



Learning Outcome Based Curriculum (LOCF) for

Geography-B.Sc (Hons.)

**Undergraduate Programme (CBCS)
w.e.f. Academic Session 2020-21**



**Kazi Nazrul University
Asansol, West Bengal**



PART I

INTRODUCTION

Learning Outcomes based Curriculum Framework (LOCF) for Geography under CBCS

1. Introduction

Geography has evolved as a discipline between human and physical sciences. Geography not only focuses on the physical aspects of the earth systems and processes but also seeks to understand the human societies, social systems and processes. Geography in true sense has emerged as a trans-disciplinary subject integrating the study of nature and society, the regional diversity with the concepts of the space and time. It has been able to provide the overview of transformation of rural ecology to globalized cultural landscape at several spatial level.

Geography is therefore a study of

- Village Ecology to Urban Regional Studies
- Qualitative Techniques and Spatial Information Technology
- Global to Micro-level Community Perception Approach

It is essential to focus on the current socio-spatial problems, issues and challenges to aware students application of geography in addressing the environmental problems and developmental issues. It is also essential to deliver ancient geographical knowledge to address the current local and global problems. In the context of global challenges, geography have to be studied from the multifaceted and dynamic perspective. It is important for the policy makers to consider the geo-spatial aspects with references to the location and in context of the best utilization of natural resources and public goods. It is further expected that if the knowledge of geography will be instrumental in regional and national development.

2. Learning Outcomes based Approach to Curriculum Planning

Learning Outcomes based Curriculum Framework (LOCF) for geography curriculum revision incorporates dynamic processes including fundamental and modern techniques, contemporary paradigms such as global initiatives like Sustainable Development Goals (SDGs), Disaster Risk Reduction (DRR), Paris Climate Action and national initiatives like smart cities, Securities of food, water, energy, human health and livelihood, biodiversity, and disaster management. The approaches are to make geography more scientific and societal-need oriented that could be the panacea of India's developmental challenges. Geography uses scientific knowledge with the current focus that includes spatio-temporal analysis, skill development, GI Science sustainable development and human security. At the same time it also addresses the challenges like mining industries, environmental and land degradation.



2.1 Nature and Extent of the B.Sc. (Hons.) Programme

Geography curriculum inculcates knowledge of essential concepts of physical and human geography together with appropriate techniques using lectures, tutorials, group discussions, presentations, assignment evaluation, lab work and field visits. Thus, pedagogy process includes:

- Identifying and explaining the physical and cultural characteristics globally and processes at varied spatio-temporal contexts.
- Understanding human-environment and nature-society interactions as well as various global environmental challenges.
- Analysing geographic information by using geo-spatial technologies.
- Responding towards the global, national and local challenges and formulating proper remedial plan.

2.2 Aims B.Sc. (Hons.) Programme

Four distinct and new learning outcomes have been incorporated from each Course such as:

- Appreciate the relevance of geographical knowledge to everyday life.
- Demonstrate the ability to communicate geographic information by utilising both lecture and practical exercises.
- Inculcate the ability to evaluate and solve geographical problems effectively.
- Demonstrate the skills in using geographical research tools including spatial statistics, cartography, remote sensing, GIS, GNSS and GIScience.
- Based on the field knowledge and advanced technologies, the students should be able to understand the on-going geographical problems in different regions and levels with appropriate pragmatic solutions.

3. Graduate Attributes in Geography

The curriculum uses CBCS framework and organises under Core Course, Skill Enhancement Course, Elective - Discipline Specific and Elective - Generic Courses. The core courses cover key areas of geography about which all students should have basic knowledge. These courses are grouped as follows:

- A. Theory Courses: These courses build up the theoretical and conceptual foundations of geography.
- B. Practical Courses: Three courses on Statistical Techniques in Spatial Analysis; Remote Sensing and Geographical Information System, GIScience and Research Methods and Fieldwork in Geography will strengthen the methodological and practical foundations of geography.
- C. Regional Approach: Such courses focus on World Geography, Geography of India / West Bengal and local geographical aspects of Durgapur-Raniganj-Asansol area.
- D. Application Oriented: This includes disaster management, climate change, tourism



geography, health and wellbeing, environmental degradation etc.

Each Course has three learning outcomes, five uniform contents and reading list incorporating a few Hindi books also wherever possible.

4. Qualification Descriptors for B.Sc. (Hons.) Program

The qualification descriptors for the B.Sc. (Hons.) program in Geography shall have the learning attributes such as field knowledge, use of advance tools and techniques for better comprehension of space and society etc. It also involves awareness among the students regarding the issues of different regions and socio-cultural aspects. The main qualification descriptors for the geography B.Sc. (Hons.) students are to develop the critical evaluation and understanding. Each Honours student in Geography should be able to;

- Demonstrate systematically geographical knowledge and understanding the theoretical as well as practical applications with understanding of various aspects related to heavy industries, mining, agriculture and urbanisation.
- Demonstrate the ability to understand the significance of geographical aspects in relation to development of the regions and minimizing regional inequalities.
- Demonstrate the ability and geographical thinking critically regarding rural and urban spaces and their day-to-day problems with the application of geographical knowledge.
- Students have to demonstrate their geographical knowledge acquired in the class and apply the same at local level.
- Recognise the scope of geography in terms of exploring the career opportunities, employment and life-long engagement in teaching and utilise the knowledge for publication for the future academic endeavors.

The students have to develop the ability through the theoretical and practical means for realising the Sustainable Development Goals (SDG) both in rural and urban spaces to minimize the differentials in developmental aspects.

5. The Programme Learning Outcomes B.Sc. (Hons.) Programme

The programme learning outcomes relating to B.Sc. (Hons.) Programme in geography:

- Demonstrating the understanding of basic concepts in geography.
- Demonstrating the coherent and systematic knowledge in the discipline of geography to deal with current issues and their solution.
- Display an ability to read and understand maps and topographic sheets to look at the various aspects on the space.
- Cultivate ability to evaluate critically the wider chain of network of spatial aspects from global to local level on various time scales as well.



- Recognize the skill development in Geographical studies programme as part of career avenues in various fields like teaching, research and administration.

5.1 Learning Outcomes

Three distinct and new learning outcomes have been incorporated from each course such as to:

1. Understand the relevance of geographical knowledge to everyday life.
2. Getting the ability to communicate geographic information utilizing both lecture and practical exercises.
3. Inculcate the ability to evaluate geographical problems effectively.
4. Exhibit the skill in using geographical research tools including spatial statistics, qualitative analysis, cartography, remote sensing, GIS, IRNSS and GIScience.

5.2 Course Level Learning Outcomes

The course level learning outcomes includes:

1. **Basic Concept:** The fundamental concepts and philosophical foundation of each course need to be discussed.
2. **Understanding Landscape:** An understanding of landscape at different levels needs to be discussed and understood for a thorough knowledge of spatial dimensions.
3. **Understanding Ecosystem Structure and Potential:** To comprehend the dynamic dimensions of human and ecosystem relationships.
4. **Human Perception and Behaviour:** Learning human perception and behaviour to acquire the geographical knowledge evolved over time, is essential to improve decision making process.
5. **Identification of Critical Problems and Issues:** Detection and identification of the critical problems and spatial issues are essential for sustainable development.
6. **Field Based Knowledge:** Field based knowledge is essential to understand the ground reality, spatial patterns and processes.
7. **Spatial Tools and Techniques:** The basics and applications of spatial tools and techniques are essential to make the studies more scientific and applicable.
8. **Statistical Techniques:** Use of statistical tools and techniques is essential for precise and objective geographic analysis and interpretation of complex phenomena.
9. **Applied Dimensions:** Identification of the critical problems and spatial issues form the core of the modern geography for various applications and decision making, including Surface and sub-surface Resources, Environment & Disaster Management, River Valley Planning, Industrial Hazards, Land Use Planning, and Urban and Regional Development together with Climate Change Mitigation and Adaptation, etc.
10. **Case Study based Analysis:** There is a need to understand the specificities of the problems in specific areas for their in-depth comprehension and solution. The case studies are essential, especially to find out the solutions to the lagging regions for their solutions based on firsthand information.
11. **Public Policy and Management:** Spatial aspects and dimensions are the integral parts in the policy making for sustainable regional development. Geographical knowledge needs to be inculcated for application and solutions of the various local, regional and national problems.



12. **Communication Skills:** Communication through models, analogue and digital maps, images and other geographical tools form the sound base for the dissemination of geographical information.

6. Course-Level Learning Outcomes Matrix

Outcomes	Core Subjects													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Basic Concept	x	X	X	X	X	X	X	x	x	x	x	X	X	X
Understanding Landscape	x	X	X				X		X	X	X	X	X	X
Understanding Ecosystem structure and Potential			X		X		X	X	X	X	X	X		X
Human Perception and Behaviour			X				X	X	X			X	X	X
Identification of Critical Problems and Issues	X		X		X	X	X	X	X	X	X	X		X
Field Based Knowledge		X		X	X					X	x	X		X
Spatial Tools and Techniques		X		X		X				X		X		X
Statistical Techniques		X		X		X				X		X		X
Applied Dimensions	X	X	X	X	X	X		X	X	X	X	X		X
Case Study based Analysis		X	X		X	X			X	X	X	X		X
Public Policy and Management					X	X	X	X	X	X	X	X		X
Communication Skills	x	X	X	X	X	X	X	X	X	X	x	X	X	X

7. Geography Course Outcomes and SDGS

The global community has adopted the Sustainable Development Goals to ensure holistic and multifaceted development of human societies across the world. These goals adopted in 2015 were an ambitious upgradation of millennium development goals.

The Indian Geographical community aims to harness the trans-disciplinary nature of the subject and link it with sustainable development goals through a range of multi-dimensional core and elective papers.

8. Teaching Learning Processes

Learning Outcomes based Curriculum Framework (LOCF) for geography incorporates dynamic processes including fundamental and modern techniques, contemporary paradigms such as global initiatives like Sustainable Development Goals (SDGs), Disaster Risk Reduction (DRR), Paris Climate Action and national initiatives like smart cities, food security, water security, energy security, biodiversity, disaster management, human health and wellbeing and livelihood security. The approaches are to make geography more scientific and societal-need oriented that could be the panacea to India's development. Geography uses scientific knowledge with the present focus that includes spatio-temporal analysis, skill development, GIScience,



sustainable development and human security.

Learning is a challenging, engaging, and enjoyable activity. Learners should be encouraged to engage in a rigorous process of learning and self-discovery by adopting a highly focused and yet flexible approach to education. Each day learners should be encouraged to focus on key areas of the course and spend time on learning the course fundamentals and their application in life and society. In teaching and learning pedagogy, there should be a shift from domain or conclusions-based approach to the experiential or process-based approach.

Geography curriculum inculcates knowledge of essential concepts of physical and human geography together with appropriate techniques using lectures, tutorials, group discussion, presentation, assignment evaluation, lab work and field visits. Thus, pedagogy process includes:

- Identifying and explaining the physical and cultural characteristics globally and processes at varied spatio-temporal contexts.
- Understanding human-environment and nature-society interactions as well as various global environmental challenges.
- Analysing geographic information by using geo-spatial technologies.
- Responding towards the global and national initiatives.

Broad framework for teaching in the class includes:

1. Theory courses should have 6 hours per week for courses carrying 6 credits.
2. Tutorial group of each theory course should have a group size of 15 students.
3. Practical courses should have 12 hours per week for a group of 15 students.
4. Practical courses will not have tutorials.

The faculty should promote learning on a proportionate scale of 20:30:50 principle, where lectures (listening/hearing) constitute 20 per cent of the delivery; visuals (seeing) 30 per cent of the learning methods; and experience (doing/participating) 50 per cent. This ratio is subject to change as per institutional needs.

In order to achieve its objective of focused process based learning and holistic development, the Institution/University may use a variety of knowledge delivery methods:

1. Lectures

Lectures should be designed to provide the learners with interesting and fresh perspectives on the subject matter. Lectures should be interactive in a way that students work with their teachers to get new insights in the subject area, on which they can build their own bridges to higher learning.

2. Discussions

Discussions are critical components of learning, and can be used as a platform for students to be creative and critical with old and new ideas. Besides developing critiquing skills, arriving at consensus on various real life issues and discussion groups lead to innovative problem solving and, ultimately to success.



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5. Life Skills:

Life skills provide students opportunities to understand real life situations and scenarios (i.e. coping with disaster), and solve challenges in a controlled environment or make use of them in simulating cultural experiences by locating/transposing them in new (local, regional, national and international) situations.

6. Case Studies:

Case studies, wherever possible, should be encouraged in order to challenge students to find creative solutions to complex problems of individual, community, society and various aspects of knowledge domain concerned.

7. Role Playing

Assuming various roles, as in real life, is the key to understanding and learning. Students are challenged to make strategic decisions through role-plays, and to analyze the impact of these decisions. For this purpose, incidents from literary texts may also be used.

8. Team Work

Positive collaboration in the form of teamwork is critical in the classroom environment, for which outcomes. In the process of teamwork, learners will acquire the skills of managing knowledge acquisition and other collaborative learners, thereby understanding how to incorporate and balance personalities.

9. Study Tours/Field Visits:

Study Tours/ Field trips provide opportunities to the learners to test their in-class learning in real life situations as well as to understand the functional diversity in the learning spaces. These may include visits to sites of knowledge creation, preservation, dissemination and application. Institutions may devise their own methods to substitute/modify this aspect.

10. Academics-Industries Interface:

The course curriculum of B.A/BSc. (Hons.) should encourage students for closer interaction with industries/collieries/corporate/research institutes, etc. for at least one week internship and training.



PART II

STRUCTURE OF B.Sc. GEOGRAPHY

9. Introduction

The curriculum uses CBCS framework and organizes under Core Courses, Skill Enhancement Course, Discipline Specific Elective, Generic Elective Courses and Ability Enhancement Compulsory Courses. The core courses cover key areas of geography about which all students should have basic knowledge. These courses are grouped as follows:

- **Theory** – These courses build up the theoretical and conceptual foundations of geography.
- **Practical** – Three courses on Statistical Techniques in Spatial Analysis; Remote Sensing and GIS, GIScience and Research Methods and Fieldwork in Geography, Thematic mapping, will strengthen the methodological and practical foundations of geography.
- **Regional Approach** – Such courses focus on Geography of India / different states.
- **Application Oriented** – This includes disaster management, climate change, tourism geography, health and wellbeing, Industrial and rural development etc.

Each Course has three learning outcomes, five uniform contents and references incorporating a few Hindi books wherever possible.

9.1. Structure of B.Sc. (HONS) IN GEOGRAPHY

A. Core Courses: 14 papers (14x6= 84 credits)
B. Discipline Specific Electives: 4 papers (4x6= 24 credits)
C. Generic Electives: 4 papers (4x6= 24 credits)
D. Ability Enhancement Compulsory Courses: 2 papers (2x4=8 credits)
E. Skill Enhancement Courses: 2 papers (2x4=8 credits)
GRAND TOTAL (A+B+C+D): 148 (84+24+24+8+8) credits



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Abbreviated Degree	Discipline	Abbreviated Degree Programme	Semester	Course Name	Course Type	Course Code	Course Details	L - T - P	Course Credit	Sem Credit	CA Marks		ESE Marks		Total Marks	Sem Marks			
											Practical	Theoretical	Practical	Theoretical					
BSCH	GEOGRAPHY	BSCHGEO	I	Geomorphology	C	BSCHGEOC101	CC-1	5 - 1 - 0	6	22		10		40	50	150 + Marks of GEC			
				Cartographic Techniques		BSCHGEOC102	CC-2	0 - 0 - 12	6		30		20		50				
				Choose from the Pool of Generic Elective Courses offered in 1st Semester by Honours Disciplines other than the Discipline in which Honours course is taken				GE	See Pool		GEC-1	See Pool	6	See Pool					
				Environment Studies	AE	AEE101	AECC-1	4 - 0 - 0	4			10		40	50				
			II	Geography of Human and Cultural Landscape	C	BSCHGEOC201	CC-3	5 - 1 - 0	6		10		40	50	150 + Marks of GEC				
				Statistical Method in Geography		BSCHGEOC202	CC-4	0 - 0 - 12	6	30		20		50					
				Choose from the Pool of Generic Elective Courses offered in 2nd Semester by Honours Disciplines other than the Discipline in which Honours course is taken				GE	See Pool	GEC-2	See Pool	6	See Pool						
				English/MIL Communication	AE	See Pool	AECC-2	4 - 0 - 0	4		10		40	50					
			III	Climatology and Oceanography	C	BSCHGEOC301	CC-5	5 - 1 - 0	6		10		40	50	200 + Marks of GEC				
				Geography of India		BSCHGEOC302	CC-6	5 - 1 - 0	6		10		40	50					
				Fundamentals of Remote Sensing		BSCHGEOC303	CC-7	0 - 0 - 12	6	30		20		50					
				Choose from the Pool of Generic Elective Courses offered in 3rd Semester by Honours Disciplines other than the Discipline in which Honours course is taken				GE	See Pool	GEC-3	See Pool	6	See Pool						
				Geographic Information System	(Any One)	SE	BSCHGEOSE301	SEC-1	0 - 0 - 8	4	30		20			50			
				Spatial Statistical Techniques		BSCHGEOSE302	0 - 0 - 8		30			20		50					
			Geographical Techniques	BSCHGEOSE303		0 - 0 - 8	30				20		50						
			IV	Introduction to Global Economic System	C	BSCHGEOC401	CC-8	5 - 1 - 0	6		10		40	50	200 + Marks of GEC				
				Environment and Natural Resource Management		BSCHGEOC402	CC-9	5 - 1 - 0	6		10		40	50					
				Digital Remote Sensing		BSCHGEOC403	CC-10	0 - 0 - 12	6	30		20		50					
				Choose from the Pool of Generic Elective Courses offered in 4th Semester by Honours Disciplines other than the Discipline in which Honours course is taken				GE	See Pool	GEC-4	See Pool	6	See Pool						
				Introduction to GIScience	(Any One)	SE	BSCHGEOSE401	SEC-2	0 - 0 - 8	4	30		20			50			
				Thematic Atlas		BSCHGEOSE402	0 - 0 - 8		30			20		50					
			V	Regional Planning and Sustainable Development	C	BSCHGEOC501	CC-11	5 - 1 - 0	6		10		40	50	200				
				Field Techniques, Surveying and Research Methods		BSCHGEOC502	CC-12	0 - 0 - 12	6	30		20		50					
				Geography of West Bengal	(Any One)	DSE	BSCHGEODSE501	DSEC-1	5 - 1 - 0	6		10		40					
Agriculture and Food Security	BSCHGEODSE502	5 - 1 - 0				10			40										
Population Geography	(Any One)	DSE		BSCHGEODSE503	DSEC-2	5 - 1 - 0	6		10		40								
Hydrology		BSCHGEODSE504	5 - 1 - 0			10			40										
VI	Evolution of Geographical Thought	C	BSCHGEOC601	CC-13	5 - 1 - 0	6		10		40	50	200							
	Disaster Management Project Work		BSCHGEOC602	CC-14	0 - 0 - 12	6	30		20		50								
	Geography of Health	(Any One)	DSE	BSCHGEODSE601	DSEC-3	5 - 1 - 0	6		10		40								
	Political Geography		BSCHGEODSE602	5 - 1 - 0				10		40									
	Biogeography		BSCHGEODSE603	5 - 1 - 0				10		40									
	Geography of Social Well being	(Any One)	DSE	BSCHGEODSE604	DSEC-4	5 - 1 - 0	6		10		40								
	Urbanization and Urban System		BSCHGEODSE605	5 - 1 - 0				10		40									
Soil Geography	BSCHGEODSE606		5 - 1 - 0			10			40										
Total Credit and Marks										148	1100 + Marks of GEC								



UG Learning Outcome Based Curriculum (LOCF) for Geography

Abbreviations: C= Core; CC=Core Course; AE= Ability Enhancement; AECC= Ability Enhancement Compulsory Course; GE= Generic Elective; GEC= Generic Elective Course; SE= Skill Enhancement; SEC= Skill Enhancement Course; DSE= Discipline Specific Elective; DSEC= Discipline Specific Elective Course; CA= Continuous Assessment, ESE= End Semester Examination, L= Lecture Hour; T= Tutorial Hour and P= Practical Hour/ Field Work and NA= Not Applicable																			
Generic Elective Courses (GEC) : Students of a particular Honours Course will choose from the Pool of Generic Elective Courses of concerned semesters offered by Disciplines other than the Discipline in which Honours course is taken																			
Semester wise Pool of Generic Elective Courses offered by this Discipline for other Honours Disciplines																			
Discipline	Semester	Course Name		Course Type	Course Code	Course Details	L - T - P	Course Credit	Sem Credit	CA Marks		ESE Marks		Total Marks	Sem Marks				
										Practical	Theoretical	Practical	Theoretical						
GEOGRAPHY	I	Disaster Management	(Any One)	GE	BSCHGEOGE101	GEC-1	5 - 1 - 0	6	NA		10		40	50	NA				
		Geography of Tourism and Pilgrimage			BSCHGEOGE102		5 - 1 - 0				10		40						
	II	Geospatial Information Technology	(Any One)		BSCHGEOGE201	GEC-2	5 - 1 - 0	6			10		40	50					
		Human & Environment System			BSCHGEOGE202		5 - 1 - 0				10		40						
	III	Climate Change, Vulnerability and Adaptation	(Any One)		BSCHGEOGE301	GEC-3	5 - 1 - 0	6			10		40	50					
		Rural Development			BSCHGEOGE302		5 - 1 - 0				10		40						
	IV	Industrial Development	(Any One)		BSCHGEOGE401	GEC-4	5 - 1 - 0	6			10		40	50					
		Sustainable Resource Development			BSCHGEOGE402		5 - 1 - 0				10		40						
	Pool of Communication Courses offered as Ability Enhancement Compulsory Courses																		
	Discipline	Semester	Course Name		Course Type	Course Code	Course Details	L - T - P		Course Credit	Sem Credit	CA Marks		ESE Marks		Total Marks	Sem Marks		
												Practical	Theoretical	Practical				Theoretical	
	English/MIL Communication	II	English Communication		(Any One)	AE	AECCE201	AECC-2		4 - 0 - 0	4	NA		10			40	50	NA
Bengali Communication			AECCB201	4 - 0 - 0					10				40						
Hindi Communication			AECCH201	4 - 0 - 0					10				40						
Urdu Communication			AECU201	4 - 0 - 0					10				40						



B.Sc. Honours in Geography





Semester- I

Course Name: Geomorphology

Course Code: BSCHGEOC101

Course Type: Core (Theoretical)	Course Details: CC-1		L-T-P: 5 - 1 - 0		
Credit: 6	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		....	10	....	40

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. Understand the functioning of landform systems in real time and analyze how the natural and anthropogenic operating factors affects the development of landforms
2. Distinguish between the mechanisms that control these processes
3. Assess the role of structure, stage and time in shaping the landforms, interpret geological maps and apply the knowledge in geographical research.

Course Content:

1. Geomorphology: Definition, Nature and Scope; Fundamental Concepts; Earth: Internal Structure; Earth Movements: Isostasy (Airy and Pratt)
2. Concept of Exogenic and Endogenic Forces; Origin and types of Folds and Faults: Landform Development on Folded and Faulted Structure; Plate Tectonics: Processes and Associated Landforms; Earthquakes and Volcanoes
3. Geomorphic Processes: Weathering, Mass Wasting; Cyclic (Davis and Penck) and Non-cyclic Concept (Hack) of Landform Development
4. Landforms associated with (Erosional and Depositional): Fluvial, Karst, Aeolian, Glacial and Coastal
5. Applied Geomorphology and Environment with reference to Ground Water

Continuous Assessment: Assignment on structure and landforms

References/ Suggested Readings:

1. Billings, M.P. (1971): Structural Geology, Pearson.
2. Bloom, A. L., (2003): *Geomorphology: A Systematic Analysis of Late Cenozoic Landforms*, Prentice-Hall of India, New Delhi.
3. Das Gupta, A and Kapoor, A.N., (2001) *Principles of Physical Geography*, S.C. Chand & Company Ltd. New Delhi.
4. Dayal, P., (1996) A Text book of Geomorphology. Shukla Book Depot, Patna.
5. Frisch, W., Meschede, M., Blakey, R.C. (2011):
6. Plate Tectonics: Continental Drift and Mountain Building,
7. Goudie, A.S. (Ed) (2004): Encyclopaedia of Geomorphology, vol. 1 & 2, Routledge.
8. Gregory, K.J., Lewin, J. (2014) The Basics of Geomorphology: Key Concepts, Sage.



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10. Huggett, R.J. (2007) *Fundamentals of Geomorphology*, Routledge, New York.
11. Kale, V. S. and Gupta A., (2001): *Introduction to Geomorphology*, Orient Longman, Hyderabad.
12. Kearey, P., Klepeis, K.A., Vine, F.J. (2011) *Global Tectonics*, 3rd ed, Wiley-India.
13. Khullar, D.R., (2012): *Physical Geography*, Kalyani Publishers, New Delhi.
14. Knighton, A.D. 1984. *Fluvial Forms and Processes*, Edward Arnold.
15. Mal, Suraj, Singh, R.B. and Huggel, Christian (2018): *Climate Change, Extreme Events and Disaster Risk Reduction*, Springer, Switzerland, pages 309.
16. McCullagh, P. (1978): *Modern Concepts in Geomorphology*, Oxford University Press.
17. Selby, M.J., (2005): *Earth's Changing Surface*, Indian Edition, OUP
18. Singh, S (2009): *Bhautik Bhugolka Swaroop (Hindi)*, Prayag Pustak, Allahabad.
19. Skinner, Brian J. and Stephen C. Porter (2000), *The Dynamic Earth: An Introduction to Physical Geology*, 4th Edition, John Wiley and Sons. Springer.
20. Strahler, A. (2016): *Introducing Physical Geography*, 6th ed, Wiley.
21. Strahler, A. H. and Strahler, A N., (2001): *Modern Physical Geography (4/E)*, John Wiley and Sons, Inc., New York.
22. Summerfield, M.J. (2003): *Global Geomorphology: An Introduction to the Study of landforms*, Longman.
23. Thornbury, W.D. (1969): *Principles of Geomorphology*, 2nd ed, Wiley-India / CBS.
24. Tikka, R N (1989): *Bhautik Bhugolka Swaroop (Hindi)*, Kedarnath Ram Nath, Meerut.

Course Name: Cartographic Techniques

Course Code: BSCHGEOC102

Course Type: Core (Practical)	Course Details: CC-2		L-T-P: 0 - 0 - 12		
Credit: 6	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	...	20	....

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. Understand the importance of scale in geography.
2. Read and prepare maps, comprehend locational and spatial aspects of the earth surface.
3. Use and importance of maps for regional development and decision making.

Course Content:

1. Basic concept of Cartography; Concept and Types of Scales; Graphical Construction of Linear, Diagonal and Vernier Scales.



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2. Map Projections – Classification, Properties and Uses; Construction of graticules, Merits and Demerits of Polar Zenithal Stereographic, Bonne's and Mercator's Projections; Basic Concept of UTM projection.
3. Topographical Maps (Open and Defence Series maps, RF 1:50,000) – Introduction to numbering system of Topographical Maps, Analysis of Physical and Cultural features and interrelationship, Interpretation using Transect Chart (Plateau/plain region)
4. Slope Analysis (Wentworth's method), Topographic Profiles-Introduction and Plotting of Cross and Longitudinal Profiles along a River.
5. Interpretation of Weather Maps (Monsoon and Post-monsoon seasons)

Continuous Assessment:

- Practical Record:** A Project File / Practical Notebook in pencil comprising one exercise each, on scale, map projection, interpretation of topographic sheet and weather map (10 Marks)
- Class Test:** 20 Marks

References/ Suggested Readings

1. Anson, R., and Ormelling F. J., (1994): International Cartographic Association: Basic Cartographic, Vol. Pregmen Press.
2. Gupta, K.K. and Tyagi V.C., (1992): Working with Map, Survey of India, DST, New Delhi.
3. Kennedy, M., Kopp, S. (2001). Understanding Map Projections, Esri Press.
4. Khan, Zulfequar Ahmad., (1998): Text book of Practical Geography, Concept Publishing Company, New Delhi.
5. Kimerling, A.J., Buckley, A.R., Muehrcke, P.C., Muehrcke, J.O. (2011). Map Use: Reading, Analysis, Interpretation, 7th ed, Esri Press.
6. Kraak, M.J., (2010): Cartography: Visualization of Geospatial Data (3rd edition), Pearson Education Ltd., London.
7. Misra, R.P., (2014): Fundamentals of Cartography (Second Revised and Enlarged Edition), Concept Publishing, New Delhi.
8. Monkhouse, F. J. and Wilkinson, H. R., (1973): Maps and Diagrams, Methuen, London.
9. Pearson II, F. 1990. Map Projections: Theory and Applications 2nd ed, CRC Press.
10. Rhind, D. W. and Taylor D. R. F., (eds.) (1989): Cartography: Past, Present and Future, Elsevier, International Cartographic Association.
11. Robinson, A. H., (2009): Elements of Cartography (6th Edition), John Wiley and Sons, New York.
12. Robinson, A.H., Morrison, J.L., Phillip, C.M., Kimerling, A.J., Guptill, S.C. (1995). Elements of Cartography, 6th ed, Wiley.
13. Sarkar, A., (2015): Practical Geography: A systematic approach, Orient Black Swan Private Ltd., New Delhi
14. Sharma, J. P., (2010): Prayogic Bhugol(Hindi), Rastogi Publishers, Meerut.
15. Singh, Gopal., (1998): Map Work and Practical Geography (4th Edition), Vikas Publishing House, Ahmedabad.



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16. Singh, R.L. & Dutta, P.K., (2012): Prayogtmak Bhugol (Hindi), Central Book Depot, Allahabad
17. Singh, R.L. and Singh R.P.B., (1999): Elements of Practical Geography, Kalyani Publishers, New Delhi.
18. Singh, R.L., & Singh, Rana. P.B., (1991): Prayogtmak Bhugol ke Mool Tatva (Hindi), Kalyani Publishers, New Delhi.
19. Steers, J.A. (1970): An Introduction to the Study of Map Projections, University of London Press, London.

Course Name: Disaster Management

Course Code: BSCHGEOGE101

Course Type: Generic Elective (Theoretical)	Course Details: GEC-1		L-T-P: 5 - 1 - 0		
Credit: 6	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		....	10	....	40

Course Learning Outcome:

After the completion of course, the students will have ability to:

1. Gain a perspective of disasters and various dimensions of disaster management
2. Have comprehensive knowledge of various natural and manmade disasters in India
3. Examine the response and mitigation measures of disasters

Course Content:

1. Disasters: Definition and Concepts; Risk and Vulnerability; Classification
2. Disasters in India: Flood: Causes, Impact, Distribution; Landslide: Causes, Impact, Distribution; Drought: Causes, Impact, Distribution
3. Disasters in India: Earthquake and Tsunami: Causes, Impact, Distribution; Cyclone: Causes, Impact, Distribution
4. Manmade Disasters: Causes, Impact, Distribution with reference to land subsidence in mining region, Industrial hazards with special reference to chemical and fire
5. Response and Mitigation to Disasters: Mitigation and Preparedness, NDMA and NIDM; Indigenous Knowledge and Community-Based Disaster Management; Do's and Don'ts During and Post-disasters

Continuous Assessment: Assignment on any one hazard

References/ Suggested Readings

1. Government of India, (2008): *Vulnerability Atlas of India*. New Delhi, Building Materials & Technology Promotion Council, Ministry of Urban Development, Government of India.
2. Govt. of India, (2011): *Disaster Management in India*, Ministry of Home Affairs, New Delhi.



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3. Kapur, Anu., (2010): *Vulnerable India: A Geographical Study of Disasters*, Sage Publication, New Delhi.
4. Modh, S., (2010): *Managing Natural Disaster: Hydrological, Marine and Geological Disasters*, Macmillan, Delhi.
5. Singh, Jagbir., (2007): *Disaster Management Future Challenges and Opportunities*, 2007.
6. Singh, R. B., (ed.), (2006): *Natural Hazards and Disaster Management: Vulnerability and Mitigation*, Rawat Publications, New Delhi.
7. Singh, R.B., (2005): *Risk Assessment and Vulnerability Analysis*, IGNOU, New Delhi. Chapter 1, 2 and 3
8. Sinha, A., (2001): *Disaster Management: Lessons Drawn and Strategies for Future*, New United Press, New Delhi.
9. Stoltman, J.P., et al. (2004): *International Perspectives on Natural Disasters*, Kluwer Academic Publications. Dordrecht.

Course Name: Geography of Tourism and Pilgrimage

Course Code: BSCHGEOGE102

Course Type: Generic Elective (Theoretical)	Course Details: GEC-1		L-T-P: 5 - 1 - 0		
Credit: 6	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		....	10	....	40

Course Learning Outcome:

After the completion of course, the students will have ability to:

1. Equip with a basic understanding of nature and scope, trends and patterns of various types of tourisms.
2. Have sound knowledge on geographical, environmental and socio-cultural aspects of tourism in India.
3. Apply the principles of Geo-tourism and analyse the prospects and problems associated with pilgrimage tourism.

Course Content:

1. Scope and Nature: Concepts and Issues, Tourism, Recreation and Leisure Inter-Relations; Geographical Parameters of Tourism by Robinson
2. Trends and Patterns: Nature Tourism, Cultural Tourism, Medical Tourism, Pilgrimage, Geo-tourism
3. Recent Trends of Tourism: International and Regional; Domestic (India); Eco-Tourism, Sustainable Tourism
4. Impact of Tourism: Impact on Economy, Environment, Society
5. Tourism in India: Tourism Infrastructure; Case Studies of Himalaya, Desert and Coastal Areas; India's World Heritage Sites and National Geological Monuments, National Tourism Policy



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Continuous Assessment: Assignment on Tourism/ Eco-tourism in West Bengal (based on secondary database or primary database of local area)

References/ Suggested Readings:

1. Alan, A. Lew, (2017): *New Research Paradigms in Tourism Geography*, Routledge.
 2. Dhar, P.N., (2006): *International Tourism: Emerging Challenges and Future Prospects*, Kanishka, New Delhi.
 3. Hall, M., and Stephen, P., (2006): *Geography of Tourism and Recreation – Environment, Place and Space*, Routledge, London.
 4. Kamra, K. K., and Chand, M., (2007): *Basics of Tourism: Theory, Operation and Practise*, Kanishka Publishers, Pune.
 5. Milton, D. (1993): *Geography of World Tourism*, Prentice. Hall, New York.
 6. Nelson, V., (2017): *An Introduction to the Geography of Tourism*, Rowman & Littlefield.
 7. Page, S. J., (2011): *Tourism Management: An Introduction*, Butterworth-Heinemann- USA.
 8. Raj, R. and Nigel, D., (2007): *Morpeth Religious Tourism and Pilgrimage Festivals Management: An International perspective by CABI*, Cambridge, USA.
 9. Robinson, H. A.,(1996): *Geography of Tourism*, Macdonald and Evans, London,.
 10. Singh, Jagbir., (2014): “*Eco-Tourism*”, I.K. International Pvt. Ltd. New Delhi, India.
 11. Tourism Recreation and Research Journal, Centre for Tourism Research and Development, Lucknow.
 12. Widawski, K., and Wyrzykowski, J.,(2017): *The Geography of Tourism of Central and Eastern European Countries*, Springer.
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**Semester-II****Course Name: Geography of Human and Cultural landscape****Course Code: BSCHGEOC201**

Course Type: Core (Theoretical)	Course Details: CC-3		L-T-P: 5-1-0		
Credit: 6	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		....	10	....	40

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. To Know the diversity of changing human and cultural landscape.
2. Understand of population growth and its implications.
3. Understand the diversity of culture.

Course Content:

1. Human Geography: Definition, Scope and Principles; Contemporary Relevance
2. Population: Factors, Measures and Distribution of Population Growth; Population Composition- Age and Sex; Malthusian and Demographic Transition Theories
3. Space and Society: Definition of Culture; Cultural Regions; Classification and World Distribution of Race, Religion and Language; Tribes: Jarwa, Munda, Eskimo, Masai
4. Settlements: Size, Form and Types of Rural Settlements; Classification of Urban Settlements; Trends and Patterns of World Urbanization
5. Population-Resource Relationships (Ackerman); Resource Development in India: Coal, fish and forest

Continuous Assessment: Assignment on any one tribal group.

References/ Suggested Readings:

1. Chandna, R.C., (2017): *Population Geography*, Kalyani Publishers, New Delhi.
2. Daniel, P.A. and Hopkinson, M.F. (1989): *The Geography of Settlement*, Oliver & Boyd, London.
3. Hassan, M.I. (2005): *Population Geography*, Rawat Publications, Jaipur
4. Hussain, Majid., (2012): *Manav Bhugol*, Rawat Publications, Jaipur.
5. Johnston, R., Gregory, D., & Pratt, G., et al. (2008): *The Dictionary of Human Geography*, Blackwell Publication.
6. Jordan-Bychkov., et al., (2006): *The Human Mosaic: A Thematic Introduction to Cultural Geography*, W. H. Freeman and Company, New York.
7. Kaushik, S.D., (2010): *ManavBhugol*, Rastogi Publication, Meerut.
8. Maurya, S.D., (2012): *ManavBhugol*, ShardaPustakBhawan, Allahabad.
9. Rozenblat., Celine., Pumain., Denise and Velasquez., Elkin Eds. (2018): *International and Transnational Perspectives on Urban Systems*, Springer, Japan, pages 393.



10. Singh, R.B., Ed. (2015): *Urban Development Challenges, Risk and Resilience in Asian Mega Cities-Sustainable Urban Future of Emerging Asian Mega Region*, Springer, Tokyo, Pages 488, 2015.

Course Name: Statistical Method in Geography

Course Code: BSCHGEOC202

Course Type: Core (Practical)	Course Details: CC-4		L-T-P: 0-0-12		
Credit: 6	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	....	20	....

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. Understand the basics of data collection and sampling.
2. Comprehend the representation and interpretation of the results.
3. Practice results in research.

Course Content:

1. Use of Data in Geography: Significance of Statistical Methods in Geography; Sources of Data, Scales of Measurement (Nominal, Ordinal, Interval and Ratio)
2. Frequency distribution in discrete and continuous variable: Histogram, Frequency Polygon and Ogives
3. Tabulation and Descriptive Statistics: Frequencies (Deciles, Quartiles), Cross Tabulation, Central Tendency (Mean, Median and Mode and their graphical presentation, Dispersion (Standard Deviation, Mean deviation, Variance and Coefficient of Variation)
3. Types of Sampling Techniques: Purposive, Random, Systematic and Stratified
4. Theoretical Distribution: Fundamental Concept of Probability and Normal Distributions
5. Association and Correlation: Scatter diagram, Rank Correlation, Product Moment Correlation, and Simple Regression

Continuous Assessment:

i. Practical Records:

Each student will submit a record containing five exercises:

1. Construct a data matrix (of about 10 x 10) with each row representing an areal unit (districts or villages or towns) and about 10 columns of relevant attributes of the areal units.
2. Based on the above table, a frequency table, measures of central tendency and dispersion would be computed and interpreted for any two attributes.
3. Histograms and frequency curve would be prepared for the entire data set and attempt to fit a normal curve and interpreted for one or two variables.



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4. From the data matrix a sample set (20 per cent) would be drawn using random-systematic and/or stratified methods of sampling and locate the samples on a map with a short note on method used.
5. Based on the sample set and using two relevant attributes, a scatter and regression line would be plotted and residual from regression would be mapped with a short interpretation. (10 Marks)

ii. **Class test:** 20 Marks

References/ Suggested Readings:

1. Ajai, S. G. and Sanjaya, S.G. (2009) *Statistical Methods for Practice and Research*, Sage Publications, New Delhi.
2. Berry, B. J. L. and Marble, D. F. (eds.): *Spatial Analysis—A Reader in Geography*.
3. Ebdon, D., (1977): *Statistics in Geography: A Practical Approach*.
4. Hammond, P. and McCullagh, P. S., (1978): *Quantitative Techniques in Geography: An Introduction*, Oxford University Press.
5. King, L. S., (1969): *Statistical Analysis in Geography*, Prentice-Hall.
6. Mahmood, A., 1977: *Statistical Methods in Geographical Studies*, Concept.
7. Pal, S. K., (1998): *Statistics for Geoscientists*, Tata McGraw Hill, New Delhi.
8. Rogerson, P. A., (2001) *Statistical Methods for Geography*, Sage Publications, New Delhi.
9. Sarkar, A. (2013): *Quantitative geography: techniques and presentations*. Orient Black Swan Private Ltd., New Delhi
10. Shinha, Indira., (2007): *Sankhyikibhugol(Hindi)*. Discovery Publishing House, New Delhi.
11. Silk, J., (1979): *Statistical Concepts in Geography*, Allen and Unwin, London.
12. Taylor P.J., (1983) *Quantitative Methods in Geography: An Introduction to Spatial Analysis*, Waveland Press, Boston Publishers.

Course Name: Geospatial Information Technology

Course Code: BSCHGEOGE201

Course Type: Generic Elective (Theory)	Course Details: GEC-2		L-T-P: 5-1-0		
Credit: 6	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Practical
		.....	10	....	40

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. Learn the basic concepts of geographical information technology.
2. Acquire knowledge on data structure, interpolation, modelling, functions and working of geographical information technology
3. Apply the geographical information technology for certain purpose.

Course Content:

1. Introduction: Definitions, Concept and Historical Development of geospatial technology
2. Geospatial Data: Web data sources; Registration and projection; Data structures: Raster and Vector



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3. Working on spatial information system
4. Information retrieval; Topological modelling; Networks; Overlay; Data output
5. Application of Geospatial Information Technology for sustainable development of a River Basin.

Continuous Assessment: Assignment on Topological Modelling

References/ Suggested Readings:

1. D. Tomlin., (1990): *Geographic Information Systems and Cartographic Modelling*, Prentice-Hall, Englewood Cliffs, NJ, ISBN 0-13-350927-3.
2. Esperança and Samet, H.,(1997): “An overview of the SAND spatial database system, to appear in *Communications of the ACM*”, (<http://www.cs.umd.edu/~hjs/pubs/sandprog.ps.gz>)
3. G. Hjaltason and Samet, H., “Ranking in Spatial Databases in *Advances in Spatial Databases —4th Symposium*”, SSD’95, M. J. Egenhofer and J. R. Herring, Eds., Lecture Notes in Computer Science 951,
4. Heywood, I., Comelius, S., and Carver, S., (1988): *An Introduction to Geographical Information Systems*, Addison Wiley Longmont, New York.

Course Name: Human & Environment System

Course Code: BSCHGEOGE202

Course Type: Generic Elective (Theoretical)	Course Details: GEC-2		L-T-P: 5-1-0		
Credit: 6	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		....	10	....	40

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. Understand the fundamental concepts of human-environment system.
2. Assess the vulnerability, risk and resilience issues associated with the human-environment interrelationships.
3. Develop possible solutions for addressing the contemporary sustainability challenges.

Course Content:

1. Concepts, components and theories of human and environment system
2. Biogeochemical cycles: CO₂, O₂, N₂; Hydrological Cycle; Interactions and impact between human and natural systems
3. Global and regional case studies: Himalaya-Ganga system; Atmosphere-water system; Surface and ground water and Coastal-water interaction
4. Integrated Assessment of Vulnerability, Risk, Resilience and Sustainability
5. Disaster Management, Governance and Policies

Continuous Assessment: Assignment on any issue related to interactions between human and natural systems and its impact on society



References/ Suggested Readings:

1. Clarke, G. L., (1967). *Elements of ecology*, New York: John Wiley Pub.
 2. Haden-Guest, S., Wright, J. K., and Teclaff, E. M.,(1956):*World Geography of Forest Resources*, New York: Ronald Press Co.
 3. Hoyt, J.B.,(1992):*Man, and the Earth*, Prentice Hall, U.S.A.
 4. Lapedes, D.N.,(1974):*Encyclopaedia of Environmental Science (eds.)*, McGraw Hill.
 5. Parmesan, C., Yohe, G.,(2003):*A globally coherent fingerprint of climate change impacts across natural systems*. *Nature*, 421 (6918), 37–42.
 6. Singh Savindra., (2015): *Paryawaran Bhoogol (Hindi)*, Prayag Pushtak Bhawan, Allahabad.
 7. Singh, R.B., Schickhoff, Udo and Mal, Suraj., (2016): *Climate Change, Glacier Response and Vegetation Dynamics in the Himalaya*, Springer, Switzerland.
 8. Singh, R.B., Prokop, Pawel., (Eds.) (2016):*Environmental Geography of South Asia*, Springer Japan
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**Semester- III****Course Name: Climatology and Oceanography****Course Code: BSCHGEOC301**

Course Type: Core (Theoretical)	Course Details: CC-5		L-T-P: 5 - 1 - 0		
Credit: 6	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		..	10	..	40

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. Understand the elements of weather and climate and its impacts at different scales.
2. Comprehend the climatic aspects and its bearing on planet earth.
3. Understand the oceanic process and availability of resources.

Course Content:

1. Atmospheric Composition and Structure: Variation with Altitude, Latitude and Season; Insolation and Temperature: Factors and Distribution; Heat Budget; Temperature Inversion
2. Atmospheric Pressure and Winds: Planetary Winds, Forces affecting Winds, General Circulation of Air, Jet Streams; Atmospheric Moisture: Evaporation, Humidity, Condensation, Fog and Clouds, Precipitation Types, Stability and Instability; Climatic Classification after Koppen and Thornthwaite (1948)
3. Cyclones: Tropical Cyclones, Temperate Cyclones; Monsoon - Origin and Mechanism with special reference to Jet Stream; El Nino and La Nina
4. Ocean Floor Topography: Pacific and Atlantic Ocean; Oceanic water Movements: Ocean Waves, Currents and Tides (Theories of origin: Progressive wave theory and stationary wave theory)
5. Ocean Salinity and Temperature: Distribution and Determinants; Coral Reefs (Darwin's theory); Marine Deposits and Ocean Resources

Continuous Assessment: Assignment on Indian Monsoon or Coral Reefs.

References/ Suggested Readings:

1. Anikouchine, W. A. and Sternberg, R. W., (1973): *The World Oceans: An Introduction to Oceanography*, Prentice-Hall.
2. Barry, R. G., and Chorley, R. J., (2009): *Atmosphere, Weather and Climate(9th Edition)*, Routledge, New York.
3. Bhutani, S., (2000): *Our Atmosphere*, Kalyani Publishers, Ludhina.
4. Critchfield, H. J., (1987): *General Climatology*, Prentice-Hall of India, New Delhi
5. Gupta, L.S., (2000): *JalvayuVigyan(Hindi)*, MadhyamKaryanvayNidishalya, Delhi VishwaVidhyalaya, Delhi
6. Kershaw, S., (2000): *Oceanography: An Earth Science Perspective*, Stanley Thornes, UK.
7. Lal, D. S., (2006): *JalvayuVigyan(Hindi)*, PrayagPustakBhavan, Allahabad



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8. Lutgens, F. K., Tarbuck E. J. and Tasa D., (2009): *The Atmosphere: An Introduction to Meteorology*, Prentice-Hall, Englewood Cliffs, New Jersey.
9. Oliver, J. E., and Hidore J. J., (2002): *Climatology: An Atmospheric Science*, Pearson Education, New Delhi.
10. Pinet, P. R., (2008): *Invitation to Oceanography* (Fifth Edition), Jones and Barlett Publishers, USA, UK and Canada.
11. Singh, S., (2009): *Jalvayu Vigyan (Hindi)*, Prayag Pustak Bhawan, Allahabad
12. Strahler, A.N., (1987) *Modern Physical Geography*, John Wiley and Sons, New York, Singapore.
13. Sverdrup, K. A. and Armbrust, E. V., (2008): *An Introduction to the World Ocean*, McGraw Hill, Boston.
14. Trewartha, G. T., and Horne L. H., (1980): *An Introduction to Climate*, McGraw-Hill.

Course Name: Geography of India

Course Code: BSCHGEOC302

Course Type: Core (Theoretical)	Course Details: CC-6		L-T-P: 5 - 1 - 0		
Credit: 6	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		..	10	..	40

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. Understand the physical profile of the country
2. Study the resource endowment and its spatial distribution and utilization for sustainable development
3. Synthesise and develop the idea of regional dimensions at present.

Course Content:

1. Physical Geography of India: Location, Physiographic Divisions; Characteristics and classification of Climate; Soil and Natural vegetation distribution
2. Population of India: Age-sex Structure; Growth and Distribution of Population; Distribution of Population by Race, Caste, Religion, Language, Tribes and their Correlates
3. Economic Geography of India: Mineral and Power Resources: Distribution and Utilization of Iron Ore, Coal, Petroleum, Natural Gas; Agricultural Production and Distribution of Rice, Wheat, Jute, Tea, Cotton
4. Regionalisation of India: Physiographic (R. L. Singh), Socio-Cultural (Sopher), Economic (Sengupta)
5. Spatial Patterns of Industrial Development of India: Automobile and Information Technology

Continuous Assessment: Assignment on any one macro physiographic region of India.



References/ Suggested Readings:

1. Deshpande, C. D., (1992): *India: A Regional Interpretation*, ICSSR, New Delhi.
2. Douglas, L. Johnson.,(2009): *World Regional Geography*, Tenth edition, Pearson Education Inc, New Jersey.
3. Johnson, B. L. C., ed. (2001):*Geographical Dictionary of India*. Vision Books, New Delhi.
4. Khullar, D.R. (2014): *India: A Comprehensive Geography*, Kalyani Publishers, New Delhi.
5. Majid Husain (2009): *Geography of India*, Tata McGraw hill Education Private Ltd, New Delhi.
6. Mandal, R. B. (ed.), (1990): *Patterns of Regional Geography–An International perspective. Vol. 3–Indian Perspective*
7. Pathak, C. R. (2003): *Spatial Structure and Processes of Development in India*. Regional Science Assoc., Kolkata.
8. Sdyasuk, Galina and P, Sengupta., (1967): *Economic Regionalisation of India*, Census of India.
9. Sharma, T.C. (2013): *Economic Geography of India*. Rawat Publication, Jaipur.
10. Singh R. L., (1971): *India: A Regional Geography*, National Geographical Society of India.
11. Singh, Jagdish.,(2003): *India - A Comprehensive & Systematic Geography*, Gyanodaya Prakashan, Gorakhpur.
12. Singh, R. B. and Prokop, Pawel.,(2016): *Environmental Geography of South Asia*, Springer, Japan.
13. Spate O. H. K. and Learmonth A. T. A., (1967): *India and Pakistan: A General and Regional Geography*, Methuen.
14. Tirtha, Ranjit (2002): *Geography of India*, Rawat Publs., Jaipur & New Delhi.
15. Tiwari, R.C. (2007): *Geography of India*. Prayag Pustak Bhawan, Allahabad.

Course Name: Fundamentals of Remote Sensing

Course Code: BSCHGEOC303

Course Type: Core (Practical)	Course Details: CC-7		L-T-P: 0 - 0 - 12		
Credit: 6	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	....	20	..

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. Appreciate the strength and application of remote sensing
2. Map the resources, their location and availability using GIS software.
3. Apply this knowledge for sustainable development at local to global level.

Course Content:

1. Remote Sensing: Definition, Development, Platforms and Types



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2. Concept of Aerial Photography and Satellite Remote Sensing: Principles, Types and Geometry of Aerial Photograph; Satellites – geostationary and remote sensing (Landsat and IRS) and Sensors, Resolution (Spectral, spatial and temporal)
3. Introduction to Image Processing and Data Analysis: Geo-Referencing; Editing and Output
4. Land use/ Land Cover Mapping: Visual Interpretation of Aerial photographs and Satellite Images
5. Application of Remote Sensing: Forests Monitoring, Water Resources and Natural hazards.

Continuous Assessment:

- i. Practical Record:** A project file consisting of one exercise will be done from aerial photos (scale, orientation and interpretation) and one exercise on using latest version of QGIS software on above mentioned themes in topic 3 and one exercise on topic 4. (10 Marks)
- ii. Class Test:** 20 Marks

References/ Suggested Readings:

1. Anji Reddy, M. (2008): Textbook of Remote Sensing and Geographic Information System, B.S. Publication, Hyderabad
 2. Campbell, J. B., (2007): *Introduction to Remote Sensing*, Guildford Press.
 3. Chauniyal, D.D., (2010): *SudurSamvedanevam Bhogolik Suchana Pranali (Hindi)*, Sharda Pustak Bhawan, Allahabad.
 4. Jensen, J. R., (2004): *Introductory Digital Image Processing: A Remote Sensing Perspective*, Prentice Hall Inc., New Jersey.
 5. Jensen, J.R. (2007): *Remote Sensing of the Environment: An Earth Resource Perspective*, Prentice-Hall Inc., New Jersey.
 6. Joseph, G. (2005): *Fundamentals of Remote Sensing*, United Press India.
 7. Kumar, Dilip, Singh, R.B. and Kaur, Ranjeet (2019): *Spatial Information Technology for Sustainable Development Goals*, Springer.
 8. Lillisand, T.M., and Kiefer, P.W., (2007): *Remote Sensing and Image Interpretation*, 6th Edition, John Wiley & Sons, New York.
 9. Nag, P. and Kudrat, M., (1998): *Digital Remote Sensing*, Concept, New Delhi.
 10. Rees, W. G., (2001): *Physical Principles of Remote Sensing*, Cambridge University Press.
 11. Sarkar, A. (2015): *Practical geography: A systematic approach*. Orient Black Swan Private Ltd., New Delhi
 12. Singh, R. B. and Murai, S., (1998): *Space-informatics for Sustainable Development*, Oxford and IBH Pub.
 13. Wolf, P. R. and Dewitt, B. A., (2000): *Elements of Photogrammetry: With Applications in GIS*, McGraw-Hill.
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Course Name: Geographic Information System

Course Code: BSCHGEOSE301

Course Type: Skill Enhancement (Practical)	Course Details: SEC-1		L-T-P: 0 - 0 - 8		
Credit: 4	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	..	20	..

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. Understand various components and principles of GIS
2. Construct the thematic maps using different digital layers
3. Apply GIS in various geographical studies

Course Content:

1. Geographical Information System (GIS): Definition and Components.
2. Global Positioning System (GPS): Principles and Uses.
3. GIS Data Structures: Types (spatial and non-spatial), Raster and Vector Data Structure.
4. GIS Data Analysis: Input; Geo-Referencing; Editing, Output and Query; Overlays.
5. Application of GIS: Land Use Mapping highlighting the open cast collieries in Paschim Bardhaman District, Representation of Socio-economic Data-Choropleth, Bar Graph

Continuous Assessment:

i. Practical Record: A project file consisting of 3 exercises using latest version of QGIS Software on above mentioned themes and preparation of map using GPS (10 Marks)

ii. Class Test: 20 Marks

References/ Suggested Readings:

1. Bhatta, B., (2010): *Analysis of Urban Growth and Sprawl from Remote Sensing*, Springer, Berlin Heidelberg.41
2. Burrough, P.A., and McDonnell, R.A. (2000): *Principles of Geographical Information System-Spatial Information System and Geo-statistics*. Oxford University Press
3. Chauniyal, D.D. (2010): *Sudur Samvedan evam Bhogolik Suchana Pranali*, Sharda Pustak Bhawan, Allahabad
4. Gomasasca, M. A. (2009) *Basics of Geomatics*, Springer Science, New York
5. Heywoods, I., Cornelius, S and Carver, S., (2006): *An Introduction to Geographical Information system*. Prentice Hall.
6. Jha, M.M. and Singh, R.B., (2008) *Land Use: Reflection on Spatial Informatics Agriculture and Development*, New Delhi: Concept.
7. Kumar, Dilip, Singh, R.B. and Kaur, Ranjeet (2019): *Spatial Information Technology for Sustainable Development Goals*, Springer.
8. Nag, P. (2008) *Introduction to GIS*, Concept India, New Delhi.
9. Sarkar, A. (2015) *Practical geography: A systematic approach*. Orient Black Swan Private Ltd., New Delhi



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10. Singh, R.B. and Murai, S. (1998) *Space Informatics for Sustainable Development*, Oxford and IBH, New Delhi.

Course Name: Spatial Statistical Techniques

Course Code: BSCHGEOSE302

Course Type: Skill Enhancement (Practical)	Course Details: SEC-1		L-T-P: 0 - 0 - 8		
Credit: 4	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	...	20	...

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. Understand the basics of data collection and, processing for the meaningful outcomes
2. Understand the selection of proper sampling techniques for the collection of data
3. Put into practice the results obtained for spatial analysis of results and to apply various statistical softwares for the study

Course Content:

1. Statistics and Statistical Data: Spatial and non-spatial
2. Probability theory, probability density functions with respect to Normal, Binomial and Poisson distributions and their geographical applications
3. Sampling plans for spatial and non-spatial data, sampling distributions; sampling estimates for large and small samples tests involving means and proportions
4. Correlation and Regression Analysis: Rank order correlation and product moment correlation; linear regression, residuals from regression, Introduction to multi-variate regression and correlation analysis (partial and multiple)
5. Time Series Analysis: Time Series processes -Semi average, moving average and least square method

Note: MS Excel to be used for practice.

Continuous Assessment:

- Practical Record:** A project file consisting of any 5 exercises using MS Excel on above mentioned themes (10 Marks)
- Class Test:** 20 Marks

References/ Suggested Readings:

1. Bart, James, E, and Gerald, M. Barber., (1996): *Elementary Statistics for Geographers*, The Guilford Press, London.
2. Cressie, N.A.C., (1991): *Statistics for Spatial Analysis*, Wiley, New York.
3. Eldon, D., (1983): *Statistics in Geography: A Practical Approach*, Blackwell, London.
4. Gregory, S., (1978): *Statistical Methods and the Geographer (4th Edition)*, Longman, London.



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5. Haining, R.P., (1990): *Spatial Data Analysis in the Social and Environmental Science*, Cambridge University Press, Cambridge.
6. Hammond, R. and McCullagh, P.S., (1974): *Quantitative Techniques in Geography: An Introduction*, Clarendon Press, Oxford.
7. Mathews, J.A., (1987): *Quantitative and Statistical Approaches to Geography: A Practical Manual*, Pergamon, Oxford.
8. Mc Grew, Jr. and Cahrles, B. M., (1993): *An Introduction to Statistical Problem Solving in Geography*, W.C. Brocan Publishers, New Jersey.
9. Rogerson ,P. A. (2001) *Statistical Methods for Geography*, Sage Publications, New Delhi.
10. Wei, W.S.,(1990): *Time Series Analysis: Variate and Multivariate Methods* , Addison Wesley Publishing.
11. Yeates, Mauris, (1974): *An Introduction to Quantitative Analysis in Human Geography*, McGrawhill, New York.

Course Name: Geographical Techniques

Course Code: BSCHGEOSE303

Course Type: Skill Enhancement (Practical)	Course Details: SEC-1		L-T-P: 0-0-8		
Credit: 4	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	.....	20	.....

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. Gain knowledge about drawing of longitudinal sections and interpretation of structure of the geological maps.
2. Predict Soil fertility (NPK, pH).
3. Acquire practical knowledge about the application of various metrological instruments.
4. Interpret and predict the climatic condition of an area.

Course Content:

1. Geological map: Analysis of geological maps (Horizontal, Uniclinal and folded structure along with intrusions and unconformities)
2. Identification of rocks and minerals: granite, basalt, dolerite, pegmatite, limestone, shale, sandstone, phyllite, slate, conglomerate, laterite, marble, schist, quartzite, bauxite, gypsum, calcite, chalcopryrite, feldspar, galena, haematite, magnetite, mica, quartz and talc
3. Measurement of soil nutrient (NPK) and Soil pH by using soil kit
4. Measurement of weather elements by Meteorological Instruments: Hygrometer, Maximum Minimum Thermometer, Fortin's barometer, Rain gauge (Simon's)
5. Preparation of Climatic Graphs and Charts: Taylor's Climograph, Hythergraph, Star Diagram and Ergograph

Continuous Assessment:

- i. **Practical Record:** A project file covering all practical topics must be prepared (10 Marks).



ii. **Class Test:** 20 Marks

References/ Suggested Readings:

1. Ahmed, I.,(1994): Practical Geography, Jawahar Publishers and Distributors, New Delhi
2. Bennison, G.M., (1990): An Introduction to Geological Structures and Maps (5th Ed.), Springer.
3. Billings, M.P., (1971): Structural Geology, Pearson.
4. Bolton, T.,(1989): Geological Maps – Their Solution and Interpretation, Cambridge University Press.
5. Borradaile, Graham., (2014): Understanding Geology through Maps, Elsevier, Inc.
6. Khan, MD.Z.A., (1998): Text Book of Practical Geography: Concept Publishing Company.
7. Khullar.D .,(2014): King’s Practical Geography, Educational Publisher, Delhi
8. Maltman, A.,(1990): *Geological Maps: An Introduction*, Open University Press, Buckingham.
9. Monkhouse F. J and Wilkinson,H.R., (1971): Maps and Diagrams B.I. publications private limited, new Delhi
10. Platt, J.I. and Challinor, J., (1956): *Simple Geological Structures (A Series of Notes and Map Exercises)*, Thomas Murby & Co, London.
11. Platt, J.I., (1974): Selected Exercises upon Geological Map, Part I, Unwin, London.
12. Roy, A. K.,(1966): Introduction to the study of geological maps, World Press Private Ltd
13. Saha, P.K. and Basu P., (2004): Advanced Practical Geography: Books and Allied Kolkata
14. Sarkar, A., (2015) Practical geography: A systematic approach. Orient Black Swan Private Ltd., New Delhi
15. Sen, A.K.,(1995): *Laboratory Manual of Geology*, Modern Book Agency (P) Ltd., Kolkata.
16. Singh R. L. and Singh R. P. B., (1999): Elements of Practical Geography, Kalyani Publishers
17. United States Department of Agriculture (USDA) (2014): *Soil Survey and Laboratory Methods Manual*, Soil Survey Investigations Report No. 51.
18. Weil, R.R. and Brady, N.C., (2006): The Nature and Properties of Soils (15th Ed.), Pearson.

Course Name: Climate Change, Vulnerability and Adaptation

Course Code: BSCHGEOGE301

Course Type: Generic Elective (Theoretical)	Course Details: GEC-3		L-T-P: 5 - 1 - 0		
Credit: 6	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		...	10	...	40

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. Understand the foundational concepts of climate change and its impacts.
2. Assess the human and environmental vulnerability to climate change.
3. Learn the various adaptation and mitigation for reducing the impacts of climate change and national action plan.

Course Content:

1. Climate Change: Understanding Climate Change; Greenhouse Gases and Global Warming; Global Climatic Assessment- IPCC



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2. Climate Change and Vulnerability: Physical Vulnerability; Economic Vulnerability; Social Vulnerability
3. Impact of Climate Change: Agriculture and Water; Biodiversity; Human Health
4. Adaptation and Mitigation: Global Initiatives with Particular Reference to South Asia
5. National Action Plan on Climate Change in India and Role of Local Institutions (Urban Local Bodies, Panchayats)

Continuous Assessment: Assignment on impact of climate change.

References/ Suggested Readings:

1. IPCC (2014): *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
2. IPCC (2007): *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change.*
3. OECD (2008): *Climate Change Mitigation: "What do we do?"* (Organisation and Economic Co-operation and Development).
4. Sen, Roy, S., and Singh, R.B., (2002): *Climate Variability, Extreme Events and Agricultural Productivity in Mountain Regions*, Oxford & IBH Pub., New Delhi.
5. Singh, M., Singh, R.B., and Hassan, M.I., (Eds.) (2014): *Climate change and biodiversity*, Proceedings of IGU Rohtak Conference, Volume 1. Advances in Geographical and Environmental Studies, Springer
6. Singh, R.B., Mal, Suraj, and Huggel, Christian (2018): *Climate Change, Extreme Events and Disaster Risk Reduction*, Springer, Switzerland, pages 309.
7. UNEP (2007): *Global Environment Outlook: GEO4: Environment for Development*, United Nations Environment Programme.

Course Name: Rural Development

Course Code: BSCHGEOGE302

Course Type: Generic Elective (Theoretical)	Course Details: GEC-3		L-T-P: 5 - 1 - 0		
Credit: 6	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
	...	10	...	40	

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. Appreciate the concepts, needs and various approaches to rural development;
2. Understand the strong economic bases of rural areas of India;
3. Appreciate the area based and target group-based approaches and provision of services to rural development.



Course Content:

1. Defining Development: Inter-Dependence of Urban and Rural Sectors of the Economy; Need for Rural Development; Gandhian Approach of Rural Development
2. Rural Economic Base: Panchayati Raj System, Agriculture and Allied Sectors, Seasonality and Need for Expanding Non-Farm Activities, Co-operatives, PURA
3. Area Based Approach to Rural Development: Drought Prone Area Programmes, Rural Connectivity -PMGSY
4. Target Group Approach to Rural Development: SJGSY, MGNREGA and Jan Dhan Yojana
5. Provision of Rural Services in India – Physical and Socio-Economic Access to Elementary Education and Primary Health Care and Micro credit

Continuous Assessment: Assignment on any one rural development programme

References/ Suggested Readings:

1. Anand, Subhash.,(2013): *Dynamics of Rural Development*, Research India Press, Delhi
2. Gilg, A. W., (1985): *An Introduction to Rural Geography*, Edwin Arnold, London.
3. Krishnamurthy, J.,(2000): *Rural Development - Problems and Prospects*, Rawat Publs., Jaipur
4. Lee, D. A. and Chaudhri, D. P., (eds.)(1983): *Rural Development and State*, Methuen, London.
5. Misra, R. P., and Sundaram, K. V., (eds.)(1979): *Rural Area Development: Perspectives and Approaches*, Sterling, New Delhi.
6. Misra, R. P., (ed.), (1985): *Rural Development: Capitalist and Socialist Paths*, Vol. 1, Concept, New Delhi.
7. Palione, M., (1984): *Rural Geography*, Harper and Row, London.
8. Ramachandran, H., and Guimaraes, J.P.C., (1991): *Integrated Rural Development in Asia– Learning from Recent Experience*, Concept Publishing, New Delhi.
9. Robb, P.,(1983): *Rural South Asia: Linkages, Change and Development*, Curzon Press.
10. Singh, R.B., (1985): *Geography of Rural Development*, Inter India, New Delhi.
11. UNAPDI (1986):*Local Level Planning and Rural Development: Alternative Strategies*. (United Nations Asian & Pacific Development Institute, Bangkok), Concept Publs. Co., New Delhi.
12. Wanmali, S., (1992): *Rural Infrastructure Settlement Systems and Development of the Regional Economy in South India*, International Food Policy Research Institute, Washington, D.C.
13. Yugandhar, B. N. and Mukherjee, Neela., (eds.) (1991): *Studies in Village India: Issues in Rural Development*, Concept Publications. Co., New Delhi.



Semester-IV

Course Name: Introduction to Global Economic System

Course Code: BSCHGEOC401

Course Type: Core (Theoretical)	Course Details: CC-8		L-T-P: 5-1-0		
Credit: 6	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		.....	10	.....	40

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. Know different types of economic activities and their utilities.
2. Understand the theories that are relevant to contemporary world.
3. Examine the importance of economic initiatives that are crucial to development.

Course Content:

1. Introduction to Global Economic System; Concept and Classification of Economic Activities
2. Theories: Agricultural location theory (Von Thunen); Theory of Industrial location (Weber's and Losch theory)
3. Primary Activities: Types of Agriculture, Forestry, Fishing and Mining activities
4. Secondary Activities: Global distribution of Manufacturing activities (Cotton Textile, Iron and Steel), Concept of Manufacturing Regions; Special Economic Zones and Technology Parks
5. Tertiary Activities: Role of Transport, Trade and Service in Economic Development

Continuous Assessment: Assignment on Eco-farming/agro-based activities

References/ Suggested Readings:

1. Alexander, J. W., (1963): *Economic Geography*, Prentice-Hall Inc., Englewood Cliffs, New Jersey.
2. Bagchi-Sen, S. and Smith, H. L., (2006): *Economic Geography: Past, Present and Future*, Taylor and Francis.
3. Clark, Gordon L.; Feldman, M.P. and Gertler, M.S., eds. (2000): *The New Oxford Handbook of Economic Geography*, Oxford Press.
4. Coe, N. M., Kelly P. F. and Yeung H. W., (2007): *Economic Geography: A Contemporary Introduction*, Wiley-Blackwell.
5. Combes, P., Mayer T. and Thisse, J. F., (2008): *Economic Geography: The Integration of Regions and Nations*, Princeton University Press.
6. Durand, L., (1961): *Economic Geography*, Crowell.
7. Hodder, B. W. and Lee, Roger, (1974): *Economic Geography*, Taylor and Francis.



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Course Name: Environment and Natural Resource Management

Course Code: BSCHGEOC402

Course Type: Core (Theoretical)	Course Details: CC-9		L-T-P: 5-1-0		
Credit: 6	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		...	10	...	40

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. Understand the relationship between man and environment.
2. Have good understanding on distribution, utilization and proper management of natural resources.
3. Know about the necessities that are pre-requisite for assessment and review of planning and policies.

Course Content:

1. Concept of Environment and Natural Resource Management, Human-Environment Relationships
2. Ecosystem: Concept, Structure and Functions; Environmental Issues in Tropical, Temperate and Polar Ecosystems
3. Natural Resource: Concept, Classification; Distribution, Utilisation, Problems and Management of Land, Water, Forests and Energy
4. Conservation of Environment and Natural Resources with special reference to Soil, Water, Forest; Sustainable Resource Development
5. Environmental Monitoring Programme: Policies – Global, National and Local

Continuous Assessment: Assignment on Local Environmental Issues

References/ Suggested Readings:

1. Chandna, R. C., (2002): *Environmental Geography*, Kalyani, Ludhiana.
2. Cunningham, W. P. and Cunningham, M. A., (2004): *Principals of Environmental Science: Inquiry and Applications*, Tata Macgraw Hill, New Delhi.
3. Goudie, A., (2001): *The Nature of the Environment*, Blackwell, Oxford.
4. Holechek, J. L. C., Richard, A., Fisher, J. T. and Valdez, R., (2003): *Natural Resources: Ecology, Economics and Policy*, Prentice Hall, New Jersey.
5. Jones, G. and Hollier, G., (1997): *Resources, Society and Environmental Management*, Paul Chapman, London.
6. Kumaraswamy, K., Alagappa Moses., A & Vasanthy, M. (2004) *Environmental Studies*, Bharathidasan University, Tiruchirappalli.
7. Miller, G. T., (2004): *Environmental Science: Working with the Earth*, Thomson BrooksCole, Singapore.
8. Mitchell, B., (1997): *Resource and Environmental Management*, Longman Harlow, England.



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9. MoEF, (2006): *National Environmental Policy-2006*, Ministry of Environment and Forests, Government of India.
10. Odum, E. P. et al, (2005): *Fundamentals of Ecology*, Ceneage Learning India.
11. Saxena, H.M., 2012: *Environmental Studies*, Rawat Publications, Jaipur.
12. Singh, R.B., and Hietala, R. (Eds.) (2014): *Livelihood security in Northwestern Himalaya: Case studies from changing socio-economic environments in Himachal Pradesh, India. Advances in Geographical and Environmental Studies*, Springer
13. Singh, Savindra.,(2001): *Paryavaran Bhugol (Hindi)*, Prayag Pustak Bhawan, Allahabad. (in Hindi)
14. Singh,R.B., Prokop, Pawel (Eds.) (2016):*Environmental Geography of South Asia*, Springer Japan
15. UNEP, (2007): *Global Environment Outlook: GEO4: Environment for Development*, United Nations Environment Programme.

Course Name: Digital Remote Sensing

Course Code: BSCHGEOC403

Course Type: Core (Practical)	Course Details: CC-10		L-T-P: 0-0-12		
Credit: 6	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	.....	20	.....

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. Develop the skill so as to use digital satellite data using software
2. Prepare the maps based with satellite data to compare with the ground realities.
3. Classify digital data for the land use/land cover and urban studies

Course Content:

1. EMR Interaction with Atmosphere and Earth Surface; Concept of Image Processing (Digital and Visual): Pre-processing (Atmospheric, Radiometric and Geometric Correction); Enhancement (Filtering); Classification (Supervised and Un-supervised)
2. Digital Image Processing and Interpretation
3. Application of Digital Remote Sensing: Land Use /Land Cover Mapping and Interpretation
4. Application of Digital Remote Sensing in Urban Studies with special reference to Urban Sprawl Analysis, Mapping and Interpretation
5. Application of Remote Sensing in weather (tropical cyclones) studies and natural hazards (floods)

Continuous Assessment:

- i. **Practical Record:** A project file consisting of 3 exercises on topic 2, 3 and 4 (10Marks)
- ii. **Class Test:** 20 Marks



References/ Suggested Readings:

1. Bhatta, B., (2008): *Remote Sensing and GIS*, Oxford University Press, New Delhi.
2. Campbell, J. B., (2007): *Introduction to Remote Sensing*, Guildford Press
3. Chauniyal, D., (2010): *Sudur Samvedana Avam Bhaugolik Suchna Pranali*, Sharda Pustak Bhawan, Allahabad.
4. Hord R.M.,(1989): *Digital Image Processing of Remotely Sensed Data*, Academic, New York.
5. Jensen, J. R., (2005): *Introductory Digital Image Processing: A Remote Sensing Perspective*, Pearson Prentice-Hall.
6. Jensen, J. R.,(2007): *Remote Sensing of the Environment: An Earth Resource Perspective*, Prentice-Hall Inc, New Jersey.
7. Joseph, G.,(2005): *Fundamentals of Remote Sensing*, United Press India.

Course Name: Introduction to GI Science

Course Code: BSCHGEOSE401

Course Type: Skill Enhancement (Practical)	Course Details: SEC-2			L-T-P: 0-0-8	
Credit: 4	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	...	20	...

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. Have comprehensive understanding of GIS.
2. Have knowledge of using GPS & DGPS for the accurate location
3. Apply the GIScience platform for map making.

Course Contents:

1. Evolution of GIScience, Institutions and GI data sharing, GIS: Definition and Components
2. Global Positioning System (GPS) – Principles and Uses
3. GIS Data Structures: Types (spatial and Non-spatial), Raster and Vector Data Structure, Overlays – Point, Line and Areal Data
4. GIS Data Analysis: Input; Geo-Referencing; Editing, Query
5. Application of GIS: Land Use Mapping; Forests Monitoring and Natural Disaster

Continuous Assessment:

i. Practical Record: A project file consisting of 5 exercises on using any GIS Software on above mentioned themes (10Marks)

ii. Class Test: 20 Marks



References/ Suggested Readings:

1. Bhatta, B., (2010): *Analysis of Urban Growth and Sprawl from Remote Sensing*, Springer, Berlin Heidelberg 41
2. Burrough, P.A., and McDonnell, R.A., (2000): *Principles of Geographical Information System-Spatial Information System and Geo-statistics*. Oxford University Press
3. Chauniyal, D.D., (2010): *Sudur Samvedan evam Bhogolik Suchana Pranali*, Sharda Pustak Bhawan, Allahabad
4. Heywoods, I., Cornelius, S and Carver, S., (2006): *An Introduction to Geographical Information system*, Prentice Hall.
5. Jha, M.M. and Singh, R.B. (2008): *Land Use: Reflection on Spatial Informatics Agriculture and Development*, Concept Publishing, New Delhi.
6. Kumar, Dilip, Singh, R.B. and Kaur, Ranjeet(2019): *Spatial Information Technology for Sustainable Development Goals*, Springer, 2019.
7. Nag, P., (2008): *Introduction to GIS*, Concept India, New Delhi.
8. Sarkar, A., (2015): *Practical geography: A systematic approach*, Orient Black Swan Private Ltd., New Delhi
9. Singh, R.B. and Murai, S., (1998): *Space Informatics for Sustainable Development*, Oxford and IBH, New Delhi.

Course Name: Thematic Atlas

Course Code: BSCHGEOSE402

Course Type: Skill Enhancement (Practical)	Course Details: SEC-2		L-T-P: 0-0-8		
Credit: 4	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	...	20	...

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. Have sound knowledge regarding the classification and elements of maps.
2. Have proper utilization of maps for explaining geographical issues.
3. Know the methods of preparation of various thematic maps.

Course Content:

1. Maps – Classification and Types; Principles of Map Design
2. Diagrammatic Data Presentation – Line Graph, Bar Graph, Proportional Circle, Pie Graph
3. Thematic Mapping Techniques – Properties, Uses and Limitations; Areal Data -Choropleth, Dot, Proportional Sphere; Isopleths map
4. Cartographic Overlays – Point, Line and Areal Data
5. Rainfall dispersion diagram, Line graph showing trend of population growth, β index map

Continuous Assessment:

i. Practical Record: A Thematic Atlas should be prepared on a specific theme with at least five plates for any state in India. (10Marks)

ii. Class Test: 20 Marks



References/ Suggested Readings:

1. Singh, R. L, and Dutta, P. K., (2012): *Prayogatama Bhugol*, Central Book Depot, Allahabad
2. Cuff, J. D. and Mattson, M. T., (1982): *Thematic Maps: Their Design and Production*, Methuen Young Books
3. Dent, B. D., Torguson, J. S., and Holder, T. W., (2008): *Cartography: Thematic Map Design* (6th Edition), McGraw Hill Higher Education
4. Gupta, K. K. and Tyagi, V. C., (1992): *Working with Maps*, Survey of India, DST, New Delhi.
5. Kraak, M.J. and Ormeling, F., (2003): *Cartography: Visualization of Geo-Spatial Data*, Prentice-Hall.
6. Mishra, R. P. and Ramesh, A., (1989): *Fundamentals of Cartography*, Concept, New Delhi.
7. Sarkar, A., (2015): *Practical geography: A systematic approach*. Orient Black Swan Private Ltd., New Delhi
8. Sharma, J. P., (2010): *Prayogic Bhugol (Hindi)*, Rastogi Publishers, Meerut.
9. Singh, R. L. and Singh, Rana, P. B., (1999): *Elements of Practical Geography*, Kalyani Publishers.
10. Singh, L. R, & Singh. R., (1977): *Manchitra or Prayogatamek Bhugol (Hindi)*, Central Book Depot, Allahabad
11. Singh, R.L. and Dutt, P.K. (1979) *Elements of Practical Geography*, Kalyani Publishers, New Delhi
12. Slocum, T. A., McMaster, R. B. and Kessler, F. C., (2008): *Thematic Cartography and Geovisualization* (3rd Edition), Prentice Hall.
13. Tyner, J. A., (2010): *Principles of Map Design*, The Guilford Press.

Course Name: Industrial Development

Course Code: BSCHGEOGE401

Course Type: Generic Elective (Theoretical)	Course Details: GEC-4		L-T-P: 5-1-0		
Credit: 6	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
	....	10	....	40	

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. Understand the factors responsible for location of an industry.
2. Differentiate various types of industries and gain knowledge about industrial regions and policies of India.
3. Understand the socio- economic and environmental implications of various types of industries.

Course Content:

1. Nature and Scope of Industrial Geography



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2. Types, Geographical Characteristics and Location of Industries, Weber's Theory of Industrial Location
3. Small, Medium and Heavy Industries: Coal and Iron based industries, Agro-based Industries, Footloose Industry
4. Mega Industrial Complexes: National Capital Region, Mumbai-Pune Industrial Region, Bengaluru-Chennai Industrial Region and Chota-Nagpur Industrial Region
5. Industrial Policy of India, Impact of Industrialisation in India

Continuous Assessment: Assignment on Environmental impact of any given industry.

References/ Suggested Readings:

1. Gunnar, Alexandersson., (1967): "*Geography of Manufacturing*, Prentice Hall, New Jersey
2. Leong, G.C., (1997): "*Human and economic geography*", Oxford University Press, New York.
3. Miller, E., (1962): *Geography of Manufacturing*, Prentice Hall, Englewood Cliff, New Jersey
4. Pathak, C. R.,(2003): *Spatial Structure and Processes of Development in India*. Regional Science Assoc., Kolkata.
5. Sharma, T.C., (2013): *Economic Geography of India*, Rawat Publication, Jaipur
6. Singh, Jagdish (2003): *India - A Comprehensive & Systematic Geography*, Gyanodaya Prakashan, Gorakhpur.

Course Name: Sustainable Resource Development

Course Code: BSCHGEOGE402

Course Type: Generic Elective (Theoretical)	Course Details: GEC-4		L-T-P: 5-1-0		
Credit: 6	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		....	10	....	40

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. Understand difficulties in defining the components of sustainable development in different contexts.
2. Distinguish the patterns of regional development of the world and the need for sustainable development plan.
3. Critically analyse the efforts and initiatives of the Governments in reducing the levels of poverty and inequality among the people of various countries.

Course Content:

1. Sustainable Resource Development: Definition, Components and Limitations
2. The Millennium Development Goals: National Strategies and International Experiences
3. Sustainable Regional Development: Need and examples from different Ecosystems



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4. Inclusive Development: Poverty and Inequality; Education, Health; The role of higher education in sustainable resource development; The Challenges of Universal Health Coverage
5. Sustainable Development Policies and Programmes: Goal-Based Development; Sustainable Development Goals; Financing for Sustainable Development; Principles of Good Governance; National Environmental Policy, Clean Development Mechanism

Continuous Assessment: Assignment on Sustainable Development Goals

References/ Suggested Readings:

1. Agyeman, Julian, Robert D. Bullard and Bob, Evans., (Eds.) (2003): *Just Sustainabilities: Development in an Unequal World*. London: Earthscan. (Introduction and conclusion.).
 2. Ayers, Jessica and David, Dodman., (2010): “*Climate change adaptation and development I: the state of the debate*”. *Progress in Development Studies* 10(2): 161-168.
 3. Baker, Susan., (2006): *Sustainable Development*. Milton Park, Abingdon, Oxon; New York, N.Y.: Routledge.
 4. Brosius, Peter., (1997): “*Endangered forest, endangered people: Environmentalist representations of indigenous knowledge*”, *Human Ecology* 25: 47-69.
 5. Lohman, Larry., (2003): *Re-imagining the population debate*, Corner House Briefing.
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Semester- V

Course Name: Regional Planning and Sustainable Development

Course Code: BSCHGEOC501

Course Type: Core (Theoretical)	Course Details: CC-11		L-T-P: 5 - 1 - 0		
Credit: 6	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		...	10	...	40

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. Identify notable backward regions and solutions for their overall development
2. Have comprehensive understanding regarding the different regions and application of different models and theories for integrated regional development.
3. Select appropriate indicators for the measurement of socio-economic regional development.

Course Content:

1. Concept of Region; Formal, Functional, and Planning Regions; Evolution, Need and Types of Regional Planning
2. Choice of a Region for Planning: Characteristics of Planning Region; Delineation of Planning Region; Regionalization of India for Planning, Agro- Ecological Zones
3. Theories and Models for Regional Planning: Myrdal, Hirschman, Rostow and Friedman; Growth Pole Model of Perroux; Village Cluster
4. Sustainable Development: Concept of Development and Underdevelopment; Efficiency-Equity Debate: Definition, Components and Sustainability for Development. Indicators (Economic, Social and Environmental)
5. Sustainable Development Policies and Programmes: Rio+20; Goal-Based Development; Financing for Sustainable Development

Continuous Assessment: Assignment on Sustainable Development Programme.

References/ Suggested Readings:

1. Agyeman, Julian, Robert, D. Bullard and Bob, Evans., (Eds.) (2003): *Just Sustainabilities: Development in an Unequal World*. London: Earthscan. (Introduction and conclusion.).
2. Anand, Subhash., (2011): *Ecodevelopment : Glocal Perspectives*, Research India Press, New Delhi.
3. Ayers, Jessica and David Dodman., (2010): "Climate change adaptation and development I: the state of the debate". *Progress in Development Studies* 10 (2): 161-168.
4. Baker, Susan., (2006): *Sustainable Development*. Milton Park, Abingdon, Oxon; New York, N.Y.: Routledge. (Chapter 2, "The concept of sustainable development").
5. Blij, H. J. De., (1971): *Geography: Regions and Concepts*, John Wiley and Sons.



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6. Friedmann, J. and Alonso W. (1975): *Regional Policy - Readings in Theory and Applications*, MIT Press, Massachusetts.
7. Gore C. G., (1984): *Regions in Question: Space, Development Theory and Regional Policy*, Methuen, London.
8. Haynes J., (2008): *Development Studies*, Polity Short Introduction Series.
9. Johnson E. A. J., (1970): *The Organization of Space in Developing Countries*, MIT Press, Massachusetts.
10. Misra, R. P., Sundaram, K.V.andV.L.S.Prakasa Rao, (1974): *Regional Development planning in India*, Vikas Publishing House Delhi.
11. Peet, R., (1999): *Theories of Development*, The Guilford Press, New York.
12. Singh, R.B. (2002): *Human Dimensions of Sustainable Development*, Rawat Pub., Jaipur, pages
13. UNDP (2001-04): *Human Development Report*, Oxford University Press.

Course Name: Field Techniques, Surveying and Research Methods

Course Coe: BSCHGEOC502

Course Type: Core (Practical)	Course Details: CC-12		L-T-P: 0 - 0 - 12		
Credit: 6	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	...	20	...

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. Conduct proper field work for the collection of primary data to bring out grassroots realities.
2. Make use of proper tools and surveying methods for measurement in context of collection and processing of data.
3. Prepare a report based on field data.

Course Content:

1. Meaning, Significance, Types and Approaches to Research in Geography; Literature review; Field Work in Geographical Studies –Defining the Field and Identifying the Case Study
2. Research Design: Identification of Research Problem; Research questions. Data Collection: Type and Sources of Data; Methods of Collection; Data Analysis, Data Representation Techniques
3. Field Techniques – Merits, Demerits and Selection of the Appropriate Technique; Observation (Participant / Non-Participant), Questionnaires (Open/ Closed / Structured / Non-Structured)
4. Surveying Use of Field Tools: Dumpy level, Prismatic Compass, Theodolite
5. Designing the Field Report – Aims and Objectives, Methodology, Analysis, Interpretation and Writing the Report



Continuous Assessment:

i. Practical Record: Field Survey and Report (20 Marks)

1. Each student will prepare an individual report based on primary and secondary data collected during fieldwork.
2. The duration of the fieldwork should not exceed 10 days.
3. The word count of the report (hand written) should be about 5000 to 8000 excluding figures, tables, photographs, maps, references and appendices. Total pages of the report have to be within 25 pages.
4. One copy of the report on A 4 size paper should be submitted in soft binding.

ii. Class Test: 10 Marks

References/ Suggested Readings:

1. Creswell, J., (1994): *Research Design: Qualitative and Quantitative Approaches* Sage Publications.
2. Dikshit, R. D.,(2003):*The Art and Science of Geography: Integrated Readings*, Prentice-Hall of India, New Delhi.
3. Evans, M., (1988): “Participant Observation: The Researcher as Research Tool” in *Qualitative Methods in Human Geography*, eds. J. Eyles and D. Smith, Polity.
4. Misra, R.P., (2014). *Fundamentals of Cartography*. (Second revised, enlarged Edition). Concept Publishing, New Delhi.
5. Mukherjee, Neela,(1993): *Participatory Rural Appraisal: Methodology and Application*, Concept Publs. Co., New Delhi.
6. Mukherjee, Neela.,(2002):*Participatory Learning and Action: with 100 Field Methods*. Concept Publs. Co., New Delhi
7. Robinson, A., (1998): "Thinking Straight and Writing That Way", in *Writing Empirical Research Reports: A Basic Guide for Students of the Social and Behavioural Sciences*, eds. by F. Pryczak and R. Bruce Pryczak, Publishing: Los Angeles.
8. Singh, R.L., & Dutta, P.K., (2012): *Prayogatmak Bhugol* (Hindi). Central Book Depot, Allahabad.
9. Special Issue on “Doing Fieldwork” *The Geographical Review* 91:1-2 (2001).
10. Stoddard, R. H., (1982): *Field Techniques and Research Methods in Geography*, Kendall/Hunt.
11. Wolcott, H., (1995): *The Art of Fieldwork*, Alta Mira Press, Walnut Creek, CA.

Course Name: Geography of West Bengal

Course Code: BSCHGEODSE501

Course Type: Discipline Specific Elective (Theoretical)	Course Details: DSEC-1		L-T-P: 5 - 1 - 0		
Credit: 6	Full Marks:	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
	50	....	10	....	40

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. Understand physical geography of West Bengal and availability of resources
2. Understand the demography, economy and regional issues of West Bengal



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3. Assess the developmental problems of West Bengal in the context of future planning

Course Content:

1. Physiography of West Bengal: Physiography and Broad Physiographic Division, Climate, Drainage System and Ground Water, Soil and Forest resources
2. Demography of West Bengal: Population Composition (age, sex, literacy, religion and caste) Population Growth and distribution, Urbanization (Characteristics and Pattern)
3. Economy of West Bengal: Irrigation and Agriculture, Mining, Industries and transport development
4. Developmental Perspective of Special Regions in West Bengal: Darjeeling Hill Region, Paschimanchal Region, Sundarban Region
5. Developmental Problems and Potentials of West Bengal: Deforestation and Joint Forest Management, Special Economic Zones, Regional Dimension of Human Development

Continuous Assessment: Assignment on any developmental issues of West Bengal.

References/ Suggested Readings:

1. Bandyopadhyay S. et.al (2004), eds. Geomorphology and Environment, ACB Publications, Kolkata
2. Basu R. and Bhaduri S. (2007), eds. Contemporary Issues and Techniques in Geography, Progressive Publishers, Kolkata
3. Bose S.C. (1968), Geography of West Bengal, NBT, New Delhi
4. GoWB (2004) West Bengal Human Development Report, UNDP
5. Singh G. (2004), A Geography of India, Atma Ram and Sons, New Delhi
6. Singh R. L. (1971), India A Regional Geography, UBS Publisher

Course Name: Agriculture and Food Security

Course Code: BSCHGEODSE502

Course Type: Discipline Specific Elective (Theoretical)	Course Details: DSEC-1		L-T-P: 5 - 1 - 0		
Credit: 6	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
	....	10	....	40	

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. Conceptualise the agriculture and its determinants.
2. Get the overview of Indian and World agriculture regions and systems.
3. Have sound knowledge of agriculture revolutions and food security



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Course Content:

1. Agriculture and Food Security: Defining the field, Introduction, nature and scope; Concept of land and soil; Land use/ land cover definition and classification (Stamp and FAO)
2. Physical, Technological and Institutional Determinants of Agriculture
3. Agricultural Regions of India: Agro-climatic, Agro-ecological & Crop Combination Regions
4. Agricultural Systems of the World (Whittlesey's classification) and Agricultural Land use model (Von Thunen, modification and relevance)
5. Food Security: Concept, approaches, pattern, Indian revolutions in agriculture and government policies related to food security

Continuous Assessment: Assignment on problems and prospects of Indian agriculture.

References/ Suggested Readings:

1. Basu, D.N., and Guha, G.S., (1996): *Agro-Climatic Regional Planning in India*, Vol.I& II, Concept Publication, New Delhi.
2. Bryant, C.R., Johnston, T.R., (1992): *Agriculture in the City Countryside*, Belhaven Press, London.
3. Burger, A., (1994): *Agriculture of the World*, Aldershot, Avebury.
4. Grigg, D.B., (1984): *Introduction to Agricultural Geography*, Hutchinson, London.
5. Hussain, M. (1996): *Systematic Agricultural Geography*, Rawat Publications, Jaipur.
6. Ilbery, B. W., (1985): *Agricultural Geography: A Social and Economic Analysis*, Oxford University Press.
7. Mohammad, N., (1992): *New Dimension in Agriculture Geography*, Vol. I to VIII, Concept Pub., New Delhi.
8. Roling, N.G., and Wageruters, M.A.E.,(ed.) (1998): *Facilitating Sustainable Agriculture*, Cambridge University Press, Cambridge.
9. Shafi, M., (2006): *Agricultural Geography*, Doring Kindersley India Pvt. Ltd., New Delhi
10. Singh, J., and Dhillon, S.S., (1984): *Agricultural Geography*, Tata McGraw Hill, New Delhi.
11. Tarrant, J. R., (1973): *Agricultural Geography*, David and Charles, Devon.

Course Name: Population Geography

Course Code: BSCHGEODSE503

Course Type: Discipline Specific Elective (Theoretical)	Course Details: DSEC-2		L-T-P: 5 - 1 - 0		
Credit: 6	Full Marks : 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		...	10	.....	40

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. Learn the role of demography and population studies as a distinct field of human geography



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2. Have sound knowledge of key concept, different components of population along with its drivers
3. Examine population dynamics and characteristic with contemporary issues

Course Contents:

1. Population Geography, Demography and Population Studies: Defining the Field, Nature and Scope; Sources of Data with special reference to India (Census, Vital Statistics and NSS)
2. Population Size, Distribution and Growth – Determinants and Patterns; Theories of Growth – Malthusian Theory and Demographic Transition Theory; Mobility Transition Theory
3. Population Dynamics: Fertility, Mortality and Migration – Measures, Determinants and Implications
4. Population Composition and Characteristics – Age-Sex Composition; Rural and Urban Composition; Literacy
5. Contemporary Issues – Ageing of Population; Child labour; Declining Sex Ratio

Continuous Assessment: Assignment on any one contemporary population issue in India.

References/ Suggested Readings:

1. Barrett, H. R., (1995): *Population Geography*, Oliver and Boyd.
 2. Bhende, A. and Kanitkar, T., (2000): *Principles of Population Studies*, Himalaya Publishing House.
 3. Chandna, R. C. and Sidhu, M. S., (1980): *An Introduction to Population Geography*, Kalyani Publishers.
 4. Chandna, R C (2006): *JansankhyaBhugol*, Kalyani Publishers, Delhi
 5. Chandna,R.C., *Geography of Population*, Kalyani Publishers, Ludhiana.
 6. Clarke, J. I., (1965): *Population Geography*, Pergamon Press, Oxford.
 7. Roy, D. *Population Geography*, Books and Allied Private Limited, Kolkata.
 8. Jones, H. R., (2000): *Population Geography*, 3rd ed. Paul Chapman, London.
 9. Lutz, W., Warren, C. S. and Scherbov, S., (2004): *The End of the World Population Growth in the 21st Century*, Earthscan
 10. Maurya, S D (2009): *JansankhyaBhugol*, Sharda Putak Bhawan, Allahabad
 11. Newbold, K. B., (2009): *Population Geography: Tools and Issues*, Rowman and Littlefield Publishers.
 12. Pacione, M., (1986): *Population Geography: Progress and Prospect*, Taylor and Francis.
 13. Panda, B. P., (1988): *JanasankhyaBhugol*, M P Hindi Granth Academy, Bhopal
 14. Wilson, M. G. A., (1968): *Population Geography*, Nelson.
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Course Name: Hydrology

Course Code: BSCHGEODSE504

Course Type: Discipline Specific Elective (Theoretical)	Course Details: DSEC-2		L-T-P: 5 - 1 - 0		
Credit: 6	Full Marks : 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
	...	10	.....	40	

Course Learning Outcomes:

After the completion of course, the students will have ability to:

- 1. Understand the basic components of hydrological cycle and comprehend practices of integrated watershed management.*
- 2. Evaluate the water balancing and river basin and water disputes.*
- 3. Study the soil as a basic resource, focusing its distribution, problems and management.*

Course Content:

1. Hydrological Cycle: Systems approach in hydrology, Basin and Global hydrological cycle, human impact on the hydrological cycle
2. Precipitation, interception, evaporation, evapotranspiration, infiltration, ground-water, runoff and runoff cycle
3. Water Balance: input and output; floods and droughts; Integrated water resource management.
4. River Basin: Characteristics and problems of river basins, basin surface run-off, and measurement of river discharge. Watershed management - with reference to DVC.
5. River Water Dispute: Kaveri and Teesta river water dispute: River linkages in India – merits and demerits

Continuous Assessment: Assignment on River Basin Management.

References/ Suggested Readings:

1. Andrew. D. ward, and Stanley, Trimble., (2004): *Environmental Hydrology*, 2nd edition, Lewis Publishers, CRC Press.
2. Fetter, C.W. (2005): *Applied Hydrogeology*, CBS Publishers & Distributors, New Delhi.
3. Reddy, K. Ramamohan, Venkateswara Rao,B, Sarala, C., (2014):*Hydrology and Watershed Management*, Allied Publishers.
4. Karanth, K.R., (1988): *Ground Water: Exploration, Assessment and Development*, Tata-McGraw Hill, New Delhi.
5. Lyon, J.G., (2003):*GIS for Water Resource and Watershed Management*, Taylor and Francis, New York.
6. Meinzer,.O.E., (1962):*Hydrology*, Dover Publication, New York.
7. Ramaswamy, C., (1985): *Review of floods in India during the past 75 years: A Perspective*, Indian National Science Academy, New Delhi.
8. Rao, K.L., (1982): *India's Water Wealth*, 2nd edition, Orient Longman, Delhi.
9. Singh, M., Singh, R.B. and Hassan, M.I., (Eds.) (2014):*Landscape ecology and water management*, Proceedings of IGU Rohtak Conference, Volume 2. *Advances in Geographical and Environmental Studies*, Springer.



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10. Singh, Vijay P., (1995): *Environmental Hydrology*. Kluwar Academic Publications, The Netherlands.
 11. Tideman, E.M., (1999): *Watershed management - Guidelines for Indian Conditions*, Omega Scientific Publishers, New Delhi
 12. Todd, D.K. (1959): *Ground water Hydrology*, Wiley India Edition, New Delhi.
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**Semester-VI****Course Name: Evolution of Geographical Thought****Course Code: BSCHGEOC601**

Course Type: Core (Theoretical)	Course Details: CC-13		L-T-P: 5-1-0		
Credit: 6	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		.....	10	.....	40

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. Understand paradigms in geography discipline through time
2. Understand the development of geographical thinking.
3. understand the past and future trends of geography as a discipline.

Course Content:

1. Pre-Modern Geography– Early Origins of Geographical Thinking with reference to the Greek, Roman and Arab Thinkers (Ancient and Medieval)
2. Modern Geography – Evolution of Geographical Thinking and Disciplinary Trends in Germany, France, Britain, United States of America
3. Debates between Environmental Determinism and Possibilism, Systematic and Regional Geography, Ideographic and Nomothetic approach in Geography
4. Paradigms and Paradigm shift in Geography: Quantitative to Critical Revolution, Modernism to Post Modernism
5. Recent Trends –Systems Approach, Radicalism, Feminism; Concept of Space in Geography, Future of Geography

Continuous Assessment: Class Test

References/ Suggested Readings:

1. Bhat, L.S., (2009): *Geography in India* (Selected Themes). Pearson
2. Bonnett, A., (2008): *What is Geography?* Sage.
3. Dikshit, R. D., (1997): *Geographical Thought: A Contextual History of Ideas*, Prentice–Hall India.
4. Freeman, R., (1970): *Hundred year of Geography*, Hutchinson. London.
5. Hartshone, R., (1959): *Perspectives of Nature of Geography*, Rand MacNally and Co.
6. Harvey, David., (1969): *Explanation in Geography*, London: Arnold.
7. Holt-Jensen, A., (2011): *Geography: History and Its Concepts: A Students Guide*, SAGE.
8. Hussain, M., (2005): *Bhougholik Chintan Ka Itihas*, Rawat Publications .
9. Johnston, R. J., (1997): *Geography and Geographers*, Anglo-American Human Geography since (1945), Arnold, London.
10. Johnston, R. J., (Ed.): *Dictionary of Human Geography*, Routledge.



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11. Kapur, A., (2001): *Indian Geography Voice of Concern*, Concept Publications.
12. Martin Geoffrey J., (2005): *All Possible Worlds: A History of Geographical Ideas*, Oxford.
13. Singh, R.B. (2016): *Progress in Indian Geography*, Indian National Science Academy, New Delhi.
14. Soja, Edward (1989): *Post-modern Geographies*, Verso, London. Reprinted 1997: Rawat Publ., Jaipur and New Delhi.
15. Sudeepta, Adhikari., (2015): *Fundamentals of Geographical Thought*, Orient blackswan private limited.

Course Name: Disaster Management Project Work

Course Code: BSCHGEOC602

Course Type: Core (Practical)	Course Details: CC-14		L-T-P: 0-0-12		
Credit: 6	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	.....	20	.....

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. Understand processes and impact of disaster on empirical basis.
2. Distinguish both the natural and man-made disaster.
3. Design and prepare project work on disasters.

Course Content:

The Project Report based on any two field-based case studies among following disasters and one disaster preparedness plan of respective college/locality and district:

1. Flood
2. Drought
3. Cyclone and Hailstorms
4. Earthquake and Volcanoes
5. Landslides
6. Human Induced Disasters: Fire Hazards, Chemical, Industrial accidents

Continuous Assessment: Assessment of the project report and Presentation (PPT/ Poster)

i) Practical Record: (Project Report): (15 +15 Marks)

Two Project Reports (case study) based on two different hazards listed above have to be prepared. At least one report has to be based on field study and contain a disaster preparedness plan.

Each Report must be typed on A4 page containing 2000 to 3000 words with necessary maps and diagrams. The total pages of the report have to be within 12 pages.

ii) End Semester Evaluation will be based on project report and viva.



References/ Suggested Readings:

1. Carter, N., (1991): *Disaster Management: A Disaster Manager's Handbook*. Asian Development Bank, Manila.
2. Government of India (2011): *Disaster Management in India*. Ministry of Home Affairs, New Delhi.
3. Government of India (2008): *Vulnerability Atlas of India*. New Delhi, Building Materials & Technology Promotion Council, Ministry of Urban Development, Government of India
4. Kapur, A., (2010): *Vulnerable India: A Geographical Study of Disasters*, Sage Publication, New Delhi.
5. Modh, S., (2010): *Managing Natural Disaster: Hydrological, Marine and Geological Disasters*, Macmillan, Delhi.
6. Ramkumar, M., (2009): *Geological Hazards: Causes, Consequences and Methods of Containment*, New India Publishing Agency, New Delhi.
7. Savindra, Singh and Jeetendra, S., (2013): *Disaster Management*, Pravalika Publications, Allahabad
8. Singh Jagbir., (2007): “*Disaster Management Future Challenges and Oppurtunities*”, 2007. Publisher- I.K. International Pvt. Ltd New Delhi, India.
9. Singh, R. B., (ed.), (2006): *Natural Hazards and Disaster Management: Vulnerability and Mitigation*, Rawat Publications, New Delhi.
10. Singh, R.B., (2005): *Risk Assessment and Vulnerability Analysis*, IGNOU, New Delhi. Chapter 1, 2 and 3
11. Sinha, A., (2001): *Disaster Management: Lessons Drawn and Strategies for Future*, New United Press, New Delhi.
12. Stoltman, J.P., et al. (2004): *International Perspectives on Natural Disasters*, Kluwer Academic Publications. Dordrecht.

Course Name: Geography of Health

Course Code: BSCHGEODSE601

Course Type: Discipline Specific Elective (Theoretical)	Course Details: DSEC-3		L-T-P: 5 - 1 - 0		
Credit: 6	Full Marks : 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		...	10	.....	40

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. Understand the key concepts related to health.
2. Identify the linkages between the health and environment.
3. Explain the relationships between health and environment with reference to climate change

Course Content:

1. Perspectives on Health: Definition; linkages with environment, development and health; driving forces in health and environmental trends - population dynamics, urbanization, poverty and inequality



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2. Pressure on Environmental Quality and Health: Human activities and environmental pressure land use and agricultural development; industrialisation
3. Exposure and Health Risks: Air and water pollution; household wastes
4. Health and Disease Pattern in Environmental Context with special reference to India, Types of Diseases and their regional pattern (Communicable and Lifestyle related diseases)
5. Climate Change and Human Health: Changes in climate system – heat and cold; Biological disease agents; food production and nutrition

Continuous Assessment: Class Test

References/ Suggested Readings:

1. Rais, Akhtar., (Ed.), (1990): *Environment and Health Themes in Medical Geography*, Ashish Publishing House, New Delhi.
 2. Avon, Joan, L. and Jonathan, A, Patzed (2001): *Ecosystem Changes and Public Health*, Baltimin, John Hopling Unit Press(ed).
 3. Bradley, D., (1977): *Water, Wastes and Health in Hot Climates*, John Wiley Chichester.
 4. Christaler, George and Hristopoles, Dionissios., (1998): *Spatio-Temporal Environment Health Modelling*, Boston Kluwer Academic Press.
 5. Cliff, A.D. and Peter, H., (1988): *Atlas of Disease Distributions*, Blackwell Publishers, Oxford.
 6. Gatrell, A. and Loytonen, (1998): *GIS and Health*, Taylor and Francis Ltd, London.
 7. Harpham T. and Tanner, M., (eds) (1995): *Urban Health in Developing Countries*; Progress and Prospects, Routledge, London.
 8. Hazra, J., (1997): *Health Care Planning in Developing Countries*. University of Calcutta, Calcutta.
 9. Moeller, Dade, wed., (1993): *Environmental Health*, Cambridge, Harvard Univ. Press.
 10. Murray, C. and A. Lopez, (1996): *The Global Burden of Disease*, Harvard University Press.
 11. Narayan, K.V., (1997): *Health and Development Inter-Sectoral Linkages in India*. Rawat Publications, Jaipur.
 12. Phillips, D. and Verhasselt, Y., (1994): *Health and Development*, Routledge, London.
 13. Tromp, S., (1980): *Biometeorology: The Impact of Weather and Climate on Humans and their Environment*, Heydon and Son.
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Course Name: Political Geography

Course Code: BSCHGEODSE602

Course Type: Discipline Specific Elective (Theoretical)	Course Details: DSEC-3		L-T-P: 5 - 1 - 0		
Credit: 6	Full Marks : 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
	...	10	.....	40	

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. Learn the concept of nation and state and geopolitical theories
2. Understand the different dimensions of resource conflicts on geopolitical base.
3. Acquire sound knowledge on politics of contemporary displacement.

Course Content:

1. Introduction: Concepts, Nature and Scope of political geography.
2. State, Nation and Nation State – Concept of Nation and State, Attributes of State – Frontiers, Boundaries, Shape, Size, Territory and Sovereignty, Concept of Nation State; Geopolitics; Theories (Heartland and Rimland)
3. Electoral Geography – Geography of Voting, Geographic Influences on Voting pattern, Geography of Representation
4. Political Geography of Resource Conflicts – Water Sharing Disputes, Disputes and Conflicts Related to Forest Rights and Minerals
5. Politics of Displacement: Issues of relief, compensation and rehabilitation: with reference to Dams and Mining

Continuous Assessment: Class Test

References/ Suggested Readings:

1. Adhikari, S. (2007): *Political Geography*, Rawat Publication, New Delhi.
2. Adhikari, S. (2013): *Political Geography of India* – Sharda Pustak Bhawan, Allahabad.
3. Agnew, J., (2002): *Making Political Geography*, Arnold.
4. Agnew, J., Mitchell K. and Total G., (2003): *A Companion to Political Geography*, Blackwell.
5. Cox, K. R., Low M. and Robinson J., (2008): *The Sage Handbook of Political Geography*, Sage Publications.
6. Cox, K., (2002): *Political Geography: Territory, State and Society*, Wiley-Blackwell
7. Gallaher, C., et al, (2009): *Key Concepts in Political Geography*, Sage Publications.
8. Glassner, M., (1993): *Political Geography*, Wiley.
9. Hodder, Dick, Sarah, J, Llyod and Keith, S, McLachlan., (1998): *Land Locked States of Africa and Asia (vo.2)*, Frank Cass .
10. Jones, M., (2004): *An Introduction to Political Geography: Space, Place and Politics*, Routledge .
11. Painter, J. and Jeffrey, A., (2009): *Political Geography*, Sage Publications.
12. Taylor, P. and Flint, C., (2000): *Political Geography*, Pearson Education.



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13. Verma, M. K., (2004): *Development, Displacement and Resettlement*, Rawat Publications, Delhi.

Course Name: Biogeography

Course Code: BSCHGEODSE603

Course Type: Discipline Specific Elective (Theoretical)	Course Details: DSEC-3		L-T-P: 5 - 1 - 0		
Credit: 6	Full Marks : 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
	...	10	.....	40	

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. Familiarise the dynamics of climate and related theories.
2. Understand of Vegetation as an index of climate.
3. Assess of different aspects of floral and faunal provinces.

Course Content:

1. Introduction to Bio-geography: Nature, scope, and contents
2. Biogeographical regions of the world
3. Definition of biosphere, meaning of ecology, Eco-tone, Communities, habitats, ecological niche, Biomes, ecological pyramids
4. Ecological successions: stages and climax
5. Biodiversity; bio-diversity hotspots, biodiversity conservation: Tiger and elephant conservation in India

Continuous Assessment: Class Test

References/ Suggested Readings:

1. Bhattacharyya, N.N.(2003): *Biogeography*, Rajesh Publications, New Delhi.
2. Clarke, G. L. (1967): *Elements of ecology*, New York: John Wiley Pub.
3. Haden-Guest, S., Wright, J. K. and Teclaff, E. M. (1956): *World Geography of Forest Resources*, New York: Ronald Press Co.
4. Hoyt, J.B. (1992): *Man, and the Earth*, Prentice Hall, U.S.A.
5. Huggett, R.J. (1998): *Fundamentals of Biogeography*, Routledge, U.S.A.
6. Lal, D. S. 2003. *Climatology*, Allahabad: ShardaPustakBhawan.
7. Lapedes, D.N. (1974): *Encyclopaedia of Environmental Science* (eds.), McGraw Hill.
8. Mal, Suraj., and Singh, R.B. (Eds.) (2009):*Biogeography and Biodiversity*,Rawat Publication, Jaipur
9. Mathur, H.S. (1998): *Essentials of Biogeography*, Anuj Printers, Jaipur.
10. *Mountain and Tree cover in Mountain Regions Report - 2002*, UNEP-WCMC.
11. Parmesan, C., Yohe, G. (2003):*A globally coherent fingerprint of climate change impacts across natural systems*. Nature, 421 (6918), 37–42
12. Singh, Savindra (2015): *Paryawaran Bhoogol (Hindi)*, PrayagPustakBhawan, Allahabad (Hindi).



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13. Sivaperuman, Chandrakasan et al., (2018): *Biodiversity and Climate Change Adaptation in Tropical Islands*, Academic Press, London.

Course Name: Geography of Social Wellbeing

Course Code: BSCHGEODSE604

Course Type: Discipline Specific Elective (Theoretical)	Course Details: DSEC-4		L-T-P: 5 - 1 - 0		
Credit: 6	Full Marks : 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
	...	10	.....	40	

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. Understand the nature, scope and relationships of geography and human wellbeing.
2. Understand the spatial dimensions of social diversity components.
3. Critically analyse the social welfare programs related to inclusive and exclusive policies in India.

Course Content:

1. Geography of Social Wellbeing: Concept, Origin, Nature and Scope
2. Social Diversity: Caste, Religion, Race and Gender and their spatial distribution
3. Social Wellbeing and Inclusive Development: Concept and Components – Healthcare, Housing and Education
4. Social Geographies of Inclusion and Exclusion, Slums, Gated Communities, Communal Conflicts and Crime
5. Social welfare program and policies with special reference to India

Continuous Assessment: Assignment on Social Welfare Programme in India

References/ Suggested Readings:

1. Ahmed, A., (1999): *Social Geography*, Rawat Publications.
2. Casino, V. J. D., Jr., (2009): *Social Geography: A Critical Introduction*, Wiley Blackwell.
3. Cater, J. and Jones, T., (2000): *Social Geography: An Introduction to Contemporary Issues*, Hodder Arnold.
4. Holt, L., (2011): *Geographies of Children, Youth and Families: An International Perspective*, Taylor & Francis.
5. Panelli, R., (2004): *Social Geographies: From Difference to Action*, Sage.
6. Rachel, P., Burke, M., Fuller, D., Gough, J., Macfarlane, R. and Mowl, G., (2001): *Introducing Social Geographies*, Oxford University Press.
7. Ramotra, K.C., (2008): *Development Processes and the scheduled Castes*, Rawat Publication.
8. Smith, D. M., (1977): *Human geography: A Welfare Approach*, Edward Arnold, London.
9. Smith, D. M., (1994): *Geography and Social Justice*, Blackwell, Oxford.



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10. Smith, S. J., Pain, R., Marston, S. A., Jones, J. P., (2009): *The SAGE Handbook of Social Geographies*, Sage Publications.
11. Sopher, David., (1980): *An Exploration of India*, Cornell University Press, Ithasa.
12. Valentine, G., (2001): *Social Geographies: Space and Society*, Prentice Hall.

Course Name: Urbanization and Urban System

Course Code: BSCHGEODSE605

Course Type: Discipline Specific Elective (Theoretical)	Course Details: DSEC-4		L-T-P: 5 - 1 - 0		
Credit: 6	Full Marks : 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
	...	10	.....	40	

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. Understand the fundamentals and patterns of urbanization process
2. Learn the functional classification of cities and Central Place Theory
3. Know contemporary problems of Delhi, Mumbai, Kolkata and Chennai

Course Content:

1. Urban Geography: Introduction, Nature and Scope and Approaches
2. Patterns of Urbanisation in India, Developed and Developing countries
3. Functional classification of cities: Quantitative and Qualitative Methods
4. Cities and Central Place Theory: Christaller and Lössch
5. Urban Issues: problems of housing, slums, basic amenities (water and transport); Case studies of Delhi, Kolkata, Asansol

Continuous Assessment: Assignment on any one urban problem.

References/ Suggested Readings:

1. Carter, H., (1972): *The study of Urban Geography*, Edward Arnold, London.
2. Fyfe, N. R. and Kenny, J. T., (2005): *The Urban Geography Reader*, Routledge.
3. Graham, S. and Marvin, S., (2001): *Splintering Urbanism: Networked Infrastructures, Technological Mobilities and the Urban Condition*, Routledge.
4. Hall, T., (2006): *Urban Geography*, Taylor and Francis.
5. Kaplan, D. H., Wheeler, J. O. and Holloway, S. R., (2008): *Urban Geography*, John Wiley.
6. Knox, P. L., and McCarthy, L., (2005): *Urbanization: An Introduction to Urban Geography*, Pearson Prentice Hall New York.
7. Knox, P. L., and Pinch, S., (2006): *Urban Social Geography: An Introduction*, Prentice-Hall.
8. Pacione, M., (2009): *Urban Geography: A Global Perspective*, Taylor and Francis.
9. Ramachandran, R., (1989): *Urbanisation and Urban Systems of India*, Oxford University Press, New Delhi
10. Ramachandran, R., (1992): *The Study of Urbanisation*, Oxford University Press, Delhi



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11. Sassen, S., (2001): *The Global City: New York, London and Tokyo*, Princeton University Press.
12. Singh, R.B., (Ed.) (2015): *Urban development, challenges, risks and resilience in Asian megacities*, Advances in Geographical and Environmental Studies, Springer
13. Singh, R.B., (Eds.) (2001): *Urban Sustainability in the Context of Global Change*, Science Pub., Inc., Enfield (NH), USA and Oxford & IBH Pub., New Delhi.
14. Sharma, Poonam and Rajput, Swati (Eds.) (2017) *Sustainable Smart Cities in India; Challenges and Future Perspectives*, Springer.
15. Sharma, Vishwa Raj and Chadrakanta, (2019): *Making Cities Resilient*, Springer.

Course Name: Soil Geography

Course Code: BSCHGEODSE606

Course Type: Discipline Specific Elective (Theoretical)	Course Details: DSEC-4		L-T-P: 5 - 1 - 0		
Credit: 6	Full Marks : 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
	...	10	.....	40	

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. Understand the concepts related to soil.
2. To know the soil diversities and importance of their preservation
3. To know about soil fertility and its significance

Course Content:

1. Concept of soil, pedology, and pedogenic processes, soil functions, Physical and chemical properties of soil: Texture, Structure, pH, Organic matter
2. Factors of soil development, Concept of soil profile, profile development of zonal soils: Laterite, Chernozem and Podzol
3. Concept of soil fertility, factors affecting fertility and fertility improvement methods.
4. Soil erosion, soil degradation, need and strategies of soil conservation, distribution and characteristics of Indian soils
5. USDA classification of Soils, types of soil survey

Continuous assessment: Assignment on fertility improvement methods based on the survey of a rural Mouza.

References/ Suggested Readings:

1. Biswas, T.D. and Mukherjee, S.K. 1987, *Text book of Soil Science*. Tata-McGraw-Hill.
2. Brady. N.C. and Weil. R.R. 1996, *The Nature and Properties of Soil*. 11th edition. Longman. London.
3. Floth. H.D. 1990, *Fundamentals of Soil Science*, 8th edition. John Wiley and Sons. New York.
4. Morgan. R.P.C. 1995, *Soil Erosion and Conservation*, 2nd edition. Longman. London.
5. Schwab. G.O. Fandmeir. D.D. and Eliot, W.J. 1996, *Soil and Water Management Systems*, 4th edition, John Wiley and Sons Inc. New York.
6. Young. A. 2000, *Land Resources: Now and for the Future*, Cambridge University Press. Cambridge.