



# UNIVERSITY OF CALCUTTA

## Notification No.CSR/22/2023

It is notified for information of all concerned that in terms of the provisions of Section 54 of the Calcutta University Act, 1979, (as amended), and, in exercise of her powers under 9(6) of the said Act, the Vice-Chancellor has, by an order dated 31.07.2023 approved the syllabus of the under mentioned subjects semester wise Four-year (Honours & Honours with Research) /Three-year (Multidisciplinary) /Four-year (Honours with core Vocational) programme of U.G. courses of studies, as applicable under CCF,2022, under this University, as laid down in the accompanying pamphlet.

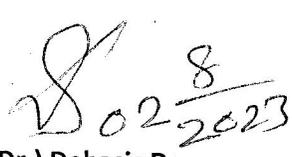
- ✓ 1. Geography
2. Physical Education
3. Film Studies
4. Fine Arts
5. History (Revised syllabus after incorporating some amendments, in the syllabus published in CSR/13/23, dt.12.7.23)
6. Islamic History & Culture (Revised syllabus after incorporating some amendments, in the syllabus published in CSR/13/23,dt.12.7.23)
7. Persian (Revised syllabus after incorporating some amendments, in the syllabus published in CSR/20/23, dt.28.7.23)
8. Computer Application. (Honours with core Vocational)

The above shall take effect from the academic session 2023-2024.

SENATE HOUSE,

Kolkata-700073

The 2<sup>nd</sup> August ,2023

  
Prof.(Dr.) Debasis Das

Registrar



# **Curriculum & Credit Framework for Undergraduate Courses in Geography**

v.1

---

TO BE EFFECTIVE FROM THE ACADEMIC SESSION 2023-24



**University of Calcutta**  
July, 2023

*Note: This page is intentionally kept blank for duplex printing*

# Curriculum & Credit Framework for Undergraduate Courses in Geography under National Education Policy of 2020

**INTRODUCTION:** In compliance with directives on the Curriculum & Credit Framework from the University Grants Commission, the undergraduate syllabus for Geography is reframed under the National Education Policy of 2020. In a major deviation from its previous versions, the current syllabus uniquely caters to the students' requirement of education levels that would help them to balance between their professional and educational aspirations.

The four-year curriculum has four exit options that are hierarchically related to the level of education at the end of second, fourth, sixth, and eighth semesters — i.e., at the completion of the first, second, third, and fourth years of the course. These would relate to the award of • certificates, • diplomas, • BA/BSc degrees, and • BA/BSc with honours degrees, respectively. The course would also provide an opportunity to do research in the final year (Semester- 7 & -8) for the meritorious students.

The present curriculum of Geography is designed to give the students a holistic understanding of the subject at every year of exit from the second year onwards, putting equal weightage to the core content and techniques used in Geography. The syllabus also tried to give similar importance to the two main branches of Geography: Physical and Human. Its principal goal of is to enable the students to secure a job at the end of the undergraduate programme. Keeping this in mind and in tune with the changing nature of Geography, adequate emphasis is rendered on applied aspects of the subject such as emerging techniques of mapping and field-based data generation, especially in the honours course.

**LEARNING OUTCOMES:** The syllabus is designed to impart basic knowledge on geography as a spatial science and train the undergraduates to secure employment in the sectors like geospatial analysis, developmental planning, and environment management.

## Contents

<b>Curriculum Structure.....</b>	<b>v</b>
Papers & Courses .....	v
Papers & Credits: Honours (H) Course .....	vi
Papers & Credits: Multidisciplinary (MD) Course .....	viii
<b>Discipline-specific Course: Honours (H-CC) .....</b>	<b>1</b>
GEOG-H-CC01-Th– Physical Geography .....	1
GEOG-H- CC01-P – Physical Geography Lab.....	2
GEOG-H-CC02-Th – Human Geography .....	3
GEOG-H-CC02-P – Human Geography Lab.....	4
GEOG-H-CC03-Th – Geotectonics .....	5
GEOG-H-CC03-P – Geotectonics Lab .....	6
GEOG-H-CC04-Th – Economic Geography .....	7
GEOG-H-CC04-P – Economic Geography Lab.....	8
GEOG-H-CC05-Th – Geomorphology.....	9
GEOG-H-CC05-P – Geomorphology Lab .....	10
GEOG-H-CC06-Th – Climatology .....	11
GEOG-H-CC06-P – Climatology Lab .....	12
GEOG-H-CC07-Th –Social Geography.....	13
GEOG-H-CC07-P –Social Geography Lab .....	14
GEOG-H-CC08-Th – Cartographic Techniques .....	15
GEOG-H-CC08-P – Cartographic Techniques Lab.....	16
GEOG-H-CC09-Th – Hydrology and Oceanography .....	17
GEOG-H-CC09-P – Hydrology and Oceanography Lab.....	18
GEOG-H-CC10-Th – Cultural and Settlement Geography.....	19
GEOG-H-CC10-P – Cultural and Settlement Geography.....	20

GEOG-H-CC11-Th – Hazard Management.....	21
GEOG-H-CC11-Tu – Hazard Management Report .....	22
GEOG-H-CC12-Th – Thematic Mapping and Surveying .....	23
GEOG-H-CC12-P – Thematic Mapping and Surveying Lab .....	24
GEOG-H-CC13-Th – Soil and Biogeography.....	25
GEOG-H-CC13-P – Soil and Biogeography Lab .....	26
GEOG-H-CC14-Th – India and West Bengal.....	27
GEOG-H-CC14-P – India and West Bengal Lab.....	28
GEOG-H-CC15-Th – Remote Sensing, GIS, and GNSS .....	29
GEOG-H-CC15-P – Remote Sensing, GIS, and GNSS Lab.....	30
GEOG-H-CC16-Th – Philosophy of Geography .....	32
GEOG-H-CC16-P – Philosophy of Geography Lab .....	33
GEOG-H-CC17-Th – Resource Geography .....	34
GEOG-H-CC17-Pr– Resource Geography Lab.....	35
GEOG-H-CC18-Th – Environmental Issues in Geography .....	36
GEOG-H-CC18-P– Environmental Issues in Geography Lab .....	37
GEOG-H-CC19-Th – Statistical Methods in Geography.....	38
GEOG-H-CC19-P – Statistical Methods in Geography Lab.....	38
GEOG-H-CC20-Th – Research Methodology and Fieldwork.....	40
GEOG-H-CC20-P – Research Methodology and Fieldwork Lab .....	41
GEOG-H-CC21-Th – Watershed and Coastal Management.....	43
GEOG-H-CC21-P – Watershed and Coastal Management Lab .....	44
GEOG-H-CC22-Th – Historical and Political Geography.....	45
GEOG-H-CC22-Tu – Historical and Political Geography Report .....	46
GEOG-H-CC23-Th – Population and Welfare Geography .....	47
GEOG-H-CC23-P – Population and Welfare Geography Lab .....	48
GEOG-H-CC24-Th – Rural and Urban Geography .....	49
GEOG-H-CC24-Tu – Rural and Urban Geography Report .....	50
GEOG-H-CC25-Th – Regional Development and Planning .....	51
GEOG-H-CC25-P – Regional Development and Planning Lab.....	52
<b>Discipline-specific Course: Multidisciplinary (MD-CC) .....</b>	<b>1</b>
GEOG-MD-CC01-Th– Physical Geography.....	1
GEOG-MD-CC01-P – Physical Geography Lab .....	2
GEOG-MD-CC02-Th – Human Geography .....	3
GEOG-MD-CC02-P – Human Geography Lab .....	4
GEOG-MD-CC03-Th – Economic Geography.....	7
GEOG-MD-CC03-P – Economic Geography Lab .....	8
GEOG-MD-CC04-Th – Geomorphology .....	9
GEOG-MD-CC04-P – Geomorphology Lab.....	10
GEOG-MD-CC05-Th – Climatology .....	11
GEOG-MD-CC05-P – Climatology Lab.....	12
GEOG-MD-CC06-Th – Hydrology and Oceanography.....	17
GEOG-MD-CC06-P – Hydrology and Oceanography Lab .....	18
GEOG-MD-CC07-Th – Cultural and Settlement Geography .....	19
GEOG-MD-CC07-P – Cultural and Settlement Geography Lab.....	20
GEOG-MD-CC08-Th – India and West Bengal .....	27
GEOG-MD-CC08-P – India and West Bengal Lab .....	28
<b>Skill Enhancement Course (SEC) &amp; Interdisciplinary Course (IDC).....</b>	<b>53</b>
GEOG-H-SEC01/MD-SEC-1-Th – Methods in Geography.....	53
GEOG-H-SEC02-Th – Environmental Impact Assessment and Environmental Management Planning.....	54
GEO-H-IDC01-Th – Geomatics and Spatial Analysis.....	56
GEO-H-IDC01-P – Geomatics and Spatial Analysis Lab .....	57

## Curriculum Structure

### Papers & Courses

Honours (H) Papers: 25 in 8 Semesters of H-CC-Major (Mj) 4 in 6 Semesters of H-CC-Minor (Mn)	Multidisciplinary (MD) Papers: 8 in 8 Semesters of MD-CC-Major (Mj) 6 in 4 Semesters of MD-CC-Minor (Mn)	Semesters				Subjects / Subdisciplines: 25 in 8 Semesters of H-CC-Major (Mj) 4 in 6 Semesters of H-CC-Minor (Mn) 8 in 8 Semesters of MD-CC-Major (Mj) 6 in 4 Semesters of MD-CC-Minor (Mn)	Paper Components: Th / P / Tu *	
		H-CC-Mj	H-CC-Mn	MD-CC-Mj	MD-CC-Mn			
GEOG-H-CC01	GEOG-MD-CC01	1	1/3	1	3	Physical Geography	Th	P
GEOG-H-CC02	GEOG-MD-CC02	2	2/4	2	4	Human Geography	Th	P
GEOG-H-CC03	—	3	—	—	—	Geotectonics	Th	P
GEOG-H-CC04	GEOG-MD-CC03	3	5	3	5	Economic Geography	Th	P
GEOG-H-CC05	GEOG-MD-CC04	4	6	4	5	Geomorphology	Th	P
GEOG-H-CC06	GEOG-MD-CC05	4	—	4	6	Climatology	Th	P
GEOG-H-CC07	—	4	—	—	—	Social Geography	Th	P
GEOG-H-CC08	—	4	—	—	—	Cartographic Techniques	Th	P
GEOG-H-CC09	GEOG-MD-CC06	5	—	5/6	—	Hydrology and Oceanography	Th	P
GEOG-H-CC10	GEOG-MD-CC07	5	—	5	6	Cultural and Settlement Geography	Th	P
GEOG-H-CC11	—	5	—	—	—	Hazard Management	Th	Tu
GEOG-H-CC12	—	5	—	—	—	Cartograms, Thematic Mapping and Surveying	Th	P
GEOG-H-CC13	—	6	—	—	—	Soil and Biogeography	Th	P
GEOG-H-CC14	GEOG-MD-CC08	6	—	6	—	India and West Bengal	Th	P
GEOG-H-CC15	—	6	—	—	—	Remote Sensing, GIS, and GNSS	Th	P
GEOG-H-CC16	—	7	—	—	—	Philosophy of Geography	Th	P
GEOG-H-CC17	—	7	—	—	—	Resource Geography	Th	P
GEOG-H-CC18	—	7	—	—	—	Environmental Issues in Geography	Th	P
GEOG-H-CC19	—	7	—	—	—	Statistical Methods in Geography	Th	P
GEOG-H-CC20	—	7	—	—	—	Research Methodology and Fieldwork	Th	P
GEOG-H-CC21	—	8	—	—	—	Watershed and Coastal Management	Th	P
GEOG-H-CC22	—	8	—	—	—	Historical and Political Geography	Th	Tu
GEOG-H-CC23	—	8	—	—	—	Population and Welfare Geography	Th	P
GEOG-H-CC24	—	8	—	—	—	Rural and Urban Geography	Th	P
GEOG-H-CC25	—	8	—	—	—	Regional Development and Planning	Th	P
GEOG-H-SEC01	GEOG-MD-SEC01	1	1	1/2/3	—	Methods in Geography	Th	—
GEOG-H-SEC02	—	3	—	—	—	Environmental Impact Assessment and Environment Management Planning	Th	—
GEOG-H-IDC01	GEOG-MD-IDC01	—	1/2/3	—	—	Geomatics and Spatial Analysis	Th	P

\* Paper Components with marks, credits, and minimum number of periods to be allotted:

**Th** : Theory – 75 Marks / 3 Credits (DSC/CC Papers): [45] Periods; 100 Marks / 4 Credits (SEC Papers): [60] periods; 50 Marks / 2 Credits (IDC Papers): [30] periods

**P** : Practical – 25 Marks / 1 Credit: [30] Periods

**Tu** : Tutorial – 25 Marks / 1 Credit: [30] Periods

**Papers & Credits: Honours (H) Course <sup>1</sup>**

Semester ↓	Major Discipline Specific Course (H-DSC/CC Major)	Minor Discipline Specific Course (H-DSC/CC Minor) <sup>2</sup>	Interdisciplinary Course (IDC) <sup>3</sup>	Ability Enhancement Course (AEC)	Skill Enhancement Course (SEC)	Common Value Added Course (CVAC)	Summer internship	Dissertation / Research work	Total Credit (incl 2nd DSC Minor course) <sup>2</sup>
	25 papers × 4 credits = 100 credits	4 papers × 4 credits = 16 credits	3 papers × 3 credits = 9 credits	4 papers × 2 credits = 8 credits	3 papers × 4 credits = 12 credits	4 papers × 2 credits = 8 credits	1 paper × 3 credits = 3 credits	(1 × 4 = 4) + (1 × 8 = 8) = 12 credits	172
1	GEOG-H-CC01-1-Th & P Physical Geography	GEOG-H-CC01-1-Th & P Physical Geography (as 1st minor subject)	GEOG-IDC01-Th & P Geomatics and Spatial Analysis	1 × 2 = 2 From central pool	GEOG-H-SEC01-1-Th Methods in Geography	2 × 2 = 4 From central pool	—	—	21
2	GEOG-H-CC02-2-Th & P Human Geography	GEOG-H-CC02-2-Th & P Human Geography (as 1st minor subject)	GEOG-IDC01-Th & P Geomatics and Spatial Analysis	1 × 2 = 2 From central pool	1 × 4 = 4 From central pool	2 × 2 = 4 From central pool	Summer Internship to be completed by students exiting after Semester-2	—	21
3	GEOG-H-CC03-3-Th & P Geotectonics	GEOG-H-CC01-3-Th & P Physical Geography (as 2nd minor subject)	GEOG-IDC01-Th & P Geomatics and Spatial Analysis	1 × 2 = 2 From central pool	GEO-SEC02-3-Th EIA & EMP	—	—	—	21
	GEOG-H-CC04-3-Th & P Economic Geography								
4	GEOG-H-CC05-4-Th & P Geomorphology	GEOG-H-CC02-4-Th & P Human Geography (as 2nd minor subject)	—	1 × 2 = 2 From central pool	—	—	Summer Internship to be completed by students exiting after Semester-4	—	22
	GEOG-H-CC06-4-Th & P Climatology								
	GEOG-H-CC07-4-Th & P Social Geography								
	GEOG-H-CC08-4-Th & P Cartographic Techniques								
5	GEOG-H-CC09-5-Th & P Hydrology and Oceanography	GEOG-H-CC04-5-Th & P Economic Geography	—	—	—	—	—	—	24
	GEOG-H-CC10-5-Th & P Cultural and Settlement Geography								
	GEOG-H-CC11-5-Th & P Hazard Management								
	GEOG-H-CC12-5-Th & P Thematic Mapping and Surveying								

NOTES: 1. Exit Options: • At the end of Semester 2 for award of Certificate (45 credits). • At the end of Semester 4 for award of Diploma (88 credits). • At the end of Semester 6 for award of BA/BSc Single Major Degree (128 credits) • At the end of Semester-8 for BA / BSc Honours degree (172 credits). • Candidates obtaining ≥75% of total credits / marks at the end of Semester 6 may opt for pursuing BA / BSc Honours with Research degree — see notes in Semester-7 and -8 rows in the next page. See note 5 in page viii for completion requirement of the 3-credit Summer Internship.

2. Two DSC/CC minor subjects are to be selected from the central pool for Geography Honours students. For students having honours in other subjects, Geography may be selected as 1st minor subject or 2nd minor subject. The first two papers of the minor course are to be taught in Semesters-1 & 2 (Semesters 3 & 4) if Geography is opted as 1st (2nd) minor subject.

3. Three IDC papers are to be selected from a pool of subjects. 'Geomatics and Spatial Science' can be taken in any of the Semesters 1, 2, and 3 by students who do not have Geography as DSC/CC.

Abbreviations: Th: Theory, P: Practical, Tu: Tutorial

Continued ...vii

Semester ↓	Major Discipline Specific Course (H-DSC/CC Major)	Minor Discipline Specific Course (H-DSC/CC Minor)	Interdisciplinary Course (IDC)	Ability Enhancement Course(AEC)	Skill Enhancement Course (SEC)	Common Value Added Course (CVAC)	Summer internship (SI)	Dissertation / Research work	Total Credit (incl 2nd DSC Minor course) <sup>2</sup>
6	GEOG-H-CC13-6-Th & P Soil and Biogeography	GEOG-H- CC05-6-Th & P Geomorphology	—	—	—	—	Summer Internship to be completed by students exiting after Semester-6	—	23
	GEOG-H-CC14-6-Th & P India and West Bengal								
	GEOG-H-CC15-6-Th & P Remote Sensing, GIS, and GNSS								
7	GEOG-H-CC16-7-Th & P Philosophy of Geography	—	—	—	—	—	—	1 × 4* NOTE: Candidates who pursue Dissertation / Research Work need not study one DSC Major paper of 4 credits —they will study four DSC papers in all	20
	GEOG-H-CC17-7-Th & P Resource Geography								
	GEOG-H-CC18-7-Th & P Environmental Issues in Geography								
	GEOG-H-CC19-7-Th & P Statistical Methods in Geography								
	GEOG-H-CC20-7-Th & P Research Methodology and Fieldwork								
8	GEOG-H-CC21-8-Th & P Watershed and Coastal Management	—	—	—	—	—	Summer Internship to be completed by students exiting after Semester-8	1 × 8* NOTE: Candidates who pursue Dissertation / Research Work need not study two DSC Major papers of 4 credits each — they will study three DSC papers in all	20
	GEOG-H-CC22-8-Th & Tu Historical and Political Geography								
	GEOG-H-CC23-8-Th & P Population and Welfare Geography								
	GEOG-H-CC24-8-Th & P Rural and Urban Geography								
	GEOG-H-CC25-8-Th & P Regional Development and Planning								
Credits	25 × 4 = 100 / * 22 × 4 = 88	8 × 4 = 32	3 × 3 = 9	4 × 2 = 8	3 × 4 = 12	4 × 2 = 8	1 × 3 = 3	* (1 × 4) + (1 × 8) = 12	172
Marks	25 × 100 = 2500 * 22 × 100 = 2200	8 × 100 = 800	3 × 75 = 225	4 × 50 = 200	3 × 100 = 300	4 × 50 = 200	1 × 75 = 75	* 1 × 100 + 1 × 200 = 300	Total Marks: 4300

**Papers & Credits: Multidisciplinary (MD) Course <sup>1</sup>**

Semester ↓	Major Discipline Specific Course (MD-DSC/CC Major) <sup>2</sup>	Minor Discipline Specific Course (MD-DSC/CC Minor) <sup>2</sup>	Interdisciplinary Course (IDC) <sup>3</sup>	Ability Enhancement Course (AEC)	Skill Enhancement Course (SEC) <sup>4</sup>	Common Value Added Course (CVAC)	Summer internship <sup>5</sup>	Total Credit (including 2nd DSC Major course) <sup>2</sup>
	8 papers × 4 credits = 32 credits	6 papers × 4 credits = 24 credits	3 papers × 3 credits = 9 credits	4 papers × 2 credits = 8 credits	3 papers × 4 credits = 12 credits	4 papers × 2 credits = 8 credits	1 paper × 3 credits = 3 credits	124
1	GEOG-MD-CC01-1-Th & P Physical Geography	—	GEOG-IDC01-Th & P Geomatics and Spatial Analysis	1 × 2 = 2 From central pool	GEOG-MD-SEC01-1-Th Methods in Geography	2 × 2 = 4 From central pool	—	21
2	GEOG-MD-CC02-2-Th & P Human Geography	—	GEOG-IDC01-Th & P Geomatics and Spatial Analysis	1 × 2 = 2 From central pool	GEOG-MD-SEC01-1-Th Methods in Geography	2 × 2 = 4 From central pool	Summer Internship to be completed by students exiting after Semester-2	21
3	GEOG-MD-CC03-3-Th & P Economic Geography	GEOG-MD-CC01-3-Th & P Physical Geography	GEOG-IDC01-Th & P Geomatics and Spatial Analysis	1 × 2 = 2 From central pool	GEOG-MD-SEC01-1-Th Methods in Geography	—	—	21
4	GEOG-MD-CC04-4-Th & P Geomorphology	GEOG-MD-CC02-4-Th & P Human Geography	—	—	—	—	Summer Internship to be completed by students exiting after Semester-4	22
	GEOG-MD-CC05-4-Th & P Climatology							
5	GEOG-MD-CC06-5-Th & P Hydrology and Oceanography <sup>6</sup>	GEOG-MD-CC03-5-Th & P Economic Geography	—	—	—	—	—	20
	GEOG-MD-CC07-5-Th & P Cultural and Settlement Geography	GEOG-MD-CC04-5-Th & P Geomorphology						
6	GEOG-MD-CC08-6-Th & P India and West Bengal	GEOG-MD-CC05-6-Th & P Climatology	—	—	—	—	Summer Internship to be completed by students exiting after Semester-6	
		GEOG-MD-CC07-6-Th & P Cultural and Settlement Geography						
Credits	8 × 4 = 32	6 × 4 = 24	3 × 3 = 9	4 × 2 = 8	3 × 4 = 12	4 × 2 = 8	3	128
Marks	8 × 100 = 800	6 × 100 = 600	3 × 75 = 225	4 × 50 = 200	3 × 100 = 300	4 × 50 = 200	—	3200

NOTES: 1. Exit Options: • At the end of Semester 2 for award of Certificate (45 credits). • At the end of Semester 4 for award of Diploma (88 credits). • At the end of Semester 6 for award of BA/BSC Degree (128 credits).

2. Geography may be selected as one of the three DSC (Core) subjects, as major (eight papers: CC-1 or CC-2) or as minor (six papers: CC-3).

3. Three IDC papers are to be selected from a pool of subjects. 'Geomatics and Spatial Science' can be taken in any of the Semesters 1, 2, and 3 by students who do not have Geography as CC.

4. Three different SEC papers are to be selected in Semester-1, -2, or -3 against the three major and minor subjects

5. The 3-credit Summer Internship is to be completed by the end of the Semester-2, -4, and -6 for the students opting for Certificate Course, Diploma Course, and BA/BSC Degree Course, respectively.

6. If Geography is selected as CC-2 subject, GEOG-MD-CC6 is to be studied in Semester 6 besides GEOG-MD-CC8

Abbreviations: Th: Theory, P: Practical

**DISCIPLINE SPECIFIC COURSES (CC): HONOURS & MULTIDISCIPLINARY****SEMESTERS – 1/3 (for H & MD)****GEOG-H-CC01/MD-CC01-1/3-Th – Physical Geography – 75 Marks / 3 Credits****Unit I: Cartography**

1. Concept and applications of scales and projections. Components and classification of maps [5]

**Unit II: Geotectonics**

2. Seismic waves and internal structure of the earth [3]

**Unit III: Geomorphology**

3. Classification of weathering and agents of erosion [5]
4. Fluvial processes and landforms [5]

**Unit IV: Climatology**

5. Nature, composition, and layering of the atmosphere [4]
6. Circulation in the atmosphere: Planetary winds, jet streams, and index cycle [5]

**Unit V: Soil Geography**

7. Factors of soil formation [4]
8. Evolution of an ideal soil profile [4]

**Unit VI: Biogeography**

9. Plant adaptation and distribution in relation to water availability [5]

**Unit VII: Geography of Hazards**

10. Nature and classification of hazards and disasters in Indian context [5]

**References**

- Ahrens, C.D. 2023. *Essentials of Meteorology: An Invitation to the Atmosphere*. 9th ed, Cengage Learning.
- Barry, R.G, Chorley R.J. 2009. *Atmosphere Weather and Climate*. 9th ed, Routledge.
- Coch, N.K. 1994. *Geohazards: Natural and Human*, Pearson College.
- Critchfield, H. J. 1983. *General Climatology*. Prentice Hall India Ltd (2010 Reprint).
- Franzmeier, D.P., McFee, W.W., Graveel, J.G., Kohnke, H. 2016. *Soil Science Simplified*, 5th ed, Waveland Press.
- Hyndman, D., Hyndman, D. 2016. *Natural Hazards & Disasters*, 5th ed, Cengage Learning.
- Huggett, R., Shuttleworth, E., 2022. *Fundamentals of Geomorphology*, 5th ed, Routledge.
- Kale, V.S., Gupta, A. 2001. *Introduction to Geomorphology*, Orient Blackswan.
- Kapur, A. 2010. *Vulnerable India: A Geographical Study of Disasters*, Sage.
- Lal, D.S. 2012. *Climatology*. Sharda Pustak Bhawan.
- Lomolino, M.V., Riddle, B.R., Whittaker, R.J. 2016. *Biogeography*, 5th ed, Oxford University Press.
- Sarkar, A. 2015. *Practical Geography: A Systematic Approach*, 3rd ed, Orient Blackswan.

- Sharma, P.D. 2011. Ecology and Environment, Rastogi Publications.
- Singer, M., Munns, D.N. 2005. Soils: An Introduction, 6th ed, Pearson.
- Singh, R.L., Singh, R.P.B. 2008. Elements of Practical Geography, Kalyani Publishers.
- Smith, K. 2013. Environmental Hazards: Assessing Risk and Reducing Disaster, 6th ed, Routledge.
- Strahler, A. 2013. Introducing Physical Geography, 6th ed., Wiley.
- Weil, R.R., Brady, N.C. 2022. The Nature and Properties of Soils, 15th ed, Pearson Education.

### **GEOG-H-CC01/MD-CC01-1/3-P – Physical Geography Lab – 25 Marks / 1 Credit**

*An A3- or tabloid-size laboratory notebook, comprising class assignments of the following is to be prepared and submitted. The exercises are to be drawn in pencil with photocopied representation of source materials where necessary. All texts are to be handwritten.*

1. Graphical construction of scales: Plain, comparative, diagonal, and vernier [10]
2. Delineation of drainage basins on Survey of India 1:50k topographical maps. Determining stream ordering (Strahler), and bifurcation ratio in a drainage basin (c. 5' x 5') [10]
3. Identification of drainage and channel patterns from Survey of India 1:50k topographical maps [6]
4. Construction and interpretation of wind rose diagram [4]
5. Viva voce based on laboratory notebook (5 Marks)

#### References

- Monkhouse F.J., Wilkinson H.R. 1971. Maps and Diagrams, their compilation and construction, 3rd ed (2017 reprint), Alphaneumera.
- Basu, P. 2021. Advanced Practical Geography — a Laboratory Manual, 4 ed, Books and Allied.
- Sarkar, A. 2015. Practical Geography: A Systematic Approach, 3rd ed, Orient Blackswan.
- Singh, R.L., Singh, R.P.B. 2008. Elements of Practical Geography, Kalyani Publishers.
- Vaidyanadhan, R., Subbarao, K.V. 2014. Landforms of India from Topomaps and Images, Geological Society of India.