UNIVERSITY OF MADRAS DEPARTMENT OF GEOGRAPHY	
Programme:	**M.Sc GEOGRAPHY**
Programme Code:	
Duration:	**2 Years**
Programme Objectives:	1. To orient the students towards identification and analysis of various facets of geographic and geographical features and processes. 2. To develop students' aptitude for acquiring basic skills of carrying out field work. 3. To guide students to learn the science and art of collecting, processing and interpreting the data. 4. To analyze various problems and overcome them through proper management, planning and sustainability 5. To expose the students to the use of the updated technologies of Remote Sensing, GNSS, Geographical Information System (GIS) and GIScience.
Programme Outcomes:	1. Understand the scope and evolution of the diverse discipline of Geography
	2. Develop ethical aptitudes and dispositions necessary to acquire and hold leadership positions in industry, government, and professional organizations.
	3. Recognize, synthesize and evaluate diverse sources of knowledge, arguments and approaches pertinent to exploring human-environment problems.
	4. Development of knowledge, skills and holistic understanding of the discipline among students. Encouragement of scientific mode of thinking and scientific method of enquiry in students.
	5. Ability to undertake research in interdisciplinary studies and problems or issues beyond the realm of what strictly comes under the purview of geography

Programme Specific Outcomes:	1. Understand the major biophysical and social patterns in the world, and the key drivers that give rise to those patterns.
	2. Demonstrate in-depth knowledge of theories, concepts, techniques and technologies in human and physical aspects of geography, as well as geographic information science and technology, through real-world practical applications at the local, regional, and global scales.
	3. Apply systems thinking and critical thinking skills to analyze problems and potential solutions in socio-economic-ecological systems at the human-environment interface.
	4. Practice obtaining, analyzing, and interpreting complex geographic data.
	5. Work effectively in interdisciplinary and multicultural real-world contexts to combine theory and practice in responding to local to global issues for humans and non-humans.

LIST OF COURSES

Semester	Course Code	Title of the Course	Core/Elective/ Soft Skill	Credits
I	Paper - I	Elements of Cartography	Core	4
	Paper – II	Applied Geomorphology	Core	4
	Paper - III	Atmospheric and Oceanographic Studies	Core	4
	Paper – IV	**Practical-I** Techniques of Mapping and Map Analysis	Core	4
	Paper (E) - I	Watershed Management	Elective	3
II	Paper - V	Theoretical Economic Geography	Core	4
	Paper – VI	Urban Geography	Core	4
	Paper - VII	Geographical Information System	Core	4
	Paper – VIII	**Practical - II** Spatial Statistical Techniques	Core	4
	Paper (E) - II	Environmental Impact Assessment	Elective	3
III	Paper - IX	Geographical thought	Core	4
	Paper – X	Geography of India and Planning	Core	4
	Paper - XI	Remote Sensing and Survey Techniques	Core	4
	Paper – XII	**Practical – III** Geospatial Technology Lab	Core	4
	Paper (E) - III	Disaster Management	Elective	3
IV	Paper - XIII	Political Geography	Core	4
	Paper – XIV	Social and Cultural Geography	Core	4
	Paper - XV	Regional Planning and Development	Core	4
	Paper – XVI	Project Work / Dissertation Viva – Voce	Core	4
	Paper (E) - IV	Field Survey and Mapping Analysis	Elective	3

Core Paper	Credit per paper	No. of paper	Total credit

Core paper	04	16	64
Elective paper	03	04	12
Total		**20**	**76**

SEMESTER - I

Paper-I : ELEMENTS OF CATROGRAPHY

Course Objectives:		
The main objectives of this course are to:		
1	exploring and defining principles of cartography, emerging trends in cartography and information age	**K1, K2**
2	understanding the basics of geodesy and map projection	**K2, K3**
3	gaining skills in map symbols, cartographic design, representation and production of maps	**K3, K6**
4	critically assessing online resources, software and its uses for interactive mapping	**K4, K5**
5	conceive the importance of web mapping and geospatial data policy	**K4, K6**
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create		

Course – I	**CORE**
Title of the Course:	**ELEMENTS OF CARTOGRAPHY**
Credits:	04
Pre-requisites, if any:	Basic knowledge in geography, artistic skill and basic statistics

UNITS

Unit -I	**FUNDAMENTALS OF CARTOGRAPHY**
History and future of cartography - Information age and mapping, Cartography as language and communication -visual thinking and visual communication-spatial information system.	

Unit-II	**MAP PROJECTIONS AND COORDINATE SYSTEMS**
Basic Geodesy, coordinate systems, and map projections- geographical data – spatial objects and attributes – map scale and accuracy	

Unit-III	**DATA FOR MAPPING, COMPILATION AND GENERALISATION**
Traditional survey methods, Automated Survey methods, Remote Sensing, Census and Sampling; compilation process, cartographic abstraction, generalisation, accuracy and reliability	

Unit-IV	**MAP DESIGN AND SYMBOLIZATION**
Perception and design, colour theory and pattern creation; feature attributes, point, line, areas and volumes; Qualitative and Quantitative symbols, graded symbolization	

Unit-V	**LAYOUT AND MAP PRODUCTION**
Map elements- typography and lettering; portraying land surface form; socio economic aspects map production and reproduction	

Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	Create professional and aesthetically pleasing maps through thoughtful application of cartographic conventions;	**K1, K2**
2	Select and combine appropriate visual variables to clearly represent geospatial data and communicate map content;	**K2, K3**
3	Classify and generalize data, apply principles of color and contrast, and choose projections and scales for maps of varying purpose;	**K3, K6**
4	Discuss current trends in cartographic science & technology, including virtual reality, open-source web tools, and geovisual analytics;	**K4, K5**
5	Demonstrate mastery in map production for communication and research; analyze, critique, and share high-quality maps.	**K4, K6**
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create		

Reading List (s) :	
1	Kenneth Field (2018),"Cartography, Environmental System Research Institute,Inc., U.S (ISBN: 978-1589484399).
2	Kraak, M.J. and F.J. Ormeling (1996)," Cartography: Visualisation of Spatial data", Longman Ltd., England.
3	Misra R.P (2014),"Fundamentals of Cartography", Concept Publishing Company, New Delhi.
4	Robinson, A.H., J.L.Morrison, P.C., Muehrcke, A.J.Kimerling and S.C.Guptill (2009), "Elements of Cartography", 6th Edition. New York. John Wiley & Sons. USA.
Recommended Text (s) :	
1	Brewer, C. A. (2005)," Designing Better Maps. Redlands", CA: ESRI Press. (ISBN 158948-089-9)
2	Dent, B.D., Torguson, J.S. and Hodler, T.W. (2009), "Cartography: Thematic Map Design", Boston: McGraw-Hill. 6th edition. (ISBN: 978-0-07-294382-5)
3	Jennings, Ken. (2011), "Map Head: Charting the Wide, Weird World of Geography Wonks", Scribner, New York.
4	Mac Eachren, Alan, M., (1995), "How Maps Work, Representation, Visualization and Design", Guilford Press, New York
5	Misra, R.P. and A.Ramesh (1989), "Fundamentals of Cartography", Concepts Publishing Company, New Delhi.
6	Monkhouse, F.J. and Wilkinson, H.R., (1971), "Maps and diagrams: their compilation and construction". Methuen.
7	Tyner, J. (1992),"Introduction to Thematic Cartography", Prentice-Hall, Englewood Cliff, New Jersey.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.] :	
1	http://www.fes.uwaterloo.ca/crs/geog165/cart.htm

2	http://www.colorado.edu/geography/gcraft/notes/cartocom/cartocom_ftoc.html#3.0
3	http://www.earthsensing.com/cart/resources/carthelp.html)
4	www.esri.com
5	http://www.unigis.org/resources/

Method of Evaluation :

Internal Assessment	End Semester Examination	Total	Grade
20	80	100	

Methods of Assessment

Recall (K1) - Simple definitions, MCQ, Recall steps, Concept definitions

Understand/ Comprehend (K2) - MCQ, True/False, Short essays, Concept explanations, Short summary or overview

Application (K3) - Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain

Analyse (K4) - Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge

Evaluate (K5) - Longer essay/ Evaluation essay, Critique or justify with pros and con

Create (K6) - Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with programme Outcomes:

PCOs	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	1	1	2	2	2
CO 2	1	1	3	1	1
CO 3	1	2	1	2	2
CO 4	1	2	1	2	2
CO 5	1	1	1	1	2

Map **Course Outcomes (CO)** for each Course with **Programme Specific Outcomes (PSO)** in the 3-Point scale of **1,2, 3 (Strong, Medium and Low)**

Paper-II : APPLIED GEOMORPHOLOGY

Course Objectives:

The main objectives of this course are to:		
1	introduce the concepts in Geomorphology in adequate manner, many facets of surface relief feature and to understand various aspects of their growth and evolution on the Earth.	**K1, K2**
2	understand landscape evolution through time and space	**K2, K3**
3	understand the processes that shape the landforms around us.	**K3, K6**
4	apply geomorphologic concepts to identify and analyze the environmental and resources issues for sustainable development	**K4, K5**
5	suggest the tools for reading in the landscape the signs of geomorphologic hazards and risks, human interference and geomorphologic resources	**K4, K6**

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Course – II	**CORE**
Title of the Course:	**APPLIED GEOMORPHOLOGY**
Credits:	04
Pre-requisites, if any:	Basic knowledge in Physical geography

UNITS

Unit -I	**SCOPE OF APPLIED GEOMORPHOLOGY**

Definition – Nature and scope of applied geomorphology – Fundamental concepts in geomorphology – Geosynclines and mountain building process – Hill slope evolution - Geomorphic ideas of Davis, Penk and King

Unit-II	**ENERGY FLOW IN GEOMORPHIC SYSTEM**

System concepts in geomorphologic studies – Structure and composition of earth – Origin of Earth crust-Theories of Continental Drift – Plate Tectonics- Isostacy and various concepts of Isostacy- Seismicity and Volcanism- climatic and tectonic changes and impacts

Unit-III	**WEATHERING, MASS WASTING AND DEVELOPMENT OF HILL SLOPES**

Metamorphism and types; Weathering : Mechanical, Chemical and Biological weathering- structure, process and time in weathering- Soil: Soil formation – Types of soils – Soil conservation practices - Mass wasting : Geophysical aspects, causes and classes of mass wasting – Planning and control measures

Unit-IV	**PROCESS GEOMORPHOLOGY**

Drainage: Drainage Basin – Basin morphometry-Types of drainage systems and patterns – Law of erosion; Fluvial system : erosion, sedimentation and structural adjustments in the fluvial system; Waves : Waves dynamics - evolution of shores and construction and destruction of coastal region; Arid and Semi arid landforms and its evolution- Karst and speleology; Glacial process, erosion and depositional landforms.

Unit-V	**APPLICATIONS OF GEOMORPHOLOGY**

Mapping and statistical analysis: Landscape and land evaluation - Hazard analysis – application of geo-informatics in geomorphological mapping and modelling – Geomorphology and its applications in Agriculture, Water resources, hazard, urban and mineral exploration.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	understand of the key concepts of geomorphology and dynamic aspects of landform development	**K1, K2**
2	understand the relationship between geomorphologic processes, natural resources and environmental impacts	**K2, K5**
3	ability to analyze the geomorphologic hazards and risks associated to geomorphic processes	**K4, K5**
4	learn the various tools and techniques relevant to the applied aspects of Geomorphology in various fields.	**K3, K5**
5	knowledge on landscape development and skill on the use of geomorphic process, features and event in resources and environmental planning and management	**K3, K6**

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Reading List (s) :

1	Paul R.Bierman, David R.Montgomery (2020), “Key concepts in Geomorphology”, Macmillan Pulblications, New York.
2	Richard John Huggett (2011), “Fundamentals of Geomorphology”, Routledge, Tailor & Francis, London.
3	Robert, S.A and Suzanne, P.A (2010),”Geomorphology – The mechanics and chemistry of landscapes, Cambridge University Press.
4	Ramkumar, M (2009),”Geological hazards: Causes, Consequences and methods of Containment”, New India Publishers, New Delhi.
5	Savindra Singh (2019),. “Geomorphology” Pravalika Publications, Allahabad, India

Recommended Text (s) :

1	Abbas Farshad (2006), "Introduction to applied Geomorphology for soil scientists" Earth Systems Analysis (ESA) Surface Processes Group (Geohazards), ITC, Enschede, The Netherlands.
2	Andrew Goudie (2003)," Encyclopedia of Geomorphology", Routledge, Tailor & Francis, New York.
3	Arthur L. Bloom (2002),"Geomorphology – A Systematic Analysis to Late Cenozoic landforms; Prentice – Hall of India Pvt., Ltd., New Delhi.
4	Bridge, J.S., (2003),"Rivers and Floodplains: Forms, Processes, and Sedimentary Record", Blackwell Publishing, Oxford.
5	Grotzinger, J., Jordan, T., Press, F. and Siever, R., (2007), "Understanding Earth (5th ed.)", W.H. Freeman and Co., New York, ISBN 0-7167-6682-5
6	Ruhe, R.V. (1982), "Geomorphology", Boston: Honghton Mifflin Company
7	William D. Thornbury (1954),"Principles of Geomorphology", John Willy & sons, Inc., London.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.] :

1	https://earthsurface.readthedocs.io/en/latest/
2	https://ocw.mit.edu/courses/earth-atmospheric-and-planetary-sciences/12-163-surfaceprocesses-and-landscape-evolution-fall-2004/lecture-notes/
3	https://www.sfu.ca/~jveditt/geog213.html
4	https://www.studocu.com/en-gb/document/university-of-oxford/geomorphology/lecturenotes/geomorphology-lecture-notes-master-2017/1677943/view
5	https://www.slideshare.net/GhassanHadi/fundamentals-e

Method of Evaluation :

Internal Assessment	End Semester Examination	Total	Grade
20	80	100	

Methods of Assessment

Recall (K1) - Simple definitions, MCQ, Recall steps, Concept definitions

Understand/ Comprehend (K2) - MCQ, True/False, Short essays, Concept explanations, Short summary or overview

Application (K3) - Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain

Analyse (K4) - Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge

Evaluate (K5) - Longer essay/ Evaluation essay, Critique or justify with pros and con

Create (K6) - Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with programme Outcomes:					
PCOs	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO 1	1	1	2	2	2
CO 2	1	1	3	1	1
CO 3	1	2	3	2	2
CO 4	1	2	1	2	2
CO 5	1	2	1	1	2
Map **Course Outcomes (CO)** for each Course with **Programme Specific Outcomes (PSO)** in the 3-Point scale of **1,2, 3 (Strong, Medium and Low)**					

Paper-III : ATMOSPHERIC AND OCANOGRAPIC STUDIES

Course Objectives:		
The main objectives of this course are to:		
1	understand the basic knowledge of the chemical and physical composition of the atmosphere and the Ocean	**K2, K1**
2	introduce all atmospheric phenomena and their impacts on the Climate	**K3, K1**
3	discuss ocean currents and atmospheric winds in the context of heat transfer and climate regulation	**K4, K5**
4	analyze the major features of the atmospheric and ocean general circulation, and understand the energy transports associated with each	**K4, K3**
5	conceptualize principles of ocean science and use them to think critically about ocean-related issues	**K5, K6**
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create		

Course – III	**CORE**
Title of the Course:	**ATMOSPHERIC AND OCEANOGRAPHIC STUDIES**
Credits:	04
Pre-requisites, if any:	Basic knowledge in Science

UNITS

Unit -I	**NATURE AND SCOPE OF CLIMATEOLOGY**
Atmosphere: Its composition (gaseous) and structure; Insolation and Radiation, heating of land and water; temperature and pressure: variations in temperature and pressure; temperature zones, heat balance, and pressure belts	
Unit-II	**GLOBAL WIND SYSTEM**
Global wind circulation: Tri-cellular meridional circulation; trade winds, easterlies and westerlies and polar winds; Air masses: Continental and maritime; fronts and their types; clouds; Precipitation: types and forms, thunderstorms, cyclones (tropical and temperate) and anti-cyclones	
Unit-III	**CLIMATIC REGIONS AND GLOBAL CLIMATE CHANGE**
Climatic classifications; Classification of Koppen and Thornthwaite, Indian climates and climatic zones; micro climates, agro climates and urban climates; Hydrological Cycle, Global climate change; global warming and their likely impacts on human life on earth; Weather forecasting.	
Unit-IV	**NATURE AND SCOPE OF OCEANOGRAPHY**

History of oceanography, distribution of land and water, major features of ocean basins, continental margins and deep- ocean basins, Bottom relief of Indian, Atlantic and Pacific oceans; Temperature and salinity distribution; salt budget

Unit-V	**CIRCULATION PATTERNS IN THE OCEANS**	
Interlink between atmospheric circulation and circulation patterns in the oceans; Surface currents-thermohaline, waves and tides; Impact of humans on the marine environment; Law of sea, Exclusive economic zone, marine deposits and formation of coral reefs– Coastal hazards		
Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	Understand the fundamentals of climatology, climate change and Ocean dynamics	**K2, K1**
2	Evaluate the climate change scenarios and projected trends and impacts of climate change	**K5, K4**
3	Explain the weather patterns, causes of atmospheric instability and disturbances, climate variability and dynamics of ocean waters	**K3, K5**
4	analyse atmospheric and oceanic circulation systems as well as their interconnections and driving forces	**K4, K5**
5	Demonstrate local specific adaptation and mitigation strategies to curb climate change and coastal hazard risk	**K3, K6**
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create		
Reading List (s) :		
1	Barry, R.G. & Chorley, R.J., (2003)," Atmosphere, Weather and Climate", 11th Edition, Routledge.	
2	Lal, D.S., (2005), "Climatology", Sharda Pustak Bhawan, Allahabad.	
3	Lutgens, F.K., Tarbuck E.J. and Tasa D., (2009), "The Atmosphere: An Introduction to Meteorology", 11th Edition, Prentice Hall.	
4	Pinet P.R. (2012),"Invitation to Oceanography", 6th Edition, Jones & Bartlett Learning.	
5	Stewart, R. (2009),"Introduction to Physical Oceanography", Orange Grove Books	
Recommended Text (s) :		
1	Abbas Farshad (2006), "Introduction to applied Geomorphology for soil scientists" Earth Systems Analysis (ESA) Surface Processes Group (Geohazards), ITC, Enschede, The Netherlands.	

2	Christopherson, R. W. and Birkeland, G. H., (2012),"Geosystems: An Introduction to Physical Geography", (8th edition), Pearson Education, New Jersey.
3	Elizabeth Kolbert, (2006),"Field Notes from A Catastrophe: Man, Nature and Climate Change", Bloomsbury Publishing Plc.
4	Howard J. Critch field (1995),"General Climatology", Prentice, Hall of India Pvt. Ltd., New Delhi.

5	Lisa F. Schipper and Ian Burton (Ed.) (2008),"Adaptation to climate Change", Earth scan Reader Series,
6	Strahler, A. H. and Strahler, A N., (2001)," Modern Physical Geography", (4/E), John Wiley and Sons, Inc., New York.
7	Thompson, R. D. and Allen, P. (1997),"Applied Climatology: Principles and Practice", Routledge, London and New York.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.] :	
1	https://public.wmo.int/en/resources/training
2	https://www.un.org/en/climatechange/speeches
3	https://metnet.imd.gov.in/phps/imdweb_imdnews.php
4	https://www.greenclimate.fund/publications
5	https://mausam.imd.gov.in/imd_latest/contents/satellite.php

Method of Evaluation :

Internal Assessment	End Semester Examination	Total	Grade
20	80	100	

Methods of Assessment

Recall (K1) - Simple definitions, MCQ, Recall steps, Concept definitions

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Evaluate (K5) - Longer essay/ Evaluation essay, Critique or justify with pros and con

Create (K6) - Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with programme Outcomes:

PCOs	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5

CO 1	1	1	1	2	2
CO 2	2	1	3	1	1
CO 3	2	2	1	2	2
CO 4	1	2	1	2	3
CO 5	2	2	1	1	2

Map **Course Outcomes (CO)** for each Course with **Programme Specific Outcomes (PSO)** in the 3-Point scale of **1,2, 3 (Strong, Medium and Low)**

Paper-IV : PRACTICAL-I : TECHNIQUES OF MAPPING AND MAP ANALLYSIS

Course Objectives:		
The main objectives of this course are to:		
1	introduce the concepts practically in mapping and to understand the various aspects of map reading, interpretation and representation of various data through maps.	**K1, K2**
2	provide a basic understanding in the field of interpretation and interpolation.	**K2, K3**
3	employ theoretical and practical methods pertaining to map making.	**K3, K5**
4	evaluate various concepts, methods, models and analysis for mapping the geographical entity.	**K4, K3**
5	suggest various advanced tools in mapmaking process	**K4, K6**

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Course – III	**CORE**
Title of the Course:	**PRACTICAL-I : TECHNIQUES OF MAPPING AND MAP ANALYSIS**
Credits:	04
Pre-requisites, if any:	Basic knowledge in Science, artistic skill and statistics
UNITS	
Unit -I	**MAP READING AND INTERPRETATION**

Map Appreciation and Conventional signs: thematic, topographic and atlas maps and appreciation; Map interpretation : Interpretation of Relief, Drainage, Settlements, Landuse, Vegetation and Transportation Network on Toposheets - Weather map interpretation - Thematic map interpretation

Unit-II	**RELIEF MAPPING AND ANALYSIS**

Slope analysis : Wenthworth's - Smith's - Henry – Raiz's, Analysis of Relief Characteristics from contours : Profiles: Transverse, Longitudinal, Serial, Superimposed, Projected and Composite – Block Diagram.

Unit-III	**WATERSHED : MORPHOMETRIC ANALYSIS**

Watershed delineation and codification ; River Morphology : Area height, Altimetry frequency and Hypsometric curve, Stream order: Horton and Straller method - Morphometric analysis : Stream length ratio (RI), Bifurcation ratio(Rb), Drainage density (Dd), Stream Frequency (Fs), Elongation Ratio (Re), Circularity Ratio (Rc)

Unit-IV	**STATISTICAL DIAGRAMS**

One dimensional (Bar and Line); Two dimensional (Circular, Rectangular and Square) ; Three dimensional (Block, Sphere and Cube) ; Other diagram (Pyramid, Flow and Cartogram) ; Climatic data: Rainfall Deviation – Climograph (Taylor and Foster) – Star / Wind rose diagram – Annual Water Budget graph

Unit-V	**DISTRIBUTION MAPS**

Chorochromatic maps – Choroschematic – Isopleths – Choropleths – Dot maps – Diagrammatic maps

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	understanding the importance of various mapping techniques in geographical study	**K2, K1**
2	describe the procedures and steps involved in the interpretation of thematic, topographic and atlas maps etc.	**K2, K5**
3	employ various quantitative methods and interpolation techniques to map the physical, social and economic issues.	**K4, K5**
4	ability to perform geospatial analysis like network analysis, stream analysis, point and line pattern analysis	**K6, K5**
5	conceptualise the geographic data as well as analyze the information from a spatio-temporal perspective.	**K4, K5**

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Reading List (s) :	
1	Lawrence, G.R.P. (1971),"Cartographic Methods", Methuen & Co., Canada
2	Ramamurthy, K. (1982),"Map Interpretation", Rex Printers, Madras
3	Singh R. L. and Singh R. P. B., (1999),"Elements of Practical Geography", Kalyani Publishers.
4	Sarkar, A. (2015),"Practical geography: A systematic approach", Orient Black Swan Private Ltd., New Delhi.
5	Tamaskar, B. G., Deshmukh, V. M. (1974),"Geographical Interpretation of Indian Topographical Maps", Orient Longman Ltd., Bombay
6	Worthington, B.D.R. and Robert Gent (1975),"Techniques in Map Analysis", Ebenzer Baylis and Sons, USA.

Recommended Text (s) :	
1	Anson R. and Ormelling F. J., (1994),"Basic Cartographic",International Cartographic Association, Pregmen Press.
2	Miller, Austin (1953),The skin of the Earth", Methuen & Co. Ltd. London
3	Monkhouse, F.J., and Wilkinson, H.R. (1976),"Maps and Diagrams", Metheun & Co., London.
4	Kimerling, A.J., Buckley, A.R., Muehrcke, P.C., Muehrcke, J.O. (2011),"Map Use: Reading, Analysis, Interpretation", 7th ed, Esri Press.
5	Mishra, R.P (2014),"Fundamentals of Cartography", (Second Revised and Enlarged Edition), Concept publication.
6	Pearson II, F. (1990),"Map Projections: Theory and Applications", 2nd ed, CRC Press.
7	Robinson A. H., (2009),"Elements of Cartography", John Wiley and Sons, New York.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.] :	
1	www.sevenoaks.wa.edu.au/linkpage/geog/copy.html
2	https://www.youtube.com/watch?v=CoVcRxza8nI
3	https://www.youtube.com/watch?v=vGzqIcuEKzs
4	www.gisdevelopment.net/books/mapping/bmap0010.html
5	https://www.youtube.com/watch?v=FqJrmnQ9sBs
6	https://www.youtube.com/watch?v=T40AMljjgrU
7	https://www.youtube.com/watch?v=3b3yGololaY

8	https://www.youtube.com/watch?v=SySBt4zdC4g
9	https://www.youtube.com/watch?v=Viup5Tpd9r0

Method of Evaluation :

Internal Assessment	End Semester Examination	Total	Grade
20	80	100	

Methods of Assessment

Recall (K1) - Simple definitions, MCQ, Recall steps, Concept definitions

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Application (K3) - Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain

Analyse (K4) - Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge

Evaluate (K5) - Longer essay/ Evaluation essay, Critique or justify with pros and con

Create (K6) - Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with programme Outcomes:

PCOs	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	1	1	2	2	2
CO 2	1	1	3	1	1
CO 3	1	2	1	2	2
CO 4	1	2	1	2	2
CO 5	1	1	1	1	2

Map **Course Outcomes (CO)** for each Course with **Programme Specific Outcomes (PSO)** in the 3-Point scale of **1,2, 3 (Strong, Medium and Low)**

Paper (E)-I : WATERSHED MANAGEMENT

Course Objectives:		
The main objectives of this course are to:		
1	understand the concept of watershed, procedure of watershed delineation and codification and to study the watershed behavior and their characteristics	**K1, K2**
2	able to interpret hydrological data and to quantify the problems by using various modelling methods	**K2, K3**
3	improve water resources management through the implementation of effective integrated management tools and techniques	**K6, K4**
4	strengthen the principles of governance, planning, adaptive management and capacity building in local, regional and transboundary water resources regimes	**K5, K6**
5	create competencies to develop skills and knowledge required for urgent needs in the water resources sector	**K6, K2**
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create		

Course – III	**ELECTIVE**
Title of the Course:	**WATERSHED MANAGEMENT**
Credits:	03
Pre-requisites, if any:	Basic knowledge in Science

UNITS

Unit -I	**BASIC CONCEPTS OF WATERSHED**

Introduction to Watershed Management- Components of the hydrological cycle - Watershed Approach – Watershed delineation - Watershed characteristics - Functions of watershed – Watershed Management and Stakeholder – Watershed Management polices – Modern techniques in Watershed Management.

Unit-II	**LAND RESOURCES MANAGEMENT**

Soil surveys - Soil erosion: causes, effects, estimation and control measures – Soil atmosphere and Soil moisture: methods of estimation - Land evaluation: land utilization, land capability classification and land suitability analysis - Land use planning – Drought management - Case studies

Unit-III	**WATER RESOURCES MANAGEMENT**

Surface runoff: Controlling factors and estimation methods Hydrograph analysis – Surface Water Quality and Pollution Issues- Groundwater: Occurrence, movement, level and quality - Groundwater suitability analysis – Environmental guidelines for Water Quality Management – Case studies.

Unit-IV	**INTEGRATED WATERSHED MANAGEMENT**

Objectives, plans and programmes – conjunctive use of water resources – Rainwater Harvesting System - Watershed modelling : Hydrological Modelling – Numerical Watershed Modelling Watershed prioritisation – Storm Water and Flood Management – Drought Management – Water conservation and recycling methods.

Unit-V	**SOCIAL ASPECTS OF WATERSHED MANAGEMENT**

Participatory Rural Appraisal in Watershed programme - Empowerment of Women and other gender issues - Equity issues in Watershed Management – Financial management and Accounting procedures – Monitoring and Evaluation in Watershed – Water legislation and implementation issues- Merits and demerits of river linking in India

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Understand the nature, characteristics, qualities and scope of a watershed studies and its various issues	**K1, K2**
2	Identify and classify the physical and socio-economic parameters controlling the watershed hydrology	**K2, K5**
3	Assess the current status of the watershed at field, by taking up accurate investigation measures and conduct survey	**K4, K5**
4	Suggest drought control measures, water conservation structures, including design	**K3, K5**
5	Evaluate the problems and to suggest the technical measures for the hydrological issues in the watershed	**K3, K6**

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Reading List (s) :

1	Dhruva N.V.V., Sastry G. and Patnaik U.S. (1990),"Watershed Management", Indian Council of Agricultural Research, New Delhi.
2	Jones C., Palmer R.M., Motkaluk S. and Walters M. (2002),"Watershed Health Monitoring: Emerging Technologies", Lewis Publishers, Boca Raton, Florida
3	Rajesh Rajora,(2002)," Integrated Watershed Management", R. Rawat Publications, New Delhi.

4	Sharda V.N., Sikka A.K. and Juyal G.P. (2006),"Participatory Integrated Watershed Management: A Field Manual", Central Soil and Water Conservation Research and Training Institute, 218, Kaulagarh Road, Dehradun.
5	Tideman E.M. (1999),"Watershed Management–Guidelines for Indian Conditions", Omega Scientific Publishers, New Delhi
Recommended Text (s) :	
1	Common Guidelines for Watershed Development Projects (2008), Government of India.
2	Dhruva N.V.V. (2002),"Soil and Water Conservation Research in India", Indian Council of Agricultural Research, KrishiAnusandhanBhavan, Pusa, New Delhi.
3	Mukherjee A. (2004b),"Participatory Rural Appraisal: Methods and Applications in Rural Planning", Concept Publishing Company, New Delhi.
4	Rajora R. (1998),"Integrated Watershed Management–Field Manual for Equitable, Productive and Sustainable Development", Rawat Publications, Jaipur.
5	Samra J.S., Sharda V.N. and Sikka A.K. (2002),"Water Harvesting and Recycling: Indian Experiences", Central Soil and Water Conservation Research and Training Institute, Dehradun
6	Singh R.V. (2003),"Watershed Planning and Management", Yash Publishing House, Bikaner.
7	Suresh R. (2005),"Watershed Hydrology", Standard Publishers Distributors, New Delhi.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.] :	
1	https://nptel.ac.in/courses/105/101/105101010/#
2	https://nptel.ac.in/content/storage2/courses/105101010/downloads/Lecture02.pdf
3	https://nptel.ac.in/content/storage2/courses/105101010/downloads/Lecture03.pdf
4	https://nptel.ac.in/content/storage2/courses/105101010/downloads/Lecture04.pdf
5	https://www.iirs.gov.in/iirs/sites/default/files/pdf/Watershed_Director_IIRS.pdf
6	http://ecoursesonline.iasri.res.in/course/view.php?id=542
7	https://www.rpcau.ac.in/wp-content/uploads/2020/03/SWC-201_WatershedHydrology_All-lectures.pdf
8	http://www.digimat.in/nptel/courses/video/105108130/L01.html
9	http://www.digimat.in/nptel/courses/video/105105042/L01.html

Method of Evaluation :

Internal Assessment	End Semester Examination	Total	Grade
20	80	100	

Methods of Assessment
Recall (K1) - Simple definitions, MCQ, Recall steps, Concept definitions
Understand/ Comprehend (K2) - MCQ, True/False, Short essays, Concept explanations, Short summary or overview
Application (K3) - Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain
Analyse (K4) - Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge
Evaluate (K5) - Longer essay/ Evaluation essay, Critique or justify with pros and con
Create (K6) - Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with programme Outcomes:

PCOs	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	1	2	1	1	2
CO 2	2	1	2	2	1
CO 3	2	1	3	1	1
CO 4	1	2	1	2	3
CO 5	1	1	2	3	1

Map **Course Outcomes (CO)** for each Course with **Programme Specific Outcomes (PSO)** in the 3-Point scale of **1,2, 3 (Strong, Medium and Low)**

SEMESTER - II

Paper-V : THEORETICAL ECONOMIC GEOGRAPHY

Course Objectives:		
The main objectives of this course are to:		
1	provide students with the contextual information of the spatial distribution and spatial interaction of economic activities	**K1, K2**
2	understanding concept of space and economic principles with reference to geography	**K2, K1**
3	understand and analyze the industrial locational models and their relevance to present scenario	**K3, K4**
4	critically analyse the economies of scale and agglomeration in heterogeneous landscape	**K6, K5**
5	apply Geospatial technology in economic geography and regional planning for solving the spatial problems	**K4, K5**

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create	
Course – I	**CORE**
Title of the Course:	**THEORETICAL ECONOMIC GEOGRAPHY**
Credits:	04
Pre-requisites, if any:	Basic knowledge in geography, and basic statistics
UNITS	
Unit -I	**INTRODUCTION TO ECONOMIC GEOGRAPHY**
Definitions, Nature, Scope, and recent trends : Fundamentals of Economic Geography; Approaches to the study of Economic Geography; Basis of economic process – Production, exchange and consumption – classification of economic activities; factors of localization of economic activity; Limits to growth models	
Unit-II	**AGRICULTURAL GEOGRAPHY**
Types of agriculture: Whittlesey's classification of agricultural regions and special study of subsistence agriculture, tropical plantation, Mediterranean agriculture, mixed farming, stock raising and its products: concept and techniques of delimitation of agriculture regions: crop combination and diversification: Von Thunen's model of agriculture locations and its modification.	
Unit-III	**GEOGRAPHY OF ENERGY AND INDUSTRY**
Spatial distribution of energy; sources of power ; coal, petroleum, hydroelectricity and atomic power; Non-conventional energy sources; Future need of energy – Energy crisis – 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.	
Unit-IV	**GEOGRAPHY OF TRANSPORT AND TRADE**
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 – WTOTRIPS, TRIMS, ASEAN, Concepts of EPZs and SEZs - Concept of economic regions, techniques of delimitation of economic regions, economic regionalization of India.	
Unit-V	**TECHNOLOGICAL CHANGES**

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.		
Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	develop an understanding of concepts and issues related to the spatial interactions of the economy	**K6, K2**
2	understanding the theoretical developments and able to for problem solving	**K2, K3**
3	develop the ability to analyze – critically – current issues related to economic geography with special reference to planning and development	**K6, K4**
4	developing the ability to analyze spatial public policy and solve the spatial problems using geospatial technology	**K4, K5**
5	develop an understanding of concepts and issues related to the spatial interactions of the economy	**K4, K6**
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create		

Reading List (s) :	
1	Bagchi Sen, S and Smith H.L (2006),"Economic Geography: Past, Present and Future", Taylor and Francis.
2	Gautam, A (2010),"Advanced Economic Geography", Sharda Pustak Bhawan, Allahabad
3	Hudson, R (2005),"Economic Geography", Sage Publication, New Delhi
4	Saxena, H.M (2013),"Economic Geography", Rawat Publications, Jaipur, India
5	Sharma T.C and Countinho.O (1998),"Economic and Commercial Geography of India, Vikas Publishing House, Delhi.
Recommended Text (s) :	
1	Combes P, Mayer T and Thisse J.F (2008),"Economic Geography: The Integration of Regions and Nations, Princeton University Press, New Jersey.
2	Hartshome and Alexander (2000),"Economic Geography", Prentice Hall, New York
3	Siddhartha K (2015),"Advanced Economic Geography", Cloudtail India.
4	World Bank (2009),"World Development Report", Washington D.C

5	Yuko Aoyama, James T. Murphy and Susan Hanson (2011),"Key Concepts in Economic Geography", SAGE Publications Ltd., California, U.S
6	Monkhouse, F.J. and Wilkinson, H.R., (1971), "Maps and diagrams: their compilation and construction". Methuen.
7	Tyner, J. (1992),"Introduction to Thematic Cartography", Prentice-Hall, Englewood Cliff, New Jersey.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.] :	
1	https://library.oapen.org/bitstream/id/ecf6e3e2-91ba-4cf4-952dc04d4bbe4704/1005865.pdf
2	https://www.pmfias.com/geography/
3	https://www.youtube.com/watch?v=CbzO-fOjPfY
4	https://www.youtube.com/watch?v=4KnSr3nxe04
5	https://www.youtube.com/watch?v=WZJRItwl1h4
6	https://www.youtube.com/watch?v=8N_cnDTEW4w
7	https://www.youtube.com/watch?v=Ha-Ga9WQDK0

Method of Evaluation :

Internal Assessment	End Semester Examination	Total	Grade
20	80	100	

Methods of Assessment

Recall (K1) - Simple definitions, MCQ, Recall steps, Concept definitions

Understand/ Comprehend (K2) - MCQ, True/False, Short essays, Concept explanations, Short summary or overview

Application (K3) - Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain

Analyse (K4) - Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge

Evaluate (K5) - Longer essay/ Evaluation essay, Critique or justify with pros and con

Create (K6) - Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with programme Outcomes:

PCOs	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	2	1	2	2	2
CO 2	1	2	3	1	1

CO 3	2	1	2	2	2
CO 4	1	2	1	2	1
CO 5	1	1	2	1	1
Map **Course Outcomes (CO)** for each Course with **Programme Specific Outcomes (PSO)** in the 3-Point scale of **1,2, 3 (Strong, Medium and Low)**					

Paper-VI : URBAN GEOGRAPHY

Course Objectives:		
The main objectives of this course are to:		
1	acquire knowledge and critique key paradigms and approaches in urban geography	**K2, K4**
2	study with patterns and functional attributes of urban places.	**K2, K3**
3	explain major concepts and theories from urban geography	**K5, K4**
4	explain major approaches to and perspectives on urban geography	**K5, K4**
5	able to integrate geographical, economic, political, cultural, historical and social knowledge in order to analyze urban issues.	**K4, K6**
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create		

Course – I	**CORE**
Title of the Course:	**URBAN GEOGRAPHY**
Credits:	04
Pre-requisites, if any:	Basic knowledge in geography

UNITS

Unit -I	**CONCEPTS AND APPROACHES**

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

Unit-II	**URBAN SYSTEMS AND DEVELOPMENT**

Concept of National Urban System - Urban Morphology: Concentric Zone, Sector and Multiple-Nuclei Theories - Central Place Theory of Christaller and Losch; the rank-size distribution of cities; Primate City distribution, Diffusion theories - City region and Urban Field.

Unit-III	**ORGANISATION OF URBAN SPACE**

Urbanization as a Multi-Dimensional Process - Urban morphology and land use structure, cityregion relations, urban sprawl, umland and periphery; rural-urban fringe, Theories of city structure (Burgess, Hoyt, Harris and Ullman, Mann, White)

Unit-IV	**URBANISATION**	
Definition and measures of urbanization, factors affecting urbanization, cycle of urbanization; Regional aspects of world urbanization; Patterns and trends of urbanization in India; Functional classification of cities (Nelson and Asok mitra)		
Unit-V	**CONTEMPORARY URBAN ISSUES**	
Urban poverty; urban renewal; slums; transportation; housing; urban infrastructure; urban finance; environmental pollution; urban crime Urban policy and planning: Concept and History of urban planning, urban land use planning, Urban Policy and programmes in India.		
Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	understand the fundamentals and patterns of urbanization process	**K1, K2**
2	understand the new Urban Geography concepts, objectives, theories, policies and practices	**K2, K3**
3	interpret the contemporary metropolis structure in different spaces and times	**K3, K6**
4	identify a variety of Urban geography approaches about the Metropolitan Regions	**K4, K5**
5	integrate knowledge with critical thinking skills to comparative transdisciplinary approaches	**K4, K6**
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create		
Reading List (s) :		
1	Bansal, S.C. (2010): Urban Geography, Meenakshi Prakashan, Meerut.	
2	Kaplan, D. H., Wheeler, J. O. and Holloway, S. R. (2008)," *Urban Geography",* NY,USA: John Wiley.	
3	Knox, P. L., and McCarthy, L. (2005),"Urbanization: An Introduction to Urban Geography", New York, USA: Pearson Prentice Hall.	
4	Pacione, M. (2009),"Urban Geography: A Global Perspective", UK Taylor and Francis.	
5	Short, J. R. (2017),"An introduction to urban geography", Routledge	

Recommended Text (s) :	
1	Knox, P. L., and Pinch, S. (2006),"*Urban Social Geography: An Introduction"*, NY, USA: Prentice-Hall.
2	Kundu, A. (1992),"Urban Development and Urban Research in India", Khanna Publication, New Delhi.
3	Pacione, M. (2010),"Urban Geography- A Global Perspective", Routledge, London.
4	Prakasa Rao, V.L.S. (2003),"Urbanization in India: Spatial Dimensions, Concept", New Delhi.
5	Ramachandran, R. (1989),"Urbanization and Urban Systems in India", Oxford, New Delhi.
6	Singh, R.B., (Ed.) (2015)," Urban development, challenges, risks and resilience in Asian megacities. Japan: Advances in Geographical and Environmental Studies", Springer.
7	Tewari, V.K., Weinstein, J.A.; Prakasa Rao, V.L.S. (ed.) (1986),"Indian Cities: Ecological Perspectives, Concept, New Delhi.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.] :	
1	https://www.youtube.com/watch?v=gCyMdVAFHvw
2	https://www.youtube.com/watch?v=VhSSqaucJJQ
3	https://www.youtube.com/watch?v=PCOlTlg1bhw
4	https://www.youtube.com/watch?v=UHJOQpw0Hiw
5	https://onlinecourses.nptel.ac.in/noc21_hs96/preview
6	https://onlinecourses.nptel.ac.in/noc21_ar10/preview
7	https://onlinecourses.nptel.ac.in/noc20_ce24/preview

Method of Evaluation :

Internal Assessment	End Semester Examination	Total	Grade
20	80	100	

Methods of Assessment

Recall (K1) - Simple definitions, MCQ, Recall steps, Concept definitions

Understand/ Comprehend (K2) - MCQ, True/False, Short essays, Concept explanations, Short summary or overview

Application (K3) - Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain

Analyse (K4) - Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge

Evaluate (K5) - Longer essay/ Evaluation essay, Critique or justify with pros and con

Create (K6) - Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with programme Outcomes:

PCOs	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	1	1	2	2	1
CO 2	2	1	3	1	1
CO 3	1	1	3	2	2
CO 4	1	2	1	2	2
CO 5	2	2	1	1	1

Map **Course Outcomes (CO)** for each Course with **Programme Specific Outcomes (PSO)** in the 3-Point scale of **1,2, 3 (Strong, Medium and Low)**

Paper-VII : GEOGRAPHICAL INFORMATION SYSTEM

Course Objectives:		
The main objectives of this course are to:		
1	understanding the basic spatial concepts, approaches, history and development of GIS	**K2, K1**
2	obtain an understanding of spatial and non-spatial data models	**K2, K3**
3	understanding of data capturing methods and data accuracy and accessing publicly available data sets	**K2, K3**
4	teaching basic spatial operations skills necessary to work with GIS project	**K6, K5**
5	develop a project requiring GIS as a management, analytical, and/or visualization tool using spatial analysis methods	**K6, K4**
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create		

Course – I	**CORE**
Title of the Course:	**GEOGRAPHHIC INFORMATION SYSTEM**
Credits:	04
Pre-requisites, if any:	Basic knowledge in geography and computing
UNITS	
Unit -I	**BASIC SPATIAL PERSPECTIVE AND GIS CONCEPTS**
GIS definition, Approaches and Components; History and Development of GIS - Data in GIS - Spatial Data, Attribute Data and their characteristics. Sources of Spatial and attribute data. Data input and editing of spatial and attribute data, Data Input techniques, Error Rectification, Transformation and Generalization.	
Unit-II	**SPATIAL DATA MODELS**
Vector and Raster Data Models – Comparison of raster and vector data -Spatial Data Structures, Spatial and Attribute data modelling and management.	
Unit-III	**SPATIAL DATA MANAGEMENT**

Database Management System – RDBMS - Linking Spatial and Attribute data, Spatial data analysis - Measurement of length, perimeter and area – Query Models – Reclassification – Buffer Analysis – Neighborhood functions- Overlay Analysis and Boolean Operators.

Unit-IV	**SPATIAL DATA ANALYSIS**
Spatial Analysis: Spatial Interpolation and surface analysis; Modeling Surfaces - Trend surfaces and Digital Elevation Models. - Modeling Networks : Network analysis.	
Unit-V	**WEB GIS AND MOBILE GIS**
Basic Concept and Components, Possibilities and Prospects, Open source software QGIS-, ILWIS, SAGA GIS, Geo Server, Open data sources for GIS analysis – Open Street Map, USGS Earth Explorer, NASA's Socioeconomic Data and Applications Center (SEDAC), United Nations Environmental Data Explorer, FAO Geo Network. Location Allocation and Facility Management using GIS.	

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	developing an understanding of spatial concepts and spatial and nonspatial data models	**K1, K2**
2	learning skills in creating spatial data models using GIS software	**K2, K3**
3	gaining ability to access data in the GIS, compile, analyze, and present geospatial data	**K3, K6**
4	performing GIS functions and demonstrate the skills in modelling	**K3, K1**
5	developing the ability to analyze and solve spatial problems using modelling approaches	**K6, K3**

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Reading List (s) :

1	Aronoff, S. (1991),"Geographic Information Systems: A Management Perspective", WDL Publications, Ottawa, Canada
2	Ian Heywood, Sarah Cornelius and Steve Carver (2000),"An Introduction to Geographical Information Systems", Addison Wesley Longman Limited, New York
3	Otto Huisman and Rolf A. de By (2001),'Principles of Geographic Information Systems – An introductory textbook", The International Institute for Geo-Information Science and Earth Observation (ITC), The Netherlands.

4	Pail Bolstad (2019),"GIS Fundamentals : A First Text on Geographic Information Stystem, 6th Edition, XanEdu Inc.Ann Arbor, MI
5	Paul A. Longley, Michael F.Goodchild, David J. Maguire, David W.Rhind (2015),"Geographic Information Science and Systems", 4th Edition, Wiley, London

Recommended Text (s) :	
1	Campbell, J. and M. Shin (2011),"Essentials of Geographic Information Systems", Online text available, Saylor Foundation, Washington, D.C.
2	David J Maguire, Michael F Goodchild, and David W Rhind ed. (1991)," Geographical Information Systems", Longman Scientific & Technical Co-published in the USA with John Weiley & sons, Inc. New York.
3	Elangovan, K (2006),"GIS - Fundamentals, Applications and Implementations", New India Publishing Agency, New Delhi
4	Kang-tsung Chang (2002),"Introduction to Geographical Information Systems", Tata McGraw-Hill Publishing Company Limited, New Delhi
5	Michael F.Goodchild (2009),"Geographic Information Systems and Science : Today and tomorrow", Taylors & Francis, New York.
6	Matt Duckham, Michael F.Goodchile, Michael Worboys (2003),"Foundation of Geographic Information Science", CRC Press, Taylor & Francis Group, New York.
7	Kang-tsung Chang (2017),"Introduction to Geographic Information System", Mc Graw Hill Education, NOIIDA, India
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.] :	
1	http://www.unigis.org/resources/
2	http://nptel.ac.in/courses/105102015/
3	http://web.mit.edu/11.520/www/lectures/internet_gis08_slides.pdf
4	www.ent.mrt.ac.lk/dialog/documents/GIS%20for%20LBS.ppt
5	http://spatial.ucsb.edu/eventfiles/docs/WebGIS_Principles_and_Applications_UCSB.pdf
6	https://gisgeography.com/best-free-gis-data-sources-raster-vector/
7	https://scihub.copernicus.eu/dhus/

Method of Evaluation :

Internal Assessment	End Semester Examination	Total	Grade

20	80	100	

Methods of Assessment

Recall (K1) - Simple definitions, MCQ, Recall steps, Concept definitions

Understand/ Comprehend (K2) - MCQ, True/False, Short essays, Concept explanations, Short summary or overview

Application (K3) - Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain

Analyse (K4) - Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge

Evaluate (K5) - Longer essay/ Evaluation essay, Critique or justify with pros and con

Create (K6) - Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with programme Outcomes:

PCOs	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	1	1	2	3	3
CO 2	2	1	3	1	1
CO 3	1	2	2	3	2
CO 4	1	2	1	2	2
CO 5	2	1	1	1	1

Map **Course Outcomes (CO)** for each Course with **Programme Specific Outcomes (PSO)** in the 3-Point scale of **1,2, 3 (Strong, Medium and Low)**

Paper-VIII : PRACTICAL-II – SPATIAL STATISTICAL TECHNIQUES

Course Objectives:		
The main objectives of this course are to:		
1	acquire knowledge of the fundamental concepts of geo-statistics and it applications	**K1, K2**
2	understand methods and techniques of data collection, data tabulation, data interpretation and analysis	**K2, K3**
3	describe and evaluate methods for analysing spatial data and mapping	**K5, K6**
4	knowledge of bivariate correlation and regression for geographic data analysis and interpretation along with mapping	**K4, K5**
5	provide an understanding of the pure and applied nature of Geography along with the key elements in the discipline.	**K4, K3**
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create		

Course – I	**CORE**
Title of the Course:	**PRACTICAL - II SPATIAL STATISTICAL TECHNIQUES**
Credits:	04
Pre-requisites, if any:	Basic knowledge in geography
UNITS	
Unit -I	**QUANTITATIVE TECHNIQUES**
Measures of Central tendencies: Mean, Median and Mode; Measures of Dispersion: Mean deviation, Standard deviation ; Coefficient of Skewness and Quartiles ; Measures of Bivariate: Correlation coefficient ; Regression and Residuals ; Time series analysis: Moving average method and Least square method ; Measures of Inequality: Lorenz curve and Gini's Coefficient - Z-score values etc	
Unit-II	**STATISTICAL TESTS**
Chi square (X2) test - 't' test - 'f' test and ANOVA test	
Unit-III	**PATTERN ANALYSIS**

Point Pattern Analysis: Mean, Median and weighted mean center; Nearest neighbor analysis of settlement pattern; Line Pattern Analysis: Measures of connectivity of a transport network (alpha index, beta index, gamma index, etc); Measures of accessibility from a point (de tour index etc) Sinuosity index; Areal Pattern Analysis: Measures of specialization (dominant and distinctive analysis, and indices of diversification, specialization, etc)

Unit-IV	**STATISTICAL ANALYSIS**
Correlation by spearman's and Karl Person's method, Scatter Diagram, Simple Linear Regression analysis, Construction of Regression Line, Plotting of Residuals of Absolute and Relative location, explanation of Residuals plotted on the maps.	
Unit-V	**STATISTICAL MAPPING**
Rainfall variability map – Population Potential map – Population density – population growth – Index of concentration -	

Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	identify the appropriate approaches/techniques in spatial data analysis	**K1, K2**
2	knowledge to solve spatial-related problems using real-life data sets and spatial statistical tools, including visualization, interpolation, pattern identification and modeling	**K2, K4**
3	develop both technical and social skills by working in pairs to solve real-life problems using different statistical software	**K3, K5**
4	analyze results of practical exercises and be able to point out challenges and advantages with those tested techniques	**K4, K6**
5	recognize and express the value of incorporating the spatial dimension of phenomena and processes in social sciences	**K1, K3**
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create		

Reading List (s) :	
1	Banerjee S, Bradley P. Carlin and Alan E.Gelfand (2015)," Hierarchical modeling and analysis for spatial data", 2°, Boca Raton: CRC Press, Taylor & Francis, New York
2	Fotheringham A.Stewart, Chris Brunsdon an Martin Chalrton (2000),"Quantitative Geography – Perspectives on Spatial data Analysis", Sage Publications, London, UK
3	Gaetan, Carlo and Xavier Guyon (2010)," Spatial statistics and modeling", New York, Springer.

4	Manfred M.Fischer and Arthur Getis (2010),"Handbook of Applied Spatial Analysis – Software Tools, Methods and Applications", Springer Link
5	Oliver Schabenberger and Carol A.Gotway, (2005),"Statistical Methods for Spatial Data Analysis", Champan & Hall/CRC, Taylor & Francis Group, New York.
Recommended Text (s) :	
1	Alan E.Gelfand, Peter J.Diggle, Montserrat Fuentes and Peter Guttorp (2010)," Handbooks of Modern Spatial Statistics Methods", Champan & Hall/CRC, Taylor & Francis Group, New York.
2	Harris, R. and Jarvis, C. (2011),"Statistics for Geography and Environmental Science", Pearson Education Ltd, London, UK.

3	O'Sullivan, D. and Unwin, D.J. (2010)," Geographic Information Analysis", Wiley, Hoboken, New Jersey
4	Pal S. K. (1998),"Statistics for Geoscientists", Tata McGraw Hill, New Delhi, India.
5	Rogerson, P.A.(2010)," Statistical Methods in Geography", Sage Publications, London, UK
6	Walfford,Nigel (2011),"Practical Statistics for Geographers and Earth Scientists", Wiley Blackwell, Hoboken, New Jersey
7	Yeates M., (1974)," An Introduction to Quantitative Analysis in Human Geography", New McGraw Hill ,Delhi, India.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.] :	
1	https://nptel.ac.in/courses/106/105/106105219/
2	https://www.youtube.com/watch?v=ukx7Hd4FSEw
3	https://nptel.ac.in/courses/111/105/111105077/
4	https://www.youtube.com/watch?v=VPZD_aij8H0
5	https://www.youtube.com/watch?v=xTpHD5WLuoA
6	https://www.youtube.com/watch?v=gN0OQ6r78f4
7	https://www.youtube.com/watch?v=SVuYPWrbvUc

Method of Evaluation :

Internal Assessment	End Semester Examination	Total	Grade
20	80	100	

Methods of Assessment

Recall (K1) - Simple definitions, MCQ, Recall steps, Concept definitions

Understand/ Comprehend (K2) - MCQ, True/False, Short essays, Concept explanations, Short summary or overview

Application (K3) - Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain

Analyse (K4) - Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge

Evaluate (K5) - Longer essay/ Evaluation essay, Critique or justify with pros and con

Create (K6) - Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with programme Outcomes:

PCOs	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	1	1	2	3	2
CO 2	2	1	3	1	1
CO 3	2	1	2	2	1
CO 4	1	2	1	2	1
CO 5	1	1	1	1	1

Map **Course Outcomes (CO)** for each Course with **Programme Specific Outcomes (PSO)** in the 3-Point scale of **1,2, 3 (Strong, Medium and Low)**

Paper (E) –II : ENVIRONMENTAL IMPACT ASSESSMENT

Course Objectives:		
The main objectives of this course are to:		
1	learn the purpose and role of EIA in the decision making process	**K1, K2**
2	understand strengths & limitations of Environmental Management.	**K2, K3**
3	know screening and scoping processes	**K3, K6**
4	know formats of EIA Report (Environmental Impact Statement or Environmental Statement)	**K2, K1**
5	understand the purpose of developing follow-up procedures, and options for designing these procedures.	**K2, K4**
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create		

Course – I	**ELECTIVE**
Title of the Course:	**ENVIRONMENTAL IMPACT ASSESSMENT**
Credits:	03
Pre-requisites, if any:	Basic knowledge in geography

UNITS

Unit -I	**INTRODUCTION**
The Concept of Environment and Ecosystem: The Problem - Environmental Impacts of Human Actions - Environmental Changes Natural and Man Made - Environment Impact Assessment (EIA) - Environmental Impact statement – EIA in Project Cycle –Types and Limitations of EIA- participation of Public and Non-Governmental Organizations in environmental decision making.	
Unit-II	**COMPONENTS AND METHODS**
Components of EIA – Processes – screening – scoping – setting – analysis - mitigation. Matrices-Networks –Checklists – connections and combinations of processes – Cost benefit analysis - Analysis of alternatives - Software packages for EIA-Expert systems in EIA.	
Unit-III	**PREDICTION, ASSESSMENT OF IMPACTS AND REPORTING**

Prediction tools for EIA - Mathematical modelling for impact prediction - Assessment of impacts: air-water - soil – noise – biological – socio - cultural environments - Cumulative Impact Assessment -Documentation of EIA findings-planning - organization of information and visual display materials -Report preparation

Unit-IV	**ENVIRONMENTAL MANAGEMENT PLAN**
Environmental Management Plan-preparation, implementation and review- Mitigation and Rehabilitation Plans-Policy and guidelines for planning and monitoring programmes - post project audit - Ethical and Quality aspects of Environmental Impact Assessment – Environmental clearance procedure in India.	
Unit-V	**CASE STUDIES**
Case studies related to the following sectors-Infrastructure-Mining-industrial-Thermal Power – River valley, Hydroelectric-Nuclear Power, and Over bridges	

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	understand the basics of EIA and its limitations across sectoral issues and terms of references in EIA. It also includes the study of participation of Public and Non-Governmental Organizations in environmental decision making.	**K2, K6**
2	understand about the methods and components of EIA and to learn about the expert systems	**K2, K3**
3	understand in detail about the prediction tools for EIA along with the mathematical modeling for impact prediction	**K2, K5**
4	improve the knowledge on the ethical and quality aspects of Environmental Impact Assessment	**K4, K2**
5	know in detail about the Case studies of EIA related to the various sectors in a country like infrastructure, sources of energy etc.	**K1, K6**

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Reading List (s) :

1	Charles H.Eccleston (2011),"Environmental Impact Assessment – A Guide to best professional practice", CRC Press, Taylors and Francis Group, New York.
2	George Alex (2020),"Environmental Impact Assessment (EIA) Simplified", Blue Rose Publishers, New Delhi.
3	John Pallister (2012),"Environmental Management", Oxford University Press, London

4	Lawrence, D.P (2003),"Environmental Impact Assessment - Practical Solutions to Recurrent Problems", Wiley- Inter science, New Jersey.
5	Petts, J (1999)," Handbook of Environmental Impact Assessment", Vol., I and II, Blackwell Science, London.
6	Raman N.S, A.R.Gajbhiye and S.R.Khandeshwar (2019),"Environmental Impact Assessment", Dreamtech Press, Wiley, New Delhi

Recommended Text (s) :	
1	Anjaneyulu Yerramilli and Valli Manickam (2020),"Environmental Impact Assessment Methodologies", 3rd Edition, BS Pulblications, Agra
2	Arvind Kumar (2003),"Dimension of Environmental Threats", Daya Publishing House, Delhi
3	Biswas, A.K. and Agarwala, S.B.C (1994),"Environmental Impact Assessment for Developing Countries", Butterworth Heinemann, London.
4	Canter, L.W (1996),"Environmental Impact Assessment"{, McGraw- Hill, New York
5	Hosetti B.B (2014),"Environmental Impact Assessment and Management", Astral International (P), Book Vistas, New Delhi.
6	Shrivastava A.K. (2003),"Environment Impact Assessment", APH Publishing, New Delhi.
7	The World Bank Group (1991)," Environmental Assessment Source Book", Vol. I, II and III. The World Bank, Washington.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.] :	
1	https://nptel.ac.in/courses/120/108/120108004/
2	https://onlinecourses.swayam2.ac.in/nou21_bt02/preview
3	https://www.youtube.com/watch?v=LwtGqpMStnk
4	https://www.iisd.org/learning/eia/wp-content/uploads/2016/06/EIA-Manual.pdf
5	https://www.youtube.com/watch?v=0iZ2andPr8Q
6	https://www.youtube.com/watch?v=yfR05FpLrFw
7	https://www.youtube.com/watch?v=ad9KhgGw5iA

Method of Evaluation :

Internal Assessment	End Semester Examination	Total	Grade
20	80	100	

Methods of Assessment

Recall (K1) - Simple definitions, MCQ, Recall steps, Concept definitions
Understand/ Comprehend (K2) - MCQ, True/False, Short essays, Concept explanations, Short summary or overview
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Evaluate (K5) - Longer essay/ Evaluation essay, Critique or justify with pros and con
Create (K6) - Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with programme Outcomes:

PCOs	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	1	1	1	1	1
CO 2	1	3	3	2	1
CO 3	2	2	1	2	2
CO 4	1	2	1	2	1
CO 5	3	1	1	1	2

Map **Course Outcomes (CO)** for each Course with **Programme Specific Outcomes (PSO)** in the 3-Point scale of **1,2, 3 (Strong, Medium and Low)**

SEMESTER - III

Paper-IX : GEOGRAPHICAL THOUGHT

Course Objectives:		
The main objectives of this course are to:		
1	teach the Methodology and historical development of geography as a professional field	**K1, K2**
2	contextualize the conceptual traditions within geography along with the major philosophical influences	**K2, K3**
3	developing critical thinking and analytical approaches in the field of geographical research	**K3, K6**
4	understanding of the fluidity, expansion and inclusivity of Modern Geographical Thought as against imperial underpinnings and latent eurocentricity.	**K4, K5**
5	acquire an understanding of and appreciation for the relationship between geography and culture	**K4, K6**

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create	
Course – I	**CORE**
Title of the Course:	**GEOGRAPHICAL THOUGHTS**
Credits:	04
Pre-requisites, if any:	Basic knowledge in geography
UNITS	
Unit -I	**THE FIELD OF GEOGRAPHY**
Meaning, philosophy and purpose of Geography. Geography as a social science and natural science. Concepts in the philosophy of geography – distributions, relationships, interactions, areal differentiation and spatial organization	
Unit-II	**HISTORICAL DEVELOPMENT OF GEOGRAPHY**
Pioneers and their Contributions to Geography: Ancient period – Greeks, Romans, Indians and Chines. Dark age- Medieval period - Arabs and Geographical Discoveries. Modern period – Alexander von Humboldt, Carl Ritter and Darwin. School of Geography – German, French, British, American and Russian. Foundation of modern geography – Development of Geography in India.	
Unit-III	**DUALISM AND DICHOTOMIES IN GEOGRAPHY**
Dualisms in Geography-Systematic & Regional Geography; Physical & Human Geography; Systematic Geography & its relation with systematic sciences and with Regional Geography; The myth and reality about dualisms. Regional Geography: Concept of region, regionalization and the regional method.	

Unit-IV	**RECENT TRENDS IN GEOGRAPHY**
Laws, theories & models; Quantitative revolution in Geography; Responses to positivism, Radicalism, behaviourism and humanism and postmodernism in Geography. Geography in the 20th century; Conceptual and methodological developments and changing paradigms; Kuhn's model of 'paradigm of science'; Dominant paradigms in Geography- environmental determinism and possibilism, Neo determinism and spatial analysis; Scientific Explanation : inductive and deductive approaches.	
Unit-V	**NEW SYNTHESIS IN GEOGRAPHY**
Empiricist Philosophy of Regional Geography – Scientific Explanations/Analysis -Trend Towards a New Synthesis – Multi-disciplinary Approach- Data Explosion – Role of Remote Sensing, Geographic Information System and Global Positioning System.	

Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	perceive the evolution of the philosophy of Geography	**K1, K2**
2	appreciate the contribution of the thinkers in Geography.	**K2, K6**
3	discussing the evolution of geographical thoughts from ancient to modern times	**K4, K1**
4	demonstrate an understanding of current research within the breadth of geography, as well as more in depth knowledge of research in their specialty areas	**K2, K5**
5	develop a solid understanding of the concepts of “space," “place” and “region” and their importance in explaining world affairs	**K6, K2**
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create		

Reading List (s) :	
1	Adhikari S (2004), “Fundamentals of Geographic thought”, concept publishers, New Delhi.
2	Cloke, Paul and Johnston, Ron (2005), “Spaces of Geographical Thought”, Sage Publications, London.
3	Dixit, R.D (2001),”Geographical Thought : A critical History of ideas”, Prentice Hall of India, New Delhi.
4	Hussain M (2001),”Evolution of Geographic Thought”, Rawat Publications, Jaipur, India
5	Nayak, Anoop and Jeffrey Alex (2011),”Geographical Thought : An Introduction to Ideas in Human Geography”, Prentice Hall, Harlow
Recommended Text (s) :	
1	Aitken Stuart & Gill Valentine ed. (2006), “Approaches to Human Geography”, Sage Publications, London.
2	Hubbard, Phil, Rob Kitchin and Gill Valentine (2008), “Key Texts in Human Geography”, Sage Publications, London.
3	Johnson R J (1988),”The Future of Geography”, Methuen, London.
4	Minshull R (1970),”The Changing Nature of Geography”, Hutchinson University Library, London.

5	Peet, Richard (2003)," Radical Geography", Rawat Publication, New Delhi.
6	Peet, Richard (1998), "Modern Geographical Thought", Oxford Blackwell, London
7	Singh. I (2006)," Diverse aspect of Geographical thought", ALFA Publications, New Delhi.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.] :	
1	https://unacademy.com/lesson/geographical-thought/C1QFV1Q2
2	https://unacademy.com/course/complete-details-course-on-geographicthought/RB3BJDO9
3	https://www.youtube.com/watch?v=cneKF4VbRvc
4	https://www.youtube.com/watch?v=cjyQuaMOvv0
5	https://www.youtube.com/watch?v=-l7YYzoO49Y
6	https://www.youtube.com/watch?v=1DD9BA0xarw
7	https://www.youtube.com/watch?v=nTScYJP00rc

Method of Evaluation :

Internal Assessment	End Semester Examination	Total	Grade
20	80	100	

Methods of Assessment

Recall (K1) - Simple definitions, MCQ, Recall steps, Concept definitions

Understand/ Comprehend (K2) - MCQ, True/False, Short essays, Concept explanations, Short summary or overview

Application (K3) - Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain

Analyse (K4) - Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge

Evaluate (K5) - Longer essay/ Evaluation essay, Critique or justify with pros and con

Create (K6) - Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with programme Outcomes:

PCOs	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5

CO 1	1	1	2	2	2
CO 2	1	1	3	1	1
CO 3	1	2	1	2	2
CO 4	1	2	1	2	2
CO 5	1	1	1	1	2
Map **Course Outcomes (CO)** for each Course with **Programme Specific Outcomes (PSO)** in the 3-Point scale of **1,2, 3 (Strong, Medium and Low)**					

Paper-X : GEOGRAPHY OF INDIA AND PLANNING

Course Objectives:		
The main objectives of this course are to:		
1	exposed to historical, economic, cultural, social and physical characteristics of India	**K1, K2**
2	familiar with the basic landforms, climate, soil, vegetation and population characteristics of India	**K2, K3**
3	learn the relationships between the global, the regional and the local particularly how places are inserted in regional and global processes	**K3, K6**
	introduced to demographic, social and cultural attributes such as migration, social relations and cultural identity	
4	spatial variations of dimensions of vitality and vulnerability would help them see the strength and weakness of the country	**K4, K5**
5	contextualize much of their further learnings, teaching and research on India within the contents of this course	**K4, K6**
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create		

Course – I	**CORE**
Title of the Course:	**GEOGRAPHY OF INDIA AND PLANNING**
Credits:	04
Pre-requisites, if any:	Basic knowledge in geography
UNITS	
Unit -I	**PHYSICAL SETTING**
Space relationship of India with neighboring countries; Structure and relief; Drainage system and watersheds; Physiographic regions; Mechanism of Indian monsoons and rainfall patterns, Tropical cyclones and western disturbances; Floods and droughts; Climatic regions; Natural vegetation; Soil types and their distributions.	
Unit-II	**RESOURCES AND AGRICULUTRE**

Resources: Land, surface and groundwater, energy, minerals, biotic and marine resources; Forest and wild life resources and their conservation. Agriculture: Green revolution and its socio-economic and ecological implications; Agro and social-forestry; Dry farming and its significance; Livestock resources and white revolution; aqua - culture; sericulture, apiculture and poultry; Agricultural regionalization; agro-climatic zones; agro- ecological regions.

Unit-III	**POPULATION AND SETTLEMENTS**

Population : Growth, Distribution and Density of population – age composition – Sex ration – Literacy – occupational structure – religious composition - population issues: Malnutrition – Migration – Population policies ; Settlements: Types, patterns and morphology of rural settlement: Urban settlement: morphology of Indian cities; functional classification of Indian cities; conurbations and metropolitan regions; urban sprawl; slums and associated problems; town planning; problems of urbanization

Unit-IV	**CONTEMPORARY ISSUES IN INDIA**

Ecological issues: environmental hazards: landslides, earthquakes, tsunamis, floods and droughts, epidemics; Issues relating to environmental pollution; Principles of environmental impact assessment and environmental management; Population explosion and food security; Environmental degradation; Deforestation, Desertification and Soil erosion; Regional disparities in economic development; Concept of sustainable growth and development; Environmental awareness; Linkage of rivers; Globalization and Indian economy.

Unit-V	**REGIONAL PLANNING IN INDIA**

Nature and scope of Regional Planning: Concept of Planning Regions ; Regional Hierarchy : Types of regions and methods of regional delineation - Experience of regional planning in India - Five Year Plans; Integrated Rural Development Programmes; Panchayath Raj and Decentralized Planning; Command Area Development; Watershed Management; Planning for Backward Area, Desert Drought-prone, Hill and Tribal Area Development planning

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	identifying and explaining the Indian Geographical Environment, from global to local scales	**K1, K2**
2	applying geographical knowledge to everyday living.	**K2, K3**
3	applying knowledge of global issues to a unique scientific problem.	**K3, K6**
4	showing an awareness and responsibility for the environment and India.	**K6, K2**
5	evaluating the impacts of human activities on natural environments special reference to India	**K5, K6**

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create	
Reading List (s) :	
1	Gautam, Alka (2009), “Advanced Geography of India”, Second Edition, Sharda Pustak Bhawan, Allahabad.
2	Husain, Majid (2008), “Geography of India”, Tata McGraw-Hill Publishing Co. Ltd., New Delhi.
3	Khullar, D.R. (2006), “India: A Comprehensive Geography”, Kalyani Publishers, New Delhi.
4	Spate, OHK & Learmonth, ATA (1967), “India & Pakistan”, Methuen, London.
5	Tiwari, R.C. (2010),”Geography of India”, Sixth Edition, Prayag Pustak Bhawan, Allahabad
Recommended Text (s) :	
1	Drèze, Jean and Amartya Sen (1996), “India: Development and Participation”, Oxford University Press, London
2	Jayaram, N (2004),”The Indian Diaspora: Dynamics of Migration”, Sage Publications, London
3	Kapur, Anu (2010),”Vulnerable India: A Geographical Study of Disasters”, Sage Publications, California
4	Kapur, Anu (2015),”Made Only in India: Goods with Geographical Indications”, Routledge, Oxfordshire,, UK
5	Krishan, Gopal (2017),”The Vitality of India: A Regional Perspective”, Rawat Publications, Jaipur, Rajasthan
6	Singh, Jagdish (2003),”India: A Comprehensive Geography”, Radha Publications, Gorakhpur, India
7	Tirtha R. and Krishan, Gopal (1996),“Emerging India”, Reprinted by Rawat Publications, Jaipur, India
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.] :	
1	https://onlinecourses.swayam2.ac.in/cec20_hs32/preview
2	https://www.youtube.com/watch?v=LPUjLci2ARY
3	https://www.youtube.com/watch?v=999ngrj_BHM
4	https://www.india.gov.in/india-glance/profile
5	https://www.mapsofindia.com/geography/
6	https://www.cs.mcgill.ca/~rwest/wikispeedia/wpcd/wp/g/Geography_of_India.htm

7	https://www.jagranjosh.com/general-knowledge/indian-geography-a-complete-studymaterial-1470739888-1

Method of Evaluation :

Internal Assessment	End Semester Examination	Total	Grade
20	80	100	

Methods of Assessment

Recall (K1) - Simple definitions, MCQ, Recall steps, Concept definitions

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Mapping with programme Outcomes:

PCOs	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	1	1	2	1	1
CO 2	2	1	3	1	1
CO 3	2	2	3	2	2
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CO 5	2	1	3	1	1

Map **Course Outcomes (CO)** for each Course with **Programme Specific Outcomes (PSO)** in the 3-Point scale of **1,2, 3 (Strong, Medium and Low)**

Paper-XI : REMOTE SENSING AND SURVEY TECHNIQUES

Course Objectives:

The main objectives of this course are to:

1	provide background knowledge and understanding of principles of RS and RS Systems	**K1, K2**

2	identify and use various sources of satellite imageries from web platforms	**K2, K5**
3	enhance student's capacity to interpret images and extract information on the earth surface from multi-resolution imagery at multi-scale level	**K3, K1**
4	acquire skills on basic image processing and classification techniques	**K3, K4**
5	enable critical, spatial and temporal thinking on Remote Sensing for real-world applications	**K5, K6**

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Course – I	**CORE**
Title of the Course:	**REMOTE SENSING AND SURVEY TECHNIQUES**
Credits:	04
Pre-requisites, if any:	Basic knowledge in geography and computing

UNITS

Unit -I	**INTRODUCTION TO SURVEYING**

Principles of surveying – measurement technology – traditional survey methods and instruments – merits and demerits of traditional surveys - automated survey systems : Overview and application of GNSS and GPR - Aerial remote sensing - Aerial photo interpretation – methods of stereoscope viewing – Orientation of aerial photographs – determination of photo scale – determination of height from aerial photos - interpretation of stereo pair

Unit-II	**CONCEPT OF ENERGY RADIATION**

Principles, components of remote sensing systems - Energy interactions ; interaction of energy in atmosphere – energy interactions of earth surface features - spectral regions and its characteristics – atmospheric windows - Principal methods of data acquisition : active and passive methods of sensing - concepts of resolutions in remote sensing process

Unit-III	**REMOTE SENSING PLATFORMS, SENSORS AND DATA PRODUCTS**

Platforms types – Orbits and its types – Sensors : imaging and non-imaging sensors - Optical mechanical and CCD sensor systems - microwave sensing - thermal scanning methods – format of raw data – Types of data products : Photographic - digital imagery and limitations

Unit-IV	**REMOTE SENSING DATA INTERPRETATION**

Satellite remote sensing data interpretation ; Visual image interpretation : elements of interpretation – interpretation strategies – image interpretation keys – equipment – level of classification – ground truth verification : Digital Image interpretation : image enhancement – image classification – supervised classification – unsupervised classification – accuracy assessment; Band ratios – NDVI – NDBI – SAVI; LST calculation; FRAGSTAT; feature extraction.

Unit-V	**REMOTE SENSING APPLICATIONS**

Land use and land cover mapping – Change detection - geology and geomorphologic applications – soils and agriculture – urban planning – water resource management – weather forecasting – disaster management – wildlife ecology

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	Being able to understand the history and evolution of Remote sensing	**K2, K1**
2	Identify and classify various satellite sensors, sources of data, and enhancement of data for various applications	**K4, K3**
3	Understand resolution properties to interpret, process, and evaluate remotely sensed images	**K2, K5**
4	Analyse and modelling the remote sensing data to create geo-spatial data for decision making	**K4, K5**
5	Applying the remote sensing technique to solve the day to day problem and planning any region for sustainable development	**K3, K6**

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Reading List (s) :

1	George Joseph and C. Jeganathan (2018),"Fundamentals of Remote Sensing", 3rd Edition, Universities Press, Hyderabad
2	James B. Campbell (1996),"Introduction to Remote Sensing", Taylor & Francis, London
3	Lilesand and Keifer (2000),"Introduction to Remote sensing and Image Interpretation; John Willy & sons Ltd., New York.
4	Rees W.G (2015,"Physical Principles of Remote Sensing", 3rd Edition, Cambridge University Press, New York.

5	Tempfli, K., Hurneman, G. C (2009)," *Principles of remote sensing: an introductory textbook*", (ITC Educational Textbook Series; Vol. 2). International Institute for GeoInformation Science and Earth Observation
Recommended Text (s) :	
1	Avery, T.E. and G.L. Berlin, (1992),"Fundamentals of Remote Sensing and Air Photo Interpretation", Macmillan Publishing Company, New York.
2	Bossler J.D (2002), Manual of Geospatial Science and Technology, Taylor and Francis, London.
3	Congalton, R.G., & Green, K (2009)," Assessing the Accuracy of Remotely Sensed Data: Principles and Practices", Second Edition, Boca Raton, CRC Press.
4	Girard M.C and Girard C.M (2003), Processing of Remote Sensing Data, Oxford & IBH, New Delhi.
5	John A. Richards (2013)," Remote Sensing Digital Image Analysis - An Introduction", (Fifth Edition), Springer-Verlag Berlin Heidelberg.
6	Pradip Kumar Guha (2013), Remote Sensing for the beginner, Third Edition, EastWest Press, New Delhi.
7	Schowengerdt R. A (2007)," Remote Sensing - Models and Methods for Image Processing", (3rd Edition), (Third ed.), California: Academic Press. San Diego
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.] :	
1	http://mohua.gov.in/upload/uploadfiles/files/guideline_satellite.pdf
2	http://www.itc.nl/library/papers_2009/general/PrinciplesRemoteSensing.pdf
3	http://www.gpsworld.com
4	http://www.colorado.edu/geography/gcraft/notes/gps/gps.html
5	http://www.isro.org/
6	http://www.csun.edu/~hmc60533/CSUN_407_690D/RS_websites.htm
7	https://rsgis.ait.ac.th/main/academic/courses/

Method of Evaluation :

Internal Assessment	End Semester Examination	Total	Grade
20	80	100	

Methods of Assessment

Recall (K1) - Simple definitions, MCQ, Recall steps, Concept definitions

Understand/ Comprehend (K2) - MCQ, True/False, Short essays, Concept explanations, Short summary or overview

Application (K3) - Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain

Analyse (K4) - Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge

Evaluate (K5) - Longer essay/ Evaluation essay, Critique or justify with pros and con

Create (K6) - Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with programme Outcomes:

PCOs	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	1	2	1	2	1
CO 2	1	1	3	1	1
CO 3	1	2	2	2	2
CO 4	1	2	1	3	1
CO 5	1	1	1	1	2

Map **Course Outcomes (CO)** for each Course with **Programme Specific Outcomes (PSO)** in the 3-Point scale of **1,2, 3 (Strong, Medium and Low)**

Paper-XII : PRACTICAL-III – GEOINFORMATIC APPLICATIONS

Course Objectives:

The main objectives of this course are to:

1	learn fundamental aspects of Aerial Photo interpretation and its applications in various thematic domains	**K2, K1**
2	understand the basic concept of Remote Sensing and know about different types of satellite, sensors and it applications	**K2, K5**
3	learn advanced pattern and process modelling techniques associated with spatial problems using remote sensing data	**K2, K6**
4	develop knowledge on conversion of data from analogue to digital and working with GIS software	**K6, K5**
5	familiarize the students with various dimensions of Geospatial Technology and career opportunities available in these fields.	**K6, K3**

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Course – I	CORE
Title of the Course:	**PRACTICAL-III : GEO-INFORMATICS APPLICATIONS**
Credits:	04
Pre-requisites, if any:	Basic knowledge in geography

UNITS

Unit -I	AERIAL PHOTO INTERPRETATION

Determination of Scale of Photographs; Flight Planning; Calculation of Number of Runs & Photo for a given area; Preparation of photo interpretation keys - Identification of Terrain from Stereo pairs; Land Use Analysis and Mapping.

Unit-II	VISUAL IMAGE INTERPREATION- SATELLITE IMAGES

Appreciation of satellite images – Preparation of thematic overlays – Levels of Image interpretation – preparation of Image interpretation keys - Preparation of landuse / landcover, forest cover, coastal zone, urban sprawl, surface waterbody demarking – area calculation.

Unit-III	DIGITAL IMAGE PROCESSING

Image rectification and Enhancement techniques – preparation of spectral profiles – classification techniques : Supervised and Unsupervised ; Band rationing – lay outing - Area calculation and report writing

Unit-IV	GIS DATA PROCESSING

Basic Concept, raster and Vector data; Generation of Vector layers, buffers and attributes tables from image and/or map data; Editing attribute tables using demographic and /or land use data ; Preparation of annotated :Land use and land cover map and / Map showing demographic or land use data through choropleth /pie charts.

Unit-V	MAPPING THROUGH BHUVAN

Creating GIS maps – Creating point, line and areal features – creating attributes and labelling – online shape file creation – Map lay outing – smart tracking – Disaster services – Ocean services – Thematic services

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	understand the concepts of Aerial and Satellite data to prepare spatial mapping for various applications	**K2, K1**

2	understand the mapping skill of aerial and satellite remote sensing data for various thematic layers using visual interpretation	**K2, K4**
3	apply the principle of image processing as the automate data processing procedure for remote sensing data analysis, resampling and DEM processing	**K3, K4**
4	integrate Remote sensing and collateral data to analyze the same for day to day problem solving using GIS concept and tools	**K5, K4**
5	create maps, images and apps to communicate spatial data in a meaningful way to the stakeholders	**K6, K3**
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create		

Reading List (s) :	
1	John A. Richards (2013),"Remote Sensing Digital Image Analysis", Springer-Verlag Berlin Heidelberg, New York.
2	Pinde Fu and jiulin Sun (2010),"Web GIS – Principles and Applications", ESRI Press, California
3	Samantha Lavender and Andrew Lavender (2017),"Practical Handbook of Remote Sensing", CRC Press, Taylor & Francis Group, NW Suite 300.
4	Shunlin Liang (2004),"Quantitative Remote Sensing of Land Surfaces",WileyInterscience , A John Wiley & sons, INC, New Jersey.
5	Thomas Eugene Avery (1978),"Forester's Guide to Aerial Photo Interpretation", U.S. Department of Agriculture, Washington D.C.

Recommended Text (s) :	
1	Cabor Farkas (2017),"Practical GIS", Packt publishing, Birmingham, UK
2	Christian Harder and Clint Brown (2017),"The ArcGIS Book-10 Big Ideas about Applying the Science Where", ESRI Press, California
3	Devillers, R. and Jeansoulin, R. (2006),"Fundamentals of Spatial Data Quality", ISTE Ltd., USA.
4	Mitchell, Andy (2012)," The Esri Guide to GIS Analysis", Volume 3: Modeling Suitability, Movement, and Interaction. Redlands, CA, Esri Press
5	NRSA (2007)," Manual of National Wastelands Monitoring Using Multi-Temporal Satellite Data", Department of Space, Hyderabad. https://bhuvan-app1.nrsc.gov.in/2dresources/ thematic/LULC250/0506.pdf

6	NRSC (2014),” Land Use/Land Cover database on 1: 50,000 scale, Natural Resources Census Project”, LUCMD, LRUMG, RSAA, National Remote Sensing Centre, ISRO, Hyderabad. https://bhuvan-app1.nrsc.gov.in/2dresources/thematic/ 2LULC/lulc1112.pdf
7	NRSC and ISRO (2011),” Manual on “Preparation of Geo Spatial Layers Using High Resolution (Cartosat-1 Pan+LISS-IV Mx) Orthorectified Satellite Imagery”, Space Based Information Support for Decentralized Planning (SIS-DP), Remote Sensing and GIS Applications Area National Remote Sensing Centre, Indian Space Research Organisation (ISRO), Department of Space, Government of India, Hyderabad.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.] :

1	https://nptel.ac.in/courses/105/105/105105202/
2	https://nptel.ac.in/courses/105/102/105102015/
3	https://www.youtube.com/watch?v=kf9W60GBzX0
4	https://onlinecourses.swayam2.ac.in/aic20_ge05/preview
5	https://youtube.videoken.com/embed/wi6CxCqVgaI
6	https://onlinecourses.nptel.ac.in/noc21_ce09/preview
7	https://nptel.ac.in/courses/121/107/121107009/

Method of Evaluation :

Internal Assessment	End Semester Examination	Total	Grade
20	80	100	

Methods of Assessment

Recall (K1) - Simple definitions, MCQ, Recall steps, Concept definitions

Understand/ Comprehend (K2) - MCQ, True/False, Short essays, Concept explanations, Short summary or overview

Application (K3) - Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain

Analyse (K4) - Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge

Evaluate (K5) - Longer essay/ Evaluation essay, Critique or justify with pros and con

Create (K6) - Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with programme Outcomes:

PCOs	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	2	1	1	1	1

CO 2	2	2	3	1	1
CO 3	1	2	1	3	2
CO 4	1	2	1	2	1
CO 5	1	1	2	1	1

Map **Course Outcomes (CO)** for each Course with **Programme Specific Outcomes (PSO)** in the 3-Point scale of **1,2, 3 (Strong, Medium and Low)**

Paper (E) -III : DISASTER MANAGEMENT

Course Objectives:		
The main objectives of this course are to:		
1	learn concepts, terminologies and developments in the field of Disaster Management	**K2, K1**
2	knowledge and understanding of the disaster phenomenon, its different contextual aspects and impacts	**K2, K5**
3	understand approaches of Disaster Risk Reduction (DRR) and the relationship between vulnerability, disasters, disaster prevention and risk reduction.	**K2, K6**
4	knowledge to create appropriate planning, preparation and response for emergency treatment in disaster situation.	**K6, K1**
5	ensure skills and ability to design, implement and evaluate research on disasters.	**K6, K5**
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create		

Course – I	**ELECTIE**
Title of the Course:	**DISASTER MANAGEMENT**
Credits:	03
Pre-requisites, if any:	Basic knowledge in geography
UNITS	
Unit -I	**UNDERSTANDING DISASTERS**

Understanding the Concepts, definitions and scope of Disaster, Hazard, Vulnerability, Risk, Capacity – Disaster and Development, and disaster management – Disaster management plans - Agencies	
Unit-II	**TYPES, TRENDS, CAUSES, CONSEQUENCES AND CONTROL OF DISASTERS**
Geological Disasters : earthquakes, landslides, tsunami, mining; Hydro-Meteorological Disasters : floods, cyclones, lightning, thunder-storms, hail storms, avalanches, droughts, cold and heat waves; Biological Disasters : epidemics, pest attacks, forest fire; Technological Disasters : chemical, industrial, radiological, nuclear; and Manmade Disasters : building collapse, rural and urban fire, road and rail accidents, nuclear, radiological, chemicals and biological disasters; Global Disaster Trends – Emerging Risks of Disasters – Climate Change and Urban Disasters	

Unit-III	**DISASTER MANAGEMENT CYCLE AND FRAMEWORK**
Disaster Management Cycle – Paradigm Shift in Disaster Management Pre-Disaster – Risk Assessment and Analysis, Risk Mapping, zonation and Micro-zonation, Prevention and Mitigation of Disasters, Early Warning System; Preparedness, Capacity Development; Awareness During Disaster – Evacuation – Disaster Communication – Search and Rescue – Emergency Operation Centre – Incident Command System – Relief and Rehabilitation – Post-disaster – Damage and Needs Assessment, Restoration of Critical Infrastructure – Early Recovery – Reconstruction and Redevelopment; IDNDR, Yokohama Strategy, Hyogo Framework of Action; Sendai frame work	
Unit-IV	**DISASTER MANAGEMENT IN INDIA**
Disaster Profile of India – Mega Disasters of India and Lessons Learnt, Disaster Management Act 2005 – NDMA, Institutional and Financial Mechanism National Policy on Disaster Management, National Guidelines and Plans on Disaster Management; Role of Government (local, state and national),Non-Government and Inter-Governmental Agencies	
Unit-V	**APPLICATIONS OF SCIENCE AND TECHNOLOGY FOR DISASTER MANAGEMENT & MITIGATION**
Geo-informatics in Disaster Management (RS, GIS, and GPS) - Disaster Communication System (Early Warning and Its Dissemination) - Land Use Planning and Development Regulations - Disaster Safe Designs and Constructions - Structural and Non Structural Mitigation of Disasters - S&T Institutions for Disaster Management in India	
Expected Course Outcomes:	
On the successful completion of the course, student will be able to:	

1	explain disaster management basics and theory (cycle, phases, risk, crisis, emergency, disasters, resilience)	**K2, K1**

2	compare hazards, disasters and associated natural phenomena and their interrelationships, causes and their effects	**K5, K4**
3	apply knowledge about existing global frameworks and existing agreements for disaster preparedness and mitigation measures in successful Disaster Risk Reduction	**K3, K6**
4	understand role of IT, remote sensing, GIS and GPS in risk reduction	**K2, K6**
5	understand disaster management acts and guidelines along with role of various stack-holders during disasters	**K5, K6**

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Reading List (s) :

1	Bryant Edwards (2005),"Natural Hazards", Cambridge University Press, U.K
2	Coppola D P, (2007),"Introduction to International Disaster Management", Elsevier Science (B/H), London.
3	National Disaster Management Policy (2009), Government of India, New Delhi.
4	Roy, P.S. (2000): Space Technology for Disaster management: A Remote Sensing & GIS Perspective, Indian Institute of Remote Sensing (NRSA) Dehradun.
5	Srivastava, A.K (2021),"Text book of Disaster Management", Scientific Publishers, Jodhpur, Rajasthan
6	Srivastava, H.N and G.D.Gupta (2006),"Management of Natural Disasters in developing countries", Daya Publishers, Delhi

Recommended Text (s) :

1	Jack Pinkowski (2008),"Disaster Management Handbook", CRC Press, Taylor & Francis Group, New York.
2	Nick Carter, W (2008),"Disaster Management – A Disaster Manager's Handbook", Asian Development Bank, Philippines.
3	Manual on natural disaster management in India (2010), NIDM, New Delhi
4	Publications of National Disaster Management Authority (NDMA) on Various Templates and Guidelines for Disaster Management
5	Singh, R.B (2006),"Natural Hazards & disaster Management – Vulnerability and Mitigation", Rawat Publications, New Delhi
6	Taori, K (2005),"Disaster Management through Panchayati Raj", Concept Publishing Company, New Delhi.

7	World Disasters Report (2009). International Federation of Red Cross and Red Crescent, Switzerland

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.] :	
1	https://library.wmo.int/index.php?lvl=author_see&id=7723#.YVmJLdpBzIU
2	https://nidm.gov.in/books.asp
3	https://nptel.ac.in/courses/105/104/105104183/
4	https://nptel.ac.in/courses/124/107/124107010/
5	https://www.youtube.com/watch?v=TB97oX7ANGo
6	https://www.youtube.com/watch?v=2YBx5NDIy8A
7	https://www.digimat.in/nptel/courses/video/124107007/L35.html

Method of Evaluation :

Internal Assessment	End Semester Examination	Total	Grade
20	80	100	

Methods of Assessment
Recall (K1) - Simple definitions, MCQ, Recall steps, Concept definitions
Understand/ Comprehend (K2) - MCQ, True/False, Short essays, Concept explanations, Short summary or overview
Application (K3) - Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain
Analyse (K4) - Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge
Evaluate (K5) - Longer essay/ Evaluation essay, Critique or justify with pros and con
Create (K6) - Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with programme Outcomes:

PCOs	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	1	1	1	1	2
CO 2	1	1	3	1	1
CO 3	1	2	3	2	1

CO 4	2	2	1	1	1
CO 5	1	1	2	1	1

Map **Course Outcomes (CO)** for each Course with **Programme Specific Outcomes (PSO)** in the 3-Point scale of **1,2, 3 (Strong, Medium and Low)**

SEMESTER - IV

Paper –XIII : POLITICAL GEOGRAPHY

Course Objectives:		
The main objectives of this course are to:		
1	become familiar with key concepts in contemporary political geography, including the state, the nation, territory, boundaries, power, and scale;	**K2, K1**
2	use geographic concepts to critically analyze how human agency interacts with the physical environment to shape and reshape political geographic outcomes;	**K3, K4**

3	advanced understanding of the political geography literature;	**K2, K1**
4	engage quality information about political issues contemporary political issues and explore your role within them;	**K6, K5**
5	use the ideas of political geography to develop a position on a contemporary issue and take a public stance on that issue.	**K4, K6**

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Course – I	**CORE**
Title of the Course:	**POLITICAL GEOGRAPHY**
Credits:	04
Pre-requisites, if any:	

UNITS

Unit -I	**DEFINITION, SCOPE AND DEVELOPMENT OF POLITICAL GEOGRAPHY**

Nature, scope and subject matter of political geography; political geography and geopolitics - approaches to the study of political geography, recent development in political geography; major schools of thought.

Unit-II	**GEOGRAPHIC ELEMENTS AND THE STATE**

Physical Elements; Human elements; Economic elements; Political geography and environment interface.

Unit-III	**THEMES IN POLITICAL GEOGRAPHY**

State, Nation, Nation-State and Nation-building, Frontiers and boundaries, Colonialism, decolonization, Neocolonialism, Federalism and other forms of governance. The changing patterns of World Powers, Perspectives on core-periphery concept, Conflicts and co-operation; Theories of Heart land and Rim land

Unit-IV	**GEOPOLITICAL SIGNIFICANCE OF INDIAN OCEAN**

Political geography of any one of the following regions: SAARC Region, South-East Asia, West Asia, East Asia, BIMSTIC, ASEAN

Unit-V	**POLITICAL GEOGRAPHY OF CONTEMPORARY INDIA**

Geopolitical location of India, The changing political map of India, centripetal & centrifugal forces; Geographical perspective of international borders of India, India's role of Indian Ocean Region(IOR), stability & instability; Interstate issues (like water disputes & riparian claims) and conflict resolutions insurgency in border states; Emergence of New States; Federal India: Unity in Diversity		
Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	study the concept of territoriality and sovereignty and be able to trace the connection between historical process of state formation and modern developments	**K2, K5**
2	understand the origins of political systems and be able to draw on the examples of different regions to explain the diversity of world orders today	**K2, K3**
3	able to apply geopolitical theory to analyzing the phenomenon of failed states and its implications for the international politics	**K3, K6**
4	understand the politics of integration and be able to articulate potential challenges to the conventional understanding of sovereignty	**K2, K3**
5	understand the mechanism of territorial enlargement and legal clauses which underpin the process	**K2 K6**
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create		
Reading List (s) :		
1	Colin Flint, Peter J.Taylor (2018),"Political Geography : World-Economy, Nation-State and Locality", Routledge, London	
2	Dikshit, R.D. (1999)," Political geography : A Century of progress, Sage Publications, New Delhi	
3	Dwivedi R.L. and Misra H.N (),"Fundamentals of Political Geography", Surjeeth Publication, Delhi	
4	Sudeepta Adhikari (2017),"Political Geography", Rawat Publications, Jaipur, Rajasthan	
5	Sudeepta Adhikari (2009),"Political Geography of India: A Contemporary perspective", Sharda Pustak Bhawan, Allahabad	
Recommended Text (s) :		
1	Carolyn Gallaher, Carl T.Dahiman, Mary Gilmartin, Alison Mountz and Peter Shirlow (2009),"Key Concepts in Political Geography",SAGE Publication Ltd. California	

2	Dikshit, R.D (1996),” Political Geography: A Contemporary Perspective”, Tata MCGraw Hill, New Delhi

3	John Rennie Short (1993),”An Introduction to Political Geography”, Routledge, London
4	John R. Short (1982), “An introduction to Political Geography”, Routledge, London.
5	Sami Moisio, Natalie Koch, Andrew E.G.Jonas, Christopher Lizotte and Juho Luukkonen (2020),”Handbook on the changing Geographies of the State – New spaces of Geopolitics”, Edward Elgar Publishing, Cheltenham, UK
6	Shannon O’lear (2020),”A Research Agenda for Environmental Geopolitics”, Edward Elgar Publishing, Cheltenham, UK
7	Roger E Kasperson and Julian V.Minghi (2011),”The structure of Political Geography”, Routledge, India
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.] :	
1	https://unacademy.com/course/concepts-of-political-geography-nta-ugc-net/UT7D5ZLF
2	https://researchguides.dartmouth.edu/human_geography/political
3	https://www.researchgate.net/publication/334724390_Geopolitics_and_the_Political_Geography_-_Similarities_and_Differences
4	https://www.youtube.com/watch?v=R-TO8lOzoAQ
5	https://www.youtube.com/watch?v=5E90dydJSfA
6	https://www.youtube.com/watch?v=6e0DIrbhpjo
7	https://www.youtube.com/watch?v=yN3TXWJ1Xcw

Method of Evaluation :

Internal Assessment	End Semester Examination	Total	Grade
20	80	100	

Methods of Assessment

Recall (K1) - Simple definitions, MCQ, Recall steps, Concept definitions

Understand/ Comprehend (K2) - MCQ, True/False, Short essays, Concept explanations, Short summary or overview

Application (K3) - Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain

Analyse (K4) - Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge

Evaluate (K5) - Longer essay/ Evaluation essay, Critique or justify with pros and con

Create (K6) - Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with programme Outcomes:

PCOs	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	1	1	1	2	2
CO 2	2	1	3	1	1
CO 3	1	1	1	2	1
CO 4	1	2	2	2	1
CO 5	2	1	1	1	1

Map **Course Outcomes (CO)** for each Course with **Programme Specific Outcomes (PSO)** in the 3-Point scale of **1,2, 3 (Strong, Medium and Low)**

Paper - XIV : SOCIAL AND CULTURAL GEOGRAPHY

Course Objectives:		
The main objectives of this course are to:		
1	provide a broad overview of the key concepts and approaches in social and cultural geography	**K2, K6**
2	examine the contested politics of place-making as a social and cultural practice	**K5, K3**
3	explore the relations between social identity and the production of geographical space.	**K3, K6**
4	ability to critically assess the material and symbolic aspects of cultural landscapes.	**K6, K5**
5	critically analyze and contribute to contemporary scholarship in social and cultural geography	**K4, K6**
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create		

Course – I	**CORE**
Title of the Course:	**SOCIAL AND CULTURAL GEOGRAPHY**
Credits:	04
Pre-requisites, if any:	No pre-requisites

UNITS

Unit -I	**CONCEPTS IN SOCIAL GEOGRAPHY**

Social Geography: Concept, Nature and Scope of Social Geography - Evolution of Social Geography: recent methodologies - Social Categories: Caste, Class, Religion, Race and Gender and their Spatial distribution - Approaches- Possibilistic , Behavioral, Radical, Humanist, Positivism and Welfare approach - Concept of space and region, types of regions: functional and types.

Unit-II	**GEOGRAPHY OF SOCIAL WELFARE AND WELLBEING**

Concept and Components – Healthcare: Nutrition and health, Housing and Education. Social Geographies of Inclusion and Exclusion, Slums and poverty, Gender ratio, Women equity and empowerment - Gated Communities, Communal Conflicts and Crime; Indicators of development of the nations of the world: social, economic and demographic characteristics, Human Development Index – impact of globalization.

Unit-III	NATURE AND SCOPE OF CULTURAL GEOGRAPHY
Definition, Nature, Scope and Significance; Concept of Culture; Cultural Theory; Cultural areas and Cultural Landscape, Cultural Regions of the World, Cultural Change: Cultural Adaptation, Cultural Assimilation, Integration Globalisation of Culture	
Unit-IV	**MOSAIC OF CULTURE : RACE, RELIGION AND LANGUAGE**
Geography of ethnic groups and tribal groups. Religion and its diffusion; diffusion of ethnic traits in world; ethnic landscape and economy of the area; cultural landscape and cultural ecology in folk geography; Religions: origin, diffusion and spatial distribution; religion & economic development - Racial and religious conflicts and management	
Unit-V	**SOCIO-CULTURAL REGIONS OF INDIA**
Bases of social region formation: role of race, caste, ethnicity; religion and languages: social transformation and change in India. Cultural diversity and regionalization in India, Language groups in India, Concepts of social well-being, physical quality of life, human development cultural diversity - Sociocultural planning in India.	

Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	understand human values, social ethics, welfare, wellbeing, inclusion and exclusion and other important concepts	**K2, K1**
2	acquaint to identify the neutrality in social and cultural issues and challenges	**K2, K3**
3	knowledge of the geographic basis of socio-cultural regionalization and correspondence of socio- political and geographic boundaries	**K5, K6**
4	develop analytical capability to read contemporary issues of culture	**K6, K4**
5	demonstrate sense of appreciation and respect for the diversity of perspectives, world-views, and cultures	**K4, K6**
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create		

Reading List (s) :	
1	Aijazuddhin Ahmad (1999),“Social Geography”, Rawat Publications, Jaipur, India
	Anderson, K., Domosh, M., Pile, S. and Thrift, N. (2003),”Handbook of Cultural Geography”, SAGE Publications, London
2	Atkinson David, (2005),“Cultural Geography”, Rawat Publication, Jaipur, India

3	Mitchell, D. (2000),” Cultural Geography :A Critical Introduction”, Blackwell, New Jersey

4	Smith S. J., Pain R., Marston S. A., Jones J. P., (2009),”The SAGE Handbook of Social Geographies”, Sage Publications, London
	Valentine, G. (2014),” Social geographies: space and society”, Routledge, Oxfordshire
Recommended Text (s) :	
1	Cavallaro, D. (2001),”Critical and Cultural Theory: Thematic Variations”, Athlone Press, London.
2	D.Stanley Etizen and Maxine Baca Zinn, (2000),“Social Problems”, (8 th edition). Allyn and Bacon, Boston.
3	H. J.de Blij and Alexander. B.Murphy, (1999),“Human Geography: Culture, Society and Space”, (6th Edition), John Wiley and Sons Inc, New York.
4	Hirsch, E and Hanlon, M. (2003),”The Anthropology of Landscape: perspectives on space and Place”, Clarendon press, Oxford, UK
5	Pain, Rachel (2001),“Introducing Social Geographies”, Arnold, London
6	Rachel P., Burke M., Fuller D., Gough J., Macfarlane R. and Mowl G., (2001), “Introducing Social Geographies”, Oxford University Press. Oxford, UK
7	Sopher, David (1980),”In Exploration of India”, Cornell University Press, Ithasa
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.] :	
1	https://nptel.ac.in/courses/109/103/109103019/
2	https://unacademy.com/course/social-and-cultural-geography-for-nta-ugcnet/KKTKXVYQ
3	https://unacademy.com/lesson/overview-of-the-course/VI9W2NRG
4	https://onlinecourses.swayam2.ac.in/cec19_hs11/preview
5	https://www.youtube.com/watch?v=2B_1xokBIiY
6	https://www.youtube.com/watch?v=5zYkFsChHMU
7	https://www.youtube.com/watch?v=SQma4798m_8

Method of Evaluation :

Internal Assessment	End Semester Examination	Total	Grade
20	80	100	

Methods of Assessment

Recall (K1) - Simple definitions, MCQ, Recall steps, Concept definitions
Understand/ Comprehend (K2) - MCQ, True/False, Short essays, Concept explanations, Short summary or overview
Application (K3) - Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain
Analyse (K4) - Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge
Evaluate (K5) - Longer essay/ Evaluation essay, Critique or justify with pros and con
Create (K6) - Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with programme Outcomes:

PCOs	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	1	1	2	2	2
CO 2	1	1	3	1	1
CO 3	2	1	2	1	3
CO 4	1	2	1	2	2
CO 5	1	1	1	3	1

Map **Course Outcomes (CO)** for each Course with **Programme Specific Outcomes (PSO)** in the 3-Point scale of **1,2, 3 (Strong, Medium and Low)**

Paper XV : REGIONAL PLANNING AND DEVELOPMENT

Course Objectives:

The main objectives of this course are to:

1	understand and evaluate the concept of region in geography and its role and relevance in regional planning and development	**K2, K1**
2	identify the issues relating to the development of the region through the process of spatial organization of various attributes and their inter relationship	**K2, K5**
3	understand the tools and techniques in Regional Planning	**K2, K6**
	familiarize the students with Theories and Models for Regional Planning	
4	identify the causes of regional disparities in development, perspectives and policy imperatives	**K2, K3**

5	understand the concepts and strategies for planning and development	**K2, K6**

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Course – I	**CORE**
Title of the Course:	**REGIONAL PLANNING AND DEVELOPMENT**
Credits:	04
Pre-requisites, if any:	No pre-requisites

UNITS

Unit -I	**REGIONAL CONCEPTS IN GEOGRAPHY**

Concept, Nature and Scope of Regional Planning, changing concept of the region from an inter-disciplinary view-point, concept of space, area and locational attributes; Types of region: Formal and functional; uniform and nodal, single purpose and composite regions, in the context of planning; regional hierarchy.

Unit-II	**CONCEPTUAL AND THEORETICAL FRAME WORK OF REGIONAL PLANNING**

Growth pole and growth foci. Planning Processes: Sectoral, Multilevel, decentralized planning. Integrated Area Development Planning (IADP). Planning for tribal and hilly areas, drought prone areas, command areas and watershed. Planning for metropolitan region: CDP, satellite towns, urban green belt.

Unit-III	**REGIONAL DEVELOPMENT PROCESSES**

Development Processes –Factors of development and under development, Indicators of Development – Measurement of Levels of Development – Regional Imbalances in Development.

Unit-IV	**REGIONAL DEVELOPMENT STRATEGIES**

Regional Development Strategies : Identification of planning regions , Regional Planning strategies for backward area – Hill area, tribal area case studies of planning program, achievements, problems and prospects from Japan and China

Unit-V	**PLANNING AND REGINAL DEVELOPMENT IN INDIA**

Regional development strategies in India – Regional Plans of India - Concept of multi- level planning; decentralized planning; peoples participation in planning process; Panchayati Raj System; role and relationship of Panchayati Raj institutions (Village, Block and District); Regional development in India- Problems and Prospects. Developmental programs: Desert, Island, Hill, Tribal and Backword area

Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	Gain knowledge about definition of region, evolution and types of regional planning.	**K1, K2**
2	Develop an idea about choice of a region for planning.	**K6, K5**
3	Build an idea about theories and models for regional planning.	**K3, K6**
4	Know about measuring development indicators.	**K2, K5**
5	Develop a keen interest in the socio and economic development strategies and importance of regional development	**K5, K6**
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create		

Reading List (s) :	
1	Allen G Noble, Frank J. Costa, Ashok K. Dutt and Robert B.Kent (1998),"Regional development and Planning for the 21 st Century : New Priorities, New Philosophies", Routledge, Oxfordshire
2	Chandana, R.C. (2000),"Regional Planning – A Comprehensive Text", Kalyani Publishers, Ludhiana.
3	Chaudhuri, J. R. (2001): An Introduction to Development and Regional Planning with special reference to India", Orient Longman, Hyderabad.
4	Friedman John and Alonso William (1965),"Regional Development and Planning: A Reader", MIT Press, Cambridge
5	Mahesh Chand and V.K.Puri (2011),"Regional Planning India", Allied Publisher, Chennai, India

Recommended Text (s) :	
1	Chandna R.C. (2020),"Regional Planning and Development", Kalyani Publisher, New Delhi
2	Janki Jiwan (2021),"Regional Development and Planning", Rawat publication, ,Jaipur, Rajasthan
3	Kanan Chatterjee (2017),"Regional Planning : Concept Theory and Practice", Concept Publishing Company Pvt. Ltd., New Delhi
4	Misra.R.P. (2002),"Regional Planning: Concepts, Techniques, policies and Case Studies", Concept Publishing Pvt. Ltd., New Delhi.

5	Peter Hall, Mark Tewdwr-Jones (2020),"Urban and Regional Planning", Routledge, Oxfordshire
6	Mishra, R.P., (1980)," Multi-Level Planning", Heritage Publishers, Delhi.
7	Misra, R.P. (1974)," Regional Development Planning in India-A Strategy", Institute of Development Studies, Mysore.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.] :

1	https://www.youtube.com/watch?v=0ecLOcV1CaA
2	https://www.youtube.com/watch?v=K9kst7RAfco
3	https://www.youtube.com/watch?v=H2gF3CLMPpE
4	https://www.youtube.com/watch?v=oNBbRsOovvY
5	https://www.youtube.com/watch?v=cbl2Izp-ht8
6	https://www.youtube.com/watch?v=u8avIVou91k
7	https://www.youtube.com/watch?v=lfilNyEsJX8

Method of Evaluation :

Internal Assessment	End Semester Examination	Total	Grade
20	80	100	

Methods of Assessment

Recall (K1) - Simple definitions, MCQ, Recall steps, Concept definitions

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Mapping with programme Outcomes:

PCOs	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	1	1	2	2	2
CO 2	1	1	3	1	1

CO 3	2	2	1	3	1
CO 4	1	1	1	2	1
CO 5	1	1	1	1	1

Map **Course Outcomes (CO)** for each Course with **Programme Specific Outcomes (PSO)** in the 3-Point scale of **1,2, 3 (Strong, Medium and Low)**

Paper-XVI : PROJECT WORK / DISSERTATION VIVA-VOCE

Course Objectives:		
The main objectives of this course are to:		
1	get an idea about the scientific processes and ethics of quality research	**K1, K2**
2	able to distinguish a purpose statement, a research question or hypothesis, and a research objective.	**K5, K4**
3	familiar with ethical issues in educational research, including those issues that arise in using quantitative and qualitative research	**K2, K4**
4	acquaint with the basic knowledge about research in terms of; research design, data collection, analysis, and report writing.	**K4, K5**
5	develop a keen interest in research and use the knowledge for future research	**K2 K6**
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create		

Course – I	**CORE**
Title of the Course:	**PROJECT WORK / DISSERTATION VIVA-VOCE**
Credits:	04
Pre-requisites, if any:	No pre-requisites

MSc Project Work / Dissertations (a minimum of 50 pages or 15,000 words) at the fourth semester of the programme to demonstrate a student's ability to formulate a geographic research problem, collect and analyze relevant data or appropriate literature, arrive at logical conclusions, and to present the entire exercise at a seminar in the department/center. MSc Project Work / Dissertations are more often-learning experiences than substantive contributions to the field.

Since the Project work / Dissertation is offered under distance education, the work will be carried out in the distance education computer lab or approved educational institution labs, where the GIS / Remote Sensing / Statistical software or map facilities are available. By using the geo-spatial software, a detailed statistical analysis followed by derived relevant thematic maps are to be interpreted properly.by the candidate. Such project undertaken by the Distance Education Stream shall be compulsory for a period of five continuous days. At the sixth day viva-voce examination shall be conducted. The Student should prepare an individual report based on primary and secondary data collected during field work. The maximum length of the neatly typed report should not exceed 15000 words, excluding figures, tables, photographs, maps, references and appendices. The report consists of the following format

1.Title, 2. Introduction, 3. Statement of problem, 4.Study area, 5.Brief review of literature, 6.Therotical frame work, 7.Research question / Hypothesis, 8.Methodology and Methods, 9. Chaptalization, 10. Results and discussion, 11. Conclusion and 12. References.

There will be generally no restrictions on the type of geographical study that one can undertake. The dissertation may be carried out within one of the systematic branches of the subject, or in an interdisciplinary nature. Each student has to carried out the dissertation work under the supervision of a faculty member and should submit three copies of the work done to the department on the 6th day morning i.e before the Viva-voce examination.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	design and execute a meaningful research project that demonstrates spatial thinking	**K2, K6**
2	articulate research or project objectives and questions clearly and situate research within an academic or Scholarly context	**K2, K3**
3	understand the challenges of empirical geographical research with practical research problems	**K2, K4**
4	narrate the research process clearly in the form of a formal multichapter master's dissertation in a structured format.	**K4, K5**
5	defend her/his thesis in any scholarly engagements	**K6, K5**

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Reading List (s) :	
1	Basil Gomez and John Paul Jones (2010),"Research Methods in Geography", WileyBlackwell, USA
2	Clifford, N. and Valentine, G. (2003)," Key Methods in Geography". Sage Publications, London
3	Creswell, J.W. (1994)," Research design: qualitative and quantitative methods". Sage Publication, London
2	Daniel R. Montello and Paul Sutton, (2013), "An Introduction to Scientific Research Methods in Geography and Environmental Studies", Sage, London
5	Kate L. Turabian, (2018),"A Manual for Writers of Research Papers, Theses, and Dissertations", Eighth Edition: Chicago Style for Students and Researchers (Chicago Guides to Writing, Editing, and Publishing) Eighth Edition
Recommended Text (s) :	
1	Baxter, L., Hughes, C. and Tight, M. (1996),"How to research", Open University Press – McGraw Education, UK

2	Bell, J. (1993) Doing your research project", Open University Press – McGraw Education, UK
3	Bird, J. (1993),"The changing worlds of geography: a guide to concepts and methods, University of Oxford, Clarendon
4	Cooper, B.M. (1964),"Writing Technical Reports", Penguin, USA
5	Kulluri Lakshmi Narasimha Murthy (2018),"International Geographical Research – A Survey", Gyan publishing House, Delhi.
6	Loyd Haring L.L (1992),"Introduction to Scientific Geographical Research", Brown (William C), Company, US
7	Najma Khan (2000),"Quantitative methods in Geographical Research", concept Publishing, New Delhi
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.] :	
1	https://nptel.ac.in/courses/121/106/121106007/
2	https://www.youtube.com/watch?v=P0mdjQizdUw
3	https://onlinecourses.nptel.ac.in/noc20_hs78/preview
4	https://www.youtube.com/watch?v=Zfr8qLuJzLM
5	https://www.youtube.com/watch?v=xZOFgOCdZP4
6	https://www.youtube.com/watch?v=70VR_cunNv0

7	https://www.youtube.com/watch?v=nv7MOoHMM2k

Method of Evaluation :

Internal Assessment	End Semester Examination	Total	Grade
20	80	100	

Methods of Assessment

Recall (K1) - Simple definitions, MCQ, Recall steps, Concept definitions

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CO 1	1	1	2	2	2
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CO 3	1	1	1	2	1
CO 4	1	2	1	1	1
CO 5	1	1	1	1	1

Map **Course Outcomes (CO)** for each Course with **Programme Specific Outcomes (PSO)** in the 3-Point scale of **1,2, 3 (Strong, Medium and Low)**

Paper (E) -IV : FIELD SURVEY AND MAPPING ANALYSIS

Course Objectives:		
The main objectives of this course are to:		
1	recall specific facts in connection with the syllabus content	**K2, K1**
2	show understanding of geographical concepts, ideas, principles contained in the syllabus and their application in the context of the physical and human environments	**K2, K3**
3	understanding of the spatial patterns and interactions within these environments	**K2, K5**
4	demonstrate locational knowledge applied to the specific problem solving	**K5, K6**
5	Understanding of the report writing and field tools	**K2, K6**
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create		

Course – I	**ELECTIVE**
Title of the Course:	**FIELD SURVEY AND MAPPING ANALYSIS**
Credits:	03
Pre-requisites, if any:	No pre-requisites
UNITS	
Unit -I	**FIELD WORK IN GEOGRPAHICAL STUDIES**
Role, Value, Data and Ethics of Field-Work; Defining the Field and Identifying the Case Study – Rural, Urban, Physical, Human and Environmental - Literature Review; Preparing tools and techniques for survey	
Unit-II	**DATA COLLECTION**
Type and Sources of Data; Methods of Collection; Data Analysis: Qualitative Data Analysis; Quantitative Data Analysis; Data Representation Techniques	
Unit-III	**FIELD 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)- Geospatial Surveys

Unit-IV	**FIELD TOOLS, TECHNIQUES AND ANALYSIS**

Collection of Material for Physical and Socio-Economic Surveys – Geo-spatial survey tools - Data Analysis: Qualitative / Quantitative Data Analysis; spatial data Representation Techniques - Spatial Analysis

Unit-V	**DESIGNING THE FIELD REPORT**

Aims and Objectives, Methodology, Analysis, Interpretation and Writing the Report, References and Citations.

FIELD REPORT:

This course work contains - Plan and schedule of the work carried out and comprehensive report on the field work. The Student should prepare an individual report based on primary and secondary data collected during field work. The maximum length of the report should not exceed 12000 words, excluding figures, tables, photographs, maps, references and appendices.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

1	observe, record, classify and interpret data collected in the field or from secondary sources, to form conclusions and communicate ideas	**K2, K1**
2	read, interpret and use maps, photos and statistical data	**K5, K3**
3	represent geographical information in simple map form (sketchmaps), graphs or diagrams, and to write in a coherent manner	**K5, K3**
4	demonstrate awareness of environmental issues in terms of the conservation and the protection of both the physical and the human environments;	**K6, K5**
5	form reasonable judgements in relation to environmental issues of a geographical nature	**K6, K5**

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Reading List (s) :

1	Dikshit, R. D. 2003. The Art and Science of Geography: Integrated Readings. Prentice-Hall of India, New Delhi.

2	Mukherjee, Neela 1993. Participatory Rural Appraisal: Methodology and Application. Concept Publs. Co., New Delhi.
3	Mukherjee, Neela 2002. Participatory Learning and Action: with 100 Field Methods. Concept Publs. Co., New Delhi
4	Stoddard R. H., 1982: Field Techniques and Research Methods in Geography, Kendall/Hunt.
5	Wolcott, H. 1995. The Art of Fieldwork. Alta Mira Press, Walnut Creek, CA.

Recommended Text (s) :	
1	Archer J.E. (1968),"Fieldwork in Geography", Batsford, London
2	Barnaby Lenon and Paul Cleves (2015),"Geography Fieldwork & Skills AS/A Level Geography",HarperCollins Publishers Pvt, UK
3	Chew-Hung Chang, Bing Sheng Wu, Tricia Seow and Kim Irvine (2018),"Learning Geography Beyond the Traditional Classroom", Springer
4	Special Issue on "Doing Fieldwork" The Geographical Review 91:1-2 (2001)
5	Steph Warren (2016),"Geographical Skills and Fieldwork", Hodder Education Learn More,UK
6	Richard Phillips and Jennifer John (2012),"Fieldwork for Human Geography", SAGE Publishing, Washington DC
7	Rod Gerber and Goh Kim Chuan (2010),"Fieldwork in Geography : Reflections, Perspectives and Actions", Kulwer Academic Publisher, Springer, New York

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1	https://www.youtube.com/watch?v=nc9RVbg66Sw
2	https://www.youtube.com/watch?v=J7vTrayt0-c
3	https://www.youtube.com/watch?v=QNrWPVN_UhM
4	https://www.youtube.com/watch?v=yTT3hPVoCoY
5	https://www.youtube.com/watch?v=-Id1Xk1Hav8
6	https://www.youtube.com/watch?v=kNLfAama-PY
7	https://www.youtube.com/watch?v=FBN0Bk6_I10

Method of Evaluation :

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Methods of Assessment
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