unit/Hours	Content	Mapping with CLO
Unit I / 15 Hours	Nomenclature, Geopolitical Significance of India's Location; The importance of Indian Ocean; Geological Origin & Evolution of India's Mountains, Plateaus, Plains, and Coast; Origin of River Systems of India. **Learning activities:** Assignment writing, Quiz	CLO1
Unit II / 15 Hours	Agro-Climatic Regions, Agro-ecological regions Sustainable Agriculture, Role of Green Revolution & Bio technology in agriculture; New Trends in Indian Agriculture, The New Agricultural Policy. **Learning activities:** Quiz/presentation/Group discussion	CLO1 CLO2
Unit III / 15 Hours	Energy and economy, Emerging energy scenario in India; Land Use Patterns; Mineral resource regions; Population Characteristics. Population Resource Regions; Regional distribution of Urban population; Industrial Regions & Industrial Complexes. Industrial Policies & Trend of Industrialization; Impact of Globalization on Indian Economy; **Learning activities:** Assignment writing, presentation/Group Discussion	CLO2 CLO3
Unit 4/ 15 Hours	Planning Regions of India: Delimitation and Salient Features; Regional Development and Disparities; Special Economic Zones; Problems & Prospects of Backward Regions. (A Case study of Bihar) **Learning activities:** Case study, Report reading/ Presentation	CLO4 CLO5

Suggested/ Recommended readings:

1. Chauhan P.R. (2001): Bharat Ka VrihatBhoogol, Vasundhara Prakashan, Gorakhpur.
2. Gautam, Alka (2001): Geography of India, Sharda Pustak Bhawan, Allahabad.
3. Govt. of India : Economic Survey, Ministry of Finance, New Delhi (Different Issues)
4. Hussain, Majid (2008): Advance Geography of India, Tata Mc Graw Hill, New Delhi.
5. Johnson, B.L.C. (1983): Development in South Asia, Penguin Books, Harmondsworth.
6. Khullar, D.R. (2006): India: A Comprehensive Geography, Kalyani Pub., New Delhi.
7. Sharma, T. C. (2003): India: Economic and Commercial Geography, Vikas Publication., New Delhi.
8. Singh, J. (2003): India: A Comprehensive and Systematic Geography, Gyanodaya Prakashan, Gorakhpur.
9. Singh, R. L. (ed.) (1971): India. A Regional Geography, National Geographical Society of India, Varanasi.
10. Tiwari, R. C. (2007): Geography of India, PrayagPustak Bhawan, Allahabad
11. Singh, M. B. (2002): Physical Geography. Tara Book Agency, Varanasi. (In Hindi).
12. Singh, S., (1998): Geomorphology. Prayag Pustak Bhavan, Allahabad.
13. Sparks, B.W., (1986): Geomorphology. Longman, London. York.

(DBCE)
GEOGRAPHY OF HEALTH AND WELLBEING

Course Title: Geography of Health and Wellbeing	**L**	**T**	**P**	**Cr**
Course Code: GEO91DE01004	4	-	-	4

Total Hour: 60 Hours

Course Learning Outcomes (CLO): At the completion of the course, the student will be able to:

CLO1: Students will be able to relate geographical condition and human health status
CLO2: Students will be able to report co-relation between social environment and human health.
CLO3: Students will explain contaminants in air, water, soil and food on human health.
CLO4: Students will be able to assess/evaluate methods applied to infer causal relationships between spatial variability in environment and health outcomes
CLO5: Students will learn about the application of GIS and remote sensing in health sector.

Unit/Hours	**Content**	**Mapping with CLO**
Unit I / 15 Hours	Introducing Geography of Health: fundamental concepts; Approaches explaining Geography of Health: ecological, social, and spatial perspectives. Global Health Transition: The epidemiological transition, its drivers, and regional patterns. **Learning activities:** Assignment writing/ Presentation	CLO1
Unit II / 15 Hours	Social Environment and Health: health inequalities across global, regional, and neighbourhood scales; health care systems and inequalities in health care services. **Learning activities:** Case study/Exercises/Report reading	CLO1 CLO2
Unit III / 15 Hours	Global Environmental Change and Health: air quality; contamination of food, and water; climate change, temperature extremes, natural hazards. Emerging Health Challenges: Urban health and well-being; Gender equity in health; migration and health; unhealthy lifestyle and chronic diseases; ageing and health; adolescent/youth and health **Learning activities:** Case study/Exercises/Report reading	CLO2 CLO3
Unit IV/ 15 Hours	Health indicators and health data– Identifying mappable health data (geocoding methods) - Mapping physical and social determinants of ill-health - GIS techniques in disease mapping and health care systems– Spatial analysis; Remote Sensing and its Applications in Health Sector. **Learning activities:** Case study/Presentation/Field Work	CLO4 CLO5

Suggested/ recommended readings:

1. Aikat, B.K. (1985) Tropical diseases in India, Arnold Meinemann, Delhi, 1st Edition
2. Akhtar Rais (1990), Environmental population and health problems, Ashish Publishers Home, New Delhi.
3. Akhtar Rais, Learmonth Amos Thomas Andrew, (2018) "Geographical Aspects of Health and Disease in India", Concept Publishing Company Pvt. Limited
4. Ansari, S.H. (2005), "Spatial Organization of health care facilities in Haryana" NGJI, Vol 51, PP3-4, ,51- 61.

5. Chakrabarti, N., (1954), "Some factors influencing the mortality of cholera. Calcutta," Medical Journal, Vol. 51.
6. Cliff, A. & Hagget, P. – Atlas of Disease Distribution.
7. Determinants of Health: A New Synthesis. John Frank. Current Issues in Public Health,1:233-240, 1995
8. Disease in India", Concept Publishing Company Pvt. Limited.
9. Egles, J. and Woods, K.J. (1983) The Social Geography of Medicine and Health, Groom Helm London, 1st Edition
10. Forste, D.H. – Health, Disease and Environment.
11. Hunter, J.M. – Geography of Health and Disease.
12. K. Chaubey, "Epidemic of HIV/AIDS in India: A Study in Medical Geography. "Annals of NAGI, Vol. XXV No.1, 2005 pp 28-33.
13. Learmonth, A.T.A. – Disease Ecology.
14. Learmonth, A.T.A. (1985) Diseases in India, Concept Pub. Company, New Delhi,1st Edition
15. Maantay, J. (2007). "Asthma and air pollution in the Bronx: methodological and data considerations in using GIS for environmental justice and health research." Health Place 13(1): 32-56.
16. May, J.M. – Ecology of Human Disease.
17. May, J.M. – Study in Disease Ecology.
18. Mishra R.P, (1972) Medical Geography of India, Lawrence Verry Incorporated.
19. Mishra, R.P.L. – Medical Geography of India.
20. Misra, R.P., (2007), Geography of Health, Concept Publishing Company, New Delhi,2007.
21. Oliver, M. N., K. A. Matthews, et al. (2005). "Geographic bias related to geocoding in epidemiologic studies." Int J Health Geogr 4: 29.
22. Pyle, G.P. – Applied Medical Geography.
23. Singhai, G.C. (2006), Medical Geography, Vasundhra Publication, Gorakhpur,2006.

(DBCE)
RURAL DEVELOPMENT

Course Title: Rural Development	**L**	**T**	**P**	**Cr**
Course Code: GEO91DE01104	4	-	-	4

Total Hour: 60 Hours

Objectives :

This course is designed to acquaint students with an insight into the concepts, approaches and planning process related to rural development in India. The students will learn the rural economic base, socio-cultural aspects, rural development process and provision of services in rural areas.

Course Learning Outcomes (CLO): At the completion of the course, the student will be able to understand:

CLO1: the need and approaches to rural development and in-depth knowledge of pre and post-independence period of rural development.

CLO2: knowledge on rural economic base especially about the significance of development of non-farm sector in rural areas.

CLO3: socio-economic and ethnic aspects of rural society

CLO4: sensitized to understand the relevance of access to basic services like health, education, credit facilities and rural connectivity in rural areas.

Unit/Hours	**Content**	**Mapping with CLO**

Unit I 15 Hours	Rural Development in India - Define Rural Development, Need for Rural Development, Approaches to Rural Development. Rural Development in pre-Independence India, Post-Independence: Government approaches through Five Year Plans with special reference to the changing focus on, Area based Approach, Target Group Approach, Integrated Rural Development Approach. **Learning activities:** Assignments	CLO1
Unit II 15 Hours	Rural Economic Base- Workforce Participation, Farmers Income, Agriculture Sector development, Rural market, Rural-Urban interface, Collective cooperative farming, Concept and Importance of Non-Farm Sector in rural areas, Cottage and Small-Scale Industries, Agro Industries, Artisian. **Learning activities:** Documentary	CLO1 CLO2
Unit III 15 Hours	Socio-cultural Space – Integrating factors Festivals, Food, Ethnicity, Folk lore, Ethnic wear, Dialect. Social construction of space and time. Globalisation and Farmer distress. **Learning activities:** Field visit	CLO2 CLO3
Unit 4 15 Hours	Provision of Services: Access to Elementary education in rural areas, Access to Primary Health Care in rural India, Micro Credit, Rural Connectivity, PURA. Case Studies: Martandan Experiment, Sriniketan Experiment, Gurgaon Experiment, Gandhian Approach, Bhoodan, Gramdan Movement & Gaon ke Aur Experiment. **Learning activities:** Case Studies	CLO3 CLO4

Suggested/ recommended readings:

1. Krishnamurthy, J. (2000). *Rural Development - Problems and Prospects*. Jaipur, India: Rawat Publs.
2. Singh, R.B. (1985): *Geography of Rural Development*. New Delhi, India: Inter India.
3. Misra, R. P. (ed.) (1985). *Rural Development: Capitalist and Socialist Paths*, Vol. 1. New Delhi, India: Concept.
4. Ramachandran, H., and Guimaraes, J.P.C. (1991). *Integrated Rural Development in Asia–Leaning fromRecent Experience.* New Delhi, India: Concept Publishing.
5. Sharma, K.K., Tripathi, A.K., Yadav, A., and Singh, M. (2017): *Rural Development: A Holistic Perspective*, Research India Press, New Delhi.
6. Sharma, K.K; Singh, M. (2014): *Perspective of Regional Development*, Research India Press, New Delhi.
7. Gilg, A. W. (1985). *An Introduction to Rural Geography*. London, UK: Edwin Arnold.
8. Lee, D. A. and Chaudhri, D. P., (eds.) (1983). *Rural Development and State*. London, UK: Methuen.
9. Palione, M. (1984). *Rural Geography*. London, UK: Harper and Row.
10. Robb, P. (1983). *Rural South Asia: Linkages, Change and Development*. UK: Curzon Press.
11. UNAPDI. (1986). *Local Level Planning and Rural Development: Alternative Strategies*.New Delhi, India: (United Nations Asian & Pacific Development Institute, Bangkok), Concept Publs. Co.

(DBCE)
URBAN GOVERNANCE AND PLANNING

Course Title: Urban Governance and Planning	**L**	**T**	**P**	**Cr**
Course Code: GEO91DE01204	4	-	-	4

Total Hour: 60 Hours

Course Learning Outcomes (CLO): At the completion of the course, the student will be able to:

CLO1: explain multiple theoretical perspectives on the city and to define, in multiple ways, the processes that constitute the city

CLO2: describe and analyse urban governance in India

CLO3: understand the basic concepts of planning

CLO4: analyse various contemporary issues of urban areas from planning perspective and explain the impact that urban policy of India has on cities.

Unit/Hours	**Content**	**Mapping with CLO**
Unit I / 15 Hours	**Urbanisation in India** Introduction to Urbanisation; Urban environment and ecology; Urban problems: environmental, transportation, housing; Urban infrastructure and services; Urban transportation. **Learning activities: Assignment**	CLO1
Unit II / 15 Hours	**Urban governance** Introduction to urban governance; Urban poverty and housing; Community building; Urban reforms and management; Urban development policies of India. **Learning activities:** Group discussion, Case study, Quiz	CLO2
Unit III/ 15 Hours	**Basic of Urban Planning and Development** Basic concepts of planning; urban land use planning; Urban and Metropolitan planning; aster Plans approach: A case study of Chandigarh and Jaipur; Concept of garden city; Neighbourhood unit; Centrally sponsored plans and schemes (Smart City mission, HRIDAY mission, AMRUT Mission) **Learning activities:** Group discussion, Case study, Quiz	CLO3
Unit 4/ 15 Hours	**Urban spaces** Urban sprawl; Managing and planning urban environment (green and blue spaces); Urban public spaces; Spatial analysis in urban planning **Learning activities:** Group discussion, Case study, Quiz	CLO4

Mode of Transaction: Lecture, class discussion, presentation methods will be used for teaching. Tools such as whatsapp, ppt., and video will also be used.

Suggested readings:

1. Bridge, B. and Watson, S. (eds.) (2000): A Companion to the City. Blackwell, Oxford.
2. Carter, H. (1995): The Study of Urban Geography. 4th ed. Reprinted in 2002 by Rawat Publications, Jaipur and New Delhi.
3. Dubey, K.K. (1976): Use and Misuse of Land in KAVAL Towns. National Geographical Society of India, Varanasi.
4. Dubey, K.K. and Singh, A.K. (1983): Urban Environment in India. Deep and Deep, New Delhi.
5. Dutt, A. Allen, K, Noble, G., Venugopal G. and Subbiah S. (eds.) (2003): Challenges to Asian Urbanisation in the 21st Century. Kluwer Academic Publishers, Dordrecht and London.

Additional readings:

1. Hall, P. (1992): Urban and Regional Planning. Routledge, London.
2. Hall, T. (2001): Urban Geography. 2nd edition. Routledge, London.
3. Haughton, G and Hunter, C. (1994): Sustainable Cities. Jessica Kingsley, London.
4. Jacquemin, A. (1999): Urban Development and New Towns in the Third World – A Lesson from the New Bombay Experience. Ashgate, Aldershot, UK.
5. Johnson, J.H. (1981): Urban Geography, Pergaman Press, Oxford.
6. Mayer, H. and Cohn, C. F. (1959): Readings in Urban Geography, University of Chicago Press, Chicago.
7. Paddison, R. (ed.) (2001): Handbook of Urban Studies. Sage, London.
8. Pacione, M. (2005): Urban Geography: A Global Perspective, Routledge, London and New York.
9. Ramachandran, R., (1991): Urbanisation and Urban Systems in India. Oxford University Press, Delhi.

Websites/web references:

1. http://mohua.gov.in/upload/uploadfiles/files/URDPFI%20Guidelines%20Vol%20I.pdf
2. https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=17
3. http://mohua.gov.in/
4. http://mohua.gov.in/upload/uploadfiles/files/G%20G%202014(2).pdf
5. https://nptel.ac.in/courses/105/105/105105202/
6. https://bhuvan.nrsc.gov.in/bhuvan_links.php
7. NASA Earth Observatory: https://earthobservatory.nasa.gov/?eocn=topnav&eoci=logo

(DBCE)
GEOGRAPHY OF HERITAGE AND CONSERVATION

Course Title: Geography of Heritage and Conservation	**L**	**T**	**P**	**Cr**
Course Code: GEO91DE01304	4	-	-	4

Total Hour: 60 Hours

Course Learning Outcomes (CLO): At the completion of the course:

CLO1: explain the relevance of heritage sites of Magadh Region and able to apply concept of world heritage.

CLO2: demonstrate and characterize heritage site relevant of its conservation and manage conservation.

CLO3: Students will be skilled in managing heritage sites.

Unit/Hours	**Content**	**Mapping with CLO**
Unit I / 15 Hours	Concept of heritage, UNESCO definition, different perspectives on heritage culture and history, terms, definitions and trope. The Content of Heritage: Global perspectives of heritage, the world heritage concept, Implementation of World Heritage Convention. **Learning activities:** Assignment writing/ Presentation	CLO1 CLO2

Unit II / 15 Hours	Broadening the representation and meaning of heritage- Intangible and tangible heritage: spatial tradition, management, planning and conservation, case studies. **Learning activities:** Case study/Exercises/Report reading	CLO1 CLO2 CLO3
Unit III / 15 Hours	Conserving Heritage: Heritage complexities, tensions and ethical challenges, conservation and management of cultural and natural heritage, heritage and socio-economic development, community-based heritage work. **Learning activities:** Case study/Exercises/Report reading	CLO2 CLO3
Unit IV/ 15 Hours	Distribution and characteristics of heritage sites, Heritage Conservation with Particular Reference to India: Managing and interpreting heritage in India, representing complicated and diverse heritages of India, government of India policies and programs on heritage conservation. **Learning activities:** Case study/Presentation/Field Work	CLO2 CLO3

Suggested/ recommended readings:

1. Bandarin, Francesco and van Oers, Ron (2012). The Historic Urban Landscape: Managing Heritage in an Urban Century. Wiley-Blackwell, Chichester U.K.
2. Bandarin, Francesco and van Oers, Ron (eds.) (2015). Reconnecting the City: The Historic Urban Landscape Approach and the Future of Urban Heritage. Wiley-Blackwell, Chichester U.K.
3. Bharne, Vinayak and Sandmeier, Trudy (eds.) (2019). Routledge Companion of Global Heritage Conservation. Routledge, Taylor & Francis, London and New York.
4. Dumper, Michael (ed.) (2019). Contested Holy Cities: The Urban Dimension of Religious Conflicts. Series: Routledge Studies in Religion and Politics. Routledge, London.
5. Edensor, Timothy; Kothari, Uma and Kalandides, Ares (eds.) (2020). Routledge Handbook of Place. Routledge, Taylor & Francis, London & New York:
6. Graham, Brian and Howard, Peter (eds.) (2008). The Ashgate Research Compendium to Heritage and Identity. Ashgate, Aldershot U.K.
7. Graham, Brian; Ashworth, Gregory J. and Tunbridge, John E. (2000). A Geography of Heritage: Power Culture & Economy. Hodder Arnold Publication, London.

(DBCE)
GEO PARKS AND GEO TOURISM

Course Title: Geo Parks and Geo Tourism	**L**	**T**	**P**	**Cr**
Course Code: GEO91DE01404	4	-	-	4

Total Hour: 60 Hours

Course Learning Outcomes (CLO): At the completion of the course, the student will be able to:

CLO1: understand the relationship between geographical elements and tourism based on Physical/natural factors.

CLO2: comprehend conservation, management and promotion of geoparks and geoheritage sites in a national perspective.

CLO3: learn about the application of remote sensing in Tourism sector.

Unit/Hours	**Content**	**Mapping with**

		CLO
Unit I / 15 Hours	Concept and importance of Geoheritage, Geoconservation; Geoparks, Geodiversity and Geotourism; Historical Development in Geoheritage. Geo-tourism Industry in the 21 Century. Geoparks, Geoheritage and Geotourism, Opportunities and Tools for sustainable development **Learning activities:** Assignment writing/ Presentation	CLO1
Unit II / 15 Hours	Geological, Geomorphological outcrops and society; Threats to geodiversity; Conservation, protection, maintenance of geological sites and related features of National importance; Conservation of geosites as a tool to protect geoheritage. **Learning activities:** Case study/Exercises/Report reading	CLO1 CLO2
Unit III / 15 Hours	Potential of geoparks and geosites in India; Rajasthan, Odisha, Karnataka, Andhra Pradesh, Madhya Pradesh, Bihar, Telangana, Tamil Nadu, Kerala, Gujarat, Himachal Pradesh and other states. UNESCO geoparks, Geopark networks across the globe; Geotourism and National geological Monuments. **Learning activities:** Case study/Exercises/Report reading	CLO2
Unit IV/ 15 Hours	Guidelines for selection of Geosites; Geoheritage laws, Role of local, state and national governments; Current status of Geoheritage protection in the country; Global geoheritage and protection laws. Recent tools such remote sensing, Ground Penetrating RADARs (GPR), Drone technology for monitoring and Management of Geo-heritages **Learning activities:** Case study/Presentation/Field Work	CLO2 CLO3

Suggested/ Recommended readings:

1. Bhatia, A. K. (1991): International Tourism - Fundamentals and Practices, Sterling Publisher, New Delhi
2. D.S.Bhardwaj and M.Chaudhary (1997): Contemporary Issues in Tourism, Himalaya Mumbai.
3. Das, M. (1999): India: A Tourist Paradise, Sterling Publishers, New Delhi
4. Ezzoura Errami, Margaret Brocx (Ed.) (2009). Geoheritage, Geoparks and Geotourism, Conservation and Management Series Springer. P 268.
5. International Journal of Geoheritage and Parks.
6. Kaul, R. K. (1985): Dynamics of Tourism and Recreation, Inter India, New Delhi.
7. Pearce, D. (1987): Tourism Today: A Geographical Analysis, Longman Scientific and Technical, New York.
8. Potential Geoheritage & Geotourism Sites in India.
9. Ranawat, P. S., George, S., (2016). Potential Geoheritage & Geotourism Sites in India International Journal of Scientific and Research Publications, Volume 9, Issue 6, June 2019
10. Robinson, H. (1996): A Geography of Tourism, Macdonald and Evans, London
11. Smith, L. J. S. (2010): Practical Tourism Research, CABI, Wallinford.

(DBCE)

ENVIRONMENT HAZARDS AND DISASTER RISK REDUCTION

Course Title: Environment hazards and Disaster Risk Reduction	**L**	**T**	**P**	**Cr**
Course Code: GEO91DE01504	4	-	-	4

Total Hour: 60 Hours

Course Learning Outcomes (CLO): At the completion of the course, the student will be able to:

CLO1: understand concept of disaster, hazards, vulnerability, resilience
CLO2: gain knowledge on phases of disaster management
CLO3: develop critical thinking on role of community in disaster management
CLO4: acquire knowledge and develop skill on geo-spatial technologies in disaster management
CLO5: comprehend the national and international initiatives for disaster risk reduction programme

Unit/Hours	**Content**	**Mapping with CLO**
Unit I / 15 Hours	**Introduction** Concepts of Disaster; Hazards: Definition, Types, Physical dimension, Spatial distribution of hazards at global, national and local level; Vulnerability: Definition, types, measures of vulnerability; Risk: Definition, Components of risk, risk perception, risk management, risk communication; Resilience: Definition; Themes in resilience studies (biophysical attribute, social attribute, social-ecological system (SES) attribute, attribute of specific area) **Learning activities:** Assignment writing	CLO1
Unit II / 15 Hours	**Disaster management** Disaster management cycle: Pre disaster management stage (preparedness, prevention, mitigation), On disaster management stage (Emergency response and management), Post disaster management stage - Relief, Recovery, Rehabilitation; Community based disaster management **Learning activities:** Group discussion/ Movie	CLO2 CLO3
Unit III / 15 Hours	**Geo-spatial technologies for Disaster Management** Early warning systems and hazard monitoring; hazard, vulnerability, and risk mapping; Geo-informatics in damage assessment; Geo-informatics in emergency management; Participatory GIS (Geographic Information System) mapping; Introduction of Web GIS and apps in disaster management **Learning activities:** Familiarisation with apps/ Assignment writing	CLO4
Unit 4/ 15 Hours	**International and National initiatives** Sendai framework: background, objectives, themes; Disaster management act 2005; Prime Minister's Ten Point Agenda on DRR **Learning activities:** Report reading/ Group discussion	CLO5

Suggested/ recommended readings:

1. Wisner, B., Blaikie, P., Cannon, T., & Davis, I. (2014). *At risk: natural hazards, people's vulnerability and disasters*. Routledge.
2. White, G. F. (1974). *Natural hazards, local, national, global*. Oxford University Press.

3. Hyndman,D. & Hyndman,D.(2016). *Natural hazards and disasters*. Cengage Learning.
4. Keller, E. A., & DeVecchio, D. E. (2016). *Natural hazards: earth's processes as hazards, disasters, and catastrophes*. Routledge.
5. Smith, K. (2013). *Environmental hazards: assessing risk and reducing disaster*. Routledge.
6. Alexander, D. (2018). *Natural disasters*. Routledge.
7. Drabek, T. E. (2018). *The human side of disaster*. CRC Press.
8. Coch, N.K. (1994). *Geohazards: Natural and Human*. Prentice-Hall, Englewood Cliffs.
9. Carter, W. N. (1999). *Disaster management: A disaster management handbook*. Manila: ADB.

Website/web references:

10. World Disasters Report, www.ifrc.org/en/publications-and-reports/world-disasters-report
11. United Nations Office for Disaster Risk Reduction, 2015. Sendai Framework for Disaster Risk Reduction 2015-2030 (2015-2030). www.undrr.org/publication/sendai-framework-disaster-risk-reduction-2015-2030
12. National Institute of Disaster Management. nidm.gov.in

(OEIC)
INTRODUCTION TO CLIMATE CHANGE

Course Title: Introduction to Climate Change	**L**	**T**	**P**	**Cr**
Course Code: GEO91OE00404	4	-	-	4

Total Hour: 60 Hours

Course Learning outcome (CLO): After completing the course, student will be able to:

CLO1: develop understanding of climate change and its causes
CLO2: comprehend climate change impact and arising issues at global level
CLO3: comprehend climate change impact and arising issues at national and local level
CLO4: identify ways to plan climate actions
CLO5: identify ways of adoption to climate change
CLO6: develop critical thinking on climate change policy.

Unit/Hours	**Content**	**Mapping with CLO**
Unit I / 15 Hours	**Climate Change Science** Introduction to Climate Change Science; Fundamental feedbacks in the Climate System; Natural & Anthropogenic Drivers of Climate Change; observed changes in the climate since the industrial revolution. **Learning activities:** Presentations, Assignments	CLO1/ CLO2
Unit II / 15 Hours	**Climate Change Impacts at Global Scale** Observed (in past & present) evidence & projected trends of Climate Change; Carbon cycle feedbacks & Changes in atmospheric greenhouse gases; Extreme weather; Introduction to live case studies from global agency datasets; IPCC Report. **Learning activities:** Group discussions, Presentations, Assignments	CLO2/ CLO3
Unit III / 15 Hours	**Climate Change Impacts at National to Local Level** Ecosystems and biodiversity; Glacier melting, impacts on regional water balance and food resources; Sea level rise and coastal	CLO2/ CLO3/ CLO4

	impacts; Human health impacts; Introduction to live case studies from national to local level agency datasets **Learning activities:** Group discussions, Presentations, Movies	
Unit IV / 15 Hours	**Climate change adaptation** Climate change vulnerability and resilience; Climate change adaptation (special reference to coastal environment, mountain environment and arid environment); Identifying and Selecting Adaptation Options (case study); Climate change adaptation and technology; Climate change adaptation policy. **Learning activities:** Group discussions, Presentations, Assignments	CLO4/ CLO5/ CLO6

Transaction mode: Lecture, Demonstration, Problem solving, Tutorial, Seminar, Local field visit discussion. Tools used: PPT, video, animation movie, whatsapp and Expert's Video Conferencing lectures from various national & international organizations

Suggested Readings:

1. IPCC, (2013): Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pp, doi:10.1017/CBO9781107415324.
2. Kininmonth, William. (2004). Climate Change: A Natural Hazard. Brentwood: Multi-Science Pub. Co.
3. Letcher, T. M. (Trevor M.). Climate Change: Observed Impacts on Planet Earth.
4. Lovejoy, Thomas E., and Lee Hannah (2019). Biodiversity and Climate Change: Transforming the Biosphere. Biodiversity and Climate Change: Transforming the Biosphere. Yale University Press.
5. Maslin, Mark (2014). Climate Change: A Very Short Introduction. Climate Change: A Very Short Introduction. Oxford University Press. doi:10.1093/actrade/9780198719045.001.0001.

(OEIC)
SPATIAL INFORMATION SYSTEM

Course Title: Spatial Information System	L	T	P	Cr
Course Code: GEO91OE00504	4	-	-	4

Total Hour: 60 Hours

Course Learning Outcomes (CLO): At the completion of the course, the student will be able to:

CLO1: will be familiar with the concept, components of SIS
CLO2: will gained knowledge on various data sources, data structures, and their application.
CLO3: will acquire knowledge of various functions applied in SIS.
CLO4: will gather detailed information on the application of SIS in various fields of mapping.

Unit/Hours	**Content**	**Mapping with CLO**
Unit I / 12 Hours	Introduction: Definitions, Concept, Components and Development **Learning activities:** Assignment writing	CLO1

Unit II / 15 Hours	Data Sources and Registration; Data types and data structures: spatial and non-spatial data, raster and vector data structure, Data representation, data modeling **Learning activities:** Assignments, Presentation	CLO1 CLO2
Unit III / 18 Hours	Data creation with GIS software's, Integration of data, Functions of Spatial Information System: Overlay Analysis; Buffer Analysis, Network Analysis, Change Detection Techniques **Learning activities:** Presentation/Group Discussion	CLO2 CLO3
Unit 4/ 15 Hours	Application of Spatial Information Technology for Natural Resource Management, Urban Planning and Forest Monitoring **Learning activities:** Case study,	CLO4 CLO5

Suggested/ Recommended readings:

1. Burrough, P.A. and McDonnell, R.A. 1998. *Principles of Geographic Information Systems*, Oxford University Press.
2. Chang, K-t. 2006. *Introduction to Geographic Information Systems,* Tata McGraw-Hill
3. D. Tomlin. (1990). *Geographic Information Systems and Cartographic Modeling*. USA: Prentice-Hall, Englewood Cliffs, NJ, ISBN 0-13-350927-3.
4. Heywood, I., Comelius, S., and Carver, S. (1988). *An Introduction to Geographical Information Systems*. New York, USA: Addison Wiley Longmont.

(OEIC)
PHYSICAL GEOGRAPHY

Course Title: Physical Geography	**L**	**T**	**P**	**Cr**
Course Code: GEO91OE00604	4	-	-	4

Total Hour: 60 Hours

Course Learning Outcomes (CLO): At the completion of the course, the student will be able to:

CLO1: Explains basic structure of earth, Earth's movement and major landforms on earth.
CLO2: An understanding of atmosphere, its composition and its physical properties.
CLO3: To understand the hydrosphere, various relief of ocean and their properties
CLO4: An understanding of biogeography and its elements.

Unit/Hours	**Content**	**Mapping with CLO**
Unit I / 17 Hours	Lithosphere: Structure of the Earth's Interior; Origin of Continents and Ocean Basins; Forces and Earth's Movements; Major landforms: mountains, plateaus and plains; Rocks: Origin and classification; Gradational Processes; Weathering and erosion; Works of running water, wind and glacier; Normal cycle of erosion. **Learning activities:** Assignment writing	CLO1
Unit II / 15 Hours	Atmosphere: Composition and structure of the atmosphere; Insolation; Temperature: vertical and horizontal distribution; Pressure belts; Air masses; Wind system **Learning activities:** Quiz; Students' presentation/Group discussion	CLO2
Unit III / 14 Hours	Hydrosphere: Relief of ocean basins; Temperature and salinity of ocean water; Ocean tides; Ocean currents; Coral reefs. **Learning activities:** Paper reading, Group discussion	CLO3

Unit IV/ 14 Hours	Biogeography: Biosphere; Ecosystem and ecology; Plant community; Animal community; Biomes. **Learning activities:** Paper reading, Assignment writing	CLO4

Suggested/ recommended readings:

1. Bryant, H.Richard (2001) : Physical Geography Made Simple, Rupa and company. New Delhi.
2. Bunnet, R.B. (2003): Physical Geography in Diagrams, Fourth GCSE edition, Pearson Education (Singapore) Private Ltd.
3. Garrison, T. (1998): Oceangraphy, Wordsworth company, Belmont.
4. Lake, P. (1979): Physical Geography, Cambridge University Press, Cambridge.
5. Monkhouse, F.J.(1979): Physical Geography, Methuen, London.
6. Singh, M.B. (2001): Bhautik Bhugol, Tara BookAgency, Varanasi.
7. Singh, S. (2003): Physical Geography.Prayag Pustak Bhawan, Allahabad.
8. Strahler, A.N. and Strahler, A.M.(1992) Modern Physical Geography, John Wiley and Sons, New York.
9. Trewartha, G.T., Robinson, A.H., Hammond, E.H., and Horn, A.T.(1976/1990):Fundamentals of Physical Geography, Third Edition, MacGraw-Hill, New York.

SEMESTER-IV

(DBCC)
ENVIRONMENT AND SUSTAINABLE DEVELOPMENT

Course Title: Environment & Sustainable Development	**L**	**T**	**P**	**Cr**
Course Code: GEO92DC01504	4	-	-	4

Total Hour: 60 Hours

Course Learning outcome (CLO): After completing the course, student will be able to:

CLO1: develop understanding and thinking of environment and environmental philosophy
CLO2: identify and explore environmental degradation and pollution
CLO3: develop concept of sustainable development
CLO4: identify ways to sustainable management
CLO5: develop critical thinking on sustainable management

Unit/Hours	**Content**	**Mapping with CLO**
Unit I / 15 Hours	**Concept and approaches of environment studies** Concept of environment and ecosystem; Basic ecological principles and Ecosystem Structure and functions: trophic level, ecological/energy pyramid, food chain and web; Types and characteristics of ecosystem; Development of Environmental Philosophy; Carrying capacity of earth: limits to growth. **Learning activities:** Presentations, Assignments	CLO1
Unit II / 15 Hours	**Environmental degradation and pollution** Types and causes of Environmental degradation; Environmental pollution: types, causes and impact (Air, Water and Land). **Learning activities:** Group discussions, Presentations, Assignments	CLO2
Unit III / 15 Hours	**Concepts of sustainable development** Sustainable Development: Concepts and Applicability; Indices and factors of sustainable development; Environmental Sustainability; UN Framework Convention on Climate Change (UNFCCC), 1992, Kyoto Protocol 1997, Brundtland Commission, Rio de Janeiro (Rio Declaration, Agenda 21, Paris Agreement; COP, Sustainable Development Goals. **Learning activities:** Group discussions, Presentations, Assignments	CLO3
Unit IV / 15 Hours	**Sustainable management** Ecosystem services; Nature based solution; Sustainable management of water resources, Sustainable management of forests; Sustainable agriculture and food security; Environmental education for sustainable development. **Learning activities:** Group discussions, Presentations, Assignments	CLO4 CLO5

Transaction mode: Lecture, Demonstration, Problem solving, Tutorial, Seminar, Local field visit discussion. Tools used: PPT, video, animation movie, whatsapp and Expert's Video Conferencing lectures from various national & international organizations

Suggested Readings:

1. Blewett, J. (ed.) (2008): Understanding Sustainable Development, Routledge
2. Brundtland Commission (1987): Our Common Future, Oxford University Press
3. Chambers, N., Craig, S. and Wackernagel M. (2004): Sharing Nature's Interest, Earthscan Publications Ltd., London

4. Dalal-Clayton, B. and Bass, S. (2002): Sustainable Development Strategies: A Resource Book, Routledge
5. Dressner, S. (2002): The Principles of Sustainability, Earthscan Publications Ltd., London
6. Elliott, L. (2004): Global Politics of the Environment, Palgrave MacMillan, New York
7. Hulse, J.H. (2007): Sustainable Development at Risk: Ignoring the Past, Foundation Books
8. Knight, B., Chigudu, H. and Tandon R. (2002): Reviving Democracy: Citizens at the Heart of Governance, Earthscan Publications
9. Mollinga, P., Dixit, A. and Athukorala K. (ed) (2006): Integrated Water Resources Management, Sage, New Delhi
10. Rogers P. (2007): An Introduction to Sustainable Development, Earthscan Publications
11. Sachs, J. (2015): The Age of Sustainable Development, Columbia University Press

Website/Web references

1. http://moef.gov.in/en/
2. http://www.envis.nic.in/
3. https://www.fsi.nic.in/
4. https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=14
5. https://nptel.ac.in/courses/127/105/127105018/
6. https://nptel.ac.in/courses/122/102/122102006/
7. https://sdgs.un.org/goals

(DBCC)
DISSERTATION

Course Title: Dissertation Part II	**L**	**T**	**P**	**Cr**
Course Code: GEO92DC01608	**-**	**-**	**-**	**8**

The student will be evaluated based on:

- Dissertation
- Formatting and timely submission
- Plagiarism
- Quality of viva presentation
- Response to questions of the committee

Continuous evaluation by the guide.

The students are required to submit a dissertation based on the research work carried out towards the fulfilment of M.A./M.Sc. dissertation. It will have following components:
(a) Origin of the research problem and literature review
(b) Objective of the research work
(c) Methodology of the work, field observations (if any) and data recorded by the student,
(d) Details of laboratory investigation (if any) carried out by the candidate,
(e) Synthesis of results and interpretation
(f) Concluding remarks and future direction

Evaluation Criteria:

The evaluation of dissertation in the fourth semester will be as follows:

- 50% weightage for continuous evaluation by the supervisor which includes regularity in work, mid-term evaluation, report presentation, and final viva-voce.
- 50% weightage based on average assessment scores by an external expert, HoD and senior-most faculty of the department; this includes report of dissertation (30%), presentation (10%), and final viva-voce (10%).
- The final viva-voce will be through offline or online mode.

- The workload of one contact hour per student will be calculated for dissertation in fourth semester.

(DBCE)
OCEANOGRAPHY

Course Title: Oceanography	**L**	**T**	**P**	**Cr**
Course Code: GEO92DE01604	4	-	-	4

Total Hour: 60 Hours

Course Learning Outcomes (CLO): At the completion of the course, the student will be able to:

CLO1: understand physical process and aspects of ocean
CLO2: gain knowledge on life in ocean
CLO3: develop awareness and critical thinking on environmental issues of ocean
CLO4: familiarisation with ocean sustainability
CLO5: develop thinking on solution of environmental issues of ocean

Unit/Hours	**Content**	**Mapping with CLO**
Unit I / 15 Hours	**Physical oceanography** Properties of ocean water and their nature of distribution (Temperature, Salinity and Density); Thermohaline circulation and the oceanic conveyor belt; Ocean currents; Waves; Tides; Coupled ocean-atmosphere system); Marine sediments. **Learning activities:** Assignment writing	CLO1
Unit II / 15 Hours	**Biological oceanography** Classification of the marine environment and marine organisms; Physio-chemical factors affecting marine life – light, temperature, salinity, pressure, nutrients, dissolved gases; adaptation and biological processes; Biological productivity and energy transfer; Marine life zones; Coastal habitats: Estuaries, Lagoons, Salt marshes, Mangrpove swamps, Coral reefs **Learning activities:** Students' presentation/Group discussion	CLO2
Unit III / 15 Hours	**Ocean resources and environmental issues** Law of the sea: Law of the Sea Treaty, Exclusive Economic Zones; The Ocean's Resources: Physical resources, Energy resources, Biological resources, No extractive resources; The Human presence in the ocean and environmental issues; Ocean and climate change: Global Climate Impact on the Coast, The Impact of Global Climate Change in the Open Ocean **Learning activities:** Case study/Movie/ Group discussion	CLO3
Unit 4/ 15 Hours	**Ocean sustainable management** Ocean and sustainable development: Sustainable management of ocean resources, Targets of sustainable development (2030) for life below water, Blue economy; Nature-based solutions and the ocean: Concept of nature-based solutions, Case studies; Coastal disaster risk reduction: coastal disaster risk, risk reduction strategy **Learning activities:** Report reading/ familiarisation with apps/ Group discussion	CLO4 CLO5

Suggested/ recommended readings:

1. Garrison, T.S. (2007). *Oceanography: An Invitation to Marine Science*. Brooks Cole, Chicago.
2. Pinet, P.R. (2006). *Invitation to Oceanography*. Jones & Bartlett Pub., New York.
3. Sverdrup, K.A. and Armrest, E.V. (2010). *An Introduction to the World Oceans*. McGraw Hill.
4. Thruman, H.V. and Trujillo, A.P. (2003). *Introductory Oceanography*. Prentice Hall, Englewood Cliffs.
5. Trujillo, A.P., Thurnman, H.V. (2016). *Essentials of Oceanography*. Prentice Hall.
6. Weyl, P.K. (1970). *Oceanography: An Introduction of the Marine Environment*. John Wiley and Sons Ltd., London.
7. Kings, C.A.M. (1969). *An Introduction to Oceanography*. McGraw, New York.
8. Tarbuck, E. J., Lutgens, F. K., & Samy, S. (2003). *Earth science*. Prentice Hall.

(DBCE)
CLIMATE CHANGE AND ADAPTATIONS

Course Title: Climate Change and Adaptations	**L**	**T**	**P**	**Cr**
Course Code: GEO92DE01704	4	-	-	4

Total Hour: 60 Hours

Course Learning outcome (CLO): After completing the course, student will be able to:

CLO1: develop understanding of climate change, its causes and impacts

CLO2:

CLO3: Describe how they plan to adapt to the negative (or positive) impacts of climate change.

CLO4: Identify ways to plan climate actions.

CLO5: Identify ways of adoption to climate change.

CLO6: Develop critical thinking on climate change policy.

Unit/Hours	**Content**	**Mapping with CLO**
Unit I / 15 Hours	**Climate Change Science** Introduction to Climate Change Science; Fundamental feedbacks in the Climate System; Natural & Anthropogenic Drivers of Climate Change; observed changes in the climate since the industrial revolution. **Learning activities:** Presentations, Assignments	CLO1/ CLO2
Unit II / 15 Hours	**Climate Change Impacts at Global Scale** Observed (in past & present) evidence & projected trends of Climate Change; Carbon cycle feedbacks & Changes in atmospheric greenhouse gases; Extreme weather & Modern surface temperature trends; Introduction to live case studies from global agency datasets; IPCC report. **Learning activities:** Group discussions, Presentations, Assignments	CLO2/ CLO3
Unit III / 15 Hours	**Climate Change Impacts at National to Local Level** Ecosystems and biodiversity; Glacier melting, impacts on regional water balance and food resources; Sea level rise and coastal impacts; Human health impacts; Introduction to live case studies from national to local level agency datasets. **Learning activities:** Group discussions, Presentations, Movies.	CLO2/ CLO3/CLO4
Unit IV / 15 Hours	**Climate change adaptation** Climate change vulnerability and resilience; Climate change	CLO4/ CLO5/

	adaptation (special reference to coastal environment, mountain environment and arid environment); Identifying and Selecting Adaptation Options (case study); Climate change adaptation and technology; Climate change adaptation policy. **Learning activities:** Group discussions, Case study; Presentations, Assignments	CLO6

Transaction mode: Lecture, Demonstration, Problem solving, Tutorial, Seminar, Local field visit discussion. Tools used: PPT, video, animation movie, whatsapp and Expert's Video Conferencing lectures from various national & international organizations

Suggested Readings:

1. IPCC, (2013): Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pp, doi:10.1017/CBO9781107415324.
2. Kininmonth, William. (2004). Climate Change: A Natural Hazard. Brentwood: Multi-Science Pub. Co.
3. Letcher, T. M. (Trevor M.). Climate Change: Observed Impacts on Planet Earth.
4. Lovejoy, Thomas E., and Lee Hannah (2019). Biodiversity and Climate Change: Transforming the Biosphere. Biodiversity and Climate Change: Transforming the Biosphere. Yale University Press.
5. Maslin, Mark (2014). Climate Change: A Very Short Introduction. Climate Change: A Very Short Introduction. Oxford University Press. doi:10.1093/actrade/9780198719045.001.0001.
6. IISD, UNITAR & UNEP (2009). IEA Training Material: Vulnerability and Climate Change Impact Assessment for Adaptation.
7. UNEP & UNDP (2011). Mainstreaming Climate Change Adaptation into Development Planning: A Guide for Practitioners

(DBCE)
REGIONAL PLANNING AND DEVELOPMENT

Course Title: Regional Planning and Development

L	T	P	Cr
4	-	-	4

Course Code: GEO92DE01804

Total Hour: 60 Hours

Course Learning Outcomes (CLO): At the completion of the course, the students will be able to:

CLO1: elucidate the scope and theories required in planning of a region.

CLO2: explain the strategies of regional planning and involved the intricacies of delimiting a region and core-periphery relations.

CLO3: present the role of infrastructure in regional planning.

CL04: understand the importance of regional planning as a tool for the development strategy.

Unit/Hours	Content	Mapping with CLO
Unit I / 15 Hours	Regional Planning: Concept, Nature and Scope and its Application to Planning. Types of regions and their Classification, Hierarchy of Regions, Types of Planning. Role of geography in regional planning. Regional Planning and Economic Development**.** Methods and Techniques of Regionalization	CLO1

Learning activities: Assignment Writing

Unit II / 15 Hours	Concepts of Multi Level Planning; Growth Foci; Metropolitan Concept: Metropolis, Metropolitan Area, Metropolitan Region Spatial and Non-Spatial Models of Regional Development; Rostow's Stage Theory, Growth Pole Theory and Growth centers, Regional Income Inequality, Core Periphery. **Learning activities:** Quiz; Students' presentation/Group discussion	CLO1 CLO2
Unit III / 15 Hours	Land Evaluation and Land Capability; Land Use Planning in India: Rural and Urban. Regional Inequality, Disparity and Diversity in India. Special Economic Zones: Perspectives of Development with special reference to Bihar and Jharkhand. **Learning activities:** Case study, Report reading	CLO2 CLO3
Unit 4/ 15 Hours	Policies and Programmes of Backward Area Development, tribal region development and development of heritage rich regions. **Learning activities:** Case study, Report reading	CLO2 CLO3

Suggested/ recommended readings:

1. Brookfield, H.C. (1975): Independent Development, Methuen, London.
2. Carney, J. Hudson, R. and Lewis, J. (eds.) (1980): Regions in Crisis, Croom Helm, London.
3. Chand, M. and Puri, V. K. (2003): Regional Planning in India, Allied Publishers Pvt. Ltd., New Delhi
4. Chandana, R. C. (2000): Regional Planning: A Comprehensive Text, Kalyani Publishers, Ludhiana
5. Freeman: Geography and Planning.
6. Glasson, J. and Marshall, T. (2007): Regional Planning, Routledge, New York
7. Hall. P. (1981) : Urban and Regional Planning, Allan & Unwin, Boston.
8. Hoyle, B.S.(Ed.): Spatial Aspects of Development.
9. India Year Book (2014): Publication Division, New Delhi
10. Isard and Cumberland: National Economic planning 1961.
11. King, C. A.M.: Techniques of Geomorphology.
12. Kuklinski, A.(ed.) (1975): Regional Development & Planning, Sythoff, London.
13. Mishra, H. N. (2005): Regional Planning, Rawat Publication, Jaipur.
14. Mishra, R. P. (2002): Regional Planning in India- Concept Publication, New Delhi.
15. Misra, R.P., (Ed.): Regional Planning, Concepts, Techniques, Policies and case studies,1969.
16. Mukerjee, R..: Planning the country side.
17. Prakasa Rao: Regional Planning.
18. Prakasa Rao: Towns of Mysore.
19. Sharma, N. (2012): Pradeshik Niyojan Geography, Drishtikon Prakashan, New Delhi.
20. Singh, J. (1981): Central Places & Integrated Development in a Backward Economy, Gorakhpur.
21. Stamp, L.D.: Applied Geography.
22. Stamp, L.D.: The Geography of Life and Death.
23. Stamp, L.D.: The Load of Britain: Its Use and Misuse.
24. Stamp, L.D.: Our Development World.

(DBCE)

SOIL GEOGRAPHY

Course Title: Soil Geography	**L**	**T**	**P**	**Cr**
Course Code: GEO92DE01904	4	-	-	4

Total Hour: 60 Hours

Course Learning Outcomes (CLO): At the completion of the course, the student will be able to:

CLO1: Get detailed information of soils, its formation and characteristics.
CLO2: Describes the soil erosion processes and salt affected land and soil.
CLO3: Examine the soil pollutants and impact of soil pollution.
CLO4: Get knowledge of different methodologies for soil conservation.
CLO5: Update knowledge of issues and strategies.

Unit/Hours	**Content**	**Mapping with CLO**
Unit I / 17 Hours	Soil Geography: Nature, Scope & relationship with other Sciences. Soil formation: Definition, rocks, minerals, soil forming factors, soil weathering types and processes, soil formation, soil horizon, soil profiles, composition of soil, soil biota and their function in soil, humus, Soil types in India. Physico-chemical and biological properties of soil, sampling and analysis of soil quality. **Learning activities:** Assignment writing	CLO1
Unit II / 15 Hours	Soil erosion: Salt affected soils, Types of erosion: water and wind erosion, causes, soil loss equation. Land degradation: causes and impacts, types of waste lands in India, desertification and its Control. **Learning activities:** Quiz; Students' presentation/Group discussion	CLO1 CLO2
Unit III / 11 Hours	Soil Classification and Capability: Concepts and Methods, USDA, Land Capability/Suitability Classification FAO. **Learning activities:** Paper reading, case study.	CLO2 CLO3
Unit 4/ 17 Hours	Soil pollution: Definition, soil pollutants: types and characteristics. Effects and impacts of soil pollution. Soil management: Methodologies for soil conservation, conservation of arable land, techniques of reclamation and restoration of soil, wasteland reclamation, soil salinity management, remedial measures for soil pollution, Legal measures for land conservation at national and international level. **Learning activities:** Report Reading.	CLO4 CLO5

Suggested/ recommended readings:

1. Backman, H.O and Brady, N.C.: The Nature and Properties of Soils, Mc Millan New York, 1960.
2. Bennet, Hugh H.: Soil Conservation, McGraw Hill, New York .
3. Bunting, B.T.: The Geography of Soils, Hutchinson, London, 1973.
4. Botkin, Daniel B. and Keller, Edward A. Environmental Science: Earth as a Living Planet. 6th ed. John Wiley & Sons, USA. 2007.
5. Clarke G.R.: Study of the Soil in the Field, Oxford University Press, Oxford, 1957.
6. Foth H.D. and Turk, L.M.: Fundamentals of Soil science, John Wiley, New York,1972.

7. Govinda Rajan, S.V. and Gopala Rao, H.G.: Studies on Soils of India Vikas, New Delhi,1978.
8. Ray choudhuri, S.P.: Soils of India, ICAR, New Delhi,1958.
9. Russell, Sir Edward J.: Soil Conditions and Plant Growth, Wiley, New York, 1961.

(DBCE)
GENDER GEOGRAPHY

Course Title: Gender Geography

	L	**T**	**P**	**Cr**
Course Code: GEO92DE02004	4	-	-	4

Total Hour: 60 Hours

Course Learning Outcomes (CLO): At the completion of the course, students will be able to

CLO1: elucidate the scope and theories required in planning of a region.
CLO2: explain the strategies of regional planning and involved the intricacies of delimiting a region and core-periphery relations.
CLO3: present the role of infrastructure in regional planning.
CLO4: understand the importance of regional planning as a tool for the development strategy.

Unit/Hours	**Content**	**Mapping with CLO**
Unit I / 15 Hours	Conceptualizing Gender within Geography: Origin, growth, nature, scope and approaches; Gender as a socio-spatial construct, gendered spaces and differentiation; Gender theories- Radical, Marxist, Post structural; Review of Feminist geographies; diverse trends and Post-modern concepts; Gender movements in India. **Learning activities:** Assignment Writing	CLO1
Unit II / 15 Hours	Status of Women in India: Traditional concept; Spatial variations, social assignments of work and work preferences; Contextualizing Gender in Geography: Various aspects; Impact of Environmental changes on role of women. **Learning activities:** Students' presentation/Group discussion/Assignment	CLO1 CLO2
Unit III / 15 Hours	Gender roles in Resource Management: Land, Water and Forest; Women in Formal and Informal sectors: Gender gaps and impacts; Gender and Society: Women in social movements; Changing dimensions with special reference to Bihar and Jharkhand. **Learning activities:** Case study, Report reading/ Assignment	CLO2 CLO3
Unit 4/ 15 Hours	Methods and Scope: Recent trends; Global pattern and the Indian situation; Gender identity, gender relationships, strategic and practical dom**ains;** Gender Policy measures and practice in India; Problems of Women Empowerment and development; Perspectives of change among the Rural, Tribal and Scheduled Caste women. **Learning activities:** Case study, Report reading	CLO2 CLO3 CLO4

Suggested/ recommended readings:

1. Boserup, E. 1989: Women's Role in Economic Development. Earthscan, London.

2. Dankelman, I. & Davidson, J. 1989: Women and Environment in the Third World Earthscan, London,.
3. Deblig, H.J. 1996: Human Geography-Culture, Society and Space (5th ed.), John Wiley, New York.
4. Haraway, D. 1991: Simians, Cyborgs and Women-The Reinvention of Nature. Routledge, New York.
5. Koblinsky, M. et.al (eds.) 1993: The Health of Women-A Global Respective. Westview Press, Boulder.
6. Lee, D. 1988: Women in Geography-A Comprehensive Bibliography. Boca Raton, Florida.
7. Momsen, J.H. & Townsend, J. (eds.) 1987: Geography of Gender in the Third World, Albany, New York.
8. Montagu, A. 1964: Man's Most Dangerous Myth-the Fallacy of Race. Cleveland.
9. Reagent, A.C. & Monk J.J. (eds.): Women and Spatial change. Kendell & Hunt, Dubuque, Iowa, 1982.
10. Rhodda, A. 1991: Women and Environment.Zed, London.
11. Seager, J.&Olson, A.: Women in the world - An International Atlas.
12. Sivant, R.L. 1985: Women-A World Survey. World Priorities Washington, D.C.,.
13. United Nations1991: The World's Women, 1970-1990. United Nations, New York.
14. United Nations: World Resources 1994-95. Chapter 3: Women and Sustainable Development. United Nations, New York

(DBCE)

INTRODUCTION TO DEMOGRAPHIC METHODS

Course Title: Introduction to Demographic Methods	**L**	**T**	**P**	**Cr**
Course Code: : GEO92DE02104	4	-	-	4

Total Hour: 60 Hours

Objectives:

This course is designed to acquaint students with basic measures in demography and elementary tools of demographic analysis. It examines various measures of fertility, mortality, nuptiality, urbanization and migration. The concept of life table is introduced leading to the construction of life table.

Course Learning Outcomes (CLO): At the completion of the course, the student will be able to:

CLO1: understand basic concepts of demography.
CLO2: demonstrate the basic measures of Mortality and Life Table.
CLO3: validate measures of Fertility and Nuptiality.
CLO4: understand the basic concepts of Migration and Urbanisation.

Unit/Hours	**Content**	**Mapping with CLO**
Unit I/ 15 Hours	**Introduction, Basic Concepts and Measures** Definition and Scope, Linkage with Public Health, History of formal Demography; Universe and Variables, Rates and Ratio, Basic Demographic Equation, Population Change, Demographic Dividends, Population Momentum **Learning activities:** Assignment writings, Discussions	CLO1
Unit 2 / 15 Hours	**Mortality: Basic Measures and Life Table** Crude Death Rate (CDR), Age-Specific Death Rate (ASDR), Useful Measures of Mortality: Infant Mortality Rate (IMR), Neonatal mortality rate (NMR), Post-neonatal mortality (PNMR), maternal	CLO2

	mortality ratio (MMR), maternal mortality rate (MMRT); Life Table: concept, columns and Construction**.** **Learning activities:** Assignments, Presentation, Quiz	
Unit 3 / 15 Hours	**Fertility and Nuptiality** Crude birth rate (CBR), General fertility rate (GFR), Age-specific fertility rate (ASFR), Total fertility rate (TFR), Child–Woman ratio (CWR), Specific fertility rates, Gross reproduction rate (GRR), Net Reproduction Rate (NRR), Crude marriage rate, duration of marriage, age at marriage, Singulate Mean Age at Marriage (SMAM). **Learning activities:** Assignments, Group Discussions, Quiz	CLO3
Unit 4/ 15 Hours	**Migration and Urbanization** Migration: importance, concepts, Estimations, limitations, Accuracy of data. Urbanisation: Concepts and Definitions, Measurement, Slums **Learning activities:** Assignments, Group Computation, Case Study	CLO4

Suggested/ recommended readings:

1. Barclay, George W., 1958. *Techniques of Population Analysis*. New York: John Wiley and Sons.
2. Bhende, Asha A. and Tara Kanitkar, 2000. *Principles of Population Studies*. Bombay: Himalaya Publishing House.
3. Coale, A. J., P. Demeny, and B. Vaughn, 1983. *Regional Model Life Tables and Stable Populations*. Princeton, NJ: Princeton University Press.
4. Preston, Samuel H., Patrick Heuveline and Michel Guillot, 2001. *Demography: Measuring and Modeling Population Processes*. Oxford: Blackwell Publishers.
5. Shryock H.S. and J. S. Siegel, 1971. *The Methods and Materials of Demography*. Vols. I and II. Washington D.C.: US Bureau of Census.
6. Srinivasan K., 1998. *Basic Demographic Techniques and Applications*. New Delhi: Sage Publications.

(DBCE)
CULTURAL GEOGRAPHY

Course Title: Cultural Geography (Core Elective)

L	**T**	**P**	**Cr**
4	-	-	4

Course Code: : GEO92DE02204

Total Hour: 60 Hours

Course Learning Outcomes (CLO): At the completion of the course, the student will be able to:

CLO1: locate the sub discipline Cultural Geography within the discipline.

CLO2: critically understand the key concepts of Cultural Geography.

CLO3: demonstrate knowledge of key methods in analysing cultural geography.

CLO4: apply concepts and evaluate emerging issues in contemporary cultural context

Unit/Hours	**Content**	**Mapping with CLO**
Unit I / 15 Hours	Concept of Culture, Nature Scope and Significance of Cultural Geography; Approached and Development; Relationships of Culture with Environment, Resources and Technology; Morphology of landscape and its critique, New Cultural Geography and its critique, recent trends.	CLO1 CLO2

	Learning activities: Assignment writing/ discussion	
Unit II / 15 Hours	Concepts in social and cultural geography: Caste, Class, Gender, Sexualities, Race, Ethnicity; Culture, Politics, Power, Cultural Politics, Critical infrastructure, Ideology, Hegemony, Identity, Space and Place. **Learning activities:** discussion and debates / Presentation on thinkers and their contribution	CLO2 CLO3
Unit III / 15 Hours	Doing Cultural Geography: Iconography, Reading landscapes, Photography and Films. **Learning activities:** discussion and debates /Report reading	CLO3 CLO4
Unit IV/ 15 Hours	Issues: Regionalism, Nationalism and Globalisation; Migration and identity; Tourism and landscape; Cultural politics of Caste, Gender, Sexuality & Religion, Migration & Identity **Learning activities:** discussion and debates /Presentation/Field Work	CLO4 CLO5

Suggested/ recommended readings:

1. Ahmad, A. 1999. Social Geography, Rawat Publication, New Delhi, 2019
2. Ahmed, A. 1993. (ed) Social Structure and Regional Development: A Social Geography. Perspective, Rawat Publications, Jaipur
3. Anderson, K. Domosh,M., Pile, S., Thift, N (eds). 2002. Handbook of Cultural Geography. Sage
4. Cosgrove Denis (1984) Social Transformation and Symbolic Landscape, Croom Helen, London.
5. Crang, Mike.1998. Cultural Geography, Routledge, London Feasibility reports. By KILA
6. Pannikar, K.M. 1959. Geographical Factors in Indian History, Bharatiya Vidya Bhavan, Bombay
7. Rachel, Pain. (eds). Introducing Social Geographies, Arnold Hodder group, London & Oxfod University Press
8. Raza, M. and Ahmed, A. 1990. An Atlas of Tribal India, Concept Publishing Co, Delhi.
9. Robertson Iaian and Penny Richards, .2003. Studying Cultural Landscapes, Oxford University Press, London and New York.
10. Sauer, C.O.1925.The Morphology of Landscape. University of Carlifornia Publication, Geography
11. Singh, K.S. 1993. People of India Vol I to XI, Oxford University Press, New Delhi.
12. Sopher, D. (ed.) 1980. An Exploration of India: Geographical Perspectives on Society and Culture, Cornell Press, New York.

(DBCE)
URBNIZATION AND URBAN SYSTEM

Course Title: Urbanization and Urban System	**L**	**T**	**P**	**Cr**
Course Code: : GEO92DE02304	4	-	-	4

Total Hour: 60 Hours

Course Learning Outcomes (CLO): At the completion of the course, the student will be able to:

CLO1: Understand the fundamentals and patterns of urbanization process

CLO2: To understand the linkages between urban cities and the societal forces that shapes it.

CLO3: Critically analyse contemporary urban issues from a geographical perspective.

CLO4: Understand urban issues in order to engage with possible and effective planning and policy interventions.

Unit/Hours	Content	Mapping with CLO
Unit I / 15 Hours	Introduction: Defining the city, understanding the different approaches in examining the city and its transformations. **Learning activities:** Assignment writing	CLO1
Unit II / 15 Hours	Concept of urban system and Patterns of Urbanization; Urban Transformations in Historical Contexts: Early cities to industrial cities, cities in the world system and global cities, colonial and post-colonial cities. **Learning activities:** presentation/Group discussion	CLO1 CLO2
Unit III / 15 Hours	Urban society: Social Space, Urban culture, urban crime; Urban environment: urban slums definition and types; urban economy's **Learning activities:** Paper reading, presentation, case studies	CLO2 CLO3
Unit 4/ 15 Hours	Urban Managements; urban development policies; Future governance structure PPP, Urban Issues: problems of housing, civic amenities (water and transport); **Learning activities:** Case study, report reading/ project study	CLO4 CLO5

Suggested/ recommended readings:

1. Andrew, E.G.J, McCann, E and Thomas, M 2015. *Urban Geography: A Critical Introduction*, Wiley, Blackwell, UK.
2. Brunn, S.D., Hays-Mitchell, M., Ziegler, D.J. 2012. *Cities of the World: World Regional Urban Development* (5th edition), Rowman and Littlefield Publishers: England
3. Fainstein, S. S and Campbell, S (eds) 2011. *Readings in Urban Theory* (3rd Edition), Wiley-Blackwell, UK.
4. Gilbert, A and Gugler, J (eds.) 1992. *Cities, Poverty, and Development: Urbanization the Third World*, Oxford University Press, Oxford.
5. Hall, T. 2002. *Urban Geography* (2nd Edition), Routledge: London and New York.
6. Fyfe, N.R and Kenny, J.T. 2005. *The Urban Geography Reader*, Routledge: London and New York.
7. Knox, P and Pinch, S. 2010.*Urban Social Geography* (6th edition), Pearson: England
8. Kundu,A. 2005. Urban Development and Urban Research in India, Khama Publishers, New Delhi.
9. LeGates T.R. and Stout F. (ed.) 2016. *The City Reader* (6th edition), Routledge: London and New York.
10. Misra. R.P. and Misra, K. (eds.) 1998. Million Cities of India Vol.I/II Sustainable Foundation, New Delhi.
11. Pacione, M. (2009). *Urban Geography: A Global Perspective*. UK Taylor and Francis.
12. Prakasa Rao,V.L.S. 1983. Urbanisation in India: Spatial Dimensions, Concept, New Delhi.
13. Ramachandran, R., (1989). *Urbanisation and Urban Systems of India*. New Delhi, India: Oxford University Press
14. Sivaramakrishnan, K.C. et al. 2005. A Hand Book of Urbanisation in India, Oxford University Press, New Delhi.

(DBCE)

NATURAL RESOURCE MANAGEMENT

Course Title: Natural Resource Appraisal & Management	**L**	**T**	**P**	**Cr**
Course Code: : GEO92DE02404	4	-	-	4

Total Hour: 60 Hours

Course Learning outcome (CLO): On completion of the course, the students will be able to:

CLO1: relate the importance of natural resources in the environment

CLO2: discuss the causes of natural resource depletion with special reference to India

CLO3: acquire understanding of various approaches of resource conservation

CLO4: understand various policies adopted at the national and international level to conserve and restore natural resources

Unit/Hours	**Content**	**Mapping with CLO**
Unit I /11 Hours	**Concept of resources, distribution and utilisation** Natural resources: Definition and Classification; natural resource degradation - Environmental impacts and conservation; Concept and approaches of resource management; Forest Resources: Forest cover of India; forest types, functions of forest – production; Water Resources: Surface, groundwater, marine and brackish water resources - assessment and utilization; wetlands in India. **Learning activities:** group discussion/ assignment	CLO1
Unit II/ 12 Hours	**Problems of natural resources with special reference to India** Issues and constraint of resource utilization, and management, environment, political and socio-economic challenges; Ground water resource depletion and salinity issues; Wetland degradation; Deforestation; Desertification; Land degradation due to mining, exploration, industrialization, irrigation and natural disasters; Soil Erosion, Loss of soil fertility. **Learning activities:** Quiz/paper reading	CLO2
Unit III/ 11 Hours	**Conservation and Management** Meaning, principles and approaches of conservation; Indigenous knowledge in resource management; Conservation of forests; forestry programmes – social forestry, farm forestry, urban forestry, community forestry; deforestation; Afforestation; Water Conservation and management techniques; Rain water harvesting; Watershed management; River cleaning, River action plans - Ganga and Yamuna action plan, Interlinking of rivers; Restoration of soil Fertility, Soil Conservation Methods; Wasteland reclamation, Organic farming, green manuring; **Learning activities:** Report reading/ group discussion/ case study	CLO3
Unit IV/ 11 Hours	**Policies and Planning** Forest, Land and water resource policy in India; Sustainable resource development- concept, methods and dimension; Integrated resource development- ecological, economic and social aspects; Jal Shakti Abhiyaan, Namami Gange, National Water Mission. **Learning activities:** Report reading/ group discussion/ case study	CLO4

Mode of Transaction: Lecture, class discussion, presentation methods will be used for teaching. Tools such as whatsapp, ppt., and video will also be used.

Suggested Readings:

1. Singh, C. K. (2018). *Geospatial Applications for natural Resources Management,* CRC

Press.

2. Primak, R. B. (2014). *Essentials of Conservation biology*, Sinauer Publishers, 6th edition.
3. Raju, N. J., et al., (2014). *Management of Water, Energy and Bio-resources in the Era of Climate Change: Emerging Issues and Challenges,* Springer.
4. Anderson, D. A. (2013). *Environmental economics and natural resource management,* Taylor and Francis 4th Edition.
5. Beckman, D. W. (2013). *Marine environmental biology and conservation,* Jones and Barlett learning.
6. Balyani, R. (2012). *Indian Forest and Forestry,* Jaipur: Pointer Publishers.
7. Jetli, K. N. (2011). *Mineral Resources and policy in India,* New Century Publications, Delhi.
8. Kathy, W. P. (2010). *Natural resources and sustainable developments,* Viva books.
9. Jaidev, S. (2010). *Natural resources in 21st century,* Oxford Publishers.
10. Mishra, S. P. (2010). *Essential Environmental Studies*, Ane Books.
11. Ghosh, A. (2010). *Natural resource and conservation and environment management,* Aph Publishing corp.
12. Lynch, D. R. (2009). *Sustainable natural resource management for scientists and engineers,* Cambridge University Press.
13. Grigg, N. S. (2009). *Water resources management: Principles, regulations, and cases*. McGraw Hill Professional.
14. Kudrow, N. J (Ed). (2009). *Conservation of natural resources, Nora Science*, New York.
15. Mohanka, R. (2009). *Bioresources and human Environment,* APH Publishing Corporation, Delhi.
16. Kohli, R. K., Batish, D. R., et al. (2009). *Invasive Plants and Forest Ecosystems,* CRC Press.
17. Rao, N. (2008). *Forest Ecology in India. Colonial Maharashtra 1850-1950*. Cambridge University Press.
18. Bravo, F., et al. (2008). *Managing forest ecosystems: the challenge of climate change*.
19. Gurdev, S. (2007). *Land resource management,* Oxford publishers.
20. Kumar, H. D. (2001). *Forest resources: Conservation and management,* Affiliated East-West Press.

Website/Web references

1. http://moef.gov.in/en/
2. http://www.envis.nic.in/
3. https://www.fsi.nic.in/
4. https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=14
5. https://sdgs.un.org/goals