Syllabus Geography

(Major & Minor)

2023

NEP-2020 and UGC-CCFUP, 2022 based CBCS Syllabus for 4-Year Undergraduate Honours/Honours with Research Course in GEOGRAPHY

BANKURA UNIVERSITY

Bankura, West Bengal, 722155

Contents

1. Introduction

The syllabus for Geography at undergraduate level using the Choice Based Credit System (CBCS) has been framed in compliance with model syllabus given by the UGC. The structure of the syllabus is based on the NEP-2020 proposed student centric "Curriculum and Credit Framework for Undergraduate Programme" (CCFUP-2022), incorporating a flexible CBCS, multidisciplinary approach with multiple entry-exit options in view of preparing students in the current competitive job scenario.

The main objective of framing this new syllabus is to give the students a holistic understanding of the subject, giving substantial weightage to both the core contents and techniques used in Geography. The syllabus has given equal importance to both the two main branches of geography – Physical and Human.

The aim of the syllabus is to prepare the students of Geography as good, socially conscious, thoughtful, well-rounded and creative individuals so that at the end of the course they are able to secure a job and can contribute beneficially to the process of nation building. Keeping in mind and in tune with the changing nature of the subject, adequate emphasis hasbeen given on new techniques of mapping and understanding of the subject.

The syllabus has also been framed in such a way that the students can easily exit at different levels with basic skillsets and general understanding of the discipline to be able to fit for the current job market.

The introduction of *Geography of Tourism, Rural Development, Political Geography and Medical Geography* will definitely boost students' analytical skills and the *Computer Applications in Geography* along with geospatial knowledge will enable students to develop their data analysis and interpretation skill which definitely boost their zeal for higher study and research and career opportunities.

2. Scheme for CBCS Curriculum

2.1 Credit Distribution across Courses

Course Type	Number of Papers	Number of Credits	
		Theory*	Practical
Core Courses (MJC)	24	18 × 3 =54 18 × 1 =18	6 × 4 =24
Minor Courses (MN)	8	4 × 3 =12 4 × 1 =4	4 × 4 =16
Multidisciplinary Courses (MD)	3		3 × 3 =9
Skill Enhancement Courses (SEC)	3		3 × 3 =9
Ability Enhancement Language Courses (AEC)	4	4 × 2 =8	
Value Added Courses (VAC)	2	2 × 4 =8	
Summer Internship (INT)*	1		1 × 2 =2
Research Project (RP)*	1		1 × 12 =12*
Total Papers/Credits	**46**	**104 (92)**	**60 (72)***

*Tutorials of 1 Credit will be conducted in case there is no practical component

*Students who want to exit after first or second year have to complete one **Summer Internship** of 4 credits in addition to the 40 credits of First Year and 82 credits after Second Year.

*Students have to successfully complete a **Summer Internship** of 2 credits in Semester-V to qualify for the Degree in Geography

*Honours with Research in Geography can be awarded to a student if he/she completes Research Project of 12 credits (in lieu of 3 DSE papers of Semester-VIII) with total 164 credits (Theory-92 + Practical-72) in all Semesters.

2.2 Major Courses (MJ)

Major Specific Core (MJC)				
Year	**Course Title**	**Semester**	**Theory**	**Practical**
First	Fundamentals of Physical Geography	I	T	
	Fundamentals of Human Geography	II	T	
Second	Geomorphology	III		
	Statistical Methods in Geography	III	T	P
	Climatology	IV		
	Soil and Biogeography	IV	T	
	Cartographic Techniques in Geography	IV	T	P
	Map Interpretation in Geography	IV		P
Third	Hydrology and Oceanography	V	T	
	Geography of Economic Activities	V	T	
	Geography of India and West Bengal	V	T	
	Techniques in Environmental Geography	V		P
	Evolution of Geographical Thought	VI	T	
	Cultural and Settlement Geography	VI	T	
	Urban Geography	VI	T	
	Remote Sensing Techniques	VI		P
Fourth	Population Geography	VII	T	
	Geography of Tourism	VII	T	
	Regional Planning and Rural Development	VII	T	
	Research Methodology and Field Work	VII		
	Disaster Management	VIII	T	P
	Agricultural Geography*	VIII	T	
	Medical Geography*	VIII	T	
	Political Geography*	VIII	T	
Fifth				

* Students secured more than 75% marks in last six semesters who opt for Honours with Research have to complete one **Research Project** of 12 credits under any of the faculty in lieu of 3 starred papers.

2.3: Minor Courses (MN)

Sl. No	**Course Title**	**Semester**	**Theory**	**Practical**
1.	Fundamentals of Physical Geography	I	T	
2.	Fundamentals of Human Geography	II	T	
3.	Geomorphology	III	T	
4.	Cartographic Techniques in Geography	IV		P
5.	Hydrology and Oceanography	V	T	
6.	Statistical Methods in Geography	VI		P
7.	Population Geography	VII	T	
8.	Research Methodology and Field Work	VIII		P

2.4: Multidisciplinary Courses (MD)

Sl. No	Course Title	Semester	Theory	Practical
1.	Surveying and Mapping Techniques	I		P
2.	GIS and GNSS	II		P
3.	Remote Sensing Techniques	III		P

2.5: Skill Enhancement Courses (SEC)

Sl. No	Course Title	Semester	Theory	Practical
1.	Elementary Practical in Geography	I		P
2.	GIS & GNSS	II		P
3.	Computer Applications in Geography	III		P

2.6: Summer Internship (INT)

Year	Conditions	Credits	Course Type
First	The students who want to exit after first year for **Certificate Course in Geography** have to secure 4 credits in addition to 40 credits after successfully completing Summer Internship/Apprenticeship (in Semester-I or II) in a firm, industry or organization or Training in Labs or any government office/organization as may be decided by the department or college. Those who completed Summer Internship of 4 credits in First Year will be allowed to re-enter the degree programme within three years and complete it within the stipulated maximum of seven years.	4 (Additional for Certificate Course in Geography)	Practical
Second	The students who want to exit after second year for **Diploma in Geography** have to secure 4 credits in addition to 82 credits after successfully completing Summer Internship/Apprenticeship (in Semester-I, II, III or IV) in a firm, industry or organization or Training in Labs or any government office/organization as may be decided by the department or college. Those who completed Summer Internship of 4 credits in Second Year will be allowed to re-enter within three years and complete the degree programme within the maximum period of seven years.	4 (Additional for Diploma in Geography)	Practical
Third	The students who want **Degree in Geography** have to secure mandatory 2 credits in addition to 124 credits after successfully completing Summer Internship/Apprenticeship (in Semester-V) in a firm, industry or organization or Training in Labs or any government office/organization as may be decided by the department or college.	2 (Mandatory for Degree in Geography)	Practical

3. SEMESTER-WISE STRUCTURE AND CREDIT FRAMEWORK

First Year: Certificate Course in Geography

SEM	Course ID	Course Code	Course Title	Credit	Marks				Teaching Hours/Week		
					IA	ESE		Total	L	T	P
						T	P				
SEMESTER–I	11901 11911	S/GEO/101/MJC-1T	Fundamentals of Physical Geography	4	10	40		50	3	1	
	11902 11912	S/GEO/102/MN-1T*	Other than Geography Major students: Fundamentals of Physical Geography	4	10	40		50	3	1	
	11903 11913	S/GEO/103/MD-1P*	Other than Geography Major students: Surveying and Mapping Techniques	3	10		40	50	3		3
	11800 11810	ACS/104/AEC-1	Communicative English	2	10	40		50	2		
	11904 11914	S/GEO/105/SEC-1P	Elementary Practical in Geography	3	10		40	50	3		3
	11801 11811	ACS/106/VAC-1	Environmental Studies	4	10	40		50	4		
	TOTAL IN SEMESTER-I			**20**	**60**	**160**	**80**	**300**	**18**	**2**	**6**

SEM	Course ID	Course Code	Course Title	Credit	Marks				Teaching Hours/Week		
					IA	ESE		Total	L	T	P
						T	P				
SEMESTER-II	21901 21911	S/GEO/201/MJC-2P	Fundamentals of Human Geography	4	10	40		50	3	1	
	21902 21912	S/GEO/202/MN-2P	Other than Geography Major students: Fundamentals of Human Geography	4	10	40		50	3	1	
	21903 21913	S/GEO/203/MD-2P	Other than Geography Major students: GIS and GNSS	3	10		40	50	3		3
	21800 21810	ACS/204/AEC-2	MIL	2	10	40		50	2		
	21904 21914	S/GEO/205/SEC-2P	GIS & GNSS	3	10		40	50	3		3
	21801 21811	ACS/206/VAC-2	2A: Health & Wellness 2B: Understanding India	4	10	40		50	4		
	21802 21812	ACS/207/INT-1	Summer Internship (Additional)	4	10		40	50			
	TOTAL IN SEMESTER-II			**20+4**	**60**	**160**	**80**	**300**	**18**	**2**	**6**
TOTAL IN FIRST YEAR				**40+4**	**120**	**320**	**160**	**600**	**36**	**4**	**12**

MJC- Major Core; MN- Minor Paper; MD- Multidisciplinary Paper; AEC- Ability Enhancement Course; SEC- Skill Enhancement Course; VAC- Value Added Course; INT- Internship

***Certificate Course in Geography can be awarded to a student if he/she completes Summer Internship of 4 credits in addition to total 40 credits in Semesters-I & II**

Second Year: Diploma in Geography											
SEM	**Course ID**	**Course Code**	**Course Title**	**Credit**	**Marks**				**Teaching Hours/Week**		
					IA	**ESE**		**Total**	**L**	**T**	**P**
						T	**P**				
SEMESTER-III	31901 31911	S/GEO/301/MJC-3T	Geomorphology	4	10	40		50	3	1	
	31902 31912	S/GEO/302/MJC-4P	Statistical Methods in Geography	4	10		40	50	4		4
	31903 31913	S/GEO/303/MN-3T	Other than Geography Major students: Geomorphology	4	10	40		50	3	1	
	31904 31914	S/GEO/304/MD-3P	Other than Geography Major students: Remote Sensing Techniques	3	10	40		50	3		3
	31805 31815	S/GEO/305/SEC-3P	Computer Applications in Geography	3	10		40	50	3		3
	31800 31810	ACS/306/AEC-3	MIL-2 Bengali, Sanskrit, Santali	2	10	40		50	2		
	TOTAL IN SEMESTER-III			**20**	**60**	**160**	**80**	**300**	**18**	**2**	**10**
SEM	**Course ID**	**Course Code**	**Course Title**	**Credit**	**Marks**				**Teaching Hours/Week**		
					IA	**ESE**		**Total**	**L**	**T**	**P**
						T	**P**				
SEMESTER-IV	41901 41911	S/GEO/401/MJC-5T	Climatology	4	10	40		50	3	1	
	41902 41912	S/GEO/402/MJC-6T	Soil and Biogeography	4	10	40		50	3	1	
	41903 41913	S/GEO/403/MJC-7P	Cartographic Techniques in Geography	4	10		40	50	4		4
	41904 41914	S/GEO/404/MJC-8P	Map Interpretation in Geography	4	10		40	50	4		4
	41905 41915	S/GEO/405/MN-4P	Other than Geography Major students: Cartographic Techniques in Geography	4	10		40	50	4		4
	41800 41810	ACSHP/406/AEC-4	Compulsory English: Literature, Language and Communication	2	10	40		50	2		
	41801 41811	ACS/407/INT-2	Summer Internship (Additional)*	**4**							
	TOTAL IN SEMESTER-IV			**22+4**	**60**	**160**	**80**	**300**	**20**	**2**	**12**
TOTAL IN SECOND YEAR				**42+4**	**120**	**320**	**160**	**600**	**38**	**8**	**22**

MJC- Major Core; MN- Minor Paper; MD- Multidisciplinary Paper; AEC- Ability Enhancement Course; SEC- Skill Enhancement Course; VAC- Value Added Course; INT- Internship

***Diploma in Geography can be awarded to a student if he/she completes Summer Internship (at least 1 in 2 years) of 4 credits in addition to total 82 credits in Semesters-I, II, III & IV**

Third Year: Degree in Geography											
SEM	**Course ID**	**Course Code**	**Course Title**	**Credit**	**Marks**				**Teaching Hours/Week**		
					IA	**ESE**		**Total**	**L**	**T**	**P**
						T	**P**				
SEMESTER-V	51901 51911	S/GEO/501/MJ C-9T	Hydrology and Oceanography	4	10	40		50	3	1	
	51902 51912	S/GEO/502/MJ C-10T	Geography of Economic Activities	4	10	40		50	3	1	
	51903 51913	S/GEO/503/MJ C-11T	Geography of India and West Bengal	4	10	40		50	3	1	
	51904 51914	S/GEO/504/MJ C-12P	Techniques in Environmental Geography	4	10		40	50			4
	51905 51915	S/GEO/505/MN-5T	Other than Geography Major students: Regional Planning and Development	4	10	40		50	3	1	
	51906 51916	ACS/506/INT-3*	Summer Internship (Mandatory)	2	10		40	50			
	TOTAL IN SEMESTER-V			**22**	**60**	**160**	**80**	**300**	**12**	**4**	**4**
	***INT- Summer Internship**										
SEM	**Course ID**	**Course Code**	**Course Title**	**Credit**	**Marks**				**Teaching Hours/Week**		
					IA	**ESE**		**Total**	**L**	**T**	**P**
						T	**P**				
SEMESTER-VI	61901 61911	S/GEO/601/MJ C-13T	Evolution of Geographical Thought	4	10	40		50	3	1	
	61902 61912	S/GEO/602/MJ C-14T	Cultural and Settlement Geography	4	10	40		50	3	1	
	61903 61913	S/GEO/603/MJ C-15T	Urban Geography	4	10	40		50	3	1	
	61904 61914	S/GEO/604/MJ C-16P	Remote Sensing Techniques	4	10		40	50			4
	61905 61915	S/GEO/605/MN-6P	Other than Geography Major students: Statistical Methods in Geography	4	10		40	50	4		4
	TOTAL IN SEMESTER-VI			**20**	**50**	**120**	**80**	**250**	**17**	**3**	**8**
TOTAL IN THIRD YEAR				**40+2**	**110**	**280**	**160**	**550**	**33**	**7**	**12**
MJC- Major Core; MN- Minor Paper; INT- Internship											
***Degree in Geography can be awarded to a student if he/she completes Summer Internship of 2 credits in addition to total 124 credits in Semesters-I, II, III, IV, V & VI**											

Fourth Year: Honours/Honours with Research in Geography

SEM	Course ID	Course Code	Course Title	Credit	Marks				Teaching Hours/Week		
					IA	ESE		Total	L	T	P
						T	P				
SEMESTER - VII	71901 71911	S/GEO/701/MJC-17T	Population Geography	4	10		40	50	3	1	
	71902 71912	S/GEO/702/MJC-18T	Geography of Tourism	4	10		40	50	3	1	
	71903 71913	S/GEO/703/MJC-19T	Regional Planning and Rural Development	4	10	40		50	3	1	
	71904 71914	S/GEO/704/MJC-20P	Research Methodology and Field Work	4	10	40		50			4
	71905 71915	S/GEO/705/MN-7T*	Other than Geography Major students: Population Geography	4	10	40		50	3	1	
	TOTAL IN SEMESTER-VII			**20**	**50**	**120**	**80**	**250**	**16**	**4**	**4**

SEM	Course ID	Course Code	Course Title	Credit	MARKS				Teaching Hours/Week		
					IA	ESE		Total	L	T	P
						T	P				
SEMESTER - VIII	81901 81911	S/GEO/801/MJC-21T	Disaster Management	4	10	40		50	3	1	
	81902 81912	S/GEO/802/MJC-22T	Agricultural Geography*	4	10	40		50	3	1	
	81903 81913	S/GEO/803/MJC-23T	Medical Geography*	4	10	40		50	3	1	
	81904 81914	S/GEO/804/MJC-24T	Political Geography*	4	10	40		50	3	1	
	81905 81915	S/GEO/805/MJE-11P	Research Project*	12	30		120	150			12
	81905 81915	S/GEO/806/MN-8P	Other than Geography Major students: Research Methodology and Field Work	4	10	40		50	4		4
	* Students secured more than 75% marks in last six semesters who opt for Honours with Research have to complete one Research Project of 12 credits under any of the faculty in lieu of 3 starred (*) papers.										
	TOTAL IN SEMESTER-VIII			**20**	**50**	**200**	**0**	**250**	**16**	**4**	**16**
TOTAL IN FOURTH YEAR				**40**	**100**	**320**	**80**	**500**	**32**	**8**	**20**

MJC- Major Core; MN- Minor Paper

Honours in Geography can be awarded to a student if he/she completes Summer Internship (in Semester-V) of 2 credits in addition to total 164 credits in all Semesters.

Honours with Research in Geography can be awarded to a student if he/she completes Summer Internship (in Semester-V) of 2 credits in addition to total 164 credits in all Semesters provided he/she successfully completed Research Project in lieu of 3 starred (*) papers.

4. Major Courses Syllabus (Core)

4.1 S/GEO /101/MJC-1T: Fundamentals of Physical Geography

Fundamentals of Physical Geography **4 Credits (60 Hours)**

Total Marks:	**50 (IA-10 Marks + ESE-40 Marks)**
Question Pattern:	**Section-A Definition Oriented (5×2=10)**
	Section-B Short Answer Type (5×4=20)
	Section-C Long Answer Type (1×10=10)

Learning Outcome

1. Understanding origin and evolution of Earth with special reference to cross-cutting approach like Big Bang Model
2. To have an idea of our dynamic earth and its geological make up.
3. Understanding major processes that are responsible for its surface features.
4. Understanding major pedologic and biospheric processes of the earth.

Unit 1: Earth: Origin and Tectonic Processes (20 Hours)

1.1 Origin of Universe (Big Bang Model), Origin of Earth (Nebular Hypothesis of Laplace and Interstellar Dust Cloud Hypothesis of Schimdt)
1.2 Internal Structure of the Earth: Seismological Evidences, physical, chemical and seismic properties of Earth layers
1.3 Isostasy: Models of Airy and Pratt; Continental Drift Theory of Alfred Wegener
1.4 Sea Floor Spreading; Plate Tectonic Theory- Processes at plate margins and Triple Junctions

Unit 2: Geomorphology (20 Hours)

2.1 Degradational (Denudation) Processes: Weathering, Mass Wasting and resultant landforms
2.2 Evolution of landforms on Uniclinal, Folded and Faulted Strata
2.3 Landscape Evolution Models: Davis, Penck and Hack
2.4 Processes of landform development in Karst, Fluvial, Glacial and Aeolian environment

Unit 3: Biosphere (20 Hours)

3.1 Factors of Soil formation
3.2 Soil profile: origin and profile characteristics of Lateritic, Podzol and Chernozem soils
3.3 Concepts of Biosphere, Ecosystem, Biome and Ecotone
3.4 Concepts of Trophic structure, Food Chain and Food Web. Energy Flow in ecosystem

Reference

1. Bloom A. L., 2001: Geomorphology: A Systematic Analysis of Late Cenozoic Landforms, Prentice-Hall of India, New Delhi.
2. Bridges E. M., 1990: World Geomorphology, Cambridge University Press,Cambridge.
3. Christopherson, Robert W., (2011), Geosystems: An Introduction to Physical Geography, 8 Ed., Macmillan Publishing Company

4. Kale V. S. and Gupta A., 2001: Introduction to Geomorphology, Orient Longman,Hyderabad.
5. Knighton A. D., 1984: Fluvial Forms and Processes, Edward Arnold Publishers,London.
6. Selby, M.J., (2005), Earth's Changing Surface, Indian Edition, OUP
7. Skinner, Brian J. and Stephen C. Porter (2000), The Dynamic Earth: AnIntroduction to physical Geology, 4th Edition, John Wiley and Sons
8. Thornbury W. D., 1969: Principles of Geomorphology, Wiley.
9. Khullar, D.R. (2012), Physical Geography, Kalyani Publishers, New Delhi
10. Mukhopadhyay, S.; Mukhopadhyay, M.; Pal, S. (2010), Advanced River Geography, ACB Publications, Kolkata
11. Choudhuri, S.K. (2018), Fundamentals of Geotectonics, New Central Book Agency, Kolkata
12. Biswas, T.D. and Mukherjee, S.K. 1997: Textbook of Soil Science, Tata McGraw Hill,
13. De, N. K. and Jana, N. C. (2016): The Land: Multifaceted Appraisal andManagement, Sribhumi Publishing House, Kolkata, Reprint
14. Chapman J.L. and Rens, M.J. 1993. Ecology: Principle and Applications, Cambridge University Press, Cambridge
15. Chairas, D.D. Reganold, J.P. and Owen, O.S. 2002. National Resource Conservation and Management for a Sustainable Future, 8th edition, Prentice Hall, Englewood Cliffs
16. Dash, M.C., 2001. Fundamental of Ecology, 2nd edition, Tata McGrawHill, New Delhi
17. Haggett, R. 1998. Fundamentals of Biogeography, Routledge, London:
18. Kormondy, E.J. 1996. Concept of Ecology, 4th edition, Prentice- Hall, India, NewDelhi
19. Mukhopadhyay, S.; Das, R. (1994), Bhumirup: Udvab o Prakriti Vol-I & II in Bengali, Paschimbanga Rajya Pustak Parshad, Kolkata
20. Basu, P. (2006), Bhugathonik Prakriya o Bhumirup in Bengali, Books and Allied, Kolkata
21. Basu, S.; Maiti, R. (2022) Adhunik Bhumirup Bigyan, Naboday Publications, Kolkata
22. Sil, A. (2012), Bhugathon o Bhumirupbidya in Bengali, The Himalayan Books, Kolkata
23. Sil, A. (2013), Prakriya Bhumirupbidya in Bengali, The Himalayan Books, Kolkata
24. Basu, P. (2014), Prakriya Sonkranta Bhumirupbidya o Sanshlishto Jalobigyan in Bengali, Books and Allied, Kolkata
25. Das, C; Pramanick, T.K. (2018), Prakritik Bhugol in Bengali, Innova Publications, Kolkata
26. Chattopadhyay, G. (2019), Mahajagotik Rahasyo in Bengali, Akshar Prakashan, Kolkata
27. Sengupta, P.K. (2019), Bhumikampo in Bengali, Education Forum, Kolkata
28. Saha, S; Roy, T. (2019), Bhugathonik Prakriya o Bhumirupbidya in Bengali, Kalyani Publishers, Kolkata
29. Maity, A.K.; Manna, S. (2020), Bhugathonik o Bhumirupbidya Prosonge in Bengali, Deb Prakashani, Kolkata
30. Tikadar, S. (2022), Prakritik Bhugol in Bengali, Book Syndicate, Kolkata

31. Choudhury, S.K. (2017), Bhougolik Bastubidya in Bengali, Central Book Agency, Kolkata
32. Das, C.; Pramanik, T.K. (2020), Poribesh Bhugol in Bengali, Innova Publications, Kolkata
33. Bera, B.; Bhattacharjee, S.; Sengupta, N. (2016), Jib Bhugol o Poribesh in Bengali, Naboday Publications, Kolkata
34. Sil, A. (2015), Jib Bhugol in Bengali, The Himalayan Books, Kolkata
35. Sil, A. (2015), Mritwika Bhugol in Bengali, The Himalayan Books, Kolkata
36. Das, P.K. (2013), Adhunik Mritwika Bhugol in Bengali, Naboday Publications, Kolkata
37. Basu, P. (2012), Mritwika Bigyan: Tathya o Abhigyota, Books and Allied, Kolkata

Reference Websites

- http://www.solarviews.com/eng/earth.htm
- http://www.moorlandschool.co.uk/earth/tectonic.htm
- https://www.usgs.gov

4.2 S/GEO /201/MJC-2T: Fundamentals of Human Geography

Fundamentals of Human Geography **4 Credits (60 Hours)**

Total Marks: **50 (IA-10 Marks + ESE-40 Marks)**
Question Pattern: **Section-A Definition Oriented (5×2=10)**
Section-B Short Answer Type (5×4=20)
Section-C Long Answer Type (1×10=10)

Learning Outcome

1. Gain knowledge on major issues of Human Geography.
2. Holistic understanding of different approaches and processes of Human Geography.
3. Developing concepts of society and its structure with an idea about space and social well being.
4. Understanding culture and its different elements.

Unit-1: Nature and Principles (20 Hours)

1.1 Nature and Scope of Human Geography
1.2 Approaches of Study: Resource, Landscape, Environmental and Contemporary
1.3 Recent Trends of Human Geography
1.4 Human Population and Environment with special reference to Development-Environment Conflict

Unit-2: Concept of Human Society (20 Hours)

2.1 Evolution of Human Societies: Hunting, Food Gathering and Pastoral Nomadism
2.2 Concept and Types of Space
2.3 Social Structure and Social Processes
2.4 Social Well Being

Unit-3: Concept of Culture (20 Hours)

3.1 Elements of Culture; Culture and Civilization, Cultural Realms
3.2 Concept of Race and Ethnicity
3.3 Language and Religion
3.4 Human Adaptation to Environment: Eskimo and Santal

Reference

1. Bergman, E.F (1995): Human Geography-Culture, Connections and Landscape, Prentice Hall, New Jersey
2. Chisholm. (1975): Human Geography, Penguin Books, Hermondsworth.
3. Daniel, P.A. and Hopkinson, M.F. (1989): The Geography of Settlement, Oliver &Boyd, London.
4. Johnston R, Gregory D, Pratt G. et al. (2008): The Dictionary of Human Geography, Blackwell Publication.
5. Jordan-Bychkov et al. (2006): The Human Mosaic: A Thematic Introduction to Cultural

Geography, W. H. Freeman and Company, New York.

6. Roy, T.; Mandal, B.; Maity, M.C. (2020), Manabiya Bhugol Anneshwan in Bengali, Kalyani Publishers, Kolkata
7. Dhara, S. (2013), Janasonkhya o Basoti Bhugol in Bengali, Naboday Publications, Kolkata
8. Mandal, M. (2016), Samajik Bhugol in Bengali, Naboday Publications, Kolkata
9. Raw, M. (1986): Understanding Human Geography: A Practical Approach, Bell and Hyman. London
10. Rubenstein, J.M. (2002), The Cultural Landscape, 7th edition, Prentice Hall, Englewood Cliffs
11. Smith D M (1982): Human Geography: A Welfare Approach, Edward Arnold, London
12. Mac Iver & Page (1950), Society: An Introductory Analysis, MacMillan, India.
13. Beteille Andre, (2002): Sociology: Essays on Approach & Methods, Oxford, India.
14. Giddens, A. and Sutton P.W. (2013) Sociology (8th edition) Polity.
15. Macionis John, (2006): Sociology, Pearson Education.
16. Rawat, H.K. (2007) Sociology: Basic Concepts, Rawat, New Delhi

4.3 S/GEO /301/MJC-3T: Geomorphology

Geomorphology **4 Credits (60 Hours)**

Total Marks:	**50 (IA-10 Marks + ESE-40 Marks)**	
Question Pattern:	**Section-A: Definition Oriented**	**(5×2=10)**
	Section-B: Short Answer Type	**(5×4=20)**
	Section-C: Long Answer Type	**(1×10=10)**

Learning Outcome

1. To have an idea of our dynamic earth and its geological make up.
2. Understanding major processes that are responsible for its surface features.
3. To gain knowledge on the impact of different anthropogenic processes on landforms.

Unit-1: Fundamentals of Geomorphology (20 Hours)

1.1 Fundamental principles of Geomorphology
1.2 Concept of grade, profile of equilibrium and base level
1.3 Earth movements – epeirogenic and orogenic earth movements; concept of and cymatogency
1.4 Concept of initial and sequential landforms

Unit-2: Process Geomorphology (20 Hours)

2.1 Climatic Geomorphology: Basic concepts, Morphoclimatic Zones of Peltier
2.2 Hillslopes: Genesis and Morphology
2.3 Fluvial processes: landform relationship, morphometric property of river basin: linear and areal aspects
2.4 Landform development in coastal areas under erosion and accretion

Unit-3: Applied Geomorphology (20 Hours)

3.1 Application of Geomorphic Mapping, DEM, TIN
3.2 Land capability and Land suitability classification
3.3 Types of check dam and their importance
3.4 Integrated River Basin Management

Reference

- Basu, P. (2006), Bhugathonik Prakriya o Bhumirup in Bengali, Books and Allied, Kolkata
- Basu, P. (2014), Prakriya Sonkranta Bhumirupbidya o Sanshlishto Jalobigyan in Bengali, Books and Allied, Kolkata
- Basu, R., Bhaduri, S. (Eds) (2007): Contemporary Issues and Techniques in Geography, Progressive Publishers.
- Basu, S.R. and Maiti R.K. (2008) Adhunik Bhumirup Bigyan (Bhugathan O Bibartan), Nabodaya Publications, Kolkata
- Bierman, P.R. and Montgomery D.R. (2014): Key Concepts in Geomorphology, WH Freeman
- Bird, E. (2008): Coastal Geomorphology: An Introduction, John Wiley & Sons, Chichester
- Bloom A.L. 1978: Geomorphology: A Systematic Analysis of Late Cenozoic Landforms Prentice – Hall of India, New Delhi.
- Bridges, E. M. (1990): World Geomorphology, Cambridge University Press.

- Brunsden D. 1985: Geomorphology in the Service of Man: The Future of Geography, Methnen, U.K. 3) Chorley, R. J. 1969: Introduction to Fluvial Processes, Methuen, London.
- Chattopadhyay, G. (2019), Mahajagotik Rahasyo in Bengali, Akshar Prakashan, Kolkata
- Chorley, R. J., Schumm, S. A. and Sugden, D. E. 1984: Geomorphology, Methuen, London.
- Cooke, R.U. and Warren, 1973: Geomorphology in Deserts, Batsford, London
- Das, C; Pramanick, T.K. (2018), Prakritik Bhugol in Bengali, Innova Publications, Kolkata
- Dayal, P. 1996: Textbook of Geomorphology, Shukla Book Depot, Patna.
- Goudie, A.S. (Ed) (2004): Encyclopaedia of Geomorphology, vol. 1 & 2, Routledge.
- Goudie, A.S. and Viles, H.A. (2016): Geomorphology in the Anthropocene, Cambridge University Press, Cambridge
- Goudie Anrew et.al. 1981: Geomorphological Techniques, George Allen &Unwin, London.
- Gupta, A. (2011): Tropical Geomorphology, Cambridge University Press
- Hallam, A. 1973: A Revolution in Earth Science: From Continental Drift to Plate Tectonics, Oxford University Press, London.
- Homes A. 1965: Principles of Physical Geology, 3rd Edition, ELBSS Edn.
- Kale, V. and Gupta, A. 2001: Introduction to Geomorphology, Orient Longman, Kolkata.
- Lindholm, R. (1987): A Practical Approach to Sedimentology, Allen & Unwin. Morisawa, M. 1985. Rivers,
- Longman. Mukolwe, M.M. 92016): Flood Hazard Mapping: Uncertainty and its Value in the Decision-making Process, CRC Press. Migon, P. (2010): Geomorphological Landscapes of the World, Springer, Dordrecht
- Maity, A.K.; Manna, S. (2020), Bhugathonik o Bhumirupbidya Prosonge in Bengali, Deb Prakashani, Kolkata
- Maiti, R.K. (2023) Geotectonics and Geomorphology: An Insight into Process-Form Relationship, Nabodaya Publications,
- Kolkata
- McCullagh, P. 1978: Modern Concepts in Geomorphology, Oxford University Press, Oxford. UK.
- Morisowa, M. 1968: Streams, their Dynamics and Morphology, McGraw Hill, New York.
- Mukhopadhyay, S.; Das, R. (1994), Bhumirup: Udvab o Prakriti Vol-I & II in Bengali, Paschimbanga Rajya Pustak Parshad, Kolkata
- Pearl, R.M. (1955): How to know the Minerals and Rocks, McGraw-Hill, New York
- Petts, G.E., Amoros, C (Eds). (1996): Fluvial Hydrosystems, Chapman and Hall.
- Rosgen, D. (1996): Applied River Morphology, Wildland Hydrology, Fort Collins, Colorado
- Saha, S; Roy, T. (2019), Bhugathonik Prakriya o Bhumirupbidya in Bengali, Kalyani Publishers, Kolkata
- Sen, P.K. (1989): Geomorphological Analysis of Drainage Basin: An Introduction to Morphometric and Hydrological Parameters, University of Burdwan.
- Sengupta, P.K. (2019), Bhumikampo in Bengali, Education Forum, Kolkata
- Sil, A. (2012), Bhugathon o Bhumirupbidya in Bengali, The Himalayan Books, Kolkata
- Sil, A. (2013), Prakriya Bhumirupbidya in Bengali, The Himalayan Books, Kolkata
- Strahler A.N. 1968: The Earth Sciences, Harper & Row Intl. Edn, New York
- Szabo, J., David, L. and Loczy, D. (eds.) (2010): Anthropogenic Geomorphology: A Guide to Man-Made Landforms, Springer
- Thornberry W. D. 1969: Principles of Geomorphology 2nd Edition, Wiley Intl. Edn. & Wiley, 1984.
- Tikadar, S. (2022), Prakritik Bhugol in Bengali, Book Syndicate, Kolkata
- Verstappen H. 1983: Applied Geomorphology, Geomorphological Surveys for Environmental Development, Elsevier, Amsterdam

4.4 S/GEO /302/MJC-3P: Statistical Methods in Geography

Statistical Methods in Geography **4 Credits (60 Hours)**

Total Marks:	**50 (IA-10 Marks + ESE-40 Marks)**	
Question Pattern:	**Question-1**	**(1x10=10)**
	Question-2	**(1x10=10)**
	Question-3	**(1x10=10)**
	Lab Note Book & Viva-Voce	**(5+5=10)**

Instruction for Laboratory Note Book

- **Practical works are to be completed in the classroom.**
- **Works are to be done in pen/pencil and neatly hand written and signed by class teachers.**
- **Laboratory Note Books must be submitted in the examination.**

Learning Outcome

1. To have an idea on analysis of spatial data, identify patterns, and make informed decisions in various geographic contexts.
2. Understanding spatial relationships, mastering statistical techniques like regression analysis and spatial correlation, and applying these methods to real-world geographical problems.
3. To gain knowledge on how to formulate and test hypotheses about spatial phenomena, including inferential statistics and hypothesis testing techniques.

Unit-1: Data Collection and Representation

1.1 Geographical Data Management: Collection (Sampling Techniques- Significance andTypes), Classification, Tabulation, Interpretation and Analysis of Geographical Data
1.2 Frequency Distribution: Attribute and Variable, Discrete and Continuous, Graphical Representation of Frequency Distribution (Histogram, Polygon, Curve and Ogives)
1.3 Measures of Central Tendency: Mean, Median and Mode, partition values (Quartiles, Deciles, Percentiles).
1.4 Measures of Dispersion: Range, Quartile Deviation, Mean Deviation and Standard Deviation, Coefficient of Variation

Unit-2: Data Analysis and Interpretation

2.1 Simple Correlation and Linear Regression
2.2 Time Series Analysis: Actual Trend, Semi Average, Moving Average,
2.3 Standard Error of Estimate and Standard Scores (Computations and Graphical Representation)
2.4 Absolute Residual Mapping

Unit-3: Analysis of Hypothesis

3.1 Hypothesis: Concept and Types of Error
3.2 Degrees of Freedom; Statistical Significance of Rejection and Acceptance of Hypothesis
3.3 Parametric Test of Hypothesis (Student 't' Test)
3.4 Non- Parametric Test of Hypothesis (Chi Square Test)

Reference

► Berry B. J. L. and Marble D. F. (eds.): Spatial Analysis – A Reader in Geography.

- Ebdon D., 1977: Statistics in Geography: A Practical Approach.
- Hammond P. and McCullagh P. S., 1978: Quantitative Techniques in Geography: An Introduction, Oxford University Press.
- King L. S., 1969: Statistical Analysis in Geography, Prentice-Hall.
- Pal S. K., 1998: Statistics for Geoscientists, Tata McGraw Hill, New Delhi.
- Sarkar, A. (2013) Quantitative geography: techniques and presentations. Orient Black Swan Private Ltd., New Delhi
- Silk J., 1979: Statistical Concepts in Geography, Allen and Unwin, London.
- Spiegel M. R.: Statistics, Schaum's Outline Series.
- Yeats M., 1974: An Introduction to Quantitative Analysis in Human Geography,McGraw Hill, New York.
- Gupta, S.C. (2015), Fundamentals of Statistics, 7th Edition, Himalaya Publishing House, New Delhi
- Mahmood, A. (1977), Statistical Methods in Geographical Studies, Rajesh Publications, New Delhi
- Adhikari, S. (2011), Honours Byaboharik Bhugol, Vol-III in Bengali, Dove Publishing House, Midnapore
- Moitra, A. (2011), Bhugole Parisonkhyan Poddhati in Bengali, Geo-observing Society, Kolkata
- Hazra, J.; Banik, G.C. (2020), Bhugole Rashitotter Prayog in Bengali, Naboday Publications, Kolkata

4.5 S/GEO /401/MJC-5T: Climatology

Climatology **Credits (60 Hours)**

Total Marks:	**50 (IA-10 Marks + ESE-40 Marks)**	
Question Pattern:	**Section-A Definition Oriented**	**(5×2=10)**
	Section-B Short Answer Type	**(5×4=20)**
	Section-C Long Answer Type	**(1×10=10)**

Learning Outcome

1. Understanding the Earth's climate system, Structure and Composition of Atmosphere, Stability and Instability of the Atmosphere, mechanism of precipitation.
2. To have an idea of the role of atmospheric circulation, climate change processes.
3. Assessing the spatial and temporal variability of climate across different regions and scales.

Unit-1: Composition of Atmosphere (20 Hours)

1.1 Insolation: Factors and Distribution, Global Heat Budget

1.2 Inversion of Temperature: Processes and Impact on Surface Weather

1.3 Atmospheric Stability and Instability

1.4 Forms and processes of Condensation; Mechanism of Precipitation: Ice Crystal and Collision-Coalescence Theory

Unit-2: Atmospheric Circulation (20 Hours)

2.1 Factors controlling Air Motion and resulting Flow Patterns

2.2 Planetary Wind system with special reference to Tricellular Model; Walker Circulation and ENSO

2.3 Jet Stream and Rossby Waves: Origin, Characteristics and Impact on SurfaceWeather

2.4 Genesis of Monsoon with particular reference to South Asia

Unit-3: Extreme Events and Climatic Classification (20 Hours)

3.1 Origin and Classification of Airmass; Frontogenesis and Frontolysis

3.2 Origin and Characteristics of Tropical and Temperate Cyclones

3.3 Classification of World Climates: Schemes of Koppen and Thornthwaite

3.4 Climate Change: Impact and adaptation; Weather forecasting

Reference

- Barry R. G. and Carleton A. M., 2001: Synoptic and Dynamic Climatology,Routledge, UK.
- Barry R. G. and Corley R. J., 1998: Atmosphere, Weather and Climate, Routledge, New York.
- Critchfield H. J., 1987: General Climatology, Prentice-Hall of India, New Delhi

- Lutgens F. K., Tarbuck E. J. and Tasa D., 2009: The Atmosphere: An Introduction to Meteorology, Prentice-Hall, Englewood Cliffs, New Jersey.
- Oliver, J.E.; Hidore, J.J. (2011), Climatology: An Atmospheric Science, Second Edition, Pearson Education, New Delhi
- Siddhartha, K. (2002), Atmosphere, Weather and Climate, Kisalaya Publications, New Delhi
- Pramakik, B. (2021), Gotishil Jalabayubidya in Bengali, Santra Publications, Kolkata
- Bishai, D. (2019), Abohaya o Jalabayubigyan in Bengali, Kalyani Publishers, Kolkata
- Majumdar, S. (2014), Adhunik Abohaya o Jalabayubigyan in Bengali, Sandhya Prakashani, Kolkata
- Sil, A. (2009), Abohaya o Jalabayu in Bengali, The Himalayan Books, Kolkata

4.6 S/GEO /402/MJC-6T: Soil and Biogeography

Soil and Biogeography **4 Credits (60 Hours)**

Total Marks:	**50 (IA-10 Marks + ESE-40 Marks)**
Question Pattern: Section-A: Definition Oriented	**(5×2=10)**
Section-B: Short Answer Type	**(5×4=20)**
Section-C: Long Answer Type	**(1×10=10)**

Learning Outcome

1. Understanding the chemical, physical, and biological properties of soil.
2. To have an idea of different types of biomes, which can help understand the relationships between soil characteristics and ecosystem dynamics.
3. To assess the role of Human Behavior and its impact on Soil and Biosphere

Unit 1 : Soil Geography (20 Hours)

1.1 Basic Concept: Ped, Pedon, Epipedon; Polypedon ;Soil Catena
1.2 Definition and Significance of Soil Properties: Physical - Texture, Structure and Moisture.
1.3 Chemical Properties of Soil - pH, Organic matter and NPK
1.4 Principles of Soil classification: Genetic and USDA (Orders and Sub-orders).

Unit 2: Bio-Geography (20 Hours)

2.1 Environmental factors for Plant Growth: Climate and Soil
2.2 Bio-geochemical cycles with special reference to Carbon Dioxide and Nitrogen
2.3 Ecological Succession and Climax Community
2.4 Geographical extent and characteristic features of Tropical Rain Forest, Taiga and Grassland Biomes

Unit 3: Man and Biosphere (20 Hours)

3.1 MAB Programme: Concept and Objectives; Present status
3.2 Soil Erosion and Degradation: Factors, processes and mitigation measures
3.3 Deforestation: Causes, consequences and management
3.4 Bio-diversity: Definition, types, threats and conservation measures

Reference

- Biswas, T.D. and Mukherjee, S.K. 1997: Textbook of Soil Science, Tata McGraw Hill,
- Brady, N.C. and Weil, R.R. 1996. The Nature and Properties of Soil, 11th edition, Longman, London:
- Foth, H.D. 1990. Fundamentals of Soil science, 8th edition, John Wiley and Sons, New York.
- Morgan, R.P.C. 1995. Soil Erosion and Conservation, 2nd edition, Longman,London
- Schwab, G.O., Fangmer, D.D. and Elliot, W.J. 1996. Soil and Water Management Systems, 4th edition, John Eiley and sons Inc., New York
- Young, A. 2000. Land Resource: Now and Future, Cambridge University Press, Cambridge: 332p.
- De, N. K. and Jana, N. C. (2016): The Land: Multifaceted Appraisal and Management,

Sribhumi Publishing House, Kolkata, Reprint

- Chapman J.L. and Rens, M.J. 1993. Ecology: Principle and Applications, Cambridge University Press, Cambridge:
- Chairas, D.D. Reganold, J.P. and Owen, O.S. 2002. National Resource Conservation and management for a Sustainable Future, 8th edition, Prentice Hall, Englewood Cliffs
- Dash, M.C., 2001. Fundamental of Ecology, 2nd edition, Tata McGrawHill, New Delhi
- Haggett, R. 1998. Fundamentals of Biogeography, Routledge, London:
- Kormondy, E.J. 1996. Concept of Ecology, 4th edition, Prentice- Hall, India, NewDelhi
- Myers, A. A. and Giller, P.S. (editors) 1988. Analytical Biogeography: An Integrated Approach to the Study of Animal and Plant Distribution. Chapman and Hall,London
- Choudhury, S.K. (2017), Bhougolik Bastubidya in Bengali, Central Book Agency, Kolkata
- Das, C.; Pramanik, T.K. (2020), Poribesh Bhugol in Bengali, Innova Publications, Kolkata
- Bera, B.; Bhattacharjee, S.; Sengupta, N. (2016), Jib Bhugol o Poribesh in Bengali, Naboday Publications, Kolkata
- Sil, A. (2015), Jib Bhugol in Bengali, The Himalayan Books, Kolkata
- Sil, A. (2015), Mritwika Bhugol in Bengali, The Himalayan Books, Kolkata
- Das, P.K. (2013), Adhunik Mritwika Bhugol in Bengali, Naboday Publications, Kolkata
- Basu, P. (2012), Mritwika Bigyan: Tathya o Abhigyota, Books and Allied, Kolkata

4.7 S/GEO /403/MJC-7P: Cartographic Techniques in Geography

Cartographic Techniques in Geography **4 Credits (60 Hours)**

Total Marks: 50 (IA-10 Marks + ESE-40 Marks)
Question Pattern: Question-1 (1×10=10)
Question-2 (1×10=10)
Question-3 (1×10=10)

Instruction for Laboratory Note Book

- **Practical works are to be completed in the classroom.**
- **Works are to be done in pen/pencil and neatly hand written and signed by class teachers.**
- **Laboratory Note Books have to be submitted in the examination.**

Learning Outcome

1. Skill in collecting, organizing, and analyzing spatial data for map creation.
2. Understanding the principles of Cartography and how to represent geographic data through various mapping techniques.
3. Ability to interpret Topographical Maps for better understanding of geographic features.
4. **Lab Note Book** **(5+5=10)**

Unit-1: Cartographic Representation of Geographical Data

1.1 Maps and Diagrams: Definition, Types and Differences

1.2 Cartograms: Proportionate Pie

1.3 Climatic Diagrams: Ombrothermic Diagram

1.4 Population Diagrams: Dependency Ratio

Unit-2: Mapping Techniques

2.1 Measures of Density by Choropleth: Population Data, Agricultural Data

2.2 Measures of Inequality: Location Quotient, Gini's Coefficient and Lorenz Curve

2.3 Measures of Interaction: Nearest Neighbour Analysis, Gravity Model

2.4 Combinational Analysis: Weaver's Crop Combination

Unit-3: Basic Surveying

3.1 Concept and principles of Angles, Bearing, Azimuths, Traversing, Radiation and Intersection.

3.2 Surveying with Prismatic Compass

3.3 Levelling with Dumpy Level and Contouring

3.4 Calculation of height and distance by Transit Theodolite (Base Accessible)

Reference

- Cuff J. D. and Mattson M. T., 1982: Thematic Maps: Their Design and Production,Methuen Young Books
- Dent B. D., Torguson J. S., and Holder T. W., 2008: Cartography: Thematic Map Design (6th Edition), McGraw-Hill Higher Education

- Gupta K. K. and Tyagi V. C., 1992: Working with Maps, Survey of India, DST, NewDelhi.
- Kraak M.-J. and Ormeling F., 2003: Cartography: Visualization of Geo-SpatialData, Prentice-Hall.
- Mishra R. P. and Ramesh A., 1989: Fundamentals of Cartography, Concept, New Delhi.
- Singh R. L. and Singh R. P. B., 1999: Elements of Practical Geography, KalyaniPublishers.
- Slocum T. A., Mcmaster R. B. and Kessler F. C., 2008: Thematic Cartography andGeovisualization (3rd Edition), Prentice Hall.
- Tyner J. A., 2010: Principles of Map Design, The Guilford Press.
- Sarkar, A. (2015) Practical geography: A systematic approach. Orient Black Swan Private Ltd., New Delhi
- Adhikari, S. (2005), Honours Byaboharik Bhugol, Vol-I, Dove Publishing House, Midnapore
- Das, N.; Khatun, S. (2021), Kartographi- Dharona o Prayog in Bengali, Kalyani Publishers, Kolkata

4.8 S/GEO /404/MJC-8P: Map Interpretation in Geography

Map Interpretation in Geography **4 Credits (60 Hours)**

Total Marks:	**50 (IA-10 Marks + ESE-40 Marks)**
Question Pattern: Question-1	**(1×10=10)**
Question-2	**(1×10=10)**
Question-3	**(1×10=10)**
Lab Note Book	**(5+5=10)**

Instruction for Laboratory Note Book

- **Practical works are to be completed in the classroom.**
- **Works are to be done in pen/pencil and neatly hand written and signed by class teachers.**
- **Laboratory Note Books have to be submitted in the examination.**

Learning Outcome

1. To have an idea of Earth's history and identification of various geological features.
2. Understanding and interpreting of Weather Maps in different seasons.
3. To gain knowledge on the atmospheric dynamics.

Unit-1: Interpretation of Topographical Maps

1.1 Principles and Nomenclature of Topographical Map (OSM) of Survey of India

1.2 Topographic Profile and Broad Physiographic Divisions

1.3 Drainage Basin Morphometry: Relative Relief (Smith, 1935), Average Slope (Wentworth, 1930), Stream Frequency (Horton, 1945) and Stream Ordering (As per Strahler)

1.4 Transect Chart

Unit-2: Geological Map

2.1 Basic Concepts: Strike and Dip, Rock Beds and Bedding Plane, Geological Succession, Outcrops, Unconformity

2.2 Construction of Geological Section: Horizontal, Uniclinal and Folded Structures

2.3 Topography and its relation with Underlying Structures

2.4 Succession of Beds and Geological history

Unit-3: Climatic Data and Weather Maps

3.1 Climograph and Hythergraph

3.2 Rainfall Dispersion Diagram

3.3 Conventional symbols of IMD Weather Maps

3.4 Interpretation of Daily Weather Maps of IMD : Pre-monsoon, Monsoon and Post-monsoon

Reference

- Bennison, G.M. (1990): An Introduction to Geological Structures and Maps, 5th Edition, Edward Arnold, London

- Cuff J. D. and Mattson M. T., 1982: Thematic Maps: Their Design and Production, Methuen Young Books
- Dent B. D., Torguson J. S., and Holder T. W., 2008: Cartography: Thematic Map Design (6th Edition), McGraw-Hill Higher Education
- Gupta K. K. and Tyagi V. C., 1992: Working with Maps, Survey of India, DST, New Delhi.
- Mishra R. P. and Ramesh A., 1989: Fundamentals of Cartography, Concept, New Delhi.
- Monkhouse F.J. amd Wilkinson, H.R. (1971): Maps and Diagrams: Their Compilation and Construction, B.I. Publications Pvt. Ltd. New Delhi
- Sarkar, A. (2015) Practical geography: A systematic approach. Orient Black Swan Private Ltd., New Delhi
- Singh R. L. and Singh R. P. B., 1999: Elements of Practical Geography, Kalyani Publishers.
- Slocum T. A., Mcmaster R. B. and Kessler F. C., 2008: Thematic Cartography and Geovisualization (3rd Edition), Prentice Hall.
- Tyner J. A., 2010: Principles of Map Design, The Guilford Press.
- Wood, D., and Fels, J. (1992) The Power of Maps. New York: Guilford.
- Adhikari, S. (2005), Honours Byaboharik Bhugol, Vol-I, Dove Publishing House, Midnapore
- Das, N.; Khatun, S. (2021), Kartographi- Dharona o Prayog in Bengali, Kalyani Publishers, Kolkata

Web Resources

- https://www.nios.ac.in/media/documents/316-New/Book-2/Practical-1.pdf
- https://icaci.org/files/documents/wom/06_IMY_WoM_en.pdf
-
- https://www.geokniga.org/bookfiles/geokniga-introduction-geological-structures-and-maps.pdf
- https://geo.libretexts.org/Bookshelves/Geology/GEOS%3A_A_Physical_Geology_Lab_Manual_for_California_Community_Colleges_(Branciforte_and_Haddad)/16%3A_Geological_Maps_and_Cross-sections/16.01%3A_Front_Matter
- https://openpress.usask.ca/geolmanual/chapter/overview-of-strike-dip-and-structural-cross-sections/
- https://nios.ac.in/media/documents/316courseE/L35%20STUDY%20OF%20WEATHER%20MAPS.pdf
- https://ncert.nic.in/textbook/pdf/kegy308.pdf
- https://egyankosh.ac.in/bitstream/123456789/69117/3/Unit-13.pdf

4.9 S/GEO /501/MJC-9T: Hydrology and Oceanography

Hydrology and Oceanography — 4 Credits (60 Hours)

Total Marks: 50 (IA-10 Marks + ESE-40 Marks)
Question Pattern: Section-A: Definition Oriented (5×2=10)
Section-B: Short Answer Type (5×4=20)
Section-C: Long Answer Type (1×10=10)

Learning Outcome

1. Have an understanding of the controlling factors and flow pattern of surface runoff as well as underground water- its recharge and discharge.
2. Students will be able to understand various air-sea interaction processes by studying oceanography.
3. Students will be able to develop knowledge on marine resources and Blue Economy.

Unit 1: Hydrology

1.1 Systems Approach in hydrology. Global hydrological cycle: Its physical and biological role

1.2 Runoff: controlling factors; Infiltration and Evapotranspiration; Run off Cycle

1.3 Drainage basin as a hydrological unit. Principles of water harvesting and Watershed Management

1.4 Groundwater: Occurrence and Storage; Factors controlling recharge, discharge and movement

Unit 2: Oceanography

2.1 Major relief features of the ocean floor

2.2 Physical and chemical properties of ocean water

2.3 Ocean Temperature and Salinity: distribution and determinants

2.4 Water Mass, T–S diagram

Unit 3: Ocean Resources and Sea Level Change

3.1 Coral reefs: Formation, classification and threats

3.2 Marine resources and Blue Economy: Classification and sustainable utilization

3.3 Tides : Concept, Theories of Origin (Progressive Wave Theory, Stationary Wave Theory)

3.4 Sea Level Change: Types and Causes

Reference

- Andrew. D. Ward and Stanley, Trimble (2004): Environmental Hydrology, 2nd edition, Lewis Publishers, CRC Press.
- Karanth, K.R., 1988: Ground Water: Exploration, Assessment and Development,Tata-McGraw Hill, New Delhi.
- Ramaswamy, C. (1985): Review of floods in India during the past 75 years: A Perspective. Indian National Science Academy, New Delhi.
- Rao, K.L., 1982: India's Water Wealth 2nd edition, Orient Longman, Delhi,
- Singh, Vijay P. (1995): Environmental Hydrology. Kluwer Academic Publications,the Netherlands.
- Anikouchine W. A. and Sternberg R. W., 1973: The World Oceans: An Introduction
- Sen, J.; Sengupta, P. (2020), Jalobigyan o Samudra Bhugol in Bengali, Kalyani Publishers, Kolkata

- Gayen, S. (2010), Bhu-Jalobidya in Bengali, Deb Prakashani, Kolkata
- Sil, A. (2016), Jalobidya, 4th Edition in Bengali, The Himalayan Books, Kolkata
- Sengupta, D.; Goswami, P.; Rudra, K. (2014), Jal in Bengali, Avenel Press, Kolkata
- Sil, A. (2014), Samudrabidya in Bengali, 4th Edition, The Himalayan Books, Kolkata
- Choudhury, S.K. (2017), Samudra Bhugol in Bengali, Central Book Agency, Kolkata

4.10 S/GEO/502/MJC-10T: Geography of Economic Activities

Geography of Economic Activities **4 Credits (60 Hours)**

Total Marks: 50 (IA-10 Marks + ESE-40 Marks)
Question Pattern: Section-A: Definition Oriented (5×2=10)
Section-B: Short Answer Type (5×4=20)
Section-C: Long Answer Type (1×10=10)

Learning Outcome

1. Would learn theoretical background of agriculture and applicable models
2. Students would develop understanding of industrial location factors and applicable models.
3. It also aims to develop students' knowledge on the tourism as an alternative means of economic development.

Unit-1: Economic Activity: Agriculture

1.1 Agricultural System: Plantation Agriculture & Mixed Farming.
1.2 Crop Combination and Crop Diversification
1.3 Classification of World Agricultural Systems after Whittlessey
1.4 Models of Agricultural Land use: Von Thunen's Model, Haggerstrand's Model on Diffusion of Innovations

Unit-2: Economic Activity: Industry

2.1 Location Factors; Role of transport in industrial location
2.2 Models of Industrial Location: Weber & Losch
2.3 Industrial Regions: Mumbai-Pune; Asansol-Durgapur, Haldia
2.4 Impact of Industrial Activities on Environment

Unit-3: Economic Activity: Trade, Transport and Tourism

3.1 Role of WTO in International Trade
3.2 Transport Network: Accessibility and Connectivity
3.3 Tourism Industry and its components
3.4 Environmental issues related to Tourism Industry

Reference

- Alexander J. W., 1963: Economic Geography, Prentice-Hall Inc., Englewood Cliffs, New Jersey.
- Coe N. M., Kelly P. F. and Yeung H. W., 2007: Economic Geography: A Contemporary Introduction, Wiley-Blackwell.
- Hodder B. W. and Lee Roger, 1974: Economic Geography, Taylor and Francis.
- Combes P., Mayer T. and Thisse J. F., 2008: Economic Geography: The Integration of Regions and Nations, Princeton University Press.
- Wheeler J. O., 1998: Economic Geography, Wiley..
- Durand L., 1961: Economic Geography, Crowell.
- Clark, Gordon L.; Feldman, M.P. and Gertler, M.S., eds. 2000: The Oxford
- Baud-Bovy, M. and Lawson, F. (1977), "Tourism and Recreation Development", The Architectural Press Ltd, CBI Publishing Company, Boston
- Boniface, B.G. and Cooper, C.P. (1987), "The Geography of Travel & Tourism",Heinemann Professional Publishing, Oxford.
- Burton, R. (1991), "Travel Geography", Pitman Publishing, London.

- Butler, R.W. (2010), ed, "The Tourism Area Life Cycle: Applications and Modifications", Vol-1, Viva Books Private Limited, New Delhi.
- Butler, R.W. (2010), ed, "The Tourism Area Life Cycle: Conceptual and Theoretical Issues", Vol-2, Viva Books Private Limited, New Delhi.
- Cooper, C., Fletcher, J., Gilbert, D. and Wanhill, S. (1993), "Tourism : Principles andPractice", Pitman, London.
- Hall, M. and Stephen, P. (2006) Geography of Tourism and Recreation – Environment, Place and Space, Routledge, London.
- Mathison, A. and Wall, G. (1982), "Tourism: Economic, Physical and SocialImpacts", Longman, Harlow.
- Mill, R. C. and Morrison, A. M. (1985), "The Tourism System: An Introductory Text",Prentice Hall, New Jersey.
- Pearce, D. (1989), "Tourism and Regional Development", Longman, London.
- Pearce, D. (1995), Tourism Today: A Geographical Analysis, Longman, London
- Siddhartha, K. (2006) Economic Geography: Theories, Processes and Patterns, Kisalaya Publications, New Delhi
- Chattopadhyay, A. (2006), Arthonaitik Bhugol o Sompad Sastrer Porichay, 7th Edition in Bengali, T.D. Publications, Kolkata
- Saha, S.; Roy, T. (2021), Adhunik Arthonaitik Bhugol in Bengali, Kalyani Publishers, Kolkata

4.11 S/GEO/503/MJC-11T: Geography of India and West Bengal

Geography of India and West Bengal **4 Credits (60 Hours)**

Total Marks: 50 (IA-10 Marks + ESE-40 Marks)
Question Pattern: Section-A: Definition Oriented (5×2=10)
Section-B: Short Answer Type (5×4=20)
Section-C: Long Answer Type (1×10=10)

Learning Outcome

1. Able to understand the geological and climatic makeup of the country in general and the state of West Bengal in particular.
2. Will learn the socio-economic profiles of India as well as West Bengal.

Unit 1: Physical Setting of India

1.1 Tectonic and Stratigraphic Provinces, Physiographic divisions
1.2 Drainage Characteristics: Peninsular and Extra-peninsular Drainage-origin and regimes
1.3 Climate, Soil and Vegetation: characteristics and general classification
1.4 Mineral and power resources distribution and utilisation: Iron ore, Petroleum,

Unit 2: Cultural and Economic setting

2.1 Population: distribution, growth and policy
2.2 Composition of population by Race, Caste, Religion and Language
2.3 Green Revolution and its consequences in India
2.4 Industrial development: Automobile and Information Technology

Unit 3: Geography of West Bengal

3.1 Physical Perspectives: Physiographic divisions, Forest and Water Resources
3.2 Population: distribution & growth; Human Development
3.3 Resources: Agriculture, Mining and Industries
3.4 Regional Problem: Water Scarcity and Irrigation Problem of Bankura *Jangalmahal* Area

Reference

- Deshpande C. D., 1992: India: A Regional Interpretation, ICSSR, New Delhi.
- Johnson, B. L. C., ed. 2001. Geographical Dictionary of India. Vision Books, New Delhi.
- Mandal R. B. (ed.), 1990: Patterns of Regional Geography – An Intenational Perspective. Vol. 3 – Indian Perspective.
- Sdyasuk Galina and P Sengupta (1967): Economic Regionalisation of India, Census of India
- Sharma, T. C. 2003: India - Economic and Commercial Geography. Vikas Publ.,New Delhi.
- Singh R. L., 1971: India: A Regional Geography, National Geographical Society of

India.

- Singh, Jagdish 2003: India - A Comprehensive & Systematic Geography,Gyanodaya Prakashan, Gorakhpur.
- Spate O. H. K. and Learmonth A. T. A., 1967: India and Pakistan: A General andRegional Geography, Methuen.
- Tirtha, Ranjit 2002: Geography of India, Rawat Publs., Jaipur & New Delhi.
- Pathak, C. R. 2003: Spatial Structure and Processes of Development in India,Regional Science Assoc., Kolkata.
- Tiwari, R.C., 2007: Geography of India. Prayag Pustak Bhawan, Allahabad
- Sharma, T.C., 2013: Economic Geography of India. Rawat Publication, Jaipur
- Khullar, D. (2014), India: A Comprehensive Geography, 3rd Edition, Kalyani Publishers, New Delhi
- Pal, S.K. (1998), Physical Geography of India: A Study in Regional Earth Sciences, Orient Longman, Kolkata
- Rudra, K. (2008), Banglar Nadikatha in Bengali, Sahitya Sansad, Kolkata
- Rudra, K. (2021), Dui Banglar Nadikatha in Bengali, Sahitya Sansad, Kolkata
- Chattopadhyay, A. (2020), Bharat O Paschimbanger Bhugol in Bengali, Naboday Publications, Kolkata
- Sen, J. (2021), Bharat O Paschimbanger Bhugol in Bengali, Kalyani Publishers, Kolkata
- Sarkar, B.C. (2019), Bharater Bhugol in Bengali, Concept Publishing Company, New Delhi
- Mandal, T. & Biswas, K. (2023), Geography of India and West Bengal, Tapati Publishers, Kolkata.

S/GEO/504/MJC-12P: Techniques in Environmental Geography

Techniques in Environmental Geography **4 Credits (60 Hours)**

Total Marks: 50 (IA-10 Marks + ESE-40 Marks)
Question Pattern: Question-1 (1×10=10)
Question-2 (1×10=10)
Project Report 10
Lab Note Book & Viva-Voce (5+5=10)

Instruction for Laboratory Note Book

•Practical works are to be completed in the classroom.
•Works are to be done in pen and neatly hand written and signed by class teachers.
•Laboratory Note Books have to be submitted in the examination.

Learning Outcome

1. Students will have practical experience on various impact assessment methods.
2. Students will also learn various techniques of measurements of environmental parameters.
3. The project based learning will have deeper understanding of the techniques and concepts.

Unit-1: Environmental Impact Assessment

1.1 Basic concepts, EIS
1.2 EIA Methods: Adhoc, Matrix- simple and Weighted
1.3 EIA Methods: Checklist and Leopold Matrix
1.4 Preparation of Questionnaire for Perception Survey on environmental problems

Unit-2: Measurement of Environmental Parameters

2.1 Quality Assessment of Soil: pH and Organic Carbon

2.2 Quality Assessment of Water: pH by pH Meter, TDS by TDS Meter

2.3 Quality Assessment of Air: calculation of API/AQI based on CPCB/WBPCB method and data

2.4 Identification and listing of different types of water and soil pollutants in the locality

Unit-3: Environmental Project Report

Each student will prepare an individual report based on a specific environmental issue in the neighbourhood (rural/urban) and may collect the following environmental data:

1. Quality of soil-pH and Organic Carbon

2. Quality of water- pH and TDS, presence of any contaminant

3. Collection of PM 2.5 data by Digital Pollution Meter (optional)

4. Solid waste disposal and management

5. Vehicular pollution, if any

6. Industrial/agricultural pollution, if any

7. Any other

The report should be computer typed in A4 size paper and must not exceed 2000 words and must be placed before the external examiner in the examination along with the other lab copy.

Reference

- Chandna R. C., 2002: Environmental Geography, Kalyani, Ludhiana.
- Cunninghum W. P. and Cunninghum M. A., 2004: Principals ofEnvironmental Science: Inquiry and Applications, Tata MacGraw Hill, New Delhi.
- Goudie A., 2001: The Nature of the Environment, Blackwell, Oxford.
- Singh, R.B. (Eds.) (2009): Biogeography and Biodiversity. Rawat Publication, Jaipur
- Miller G. T., 2004: Environmental Science: Working with the Earth, ThomsonBrooksCole, Singapore.
- MoEF, 2006: National Environmental Policy-2006, Ministry of Environment andForests, Government of India.
- 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
- Odum, E. P. et al, 2005: Fundamentals of Ecology, Ceneage Learning India.
- Singh S., 1997: Environmental Geography, Prayag Pustak Bhawan. Allahabad.
- UNEP, 2007: Global Environment Outlook: GEO4: Environment for Development,
- United Nations Environment Programme.
- Singh, M., Singh, R.B. and Hassan, M.I. (Eds.) (2014): Climate change and biodiversity: Proceedings of IGU Rohtak Conference, Volume 1. Advances inGeographical and Environmental Studies, Springer
- Das Chatterjee N. 2016: Man-Elephant Conflict: A Case Study from Forests in West Bengal, India, Springer
- Morgan R.K. 2002: Environmental Impact Assessment: A Methodological Perspective, Kluwer Academic Publishers, London
- Eccleston C.H. 2011: Environmental Impact Assessment: A Guide to Best Professional Practices, CRC Press, New York
- Gilpin.A (1994) Environmental Impact Assessment: Cutting Edge for the 21st Century (Eia : Cutting Edge for the Twenty-First Century, Cambridge University Press,
- Pan, S. (2018), Environmental Hazards, Kabitika Publications, Midnapore
- CPCB Reports, Ministry of Environment, Forest and Climate Change, Govt. Of India, http://www.cpcb.nic.in/Publications.php

4.12 S/GEO/601/MJC-13T: Evolution of Geographical Thought

Evolution of Geographical Thought **4 Credits (60 Hours)**

Total Marks:	**50 (IA-10 Marks + ESE-40 Marks)**
	Question Pattern: Section-A: Definition Oriented (5×2=10)
	Section-B: Short Answer Type (5×4=20)
	Section-C: Long Answer Type(1×10)=10

Learning Outcome

1. Students will learn the growth and development of the discipline during its entire course of journey.
2. It helps to understand the basic philosophy of geography.
3. It highlights various schools of thought evolved in different areas of the world with a thrust into the paradigm shift in the discipline during its making.

Unit-1: Development of Geography

1.1 Definition, Scope and Content of Geography
1.2 Development of Geography in the Ancient and Mediaeval Periods: Contributions of Greek, Arabian and Indian Geographers
1.3 Development of Modern Scientific Geography in the 19th Century with particular reference to the Contributions of Humboldt and Ritter
1.4 Development of Geography in the 20th Century: Quantitative Revolution and its impact

Unit-2: Development of Schools of Thought in Modern Geography

2.1 German School and French School
2.2 British School and American School
2.3 Indian School
2.4 Paradigm Shift in Geography

Unit-3: Concepts and Trends in Geography

3.1 Concepts of Determinism, Possibilism and Neo-Determinism
3.2 Concepts of Empiricism and Positivism
3.3 Approaches to Geographic Studies: Systematic Vs. Regional Approach
3.4 Recent trends in Geography: Post Modernism, Feminism

Reference

- Arentsen M., Stam R. and Thuijis R., 2000: Post-modern Approaches to Space,ebook.
- Bhat, L.S. (2009): Geography in India (Selected Themes). Pearson
- Bonnett A., 2008: What is Geography? Sage.
- Dikshit R. D., 1997: Geographical Thought: A Contextual History of Ideas,Prentice– Hall India.
- Hartshone R., 1959: Perspectives of Nature of Geography, Rand MacNally and Co.
- Holt-Jensen A., 2011: Geography: History and Its Concepts: A Students Guide,SAGE.
- Johnston R. J., (Ed.): Dictionary of Human Geography, Routledge.
- Johnston R. J., 1997: Geography and Geographers, Anglo-American

HumanGeography since 1945, Arnold, London.

- Kapur A., 2001: Indian Geography: Voice of Concern, Concept Publications.
- Martin Geoffrey J., 2005: All Possible Worlds: A History of Geographical Ideas,Oxford.
- Soja, Edward 1989. Post-Modern Geographies, Verso, London. Reprinted 1997:Rawat Publ., Jaipur and New Delhi.
- Adhikari, S. (2015), Fundamentals of Geographical Thought, Orient Blackswan, Kolkata
- Maity. R.; Moitramaity, M. (2013), Bhugol-Chinta o Darshan in Bengali, Naboday Publications, Kolkata
- Mukhopadhyay, J. (2009), Bhugol Darshan in Bengali, Mitram Publishers, Kolkata
- Sen, J. (2014), Bhugol Darshan in Bengali, Kalyani Publishers, Kolkata

Mitra, K.; Sen, J.; Sengupta, P. (2008), Bhugol Darshan o Rajnaitik Chintadhara in Bengali, Kalyani Publishers, Kolkata

4.13 S/GEO/602/MJC-14T: Cultural and Settlement Geography

Cultural and Settlement Geography **4 Credits (60 Hours)**

Total Marks:	**50 (IA-10 Marks + ESE-40 Marks)**
	Question Pattern: Section-A: Definition Oriented (5×2=10)
	Section-B: Short Answer Type (5×4=20)
	Section-C: Long Answer Type (1×10=10)

Learning Outcome

1. Students will be able to correlate different cultural traits with their own and the cultural transformation with time.
2. Understanding of the patterns of rural as well as urban settlements and their distribution over space.

Unit 1: Cultural Geography

1.1 Definition, scope and content of Cultural Geography, development of cultural geography in relation to allied disciplines
1.2 Cultural Diffusion, Segregation and Cultural diversity
1.3 Acculturation; Cultural Landscape
1.4 Culture, Technology and Development.

Unit 2: Rural Settlement

2.1 Rural Settlement: Definition, Nature and Characteristics of Rural Settlements
2.2 Factors influencing Site and Situation of Rural Settlements
2.3 Types and Pattern of Rural Settlements
2.4 Social segregation in rural areas

Unit-3: Urban Settlement

3.1 Urban Settlements: Census definition and categories in India
3.2 Urban morphology: Classical models-Burgess, Homer Hoyt, Harris and Ullman.
3.3 City-region and Conurbation; Concept of Smart City
3.4 Functional classification of cities: Harris, Nelson and Mackenzie

Reference

- Banerjee Guha, S. ed (2004) Space, Society & Geography, Rawat Publication,Delhi
- Bardhan, P., 2003, Poverty, Age Structure & Political Economy in India, OxfordUniversity Press
- Biswas, A.K., Jortajada, C., 2006, Appraising Sustainable Development, OxfordUniversity
- Dhanagare, D.N., 2004, Themes and Perspectives in Indian Sociology, RawatPublication, Delhi

Fellmann, J.D.,Getis, A., Getis, J., 2000, Human Geography- Landscape of HumanActivity, McGraw Hill

- Fern, R.L., 2002, Nature, God and Humanity, Cambridge university Press
- Gadhil, M., Guha,R.,2000, The Use and Abuse of Nature, Oxford University Press
- Gregory, D.,Urry, J.,1985, Social Relation and Spatial Structure, MacMillan
- Herbert, D.T., Johnston, R.J.,1982, Geography and Urban Environment. JohnWiley& Sons
- Hussain, M.,2007, Models in Geography, Rawat Publication

- Jordan,T., Rowntree, L.,1990, Human Mosaic, Harper Collins Publishers
- Knox, P., Pinch,S., 2000, Urban Social Geography, Pearson Education
- Mitchell, D. 2000, Cultural Geography-A Critical Introduction, Black Well.
- Dhara, S. (2013), Janasonkhya o Basoti Bhugol in Bengali, Naboday Publications, Kolkata
- Mandal, M. (2016), Samajik Bhugol in Bengali, Naboday Publications, Kolkata

4.13 S/GEO/603/MJC-15T: Urban Geography

Urban Geography **4 Credits (60 Hours)**

Total Marks:	**50 (IA-10 Marks + ESE-40 Marks)**
	Question Pattern: Section-A: Definition Oriented (5×2=10)
	Section-B: Short Answer Type (5×4=20)
	Section-C: Long Answer Type (1×10=10)

Learning Outcome

1. Students will learn concepts and theories of urbanization.
2. Will have an exposure on different urban processes and models.
3. They will also learn different aspects and problems of urbanization with special reference to India.

Unit -1: Basic Concepts

1.1 Urban Geography: nature and scope, different approaches, and recent trends in Urban Geography
1.2 Origin of urban places in Ancient, Medieval, Modern and Post-Modern periods- factors, stages, and characteristics.
1.3 Theories of Urban Evolution and Growth: Hydraulic Theory, Economic Theory
1.4 Urban Hierarchies: Central Place Theory of W. Christaller

Unit -2: Urban Processes

2.1 Ecological processes of Urban Growth; Urban Fringe
2.2 Aspects of urban places: Location, Site and Situation
2.3 Size and Spacing of Cities: The Rank Size Rule, The Law of the Primate City
2.4 Patterns of urbanization in developed and developing countries

Unit 3: Urbanization in India

3.1 Urban Issues: problems of Housing, Slums, Civic Amenities (water and transport)
3.2 Trends of urbanization in India
3.3 Case studies of Delhi, Kolkata, and Chandigarh with reference to land use
3.4 Policies on urbanization in India

Reference

- Fyfe N. R. and Kenny J. T., 2005: The Urban Geography Reader, Routledge.
- Graham S. and Marvin S., 2001: Splintering Urbanism: Networked Infrastructures,Technological Mobility and the Urban Condition, Routledge.
- Hall T., 2006: Urban Geography, Taylor and Francis.
- Kaplan D. H., Wheeler J. O. and Holloway S. R., 2008: Urban Geography, JohnWiley.
- Knox P. L. and McCarthy L., 2005: Urbanization: An Introduction

to UrbanGeography, Pearson Prentice Hall New York.

- Knox P. L. and Pinch S., 2006: Urban Social Geography: An Introduction, Prentice-Hall.
- Pacione M., 2009: Urban Geography: A Global Perspective, Taylor and Francis.
- Sassen S., 2001: The Global City: New York, London and Tokyo, Princeton
- Dhara, S. (2013), Janasonkhya o Basoti Bhugol in Bengali, Naboday Publications, Kolkata
- Mandal, M. (2016), Samajik Bhugol in Bengali, Naboday Publications, Kolkata

4.14 S/GEO/604/MJC-16P: Remote Sensing Techniques

Remote Sensing Techniques **4 Credits (60 Hours)**

Total Marks:	**Total Marks:**	**50 (IA-10 Marks + ESE-40 Marks)**
Question Pattern:	**Question-1**	**(1×10=10)**
	Question-2	**(1×10=10)**
	Question-3	**(1×10=10)**
	Lab Note Book & Viva-Voce	**(5+5=10)**

Instruction for Laboratory Note Book

- Practical works are to be completed in the classroom.
- Works are to be done in QGIS software and theoretical portions are to be neatly hand written/computer typed and signed by class teachers.
- Laboratory Note Books have to be submitted in the examination.

Learning Outcome

1. Students will learn to understand basic concepts of remote sensing as a modern data acquisition tool.
2. It will give practical idea of data downloading, classification and further analysis of georeferenced earth data which they can further use in various research endeavours.
3. Will be able to prepare 3-D surface models using various DEMs.

Unit-1: Basic Concepts

1.1 Energy Sources, Interactions with atmosphere, Interactions with Earth's surface
1.2 Sensing Systems: Types of RS satellites and sensors
1.3 Sensor Resolutions: Spatial, Spectral, Radiometric and Temporal
1.4 Principles of preparing Standard False Colour Composites

Unit-2: Data Acquisition and Classification

2.1 Free sources of Remote Sensing data: NRSC and USGS
2.2 Principles of image interpretation and feature extraction
2.3 Image classification: Supervised and Unsupervised
2.4 Preparation of NDVI, NDBI and NDWI

Unit-3: Terrain Modelling

3.1 Introduction to DEM and its sources: CARTODEM and SRTM DEM
3.2 DEM visualization: Hillshade
3.3 Preparation of Slope map
3.4 Contour extraction from DEM

Reference

- Campbell J. B., 2007: Introduction to Remote Sensing, Guildford Press.
- Jensen J. R., 2004: Introductory Digital Image Processing: A Remote SensingPerspective, Prentice Hall.

- Joseph, G. 2005: Fundamentals of Remote Sensing, United Press India.
- Lillesand T. M., Kiefer R. W. and Chipman J. W., 2004: Remote Sensing andImage Interpretation, Wiley (Wiley Student Edition).
- Nag P. and Kudra, M., 1998: Digital Remote Sensing, Concept, New Delhi.
- Rees W. G., 2001: Physical Principles of Remote Sensing, Cambridge UniversityPress.
- Singh R. B. and Murai S., 1998: Space-informatics for Sustainable Development,Oxford and IBH Pub.
- Wolf P. R. and Dewitt B. A., 2000: Elements of Photogrammetry: With Applicationsin GIS, McGraw- Hill.
- Sarkar, A. (2015) Practical Geography: A Systematic Approach. Orient Black SwanPrivate Ltd., New Delhi

5 Minor Courses Syllabus (MN)

5.1 S/GEO /102/MN-1T: Fundamentals of Physical Geography

Fundamentals of Physical Geography **4 Credits (60 Hours)**

Total Marks:	**50 (IA-10 Marks + ESE-40 Marks)**
Question Pattern:	**Section-A Definition Oriented (5×2=10)**
	Section-B Short Answer Type (5×4=20)
	Section-C Long Answer Type (1×10=10)

Learning Outcome

1. Understanding origin and evolution of Earth with special reference to cross-cutting approach like Big Bang Model
2. To have an idea of our dynamic earth and its geological make up.
3. Understanding major processes that are responsible for its surface features.
4. Understanding major pedologic and biospheric processes of the earth.

Unit 1: Earth: Origin and Tectonic Processes (20 Hours)

1.5 Origin of Universe (Big Bang Model), Origin of Earth (Nebular Hypothesis of Laplace and Interstellar Dust Cloud Hypothesis of Schimdt)
1.6 Internal Structure of the Earth: Seismological Evidences, physical, chemical andseismic properties of Earth layers
1.7 Isostasy: Models of Airy and Pratt; Continental Drift Theory of Alfred Wegener
1.8 Sea Floor Spreading; Plate Tectonic Theory- Processes at plate margins and Triple Junctions

Unit 2: Geomorphology (20 Hours)

2.5 Degradational Processes: Weathering, Mass Wasting and resultant landforms
2.6 Evolution of landforms on Uniclinal, Folded and Faulted Strata
2.7 Landscape Evolution Models: Davis, Penck and Hack
2.8 Processes of landform development in Karst, Fluvial, Glacial and Aeolian environment

Unit 3: Biosphere (20 Hours)

3.5 Factors of Soil formation
3.6 Soil profile: origin and profile characteristics of Lateritic, Podzol and Chernozem soils
3.7 Concepts of Biosphere, Ecosystem, Biome and Ecotone
3.8 Concepts of Trophic structure, Food Chain and Food Web. Energy Flow in ecosystem

Reference Books

1. Bloom A. L., 2001: Geomorphology: A Systematic Analysis of Late Cenozoic Landforms, Prentice-Hall of India, New Delhi.

2. Bridges E. M., 1990: World Geomorphology, Cambridge University Press,Cambridge.
3. Christopherson, Robert W., (2011), Geosystems: An Introduction to Physical Geography, 8 Ed., Macmillan Publishing Company
4. Kale V. S. and Gupta A., 2001: Introduction to Geomorphology, Orient Longman, Hyderabad.
5. Knighton A. D., 1984: Fluvial Forms and Processes, Edward Arnold Publishers, London.
6. Selby, M.J., (2005), Earth's Changing Surface, Indian Edition, OUP
7. Skinner, Brian J. and Stephen C. Porter (2000), The Dynamic Earth: AnIntroduction to physical Geology, 4th Edition, John Wiley and Sons
8. Thornbury W. D., 1969: Principles of Geomorphology, Wiley.
9. Khullar, D.R. (2012), Physical Geography, Kalyani Publishers, New Delhi
10. Mukhopadhyay, S.; Mukhopadhyay, M.; Pal, S. (2010), Advanced River Geography, ACB Publications, Kolkata
11. Choudhuri, S.K. (2018), Fundamentals of Geotectonics, New Central Book Agency, Kolkata
12. Biswas, T.D. and Mukherjee, S.K. 1997: Textbook of Soil Science, Tata McGraw Hill,
13. De, N. K. and Jana, N. C. (2016): The Land: Multifaceted Appraisal andManagement, Sribhumi Publishing House, Kolkata, Reprint
14. Chapman J.L. and Rens, M.J. 1993. Ecology: Principle and Applications, Cambridge University Press, Cambridge
15. Chairas, D.D. Reganold, J.P. and Owen, O.S. 2002. National Resource Conservation and Management for a Sustainable Future, 8th edition, Prentice Hall, Englewood Cliffs
16. Dash, M.C., 2001. Fundamental of Ecology, 2nd edition, Tata McGrawHill, New Delhi
17. Haggett, R. 1998. Fundamentals of Biogeography, Routledge, London:
18. Kormondy, E.J. 1996. Concept of Ecology, 4th edition, Prentice- Hall, India, NewDelhi
19. Mukhopadhyay, S.; Das, R. (1994), Bhumirup: Udvab o Prakriti Vol-I & II in Bengali, Paschimbanga Rajya Pustak Parshad, Kolkata
20. Basu, P. (2006), Bhugathonik Prakriya o Bhumirup in Bengali, Books and Allied, Kolkata
21. Basu, S.; Maiti, R. (2022) Adhunik Bhumirup Bigyan, Naboday Publications, Kolkata
22. Sil, A. (2012), Bhugathon o Bhumirupbidya in Bengali, The Himalayan Books, Kolkata
23. Sil, A. (2013), Prakriya Bhumirupbidya in Bengali, The Himalayan Books, Kolkata
24. Basu, P. (2014), Prakriya Sonkranta Bhumirupbidya o Sanshlishto Jalobigyan in Bengali, Books and Allied, Kolkata
25. Das, C; Pramanick, T.K. (2018), Prakritik Bhugol in Bengali, Innova Publications,

Kolkata

26. Chattopadhyay, G. (2019), Mahajagotik Rahasyo in Bengali, Akshar Prakashan, Kolkata
27. Sengupta, P.K. (2019), Bhumikampo in Bengali, Education Forum, Kolkata
28. Saha, S; Roy, T. (2019), Bhugathonik Prakriya o Bhumirupbidya in Bengali, Kalyani Publishers, Kolkata
29. Maity, A.K.; Manna, S. (2020), Bhugathonik o Bhumirupbidya Prosonge in Bengali, Deb Prakashani, Kolkata
30. Tikadar, S. (2022), Prakritik Bhugol in Bengali, Book Syndicate, Kolkata
31. Choudhury, S.K. (2017), Bhougolik Bastubidya in Bengali, Central Book Agency, Kolkata
32. Das, C.; Pramanik, T.K. (2020), Poribesh Bhugol in Bengali, Innova Publications, Kolkata
33. Bera, B.; Bhattacharjee, S.; Sengupta, N. (2016), Jib Bhugol o Poribesh in Bengali, Naboday Publications, Kolkata
34. Sil, A. (2015), Jib Bhugol in Bengali, The Himalayan Books, Kolkata
35. Sil, A. (2015), Mritwika Bhugol in Bengali, The Himalayan Books, Kolkata
36. Das, P.K. (2013), Adhunik Mritwika Bhugol in Bengali, Naboday Publications, Kolkata
37. Basu, P. (2012), Mritwika Bigyan: Tathya o Abhigyota, Books and Allied, Kolkata

Reference Websites

- http://www.solarviews.com/eng/earth.htm
- http://www.moorlandschool.co.uk/earth/tectonic.htm
- https://www.usgs.gov

5.2 S/GEO /202/MN-2T: Fundamentals of Human Geography

Fundamentals of Human Geography **4 Credits (60 Hours)**

Total Marks:	**50 (IA-10 Marks + ESE-40 Marks)**
Question Pattern:	**Section-A Definition Oriented (5×2=10)**
	Section-B Short Answer Type (5×4=20)
	Section-C Long Answer Type (1×10=10)

Learning Outcome

1. Gain knowledge on major issues of Human Geography.
2. Holistic understanding of different approaches and processes of Human Geography.
3. Developing concepts of society and its structure with an idea about space and social well being.
4. Understanding culture and its different elements

Unit-1: Nature and Principles (20 Hours)

1.1 Nature and Scope of Human Geography
1.2 Approaches of Study: Resource, Landscape, Environmental and Contemporary
1.3 Recent Trends of Human Geography
1.4 Human Population and Environment with special reference to Development-Environment Conflict

Unit-2: Concept of Human Society (20 Hours)

2.5 Evolution of Human Societies: Hunting, Food Gathering and Pastoral Nomadism
2.6 Concept and Types of Space
2.7 Social Structure and Social Processes
2.8 Social Well Being

Unit-3: Concept of Culture (20 Hours)

3.5 Elements of Culture; Culture and Civilization
3.6 Concept of Race and Ethnicity
3.7 Language and Religion
3.8 Human Adaptation to Environment: Eskimo and Santal

Reference

1. Bergman, E.F (1995): Human Geography-Culture, Connections and Landscape, Prentice Hall, New Jersey
2. Chisholm. (1975): Human Geography, Penguin Books, Hermondsworth.
3. Daniel, P.A. and Hopkinson, M.F. (1989): The Geography of Settlement, Oliver & Boyd, London.
4. Johnston R, Gregory D, Pratt G. et al. (2008): The Dictionary of Human Geography, Blackwell Publication.
5. Jordan-Bychkov et al. (2006): The Human Mosaic: A Thematic Introduction to Cultural

Geography, W. H. Freeman and Company, New York.

6. Roy, T.; Mandal, B.; Maity, M.C. (2020), Manabiya Bhugol Anneshwan in Bengali, Kalyani Publishers, Kolkata
7. Dhara, S. (2013), Janasonkhya o Basoti Bhugol in Bengali, Naboday Publications, Kolkata
8. Mandal, M. (2016), Samajik Bhugol in Bengali, Naboday Publications, Kolkata
9. Raw, M. (1986): Understanding Human Geography: A Practical Approach, Bell and Hyman. London
10. Rubenstein, J.M. (2002), The Cultural Landscape, 7th edition, Prentice Hall, Englewood Cliffs
11. Smith D M (1982): Human Geography: A Welfare Approach, Edward Arnold, London
12. Mac Iver & Page (1950), Society: An Introductory Analysis, MacMillan, India.
13. Beteille Andre, (2002): Sociology: Essays on Approach & Methods, Oxford, India.
14. Giddens, A. and Sutton P.W. (2013) Sociology (8th edition) Polity.
15. Macionis John, (2006): Sociology, Pearson Education.
16. Rawat, H.K. (2007) Sociology: Basic Concepts, Rawat, New Delhi

5.3 S/GEO /303/MN-3T: Geomorphology

Geomorphology **4 Credits (60 Hours)**

Total Marks:	**50 (IA-10 Marks + ESE-40 Marks)**	
Question Pattern:	**Section-A: Definition Oriented**	**(5×2=10)**
	Section-B: Short Answer Type	**(5×4=20)**
	Section-C: Long Answer Type	**(1×10=10)**

Learning Outcome

1. To have an idea of our dynamic earth and its geological make up.
2. Understanding major processes that are responsible for its surface features.
3. To gain knowledge on the impact of different anthropogenic processes on landforms.

Unit-1: Fundamentals of Geomorphology (20 Hours)

1.1 Concept of Grade, Profile of Equilibrium
1.2 Concept of Base Level
1.3 Epeirogenic Earth movements
1.4 Orogenic Earth movements

Unit-2: Process Geomorphology (20 Hours)

2.1 Linear Aspect of River Basin Morphometry
2.2 Areal Aspect River Basin Morphometry
2.3 Landform development in Coastal Region
2.4 Landform development in Arid Region

Unit-3: Applied Geomorphology (20 Hours)

3.1 Types of Check Dams
3.2 Importance of Check Dams
3.3 Importance of Major Irrigation Project in Dry Region
3.4 Integrated River Basin Management

Reference

- Basu, P. (2006), Bhugathonik Prakriya o Bhumirup in Bengali, Books and Allied, Kolkata
- Basu, P. (2014), Prakriya Sonkranta Bhumirupbidya o Sanshlishto Jalobigyan in Bengali, Books and Allied, Kolkata
- Basu, R., Bhaduri, S. (Eds) (2007): Contemporary Issues and Techniques in Geography, Progressive Publishers.
- Bierman, P.R. and Montgomery D.R. (2014): Key Concepts in Geomorphology, WH Freeman
- Bird, E. (2008): Coastal Geomorphology: An Introduction, John Wiley & Sons, Chichester
- Bloom A.L. 1978: Geomorphology: A Systematic Analysis of Late Cenozoic Landforms Prentice – Hall of India, New Delhi.
- Bridges, E. M. (1990): World Geomorphology, Cambridge University Press.
- Brunsden D. 1985: Geomorphology in the Service of Man: The Future of Geography, Methnen, U.K. 3) Chorley, R. J. 1969: Introduction to Fluvial Processes, Methuen, London.

- Chattopadhyay, G. (2019), Mahajagotik Rahasyo in Bengali, Akshar Prakashan, Kolkata
- Chorley, R. J., Schumm, S. A. and Sugden, D. E. 1984: Geomorphology, Methuen, London.
- Cooke, R.U. and Warren, 1973: Geomorphology in Deserts, Batsford, London
- Das, C; Pramanick, T.K. (2018), Prakritik Bhugol in Bengali, Innova Publications, Kolkata
- Dayal, P. 1996: Textbook of Geomorphology, Shukla Book Depot, Patna.
- Goudie, A.S. (Ed) (2004): Encyclopaedia of Geomorphology, vol. 1 & 2, Routledge.
- Goudie, A.S. and Viles, H.A. (2016): Geomorphology in the Anthropocene, Cambridge University Press, Cambridge
- Goudie Anrew et.al. 1981: Geomorphological Techniques, George Allen &Unwin, London.
- Gupta, A. (2011): Tropical Geomorphology, Cambridge University Press
- Hallam, A. 1973: A Revolution in Earth Science: From Continental Drift to Plate Tectonics, Oxford University Press, London.
- Homes A. 1965: Principles of Physical Geology, 3rd Edition, ELBSS Edn.
- Kale, V. and Gupta, A. 2001: Introduction to Geomorphology, Orient Longman, Kolkata.
- Lindholm, R. (1987): A Practical Approach to Sedimentology, Allen & Unwin. Morisawa, M. 1985. Rivers,
- Longman. Mukolwe, M.M. 92016): Flood Hazard Mapping: Uncertainty and its Value in the Decision-making Process, CRC Press. Migon, P. (2010): Geomorphological Landscapes of the World, Springer, Dordrecht
- Maity, A.K.; Manna, S. (2020), Bhugathonik o Bhumirupbidya Prosonge in Bengali, Deb Prakashani, Kolkata
- McCullagh, P. 1978: Modern Concepts in Geomorphology, Oxford University Press, Oxford. UK.
- Morisowa, M. 1968: Streams, their Dynamics and Morphology, McGraw Hill, New York.
- Mukhopadhyay, S.; Das, R. (1994), Bhumirup: Udvab o Prakriti Vol-I & II in Bengali, Paschimbanga Rajya Pustak Parshad, Kolkata
- Pearl, R.M. (1955): How to know the Minerals and Rocks, McGraw-Hill, New York
- Petts, G.E., Amoros, C (Eds). (1996): Fluvial Hydrosystems, Chapman and Hall.
- Rosgen, D. (1996): Applied River Morphology, Wildland Hydrology, Fort Collins, Colorado
- Saha, S; Roy, T. (2019), Bhugathonik Prakriya o Bhumirupbidya in Bengali, Kalyani Publishers, Kolkata
- Sen, P.K. (1989): Geomorphological Analysis of Drainage Basin: An Introduction to Morphometric and Hydrological Parameters, University of Burdwan.
- Sengupta, P.K. (2019), Bhumikampo in Bengali, Education Forum, Kolkata
- Sil, A. (2012), Bhugathon o Bhumirupbidya in Bengali, The Himalayan Books, Kolkata
- Sil, A. (2013), Prakriya Bhumirupbidya in Bengali, The Himalayan Books, Kolkata
- Strahler A.N. 1968: The Earth Sciences, Harper & Row Intl. Edn, New York
- Szabo, J., David, L. and Loczy, D. (eds.) (2010): Anthropogenic Geomorphology: A Guide to Man-Made Landforms, Springer
- Thornberry W. D. 1969: Principles of Geomorphology 2nd Edition, Wiley Intl. Edn. & Wiley, 1984.
- Tikadar, S. (2022), Prakritik Bhugol in Bengali, Book Syndicate, Kolkata
- Verstappen H. 1983: Applied Geomorphology, Geomorphological Surveys for Environmental Development, Elsevier, Amsterdam

5.4 S/GEO /405/MN-4P: Cartographic Techniques in Geography

Cartographic Techniques in Geography **4 Credits (60 Hours)**

Total Marks:	**50 (IA-10 Marks + ESE-40 Marks)**	
Question Pattern:	**Question-1**	**(1×10=10)**
	Question-2	**(1×10=10)**
	Question-3	**(1×10=10)**

Instruction for Laboratory Note Book

- **Practical works are to be completed in the classroom.**
- **Works are to be done in pen/pencil and neatly hand written and signed by class teachers.**
- **Laboratory Note Books have to be submitted in the examination.**

Learning Outcome

1. To have an idea of Earth's history and identification of various geological features.
2. Understanding and interpreting of Weather Maps in different seasons.
3. To gain knowledge on the atmospheric dynamics.
4. **Lab Note Book** **(5+5=10)**

Unit-1: Scale and Cartograms

1.1 Definition and Types of Map Scale
1.2 Advantages and Disadvantage of Map Scale
1.3 Construction of Linear Scale
1.4 Construction of Comparative Linear Scale

Unit-2: Cartographic Representation of Geographical Data

2.1 Basic Concept of Cartograms
2.2 Cartograms: Line Graph, Bar graph
2.3 Age-sex Pyramid
2.4 Dependency Ratio

Unit-3: Mapping Techniques

3.1 Measure of Density: Choropleth Method
3.2 Measures of Inequality: Location Quotient
3.3 Measures of Interaction: Nearest Neighbour Analysis
3.4 Weaver's Crop Combination

Reference

- Cuff J. D. and Mattson M. T., 1982: Thematic Maps: Their Design and Production,Methuen Young Books
- Dent B. D., Torguson J. S., and Holder T. W., 2008: Cartography: Thematic MapDesign (6th Edition), McGraw-Hill Higher Education
- Gupta K. K. and Tyagi V. C., 1992: Working with Maps, Survey of India, DST, NewDelhi.

- Kraak M.-J. and Ormeling F., 2003: Cartography: Visualization of Geo-SpatialData, Prentice-Hall.
- Mishra R. P. and Ramesh A., 1989: Fundamentals of Cartography, Concept, NewDelhi.
- Singh R. L. and Singh R. P. B., 1999: Elements of Practical Geography, KalyaniPublishers.
- Slocum T. A., Mcmaster R. B. and Kessler F. C., 2008: Thematic Cartography andGeovisualization (3rd Edition), Prentice Hall.
- Tyner J. A., 2010: Principles of Map Design, The Guilford Press.
- Sarkar, A. (2015) Practical geography: A systematic approach. Orient Black SwanPrivate Ltd., New Delhi
- Adhikari, S. (2005), Honours Byaboharik Bhugol, Vol-I, Dove Publishing House, Midnapore
- Das, N.; Khatun, S. (2021), Kartographi- Dharona o Prayog in Bengali, Kalyani Publishers, Kolkata

S/GEO/505/MN-5T: Regional Planning and Development

Regional Planning and Development **4 Credits (60 Hours)**

Total Marks:	**50 (IA-10 Marks + ESE-40 Marks)**	
Question Pattern:	**Question-1**	**(1×10=10)**
	Question-2	**(1×10=10)**
	Question-3	**(1×10=10)**

Learning Outcome

1. Students will learn processes and methods of planning for regional economic development.
2. Have an understanding on various theoretical perspectives of regional planning at different levels.
3. Have an idea of the present status of regional development programmes and policies taken at national and regional level..

Unit 1: Regional Planning

1.1 Concept of Regions: Types of regions
1.2 Types of Planning, principles and objectives of regional planning,
1.3 Steps of Regional Planning
1.4 Multi-Level Planning in India

Unit 2: Regional Development

2.1 Development: Meaning, growth versus development

2.2 Concept of Growth Pole model of Perroux

2.3 Theories and models for regional development: Cumulative Causation (Myrdal), and Economic Growth Stage Model (Rostow)

2.4 Indicators of development

Unit 3: Regional Planning & Development in India

3.1 Concept and strategies of regional development in India

3.2 Nature of regional inequalities and disparities in India

3.3 Regional and Local Development Programmes: MGNREGA, PMGSY, JJM

3.4 SEZ and EEZ : Characteristics and Significance

Reference

- Berry, BJ.L. and Horton, F.F. (1970): Geographic Perspectives on UrbanSystems. Prentice Hall, New Jersey.
- Bhat L.S. (1972): Regional Planning In India, Statistical Publishing Society
- Blij H. J. De, 1971: Geography: Regions and Concepts, John Wiley and Sons.
- Chand ,M and Puri V.K. (1983) : Regional Planning In India , Allied publishers ,New Delhi
- Claval P.l, 1998: An Introduction to Regional Geography, Blackwell Publishers, Oxford and Massachusetts.
- Dickinson, R.E. (1964): City and Region, Rutledge, London.
- Friedmann J. and Alonso W. (1975): Regional Policy - Readings in Theory and Applications, MIT Press, Massachusetts.
- Gore C. G., 1984: Regions in Question: Space, Development Theory and

Regional Policy, Methuen, London.

- Gore C. G., Köhler G., Reich U-P. and Ziesemer T., 1996: Questioning Development; Essays on the Theory, Policies and Practice of Development Intervention, Metropolis-Verlag, Marburg.
- Hall, P. (1992): Urban and Regional Planning, Routledge, London
- Haynes J., 2008: Development Studies, Polity Short Introduction Series.
- Johnson E. A. J., 1970: The Organization of Space in Developing Countries, MIT Press, Massachusetts.
- Kulshetra, S.K,(2012) : Urban and Regional Planning in India : A Handbook for Professional Practioners , Sage Publication , New Delhi
- Kundu, A. (1992): Urban Development Urban Research in India, Khanna Publ. NewDelhi.
- Misra , R.P, Sundaram K.V, Prakash Rao , VLS(1974): Regional Development Planning in India , Vikas Publication , New Delhi
- Misra, R.P (1992): Regional Planning: Concepts, Techniques, Policies and Case Studies , Concept , New Delhi
- Peet R., 1999: Theories of Development, The Guilford Press, New York.
- UNDP 2001-04: Human Development Report, Oxford University Press.
- World Bank 2001-05: World Development Report, Oxford University Press, New Delhi
- Sen, J. (2013), Ancholik Porikalpona o Ancholik Bhugol in Bengali, Naboday Publications, Kolkata
- Barman, N.K.; Maity, M.; Pahari, S. (2021), Anchal Prasongo in Bengali, Kalyani Publishers, Kolkata
- Sahoo, A.; Gayen, S. (2012), Anchal, Porikalpona o Bharater Anchalik Porikroma in Bengali, Deb Prakashani, Kolkata
- Mukherjee, B.; Mukherjee, D. (2010), Tritiya Duniyai Arthonaitik Unnoyan o Manab Unnoyan in Bengali, New Central Book Agency, Kolkata

S/GEO/605/MN-6P: Statistical Methods in Geography

Statistical Methods in Geography **4 Credits (60 Hours)**

Total Marks: 50 (IA-10 Marks + ESE-40 Marks)
Question Pattern: Question-1 (1×10=10)
Question-2 (1×10=10)
Question-3 (1×10=10)
Lab Note Book & Viva-Voce (5+5)

Instruction for Laboratory Note Book

1. Practical works are to be completed in the classroom.
2. Works are to be done in pen/pencil and neatly hand written and signed by class teachers.
3. Laboratory Note Books have to be submitted in the examination.

Learning Outcome

1. Students will learn various quantitative techniques to supplement regular qualitative interpretation.
2. Statistics as a tool of geography provides strong scientific footing to geographical interpretation and it helps students to make any geographical study and empirical base.

Unit-1: Data Collection and Representation

1.5 Geographical Data Management
1.6 Classification, Tabulation, Interpretation and Analysis of Geographical Data
1.7 Frequency Distribution: Attribute and Variable, Discrete and Continuous,
1.8 Graphical Representation of Frequency Distribution (Histogram, Polygon, Curve and Ogives)

Unit 2: Descriptive Statistics

2.1 Measures of Central Tendency: Mean, Median and Mode
2.2 Measures of Dispersion: Range, Quartile Deviation,
2.3 Measures of Dispersion: Mean Deviation
2.4 Measures of Dispersion: Standard Deviation

Unit-3: Data Analysis and Interpretation

3.1 Pearson's Correlation Coefficient
3.2 Scatter Diagram
3.3 Linear Regression
3.4 Time Series Analysis: Moving Average

Reference

- Berry B. J. L. and Marble D. F. (eds.): Spatial Analysis – A Reader in Geography.
- Ebdon D., 1977: Statistics in Geography: A Practical Approach.
- Hammond P. and McCullagh P. S., 1978: Quantitative Techniques in Geography:An Introduction, Oxford University Press.
- King L. S., 1969: Statistical Analysis in Geography, Prentice-Hall.
- Pal S. K., 1998: Statistics for Geoscientists, Tata McGraw Hill, New Delhi.
- Sarkar, A. (2013) Quantitative geography: techniques and presentations. Orient Black Swan Private Ltd., New Delhi

- Silk J., 1979: Statistical Concepts in Geography, Allen and Unwin, London.
- Spiegel M. R.: Statistics, Schaum's Outline Series.
- Yeats M., 1974: An Introduction to Quantitative Analysis in Human Geography,McGraw Hill, New York.
- Gupta, S.C. (2015), Fundamentals of Statistics, 7th Edition, Himalaya Publishing House, New Delhi
- Mahmood, A. (1977), Statistical Methods in Geographical Studies, Rajesh Publications, New Delhi
- Adhikari, S. (2011), Honours Byaboharik Bhugol, Vol-III in Bengali, Dove Publishing House, Midnapore
- Moitra, A. (2011), Bhugole Parisonkhyan Poddhati in Bengali, Geo-observing Society, Kolkata
- Hazra, J.; Banik, G.C. (2020), Bhugole Rashitotter Prayog in Bengali, Naboday Publications, Kolkata

Multidisciplinary Courses Syllabus (MD)

6.1: S/GEO/103/MD-1P: Surveying and Mapping Techniques

Surveying and Mapping Techniques **3 Credits (45 Hours)**

Total Marks:	**50 (IA-10 Marks + ESE-40 Marks)**	
Question Pattern:	**Question-1**	**(1x10=10)**
	Question-2	**(1x10=10)**
	Question-3	**(1x10=10)**
	Lab Note Book & Viva-Voce	**(5+5=10)**

Instruction for Laboratory Note Book

- **Practical works are to be completed in the classroom.**
- **Works to be done manually and signed by class teachers.**
- **Laboratory Note Books have to be submitted in the examination.**

Learning Outcome

1. Learning measurement of the various features of the earth by developing expertise on cartographic methods and techniques
2. Measuring the earth's surface features on horizontal and vertical planes through learning of different surveying and levelling operations.
3. Develop skills of map making and basics of cartography.

Unit-1: Scale and Cartograms (15 Hours)

1.1 Construction of Linear and Comparative Scale (Unit)
1.2 Cartograms: Proportional Circle and Pie graph
1.3 Age-Sex Pyramid
1.4 Dependency Ratio

Unit-1: Conventional Surveying (15 Hours)

2.1 Concepts and Principles: Angle and Bearing, Traversing, Radiation, Intersection
2.2 Prismatic Compass: Preparation of land use maps by open and closed traverse
2.3 Computations of compass traverse- Included Angle, Area of traverse
2.4 Levelling by Dumpy Level: Profile and Contouring

Unit 3: Mapping Techniques (15 Hours)

3.1 Population Maps and Diagrams: Choropleth method
3.2 Measures of Inequality: Location Quotient
3.3 Measures of Interaction: Nearest Neighbour Analysis
3.4 Combinational Analysis: Weaver's Crop Combination

References

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. Mishra R.P. and Ramesh, A., 1989: Fundamentals of Cartography, Concept, New Delhi.
4. Monkhouse F. J. and Wilkinson H. R., 1973: Maps and Diagrams, Methuen, London.
5. Rhind D. W. and Taylor D. R. F., (eds.), 1989: Cartography: Past, Present and
6. Future, Elsevier, International Cartographic Association.
7. Robinson A. H., 2009: Elements of Cartography, John Wiley and Sons, New York.
8. Singh R. L. and Singh R. P. B., 1999: Elements of Practical Geography, Kalyani Publishers.
9. Sarkar, A. (2015) Practical geography: A systematic approach. Orient Black Swan Private Ltd., New Delhi
10. Agor, R. (1999), Textbook of Surveying and Levelling, Khanna Publishers, Delhi
11. Venkatramaiah, C. (2011), Textbook of Surveying, Universities Press, Hyderabad
12. Adhikari, S. (2005), Honours Byaboharik Bhugol, Vol-I, Dove Publishing House, Midnapore
13. Das, N.; Khatun, S. (2021), Kartographi- Dharona o Prayog in Bengali, Kalyani Publishers, Kolkata

6.2: S/GEO/203/MD-2P: Geographical Information System

Geographical Information System **3 Credits (45 Hours)**

Total Marks:	**50 (IA-10 Marks + ESE-40 Marks)**	
Question Pattern:	**Question-1**	**(1x10=10)**
	Question-2	**(1x10=10)**
	Question-3	**(1x10=10)**
	Lab Note Book & Viva-Voce	**(5+5=10)**

Instruction for Laboratory Note Book

- **Practical works are to be completed in the classroom.**
- **Works to be done in computer and signed by class teachers.**
- **Laboratory Note Books have to be submitted in the examination.**

Learning Outcome

1. Students will have practical experience on handling GIS software and its theoretical background.
2. At the UG level, students will also be able to make their own maps in GIS software and they will have hands on experience on Digital Cartography.
3. They will also be able to handle GPS/GNSS devices, collect waypoints and working with them in MS-EXCEL as well as GIS platforms.

Unit-1: Basic Concepts (15 Hours)

1.1 Components of GIS
1.2 Projection and Datum
1.3 Data Structure: Raster and Vector
1.4 Introduction to QGIS Software

Unit-2: GIS Data Input and Mapping (15 Hours)

2.1 Georeferencing, Digitization of maps using QGIS Software
2.2 Import of Excel Data in QGIS
2.3 Map Composition and Layout- Choropleth, Isopleth and Dot Map
2.4 Proportional Pie and Bargraph

Unit-2: GNSS Surveying (15 Hours)

2.1 Basic Concept: GNSS and GPS, Segments, PRN Code, Waypoints and Tracks, Sources of Error
2.2 Distance Calculation, Open and Closed Traverse.
2.3 Plotting in Microsoft Excel
2.4 GNSS/GPS data downloading in software and mapping.

References

1. Jatin Pandey and Darshana Pathak, 2013, Geographic Information System, TERI Publishing House.
2. Chor Pang Lo, 2009, Concepts and Techniques of Geographic InformationSystem,

Prentice Hall.

3. Michael N. Demers, 2012, Fundamentals of Geographic Information Systems, Willy.
4. Chairsman, N. 1992. Exploring Geographical Information Systems, John
5. Willey and Sons Inc., New York, 198p

6.3: S/GEO/304/MD-3P: Remote Sensing Techniques

Remote Sensing Techniques **3 Credits (45 Hours)**

Total Marks:	**50 (IA-10 Marks + ESE-40 Marks)**	
Question Pattern:	**Question-1**	**(1x10=10)**
	Question-2	**(1x10=10)**
	Question-3	**(1x10=10)**
	Lab Note Book & Viva-Voce	**(5+5=10)**

Instruction for Laboratory Note Book

- **Practical works are to be completed in the classroom.**
- **Works are to be done in QGIS software and theoretical portions are to be neatly hand written/computer typed and signed by class teachers.**
- **Laboratory Note Books have to be submitted in the examination.**

Learning Outcome

1. Students will learn to understand basic concepts of Remote Sensing as a modern data acquisition tool.
2. It will give practical idea of data downloading, classification and further analysis of georeferenced earth data which they can further use in various research endeavors.
3. Students can build they capacity as an image analyst to bring them in the modern Job Market.

Unit-1: Basic Concepts

1.5 Energy Sources, Interactions with atmosphere, Interactions with Earth's surface
1.6 Sensing Systems: Types of RS satellites and sensors
1.7 Sensor Resolutions: Spatial, Spectral, Radiometric and Temporal
1.8 Principles of preparing Standard False Colour Composites

Unit-2: Data Acquisition and Classification

2.5 Free sources of Remote Sensing data: NRSC Bhuban
2.6 Free sources of Remote Sensing data: USGS
2.7 Principles of image interpretation and feature extraction
2.8 Image classification: Supervised and Unsupervised

Unit-3: Preparation of Different Indices

3.5 Preparation of SFCC
3.6 Preparation of NDVI
3.7 Preparation of NDBI
3.8 Preparation of SAVI

Reference

- Campbell J. B., 2007: Introduction to Remote Sensing, Guildford Press.
- Jensen J. R., 2004: Introductory Digital Image Processing: A Remote

SensingPerspective, Prentice Hall.

- Joseph, G. 2005: Fundamentals of Remote Sensing, United Press India.
- Lillesand T. M., Kiefer R. W. and Chipman J. W., 2004: Remote Sensing andImage Interpretation, Wiley (Wiley Student Edition).
- Nag P. and Kudra, M., 1998: Digital Remote Sensing, Concept, New Delhi.
- Rees W. G., 2001: Physical Principles of Remote Sensing, Cambridge UniversityPress.
- Singh R. B. and Murai S., 1998: Space-informatics for Sustainable Development,Oxford and IBH Pub.
- Wolf P. R. and Dewitt B. A., 2000: Elements of Photogrammetry: With Applicationsin GIS, McGraw- Hill.
- Sarkar, A. (2015) Practical Geography: A Systematic Approach. Orient Black SwanPrivate Ltd., New Delhi

7. Skill Enhancement Courses Syllabus (SEC)

7.1: S/GEO/105/SEC-1P: Elementary Practical in Geography

Elementary Practicals in Geography **3 Credits (45 Hours)**

Total Marks:	**50 (IA-10 Marks + ESE-40 Marks)**	
Question Pattern:	**Question-1**	**(1x10=10)**
	Question-2	**(1x10=10)**
	Question-3	**(1x10=10)**
	Lab Note Book & Viva-Voce	**(5+5=10)**

Instruction for Laboratory Note Book

- **Practical works are to be completed in the classroom.**
- **Works to be done manually in note books and signed by class teachers.**
- **Laboratory Note Books have to be submitted in the examination.**

Learning Outcome

1. Learning measurement of the various features of the earth by developing expertise on cartographic methods and techniques
2. Developing concepts in projecting the earth as a planet.
3. Students will be capable of identifying major rocks and minerals that make up our planet and have hands on training on different meteorological instruments.

Unit-1: Map Scale (15 Hours)

1.1 Definition and Types of Map Scale
1.2 Construction of Linear, Comparative (Unit), Diagonal and Vernier scales.
1.3 Scale Enlargement and Reduction (Computations)
1.4 Calculation of area from maps (Graphical Methods)

Unit-2: Map Projections (15 Hours)

2.1 Map Projections: Nature, Classification and Uses
2.2 Basic Concepts: Parallels and Meridians, Datum, Geoid, Scale Factor, Deformation, Orthodrome and Loxodrome.
2.3 Principles, Theories, Construction and Properties of select Map Projections: Conical Case- Simple Conical with one Standard Parallel and Polyconic; Cylindrical Case- Equal Area, Mercator; Zenithal Case- Gnomonic, Stereographic
2.4 UTM Grid System.

Unit-3: Rocks-Minerals and Instruments (15 Hours)

3.1 Megascopic Identification of Rocks: Granite, Basalt, Limestone, Shale, Sandstone, Slate, Marble and Schist
3.2 Megascopic Identification of Minerals: Bauxite, Calcite, Chalcopyrite, Feldspar, Galena, Haematite, Magnetite and Quartz
3.3 Recording of Maximum-Minimum Thermometer (Six's)
3.4 Recording of Fortin's Barometer, Hygrometer

Reference

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. Mishra R.P. and Ramesh, A., 1989: Fundamentals of Cartography, Concept, New Delhi.
4. Monkhouse F. J. and Wilkinson H. R., 1973: Maps and Diagrams, Methuen,London.
5. Rhind D. W. and Taylor D. R. F., (eds.), 1989: Cartography: Past, Present and Future, Elsevier, International Cartographic Association.
6. Robinson A. H., 2009: Elements of Cartography, John Wiley and Sons, New York.
7. Singh R. L. and Singh R. P. B., 1999: Elements of Practical Geography, Kalyani Publishers.
8. Sarkar, A. (2015) Practical geography: A systematic approach. Orient Black Swan Private Ltd., New Delhi
9. Adhikari, S. (2005), Honours Byaboharik Bhugol, Vol-I, Dove Publishing House, Midnapore
10. Das, N.; Khatun, S. (2021), Kartographi- Dharona o Prayog in Bengali, Kalyani Publishers, Kolkata

Online Materials

- https://egyankosh.ac.in/bitstream/123456789/66733/1/Experiment-1.pdf
- https://egyankosh.ac.in/bitstream/123456789/66739/1/Experiment-7.pdf
- https://www.atri.edu.in/images/pdf/departments/Manual_Geology.pdf

7.2: S/GEO/205/SEC-2P: GIS and GNSS

GIS and GNSS Applications **3 Credits (45 Hours)**

Total Marks:	**50 (IA-10 Marks + ESE-40 Marks)**	
Question Pattern:	**Question-1**	**(1x10=10)**
	Question-2	**(1x10=10)**
	Question-3	**(1x10=10)**
	Lab Note Book & Viva-Voce	**(5+5=10)**

Instruction for Laboratory Note Book

- **Practical works are to be completed in the classroom.**
- **Works to be done in computer and signed by class teachers.**
- **Laboratory Note Books have to be submitted in the examination.**

Learning Outcome

1. Learning measurement of the various features of the earth by developing expertise on cartographic methods and techniques
2. Developing concepts in projecting the earth as a planet.
3. Students will be capable of identifying major rocks and minerals that make up our planet and have hands on training on different meteorological instruments.

Unit-1: Geographical Information System (15 Hours)

1.1 GIS: Basic Concepts
1.2 Components of GIS
1.3 Development of GIS Technology
1.4 GIS Data structure: Raster and Vector

Unit-2: Introduction to GNSS (15 Hours)

2.1 Basic Concept: GNSS and GPS, Segments, PRN Code, Waypoints and Tracks
2.2 Distance Calculation, Open and Closed Traverse.
2.3 Plotting in Microsoft Excel
2.4 GNSS/GPS data downloading in QGIS software and mapping.

Unit 3: Mapping in GIS (15 Hours)

3.1 Geo-referencing and Reprojection of maps using QGIS Software
3.2 Digitization of maps using QGIS Software
3.3 Attribute data creation and uses: Choropleth, Isopleth, Dot Map, Bargraph and Proportionate Pie Diagram
3.4 Map Composition and Map Layout

References

1. Jatin Pandey and Darshana Pathak, 2013, Geographic Information System,TERI Publishing House.
2. Chor Pang Lo, 2009, Concepts and Techniques of Geographic InformationSystem, Prentice Hall.
3. Michael N. Demers, 2012, Fundamentals of Geographic InformationSystems, Willy. New York
4. Chairsman, N. 1992. Exploring Geographical Information Systems, John Willey and Sons Inc., New York, 198p

7.3: S/GEO/306/SEC-3P: Computer Applications in Geography

Computer Applications in Geography **3 Credits (45 Hours)**

Total Marks:	**50 (IA-10 Marks + ESE-40 Marks)**	
Question Pattern:	**Question-1**	**(1×10=10)**
	Question-2	**(1×10=10)**
	Question-3	**(1×10=10)**
	Lab Note Book & Viva-Voce	**(5+5=10)**

Instruction for Laboratory Note Book

- **Practical works are to be completed in the classroom.**
- **Works to be done in computer and signed by class teachers.**
- **Laboratory Note Books have to be submitted in the examination.**

Learning Outcome

1. Students will learn basics of computer architecture- hardware and software components, operating systems, input and output devices etc.
2. They will be made capable of handling MS-EXCEL particularly statistical calculations, formula making and graphical representation of data which has immense application in higher studies..

Unit-1: Computer Basics

1.1 Components of Computer System: Hardware, Software

1.2 Concept of computing, Data and Information

1.3 Operating Systems, User Interface

1.4 File and Directory Management, Common utilities of computer in geography

Unit-2: Understanding Spreadsheets

2.1 Data Entry: Arrangement into ascending and descending order

2.2 Manipulation of cells, formulas and functions

2.3 Computation of Mean, Median, Mode, Standard Deviation using formula for ungrouped and grouped data

2.4 Graphical Representation: Line, Bar, Pie/Doughnut, Scatter Diagram, Fitting of Trend Lines

Unit-3: Internet Basics

3.5 Concept of Internet, World Wide Web, Search Engine, URLs

3.6 Internet Surfing: generation and extraction of information

3.7 Basics of Electronic Mails, Emails

3.8 Cloud Computing and Drive Sharing

Reference

- Bartee, Thomas C. (1977): Digital Computer Fundamental; McGraw Hill.
- Chauhan, S.; Chauhan, A. and Gupta, K. (2006): Fundamental of Computer; Firewall Media.
- Flake, L.J.; McClintock, C.E. and Turner, S. (1989): Fundamental of ComputerEducation; Wordsworth Pub. Co.
- Leon, A .and Leon,M.(1999): Introduction to Computer, USB Publishers'Distributors Ltd.
- Malvino, A.P. and Leach, D.P. (1981): Digital Principles and Appications; TataMcGraw Hill.
- Mano, Moris M. and Kime, Charles R. (2004): Logic and Computer DesignFundamental; Prentice Hall.
- Mondal, J & Askari, MH (2024): Computer Basics and Applications in Geography. Nabodaya Publications.
- Rajaraman, V. (2003): Fundamentals of Computer, Prentice Hall Publisher
- Sarkar, A. and Gupta, S.K (2002): Elements of Computer Science, S Chand and Company, New Delhi
- Blissmer (1996): Working with MS Word; Houghton Mifflin Co.
- Johnson, Steve (2007): Microsoft Power Point 2007; Pearson Paravia Bruno.
- Leon, A .and Leon,M.(1999): Introduction to Computer, USB Publishers'Distributors Ltd.
- Leon, A. and Leon, M.(1999): A beginners Guide to Computers, Vikas
- Rajaraman, V. (2008): Computer Primer; Prentice Hall of India Pvt. Ltd.
- Sarkar, A. and Gupta, S.K (2002) Elements of Computer Science, S Chand and

8. Course Objectives

The principal objectives of this undergraduate course in Geography are:

i. To understand the core content and techniques particularly modern techniques in geography.

ii. To explore the theories and techniques used in regional planning and development.

iii. The syllabus also aims to develop basic skills of the subject to prepare students to pursue higher studies in geography and to make them successful in search of suitable employment.

9. Course Outcomes

The Geography is the study of distribution of elements over space as well as the mutual and reciprocal relationship between man and environment. It also studies different activities of man in different milieu of life in changing the face of the earth, how 'space' turns into 'place' with different values added to it by man's varied modes of life with due emphasis on major empirical questions of 'what', 'why', 'how' and 'where'. Therefore, the study of this discipline at undergraduate level would have the following learning outcomes in general:

i. It helps to develop a holistic understanding of the earth as the home of man.

ii. Student can understand what Geography really is. They shall come to know that geography is not merely a 'science of placenames', rather it is true science of distribution with expertise in various modern skills and techniques.

iii. Students will be to find their place in job market both in academic as well as corporate sector.

iv. Students also can explore the engineering aspects of the discipline particularly Geoinformatics, Geoinformation Science, Geomatics Engineering etc.

v. At the end of the course, students will be capable of segmenting the whole discipline in three different components- physical, human and applied.

10. Programme Specific Outcomes (PSO)

Geography is widely accepted as the most emerging science in recent years due to its versatile character to include contents of both science and humanities. Therefore, students from both the streams can choose the subject at their undergraduate level. Bankura University offers B.Sc, degree in Geography keeping in view the demand of the students as well as towards making it more suitable for higher education where stiff competition is prevailed from other science students. Since its inception, the university follows CBCS curriculum based on UGC guidelines with slight modification in view of the local aspects. Geography basically deals with space. The spatial aspects of the earth, their guiding laws and theories, nature and evolution are recorded and represented through a number of instrumental and mechanical ways. A holistic

view of the Earth as an entity and the features within the earth are taught to students. The evolution of natural landscape to cultural landscape is illustrated. The mapping techniques are guides to represent all the physical, social, cultural features through proper scaling and elaborative description. The project based studies and analyses are very helpful in building up a research outlook among the students. They learn about the sample drawing procedures and detailed idea about the important issues around them. The course is intersected into several small sections and put under expert faculties of that field to provide the students the desired benefit of the course. The Programme Specific outcomes can be listed as under:

PSO-1: Acquiring Knowledge of Physical Geography

Fundamentals of Physical Geography will help students to gain the knowledge of physical aspects of the earth. They will gather knowledge about the processes that make up the planet earth. Imbibing knowledge, skills and holistic understanding of the Earth, atmosphere, biosphere and the planet through analysis of landform development; crustal mobility and tectonics, and different biospheric processes.

PSO-2: Acquiring Knowledge of Human Geography

With base knowledge of Physical Geography, students can easily correlate the knowledge of physical geography with the human geography, establishing man-environment relationships; and exploring the place and role of Geography vis-a-sis other social and earth sciences. They will be able to analyze the problems of physical as well as cultural environments of both rural and urban areas. Moreover, they will try to find out the possible measures to solve those problems.

PSO-3: Developing Quantitative Skills

Students will be able to quantitatively measure earth and its surface features- both natural and man made by developing skills on map scales, different surveying and mapping techniques.

PSO-4: Training on Surveying and Meteorological Instruments

Students will have rigorous training on various conventional as well as modern surveying instruments, different meteorological instruments to make them suitable for current job market. This will learn how to collect primary data on earth and its surface features which they can apply in their higher studies.

PSO-5: Skill Enhancement in Automated Cartography and Data Analytics

In this age of data science, the Remote Sensing, Geographical Information System and GNSS techniques will enable students to collect data and will learn analytical procedures in computer softwares which will definitely enhance students' skillsets towards understanding of big data. Geographers in this field can surpass other disciplines because they are able to handle spatial data.

11. Technical Skill sets and possible Job opportunities after each exit

Semester	Exit Level	Credits	Technical Skillsets	Job Opportunities
II	Certificate	40+4	• Geomorphic Analysis • Map Interpretation • Surveying skill • GIS Mapping skill • GNSS Surveying	• Field Surveyor • GIS Expert in Govt. and private sector • Digital Cartographer
IV	Diploma	82+4	• Climatic Data Analysis • Map Interpretation • Surveying skill • GIS Mapping skill • GNSS Surveying	• Field Surveyor • GIS Expert in Govt. and private sector • Digital Cartographer
VI	Degree	124	• Map Interpretation • Surveying skill • GIS Mapping skill • GNSS Surveying • Tourism Management • Digital Image Processing	• Field Surveyor • GIS Expert in Govt. and private sector • Project Assistants in academic institutions • Hotels and Tourist Industries such as Travel Agency, Transport Operators
VIII	Degree with Honours/ Research	164	• Map Interpretation • Disaster Management Techniques • Climate Change concepts • Knowledge on diseases and their distribution	• Tourism Planner • Town Planner • Cartographer • GIS Consultant • Geography Teacher • Geography Researcher