



**Government of Karnataka**

**Curriculum Framework for Undergraduate**

**V and VI Semester  
Model Syllabus for  
BA / BSc. in  
GEOGRAPHY**

**Submitted to  
Vice Chairman**

Karnataka State Higher Education Council  
30, Prasanna Kumar Block, Bengaluru City University Campus,  
Bengaluru, Karnataka – 560009

### Syllabus Aims:

The aims of the syllabus describe the B.A. / B.Sc in Geography at 5<sup>th</sup>, 6<sup>th</sup>. 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. Realisation 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 analyse 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, analysing and interpreting geographical data

### Program Outcomes (POs)

By the end of the program the students will be able to:

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.



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Curriculum

Program Name	BA / BSc in Geography		Semester	5
Course Title	Population Resources and Dynamics			
Course Code:	GEO C9-T	No. of Credits	4	
Contact hours	60 Hours	Duration of SEA/Exam	2 hours	
Formative Assessment Marks	40	Summative Assessment Marks	60	
<b>Course Pre-requisite(s):</b> No Pre-requisite course(s)				
<b>Course Outcomes (COs):</b> 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 Analyse population growth issues and challenges. CO5 Investigate how migration takes place				
<b>Contents</b>				60 Hrs
<b>Introduction:</b> Nature and Scope of Population Geography, Population Geography and Demography, Sources of Population Data. Density of Population. World Population: Measures, patterns, and determinants. Growth, distribution, and problems.				10
<b>Population Change:</b> Concept of over, under & optimum population; Growth of Population in the World and India, Components of Population Change. Fertility and Mortality Analysis: Indices, determinants, and world patterns. Demographic Attributes and Demographic Transition. Theories of Population Growth: Malthus, Sadler, and Ricardo. <b>Assignment:</b> Students are to be prepared a report regarding population change in their own area and submit a report.				20
<b>Migration:</b> Meaning, types, causes, consequences, and models. Theories of Migration Ravenstein & Lee. Population composition and characteristics. Age, Sex, rural-urban, occupational structure, and educational level. <b>Field Activity:</b> Students need to visit a nearby village and get to know how and why migration takes place and submit a report.				15
<b>Population as Resource,</b> 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; HIV/AIDS. Population policies in developed and developing countries. Human Development Index (HDI)				15

**Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-15)**

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 / <b>Assignment</b>	10
Case study / <b>Field-Study</b> / Project work etc	10
<b>Total</b>	<b>40 Marks</b>
<i>Formative Assessment as per guidelines.</i>	



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Curriculum

Program Name	<b>BA / BSc in Geography</b>		Semester	<b>5</b>
Course Title	<b>Techniques in Population Geography</b>		Practical Credits	<b>02</b>
Course Code	<b>GEO C10-P</b>		Contact Hours	<b>60 Hours</b>
Formative Assessment	<b>25 Marks</b>	Summative Assessment	<b>25 Marks</b>	

**Course Pre-requisite(s):** No Pre-requisite course(s)

**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

- 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),
- Population distribution and density
  - Thematic maps for population Distribution-patterns (dot map, Choropleth maps).
  - Calculation of Population Growth rate,
  - Calculation of population projection, arithmetic method,
  - Calculation of population Density, arithmetic density, and agriculture density.
- Calculation of different types of fertility and mortality rates for any one region Eg: India / Karnataka / District, using the Census of India latest data.
  - Crude birth rate,
  - General fertility rate, Total fertility rate
  - Crude death rate/ Mortality rate, Infant mortality rate
  - Age-specific mortality rate
  - Sex-specific mortality rate
- 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 1-15)**

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.

<b>Formative Assessment for Practical</b>	
<b>Assessment Occasion/ type</b>	<b>Marks</b>
Sessional Tests-1	05
Sessional Tests-2	05
Case study /Assignment / Field-activity / Project work etc	05
Practical Record Maintenance	10
<b>Total</b>	<b>25 Marks</b>
<i>Formative Assessment as per guidelines.</i>	

<b>References</b>	
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. Tripathi ((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
	<b>Resource Websites:</b>
1	<a href="https://censusindia.gov.in/census.website/">https://censusindia.gov.in/census.website/</a>
2	<a href="https://mea.gov.in/icm.htm">https://mea.gov.in/icm.htm</a>
3	<a href="https://population.un.org/wpp/">https://population.un.org/wpp/</a>
4	<a href="https://www.popcouncil.org/research/india">https://www.popcouncil.org/research/india</a>
5	<a href="https://www.cdc.gov/csels/dsepd/ss1978/lesson3/section3.html">https://www.cdc.gov/csels/dsepd/ss1978/lesson3/section3.html</a>



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Curriculum

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 hours
Formative Assessment Marks	40	Summative Assessment Marks	60

<b>Course Pre-requisite(s):</b> No Pre-requisite course(s)	
<b>Course Outcomes (COs):</b> 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	
<b>Contents</b>	<b>60 Hrs</b>
<b>Introduction to Remote Sensing:</b> Definition and Components, History of Remote Sensing, Electromagnetic Magnetic Spectrum, Interaction of EMR with the atmosphere and with the surface feature, Atmospheric window, spectral reflectance of land covers (minerals, rocks, water, vegetation, and urban area).	15
<b>Sensors &amp; Platforms:</b> Types of orbits-sun-synchronous and geosynchronous, Sources of energy, Classification of remote sensors - Active, Passive, Electro-mechanical, and optical sensors. Resolution concept - Spectral, Radiometric, and temporal resolution. Platform types and characteristics, Launch of space vehicles. Angular characteristics-FOV and IFOV, pushbroom and whiskbroom cameras, Panchromatic, multispectral, hyperspectral scanners, and geometric characteristics of the imageries. <b>Assignment:</b> 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
<b>Aerial Photography:</b> Elements, Types and interpretation of Aerial photography, Principles, Classification of Aerial photographs based on Height and Tilt, Scales, Components of camera, film, Aerial platforms. Elements of Aerial photo interpretation, Digital and Analog data, Image formats, Stereo pairs, Applications of Aerial Photography.	15
<b>Applications of Remote Sensing:</b> 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 1-15)

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:** Blended learning, Interactive Lectures, MOOCs

Formative Assessment for Theory	
Assessment Occasion/ type	Marks
Sessional Tests-1	10
Sessional Tests-2	10
Seminars / Presentations / <b>Assignment</b>	10
Case study / <b>Field-Study</b> / Project work etc	10
<b>Total</b>	<b>40 Marks</b>
<i>Formative Assessment as per guidelines.</i>	





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Curriculum

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 Pre-requisite(s):** No Pre-requisite course(s)

**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. Analyse 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: colour, texture, association, pattern, tone, shape.
3. Satellite Products and Band Characteristics, band combination
4. Satellite image downloading portals, Bhuvan, USGS explorer.
5. Image Enhancement: Radiometric, spatial enhancement
6. Layers Stacking
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 1-15)

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, MOOCs

Formative Assessment for Theory	
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
<b>Total</b>	<b>25 Marks</b>
<i>Formative Assessment as per guidelines.</i>	

References	
	<b>Books</b>
1	Lillesand T. Mand Kiefer R.W (2021), Remote Sensing and Image interpretation, 7 <sup>th</sup> Edition, John Wiley & Sons, Canada.
2	Jensen J. R, (2012), Remote Sensing of Environment: An Earth Resources Perspective, 2 <sup>nd</sup> 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, 2 <sup>nd</sup> 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, 5 <sup>th</sup> Edition, Prentice Hall, New Jersey.
8	Sabins, F.F. Jr, (1987), Remote Sensing; Principles and Interpretation, 2 <sup>nd</sup> Edition, W.H. Freeman and Co, New York.
9	Jensen, John R., (2005), Introductory Digital Image Processing, 3 <sup>rd</sup> Ed., Upper Saddle River, NJ: Prentice Hall, 526 pages.
	<b>MOOC</b>
1	Remote Sensing: <a href="https://nptel.ac.in/courses/105/108/105108077/">https://nptel.ac.in/courses/105/108/105108077/</a>
2	Introduction to Remote Sensing: <a href="https://nptel.ac.in/courses/121/107/121107009/">https://nptel.ac.in/courses/121/107/121107009/</a>
3	Digital Image Processing of Remote Sensing Data: <a href="https://nptel.ac.in/courses/105/107/105107160/">https://nptel.ac.in/courses/105/107/105107160/</a>
4	Remote Sensing and GIS: <a href="https://nptel.ac.in/courses/105/103/105103193/">https://nptel.ac.in/courses/105/103/105103193/</a>
5	Remote Sensing Essentials: <a href="https://nptel.ac.in/courses/105/107/105107201/">https://nptel.ac.in/courses/105/107/105107201/</a>
6	Remote Sensing: Principles and Applications: <a href="https://nptel.ac.in/courses/105/101/105101206/">https://nptel.ac.in/courses/105/101/105101206/</a>
7	Basics of Remote sensing, GIS & GNSS technology and their applications:
8	<a href="https://onlinecourses.swayam2.ac.in/aic20_ge05/preview">https://onlinecourses.swayam2.ac.in/aic20_ge05/preview</a>
9	<a href="http://rst.gsfc.nasa.gov/Front/tofc.html">http://rst.gsfc.nasa.gov/Front/tofc.html</a> .
	<b>Web Resources</b>
1	Projections: <a href="https://map-projections.net/imglist.php">https://map-projections.net/imglist.php</a>
2	Textbook of Canadian Remote Sensing: <a href="https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/earthsciences/pdf/resource/tutor/fundam/pdf/fundamentals_e.pdf">https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/earthsciences/pdf/resource/tutor/fundam/pdf/fundamentals_e.pdf</a>
3	ITC Netherlands, Principles of Remote Sensing <a href="https://webapps.itc.utwente.nl/librarywww/papers_2009/general/principlesremotesensing">https://webapps.itc.utwente.nl/librarywww/papers_2009/general/principlesremotesensing</a> .
4	Pdf <a href="http://earthobservatory.nasa.gov/Library/RemoteSensing">http://earthobservatory.nasa.gov/Library/RemoteSensing</a>
5	<a href="https://earthexplorer.usgs.gov/">https://earthexplorer.usgs.gov/</a>
6	<a href="https://bhuvan.nrsc.gov.in/home/index.php">https://bhuvan.nrsc.gov.in/home/index.php</a>
7	<a href="https://map-projections.net/imglist.php">https://map-projections.net/imglist.php</a>



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Curriculum

Program Name	BA / BSc in Geography	Semester	V
Course Title	Evolution of Geographical Thoughts		
Course Code:	GEO C13-T	No. of Credits	04
Contact hours	60 Hours	Duration of SEA/Exam	2 hours
Formative Assessment Marks	40	Summative Assessment Marks	60

<b>Course Pre-requisite(s):</b> No Pre-requisite course(s)	
<b>Course Outcomes (COs):</b> After the successful completion of the course, the student will be able to: CO1. Learn the history of Geography, including Classical Geography. CO2. Compare and contrast the different approaches to scientific geography. CO3. Evaluate the contributions of eminent geographers such as Ratzal Humbolt, Hartshorne, David Harvey CO4. Analyze the various philosophies in Geography, like Man-Environment relationship. CO5. Investigate the regional geography of their own town/village.	
<b>Contents</b>	<b>60 Hrs</b>
<b>Foundations to Geography (Empiricism)</b> What is Geography? Definitions; Meaning, Nature and Scope of Geography: Geography as a Natural and Social Science; Origin and evolutionary process of Geography. Classical Geography – Greek, Roman and Arab period. Age of Exploration. Determinism and possibilism.	15
<b>Towards Scientific Geography (Positivism 1950's):</b> Quantitative revolution and scientific method (emphasis on Harvey's work); Geography as a spatial science: Spatial approach and spatial analysis; Peter Hagget's spatial systems and Richard Chorley's work on systems analysis. <b>Assignment:</b> Student needs to work on changes taken place during the quantitative revolution.	15
<b>Contribution of Eminent Geographers:</b> Ratzal Humbolt, Hartshorne, David Harvey, Peter Hagget and Mackinder.	15
<b>Philosophy in Geography:</b> Emperealism, externalism, ideologism, environmentalism, man-environmental relationship, Markism and realism. Landscape theme, Aerial Differentiation theory, spatio-temporal theme, spatial organization, theory and geometric theory. <b>Field Activity:</b> Students need to work on regional geography of their own town / village with physical and cultural features.	

**Course Articulation Matrix:** Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-15)

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

**Pedagogy:** Interactive Lectures, case studies, Discussion-based, Inquiry-based

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
<b>Total</b>	<b>40 Marks</b>
<i>Formative Assessment as per guidelines.</i>	

References	
1	Brendan Bartley; Phil Hubbard; Rob Kitchin and Duncan Fuller, (2002), Thinking Geographically: Space, Theory and Contemporary Human Geography, Continuum International Publishing Group Ltd.
2	David Harvey (2000), Explanations in Geography, Macmillan, New York
3	Dikshit R.D (2001), Geographical Thoughts: A Conceptual History of ideas, Prentice Hall Publishing Company, New Delhi
4	Johnston, R.J. (2000) the Dictionary of Human Geography, Oxford: Blackwell Publishers.
5	MajidHussain, (2001), Evolution of Geographic thoughts, R.K Publication and distributors
6	Peter Hagget (1972), Geography: A Modern Synthesis, Harper & Row series in geography
7	Preston E. James (1993) All Possible Worlds: A History of Geographical Ideas, New York, John Wiley.



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Curriculum

Program Name	BA / BSc/ BCom in Geography	Semester	V
Course Title	Water Resource Management		
Course Code:	GEO E1.1-T	No. of Credits	03
Contact hours	45 Hours	Duration of SEA/Exam	2 hours
Formative Assessment Marks	40	Summative Assessment Marks	60

<b>Course Pre-requisite(s):</b> No Pre-requisite course(s)	
<b>Course Outcomes (COs):</b> After the successful completion of the course, the student will be able to: CO1. Describe, with a geographic perspective, how and why freshwater is distributed. CO2. Discuss why conflicts arise over freshwater. CO3. Identify the unique characteristics of freshwater. CO4. Analyse the challenges facing water management in varied climate types around the world. CO5. Compare how humans interact with hydrological cycle.	
Contents	Hrs
<b>Introduction to water:</b> Water as a natural resource. Characteristics, sources, forms. Hydrologic Cycle. Distribution of freshwater resources in the world and India and freshwater stress. Water Demand and Supply – World and Indian Scenario. <b>Evapotranspiration:</b> Factors controlling evapotranspiration – measurements of evapotranspiration. Interception: process, determination, and variations. Water in Bangalore: Sources, demand and supply, issues and challenges. Alternate resources: Yattinahole, Linganamakki, Mekedaatu, and K.C. Valley water projects,	15
<b>Groundwater:</b> Groundwater as a storage medium. Groundwater in urban (Bangalore) and rural areas in India. Aquifers: Importance, Types and distribution. Infiltration process and methods of determining infiltration rate. Groundwater depletion, salt-water intrusion and recharge. Watershed as a precipitation collector; surface water resources, growing water scarcity, Water Balance. Elements of Drainage basin; Drainage pattern; morphometry of drainage basin. <b>Assignment:</b> Student needs to work on changes taken place in groundwater in their local areas and prepare a report.	15
<b>Sustainable Water Resource Management:</b> Rain-water harvesting, Groundwater harvesting, Drip irrigation. Water Management in Major Cities: Reduce, recycle and reuse. Hydrologic Information System. Nature-Based Solutions (NBS) for rivers; Water Projects: Hoover Dam, Three Gorges, Namami Gange and Cauvery River Project. Water efficient tree plantation; Conservation of water resources – Community Participatory Approach and Role of NGO's. <b>Field Activity:</b> Students need to visit area where NGO work on water resource management and submit a report.	15

**Course Articulation Matrix:** Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-15)

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

**Pedagogy:** Interactive Lectures, case studies, Discussion-based, Inquiry-based

Formative Assessment for Theory	
Assessment Occasion/ type	Marks
Sessional Tests-1	10
Sessional Tests-2	10
Seminars / Presentations / <b>Assignment</b>	10
Case study / <b>Field-Study</b> / Project work etc	10
<b>Total</b>	<b>40 Marks</b>
<i>Formative Assessment as per guidelines.</i>	

References	
1	Ayodade, J. O., 2nd edition (2011) Tropical Hydrology and Water Resources, Macmillan Publishers, London.
2	Chor Pang Lo(2011) Concepts and Techniques of Geographic Information Systems, Prentice Hall India Learning Private Limited.
3	Lyon, J.G., (2013) GIS for Water Resource and Watershed Management, Taylor and Francis, New York.
4	Patel Dhruvesh (2013) Application of RS and GIS in Water Resources Management, LAP Lambert Academic.
5	Sewell, W.R.D., (1975) Geography of Water Resources, Prentice Hall, New York.
6	Shama, Nayan, Flugel,(2014), Applied Geoinformatics for Sustainable Integrated Land and Water Resources Management (IIWRM) in the Brahmaputra River Basin, Springer India.
8	Todd, D.K., (1959) Groundwater Hydrology, McGraw Hill Book Company, New York
9	Olson, R. E., (2012) A Geography of Water Resources, WMC Brown Company Publishers, Iowa.
10	Rao, K. L., (1975) India's Water Wealth: Its Assessment, Uses & Projections, Orient Longman, New Delhi.
11	Ward, R.C., 6th edition (2014) Principles of Hydrology, McGraw-Hill Book Company, London.



Government of Karnataka

Curriculum

Program Name	BA / BSc/ BCom in Geography	Semester	V
Course Title	Soil Conservation and Management		
Course Code:	GEO E1.2	No. of Credits	03
Contact hours	45 Hours	Duration of SEA/Exam	2 hours
Formative Assessment Marks	40	Summative Assessment Marks	60

**Course Pre-requisite(s):** No Pre-requisite course(s)

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

- CO1. Discuss why conflicts arise over freshwater.
- CO2. Distinguished organizations and their special programs for soil management.
- CO3. Synthesize the processes involved in soil formation and understanding the parameters.
- CO4. Analyse different soil programmes and their relatability.
- CO5. Evaluate processes that lead to soil degradation and identify suitable ways to control erosion.

Contents	Hrs
<b>Introduction to Soil:</b> Definition, nature and scope. Soil Formation, Influencing Factors, Properties, Profile, Types, Distribution, Soil ecosystem. Soil as a Resource. Soil fertility & Soil productivity, Soil Carbon Cycle, Biological Nitrogen Fixation, Micro Nutrients, Nutrient Imbalance. <b>Assignment:</b> Students should study NBSS and LUP in conserving soil. <b>Assignment:</b> Student needs to work on soil profile nearby their local place and prepare a report.	15
<b>Soil Degradation &amp; Conservation:</b> Drivers of Soil degradation, Forms of Soil degradation, Soil erosion problems, Principles of erosion control, Determination of different soil erodibility factors, Soil erosion types, Soil Conservation methods, Land capability, Sustainable soil management solutions, Organic farming, RS & GIS Techniques for soil management.	15
<b>Soil Organizations and Programs:</b> Soil health card, Watershed Management program for soil conservation, NABARD, SUJALA. Organizations: FAO, WST, Central Arid Zone Research Institute, Indian Institute of Soil Water Conservation, NBSS & LUP, Soil Conservation Society of India. Soil Conservation case studies at regional level. <b>Field Study:</b> Students needs to work on soil conservation methods in their own area / village.	15

**Course Articulation Matrix:** Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-15)

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

**Pedagogy:** Interactive Lectures, Inquiry-based learning, case studies, Discussion-based

Formative Assessment for Theory	
Assessment Occasion/ type	Marks
Sessional Tests-1	10
Sessional Tests-2	10
Seminars / Presentations / <b>Assignment</b>	10
Case study / <b>Field-Study</b> / Project work etc	10
<b>Total</b>	<b>40 Marks</b>
<i>Formative Assessment as per guidelines.</i>	

References	
1	Strahler A.N. (1968) The Earth Sciences, Harper International Education, New York.
2	Brady NC & Weil RR. 2002. The Nature and Properties of Soils. 13th Ed. Pearson Edu.
3	Kabata-Pendias A & Pendias H. 1992. Trace Elements in Soils and Plants. CRC Press.
4	Pierzinsky GM, Sims TJ & Vance JF. 2002. Soils and Environmental Quality. 2nd Ed. CRC Press.
5	Stevenson FJ & Cole MA. 1999. Cycles of Soil: Carbon, Nitrogen, Phosphorus, Sulphur, Micronutrients. John Wiley & Sons.
6	Tisdale SL, Nelson SL, Beaton JD & Havlin JL. 1999. Soil Fertility and Fertilizers. 5th Ed. Prentice Hall of India.
7	Agarwal, R.R., Yadav, J.S.P. and Gupta, R.N. 1982. Saline and Alkali Soils of India. ICAR, New
8	<a href="http://www.fao.org/publications/en/">http://www.fao.org/publications/en/</a>
9	<a href="https://www.nbsslup.in/publications.htm">https://www.nbsslup.in/publications.htm</a>
10	<a href="http://www.fao.org/global-soil-partnership/resources/events/detail/en/c/1170374/">http://www.fao.org/global-soil-partnership/resources/events/detail/en/c/1170374/</a>
11	<a href="http://www.iiss.nic.in/Research%20Publications.html">http://www.iiss.nic.in/Research%20Publications.html</a>
12	<a href="https://soilhealth.dac.gov.in/">https://soilhealth.dac.gov.in/</a>
13	<a href="https://www.india.gov.in/integrated-watershed-management-programme-ministry-rural-development">https://www.india.gov.in/integrated-watershed-management-programme-ministry-rural-development</a>
14	<a href="http://water.rajasthan.gov.in/content/water/en/wdandscdepartment.html">http://water.rajasthan.gov.in/content/water/en/wdandscdepartment.html</a>





Government of Karnataka

Curriculum

Program Name	BA / BSc / BCom in Geography	Semester	V
Course Title	Tourism Geography		
Course Code:	GEO E1.3-T	No. of Credits	03
Contact hours	45 Hours	Duration of SEA/Exam	2 hours
Formative Assessment Marks	40	Summative Assessment Marks	60

<b>Course Pre-requisite(s):</b> No Pre-requisite course(s)	
<b>Course Outcomes (COs):</b> After the successful completion of the course, the student will be able to: CO1. Will be acquainted with the development of tourism in India CO2. Interpret and evaluate tourism as a phenomenon and as a business system CO3. Critique tourism practices for their implications locally and globally. CO4. Contextualize tourism within broader physical, cultural, environmental, and economic dimensions. PO4. Plan, lead, organize and control resources for effective and efficient tourism	
<b>Contents</b>	45 Hrs
<b>Introduction:</b> Scope and Content of Tourism Geography – Economic and Social significance of tourism. Types of Tourism: Forms of Tourism: National tourism (Domestic) -International Tourism (Inbound and Outbound Tourism) –New Forms of Tourism: Adventure, Green Tourism, Eco tourism, Health, MICE Tourism, Soft Tourism, Sports Tourism and Rural tourism. <b>Assignment:</b> Students should select nearby Taluk / District and submit a report local tourism.	15
<b>Tourism Management &amp; Planning:</b> Tourism Management – Objective, Strategies and Types of Tourism Management - Tourism Planning Process and Approaches - Types of Tourism Planning: Sectoral, Spatial, Integrated, Complex, Centralized and Decentralized - Tourism Demand: Determinants and Measurement - Cost benefit analysis - Multiplier effect – Role of IT and GIS in tourism management.	15
<b>Tourism development in India:</b> Tourism development in India – Tourism in Karnataka - Tourism and Environmental management – Sustainable Management – Wildlife Management – Environmental Preservation and Conservation – Community Involvement and participation – Tourism policies and programmes. <b>Field Study:</b> Students will have to visit community and create awareness in participation in policy and prepare report.	15

**Course Articulation Matrix:** Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-15)

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

**Pedagogy:** Interactive Lectures, Inquiry-based learning, case studies, Discussion-based

Formative Assessment for Theory	
Assessment Occasion/ type	Marks
Sessional Tests-1	10
Sessional Tests-2	10
Seminars / Presentations / <b>Assignment</b>	10
Case study / <b>Field-Study</b> / Project work etc	10
<b>Total</b>	<b>40 Marks</b>
<i>Formative Assessment as per guidelines.</i>	

References	
1	Swain and Mishra (2011), "Principles of Tourism", Oxford University Press, New Delhi
2	A.K. Bhatia, (2012) "Tourism Development: Principles and Strategies, Sterling Publishers, New Delhi
3	Velvet Nelson (2013) – An Introduction to the Geography of Tourism, Rowman & Littlefield Publishers
4	Ballabh, A (2005), "Fundamentals of Travel and Tourism", Akansha Publishing House, New Delhi
5	Mill, and Morisson, (2006), "Tourism Systems", Kendal Publications, Dubuque.
6	Stephen Williams (1998) – Tourism Geography, Routledge, London
7	P.C. Sinha, (2010) Tourism Management, Anmol Publications Private, Ltd
8	Romila Chawla,(2003) Tourism Management, Sonali Publications Private, Ltd.
9	Parul Gupta, ( 2011) Tourism Management, Global India Publications Private, Ltd
10	Dixit N.K. (2010), Tourism Geography, Vista International Publishing
11	Velvet Nelson (2013), An Introduction to the Geography of Tourism, Rowman & Littlefield
12	<a href="https://tourism.gov.in/">https://tourism.gov.in/</a>
13	<a href="https://www.incredibleindia.org/content/incredibleindia/en.html">https://www.incredibleindia.org/content/incredibleindia/en.html</a>
14	<a href="https://www.karnatakaturism.org/">https://www.karnatakaturism.org/</a>
15	<a href="https://saathi.qcin.org/">https://saathi.qcin.org/</a>
16	<a href="https://nidhi.nic.in/HotelDivision/Default.aspx">https://nidhi.nic.in/HotelDivision/Default.aspx</a>



Government of Karnataka

Curriculum

Program Name	BA / BSc in Geography	Semester	V
Course Title	Fundamentals of Cartography		
Course Code:	GEO V1.1-T	No. of Credits	03
Contact hours	45 Hours	Duration of SEA/Exam	2 hours
Formative Assessment Marks	40	Summative Assessment Marks	60

<b>Course Pre-requisite(s):</b> No Pre-requisite course(s)	
<b>Course Outcomes (COs):</b> After the successful completion of the course, the student will be able to: CO1. Understating a map and map-making process CO2. Formulate the techniques involved in representing the 3D feature on 2D surface. CO3. Manage the methods involved in preparing visually appealing maps. CO4. Apply the variety of techniques of map making. CO5. Create maps and graphs to visualise statistical and spatial data.	
<b>Contents</b>	60 Hrs
<b>Concept, scope &amp; Significance of Cartography:</b> Growth & Development of Cartography: Impact of Technology on Cartography. Map as tool in Geographical Studies, Cartography as a science of human communication. <b>Shape of the Earth:</b> Spheroid, Ellipsoid and Geoid. Geographic Coordinates: Latitude and Longitude. Datum. Map projections: Properties, Distance, Direction and Angle, Selection of appropriate map projection and types. <b>Assignment:</b> Students should select nearby Taluk / District and draw coordinate systems and submit a report.	15
<b>Scope and Objectives of Map Designing:</b> Controls of map design and constraints in map design. Map Scale: Statement, Representative Fraction, & Geographical Scales, Determining & scale. Ground Survey and Positioning: Measuring distance, and direction, Traditional Survey Methods, Global Positioning Systems.	
<b>Types of Maps:</b> Types of maps: Thematic and composite mapping. Techniques of map making: Choropleth, Isarithmic, Dasymetric, Chorochromatic, Choroschematic and Flow maps. Data representation on maps: Pie diagrams, bar diagrams and line graphs. <b>Field Study:</b> Students will have to draw few layers of maps of a village nearby and prepare layout and fringe information and submit.	15

**Course Articulation Matrix:** Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-15)

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

**Pedagogy:** Interactive Lectures, Inquiry-based learning, case studies, Discussion-based.

Formative Assessment for Theory	
Assessment Occasion/ type	Marks
Sessional Tests-1	10
Sessional Tests-2	10
Seminars / Presentations / <b>Assignment</b>	10
Case study / <b>Field-Study</b> / Project work etc	10
<b>Total</b>	<b>40 Marks</b>
<i>Formative Assessment as per guidelines.</i>	

References	
1	Dent B.D., 1999. Cartography: Thematic Map Design, (Vol. 1), McGraw Hill
2	Gupta K.K and Tyagi V.C., 1992. Working with Maps, Survey of India, DST, New Delhi.
3	Mishra R.P. and Ramesh A., 1989. Fundamentals of Cartography, Concept Publishing.
4	Monkhouse, F.J. and Wilkinson, H.R., 1971. Maps and Diagrams. Methuen & Co. Ltd., London. K.
5	Singh, R.L., 2005. Elements of Practical Geography. Kalyani Publishers, New Delhi. India.
6	Ramamurthy, K., 1982. Map Interpretation, Rex Printers, Madras.
7	Robinson A., 1953. Elements of Cartography, John Wiley.
8	Sharma J. P., 2010. Prayogic Bhugol, Rastogi Publishers.
9	Singh R.L. and Singh R.P.B., 1999. Elements of Practical Geography, Kalyani Publishers.
10	Singh R.L., 1998. Prayogic Bhugol Rooprekha, Kalyani Publication.
11	Singh, G., 2005. Map work and practical geography. Vikas Publishing House Pvt. Ltd., New Delhi
12	Singh, L.R. and Singh, R., 1973. Map work and practical geography, Central Book Allahabad
13	Siddhartha, K., 2006. Geography through maps, Kisalaya Publications Pvt. Ltd, Delhi
14	Singh, R.L., and Dutt, P.K., 1968. Elements of practical geography, Students' Friends, Allahabad
15	Steers, J.A., 1970. An Introduction to Study of Map Projections. University of London Press Ltd., London.



Government of Karnataka

Curriculum

Program Name	BA / BSc in Geography	Semester	V
Course Title	Utility Mapping for Urban Sustainability		
Course Code:	GEO V1.2-T	No. of Credits	03
Contact hours	45 Hours	Duration of SEA/Exam	2 hours
Formative Assessment Marks	40	Summative Assessment Marks	60

<b>Course Pre-requisite(s):</b> No Pre-requisite course(s)	
<b>Course Outcomes (COs):</b> After the successful completion of the course, the student will be able to: CO1. Identify the difference types of utilities and their importance to urban sustainability CO2. Explain the principles of utility mapping CO3. Analyse various methods and tools that can be used to create utility maps CO4. Interpret the role of utility mapping in urban planning and sustainability initiatives CO5. Investigate the importance of utilities in a given study area	
<b>Contents</b>	45 Hrs
<b>Introduction to Utility Mapping:</b> What is utility mapping? Importance utility mapping, Types of utilities. Data sources for utility mapping. Role of Utility mapping in urban sustainability. <b>Assignment:</b> Students should select nearby Town / District and write about importance of utilities and submit a report.	15
<b>Technologies used in Utility mapping:</b> Technology fundamentals for utility mapping -Geographic information system, Global positioning system, Ground penetrating radar, LIDAR, Unmanned aerial vehicle. Use of facilities mapping and automated mapping in utility mapping. Overview of software used for utility mapping – Autocad map, ESRI -Arc Map with network analyst extension	15
<b>Applications of Utility mapping:</b> Network planning. Business intelligence. Digital twin. Emergency management. Field operations and utilities complaint redressal system. <b>Field Study:</b> Students will have to draw few layers of maps of a town nearby and prepare utility maps and submit.	15

**Course Articulation Matrix:** Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-15)

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

**Pedagogy:** Interactive Lectures, Inquiry-based learning, case studies, Discussion-based.

<b>Formative Assessment for Theory</b>	
<b>Assessment Occasion/ type</b>	<b>Marks</b>
Sessional Tests-1	10
Sessional Tests-2	10
Seminars / Presentations / <b>Assignment</b>	10
Case study / <b>Field-Study</b> / Project work etc	10
<b>Total</b>	<b>40 Marks</b>
<i>Formative Assessment as per guidelines.</i>	

<b>References</b>	
1	Delivering Water and Power: GIS for Utilities- by <a href="#">Keith Mann</a> , <a href="#">Pat Hohl</a>
2	Building a Smarter Community: GIS for State and Local Government: by Christopher Thomas , Keith Mann
3	Utility Mapping And Record Keeping for Infrastructure by David Pickering, Jonathan M. Park, and David H. Bannister



Government of Karnataka

Curriculum

Program Name	BA / BSc in Geography	Semester	V
Course Title	Surveying with GNSS		
Course Code:	GEO V1.3-T	No. of Credits	03
Contact hours	45 Hours	Duration of SEA/Exam	2 hours
Formative Assessment Marks	40	Summative Assessment Marks	60

<b>Course Pre-requisite(s):</b> No Pre-requisite course(s)	
<b>Course Outcomes (COs):</b> After the successful completion of the course, the student will be able to:	
CO1. Get a knowledge of Total station, GNSS and GIS Integration techniques. CO2. Acquire ideas on GNSS Applications in Navigation, Tracking, Mapping and Tinning. CO3. Apply ideas about GPS'S Satellite geometry and GPS coordinate system. CO4. Formulate the role of GNSS, or GNSS based products and services, in sustainable development. CO5. Implement basic algorithms for estimation of GNSS based positions	
<b>Contents</b>	45 Hrs
<b>Geodesy and Surveying:</b> Geodesy - meaning and application - geoid, spheroid and ellipsoid of revolution, use of gravity in geodesy, coordinate system, geodetic reference systems, - GNSS – GPS coordinate system – Local Coordinate system – transformations – step wise transformation – seven parameter transformation; Measuring techniques – Static surveys – rapid static survey – kinematic survey – RTK survey – Pre survey preparations – Total Station. <b>Assignment:</b> Students should prepare report on Geoid, Spheroid and Ellipsoid and submit the report.	15
<b>GNSS and GIS Integration:</b> Integration techniques - Data focused integration, position focused and technology focused integration; Technology convergence for data use; Methods of integration - NAME, Binary Data control and customization –Active X; Hardware and software platforms; GPS, GIS.	
<b>GNSS Applications:</b> Location - Navigation - Tracking - Mapping and Tinning - Misuses of GNSS - types of misuses - examples - Intelligence collection augmentation with weapon system, integration into ballistic and cruise missile. systems; Future uses – position information society - consumer based GNSS products. <b>Field Study:</b> Students will have to draw map of their locality with GNSS and interpret the same.	15

**Course Articulation Matrix:** Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-15)

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

**Pedagogy:** Interactive Lectures, Inquiry-based learning, case studies, Discussion-based.

Formative Assessment for Theory	
Assessment Occasion/ type	Marks
Sessional Tests-1	10
Sessional Tests-2	10
Seminars / Presentations / <b>Assignment</b>	10
Case study / <b>Field-Study</b> / Project work etc	10
<b>Total</b>	<b>40 Marks</b>
<i>Formative Assessment as per guidelines.</i>	

References	
1	Hofmann – Wellenhof, Lichtenegger, and Wasle, (2008). Global Navigational Satellite Systems
2	(GNSS) Springer Wien New York.
3	F. van Diggelen. A-GPS, Assisted GPS, GNSS, and SBAS, Artech House, Boston, London, 2009 Earth-prints. Internet repository of scientific papers.
4	Basudeb Bhatta (2021). Global Navigation Satellite Systems: New Technologies and Applications, CRC Press, India
5	Lu, Zhiping, Qu, Yunying, Qiao, Shubo (2014) "Geodesy: Introduction to Geodetic Datum and Geodetic Systems"
6	Torge, Wolfgang / Müller, Jürgen (2012) "Geodesy".
7	Mohinder S. Grewal, Angus P. Andrews, Chris G. Bartone, (2020) Global Navigation Satellite Systems, Inertial Navigation, and Integration, 4th Edition
8	Agraval, N. K., (2006). Essentials of GPS, Geodesy and GPS publications, Hyderabad.
9	Jan Van Sickle, (2008). GPS for Land Surveyors, CRC Press, Taylor & Francis Group, New York.
10	NelSamama, (2008). Global Positioning Techniques and Performance, John Wiley and Sons, Inc., New Jersey.
11	Ganesh, A., (2006). Dimensions of Geomatics, Bharathidasan University, Tiruchirappalli.
	<b>Web References:</b> <ol style="list-style-type: none"> <li><a href="http://www.unoosa.org/pdf/icg/2013/Ed_GNSS_eBook.pdf">http://www.unoosa.org/pdf/icg/2013/Ed_GNSS_eBook.pdf</a></li> <li><a href="https://www.ion.org/publications/online-tutorial-intertial.cfm">https://www.ion.org/publications/online-tutorial-intertial.cfm</a></li> <li><a href="https://www.novatel.com/an-introduction-to-gnss/">https://www.novatel.com/an-introduction-to-gnss/</a></li> <li><a href="https://serc.carleton.edu/getsi/teaching_materials/high-precision/unit1.html">https://serc.carleton.edu/getsi/teaching_materials/high-precision/unit1.html</a></li> <li><a href="https://www.e-education.psu.edu/geog862/node/1407">https://www.e-education.psu.edu/geog862/node/1407</a></li> </ol>



**Question Paper Pattern for UG Semester**

**DSC, DSEC & OEC**

Paper Code:	<b>DSC-I</b>	Paper Title:	<b>Principles of Geomorphology</b>
Duration of Exam	<b>2 Hours</b>	Max Marks	<b>60</b>
Instruction:	<b>Answer all the sections</b>		

**Section-A**

<b>Answer any four of the following questions</b>	<b>(2X4=8)</b>	<b>Marks</b>
<ol style="list-style-type: none"><li>1. Father of Geography</li><li>2. Cenozoic Era</li><li>3. Types of Volcanoes</li><li>4. Types of Folds</li><li>5. Weathering</li><li>6. Barkhans</li></ol>		

**Section-B**

<b>Answer any four of the following questions</b>	<b>(5X4=20)</b>	<b>Marks</b>
<ol style="list-style-type: none"><li>7. Explain inter-relationship between Physical and human geography.</li><li>8. Explain Isostasy theory in the view of Pratt.</li><li>9. Explain Geological Time Scale.</li><li>10. Explain Tetrahedral hypothesis of Lowthian Green.</li><li>11. Explain the types of crustal movements.</li><li>12. Explain the depositional landforms of Wind.</li></ol>		

**Section-C**

<b>Answer any four of the following questions</b>	<b>(8X4=32)</b>	<b>Marks</b>
<ol style="list-style-type: none"><li>13. Explain the scope and content of Physical Geography.</li><li>14. Explain the Convection Current Theory.</li><li>15. Explain types of folds.</li><li>16. Explain "Glacier as an agent of Denudation"</li><li>17. Explain Cycle of Erosion of Davis and Penk.</li><li>18. What is weathering? Explain its types.</li></ol>		

**6<sup>th</sup> SEMESTER**  
**BA / BSc**  
**Geography**



Government of Karnataka

Curriculum

Program Name	BA / BSc in Geography	Semester	6
Course Title	Environmental Geography		
Course Code:	GEO C14-T	No. of Credits	4
Contact hours	60 Hours	Duration of SEA/Exam	2 hours
Formative Assessment Marks	40	Summative Assessment Marks	60

<b>Course Pre-requisite(s):</b> No Pre-requisite course(s)	
<b>Course Outcomes (COs):</b> 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.	
<b>Contents</b>	60 Hrs
<b>Introduction to Environment Geography:</b> Nature and Interdisciplinary Aspect of Environmental Geography. Ecological Approaches. 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
<b>Ecosystem:</b> Structure and Functioning of Ecosystem, Pond as an Ecosystem, ecosystem management, and conservation. Principle of ecology; human ecological adaptation; the influence of man on ecology and environment. Global and regional ecological change & imbalance. Food Chains, Food Webs, Food Pyramid.	20
<b>Man-Induced Changes in Environment:</b> Environmental Pollution, i.e., Air, Water, Noise; Solid Waste with special reference to India. Environmental Hazards, i.e., earth as Warehouses, 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
<b>Principles of Environmental Management:</b> Environmental Policy of India, (post-2000 AD). Environment Impact Assessment (EIA). Global Summits & Agencies of Environment Conservation. Environmental degradation, management and conservation. Problems of Deforestation and conservation measures. Environmental policy; environmental hazards and remedial measures. Environmental Education and Legislation.	15

**Course Articulation Matrix:** Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-15)

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 / <b>Assignment</b>	10
Case study / <b>Field-Study</b> / Project work etc	10
<b>Total</b>	<b>40 Marks</b>
<i>Formative Assessment as per guidelines.</i>	



Government of Karnataka  
Curriculum

Program Name	<b>BA / BSc in Geography</b>		Semester	<b>6</b>
Course Title	<b>Methods in Environmental Geography</b>		Practical Credits	<b>02</b>
Course Code	<b>GEO C15-P</b>		Contact Hours	<b>60 Hours</b>
Formative Assessment	<b>25 Marks</b>	Summative Assessment	<b>25 Marks</b>	

**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. Suitability of the site for waste disposal (with reference to height, location, land use, land value, slope,
9. Mapping of parks and open spaces in the neighbourhood.
10. Mapping of areas in the neighbourhood where crowding is prevalent and type of land use around such places.
11. Materials required for the practical survey: Use a Boundary map of the neighbourhood area and GPS (field mapping) or Google Earth can also be used for mapping neighbourhood area.

**Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-15)**

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
<b>Total</b>	<b>25 Marks</b>

**Formative Assessment as per guidelines.**

<b>References</b>	
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	Cheryl Simon Silve& Ruth S. De Fries (1991) One Earth One Future-Our chaining Global Environment, National Academy of Sciences, Affiliated to East-West Press Pvt. Ltd. New Delhi.
9	Strahler A.N. and Strahler A.H. (1977) Geography and Man's Environment, John Wiley & Sons, New York
10	Goldsmith Edward et al. (1988) The Earth Report – The Essential Guide to Global Issues, Price Stern Solan Inc. 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	Cheryl Simon Silve& Ruth S. De Fries (1991) One Earth One Future-Our chaining Global Environment, National Academy of Sciences, Affiliated to East-West Press Pvt. Ltd. New Delhi.
21	Strahler A.N. and Strahler A.H. (1977) Geography and Man's Environment, John Wiley & Sons, New York
22	Goldsmith Edward et al. (1988) The Earth Report – The Essential Guide to Global Issues, Price Stern Solan Inc. California, USA
	<b>Websites:</b>
1	<a href="https://moef.gov.in/en/">https://moef.gov.in/en/</a>
2	<a href="http://environmentclearance.nic.in/">http://environmentclearance.nic.in/</a>
3	<a href="https://ndma.gov.in/">https://ndma.gov.in/</a>
4	<a href="https://bhuvan.nrsc.gov.in/home/index.php">https://bhuvan.nrsc.gov.in/home/index.php</a>
5	<a href="http://www.indiaenvironmentportal.org.in/">http://www.indiaenvironmentportal.org.in/</a>



Government of Karnataka

Curriculum

Program Name	BA / BSc in Geography	Semester	6
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 hours
Formative Assessment Marks	40	Summative Assessment Marks	60

**Course Pre-requisite(s):** No Pre-requisite course(s)

**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
<b>Introduction:</b> Definition, scope, of GIS in digital world; Components, functionalities, merits and demerits, global market. Interdisciplinary domains, and its integration with GIS.	10
<b>Geodesy and Spatial Mathematics:</b> Meaning scope of geodesy, geographical coordinates, latitude, longitudes; Datum: WGS-84, vs NAD-32. UTM; Aerial Distance measurement using Geographic and projected coordinates, Area, Perimeter, length by coordinates and various international measures. <b>Assignment:</b> students need to prepare hand drawn maps with the help of graticules.	20
<b>Data and Scale:</b> Spatial Data and its structures; Sources and Types of data collection. Data errors, and relationships. Large Scale vs Small Scale; Generalization; precision and accuracy of data.	15
<b>Geo-processing and Visualization:</b> 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. <b>Case Study:</b> Students need to collect available spatial and non-spatial data of all the talukas of their districts from online resources.	15

**Course Articulation Matrix:** Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-15)

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	-	-	-
Course Outcomes (COs) / Program Outcomes (POs)	Program Outcomes (POs)											
	1	2	3	4	5	6	7	8	9	10	11	12
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 / <b>Assignment</b>	10
Case study / <b>Field-Study</b> / Project work etc	10
<b>Total</b>	<b>40 Marks</b>
<i>Formative Assessment as per guidelines.</i>	





Government of Karnataka

Curriculum

Program Name	BA / BSc in Geography		Semester	6
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	
<b>Practical Content</b>				
<ol style="list-style-type: none"> <li>1. Draw manually point, line, and polygon using a toposheet</li> <li>2. Draw vector structures from the toposheet with reference to settlements, roads, water bodies, etc.</li> <li>3. Create raster structures of a portion of the toposheet using a graph sheet.</li> <li>4. Downloading images from the internet portal (Bhuvan);</li> <li>5. Different image formats</li> <li>6. File management</li> <li>7. Geo-referencing of toposheet</li> <li>8. Digitize the Point line polygon, creating layers.</li> <li>9. Buffer analysis,</li> <li>10. proximity analysis,</li> <li>11. Map layout, map composition, and map designing</li> </ol>				

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

<b>Formative Assessment for Practical</b>	
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
<b>Total</b>	<b>25 Marks</b>
<i>Formative Assessment as per guidelines.</i>	

<b>References</b>	
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)

References	
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)
	<b>Web resources:</b>
1	IIRS MOOC programme: <a href="https://isat.iirs.gov.in/mooc.php">https://isat.iirs.gov.in/mooc.php</a>
2	ITC Netherlands, Principles of GIS <a href="https://webapps.itc.utwente.nl/librarywww/papers_2009/general/principlesgis.pdf">https://webapps.itc.utwente.nl/librarywww/papers_2009/general/principlesgis.pdf</a>
3	Geographical Information Systems: Principles, Techniques, Management and Applications <a href="https://www.geos.ed.ac.uk/~gisteac/gis_book_abridged/">https://www.geos.ed.ac.uk/~gisteac/gis_book_abridged/</a>
4	<a href="https://www.esri.com/en-us/home">https://www.esri.com/en-us/home</a>



Government of Karnataka

Curriculum

Program Name	BA / BSc in Geography	Semester	6
Course Title	Oceanography		
Course Code:	GEO C18-T	No. of Credits	4
Contact hours	60 Hours	Duration of SEA/Exam	2 hours
Formative Assessment Marks	40	Summative Assessment Marks	60

**Course Pre-requisite(s):** No Pre-requisite course(s)

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

- CO1. Express the origin of ocean floors & illustrate and identify the features of ocean floor
- CO2. Judge the ocean relief and physio-chemical characteristics of major oceans
- CO3. Evaluate the impact of human activities on marine environment
- CO4. Will acquainted with the Sea water properties
- CO5. Will be able to discern the recent trends in Oceanography

**Contents**

60 hrs

**Introduction:** Scope and Content of Oceanography, Importance of the Oceans, Origin of the ocean basins; The Configuration of Ocean Floors - Continental Shelf, Slope, Submarine canyons and its related theories, Ocean Plains and Ocean Deeps.

15

Bottom relief of the Ocean: Relief of the Atlantic, the Pacific and the Indian Ocean. Physical and Chemical Properties of Ocean waters: Composition, Temperature, Density and Salinity of Ocean water, Heat and salt budget. Sea-level changes. **Assignment:** Students have to write report on ocean temperature by referring NOAA website

15

Movement and Circulation of Ocean Water: Waves, Tides, Currents and their effects. Deep circulation. Currents in Pacific, Atlantic and Indian Oceans. Coastal Ecology, Coastal dunes and Mangroves. Marine resources and their utilization.

15

Ocean Deposits: Types and Distribution. Coral Reefs: Origin, Types and Theories of Origin of Coral Reefs (Darwin, Dally and Murray). Coral Bleaching. Impact of Humans on the Marine Environment. Recent Trends in Oceanography. Sea-level changes, Law of the sea and marine pollution.

15

**Case Study:** Students have to refer NOAA website and prepare a report on impact on marine life by human induced activity.

**Course Articulation Matrix:** Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-15)

Course Outcomes (COs) / Program Outcomes (POs)	Program Outcomes (POs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	-	-	-	-	-	-	2	1	-	-	-
Course Outcomes (COs) / Program Outcomes (POs)	Program Outcomes (POs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CO2	2	-	-	-	-	-	--	1	3	-	-	-
CO3	-	-	-	-	-	-	-	1	-	-	2	3
CO4	2	-	-	-	-	-	-	-	-	-	--	3
CO5	1	-	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 / <b>Assignment</b>	10
Case study / <b>Field-Study</b> / Project work etc	10
<b>Total</b>	<b>40 Marks</b>
<i>Formative Assessment as per guidelines.</i>	

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

References	
1	Lal. D.S. (2003) Oceanography, Sharada Pustak Bhavan, Allahabad 02.
2	King Cuchalaine A.M. (2000) Oceanography for geographers, Edward Arnold publications, London.
3	Savindra Singh (2004): physical geography, Prayog Pustak Bhavan, Allahabad -02
4	Siddharth (2005) Oceanography: A brief introduction, Rawat Publishers. New Delhi.
5	Sharma RC (2000) Oceanography for Geographers, Chaitanya Publishers, Allahabad -02
6	Vattal and Sharma (2003), Oceanography for Geographers, Chaitanya Publishers, Allahabad -02
7	Yadav A.S. (2002): Geography of Minerals of Oceans, concept Publishers, New Delhi,
8	Basu S.K. (2003): Hand book of oceanography, Global vision, Delhi.
9	Garrison Tom (1999): Oceanography, Cole, Wadsworth, New York.
10	Sharma and Vattal (1962) Oceanography for Geographers, Chaitanya Publication House, Allahabad.
11	Turman Harold (1985); Introductory Oceanography, Bell & Howell Co. London.
12	<a href="http://drs.nio.org/drs/index.jsp">http://drs.nio.org/drs/index.jsp</a>



Government of Karnataka

Curriculum

Program Name	BA / BSc/ BCom in Geography	Semester	6
Course Title	Forest Resource Management		
Course Code:	GEO E2.1-T	No. of Credits	3
Contact hours	45 Hours	Duration of SEA/Exam	2 hours
Formative Assessment Marks	40	Summative Assessment Marks	60

<b>Course Pre-requisite(s):</b> No Pre-requisite course(s)	
<b>Course Outcomes (COs):</b> After the successful completion of the course, the student will be able to: CO1. Understanding the forest resources and their uses CO2. Identify the type of forests and classify them based on their characteristics. CO3. Practice methods and ways to conserve forests. CO4. Value the rights for the protection of forest CO5. Develop an understanding of forest conservation principles, and afforestation programs.	
<b>Contents</b>	<b>45 Hrs</b>
<b>Introduction to Forest:</b> Characteristics, importance, types & classifications and distribution. Factors Influencing Forest Formation, Forest as an Ecosystem. Grasslands: Importance, and distribution. Factors controlling the grasslands. Impacts of mining, construction and developmental projects on forest. Forest fire: cause and effects. Forest degradation. Biosphere Reserves: Characteristics of biosphere reserves. Distribution of Biosphere Reserves in the world, India and Karnataka. Man, and Biosphere Programme (MAB), Protecting Biosphere Reserves for Sustainable Development.	15
<b>Agroforestry &amp; Social Forestry:</b> Agroforestry: Scope and necessity; role in the life of people and domestic animals and in integrated land use, planning. Agroforestry systems under different agroecological zones; food, fodder and fuel security. Social / Urban Forestry: objectives, scope and necessity; people's participation, role of NGOs. Forest and human wellbeing. <b>Assignment:</b> Student have to visit nearby social forestry area and prepare a report on its impact on forest conservation	15
<b>Forest Conservation:</b> Principles of conservation, Role of trees and forests in environmental conservation. Afforestation programmes. Forest Measuring through Remote Sensing: Methods of measuring, forest cover monitoring through RS; measuring carbon-sink, density and canopy. Geographic Information Systems for management and modelling. <b>Field Activity:</b> Students needs to visit local in situ conservation sites and write a report.	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	-	-	1
CO2	2	-	-	-	3	-	1	-	-	-	-	-
CO3	-	-	-	-	2	-	-	1	3	-	-	-
CO4	-	-	-	-	-	-	-	2	-	1	2	3
CO5	-	-	-	-	-	-	-	1	-	2	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 / <b>Assignment</b>	10
Case study / <b>Field-Study</b> / Project work etc	10
<b>Total</b>	<b>40 Marks</b>
<i>Formative Assessment as per guidelines.</i>	

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

References	
1	Guha J.L. and Chatteraj (2004), A New approach to economic geography, A study of resources, the world Press pvt. Ltd. Calcutta.
2	Zimmerman- World resources and industries
3	Khanna K.K. and Gupta V.K (1993) Economic and Commercial Geography, Sultan Chand, New Delhi.
4	Mallappa P. (2004) UdyamSaupahmagalu, Chetan Book House, Mysore
5	Roy. PR. (2001) Economic Geography- A study of Resources, New Central Book Agency, (p) Ltd. Calcutta.
6	P. Hagget (1997), Geography, A Modern Synthesis, Haper and Roo publications, New York.
7	Dubey RN. And Negi BS (2002)- Economic Geography of India, Kitabmahal, Allahabad.
8	<a href="http://www.nationmaster.com/graph/geo_nat_res-geography-natural-resources">http://www.nationmaster.com/graph/geo_nat_res-geography-natural-resources</a>



Government of Karnataka

Curriculum

Program Name	BA / BSc/ BCom in Geography	Semester	6
Course Title	Global Climate Change		
Course Code:	GEO E2.2-T	No. of Credits	3
Contact hours	45 Hours	Duration of SEA/Exam	2 hours
Formative Assessment Marks	40	Summative Assessment Marks	60

**Course Pre-requisite(s):** No Pre-requisite course(s)

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

- CO1. Identify factors responsible for climate change.
- CO2. Evaluate climatic disturbances and anomalies.
- CO3. Analyse the impacts of climate change.
- CO4. Interpret and relate the significance of policies regarding climate change.
- CO5. Apply knowledge to educate and do awareness in the society.

**Contents**

45 Hrs

**Climate change:** meaning, concept, causes and evidences of climatic change in the past, human impact on global climate. Ozone depletion, green house effects; Ocean circulation and climate change, El-Nino and La-Nina, oceans and carbon di-oxide exchange, ocean acidification, global mean temperature and sea level rise. Meteorological Hazards and Disasters (Cyclones, Thunderstorms, Tornadoes, Hailstorms, Heat and Cold waves Drought and Cloudburst, Glacial Lake Outburst (GLOF).

15

**India's approaches to climate change:** impact of climate change in India, impact on water supply, occurrences of droughts, effects on monsoon, impact of climate change on agriculture, effect of air pollution on climate change, climate change and sustainable development in India.

15

**Assignment:** Students have to write a report on erratic nature of monsoon by referring online news articles

**Climate and Policy:** Management and mitigation of climate change; commercial plantation and forestry, energy efficiency, reducing carbon emissions, strategies for carbon cutting, sustainable emission reductions, satellites that monitor weather and climate, sources of climate data availability, climate change mitigation strategies. UN Climate Change Conferences, IPCC (Intergovernmental Panel on Climate Change) UNFCCC (UN Framework Convention on Climate Change), CBDR (Common but Differentiated Responsibilities) INDC (Intended Nationally Determined Contributions), National Action Plan on Climate Change, Government of India. **Field Activity:** Students needs to write a brief report on effects of climate change with examples by visiting WMO and IMD websites

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	2	--	-	-	-	-	-	-	3	-	-	1
CO2	1	-	-	-	-	-	-	-	2	-	-	3
CO3	-	-	-	-	-	-	1	-	2	-	3	3
CO4	-	-	-	-	-	-	1	2	-	3	-	2
CO5	-	-	-	-	-	-	-	3	-	1	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
<b>Total</b>	<b>40 Marks</b>
<i>Formative Assessment as per guidelines.</i>	

References	
1	Emanuel K (2018). Know about climate change. Massachusetts Institute of technology, United States.
2	Sarkar S and Chaudhury S.K (2014). Text book of environmental science. A.P.H publishing corporation, New Delhi.
3	Ahmad J (2013): Climate change and sustainable development in India. New century publications, New Delhi, India.
4	TarhuleAondover (2013). Climate variability: Reginal and thematic patterns. Intech publication, Croatia.
5	Shagufta C. J (2010): Global warming and climate change. A.P.H publishing corporation, New Delhi.
6	Letcher, T.M (2009). Climate change: observed impacts on planet earth. Elsevier publications, United Kingdom.
7	Letcher, T.M (2009). Managing global warming: An interface of technology and human issues. Elsevier publications, United Kingdom.
8	Silver, J (2008). Global warming and climate change demystified. McGraw Hill Educations, New York.
9	Kumar H.D (2006): Global climate change: insights, impacts and concerns. Vistara Publishing Pvt. Ltd, New Delhi.
10	Singh S (2005): Climatology. Pravalika Publications, Allahabad, India.
11	<a href="https://climate.nasa.gov/resources/education/">https://climate.nasa.gov/resources/education/</a>
12	<a href="https://www.noaa.gov/climate-education-resources">https://www.noaa.gov/climate-education-resources</a>





Government of Karnataka

Curriculum

Program Name	BA / BSc/ BCom in Geography	Semester	6
Course Title	Transport Geography		
Course Code:	GEO E2.3-T	No. of Credits	3
Contact hours	45 Hours	Duration of SEA/Exam	2 hours
Formative Assessment Marks	40	Summative Assessment Marks	60

**Course Pre-requisite(s):** No Pre-requisite course(s)

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

- CO1. Know how the transport system operates at regional, national and global level
- CO2. Understand the essence of transport to diffuse knowledge and information.
- CO3. Know various mode of transportation
- CO4. Realize regional imbalance created due to lack of transportation network
- CO5. To comprehend the transportation system through sustainable development

**Contents**

45 Hrs

**Introduction:** Meaning and scope of Transport Geography; Economic and regional development and transport development. Characteristics and relative significance of different modes of transport – Models of transport cost - Accessibility and connectivity: inter-regional and Intra-regional - Comparative cost advantages. **Assignment:** Students have to write report in transport in their locality.

15

**Models:** Bases of spatial interaction, complementarity, intervening opportunities, and transferability - Models of spatial interaction - Gravity, potential population surface, Breaking point theory - Trade area delimitation, Law of retail trade gravitation.

15

**Transport, Policy and Planning:** Transport policy and planning in India - Urban transport: growth and problem of urban transportation – Transport and environmental degradation - Development in information technology and their impacts on trade and transport – Role of Geoinformatics in transportation planning and logistics management. **Field activity:** Students need to visit transportation department nearby and suggest better transportation in their Taluk/District.

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	2	-	-	-	-	-	-	-	3	-	-	-
CO2	3	-	-	-	-	-	-	1	2	-	-	-
CO3	3	-	-	-	-	-	2	3	-	-	-	-
Course Outcomes (COs) / Program Outcomes (POs)	Program Outcomes (POs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CO4	-	-	2	-	-	-	2	3	-	-	-	-
CO5	-	-	-	-	-	-	1	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 / <b>Assignment</b>	10
Case study / <b>Field-Study</b> / Project work etc	10
<b>Total</b>	<b>40 Marks</b>
<i>Formative Assessment as per guidelines.</i>	

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

References	
1	Chorley R.J. & Hagett P.: Models in Geography Methuen & Co. London. 1967.
2	Hurst, M.E. (ed.): Transportation Geography, McGraw-Hill, 1974.
3	Hagget, F and Chorley, R.J. Network Analysis', Edward Arnold, London, 1968.
4	Hoyle, B.S. (ed): Transport and Development, MacMillan, London, 1973.
5	Robison H & Bamford C.G.: Geography of Transport Mac donals & Evans. London 1978.
6	Taffe, E.J. & Gauthier (Jr.) H.L. Geography of Transportation, Prentice-Hall, Englewood Cliffs, N.J., 1973.
7	Ullman E.L.: American Commodity Flow University of Washington Press 1957.
8	White H.P. and Senior, M.L. Transport Geography, Longman, London, 1983.
9	Yeats M. H. (1978): An Introduction to Quantitative Analysis in Human Geography
10	H. N. Saxena (2005), Transport Geography, Rawat Publications
11	Dhawan Bimal (2015), Geography of Transport and Trade, Anmol Publication
12	<b>Resource Websites:</b> 1. <a href="https://commerce.gov.in/">https://commerce.gov.in/</a> 2. <a href="https://morth.nic.in/">https://morth.nic.in/</a> 3. <a href="https://transport.karnataka.gov.in/english">https://transport.karnataka.gov.in/english</a> 4. <a href="https://www.esri.com/en-us/home">https://www.esri.com/en-us/home</a>



Government of Karnataka

Model Curriculum

Program Name	BA / BSc in Geography	Semester	6
Course Title	Statistical Geography		
Course Code:	GEO V2.1-T	No. of Credits	3
Contact hours	45 Hours	Duration of SEA/Exam	2 hours
Formative Assessment Marks	40	Summative Assessment Marks	60

**Course Pre-requisite(s):** No Pre-requisite course(s)

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

- CO1. Adapt the vocational training in a practical way through the statistical software.
- CO2. Analyze and interpret different types of data used in geographical studies.
- CO3. Apply methods of data collection, data storage, data analytics, data interpretation and data display.
- CO4. Demonstrate hands-on training on various software.
- CO5. Construct and interpret the graphical visualisation of the statistics.

**Contents**

**45 hrs**

**Introduction:** Uses and importance of statistics in geography. Meaning of data, sources, and types of data in geographical study. Mean, Median and Mode; graphical location of median and mode; quartile, deciles and percentiles.

15

**Graphical representation of Frequency distribution:** cumulative frequency polygon, cumulative frequency curve and ogive. Range, mean deviation, standard deviation (step-deviation method) and variance. Bivariate Data: scatter diagrams; Correlation, rank correlation, and simple regression. Normal curve and its properties and use; theoretical frequency under normal curve. Fitting the normal curve to data. Sampling Techniques: Meaning and Types. **Assignment:** Students are required to write a brief report on various primary data sources upon which geographers are relied on.

15

**Introduction to statistical software:** students are expected to become confident in operating the software and able to demonstrate the statistical output.

1. Excel: hands on excel and explain the different feature, data creation, arithmetic functions (addition, Subtraction, multiplication, division, sorting); statistical functions (mean, median, mode, standard deviation, correlation, regression); generating graphs, charts and diagrams using excel data.

15

**Field Activity:** Students have to create a database pertaining to population/ agriculture/weather using excel sheet and represent the data in a suitable diagram.

**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	-	-	2	-	-	-	-	3	-	-	-
CO2	3	-	-	-	-	-	-	-	2	-	1	-
CO3	-	-	-	1	2	-	-	-	3	-	-	-
CO4	-	-	-	3	-	-	-	-	2	1	-	-
CO5	1	-	-	2	-	3	1	-	-	-	-	-

**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 / <b>Assignment</b>	10
Case study / <b>Field-Study</b> / Project work etc	10
<b>Total</b>	<b>40 Marks</b>
<i>Formative Assessment as per guidelines.</i>	

References	
1	Haymond and Mccullah (1974), Quantitative techniques in geography, An introduction, Oxford London.
2	Aslam Mohamed (1977), Statistical Methods in Geographical Studies, Rajesh Publications, New Delhi.
3	Gupta CB. (1979), An introduction to statistical methods, Vika publishing house Pvt. Ltd. New Delhi.
4	Murray R. Spiegel (1972): Theory and problems of statistics, McGraw Hill Book co. New York.
5	Singh RL. (1979) elements of Practical Geography, Kalyani Publishers, New Delhi



Government of Karnataka

Model Curriculum

Program Name	BA / BSc in Geography	Semester	6
Course Title	Biogeography		
Course Code:	GEO V2.2-T	No. of Credits	3
Contact hours	45 Hours	Duration of SEA/Exam	2 hours
Formative Assessment Marks	40	Summative Assessment Marks	60

**Course Pre-requisite(s):** No Pre-requisite course(s)

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

- CO1. Evaluate own knowledge and skills in Bio-Geography.
- CO2. Work with Biogeographical data, its graphical representation, interpretation and analysis.
- CO3. Understand the geography and biology of dispersal.
- CO4. Expose to understand processes of biogeography.
- CO5. Relate geography with biogeography.

Contents	45 hrs
<b>Introduction:</b> Some basic Evolution and theories, Introduction to dispersal, Excerpt from Darwin's Origin of Species. Ecological niche, distribution of species. species ranges and dynamics. Ecoregions - dispersal syndromes, barriers and limits to distributions. Pattern of biodiversity: local gradients to global biodiversity hotspots.	15
<b>Vicariance biogeography:</b> mammals and paleontology. Life, death, and evolution on islands. Biogeographic process –dispersal and colonization; evolution and speciation – oceanic islands focus. Species area relationship theory. The theory of Island biogeography, general dynamic model, nestedness, SLOSS. Phylogenetic, Vicariance biogeography and Nothofagus. <b>Assignment:</b> Students have to write a report on biodiversity found around their locality	15
<b>Biogeography, diversity and conservation:</b> habitat loss, over-harvest, pollution, and climate change impacts on species distribution and abundance. Global change, non-analog ecosystems and related policy dilemmas. Biogeography of microbes and disease. Invasion biology, Anthropocene and modified dynamics; extinction debts, modelling the future, concerns. <b>Field Activity:</b> Students needs to visit nearby Biosphere/Biodiversity spot and write a report.	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	-	1	-
CO2	1	-	-	2	-	2	-	-	-	-	-	-
CO3	1	-	-	-	-	-	-	2	3	-	-	-
Course Outcomes (COs) / Program Outcomes (POs)	Program Outcomes (POs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CO4	1	-	-	-	-	-	3	-	2	-	-	-
CO5	2	-	-	-	-	-	-	-	3	-	-	1

**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 / <b>Assignment</b>	10
Case study / <b>Field-Study</b> / Project work etc	10
<b>Total</b>	<b>40 Marks</b>
<i>Formative Assessment as per guidelines.</i>	

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

References	
1	Lomolino, M. V., B. R. Riddle, J. H. Brown, and R. J. Whittaker. 2010. Biogeography. Fourth Edition. Sinauer Associates, Sunderland, MA.
2	Darwin, C. 1859. The Origin of Species. P. F. Collier & Son.
3	MacDonald, G. M. 2003. Biogeography: Space, Time and Life. Wiley, New York.
4	Prof. Savindra Singh. 2016. Biogeography. Third edition. Pravalika publications, Allahabad.
5	N. N. Bhattacharya. 2003. Biogeography. Rajesh publication, New Delhi.
6	Richard John Haggett. 2004. Fundamentals of Biogeography. Routledge Taylor and Francis group London and New York.



**Government  
of  
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Curriculum**

Program Name	<b>BA / BSc in Geography</b>	Semester	<b>6</b>
Course Title	<b>Web GIS</b>		
Course Code:	<b>GEO V2.3-T</b>	No. of Credits	<b>3</b>
Contact hours	<b>45 Hours</b>	Duration of SEA/Exam	<b>2 hours</b>
Formative Assessment Marks	<b>40</b>	Summative Assessment Marks	<b>60</b>

**Course Pre-requisite(s):** No Pre-requisite course(s)

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

- CO1. Provide up-to-date overview of Web GIS, including the basic concepts, principles.
- CO2. Familiarize with the broad and real-world applications of Web GIS.
- CO3. Provide the state-of-art technical skills to build Web GIS applications.
- CO4. Understand the functional model and capabilities of open-source GIS
- CO5. Discuss on WLS, WMS, WFS services and Geo-Server.

<b>Contents</b>	<b>45 hrs</b>
<b>Internet Technology in GIS:</b> Networking environment-data communication and Protocols- Distributed Computing-Grid computing and clusters-Internet map servers: Concepts and functions- map server applications-Data sharing concepts.	15
<b>Web Technology:</b> Comparison of web GIG-client-side framework and web Browser server-side framework and web server-WLS, WMS, WFS services-web protection server-Map server and Geo Server relations-web GIS engineer-scripting type and main GIS: Java script, Ajax, PHP, Python scripting-on line GIS-mobile GIS. <b>Assignment:</b> Write a brief report we technology application on agricultural innovation	15
<b>Open GIS:</b> open-source technology options and limitations - Open foundations: OGC, GDAL, PROJ4, Geo Tools, FOSS4G – interoperability web GIS – Open sources:resources and tools. <b>Field Activity:</b> Students are to refer open-source technology options to address various issues and challenges in community and write a report.	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	-	-	2	-	-	-	-	3	-	-	-
CO2	-	-	-	2	3	-	-	-	1	--	-	-
CO3	-	-	3	-	2	-	-	-	2	-	-	-

  

Course Outcomes (COs) / Program Outcomes (POs)	Program Outcomes (POs)											
	1	2	3	4	5	6	7	8	9	10	11	12
CO4	1	-	-	2	-	-	-	-	3	-	-	-
CO5	1	-	-	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 / <b>Assignment</b>	10
Case study / <b>Field-Study</b> / Project work etc	10
<b>Total</b>	<b>40 Marks</b>
<i>Formative Assessment as per guidelines.</i>	

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

References	
1	Cartwright, W., Peterson, M. P., and Gartner G. (Eds) (2007), Multimedia Cartography, Springer, Berlin.
2	Pinde Fu (2020). Getting to Know Web GIS, Taylor and Francis, ESRI, U.S.A
3	Kraak, M., and Ormeling, F., (2003). Cartography: Visualization of Geospatial Data, Pearson Education, New Delhi.
4	Rene Rubalcava, (2014). ArcGIS Web Development, Simon and Schuster.
5	Kropla B., (2005). Beginning MapServer Open-Source GIS Development, Apress, New York.
6	Pinde Fu (2018). Getting to Know Web GIS, Esri Press.
7	Christian Harder (2017). The ArcGIS Book, Esri Press.
8	Paul A. Zandbergen (2017). Python Scripting for ArcGIS Pro, ESRI, U.S.A
9	Songnian Li, Suzana Dragicevic, Bert Veenendaal (2011). Advances in Web-based GIS, Mapping Services and Applications, CRC Press.
10	Tyler Mitchell, (2005). Web Mapping Illustrated: Using Open-Source GIS Toolkits, O'Reilly Media.
	<b>Web References:</b> <ol style="list-style-type: none"> <li><a href="https://foss4g.org/">https://foss4g.org/</a></li> <li><a href="https://mapserver.org/">https://mapserver.org/</a></li> <li><a href="http://webgis.pub/">http://webgis.pub/</a></li> <li><a href="https://libguides.utk.edu/c.php?g=1020425&amp;p=7391962">https://libguides.utk.edu/c.php?g=1020425&amp;p=7391962</a></li> <li><a href="https://www.qgis.org/en/site/">https://www.qgis.org/en/site/</a></li> </ol>



