BENGALURU CITY UNIVERSITY

CHOICE BASED CREDIT SYSTEM

(Semester Scheme with Multiple Entry and Exit Options for Under Graduate Course)

Syllabus for B.A. / B.Sc. Geography
(V & VI Semester)

2023-24

Proceedings

of curriculum and syllabus for B.A/B.Sc. Geography

Under Graduate Program in Geography

The curricula and syllabus for Four-Years Under Graduate Program in Geography Committee formed by Higher Education Council, Government of Karnataka. In connection to the matter, BOS, UG Committee meeting was held on 4th and 5th of September 2023 in the Central College, Bangalore City University at 10.30 am to discuss and finalize curricula and syllabus for Three Years under Graduate Program commencing during 2023-24 for V & VI Semesters.

At the outset **Prof. D. Rajasekaran**, Chairman BOS UG, Department of Geography, Govt. First Grade College, Ramanagram-562159, Welcomed the Committee Members for the meeting and informed that University has directed to conduct BOS meeting to approve **Curriculum and Syllabus for B.A. /B.Sc. Geography Under Graduate Program** in Geography to be commenced in 2023-24 which has been designed on par with NEP-2020 guidelines.

Subsequently the BOS UG Committee members discussed thoroughly and recommended as under

	Item	Recommendations of the Committee
1	Approval of the curriculum and syllabus for **B.A/B.Sc. Geography Under Graduate Program** in Geography to be commenced in 2023-24 (V & VI Sem.)	The BOS Committee resolved curriculum and **Syllabus for B.A/B.Sc. Geography Under Graduate Program** in Geography to be commenced in 2023-24 (V & VI Sem.)

Prof. D. Rajasekaran, Chairman, BOS assured that the recommendations of the committee will be submitted to the University for further processing. The meeting concluded with vote of thanks.

Members of BOS Committee		
	Name, designation and address	Signature
1.	**Prof. D. Rajasekaran,** HOD, Department of Geography, Govt. First Grade College, Ramanagara-562159	
2.	**Dr. Ashok Hanjagi,** Professor and Chairman, Department of Geography, Bangalore University, Bangalore - 560056	
3.	**Dr. Surendra P.,** Assistant Professor, Department of Geography, Bangalore University, Bangalore - 560056	
4.	**Dr. Shivamurthy H. N,** Associate Professor, Department of Geography, Govt. Arts College, Bangalore-01	
5.	**Jagadeesha N,** Assistant Professor, Department of Geography, Govt. Arts College, Bangalore-01	
6.	**Dr. L. T. Naik,** Associate Professor, Department of Geography, Karnataka Science College, Dharwad - 58001	
7.	**Sri. K N Mahadevaprasad,** Department of Geography, Maharani's Arts College for Women, Mysore -570006	

Prof. D. Rajasekaran.
Chairman, BOS, UG
Bangalore City University

Syllabus Aims:

The aims of the syllabus describe the B.A. / B.Sc in Geography at 5th and 6th Level. These aims outline the educational context in which syllabus content should be viewed. Many of these aims may be delivered by the use of suitable case-studies, through application of geographical skills and through practical field visits.

The BA. / B.Sc Geography syllabus aims to enable students to:

1. Know the significance of scale in studying geography
2. Know the processes functioning at various scales within physical and human environments
3. Improve a sense of space, place and location
4. Develop consciousness of the relevance of geography to understanding and solving contemporary environmental problems
5. Realization of the main fundamentals of physical geography and human geography and the interconnectedness between them
6. Explain the causes and effects of change over space and time on physical and human environments
7. Develop an insight into the nature, value, limitations and importance of different approaches to analyze and explanation in geography
8. Increase the knowledge and ability to use and apply appropriate skills and techniques including fieldwork
9. Improve a logical approach in order to present a structured, coherent and evidence-based argument
10. Develop a concern for accuracy and objectivity in extracting, recording, processing, presenting, analyzing and interpreting geographical data

PROGRAMME OUTCOMES		
PO1	Geographical Knowledge	Give an explanation of relevant terms and concept of geography including definitions
PO2	Project Management	Recognize geographical principles, theories and models to manage projects and achieve its objectives.
PO3	Problem Analysis	Find solution to environmental and Human problems
PO4	Modern Tool	Application of modern tools and techniques to interpret how processes bring changes in systems, distributions and environments.
PO5	Research of Complex Problems	Apply research-based knowledge to provide valid conclusions and demonstrate skill of analysis and synthesis of geographical information.
PO6	Communication	Communicate effectively by identifying human activities and use geographical data to identify trends and patterns.
PO7	Design / development of solutions	Carry out investigation into the complex and interactive nature of physical and human environments.
PO8	Geography and Society	To inspect the environmental and societal issues and compare between the places, environments and people.
PO9	Multi-disciplinary Settings	Assemble geographical evidence, ideas and arguments with multi-disciplinary setting.
PO10	Ethics	Develop ethical principles and commit to professional ethics and responsibilities and norms of scientific practices.
PO11	Life-long Learning	Understand the effects of geographical processes and change on physical and human environments and life-long learning of geographical studies.
PO12	Environment and Sustainability	Assess how the viewpoints of different groups of people, potential conflicts of interest and other factors interact in the management of physical and human environments to bring environmental sustainability.

Program Name	**BA / BSc in Geography**	Semester	**V**
Course Title	**Population Resources and Dynamics**		
Course Code:	**GEO C9-T**	No. of Credits	**4**
Contact hours	**60 Hours**	Duration of SEA/Exam	**2:30 hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Outcomes (COs): After the successful completion of the course, the student will be able to:

CO1 Apply critical analysis skills on the demographic composition of a country.
CO2 Classify and evaluate migrations and their types.
CO3 Understanding the population resources.
CO4 Analyze population growth issues and challenges.
CO5 Investigate how migration takes place

Contents	60 Hrs
Introduction: Nature and Scope of Population Geography, Population Geography and Demography, Sources of Population Data. Density of Population. World Population: Patterns and Determinants, Growth, Distribution and Problems.	10
PopulationChange:ConceptofOver,Under&OptimumPopulation;FertilityandMortality:Indices,Determinant sandWorld Patterns. Demographic Transition. Theories of Population Growth: Malthus, Sadler, and Ricardo. Urbanization: Trends and Patterns. **Assignment**: Students are to be prepared a report regarding population change in their own area and submit a report.	20
Migration: Meaning, Types, Causes and Consequences. Models of Migration. Theories of Migration: Ravenstein & Lee. Population composition and characteristics. Age, Sex, rural-urban, occupational structure, and educational level. **Field Activity**: Students need to visit a nearby village and get to know how and why migration takes place and submit a report.	15
Population as Resource, Population Resource Regions. Population Policy of India. Policy issues; Social Well-being and Quality of Life; Population as Social Capital. Contemporary Issues – Ageing of Population; Declining Sex Ratio. Population Policies in Developed and Developing Countries. Human Development Index (HDI).	15

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-12)												
Course Outcomes (COs) / Program Outcomes (POs)	**Program Outcomes (POs)**											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1	1	-	3	-	-	-	-	-	2	-	2	-
CO2	1	-	-	-	-	1	-	1	2	-	2	-
CO3	3	-	-	-	-	2	1	1	2	-	2	-
CO4	1	-	3	-	-	1	2	1	2	-	2	-
CO5	1	1	2	-	2	1	3	1	2	1	2	-

Pedagogy: Interactive Lectures, Inquiry-based learning, Blended learning, Case Studies.

Formative Assessment for Theory	
Assessment Occasion/ type	**Marks**
Sessional Tests-1	10
Sessional Tests-2	10
Seminars / Presentations / **Assignment**	10
Case study / **Field-Study** / Project work etc	10
Total	**40 Marks**
Formative Assessment as per NEP guidelines are compulsory	

Program Name	**BA / BSc in Geography**	Semester	**V**
Course Title	**Techniques in Population Geography**	Practical Credits	**02**
Course Code	**GEO C10-P**	Contact Hours	**60 Hours**
Formative Assessment	**25 Marks**	Summative Assessment	**25 Marks**

Course Outcomes (COs): After the successful completion of the course, the student will be able to:

CO1 Learn various methods of representative of demographic data
CO2 Apply various technologies in representation of demographic data
CO3 Analyse the trend and pattern of demographic data
CO4 Construct different diagrams using the data
CO5 Formulate the future trend of the data

1. Sources of population data: Census of India, UNPD (united nations population division), birth and death registry VSS (Vital statistics survey), NSS (National Sample Survey), NFHS (National Family and Health Survey),
2. Population distribution and density
    a) Calculation of Population Growth rate,
    b) Calculation of population projection, arithmetic method,
    c) Calculation of population Density, arithmetic density, and agriculture density.
3. Calculation of different types of fertility and mortality rates for any one region Eg: India / Karnataka /District, using the Census of India latest data.
    a) Crude birthrate,
    b) General fertility rate, Total fertility rate
    c) Crude death rate/ Mortality rate, Infant mortality rate
    d) Age-specific mortality rate
    e) Sex-specific mortality rate
4. Thematic maps for Population composition: construction of population pyramids for Age, Sex, Rural and Urban, for important places on outline map Eg: India / Karnataka /District, using the Census of India latest data.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-12)

Course Outcomes (COs) / Program Outcomes (POs)	Program Outcomes (POs)											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1	3	-	-	-	-	1	-	-	2	-	2	-
CO2	2	-	-	3	-	1	-	-	2	-	2	-
CO3	1	-	3	-	-	1	2	-	2	-	2	--
CO4	1	-	1	-	-	1	-	-	2	-	2	-
CO5	1	-	1	-	1	1	2	-	2	-	2	-

Pedagogy: Interactive Lectures, Inquiry-based Learning, Cooperative Learning.

Formative Assessment for Practical	
Assessment Occasion/ type	**Marks**
Sessional Tests-1	05
Sessional Tests-2	05
Case study /Assignment / Field-activity / Project work etc	05
Practical Record Maintenance	10
Total	**25 Marks**
Formative Assessment as per NEP guidelines are compulsory	

	References
1	Chandna R.C. (2009), Geography of Population, Kalyani Publicishers, Aneari Road, Daryaganj, New Delhi.
2	Majid Hussain (1999), Human Geography, Rawat publications, Jaipur.
3	Trewartha GT. (1959) A Geography of Population, world Patterns, John Wiley and Sons Inc. New York.
4	Ghosh BN. (1987) Fundamentals of population Geography s, sterling publishing company, New Delhi
5	Jingam ML. B.K. Bhat, JN Deasi (2003) Demography, Urinda Publishers Pvt. Ltd. Delhi.
6	R.K. Tripati ((2000) Population geography, commonwealth publishers, New Delhi.
7	Kayastha SL. (1998) Geography of Population, Rawat publications, jaipur.
8	Clerk I (1984) Geography of populations, approaches and applications, pergamon press, Oxford, UK.
9	Ritu Malik (2013), Changes in population Dynamics, Sanjay Prakashan
10	Prthvish Nag, G.C.Debnath (2021), Population Geography, Bharti Prakashan, Varanasi
	Resource Websites:
1	https://censusindia.gov.in/census.website/
2	https://mea.gov.in/icm.htm
3	https://population.un.org/wpp/
4	https://www.popcouncil.org/research/india
5	https://www.cdc.gov/csels/dsepd/ss1978/lesson3/section3.html

Program Name	**BA / BSc in Geography**	Semester	**V**
Course Title	**Fundamentals of Remote Sensing**		
Course Code:	**GEO C11-T**	No. of Credits	**04**
Contact hours	**60 Hours**	Duration of SEA/Exam	**2:30 hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Outcomes (COs): After the successful completion of the course, the student will be able to:

CO1. Define and describe the components of remote sensing and explain the history of remote sensing. CO2. Differentiate between the types of remote sensors and platforms and analyze
CO3. Interpret aerial photographs and identify and compare digital and analog data.
CO4. Evaluate the applications of remote sensing, including the new satellite programs of India.
CO5. Analyze ground truth verification using Google Earth and evaluate its usefulness

Contents	60 Hrs
Introduction to Remote Sensing: Meaning and Definition; Process of Remote Sensing, History of Remote Sensing, Electro-Magnetic Spectrum, Interaction of EMR with the Atmosphere and with the Surface Features, Atmospheric Window, Spectral Reflectance Curve (Minerals, Water, Soil, Vegetation, and Urban Area).	15
Sensors & Platforms: Types of Orbits- Sun-synchronous and Geosynchronous, Sources of Energy, Classification of Sensors - Active, Passive, Electro-Mechanical and Optical Sensors. Resolution– Spatial, Spectral, Radiometric and Temporal. Platform Types and Characteristics. Angular characteristics-FOV and IFOV, Push broom and Whiskbroom Cameras, Panchromatic, Multispectral, Hyper spectral Scanners. Geometric Characteristics of the Imageries. **Assignment**: Students need to prepare a report on how satellite images are captured, processed, and distributed to the end users by citing Bhuvan, ISRO, ISAC, NRSC, and SGC Websites.	20
Aerial Photography: Elements and Types. Geometry of Aerial Photographs –Height, Tilt, Scales and Vantage Point. Components of Camera, Types of Cameras and Films. Aerial Flat forms. Elements of Aerial Photo Interpretation, Digital and Analog Data, Image Formats, Stereo Pairs, Applications of Aerial Photography.	15
Applications of Remote Sensing: Indian Remote Sensing Centers and their Activities, New Satellite Programs of India. Different Satellites and their Application in Land Resources, Meteorology, and Hydrology. Ground Truth Verification using Google Earth. **Field Activity:** Students need to visit a nearby village and get to know how remote sensing images and real world looks and submit a report.	10

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-12)

Course Outcomes (COs) / Program Outcomes (POs)	Program Outcomes (POs)											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1	3	-	-	-	-	2	-	-	2	-	2	-
CO2	2	-	-	-	-	2	2	-	2	-	2	-
CO3	1	-	1	3	-	2	2	-	2	-	2	-
CO4	1	-	2	-	-	2	2	-	2	-	2	-
CO5	1	-	3	3	-	2	2	-	2	-	2	-

Pedagogy: Interactive Lectures, Inquiry-based learning, Blended learning, Case Studies.

Formative Assessment for Theory	
Assessment Occasion/ type	**Marks**
Sessional Tests-1	10
Sessional Tests-2	10
Seminars / Presentations / **Assignment**	10
Case study / **Field-Study** / Project work etc.	10
Total	**40 Marks**
Formative Assessment as per NEP guidelines are compulsory	

Program Name	**BA / BSc in Geography**		Semester	**V**
Course Title	**Interpretation of Aerial Photos and Satellite Images**		Practical Credits	**02**
Course Code	**GEO C12-P**		Contact Hours	**60 Hours**
Formative Assessment	**25 Marks**	Summative Assessment		**25 Marks**

Course Outcomes (COs): After the successful completion of the course, the student will be able to:

CO1. Learn remote sensing techniques
CO2. Apply modern technology in various geographical area
CO3. Interpret remotely sensed data
CO4. Analyze digital imageries
CO5. Analyze ground truth verification using Google Earth and evaluate its usefulness

Practical Content

1. Basic Information of the Image (projection, histogram, layers, pixel)
2. Visual Interpretation: Color, Texture, Association, Pattern, Tone, Shape.
3. Layers Stacking
4. Satellite Products and Band Characteristics, Band Combination
5. Satellite Image Downloading Portals, Bhuvan, USGS Explorer.
6. Image Enhancement: Radiometric, Spatial Enhancement
7. Pre-Processing: Geometric and Radiometric Correction
8. Spectral Enhancement: Spectral Indices, NDVI
9. Image Classification: Supervised and Unsupervised
10. Change Detection

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-12)

Course Outcomes (COs) / Program Outcomes (POs)	**Program Outcomes (POs)**											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1	3	-	-	2	-	-	-	-	2	-	2	-
CO2	2	-	-	3	-	-	2	-	2	-	2	-
CO3	1	--	-	3	-	2	2	-	2	-	2	-
CO4	1	-	3	3	-	-	2	-	2	-	2	-
CO5	1	-	2	3	1	-	3	-	2	-	2	-

Pedagogy: Interactive Lectures, Inquiry-based Learning, Cooperative Learning.

Formative Assessment for Practical	
Assessment Occasion/ type	**Marks**
Sessional Tests-1	05
Sessional Tests-2	05
Case study /Assignment / Field-activity / Project work etc	05
Practical Record Maintenance	10
Total	**25 Marks**
Formative Assessment as per NEP guidelines are compulsory	

	References
1	Lillesand T. Mand Kiefer R.W (2021), Remote Sensing and Image interpretation, 7th Edition, John Wiley & Sons, Canada.
2	Jensen J. R, (2012), Remote Sensing of Environment: An Earth Resources Perspective, 2nd Edition, Pearson Education, Upper Saddle River, Prentice Hall, New Jersey.
3	Elachi Candvan Zyl J .J, (2006), Introduction to the Physics and Techniques of Remote Sensing, John Wiley & Sons, Canada.
4	Joseph G, (2005), Fundamentals of Remote Sensing, 2nd Edition, Universities Press (India) Pvt Ltd, Hyderabad.
5	Narayan LRA, (1999), Remote Sensing and its Applications, Universities Press (India) Pvt Ltd, Hyderabad.
6	Rampal K. K, (1999), Handbook of Aerial Photography and Interpretation, Concept Publishing Co, New Delhi.
7	Avery T. E and Berlin G.L, (1992), Fundamentals of Remote Sensing and Air Photo Interpretation, 5th Edition, Prentice Hall, New Jersey.
8	Sabins, F.F. Jr, (1987), Remote Sensing; Principles and Interpretation, 2nd Edition, W.H. Freeman and Co, New York.
9	Jensen, John R., (2005), Introductory Digital Image Processing, 3rd Ed., Upper Saddle River, NJ: Prentice Hall, 526 pages.
	Web Resources
1	Projections: https://map-projections.net/imglist.php
2	Textbook of Canadian Remote Sensing: https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/earthsciences/pdf/resource/tutor/fundam/pdf/fundamentals_e.pdf
3	ITC Netherlands, Principles of Remote Sensing https://webapps.itc.utwente.nl/librarywww/papers_2009/general/principlesremotesensing.
4	Pdf http://earthobsevatory.nasa.gov/Library/RemoteSensing
5	https://earthexplorer.usgs.gov/
6	https://bhuvan.nrsc.gov.in/home/index.php
7	https://map-projections.net/imglist.php

Program Name	**BA / BSc in Geography**	Semester	**VI**
Course Title	**Environmental Geography**		
Course Code:	**GEO C14-T**	No. of Credits	**4**
Contact hours	**60 Hours**	Duration of SEA/Exam	**2:30 hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Outcomes (COs): After the successful completion of the course, the student will be able to:
CO1. Understand the interdisciplinary nature and the relationship between man and the environment.
CO2. Know functioning of ecosystems, including the impact of human activity and global ecological changes.
CO3. Evaluate man-made changes like pollution, environmental hazards, and the depletion of natural resources.
CO4. Examine environmental policy, impact assessment, and conservation measures.
CO5. Apply knowledge of environmental geography to real-world situations.

Contents	60 Hrs
Introduction to Environment Geography: Nature and Interdisciplinary Aspect of Environmental Geography. Definition and Meaning of Environment. Habitat. Ecological Niche. Biosphere and Biodiversity; Bio-diversity and Sustainable Development. Biomes – major Biomes of the World. Man and Environmental Relationships	10
Ecosystem: Structure and Functioning of Ecosystem, Pond as an Ecosystem, Ecosystem Management, and Conservation. Principles of Ecology; Human Ecological Adaptation; Influence of Manon Ecology and Environment. Global and Regional Ecological Change &Imbalance. Food Chains, Food Webs, Food Pyramid.	20
Man-Induced Changes in Environment: Environmental Pollution, i.e., Air, Water, Noise; Solid Waste with Special Reference to India. Environmental Hazards, i.e., Flood, Famines; Land Slides, Avalanches, Forest Fires; Impact of Green Revolution and Extinction of Species. Man-Made Ecosystem - Urban, Ecotourism, National Parks and Sanctuaries. Depletion of Ozone, Green House Effect, and Acid Rain.	15
Principles of Environmental Management: Environmental Policy of India,(post-2000AD).Environment Impact Assessment (EIA). Global Summits & Agencies of Environment Conservation. Environmental Degradation, Management and Conservation. Problems of Deforestation and Conservation Measures. Environmental Policy; Disaster Management; Environmental Education and Legislation.	15

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-12)

Course Outcomes (COs) / Program Outcomes (POs)	**Program Outcomes (POs)**											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1	3	-	-	-	-	-	-	2	2	-	-	-
CO2	2	-	-	-	-	-	-	3	-	-	-	1
CO3	-	-	-	-	-	-	3	-	-	-	1	-
CO4	-	-	-	-	-	-	2	-	-	-	-	3
CO5	-	-	3	-	-	-	2	-	-	-	-	-

Pedagogy: Interactive Lectures, Inquiry-based learning, Blended learning, Case Studies.

Formative Assessment for Theory	
Assessment Occasion/ type	**Marks**
Sessional Tests-1	10
Sessional Tests-2	10
Seminars / Presentations / Assignment	10
Case study / Field-Study / Project work etc.	10
Total	**40 Marks**
Formative Assessment as per NEP guidelines are compulsory	

Program Name	**BA / BSc in Geography**		Semester	**VI**
Course Title	**Methods in Environmental Geography**		Practical Credits	**02**
Course Code	**GEO C15-P**		Contact Hours	**60 Hours**
Formative Assessment	**25 Marks**	Summative Assessment		**25 Marks**

Practical Content

1. List out Biotic and Abiotic elements in the local region.
2. Identify and map micro-Biomes in the local region and study the biodiversity of the place.
3. List some ecosystem management and conservation methods in the local region for water bodies,
4. mapping of water bodies,
5. Mapping of bore wells.
6. Map the polluting points in the local area and their influence of man on the local environment.
7. Mapping of Waste disposal sites
8. Survey Techniques, Preparation of Survey Schedule and Questionnaires relating to Environmental Problems and Issues.
9. Mapping of parks and open spaces in the neighborhood.
10. PH of Soil and Water, Measurement of BOD and DO, Nutrient Concentration in Soil
11. Materials required for the practical survey: Use a Boundary map of the neighborhood area and GPS (field mapping) or Google Earth can also be used for mapping neighborhood area.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-12)

Course Outcomes (COs) / Program Outcomes (POs)	**Program Outcomes (POs)**											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1	3	-	-	-	-	-	-	2	2	-	-	-
CO2	2	-	-	-	-	-	-	3	-	-	-	1
CO3	-	-	-	-	-	-	3	-	-	-	1	-
CO4	-	-	-	-	-	-	2	-	-	-	-	3
CO5	-	-	3	-	-	-	2	-	-	-	-	-

Pedagogy: Interactive Lectures, Inquiry-based Learning, Cooperative Learning.

Formative Assessment for Practical	
Assessment Occasion/ type	**Marks**
Sessional Tests-1	05
Sessional Tests-2	05
Case study /Assignment / Field-activity / Project work etc	05
Practical Record Maintenance	10
Total	**25 Marks**
Formative Assessment as per NEP guidelines are compulsory	

References

1	Strahler A.N. (1968) The Earth Sciences, Harper International Education, New York.
2	Richard H.B. (2004) Physical Geography, Heinmann Simple Services, Rupa & Company, New Delhi
3	Robinson H. (1982) Bio Geography, ELBS, New York.
4	Healey I.N. and Moore P.D. (1973) Biogeography, Backwell Oxford, U.K.
5	Strahler A.N. and Strahler A.H. (1973) Environmental Geo Science, Hamilton, California, USA.
6	Savindra Singh (2004) Environmental Geography, Prayog Pustak Bhawan, Allahabad, India.
7	Paul Selman (2000) Environmental Planning, Sage Publications, New Delhi
8	CherylSimonSilve&RuthS.DeFries(1991)OneEarthOneFuture-OurchainingGlobalEnvironment,NationalAcademy of Sciences, Affiliated to East-West Press Pvt. Ltd. NewDelhi.
9	Strahler A.N. and Strahler A.H. (1977) Geography and Man's Environment, John Wiley & Sons, New York
10	GoldsmithEdwardetal.(1988)TheEarthReport–TheEssentialGuidetoGlobalIssues,PriceSternSolanInc.California, USA
11	Y.K. Sharma (2020), Narain's Environmental Geography (Resource and Development), Lakshmi Narain Agarwal
12	H.M. Saxena (2021), Environmental Geography, Rawat Publications
13	Strahler A.N. (1968) The Earth Sciences, Harper International Education, New York.
14	Richard H.B. (2004) Physical Geography, Heinmann Simple Services, Rupa & Company, New Delhi
15	Robinson H. (1982) Bio Geography, ELBS, New York.
16	Healey I.N. and Moore P.D. (1973) Bio-Geography, Backwell Oxford, U.K.
17	Strahler A.N. and Strahler A.H. (1973) Environmental Geo Science, Hamilton, California, USA.
18	Savindra Singh (2004) Environmental Geography, Prayog Pustak Bhawan, Allahabad, India.
19	Paul Selman (2000) Environmental Planning, Sage Publications, New Delhi
20	CherylSimonSilve&RuthS.DeFries(1991)OneEarthOneFuture-OurchainingGlobalEnvironment,NationalAcademy of Sciences, Affiliated to East-West Press Pvt. Ltd. NewDelhi.
21	Strahler A.N. and Strahler A.H. (1977) Geography and Man's Environment, John Wiley & Sons, New York
22	GoldsmithEdwardetal.(1988)TheEarthReport–TheEssentialGuidetoGlobalIssues,PriceSternSolanInc.California, USA

Program Name	**BA / BSc in Geography**	Semester	**VI**
Course Title	**Fundamentals of Geographic Information Systems**		
Course Code:	**GEO C16-T**	No. of Credits	**4**
Contact hours	**60 Hours**	Duration of SEA/Exam	**2:30 hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Outcomes (COs): After the successful completion of the course, the student will be able to:

CO1. Understand the definition, components, and interdisciplinary domains of GIS.
CO2. Apply geodesy and spatial mathematics for measuring distances and coordinates.
CO3. Analyze and evaluate spatial data structures, sources, errors, and scales for precision and accuracy.
CO4. Perform geo-processing and visualization techniques including spatial and non-spatial queries.
CO5. Collect and integrate spatial and non-spatial data for a case study using online resources.

Contents	**60 hrs**
Introduction: Definition, scope and History of GIS; Components, Functionalities, Merits and Demerits, Global Market. Interdisciplinary Domains and their Integration with GIS.	10
Spatial Mathematics: Cartesian and GeographicalCoordinates;Datum:NAD-27, NAD-83, WGS-84;Projection: UTM; Aerial Distance measurement using Geographic and projected coordinates, Global Positioning System: History, Segments, Working Principles. **Assignment:** students need to prepare hand drawn maps with the help of graticules.	20
Data And Scale: Spatial Data and Its Structures: Vetor Data Models, Raster Data Model; Attribute Data; Surface Representation – DEM; Data Errors and Relationships. Precision and Accuracy of Data.	15
Geo-processing and Visualization: Spatial and Non-Spatial Queries; Proximity Analysis, Preparation of Terrain and Surface Models. Hotspot And Density Mapping. Types Of Maps, Thematic Maps and Its Types, Relief Maps, Flow Maps and Cartograms. Tabulations: Graphs and Pivot Tables. **Case Study:** Students need to collect available spatial and non-spatial data of all the taluk as of their districts from online resources.	15

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-12)

Course Outcomes (COs) / Program Outcomes (POs)	**Program Outcomes (POs)**											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1	3	-	-	-	-	-	-	-	2	-	-	-
CO2	2	-	-	-	-	-	-	-	3	-	-	-
CO3	1	-	2	3	-	-	-	-	-	-	-	-
CO4	-	-	-	-	3	-	-	-	2	-	-	-
CO5	-	1	-	2	-	-	-	-	3	-	-	-

Pedagogy: Interactive Lectures, Inquiry-based learning, Blended learning, Case Studies.

Formative Assessment for Theory	
Assessment Occasion/ type	**Marks**
Sessional Tests-1	10
Sessional Tests-2	10
Seminars / Presentations / Assignment	10
Case study / Field-Study / Project work etc.	10
Total	**40 Marks**
Formative Assessment as per NEP guidelines are compulsory	

Program Name	**BA / BSc in Geography**		Semester	**VI**
Course Title	**GIS for map-making**		Practical Credits	**02**
Course Code	**GEO C17-P**		Contact Hours	**60 Hours**
Formative Assessment	**25 Marks**	Summative Assessment		**25 Marks**

Practical Content

1. Draw manually point, line, and polygon using a toposheet
2. Draw vector structures from the toposheet with reference to settlements, roads, water bodies, etc.
3. Downloading images from the internet portal (Bhuvan);
4. Conversion – Degree-minute-second, Radians, Decimal Degrees
5. Different image formats
6. File management
7. Geo-referencing of toposheet
8. Digitize the Point line polygon, creating layers.
9. Buffer analysis,
10. Proximity analysis,
11. Map layout, map composition, and map designing

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-12)

Course Outcomes (COs) / Program Outcomes (POs)	**Program Outcomes (POs)**											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1	3	-	-	-	-	-	-	-	2	-	-	-
CO2	2	-	-	-	-	-	-	-	3	-	-	-
CO3	1	-	2	3	-	-	-	-	-	-	-	-
CO4	-	-	-	-	3	-	-	-	2	-	-	-
CO5	-	1	-	2	-	-	-	-	3	-	-	-

Pedagogy: Interactive Lectures, Inquiry-based Learning, Cooperative Learning.

Formative Assessment for Practical	
Assessment Occasion/ type	**Marks**
Sessional Tests-1	05
Sessional Tests-2	05
Case study /Assignment / Field-activity / Project work etc	05
Practical Record Maintenance	10
Total	**25 Marks**
Formative Assessment as per NEP guidelines are compulsory	

References

1	Ian Heywood (2011), An Introduction to Geographical Information Systems, Pearson
2	Aronoff, S. (1989), Geographic Information Systems: A Management Perspective, Geocarto International: Vol. 4, No. 4, pp. 58-58.
3	Elangovan, K. (2006), GIS - Fundamentals, Applications, and Implementations, Nipa
4	Chang, Kang – Tsung (2015), Introduction to Geographical Information Systems, McGraw-Hill Education
5	Bhatta, B. (2011), Remote Sensing and GIS, Oxford
6	Sharma, H.S. (2006), Mathematical Modelling in Geographical Information System, Global Positioning System and Digital Cartography – New Delhi, India
7	Spatial Analysis and Location-Allocation Models - Ghosh, A. and G. Rushton (1987)
8	Geographic Information Systems and Cartographic Modelling - Tomlin, C.D. (1990)
9	Geographic Information Systems and Science – Paul A. Longley, et.al. (2015)
10	Geographic Information Systems and Environmental Modelling - Clarke, C.,K. (2002)
11	An Introduction to Geographical Information Systems, 3rd Edition- Ian Heywood, Sarah Cornelius, Steve Carver (2009)
12	Concepts and Techniques of Geographic Information Systems- Chor Pang Lo, Albert K.W. Yeung (2016)
	Web resources:
1	IIRS MOOC programme: https://isat.iirs.gov.in/mooc.php
2	ITC Netherlands, Principles of GIS https://webapps.itc.utwente.nl/librarywww/papers_2009/general/principlesgis.pdf
3	Geographical Information Systems: Principles, Techniques, Management and Applications https://www.geos.ed.ac.uk/~gisteac/gis_book_abridged/
4	https://www.esri.com/en-us/home