UNIVERSITY OF CALCUTTA

Notification No. CSR/62/2026

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 the exercise of his powers under 9(6) of the said Act, the Vice-Chancellor has, by an order dated 29.05.2026, approved the revised Syllabus (including Examination Modalities) of Geography under CCF, 2022.

The above shall take effect from the Odd semester examinations, 2026 and onwards.

04/06/2026

Prof.(Dr.) Debasis Das

Registrar

SENATE HOUSE

Kolkata-700073

04.06.2026

Curriculum & Credit Framework
for
Undergraduate Courses in Geography

v.3

TO BE EFFECTIVE FROM THE ACADEMIC SESSION 2023-24

University of Calcutta
July,2023

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

INTRODUCTION: In compliance with directives onthe Curriculum & Credit Frameworkfrom 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 ambitions.

The four-year curriculum has four exit options that are hierarchically related to the level of education at the end of the 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 (Graduate with Major), BA/BSc with honours degrees and BA/BSc honours with research, respectively. The course also provides an opportunity to do research in the final year (Semester- 7 & -8) to the meritorious students.

This new curriculum of Geographyis designed to give the students a holistic understanding of the subject at every year of exit, putting equal weightage to the core content and techniques used in Geography. The syllabus also tried to give equal importance to the two main branches of Geography: Physical and Human.The principal goal of the syllabus 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 of geospatial analysis, development and planning, mapping, and surveying.

Contents

Curriculum Structure

Papers & Courses

For 4 year Hons & Hons with Research Course and Major & Minor Papers: **25** DSCC-Major &3 SEC Papers in 8 Semesters [1] **4** Minor(MN) Papers in 6 Semesters [2]	**For Multidisciplinary CC & Minor Papers:** **8** CC & 1 SEC in 6 Semesters [3] **6** Minor (MN) &1 SEC In 6 Semesters[4]	**Semesters**				**Subjects / Sub-disciplines:** **25** DSCC-Major &3 SEC Papers in 8 Semesters [1] **4** Minor(MN) Papers in 6 Semesters[2] **8** CC &1 SEC Papers in 6 Semesters(MDC)[3] **6**Minor (MN) &1 SEC Papers in 6 Semesters	**Paper Components:** Th / P	
		GEOM-DSCC[1]	MGEO-MN[2]	MGEO-CC[3]	MGEO-MN[4]			
GEOM-DSCC-1	MGEO-CC-1	1	1/3	1	3	Physical Geography	Th	P
GEOM-DSCC-2	MGEO-CC-2	2	2/4	2	4	Human Geography	Th	P
GEOM-DSCC-3	—	3	—	—	—	Geotectonics	Th	P
GEOM-DSCC-4	MGEO-CC-3	3	5/6	3	5	Economic Geography	Th	P
GEOM-DSCC-5	MGEO-CC-4	4	5/6	4	5	Geomorphology	Th	P
GEOM-DSCC-6	MGEO-CC-5	4	—	4	6	Climatology	Th	P
GEOM-DSCC-7	—	4	—	—	—	Social Geography	Th	P
GEOM-DSCC-8	—	4	—	—	—	Cartographic Techniques	Th	P
GEOM-DSCC-9	MGEO-CC-7	5	—	5/6	-	Hydrology and Oceanography	Th	P
GEOM-DSCC-10	MGEO-CC-6	5	—	5	6	Cultural and Settlement Geography	Th	P
GEOM-DSCC-11	—	5	—	—	—	Hazard Management	Th	P
GEOM-DSCC-12	—	5	—	—	—	Thematic Mapping and Surveying	Th	P
GEOM-DSCC-13	—	6	—	—	—	Soil and Biogeography	Th	P
GEOM-DSCC-14	MGEO-CC-8	6	—	6	—	India and West Bengal	Th	P
GEOM-DSCC-15	—	6	—	—	—	Remote Sensing, GIS, and GNSS	Th	P
GEOM-DSCC-16	—	7	—	—	—	Philosophy of Geography	Th	P
GEOM-DSCC-17	—	7	—	—	—	Resource Geography	Th	P
GEOM-DSCC-18	—	7	—	—	—	Environmental Issues in Geography	Th	P
GEOM-DSCC-19	—	7	—	—	—	Statistical Methods in Geography	Th	P
GEOM-DSCC-20	—	7	—	—	—	Regional Development and Planning	Th	P
GEOM-DSCC-21	—	8	—	—	—	Research Methodology-I	Th	P
GEOM-DSCC-22	—	8	—	—	—	Research Methodology-II	Th	P
GEOM-DSCC-23	—	8	—	—	—	Research Internship (HR/Population and Welfare Geography (H)	Th	P
GEOM-DSCC-24	—	8	—	—	—	Field-Based Dissertation (HR)/Historical and Political Geography (H)	Th	P
GEOM-DSCC-25	—	8	—	—	—	Field-Based Dissertation (HR) /Fieldwork (H)	Th	P
GEOM-SEC-1	MGEO-SEC-1	1		1/2/3		Methods in Geography	Th	--
GEOM-SEC-3		3	—	—	—	EIA and EMP	Th	--
GEOD-IDC-1	GEOD-IDC-1	1/2/3		1/2/3		Introduction to Geography	Th	P

* Paper Components – Marks, credits & number of periods to be allotted

Th : Theory – 75 Marks / 3 Credits (DSCC/CC/Minor), 50 marks/2 Credits (IDC Papers) & 100 Marks / 4 Credits (SEC Papers): 45 & 60 periods

P : Practical –25 Marks / 1 Credit: 30 Periods (DSCC /CC / Minor/ IDC); **Tu**: Tutorial– 25 Marks / 1 Credit: 30 Periods

H: Honours Courses,**HR**: Honours with Research Course

Papers &Credits: Major (M) Course [1]

Semester ⇩	DSCC /Core Course	Minor Course	Interdisciplinary Course (IDC) [4]	Ability Enhancement Course (AEC)	Skill Enhancement Course (SEC)	Common Value-Added Course (CVAC)	Summer internship	Dissertation / Research work	Total Credit (incl 2nd Minor course)[2]
	25 papers × 4 credits = 100 credits*	8 papers × 4 credits = 32 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		172
1	GEOM-DSCC-**1**-Th & P Physical Geography	MGEO-MN-1-Th & P [2] Physical Geography (as 1st minor subject)	GEOD-IDC-**1/2/3**-Th & P Introduction to Geography	1 × 2 = 2 From central pool	GEOM-SEC-**1**-Th Methods in Geography	2 × 2 = 4 From central pool	—		21
2	GEOM-DSCC-**2**-Th & P Human Geography	MGEO-MN-2-Th & P [2] Human Geography (as 1st minor subject)	GEOD-IDC-**1/2/3**-Th & P Introduction to Geography	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	GEOM-DSCC-**3**-Th & P Geotectonics GEOM-DSCC-**4**-Th & P Economic Geography	MGEO-MN-1-Th & P [2] Physical Geography (as 2nd minor subject)	GEOD-IDC-**1/2/3**-Th & P Introduction to Geography	1 × 2 = 2 From central pool	GEOM-SEC-**3**-Th EIA & EMP	—	—		21
4	GEOM-DSCC-**5** -Th & P Geomorphology GEOM-DSCC-**6**-Th & P Climatology GEOM-DSCC-7-Th & P Social Geography GEOM-DSCC-**8**-Th & P Cartographic Techniques	MGEO-MN-2-Th &P [2]Human Geography (as 2nd minor subject)	—	1 × 2 = 2 From central pool	—	—	Summer Internship to be completed by students exiting after Semester-4		22
5	GEOM-DSCC-9-Th & P Hydrology and Oceanography GEOM-DSCC-10-Th & P Cultural and Settlement Geography GEOM-DSCC-**11**-Th & P Hazard Management GEOM-DSCC-**12**-Th & P Thematic Mapping and Surveying	MGEO-MN-3--Th & PEconomic Geography[3] MGEO-MN-4-Th & P Geomorphology[3]	—	—	—	—	—		24

NOTES:
1. *Degree Options*: • All candidates are to complete eight semesters of study for *BA/BScHonours* degree (172 credits). • Candidates obtaining ≥75% of total credits/marks at the end of Semester 6 may opt for pursuing *BA/ BScHonours with Research* degree — see notes in Semester-7 and -8 rows in the next page.
2. Two minor subjects (m1/m2) are to be selected from the central pool for Geography Honours students. For students with honours in other subjects, Geography may be chosen as the 1st or 2nd minor subject. If Geography is opted as 1st minor subject, both MGEO-MN-1& 2 are to be taught in Semesters 1 & 2, and if Geography is opted as 2nd minor subject, both MGEO-MN-1& 2 are to be taught in Semesters 3 & 4.
3. For 4-year B.A./ B.Sc.--Honours & Honours with Research students, Minor, both MGEO-MN-3 & 4 are to be completed either in Semester-5 or in Semester-6
4. Three IDC papers are to be selected from a pool of subjects. A selected paper — e.g., 'Introduction to Geography' — can be taken in any of the Semesters 1, 2, and 3.

Semester ⇩	DSCC /Core Course	MINOR Course	Interdisciplinary Course (IDC)	Ability Enhancement Course(AEC)	Skill Enhancement Course (SEC)	Common Value AddedCourse (CVAC)	Summer internship (SI)	Dissertation / Research work	Total Credit (incl 2nd Minor course)[2]
6	GEOM-DSCC-**13**-Th & P Soil and Biogeography GEOM-DSCC-**14**-Th & P India and West Bengal GEOM-DSCC-**15**-Th & P RS, GIS, and GNSS	MGEO-MN-3--Th & PEconomic Geography[3] MGEO-MN-4-Th & P Geomorphology[3]	—	—	—	—	Summer Internship to be completed by students exiting after Semester-6	—	23
7	GEOM-DSCC-**16**-Th & P Philosophy of Geography GEOM-DSCC-**17**-Th & P Resource Geography GEOM-DSCC-**18**-Th & P Environmental Issues in Geography GEOM-DSCC-**19**-Th & P Statistical Methods in Geography GEOM-DSCC-**20**-Th & P Regional Development and Planning	—	—	—	—	—	—		20
8	GEOM-DSCC-**21**-Th & P Research Methodology-I GEOM-DSCC-**22**-Th & P Research Methodology-II GEOM-DSCC-**23**-Th & P Research Internship **(HR)/**Population and Welfare Geography **(H)** GEOM-DSCC-**24**-Th & P *Field-Based Dissertation **(HR)** / Historical and Political Geography **(H)** GEOM-DSCC-**25**-Th & P *Field-Based Dissertation **(HR)** / Fieldwork **(H)**	—	—	—	—	—	—	*For Honours with Research (HR) Students, DSCC-24 & DSCC-25 will be considered as a single paper of 8 Credits for assessment purpose (6 credits for evaluation of dissertation and 2 credits for viva-voce)	20
Credits	25 × 4 = 100 *	8 × 4 = 32	3 × 3 =9	4 × 2 =8	3 × 4 = 12	4 × 2 =8	1 × 3 = 3	***Credits and Marks computed within DSCC Major**	**172**
Marks	25 × 100 = 2500*	8 × 100 = 800	3 × 75 = 225	4 × 50 = 200	3 × 100 = 300	4 × 50 = 200	1 × 75 = 75		**Total Marks: 4300**

Papers &Credits: Multidisciplinary (MD) Course [1]

Semester ⇩	CCCourse (Core) [2]	MinorCourse(MN)[2]	Interdisciplinary Course (IDC)[3]	Ability Enhancement Course(AEC)	Skill Enhancement Course (SEC)[4]	Common Value-Added Course (CVAC)	Summer internship[5]	Total Credit[2]
	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	1paper × 3 credits = 3 credits	128
1	MGEO-CC-1-Th & P Physical Geography	—	GEOD-IDC-**1/2/3**-Th & P Introduction to Geography	1 × 2 = 2 From central pool	MGEO-SEC-1/2/3-Th Methods in Geography	2 × 2 = 4 From central pool	—	21
2	MGEO-CC-2-Th & P Human Geography	—	GEOD-IDC-**1/2/3**-Th & P Introduction to Geography	1 × 2 = 2 From central pool	MGEO-SEC-1/2/3-Th Methods in Geography	2 × 2 = 4 From central pool	Summer Internship to be completed by students exiting after Semester-2	21
3	MGEO-CC-3-Th & P Economic Geography	MGEO-MN-1-Th & P Physical Geography	GEOD-IDC-**1/2/3**-Th & P Introduction to Geography	1 × 2 = 2 From central pool	MGEO-SEC-1/2/3-Th Methods in Geography	—	—	21
4	MGEO-CC-4-Th & P Geomorphology MGEO-CC-5-Th & P Climatology	MGEO-MN-2-Th & P Human Geography	—	—	—	—	Summer Internship to be completed by students exiting after Semester-4	22
5	MGEO-CC-6-Th & P Cultural and Settlement Geography [7] MGEO-CC-7-Th & P Hydrology and Oceanography[6]	MGEO-MN-3-Th & P Economic Geography MGEO-MN-4-Th & P Geomorphology	—	—	—	—	—	20
6	MGEO-CC-7--Th & P Hydrology and Oceanography[6] --- MGEO-CC-8--Th & P India and West Bengal	MGEO-MN-5-Th & P Climatology MGEO-MN-6-Th & P Cultural and Settlement Geography	—	—	—	—	Summer Internship to be completed by students exiting after Semester-6	
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 the 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 two CC (Core) subjects (eight papers: CC-1 or CC-2) or as a minor (six papers: Mn).

3. Three IDC papers are to be selected from a pool of subjects. A selected paper — e.g., 'Introduction to Geography' — can be taken in any of the Semesters 1, 2, and 3.

4. Three different SEC papers are to be taken in Semester-1, -2, or -3 against the two CC and one minor subjects, If Geography is selected as CC2, 'Introduction to Geography' will be studies in Semester-2

5. The 3-credit Summer Internship is to be completed by the end of 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, MGEO-CC-7 is to be studied in Semester 6 besides MGEO-CC-8,

7. If Geography is selected as CC-1 subject, MGEO-CC-6 is to be studied in Semester 5 besides MGEO-CC-7 and, MGEO-CC-8 is to be studied in semester-6

*** For MDC courses, 32 credits will be added to the total credits for another CC subject.** ***Abbreviations:*** **Th: Theory; P: Practical**

SEMESTERS–1 (forMAJOR& MD)

GEOM-DSCC-1/MGEO-CC-1-Th– Physical Geography✧75 Marks / 3Credits

Unit I: Cartography

1. Concept and applications of scales, projections. Components and classification of maps[6]

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, 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 disastersin Indian context[5]

References

Ahrens, C.D. 2012. 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).

Huggett, R., Shuttleworth, E., 2022. Fundamentals of Geomorphology, 5th ed, Routledge.

Kale, V.S., Gupta, A. 2001. Introduction to Geomorphology, Orient Blackswan (2018 reprint).

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 Private Ltd.

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

GEOM-DSCC-1/MGEO-CC-1-P – Physical GeographyLab✧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 (5Marks)

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 Private Ltd.

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.

SEMESTERS–2 (forMAJOR& MD)

GEOM-DSCC-2/MGEO-CC-2-Th – Human Geography✧75 Marks / 3Credits

Unit I: Scope and Approaches

1. Elements of Human Geography: Nature, scope and recent trends. [4]
2. Approaches to Human Geography: Resource, locational, landscape, environment[6]

Unit II: Social Geography

3. Evolution of human societies: Hunting and food gathering, pastoral nomadism, subsistence farming and industrial society[6]
4. Human adaptation to the environment:Chenchu, Toda, and Gond [6]
5. Evolution and characteristics of post-industrial urban societies [2}

Unit III: Population Geography

6. Demographic transition. Significance of demographic dividend[3]
7. Distribution, density and growth of population in India [4]

Unit IV: Settlement Geography

8. Characteristics of settlements: urban and rural [4]
9. Site, situation, types and patterns of rural settlements [6]

Unit V: Urban Geography

10. Size- class classification of urban settlements after Census of India [4]

References

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Bose, N.K. 1972. Some Indian Tribes, National Book Trust.

Chandna R.C. 2022. Geography of Population, Part 1: Concepts, Determinants and World Patterns, Kalyani Publishers.

Dorrel, D., Henderson, P. 2018. Introduction to Human Geography. University of Georgia Press.

Fouberg, E.H., Nash, A.B., Murphy, A.B., de Blij, H., 2015. Human Geography: People, Place, and Culture, 11th ed, Wiley.

Ghosh S. 1998. An Introduction to Settlement Geography, Sangam Books Ltd.

Gregory, D, Johnston, R., Pratt, G., Watts, K., Whatmore, S. (Eds) 2009.The Dictionary of Human Geography, 5th ed, Wiley Blackwell.

Knox, P.L., Marston, S.A. 2014. Human Geography, Places and Regions In Global Context,6th ed, Pearson Education Ltd.

Majumdar, P.K. 2013. India's Demography, Changing Demographic Scenario in India, Rawat Publications.

Mercier, M., Norton, W. 2019. Human Geography, 10th ed, Oxford University Press.

Paul, C.,Crang, P., Goodwine, M.G. 2014, Introducing Human Geographies, 3rd ed, Routledge.

Rubenstein J.M.,2018, Contemporary Human Geography, 4th ed, Pearson.

Short, R.J. 2017. Human Geography: A short Introduction, 2nd ed, Oxford University Press.

Sing, R.Y. 2009, A Geography of Settlements, Rawat Publications.

GEOM-DSCC-2/MGEO-CC-2-P – Human GeographyLab✧25 Marks / 1 Credit

An A4- or tabloid-sizelaboratory notebook, comprising class assignmentsof the following is to be prepared and submitted. Census of India data are to be used where applicable. The exercises are to be drawn in pencil with photocopied representation of source materials where necessary.All texts are to be handwritten.

1. Growth rate of population: Arithmetic growth comparing two decadal datasets [6]
2. Representation and interpretation of population density of Indian states or West Bengal districts by choropleth method [8]
3. Identification of types of settlements according to sites from Survey of India 1:50ktopographical maps[8]
4. Construction of proportional squares depicting number of houses [8]
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 Edition, (2017 reprint), Alphaneumera, Kolkata

Sarkar, A. 2015. Practical Geography: A Systematic Approach, 3rd ed, Orient Blackswan Private Ltd.

Singh, R.L., Singh, R.P.B. 2008. Elements of Practical Geography, Kalyani Publishers.

WEBSITE:

Census of India: https://censusindia.gov.in/census.website/data/census-tables

SEMESTERS–3 (forMAJOR)

GEOM-DSCC-3-Th – Geotectonics✧75 Marks/ 3Credits

1. Relative and absolute dating of rocks [4]
2. The geological time scale with special reference to the events of the Pleistocene[4]
3. Formation and structural differentiation of earth[4]
4. Isostasy: Models of Airy, Pratt, and their applicability [5]
5. Plate Tectonics as a unified theory of global tectonics: Processes and landforms at plate margins and hotspots[7]
6. Genetic classification of mountains. Types of volcanic eruptions [4]
7. Major relief features of the ocean floor: Characteristics and origin according to Plate Tectonics [5]
8. Folds: Formation and classification[4]
9. Faults: Formation and classification [4]
10. Morphometric indices of tectonic activity: Basin asymmetry factor, transverse topographic symmetry factor, mountain front sinuosity [4]

References

BOOKS:

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Frisch, W., Meschede, M., Blakey, R.C. 2022. Plate Tectonics: Continental Drift and Mountain Building,2nd ed, Springer.

Fossen, H. 2016. Structural Geology, 2nd ed, Cambridge University Press.

Knoll, A.H. 2021. A Brief History of Earth: Four Billion Years in Eight Chapters, Custom House.

Lutgens, F., Tarbuck, E., Tasa, D. 2017. Essentials of Geology, 13th ed, Pearson.

Strahler, A. 2013. Introducing Physical Geography, 6th ed, Wiley.

Summerfield, M.J. 2003. Global Geomorphology: An Introduction to the Study of landforms, Longman.

WEBSITES:

British Society for Geomorphology: www.geomorphology.org.uk

Geological Survey of India: www.gsi.gov.in

Indian Institute of Geomorphologists: www.indiageomorph.org

International Association of Geomorphologists:www.geomorph.org

Plaleomap Project: www.scotese.com&www.youtube.com/user/cscotese

'This Dynamic Earth' (USGS): https://pubs.usgs.gov/gip/dynamic/dynamic.html

GEOM-DSCC-3-P – GeotectonicsLab✧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. Measurement of dip and strike using clinometer [5]
2. Megascopic identification of mineral samples: Bauxite, calcite, chalcopyrite, feldspar, galena, gypsum, hematite, magnetite, mica, quartz, talc, and tourmaline

   Megascopic identification of rock samples: Granite, dolerite, basalt, laterite, limestone, shale, sandstone, conglomerate, quartzite, slate, marble, schist, phyllite, and gneiss [6]
3. Analysis of tectonic activity from Survey of India 1:50k topographical maps: Basin asymmetry factor and transverse topographic symmetry factor[4]
4. Interpretation of geological maps with uniclinal structure, folds, unconformity, and intrusions [15]
5. Viva-voce based on laboratory notebook (5Marks)

References

Basu, P. 2021. Advanced Practical Geography — a Laboratory Manual, 4 ed, Books and Allied.

Bolton. T. 2009 (reprint). Geological Maps: Their Solution and Interpretation, Cambridge Univ. Press.

Burbank, D.W. 2011. Tectonic Geomorphology, 2nd ed, Wiley India.

Farndon, J. 2012. The Illustrated Guide to Rocks & Minerals, Southwater.

Pillent, C. 2002. Smithsonian Handbooks: Rocks & Minerals, Dorling Kindersley.

Sarkar, A. 2015. Practical Geography: A Systematic Approach, 3rd ed, Orient Blackswan Private Ltd.

Sorrell, C.A. Rocks and Minerals: A Guide to Field Identification, St. Martin's Press.

SEMESTERS–3 (forMAJOR)

GEOM-DSCC-4/MGEO-CC-3-Th – Economic Geography✧75 Marks / 3 Credits

Unit I: Concepts

1. Economic Geography: Scope and approaches [4]
2. Concepts in economic geography: Goods and services, production, exchange and consumption; concept of economic man[5]

Unit II: Economic Activities

3. Classification of economic activities: Primary, Secondary, Tertiary, Quaternary, Quinary [4]
4. Location of economic activities: agriculture (von Thünen), and industry (Weber)[6]
5. Primary activities: Agriculture, forestry, fishing, and mining[6]
6. Secondary activities: Classification of manufacturing industries, Special Economic Zones and Technology Parks[6]
7. Tertiary activities: Transport, trade and services[6]
8. Economic Globalisation: Concepts and contemporary issues [2]
9. International trade, Role of WTO [2]
10. Emergence of Economic Blocs (Post WWII); BRICS: Evolution and significance[4]

References

BOOKS:

Adams, F.G., 2011, Globalization, Today and Tomorrow, Routledge.

Anderson, W.P., 2012. Economic Geography, Routledge.

Aoyama, Y., Murphy, J.T., Hanson, S. 2010. Key Concepts in Economic Geography, Sage.

Coe N. M., Kelly P. F. and Yeung H. W., 2019: Economic Geography: A Contemporary Introduction, 3rd ed, Wiley-Blackwell.

Combes P., Mayer T. and Thisse J. F., 2008: Economic Geography: The Integration of Regions and Nations, Princeton University Press.

MacKinnon, D., Cumbers, A. 2018. An Introduction to Economic Geography: Globalisation, Uneven Development and Place, 3rd ed

Waters M., 2001, Globalization, Routledge.

Willington D. E., 2008: Economic Geography, Husband Press.

Wood, A., Roberts, A. 2010. Economic Geography: Places, Networks and Flows, Routledge.

WEBSITES:

BRICS: www.brics2017.org/English&www.brics2016.gov.in

World Trade Organisation: www.wto.org

United Nations: www.un.org/en/

GEOM-DSCC-4/MGEO-CC-3-P– Economic GeographyLab✧25 Marks / 1 Credit

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

1. Construction and interpretation of gender-wise bar showing work participation rate[8]
2. Construction and interpretation of proportional divided circles showing state-wise variation in occupational structure [8]
3. Preparation of crop calendar. Construction and interpretation of ergograph[6]
4. Time series analysis of industrial production of India using moving average [8]
5. Viva-voce based on laboratory notebook (5 Marks)

References

BOOKS:

Khullar, D.R. 2011. India: A Comprehensive Geography, Kalyani Publishers

Monkhouse, F.J., Wilkinson, H.R. 1971. Maps and Diagrams: Their Compilation and Construction, 3rd ed (2017 reprint), Alphaneumera-Kolkata

Sharma, T.C. 2012. Economic Geography of India, Rawat Publications.

Saxena, H.M. 2005. Transport Geography, Rawat Publications.

WEBSITES:

Census of India: www.censusindia.gov.in

Government of India Data Platform: https://data.gov.in

Planning Commission (West Bengal Development Report 2010):
https://www.scribd.com/document/433016798/sdr-wb1909-pdf

Trending Economics (India's industrial production):
https://tradingeconomics.com/india/industrialproduction

West Bengal District Statistical Handbooks:
http://wbpspm.gov.in/publications/District%20Statistical%20Handbook

Wikipedia (Hierarchy of states):
https://en.wikipedia.org/wiki/List_of_Indian_states_and_union_territories_by_GDP_per_capita

SEMESTERS–4 (FOR MAJOR & MD)

GEOM-DSCC-5/MGEO-CC-4-Th – Geomorphology ✧ 75 Marks/ 3Credits

1. Time and space in geomorphology: Schumm and Lichty's model. Landform ordering: Ga Scale of Tricart and Haggett[4]
2. Degradational processes: Classification of mass wasting, and resultant landforms[4]
3. Processes of entrainment, transportation, and deposition by different geomorphic agents [5]
4. Development of river network and landforms on uniclinal and folded structures. Surface expression of faults[6]
5. Development of river network and landforms on granites, basalts, and limestones[6]
6. Coastal processes and landforms[4]
7. Glacial and glacio-fluvial processes and landforms[4]
8. Aeolian and fluvio-aeolian processes and landforms [4]
9. Models on landscape evolution: Views of Davis, Penck, King, and Hack. Significance of systems approach [6]
10. Role of humans in landform development[2]

References

BOOKS:

Bierman, P.R., Montgomery, D.R., 2019. Key Concepts in Geomorphology, 2nded, W. H. Freeman.

Goudie, A.S. (Ed) 2004. Encyclopaedia of Geomorphology, vol. 1 & 2, Routledge.

Gregory, K.J., Lewin, J. 2014. The Basics of Geomorphology: Key Concepts, Sage.

Gupta, A. 2011. Tropical Geomorphology, Cambridge University Press.

Harvey, A. 2022. Introducing Geomorphology: A Guide to Landforms and Processes, 2nd ed, Dunedin Academic Press.

Huggett, R., Shuttleworth, E., 2022. Fundamentals of Geomorphology, 5th ed, Routledge.

Kale, V.S., Gupta, A. 2001. Introduction to Geomorphology, Orient Blackswan (2018 reprint).

Knighton, A.D. 1998. Fluvial Forms and Processes: A New Perspective, Edward Arnold.

McCullagh, P. 1978. Modern Concepts in Geomorphology, Oxford University Press.

Szabó, J., Dávid, L., Lóczy, D. (Eds) 2010. Anthropogenic Geomorphology: A Guide to Man-made Landforms, Springer.

Selby, M.J. 1986. Earth's Changing Surface, Oxford University Press.

Strahler, A. 2016. Introducing Physical Geography, 6th ed, Wiley.

Summerfield, M.J. 2003. Global Geomorphology: An Introduction to the Study of landforms, Longman.

Thornbury, W.D. 1969. Principles of Geomorphology, 2nd ed, Wiley-India / CBS.

WEBSITES:

British Society for Geomorphology: geomorphology.org.uk

Indian Institute of Geomorphologists: www.indiageomorph.org

International Association of Geomorphologists: www.geomorph.org

GEOM-DSCC-5/MGEO-CC-4-P – GeomorphologyLab✧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. Extraction and interpretation of geomorphic information from Survey of India 1:50ktopographical maps of plateau region: Construction of relief profiles (superimposed, projected, and composite)[6]
2. Construction of relative relief map, slope map (Wentworth's method), drainage density mapon a drainage basin(c. 5' x 5') [8]
3. Construction of hypsometric curve and derivation of hypsometric integer of a drainage basin (c. 5' x 5') of a plateau region [6]
4. Determination of channel sinuosity index (channel length/valley length measured through straight line) and braiding index of rivers from topographical maps (c 10-km reach) [6]
5. Viva-voce based on laboratory notebook (5Marks)

References

Basu, P. 2021. Advanced Practical Geography — a Laboratory Manual, 4 ed, Books and Allied

McCullagh, P. 1978. Modern Concept in Geomorphology, Oxford University Press.

Sarkar, A. 2015. Practical Geography: A Systematic Approach, 3rd ed, Orient Blackswan Private Ltd.

Sen, P.K. 1989. Geomorphological Analysis of Drainage Basin: An Introduction to Morphometric and Hydrological Parameters, University of Burdwan.

Vaidyanadhan, R., Subbarao, K.V. 2014. Landforms of India from Topomaps and Images, Geological Society of India.

GEOM-DSCC-6/MGEO-CC-5-Th – Climatology✧75 Marks / 3 Credits

Unit I: Elements of the Atmosphere

1. Insolation: Controlling factors. Heat budget of the atmosphere[4]
2. Temperature: horizontal and vertical distribution. Inversion of temperature: types, causes and consequences[4]
3. Overview of climate change: Causes, trends, and predictions of global temperature rise since 1850 CE. Formation, depletion, restoration, and significance of the ozone layer[6]

Unit II: Atmospheric Phenomena and Climatic Classification

4. Condensation: Process and forms. Mechanism of precipitation: Bergeron-Findeisen theory, collision and coalescence. Forms of precipitation[5]
5. Air mass: Typology, origin, characteristics and modification[4]
6. Types of fronts. Frontogenesis and frontolysis[5]
7. Weather: Stability and instability, barotropic and baroclinic conditions[4]
8. Atmospheric disturbances: Tropical and mid-latitude cyclones, thunderstorms [6]
9. Monsoon circulation and mechanism with reference to India[4]
10. Climatic classification after Köppen (1936) and Thornthwaite (1948) [4]

References

BOOKS:

Ahrens, C.D. 2012. 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.

Critchfield, H. J. 1983. General Climatology. Prentice Hall India Ltd (2010 Reprint).

Dessler, A.E. 2021. Introduction to Modern Climate Change, 3rd ed, Cambridge University Press.

Hidore, J.J., Oliver, J.E., Snow, M., Snow, R. 2020. Climatology: An Atmospheric Science, 3rd ed, Pearson.

Lal, D.S. 2012. Climatology. Sharda Pustak Bhawan.

Lutgens, F.K., Tarbuck, E.J. 1998. The Atmosphere: An Introduction to Meteorology, 9th ed, Prentice-Hall Inc.

Oliver, J.E., Hidore J.J. 2002. Climatology: An Atmospheric Science, Pearson Education India

WEBSITES:

India Meteorological Department: www.imd.gov.in

Intergovernmental Panel on Climate Change: www.ipcc.ch

World Bank Climate Change Knowledge Portal: sdwebx.worldbank.org/climateportal/index.cfm

World Meteorological Organization: public.wmo.int/en

GEOM-DSCC-6/MGEO-CC-5-P – ClimatologyLab✧25 Marks / 1 Credit

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

1. Measurement of weather elements using analogue instruments: Mean daily temperature, air pressure, relative humidity, and rainfall[6]
2. Interpretation of a daily weather map of India (any two): Pre-Monsoon, monsoon, and post-monsoon[12]
3. Construction and interpretation of monthly rainfall dispersion diagram (quartile method), climatic water budget [6]
4. Construction and interpretation of hythergraph and climograph (G. Taylor)[6]
5. Viva-voce based on laboratory notebook (5 Marks)

References

BOOKS:

Basu, P. 2021. Advanced Practical Geography — a Laboratory Manual, 4 ed, Books and Allied.

Monkhouse, F.J., Wilkinson, H.R. 1971. Maps and Diagrams: Their Compilation and Construction, 3rd ed (2017 reprint), Alphaneumera-Kolkata.

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.

WEBSITE:

India Meteorological Department: www.imd.gov.in
Climatological tables of observatories of India:
https://www.imdpune.gov.in/library/public/Climatological%20Tables%201991-2020.pdf

GEOM-DSCC-7-Th –Social Geography✧75 Marks / 3 Credits

Unit I: Concepts

1. Nature, scope and content of Social Geography [4]
2. Social structure: caste and class; social process: urbanization, industrialization, migration [6]
3. Social differentiation and region formation [3]

Unit II: Social Issues

4. Social indicators of development: Education and health [3]
5. Concepts of social justice and social security with examples from India [6]
6. Contemporary social issues: Gender related problems [4]
7. Social problems in urban areas- poverty and crime [4]
8. Social problems in rural areas- marginalization and deprivation [4]
9. Social welfare schemes: tribal, women and children [6]
10. Social segregation in Western cities: formation of Ghettos [5]

References

Chandna, R.C. 2016. Geography of Population: Concepts, Determinants and Patterns, Kalyani Publishers.

Fouberg, E.H., Murphy, A.B., de Blij H.J. 2015. Human Geography: People, Place, and Culture, 11th ed, Wiley.

Ghosh, S. 1998. Introduction to Settlement Geography, Sangam Books Ltd.

Gould, W.T.S. 2015. Population and Development, Routledge.

Gregory, D., Johnston, R., Pratt, G., Watts, M., Whatmore, S. (Eds) 2009. The Dictionary of Human Geography, 5th ed, Wiley.

Knox, P.L., Marston, S.A. 2014. Human Geography: Places and Regions in Global Context, 6th ed, Pearson Education Limited.

Knox, P.L., McCarthy, L.M. 2011. Urbanization: An Introduction to Urban Geography, 3rd ed, Pearson Educztuion Ltd.

Mandal, R.B. 2001. Introduction to Rural Settlement, 2nd ed, Concept Publishing Company.

Majumdar, P.K. 2013. India's Demography: Changing Demographic Scenario in India, Rawat Publications.

Moseley, W.G., Perramond, E., Hapke, H.M., Laris, P. 2013. An Introduction to Human-Environment Geography: Local Dynamics and Global Processes, Wiley-Blackwell.

Norton, W. 2014. Human Geography, 8th ed, Oxford University Press.

Pickering K. and Owen A. A. (1997): An Introduction to Global Environmental Issues, 2nd edition Rutledge, London.

Rubenstein, J.M. 2016. The Cultural Landscape: An Introduction to Human Geography, 12th ed, Pearson Education Limited.

Singh, R.Y. 2000. Geography of Settlements, Rawat Publication

Short, R.J. 2017. Human Geography: A Short Introduction, 2nd ed, Oxford University Press.

GEOM-DSCC-7-P –Social GeographyLab✧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. Preparation of Human Development Index(UNDP)[8]
2. Preparation of Gender Development Index (UNDP)[10]
3. Construction and interpretation of cartograms showing distribution of people living below poverty line in India [5]
4. Preparation of a questionnaire on socio-economic status /access to amenities in slum areas [7]
5. Viva-voce based on laboratory notebook (5 Marks)

References

Books:

Basu, R., Bhaduri, S. (Eds) 2007. Contemporary Issues and Techniques in Geography, Progressive Publishers.

Basu, P. 2021. Advanced Practical Geography — a Laboratory Manual, 4 ed, Books and Allied.

Hassan, M.I. 2005. Population Geography, Rawat publications.

Knowles, R., Wareing, J. 1990. Economic and Social Geography, Made Simple Books.

Mahmood, A. 1998. Statistical Methods in Geographical Studies, Rajesh Publication.

Monkhouse, F.J., Wilkinson, H.R. 1971. Maps and Diagrams: Their Compilation and Construction, 3rd ed (2017 reprint), Alphaneumera-Kolkata.

Sarkar, A. 2015. Practical Geography: A Systematic Approach, 3rd ed, Orient Blackswan Private Ltd.

WEBSITE:

UNDP Human Development Report on India (2016):

hdr.undp.org/en/countries/profiles/IND

hdr.undp.org/sites/all/themes/hdr_theme/country-notes/IND.pdf

GEOM-DSCC-8-Th – Cartographic Techniques✧75 Marks / 3 Credits

1. Coordinate systems: Polar and rectangular [3]
2. Grids: Angular and linear systems of measurement [3]
3. Bearing: Magnetic and true, whole-circle and reduced [2]
4. Concept of geoid and spheroid with special reference to Everest and WGS-84. Conversion of angular distance to linear distance [4]
5. Map projections: Classification, properties and uses [10]
6. Properties, uses and limitations of projections: Polar Zenithal Stereographic, Simple Conic with one standard parallel, Bonne's, Cylindrical Equal Area, and Mercator's [5]
7. Concept and significance of UTM projection [3]
8. Representation of data usingdots, spheres anddivided proportional circles [6]
9. Representation of data usingisopleth, choropleth, and chorochromatic maps [6]
10. Survey of India topographical maps: Reference scheme of old and open series. Information on the margin of maps [3]

References

BOOKS

Kennedy, M., Kopp, S. 2001. Understanding Map Projections, Esri Press.

Kimerling, A.J., Buckley, A.R., Muehrcke, P.C., Muehrcke, J.O. 2011. Map Use: Reading, Analysis, Interpretation, 7th ed, Esri Press.

Monkhouse, F.J., Wilkinson, H.R. 1971. Maps and Diagrams: Their Compilation and Construction, 3rd ed (2017 reprint), Alphaneumera-Kolkata.

Pearson II, F. 1990. Map Projections: Theory and Applications 2nd ed, CRC Press.

Robinson, A.H., Morrison, J.L., Phillip, C.M., Kimerling, A.J., Guptill, S.C. 1995. Elements of Cartography, 6th ed, Wiley.

Sarkar, A. 2015. Practical Geography: A Systematic Approach, 3rd ed, Orient Blackswan Private Ltd.

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.

WEBSITES

INDIAN NATIONAL CARTOGRAPHIC ASSOCIATION: WWW.INCAINDIA.ORG

SURVEY OF INDIA: WWW.SURVEYOFINDIA.GOV.IN

GEOM-DSCC-8-P – Cartographic TechniquesLab✧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. Construction of projections: Polar Zenithal Stereographic, Simple Conic with one standard parallel, Bonne's [8]
2. Construction of projections: Cylindrical Equal Area, and Mercator's[6]
3. Construction and interpretation of thematic maps: Simple and composite line and bar graphs. Dots and sphere [8]
4. Construction and interpretation of thematic maps: Dasymetric density, isopleth, and chorochromatic maps [8]
5. Viva-voce based on laboratory notebook (5 Marks)

References

Basu, P. 2021. Advanced Practical Geography — a Laboratory Manual, 4 ed, Books and Allied.

Kennedy, M., Kopp, S. 2001. Understanding Map Projections, Esri Press.

Kimerling, A.J., Buckley, A.R., Muehrcke, P.C., Muehrcke, J.O. 2011. Map Use: Reading, Analysis, Interpretation, 7th ed, Esri Press.

Monkhouse, F.J., Wilkinson, H.R. 1971. Maps and Diagrams: Their Compilation and Construction, 3rd ed (2017 reprint), Alphaneumera-Kolkata.

Pearson II, F. 1990. Map Projections: Theory and Applications 2nd ed, CRC Press.

Robinson, A.H., Morrison, J.L., Phillip, C.M., Kimerling, A.J., Guptill, S.C. 1995. Elements of Cartography, 6th ed, Wiley.

Sarkar, A. 2015. Practical Geography: A Systematic Approach, 3rd ed, Orient Blackswan Private Ltd.

Singh, R.L., Singh, R.P.B. 2008. Elements of Practical Geography, Kalyani Publishers.

SEMESTERS –5 (for MAJOR & MD)

GEOM-DSCC-9/MGEO-CC-7-Th – Hydrology and Oceanography ✧75 Marks / 3 Credits

Unit-I: Hydrology

1. Systems approach in hydrology. Global hydrological cycle: Its physical and biological role [5]
2. Run off: controlling factors. Infiltration and evapotranspiration. Run off cycle [5]
3. Drainage basin as a hydrological unit. Principles of water harvesting and watershed management [5]
4. Groundwater: Occurrence and storage. Factors controlling groundwater recharge, discharge and movement [5]

Unit-II: Oceanography

5. Physical and chemical properties of ocean water [4]
6. Ocean temperature and salinity: Distribution and determinants [4]
7. Water mass, T–S diagram [3]
8. Ocean circulation, wave and tide [6]
9. Marine resources: Classification and sustainable utilisation [4]
10. Sea level change: Types and causes [5]

References

Dingman, S.L. 2015. Physical Hydrology, 3rd ed, Macmillan Publishing Co.

Fitts, C.R. 2002. Groundwater Science, Elsevier.

Garrison, T., Ellis, R. 2021. Oceanography: An Invitation to Marine Science, 10th ed, Cengage Learning.

Karanth, K.R., 1988: Ground Water: Exploration, Assessment and Development, Tata- McGraw Hill.

Kearey, P., Klepeis, K.A., Vine, F.J. 2011. Global Tectonics, 3rd ed, Wiley-India.

Nicolas, R. 2020. Introducing Hydrogeology, 2nd ed, Dunedin Academic Press.

Pinet, P.R. 2019. Invitation to Oceanography. 8th ed, Jones and Barlett Learning.

Pinneker, E.V. 2010. General Hydrogeology, Cambridge University Press.

Pugh, D., Woodworth, P. 2014. Sea-Level Science: Understanding Tides, Surges, Tsunamis and Mean Sea-Level Changes, 2nd ed, Cambridge University press.

Raghunath, H.M. 2006. Hydrology: Principles, Analysis, Design, 3rd ed, New Age International Publishers.

Reddy, P.J.R. 2014. A Textbook of Hydrology, University of Science Press.

Subramanya, K. 2013. Engineering Hydrology, McGraw Hill Education.

Sverdrup, K.A., Armbrust, E.V. 2008. An Introduction to the World's Oceans, 10th ed, McGraw Hill.

Todd, D.K., Larry, W.M. 2004. Groundwater Hydrology, John Wiley & Sons.

Ward, A.D., Trimble, S.W., Burckhard, S.R., Lyon, J.G. 2016. Environmental Hydrology, 3rd ed, CRC Press.

GEOM-DSCC-9/MGEO-CC-7-P – Hydrology and Oceanography Lab ✧25 Marks / 1 Credit

An A3- or tabloid-size laboratory notebook, comprising class assignments of the following is to be prepared and submitted. Central Water Commission and India Meteorological Department data are to be used where applicable. The exercises are to be drawn in pencil with photocopied representation of source materials where necessary.All texts are to be handwritten.

1. Construction and interpretation of rating curves [3]
2. Construction and interpretation of hydrographs and unit hydrographs.Derivation of phi index and W index [11]
3. Construction and interpretation of Ombrothermic graph andHyetograph [10]
4. Construction of Thiessen polygon from precipitation data [6]
5. Viva-voce based on laboratory notebook (5 Marks)

References

BOOKS:

Sen, P.K. 1989. Geomorphological Analysis of Drainage Basin: An Introduction to Morphometric and Hydrological Parameters, University of Burdwan.

Monkhouse, F.J., Wilkinson, H.R. 1971. Maps and Diagrams: Their Compilation and Construction, 3rd ed (2017 reprint), Alphaneumera-Kolkata.

Raghunath, H.M. 2006. Hydrology: Principles, Analysis, Design, 3rd ed, New Age International Publishers.

WEBSITES:

India Meteorological Department: www.imd.gov.in

Central Water Commission: cwc.gov.in

GEOM-DSCC-10/MGEO-CC-6-Th – Cultural and Settlement Geography ✧ 75 Marks/3 Credits

Unit I: Cultural Geography

1. Definition, scope and content of cultural geography[2]
2. Cultural geography in relation to allied disciplines [4]
3. Cultural hearths and realms: distribution and characteristics [3]
4. Cultural diffusion: types of cultural diffusion, innovation diffusion; Hagerstrand's model [6]
5. Diffusion of major world religions and languages [6]
6. 6. Cultural segregation; diversity and integration [4]

Unit II: Settlement Geography

7. Rural settlements: evolution and morphology [5]
8. Rural house types with reference to India, social segregation in rural areas [5]
9. Urban settlement: concepts of metropolis, megalopolis, conurbation, agglomeration; evolution of urban settlements [3]
10. Urban morphology: Models of Burgess, Hoyt, Harris, and Ullman[7]

References

Banerjee Guha, S. (Ed.) 2004. Space, Society and Geography, Rawat Publication.

Bjelland, M.D., Montello, D.R., Fellmann, J.D., Getis, A., Getis, J. 2000. Human Geography: Landscape of Human Activity, McGraw Hill.

Carter, H. 1995. The Study of Urban Geography, 4th ed, Arnold.

Dhanagare, D.N. 2004. Themes and Perspectives in Indian Sociology, Rawat Publication.

Fern, R.L. 2002. Nature, God and Humanity, Cambridge University Press.

Fouberg, E.H., Murphy, A.B., de Blij H.J. 2015. Human Geography: People, Place, and Culture, 11th ed, Wiley

Ghosh, S. 1998. Introduction to Settlement Geography, Sangam Books Ltd.

Gottdiener, M., Budd, M. Lehtovuori, P. 2016. Key Concepts in Urban Studies, 2nd ed, Sage.

Gregory, D., Johnston, R., Pratt, G., Watts, M., Whatmore, S. (Eds) 2009. The Dictionary of Human Geography, 5th ed, Wiley.

Haggett, P. 1975. Geography: A Modern Synthesis, Harper and Row Publishers.

Hudson, F.S. 1970. Geography of Settlements, Macdonald and Evans Ltd.

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.

Mandal, R.B. 2001. Introduction to Rural Settlement, 2nd ed, Concept Publishing Company.

Mitchell, D. 2000. Cultural Geography: A Critical Introduction, Blackwell.

Singh, R.Y. 2000. Geography of Settlements, Rawat Publication.

GEOM-DSCC-10/MGEO-CC-6-P – Cultural& Settlement Geography Lab✧75 Marks/3 Credits

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

1. Mapping state-wise distribution of major languages in India (State wise pie graphs of any census year [5]
2. Cartograms showing representation of roof materials used in rural houses (census years 1991, 2001, 2011 for any state of India[5]
3. Accessibility mapping using detour index from Survey of India 1:50k topographical maps[10]
4. Nearest neighbour analysis from Survey of India 1:50k topographical maps of plain region (c. 5' x 5')[10]
5. Viva-voce based on laboratory notebook (5 Marks)

References

Monkhouse, F.J. Wilkinson, H.R. (2017 Reprint), Maps and Diagrams: Their Compilation and Construction, Alphanumera

Census of India: 1991 (H2A), 2001 and 2011 (Table H-3A): Census Houses by Predominant Material of the Roof

Sarkar, A. 2015. Practical Geography: A Systematic Approach, Orient BlackswanPvt. Ltd.

WEBSITE:

Census of India: www.censusindia.gov.in

GEOM-DSCC-11-Th – Hazard Management ✧ 75 Marks / 3 Credits

Unit I: Concepts

1. Approaches to hazard study: Risk perception and vulnerability assessment. Hazard paradigms and continuum [7]
2. Responses to hazards: Preparedness, trauma, and aftermath. Resilience, capacity building [7]
3. Hazard mapping: Data and geospatial techniques (for hazards enlisted in Unit II and GEOM-DSCC-6-14-P) [3]

Unit II: Hazard-specific Study with Focus on West Bengal and India

4. Earthquake: Factors, vulnerability, consequences, and management [4]
5. Landslide: Factors, vulnerability, consequences, and management [4]
6. Land subsidence: Factors, vulnerability, consequences, and management [4]
7. Tropical cyclone: Factors, vulnerability, consequences, and management [4]
8. Riverbank and coastal erosion: Factors, vulnerability, consequences, and management [4]
9. Fire: Factors, vulnerability, consequences, and management [4]
10. Biohazard: Classification, vulnerability, consequences, and management [4]

References

BOOKS:

Coenraads, R. (Ed.) 2006. Natural Disasters and How We Cope, Millennium House.

Coch, N.K. 1994. Geohazards: Natural and Human, Pearson College.

Cutter, S.L. 2006. Hazards Vulnerability and Environmental Justice, Routledge

Government of India. 1997. Vulnerability Atlas of India, Revised ed, Building Materials & Technology Promotion Council, Ministry of Urban Development.

Gupta, H.K. 2013. Disaster Management, University Press.

Hyndman,D., Hyndman, D. 2016. Natural Hazards and Disasters, 5th ed, Brooks Cole.

Kapur, A. 2010. Vulnerable India: A Geographical Study of Disasters, Sage.

Keller. E.A., DeVecchio, D.E. 2014. Natural Hazards: Earth's Processes as Hazards, Disasters, and Catastrophes, 4th ed, Routledge.

Pine, J.C. 2014. Hazards Analysis: Reducing the Impact of Disasters, 2nd ed, CRC Press.

Robbins, P., Hintz, J., Moore, S.A. 2014. Environment and Society: A Critical Introduction 2nd ed, Wiley.

Smith, K. 2013. Environmental Hazards: Assessing Risk and Reducing Disaster, 6th ed, Routledge.

WEBSITES:

AGU landslide Blog: blogs.agu.org/landslideblog

Dartmouth Flood Observatory:floodobservatory.colorado.edu

Disaster News Network: secure.disasternews.net

India Meteorological Department Cyclone Page: www.rsmcnewdelhi.imd.gov.in/index.php?lang=en

USGS Earthquake Hazards Programme: www.earthquake.usgs.gov

GEOM-DSCC-11-P – Hazard ManagementReport✧25 Marks / 1 Credit

A Group Project Report is to be prepared and submitted based on any one case study among the following hazards from India, incorporating a preparedness plan:

1. Earthquake
2. Landslide
3. Land subsidence
4. Thunderstorm
5. Tropical Cyclone
6. Flood
7. Riverbank / Coastal erosion
8. Fire
9. Industrial accident
10. Road / Railway accident
11. Structural collapse
12. Environmental pollution
13. Biohazard

One case study will be done by a group of five to ten students. Different groups may choose different case studies from any one or different types of disasters. The report should be prepared on secondary data and handwritten on A4 page in candidates' own words not exceeding 2,000 words excluding references. The report should contain a proper title. The report should incorporate relevant tables, maps, diagrams, and references, not exceeding ten pages. Photographs are optional and should not exceed three. A copy of the stapled / spiral-bound report in a transparent cover, duly signed by the concerned teacher, is to be submitted during examination. Without the report the candidates will not be evaluated for GEOM-DSCC-11-P.

Marks division: 20 on report + 5 on viva-voce = 25

GEOM-DSCC-12-Th – Thematic Mapping and Surveying ✧75 Marks / 3 Credits

1. Concepts of rounding, scientific notation.Logarithm and anti-logarithm.Natural and log scales. [4]
2. Preparation and interpretation of geological maps [5]
3. Preparation and interpretation land use land cover maps [5]
4. Preparation and interpretation of socio-economic maps [5]
5. Principal national agencies producing thematic maps in India: NATMO, GSI, NBSSLUP, NHO, and NRSC / Bhuvan [5]
6. Basic concepts of surveying and survey equipment: Prismatic compass [5]
7. Basic concepts of surveying and survey equipment: Dumpy level [7]
8. Basic concepts of surveying and survey equipment: Theodolite [7]
9. Basic concepts of surveying and survey equipment: Abney level [5]
10. Basic concepts of surveying and survey equipment:Total Station& Echosounder[5]

References

BOOKS:

Basak, N.N. 2017. Surveying and Levelling, 2nd ed, McGraw Hill Education.

Kanetkar, T.P., Kulkatni, S.V. 1988. Surveying and Levelling, Part I, Pune Vidyarthi Griha Prakashan.

Monkhouse, F.J., Wilkinson, H.R. 1971. Maps and Diagrams: Their Compilation and Construction, 3rd ed (2017 reprint), Alphaneumera-Kolkata.

Robinson, A.H., Morrison, J.L., Phillip, C.M., Kimerling, A.J., Guptill, S.C. 1995. Elements of Cartography, 6th ed, Wiley.

Sarkar, A. 2015. Practical Geography: A Systematic Approach, 3rd ed, Orient Blackswan Private Ltd.

Singh, R.L., Singh, R.P.B. 2008. Elements of Practical Geography, Kalyani Publishers.

Subramanian, R. 2012. Surveying and Levelling, 2nd ed, Oxford University Press

WEBSITES:

Geological Survey of India: www.gsi.gov.in

Indian Naval Hydrographic Department: www.hydrobharat.nic.in

National Bureau of Soil Survey and Land Use planning: www.nbsslup.in

Survey of India: www.surveyofindia.gov.in

ISRO Bhuvan 2D Platform: bhuvan.nrsc.gov.in/map/bhuvan/bhuvan2d.php

National Remote Sensing Centre: www.nrsc.gov.in

GEOM-DSCC-12-P – Thematic Mapping and Surveying 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. Traverse survey using prismatic compass [8]
2. Profile survey using dumpy level [8]
3. Profile survey using Abneylevel[4]
4. Height determination of base accessible and inaccessible objects by theodolite (same vertical plane method) [10]
5. Viva-voce based on laboratory notebook (5 Marks)

References

Basak, N.N. 2017. Surveying and Levelling, 2nd ed, McGraw Hill Education.

Bolton. T. 2009 (reprint). Geological Maps: Their Solution and Interpretation, Cambridge University Press.

Kanetkar, T.P., Kulkatni, S.V. 1988. Surveying and Levelling, Part I, Pune Vidyarthi Griha Prakashan.

Monkhouse, F.J., Wilkinson, H.R. 1971. Maps and Diagrams: Their Compilation and Construction, 3rd ed (2017 reprint), Alphaneumera-Kolkata.

Robinson, A.H., Morrison, J.L., Phillip, C.M., Kimerling, A.J., Guptill, S.C. 1995. Elements of Cartography, 6th ed, Wiley.

Sarkar, A. 2015. Practical Geography: A Systematic Approach, 3rd ed, Orient Blackswan Private Ltd.

Singh, R.L., Singh, R.P.B. 2008. Elements of Practical Geography, Kalyani Publishers.

Subramanian, R. 2012. Surveying and Levelling, 2nd ed, Oxford University Press

SEMESTER –6 (for MAJOR& MD)

GEOM-DSCC-13-Th – Soil and Biogeography✧75 Marks / 3 Credits

Unit I: Soil Geography

1. Definition and significance of soil properties: Texture, structure, and moisture [5]
2. Definition and significance of soil properties: pH, organic matter, and NPK [5]
3. Origin and profile characteristics of lateritic, podsol and chernozem soils [6]
4. Principles of soil classification: Genetic and USDA. Concept of land capability and its classification [6]
5. Soil erosion and degradation: Factors, processes and management measures. Humans as active agents of soil transformation [5]

Unit II: Biogeography

6. Concepts of biosphere, ecosystem, biome, ecotone, community and ecology [5]
7. Concepts of trophic structure, food chain and food web. Energy flow in ecosystems [5]
8. Classification of world biomes (Whittaker). Geographical extent and characteristics of tropical rain forest,savanna, hot desert, taigaand coral reef biomes [8]
9. Bio-geochemical cycles with special reference to carbon dioxide and nitrogen [4]
10. Deforestation: Causes, consequences and management [4]

References

Chapman J.L., Reiz, M.J. 1993. Ecology: Principle and Applications, Cambridge University Press.

Chiras, D.D., Reganold, J.P. 2009. Natural Resource Conservation: Management for a Sustainable Future, 10th ed, Pearson.

Cox, B., Moore, P.D., Ladle, R. 2016. Biogeography: An Ecological and Evolutionary Approach, 9th ed, Wiley-Blackwell.

Daji, J.A., Kadam, J.R., Patil, N.D. 1996. A Textbook of Soil Science, Media Promoters and Publishers.

Dash, M.C., 2001. Fundamental of Ecology, 2nd edition, Tata McGrawHill, New Delhi

Dey, N. K., Ghosh. P. 1993. India: A Study in Soil Geography, Sribhumi Publishing Company.

Franzmeier, D.P., McFee, W.W., Graveel, J.G., Kohnke, H. 2016. Soil Science Simplified, 5th ed, Waveland Press.

Huggett, R. 1998. Fundamentals of Biogeography, Routledge, London:

Lomolino, M.V., Riddle, B.R., Whittaker, R.J. 2016. Biogeography, 5th ed, Oxford University Press.

MacDonald, G.2001. Biogeography: Introduction to Space, Time, and Life, Wiley

Morgan, R.P.C. 1995. Soil Erosion and Conservation, 2nd edition, Longman.

Santra. A. 2006. Handbook on Wild and Zoo Animals, International Book Distributing Co.

Sharma, P.D. 2011. Ecology and Environment, Rastogi Publications.

Singer, M., Munns, D.N. 2005. Soils: An Introduction, 6th ed, Pearson.

Weil, R.R. and Brady, N.C. 2016. The Nature and Properties of Soil, 15th edition, Pearson.

White, R. 2006. Principles and Practice of Soil Science: The Soil as a Natural Resource, Blackwell.

Whittaker, R.H. 1975. Communities and Ecosystems, MacMillan.

GEOM-DSCC-13-P – Soil and BiogeographyLab✧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. Determination of soilpHand NPKusing field kit [8]
2. Determination of soil type by ternary diagram textural plotting [7]
3. Plant species diversity determination by matrix method [8]
4. Time series analysis of biogeography data[7]
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-Kolkata.

Stohlgren, T.J. 2007. Measuring Plant Diversity: Lessons from the Field. Oxford University Press.

USDA: United States Department of Agriculture. 2014. Soil Survey and Laboratory Methods Manual, Soil Survey Investigations Report No. 51.

Walters,M., Scholes, R.J. (Eds.) 2017. The GEO Handbook on Biodiversity Observation Networks, Springer International Publishing.

Xiao, M. 2009. Soil Testing Laboratory Manual, Bent Tree Press.

GEOM-DSCC-14/MGEO-CC-8-Th – India and West Bengal✧75 Marks / 3 Credits

Unit I: India

1. Physiographic divisions with reference to tectonic provinces [4]
2. Climate, soil and vegetation regions [6]
3. Green revolution (Phases I and II), white revolution, and their impacts [4]
4. Industrial development: Automobile andinformation technology sectors[4]
5. Regionalisation of India: Basis of classification with reference to economic regions (P. Sengupta) [4]

Unit II: West Bengal

6. Physiographic divisions: Tectonic and geomorphic evolution [4]
7. Drainage system. Water resources and issues related to them[5]
8. Changing pattern of industrialisation in West Bengal. Development of SEZs [4]
9. Population: Growth, distribution, migration, and human development[4]
10. DarjilingHimalaya as a physiographic region, Sundarbanas an ecological region, and Haldia as an industrial region[6]

References

BOOKS

Bandyopadhyay, S., Kar, N.S., Das, S., Sen, J. 2014. River system and water resources of West Bengal: A Review. In: Vaidyanadhan, R. (Ed) Rejuvenation of Surface Water Resources of India: Potential, Problems and Prospects, Geological Society of India Special Publication.

Chand, M. and Puri, V.K. 2013 (*reprint*) Regional Planning in India, Allied Publishers.

Johnson, B.L.C. (Ed) 2001. Geographical Dictionary of India, Vision Books.

Khullar, D.R. 2011. India: A Comprehensive Geography, Kalyani Publishers

Rudra, K. 2018. Rivers of the Ganga-Brahmaputra-Meghna Delta: A Fluvial Account of Bengal, Springer.

Sharma, T.C. 2012. Economic Geography of India, Rawat Publications.

Singh, J. 2003. India-A Comprehensive & Systematic Geography, Gyanodaya Prakashan.

Singh, R.L. 1971. India: A Regional Geography, National Geographical Society of India.

Spate, O.H.K., Learmonth, A.T.A. 1967. India and Pakistan: A General and Regional Geography, Methuen.

Tiwari, R.C. 2007. Geography of India, Prayag Pustak Bhawan.

Valdiya, K.S. 2010. The Making of India: Geodynamic Evolution, Macmillan Pubishers India Ltd.

Wadia. D.N. 1926. Geology of India, Macmillan and Co. Ltd.

WBPCB. 2021. West Bengal State of Environment, Vol I and II

WEBSITES

Geological Survey of India: gsi.gov.in

National Bureau of Soil Survey and Land Use Planning: nbsslup.in

Indian Council of Agricultural Research: icar.org.in

Census of India: censusindia.gov.in / censusindia.gov.in/2011census/dchb/WBA.html

GEOM-DSCC-14/MGEO-CC-8-P –India and West Bengal 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. Monthly temperature and rainfall graphs of five select stations from different physiographic regions of India[8]
2. Graphical representation of annual trends of production: Manufacturing goods over any two decades from India or West Bengal [8]
3. Preparation of composite index (Kendall's Method): Comparison of developed and less-developed states of India[7]
4. Change in mean centre of population of West Bengal over any three census years[7]
5. Viva-voce based on laboratory notebook (5 marks)

References

BOOKS:

Datt, R. and Sundharam, K.P.M. 2015. Indian Economy, 50th ed,S. Chand.

Khullar, D.R. 2011. India: A Comprehensive Geography, Kalyani Publishers.

Government of West Bengal. District Statistical Handbooks (e.g. bardhaman.nic.in/dshb05.pdf)

Mahmood, A. 1977. Statistical Methods in Geographical Studies, Rajesh Publications.

WEBSITES:

Census of India:

India Meteorological Department: www.imd.gov.in

ISRO Bhuvan 2D Platforms: bhuvan.nrsc.gov.in/map/bhuvan/bhuvan2d.php

Open Government of India Data Platform: data.gov.in

Planning Commission (West Bengal Development Report 2010):planningcommission.nic.in/plans/stateplan/sdr/sdr_wb1909.pdf

Trending Economics (India's industrial production): tradingeconomics.com/india/industrial-production

UNDP Human Development Report on India (2016):

hdr.undp.org/en/countries/profiles/IND

hdr.undp.org/sites/all/themes/hdr_theme/country-notes/IND.pdf

Wikipedia (hierarchy of states):en.wikipedia.org/wiki/List_of_Indian_states_and_union_territories_by_GDP_per_capita

GEOM-DSCC15-Th – Remote Sensing, GIS, and GNSS✧75 Marks / 3 Credits

Unit I: Remote Sensing

1. Principles of Remote Sensing (RS): Types of RS satellites and sensors[5]
2. Sensor resolutions and their applications with reference to IRS and Landsat missions [4]
3. Image referencing schemes and acquisition procedure of free geospatial data from NRSC / Bhuvan and USGS [3]
4. Preparation of standard and other types of False Colour Composites from IRS LISS-3 and Landsat TM / OLI data[5]
5. Principles of image interpretation. Preparation of inventories of landuse land cover (LULC) features from satellite images [6]

Unit II: Geographical Information Systems and Global Navigation Satellite System

6. GIS data structures types: Spatial and non-spatial, raster and vector [5]
7. Principles of preparing attribute tables, data manipulation, and query [6]
8. Principles and significance of buffer preparation [2]
9. Principles and significance of overlay analysis [4]

Unit III: Global Navigation Satellite System (GNSS)

10. Principles of GNSS positioning and waypoint collection [5]

References

BOOKS:

Bhatta, B. 2011. Global Navigation Satellite Systems: Insights into GPS, GLONASS, Galileo, Compass and Others, CRC Press.

Bhatta, B. 2020. Remote Sensing and GIS, 3rd ed, Oxford Univ. Press.

Bolstad, P. 2016. GIS Fundamentals: A First Text on Geographic Information Systems, 5th ed, XanEdu Publishing.

Brewer, C.A. 2015. Designing Better Maps: A Guide for GIS Users, 2nd ed, Esri Press.

Harvey, F. 2015. A Primer of GIS: Fundamental Geographic and Cartographic Concepts, 2nd ed, The Guilford Press.

Jensen, J.R., 2013. Remote Sensing of the Environment: An Earth Resource Perspective, Pearson Education India.

Joseph, G. and Jegannathan, C. 2018. Fundamentals of Remote Sensing, 3rd ed, Universities Press.

Lillesand, T.M., Kiefer, R.W., Chipman, J.W. 2015. Remote Sensing and Image Interpretation, 7th ed, Wiley.

Indian Space Research Organisation. 2017. Effective Use of Space Technology.

Sarkar, A. 2015. Practical Geography: A Systematic Approach. 2nd ed, Orient Black Swan Private Ltd.

WEBSITES:

ALOS Global Digital Surface Model: www.eorc.jaxa.jp/ALOS/en/aw3d30/index.htm

International Society for Photogrammetry and Remote Sensing: www.isprs.org

ISRO Bhuvan 2D and 3D Platforms: bhuvan.nrsc.gov.in/map/bhuvan/bhuvan2d.php
bhuvan.nrsc.gov.in/globe/3d.php#

NASA Landsat Science: www.landsat.gsfc.nasa.gov

National Remote Sensing Centre: www.nrsc.gov.in

USGS Global Visualization Viewer: www.glovis.usgs.gov

GEOM-DSCC-15-P – Remote Sensing, GIS, and GNSSLab✧25 Marks / 1 Credit

An A4- or letter-size laboratory notebook, comprising class assignments of the following is to be prepared and submitted. The exercises are to be represented as computer prints from Q-GIS / Garmin Basecamp / MS Excel software as applicable.Methods and interpretations are to be handwritten.

1. Image georeferencing and enhancement. Preparation of spectral reflectance libraries of LULC features across different image bands of IRS L3 or Landsat OLI data [8]
2. Supervised image classification, class editing, and post-classification analysis [8]
3. Digitisation of features and administrative boundaries. Data attachment, vector overlay, and preparation of annotated thematic maps [8]
4. Waypoint collection from GNSS receivers, exporting to GIS databaseand plotting [6]
5. Viva-voce based on laboratory notebook (5 Marks)

References

BOOKS:

Bhatta, B. 2011. Global Navigation Satellite Systems: Insights into GPS, GLONASS, Galileo, Compass and Others, CRC Press.

Bhatta, B. 2020. Remote Sensing and GIS, 3rd ed, Oxford Univ. Press.

Bolstad, P. 2016. GIS Fundamentals: A First Text on Geographic Information Systems, 5th ed, XanEdu Publishing.

Brewer, C.A. 2015. Designing Better Maps: A Guide for GIS Users, 2nd ed, Esri Press.

Chang, K-t. 2015. Introduction to Geographical Information System, McGraw-Hill Education.

Harvey, F. 2015. A Primer of GIS: Fundamental Geographic and Cartographic Concepts, 2nd ed, The Guilford Press.

Jensen, J.R., 2013. Remote Sensing of the Environment: An Earth Resource Perspective, Pearson Education India.

Joseph, G. and Jegannathan, C. 2018. Fundamentals of Remote Sensing, 3rd ed, Universities Press.

Lillesand, T.M., Kiefer, R.W., Chipman, J.W., 2015. Remote Sensing and Image Interpretation, 7th ed, Wiley.

Sarkar, A. 2015. Practical Geography: A Systematic Approach. 2nd ed, Orient Black Swan Private Ltd.

WEBSITES:

Garmin: support.garmin.com/en-US/?productID=52801&tab=manuals

International Society for Photogrammetry and Remote Sensing: www.isprs.org

ISRO Bhuvan 2D and 3D Platforms: bhuvan.nrsc.gov.in/map/bhuvan/bhuvan2d.php
bhuvan.nrsc.gov.in/globe/3d.php#

NASA Landsat Science: www.landsat.gsfc.nasa.gov

National Remote Sensing Centre: www.nrsc.gov.in

Q-GIS: qgis.org/en/site/forusers/index.html

USGS Global Visualization Viewer: www.glovis.usgs.gov

SEMESTER –7 (for MAJOR)

GEOM-DSCC-16-Th – Philosophy of Geography ✧ 75 Marks / 3 Credits

Unit I: Nature of Geography

1. Development of Ancient Geography: Contributions of Greek, Roman, and Indian geographers [5]
2. Development of Medieval Geography: European and Arab geographers [5]
3. Contributions of Bernard Varenius and Immanuel Kant [4]
4. Contributions of Humboldt and Ritter[2]
5. Contributions of Richthofen, Ratzel, Hettner, Vidal de la Blaché, Hartshorne [5]
6. Dualism and Dichotomies: General vs. Particular; Physical vs. Human; Regional (Ideographic) vs. Systematic (Nomothetic); Determinism vs. Possibilism [5]

Unit II: Geography in the 20th Century

7. Trends of geography in the post-World War-II period: Positivism, Hartshorne-Schaefer debate, quantitative revolution [6]
8. Philosophical basis of radicalism: Historical and dialectical materialism, structuralism [5]
9. Behavioural, humanistic and critical approaches in Geography [7]
10. Concept of space; absolute, relative and relational with special reference to Lefebvre [6]

References

Adhikari, S. 2015. Fundamentals of Geographical Thought, Orient Blackswan.

Clifford, N. Holloway S.L., Rice, S.P., Valentine, G. 2009. Key Concepts in Geography, 2nd ed, Sage.

Couper, P. 2015. A Student's Introduction to Geographical Thought: Theories, Philosophies, Methodologies, Sage.

Cresswell, T. 2013. Geographic Thought: A Critical Introduction, Wiley-Blackwell.

Dickinson, R.E. 2015. The Makers of Modern Geography, Routledge

Dikshit, R.D. 2004. Geographical Thought: A Contextual History of Ideas, Prentice Hall India.

Holt-Jensen, A. 2018. Geography: History and Concepts: A Student's Guide, 5th ed, Sage.

Husain, M. 2015. Evolution of Geographical Thought, 6th ed, Rawat Publications.

Gregory, D., Johnston, R., Pratt, G., Watts, M., Whatmore, S. (Eds) 2009. The Dictionary of Human Geography, 5th ed, Wiley.

Jeffrey A. and Nayek, A. 2013. Geographical Thought: An Introduction to Ideas in Human Geography, Routledge.

Johnston, R. and Sidaway, J.D. 2015 Geography and Geographers: Anglo-American Human Geography since 1945, 7th ed, Routledge.

Peet, P. 1998. Modern Geographical Thought, Wiley-Blackwell.

GEOM-DSCC-16-P – Philosophy of GeographyLab✧25 Marks / 1 Credit

An A3- or tabloid-size laboratory notebook, comprising class assignments of topics 1, 2, and 4 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. Posters related to topic 3 should be of 59.4 x 84.1 cm size (A1), approximately. Technique of preparing the posters can be manual, digital or blended. They should carry signatures of teacher(s) responsible for supervising their preparation.

1. Changing perception of maps of the world: Ptolemy and Mercator [5]
2. Mapping voyages: Columbus, Vasco da Gama, Magellan, and James Cook [5]
3. Group Presentation of five to tenstudents on any selected paradigm in geographical thought by using poster [10]
4. A Book Review within 1000 words [Select from Couper / Dickinson / Johnston-Sidaway [10]
5. Viva-voce based on laboratory notebook (5 marks)

References

Black, J. 2003. Visions of the World: A History of Maps, Mitchell Beazley.

Couper, P. 2015. A Student's Introduction to Geographical Thought: Theories, Philosophies, Methodologies, Sage.

Holt-Jensen, A. 2011. Geography: History and Concepts: A Student's Guide, Sage.

Whitfield, P. 2017. Charting the Oceans, British Library.

GEOM-DSCC-17-Th– ResourceGeography ✧75 Marks / 3 Credits

Unit I: Resource and Development

1. Natural resources: Concept, significance and classification [4]
2. Approaches to resource utilization: Utilitarian, conservational, community based and adaptive [5]
3. Crisis of resource availability: Global scenario of forest and water [4]
4. An overview on conservation of forest and water resources [4]

Unit II: Resource Conflict and Management

5. Agricultural resource conflicts: issues of productivity of species / genetically modified crops [5]
6. Distribution, utilisation, problems and management of metallic mineral resources: Iron ore, bauxite, and copper [5]
7. Distribution, utilisation, problems and management of non-metallic mineral resources: Limestone, mica, gypsum [5]
8. Distribution, utilisation, problems and management of energy resources: Conventional and non-conventional [4]
9. Significance of human resource: Issues related to capability development [4]
10. Limits to growth and sustainable use of resources with reference to relevant sustainable development goals [5]

References

Chiras, D.D., Reganold, J.P. 2009. Natural Resource Conservation: Management for a Sustainable Future, 10th ed, Pearson.

Cutter, S.N., Renwich, H.L., Renwick, W. 1991. Exploitation, Conservation, and Preservation: A Geographical Perspective on Natural Resources Use, John Wiley and Sons.

Gadgil, M., Guha, R. 2005. The Use and Abuse of Nature: Incorporating This Fissured Land: An Ecological History of India and Ecology and Equity, Oxford University Press.

Gregory, D., Johnston, R., Pratt, G., Watts, M., Whatmore, S. (Eds) 2009. The Dictionary of Human Geography, 5th ed, Wiley.

Holechek, J.L.C., Richard, A., Fisher, J.T., Valdez, R. 2003. Natural Resources: Ecology, Economics and Policy, Prentice Hall.

Jones, G., Hollier, G. 1997. Resources, Society and Environmental Management, Paul Chapman.

Klee, G. 1991. Conservation of Natural Resources, Prentice Hall.

Mather, A.S., Chapman, K. 1995. Environmental Resources, John Wiley and Sons.

Mitchell, B. 1997. Resource and Environmental Management, Longman Harlow.

Owen, S., Owen, P.L. 1991. Environment, Resources and Conservation, Cambridge University Press.

Rees, J. 1990. Natural Resources: Allocation, Economics and Policy, Routledge.

GEOM-DSCC-17-P– ResourceGeography 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. Mapping and area estimate of changes in forest cover from maps and/or satellite images [8]
2. Mapping and number estimate of changes in water bodies from maps and/or satellite images[8]
3. Crop combination: Comparison of any two contrasting districts from West Bengal using Weavers Method [8]
4. Graphical representation of decadal changes in state-wise production of coal and iron ore [6]
5. Viva-voce based on laboratory notebook (5 Marks)

References

Books:

Bhatta, B. 2020. Remote Sensing and GIS, 3rd ed, Oxford Univ. Press

Datta, R., Sundharam, K.P.M. 2015.Indian Economy, Chand.

Fukuda-Parr, S., Kumar, S.A.K. 2005. Readings in Human Development, Oxford University Press.

Khullar, D.R. 2011. India: A Comprehensive Geography, Kalyani Publishers

Lillesand, T.M., Kiefer, R.W., Chipman, J.W., 2015. Remote Sensing and Image Interpretation, 7th ed, Wiley.

Monkhouse, F.J., Wilkinson, H.R. 1971. Maps and Diagrams: Their Compilation and Construction, 3rd ed (2017 reprint), Alphaneumera-Kolkata.

Websites:

Open Government of India Data Platform: data.gov.in

Wikipedia (hierarchy of states):en.wikipedia.org/wiki/List_of_Indian_states_and_union_territories_by_GDP_per_capita

GEOM-DSCC-18-Th – Environmental Issues in Geography ✧ 75 Marks / 3 Credits

1. Geographers' approach to environmental studies [5]
2. Concept of holistic environment and systems approach [5]
3. Ecosystems and their relation with habitats [5]
4. Wetland ecosystem with special reference to East Kolkata Wetlands[5]
5. Rural environmental issues: Special reference to sanitation and public health [6]
6. Urban environmental issues with special reference to waste management [4]
7. Environmental policies – Club of Rome, earth summits (special reference to Stockholm, Rio, Johannesburg)[5]
8. Conference of the Parties: Global initiatives for environmental management (special reference to Montreal, Kyoto, Paris agreement) [5]
9. Environmental Impact Assessment and Environmental Management Planning [5]
10. Overview of principal environment-related regulations of India. Review of their achievements [5]

References

BOOKS:

Basu, R., Bhaduri, S. (Eds) 2007. Contemporary Issues and Techniques in Geography, Progressive Publishers.

Chandna, R.C. 2002. Environmental Geography, Kalyani Press.

Chapman, J.L., Reiz, M.J. 1993. Ecology: Principle and Applications, Cambridge University Press.

Cunninghum, W.P., Cunninghum, M.A. 2004. Principals of Environmental Science: Inquiry and Applications, Tata Macgraw Hill.

Goudie, A. 2001. 2013. The Human Impact on the Natural Environment: Past, Present, and Future, 7th ed, Wiley-Blackwell.

Gilpin, A., 1994. Environmental Impact Assessment: Cutting Edge for the 21st Century, Cambridge University Press.

Miller, G.T. 2004. Environmental Science: Working with the Earth, Thomson Brooks.

Odum, E.P.,Barrett, G.W. 2005. Fundamentals of Ecology, Ceneage Learning.

Raven, P.H., Hassenzahl, D.M., Hager, M.C., Gift, N.Y., Berg, L.R. 2015. Environment, 9th ed, Wiley.

Sharma, P.D. 2011. Ecology and Environment, Rastogi Publications.

Singh, S. 2013. Environmental Geography, Prayag Pustak Bhawan.

Withgott, J.H., Laposata, M. 2017. Environment: The Science behind the Stories, 6th ed, Pearson.

WEBSITES:

BBC – Science & Environment: www.bbc.com/news/science_and_environment

Central Pollution Control Board: www.wbpcb.gov.in

Centre for Science and Environment: www.cseindia.org

Ministry of Environment, Forest and Climate Change: www.envfor.nic.in

The Energy and Resources Institute: www.teriin.org

The World Bank – Environment: www.worldbank.org/en/topic/environment

United Nations Environment Programme: www.unenvironment.org

United Nations Conference of Parties: https://unfccc.int/process/bodies/supreme-bodies/conference-of-the-parties-cop

West Bengal Pollution Control Board: www.cpcb.nic.in

GEOM-DSCC-18-P– Environmental Issues in GeographyLab✧25 Marks / 1 Credit

An A4- or letter-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. Preparation of questionnaire for perception survey on environmental problems[8]
2. Preparation of check-list for Environmental Impact Assessment for urban / industrial development projects [15]
3. Quality assessment of water using portable tester: pH, salinity, and hardness [15]
4. Interpretation of changes in air quality using multi-seasonal and multi-city or multi locational (within a single city) CPCB / WBPCB data[15]
5. Laboratory notebook and viva voce (10 marks)

References

BOOKS:

Clifford, N., Cope, M., Gillespie,.T.W., French, S. (Eds) 2016. Key Methods in Geography, 3rd ed, Sage

Gilpin, A., 1994. Environmental Impact Assessment: Cutting Edge for the 21st Century, Cambridge University Press.

Northey, N., Draper, D., Knight, D.B. 2015. Making Sense in Geography and Environmental Sciences: A Student's Guide to Research and Writing, 6th ed, Oxford University Press.

WEBSITES:

Central Pollution Control Board: www.wbpcb.gov.in

West Bengal Pollution Control Board: www.cpcb.nic.in

GEOM-DSCC-19-Th – Statistical Methods in Geography✧75 Marks / 3 Credits

Unit I: Frequency Distribution and Sampling

1. Discrete and continuous data, population and samples, scales of measurement (nominal, ordinal, interval and ratio) [4]
2. Collection of data and preparation of statistical tables[4]
3. Sampling: Need, types, significance, and methods of random sampling[4]
4. Theoretical distribution: Frequency, cumulative frequency, normal, and probability [5]

Unit II: Numerical Data Analysis

5. Central tendency: Mean, median, mode, and partition values [4]
6. Measures of dispersion range, mean deviation, standard deviation, and coefficient of variation [6]
7. Association and correlation: Product moment correlation and rank correlation[6]
8. Regression: Linear and non-linear, residual maps[4]
9. Time series analysis [4]
10. Hypothesis testing: Chi-square test and T-test [4]

References

Acevedo, M.F. 2012. Data Analysis and Statistics for Geography, Environmental Science and Engineering, CRC Press.

Harris, R., Jarvis, C. 2011. Statistics for Geography and Environmental Science, Prentice Hall.

McGrew Jr., J.C., Lembo Jr., A.J.,Monroe, C.B. 2014. An Introduction to Statistical Problem Solving in Geography, 3rd ed, Waveland Press.

Pal S. K., 1998. Statistics for Geoscientists: Techniques and Applications, Concept Pub Co.

Rogerson, P.A. 2015. Statistical Methods for Geography: A Student's Guide, 4th ed, Sage.

Sarkar, A. 2015. Practical Geography: A Systematic Approach, 3rd ed, Orient Blackswan.

GEOM-DSCC-19-P – Statistical Methods in GeographyLab✧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. Construction of data matrix with each row representing an area unit (districts / blocks / *mouzas* / towns) and corresponding columns of relevant attributes [8]
2. Based on the above, a frequency table, measures of central tendency, and dispersion would be computed and interpreted using histogram and frequency curve [7]
3. From the data matrix, a sample set (20%) would be drawn using random, systematic, and stratified methods of sampling and the samples would be located on a map with an explanation of the methods used [8]

4. Based on the sample set and using two relevant attributes, a scatter diagram and linear regression line would be plotted and residual from regression would be mapped with a short interpretation [7]
5. Viva-voce based on laboratory notebook (5 Marks)

References

Books:

Acevedo, M.F. 2012. Data Analysis and Statistics for Geography, Environmental Science and Engineering, CRC Press.

Harris, R., Jarvis, C. 2011. Statistics for Geography and Environmental Science, Prentice Hall.

McGrew Jr., J.C., Lembo Jr., A.J.,Monroe, C.B. 2014. An Introduction to Statistical Problem Solving in Geography, 3rd ed, Waveland Press.

Pal, S. K., 1998. Statistics for Geoscientists: Techniques and Applications, Concept Pub Co.

Rogerson, P.A. 2015. Statistical Methods for Geography: A Student's Guide, 4th ed, Sage.

Sarkar, A. 2015. Practical Geography: A Systematic Approach, 3rd ed, Orient Blackswan.

Websites:

Open Government of India Data Platform: data.gov.in

Census of India: censusindia.gov.in

GEOM-DSCC20-Th – Regional Development and Planning ✧ 75 Marks / 3 Credits

Unit I: Regional Development

1. Regions: Concept, types, and delineation [4]
2. Concepts of growth and development. Indicators of development: Economic, demographic and environmental [4]
3. Theories and models for regional development: Cumulative causation (Myrdal), stages of development (Rostow) and growth pole model (Perroux) [6]
4. Underdevelopment: Concept and causes [2]
5. Regional disparities in India: Economic and social [4]

Unit I: Regional Planning

6. Regional planning: Principles and objectives [4]
7. Approaches to regional planning: Sectoral and spatial planning, centralised planning [6]
8. Decentralisation and multi-level planning in India (73rd and 74th amendments) [8]
9. Planning Issues in hill area (formal region) and city region (functional region) [4]
10. Planning strategies: Participatory planning and governance [5]

References

Bhargava, G. 2001. Development of India's Urban, Rural, and Regional Planning in 21st Century: Policy Perspective, Gyan Publishing House.

Chand, M., Puri, V.K. 2000. Regional Planning In India, Allied Publishers Ltd.

Chandana, R.C. 2016. Regional Planning and Development, 6th ed, Kalyani Publishers.

Glasson, J. 2017. Contemporary Issues in Regional Planning, Routledge.

Gore, C. 2011. Regions in Question: Space, Development Theory, and Regional Policy, Routledge.

Gregory, D., Johnston, R., Pratt, G., Watts, M., Whatmore, S. (Eds) 2009. The Dictionary of Human Geography, 5th ed, Wiley.

Hall, P., Tewdwr-Jones, M. 2010. Urban and Regional Planning, Routledge.

Higgins, B., Savoie, D.J. 2017. Regional Development: Theories and Their Application, Routledge.

Kulshetra, S.K. 2012. Urban and Regional Planning in India: A Handbook for Professional Practioners, Sage Publication.

Kumar, A., Meshram, D.S., Gowda, K. (Eds) 2016. Urban and Regional Planning Education: Learning for India, Springer.

Misra, R.P. 1992. Regional Planning: Concepts, Techniques, Policies and Case Studies, Concept Publishing.

Ray, J. 2001. Introduction to Development & Regional Planning, Orient Blackswan.

Combes P., Mayer T. and Thisse J. F., 2008: Economic Geography: The Integration of Regions and Nations, Princeton University Press.

Wheeler, J.O., Muller, P.O., Thrall, G.I., Fik, T.J. 1998. Economic Geography, 3rd ed, Wiley.

Willington D. E., 2008: Economic Geography, Husband Press.

Wood, A., Roberts, A. 2010. Economic Geography: Places, Networks and Flows, Routledge.

GEOM-DSCC-20-P – Regional Development and PlanningLab✧ 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. Delineation of formal regions by weighted index method [8]
2. Delineation of functional regions by breaking point analysis [8]
3. Measurement of inequality by location quotient [6]
4. Preparation of an interview schedule for any Gram Panchayat member on a relevant development issue [8]
5. Viva-voce based on laboratory notebook (5 Marks)

References

Glasson, J. 2017. Contemporary Issues in Regional Planning, Routledge.

Knowles, R, Wareing,J.1990. Economic and Social Geography, Made Simple Books, Rupa.

Mahmood, A. 1998. Statistical Methods in Geographical Studies, Rajesh Publication.

Monkhouse, F.J., Wilkinson, H.R. 1971. Maps and Diagrams: Their Compilation and Construction, 3rd ed (2017 reprint), Alphaneumera-Kolkata.

SEMESTER –8 [for MAJOR (H &HR)]

GEOM-DSCC-21-Th (H & HR) – Research Methodology -I ✧75 Marks / 3 Credits

Research Methodology: Fundamentals

1. General overview of approaches to geographical research (Physical and Human Geography) mainly Positivist, Systematic and Critical.
2. Perspectives in geographical research and their significance (Descriptive, explorative, explanatory, analytical etc.)
3. Formulation and identification of a research problem
4. Literature review: framing, managing, literary catalogues, other literature sources) types, criteria, nature, characteristics
5. Research objective: Scope &purpose, variables, key concepts, target areas or topic
6. Formulation of the research design: types, stages and functions
7. Making sense of secondary data, sources, utilisation, data handling, representation, and abstraction (disseminating date from open accesses platforms of the Govt. of India)
8. a) Research in Physical Geography: use of instruments for observation and applications: data collection procedure

   b) Research in Human Geography: Questionnaire versus interview schedule, observation, case study, narratives and content analysis: data collection procedure
9. Data analysis: Quantitative versus qualitative research methods
10. Techniques of writing scientific reports: Preparing notes, references, bibliography, abstract, keywords, and sectioning tables and diagrams, placement and footnotes

References

Kothari, C.R. 1985 & 2004. Research Methodology: Methods and Techniques, John Wiley & Sons

Remler, D.K., &Ryzin ,G.G.Van. 2011. Research Methods in Practice, Sage

Kumar, Ranajit. 2014. Research Methodology- A Step-by step Guide for Beginners. Sage

Bryman, Alan.1998. Quantity and Quality in Social Research, Routledge

Clifford, Nichola. & et. Al. 2010. Key Methods in Geography. Sage

Yang, Keming. 2010. Making Sense of Statistical Methods in Social Research, Sage

GEOM-DSCC-21-P (H& HR) – Research Methodology -I Lab ✧25 Marks / 1 Credit

Laboratory note book will have

i. Literature review: based on one or two issues/ topics
ii. Book/article review based on a topic

For the assessment of the practical notebook, marks would be divided

i. Literature review-**10 Marks**
ii. Book / Article review-**10 Marks**
iii. Laboratory notebook (Literature review and Book/Article review may be included in the same laboratory notebook) -Viva-voce-**5 Marks**

iii) Guideline for literature review: Systematic literature review using **PRISMA and Meta-Analysis** (computer based)

Systematic literature review is a method to process identifying, selecting and critically analysing relevant studies on selected research questions. It is different from a traditional or narrative review by its rigor, transparency, and reproducibility. The main features are a) clearly defined research question (review begins with a specific, focused and targeted questions), b) Predefined protocol- structured plan like objectives, search strategy and inclusion and exclusion criteria, c) comprehensive literature search (from Scopus, Web of Science, Google Scholar), d) Explicit inclusion and exclusion criteria (included-peer-reviewed, specific year, region and excluded-irrelevant topic, poor quality studies), e) Transparent and reproducible process, f) Screening and selection process (title screening, abstract screening and full-text review), g) Data extraction (author, year, methods and findings), i) Quality assessment (critical appraisal) j) Evidence based conclusions

Meta- Analysis- refers to a statistical technique used within a systematic review to quantitatively combine results from multiple studies. It is usually conducted as a part of systematic literature review. Its main purposes are to estimate overall effect size, increase statistical power and resolve inconsistencies among studies Research. It provides the stronger evidence, more precise estimate and better generalization of results. A simple step can be followed (Question → Literature Search → Study Selection → Data Extraction → Effect Size Calculation → Statistical Analysis → Interpretation).

PRISMA analysis- (Preferred Reporting Items for Systematic Reviews andMeta-Analyses) a transparent method to track and report how studies are selected in a systematic review. Steps in conducting PRISMA analysis (Define research question, Develop protocol, Conduct systematic search, Record total number of studies, Remove duplicates, Screen titles and abstract, Review full-text articles, Document reasons for exclusion, Finalize included studies, Present results using PRISMA flow diagram. A conceptual example may be-Records identified-500, after duplicates removed- 420, after screening-120, full text reviewed-60, final included studies-30. This analysis is required to improve the quality of research reporting, enhance credibility and acceptance, and it is required by many journals and academic institutions.

iv) Guideline for Book / Article Review

A book or article may be selected by the students as per their interest related to physical and human affairs/ aspects. It should be a fundamental book or topic related best /leading article (preferably foreign books on the topics). That book / article review should be submitted during the examination and a certificate (collected from the respective teacher) should be attached before the contents of this review. The review should not exceed 6 pages. A tentative chapterization for thepreparation of this review is given below

1. Preliminary information (title, author, publisher, edition, number of pages)

2. Understand the purpose (major objectives, issues, themes and purpose)

3.Read the book critically (analysis, key arguments, contents and structure)

4. Summary of the content (brief summary, principal arguments, ideas)

5. Evaluate the book (strengths, weakness, methodology adopted, data & logical consistency)

6 Personal interpretation (reasoned opinion, supportive views with arguments, usefulness)

7.Conclusion (final assessment, relevance in the present context and citation-APA, MLA or Chicago)

GEOM-DSCC-22-Th (H & HR) – Research Methodology -II ✧75 Marks / 3 Credits

Research Methodology: Applications

1. Making sense of the number: unit, rate, ratio, distribution, central tendency, significance test, confidence interval, simple regression using statistical software.
2. Scalar dimension: Measurement of Scale and application in physical and social research: Validity, reliability, Measurement error.
3. Sampling in Geography: Basic types, sampling in practice, accuracy, precision and bias
4. Model in geographical research: Normative and analytical
5. Internet mediated research: Online survey (Google form), Virtual interviews and focus groups (Zoom or Microsoft teams), Big data / Secondary data analysis (online databases, govt portals), Virtual fieldwork tools (RS & GIS platforms), Real-time data access (weather, mobility, environmental monitoring)
6. Computer-aided quantitative and qualitative data analysis (Using NVivo / SPSS or any software for data analysis)
7. Analysis of historical and archival sources (Analytical description of old maps of Kolkata and surroundings using NATMO's publication of set of plates)
8. Application of Remote Sensing and GIS in environmental issues (physical and social)
9. Ethical issues in the research process: plagiarism; types and consequences, digital tools and resources to check plagiarism
10. Compilation and organization of research findings

References

Lillesand, Thomas M. & Kiefer, R.W. 1979. Remote Sensing and Image Interpretation. John Wiley & Sons

Joseph, George. 2003. Fundamentals of Remote Sensing, Universities Press

Field, Andy. 2014. Discovering Statistics Using IBM SPSS Statistics. Sage

Clifford, Nichola. & et. Al. 2010. Key Methods in Geography. Sage

Yang, Keming. 2010. Making Sense of Statistical Methods in Social Research, Sage

Chang, Kang-tsung. 2006. Introduction to Geographic Information Systems. Tata McGraw- Hill

GEOM-DSCC-22-P (H & HR)-Research Methodology -II Lab✧25 Marks / 1 Credit

For the assessment of practical note book, marks would be divided

i) A report on an integrated application of RS, GIS and GNSS for Physical, Social and Environmental Issues-**10 Marks**

(guideline- any issue/ topic can be selected from Physical like- Natural hazards, LULC, water resources, river bank erosion, coaster management, climate and weather, social-urban planning, rural development, poverty, population and health, resource allocation, disaster management (human dimension), Environmental-deforestation and biodiversity loss, community participation in conservation and environmental management, pollution monitoring, climate change, desertification, salinization etc.

Report to be made using the following steps-

Title Page (title of the study, course, semester, institution, name of the supervisor, designation, affiliated organization, date of submission, ii) certificate/ declaration (certificate from the supervisor/ mentor/ company, student's declaration of original work, iii) acknowledgement, iv) contents (list of chapters, sections, tables, maps, figures with page numbers, v) abstract / executive summary (aim and objectives, methods, key findings and conclusion), vi) core chapters (introduction-background of the study, research problem, objectives, significance of the study, review of limitation, summary of previous studies, theoretical/conceptual framework, vii) introducing study area (if any) - location map, features of physical and socio-economic components, viii) data and methodology-types of data, sources, methods of data collection, tools and techniques analysis and ix) interpretation and analysis-data analysis (tables, maps graphs, explanation of patterns and relationships) , results/findings (key outcomes of the study, direct answers to the research objectives), x) discussion- interpretation of results, comparison with earlier studies, xi) conclusion-summary of findings, final remarks, policy recommendation (if any) xii) suggestions/ recommendations-practical suggestions based on findings, xiii) final sections- bibliography/ references (APA/ MLA of Chicago style) xii) appendix (questionnaire, raw data, additional maps, tables).

ii) A report on an application of NVivo / SPSS software to handle Physical, Social and EnvironmentalIssues-**10 Marks**

Topics to be selected for analysis in NVivo software[topic like Social issues (for the analysis of interviews, opinions and perceptions)-poverty and inequality, migration and urbanization, gender issue & empowerment, education quality, health and healthcare access, Environmental issues-climate change impacts, deforestation, pollution (air, water and soil), biodiversity loss, disaster risks, economic and urban issues-unemployment, livelihood patterns, rural development, market behaviour, slum development, transport and traffic issues, smart city planning]

Steps for analysis in NVivo software: Define the research issues, prepare the data (interviews, FGD, documents and reports, audio/video files), import data- upload files into NVivo through- text documents,

audio/video, images, familiarize the date carefully, coding the data (open coding, axial coding, selecting coding), create nodes (themes), run queries (text search query, work frequency query, coding query), visualization (work clouds, three map, concept maps, chart), analyse relationships (like urbanization-pollution and health issues), report writing (themes and sub-themes, supporting codes from data, visual outputs-charts and maps)

Topic to be selected for analysis in SPSS[topic like Social issues (for the analysis of interviews, opinions and perceptions)-poverty and inequality, migration and urbanization, gender issue & empowerment, education quality, health and healthcare access, Environmental issues-climate change impacts, deforestation, pollution (air, water and soil), biodiversity loss, disaster risks, economic and urban issues-unemployment, livelihood patterns, rural development, market behaviour, slum development, transport and traffic issues, smart city planning]

Steps for analysis in SPSS: Define the research issues, design data structure (prepare questionnaire or dataset-variables (age, gender income, pollution types, sources, etc. measurement type-nominal, ordinal and scale), data entry (through variable view and data view) data cleaning (missing value, errors or outliers using frequencies, descriptive statistics), data coding, descriptive statistics (central tendencies, standard deviation, frequency tables), inferential statistics (t-test, Chi-square, Correlation, Regression etc.), data visualization (bar, pie, histogram, box plot, scatter etc), interpretation results, report writing.

[Digital tools and methods to check plagiarism and conduct literature review, ways to upload research finding on relevant sites (may be conducted in collaboration with the librarian of the institute)]

iii) Laboratory note book (both can be combined in a single volume) and Viva voce -**5 Marks**

GEOM-DSCC-23-Th (H) –Population and Welfare Geography ✧75 Marks / 3 Credits

1. Interdisciplinary nature of population geography. Relationship between demography and population studies
2. Factors influencing spatial distribution and density of population
3. Population growth: Global trends and patterns
4. Theories of population growth: Malthus and Marx
5. Population structure and composition: Age and sex specific, occupational and ethnic
6. Determinants and measures of fertility, morbidity and mortality
7. Migration: types, causes and impacts
8. Population policies: Sweden, China, and India
9. Welfare issues: Child labour, unemployment, human trafficking
10. Ageing population: Issues and challenges

References

Barrett, H.R. 1995, Population Geography, Oliver and Boyd.

Binde, N.,Kanitkar, H. 2008, The Principles of Population Studies, Himalaya Publications.

Chandna, R.C. 2022a. Geography of Population Part-1: Concepts, Determinants and World Patterns, Kalyani Publications.

Chandna, R.C. 2022b. Geography of Population Part-2:India – Population and Patterns, Kalyani Publications.

Clerk,J. 1972. Population Geography, Elsevier.

Clerk, J.I. 1965. Population Geography and the Developing countries, Elsevier.

Halen, H.D. & et al., 2025. Population Geography: Social Justice for a Sustainable World, Talor & Francis

Hussain, M. 1994. Population Geography, Vol. 1 & 2, Anmol Publications.

Jones, H. 1990. Population Geography, SLE Pound.

Nag, P., Debnath, G.C. 2021. Population Geography, Bharati Prakashan.

Newbold, K.B. 2017. Population Geography: Tools and Issues, Rowman and Littlefield.

Trewartha, G.T. 1969. A Geography of Population: World Patterns, John Wiley & Sons

Weeks, J.R. 2018. Population: An introduction to Concepts and Issues, Cengage.

William, F.H., 1993. An Introduction to Population Geography, Cambridge University Press.

Wood, R. 1979. Population Analysis in Geography. Longman.

Wood, R. 1982. Theoretical Population Geography. Longman

GEOM-DSCC-23-P (H) – Population and Welfare Geography-Lab ✧25 Marks / 1 Credit

An A4- size laboratory notebook, comprising class assignments of the following is to be prepared and submitted. Census of India data are to be used where applicable. The exercises are to be drawn in pencil with photocopied representation of source materials where necessary. All texts are to be handwritten.

1. Linear and exponential trends of growth rate of population
2. Construction and interpretation of age-sex pyramid: Progressive and regressive
3. Construction and interpretation of choroplethshowing distribution of infant mortality rates
4. Graphical representation and interpretation of spatial distribution of total fertility rate
5. Viva voce based on laboratory notebook (5 marks)

References

Books:

Mahmood, A. 1999. Statistical Methods in Geographical Studies, Rajesh Publisher.

Sarkar, A. 2015. Practical Geography: A Systematic Approach, 3rd ed, Orient Blackswan Private Ltd.

Singh, R.L., Singh, R.P.B. 2008. Elements of Practical Geography, Kalyani Publishers.

Website:

World Bank: www.worldbank.org

GEOM-DSCC-24-Th (H) –Historical and Political Geography ✧75 Marks / 3 Credits

Unit I: Historical Geography

1. Nature, Scope, Content and Approaches of Historical Geography
2. Source materials and travel accounts: Huen Tsang, Ibn-Batuta and Bernier
3. Phases of development: Agricultural (medieval and modern India) and industrial (colonial and independent India)
4. Trade, commerce and transport: Development of gateway cities in colonial India
5. Evolution of Indian societies. Tribes and castes in modern India

Unit I: Political Geography

6. Nature, scope and approaches of Political Geography
7. Concept of core–periphery: Wallerstein's World Systems Theory
8. Concept of nation, nation-states; borders, boundaries, frontiers, buffer-zones and landlocked states. Federalism and regional integration
9. Post-colonialism, end of cold-war, disintegration of Soviet Union and East Europe; shift from bi-polar to multi-polar world
10. Chinese strategy of expansionism: Belt and Road initiative and power struggle in South China Sea

References

BOOKS:

Baker, A.R.H. 2003. Historical Geography: through the Gates of Space and Time, Oxford University Press

Hartshorne, Richard. 1939. The Nature of Geography, Association of American Geographers

Muir, Richard. 1997. Political Geography: A New Introduction, Red Global Press

Menon, Sudha. 2017. Political Geography, Delve Publication

Dixit, Ramesh. 1997. Political Geography: A Contemporary Perspective, Tata Mcgraw- Hill Publishing Company Limited

Johnston, Ron., & Sidaway, James. D. 2016. Geography & Geographers. Routledge

Norton, William. 1984. Elements of Historical Geography, Duxbury Press

Taylor, Peter. J., & Flint., Colin., 2000. The Political Geography of the State, Pearson/ Prentice Hall

WEBSITE:

World Bank: www.worldbank.org

GEOM-DSCC-24-P(H)-Historical and Political Geography -Lab ✧25 Marks / 1 Credit

One case study on historical geography or political geography will be done by a group of five to ten students. The report should be prepared on secondary data and handwritten on A4 page in candidates' own words not exceeding 2000 excluding references. The report should contain a proper title. The report should incorporate relevant tables, maps, diagrams, and references, not exceeding 10 pages. Photographs are optional and should not exceed three. A copy of the stapled / spiral-bound report in a transparent cover, duly signed by the concerned teacher, is to be submitted during examination. Without the report the candidates will not be evaluated for GEOM-DSCC-24-P (H)

Marks division: 20 Marks on report + 5 Marks on viva-voce = 25 Marks

References

BOOKS:

Johnston, Ron., & Sidaway, James. D. 2016. Geography & Geographers. Routledge

Baker, A.R.H. 2003. Historical Geography: through the Gates of Space and Time, Oxford University Press

Hartshorne, Richard. 1939. The Nature of Geography, Association of American Geographers

Muir, Richard. 1997. Political Geography: A New Introduction, Red Global Press

Menon, Sudha. 2017. Political Geography, Delve Publication

Dixit, Ramesh. 1997. Political Geography: A Contemporary Perspective, Tata Mcgraw- Hill Publishing Company Limited

Norton, William. 1984. Elements of Historical Geography, Duxbury Press

Taylor, Peter. J., & Flint., Colin., 2000. The Political Geography of the State, Pearson/ Prentice Hall

WEBSITE:

World Bank: www.worldbank.org

GEOM-DSCC-25-Th & P (H)–Fieldwork (Report) ✧100 Marks / 4 Credits

Every student needs to participate in fieldwork and prepare a field report according to thefollowingguideline,failingwhichhe/shewillnotbeevaluatedforGEOM-DSCC-25-Th & P – Field Report (H)

1. Each student will prepare a report based on primary data collected from field survey andsecondarydatacollectedfromdifferent sources.
2. Students will select either one rural area (*mouza*) or an urban area (municipal ward or borough) forthe study, with the primary objective of evaluating the relation between physical andculturallandscape.
3. A specificissue shouldbeidentifiedbasedonwhich,thestudyareawillbeselected.
4. The report should be typed in English on A4 size paper in candidate's own words (Font: Times New Roman, Normal Margin, Font size 12, spacing 1.5, subheading in bold) within 6000 words giving due weightage to each chapterexcludingtables,photographs,maps,diagrams,referencesandappendices.
5. Photographs (5 pages or in the main structure of the writeup),maps (Mapping of the study area through GIS) anddiagrams using SPSS or Excel shouldnotexceed20pages.
6. A copy of the bound report duly signed by the concerned teachers on maps and diagrams and on the content of report, will be submitteddduringexamination.
7. The pre fieldwork, field work andpost-fieldworkwillinclude:

a. Literature Survey and collection of secondary data.

b. Collection of primary data on physical aspects of the study area.Students should use any or more than one of the survey instruments like Dumpy Level or Auto Level, Prismatic Compass, GPS, AbneyLevel, Clinometer, Altimeterwherevernecessary.

c. Collection of soil samples from different land cover land use regions of the study areafordeterminingpHandNPKvalueswithhelpofasoilkit.

d. Collectionofsocio-economicdata,atthehouseholdlevel(withthehelpofasurvey schedule)intheselectedstudyarea.

e. Plot to plot land use survey for preparation of a land use map, covering whole or partoftheselectedarea.

f. Visittodifferentorganizationsanddepartmentsforcollectionofdata and information.

g. More relevantsurvey inclusive of Education, Health, Housing, Market, Traffic and Transport and other amenities, Law and Order and Governance.

8. TheFieldReportshouldcontainthefollowingsections(a→f).

a. Cover Page, Dummy page, Certificate, Acknowledgement, Content inclusive of List of

Figures, List of Tables, List of Plates, References.

b. Introduction: Study area extent and space relations, reasons for selection of thestudyareaonthebasisofspecialfeature,objectives,methodsofdatacollection,analysesandpresentation,sourcesofinformation, limitationsetc.

c. Physicalaspects:Lithologyandgeologicalstructure,relief,slope,drainage,climate,soil,vegetation,environmentalissues,ground water survey as far applicable.

d. Socio-economicaspects:

i. The students will prepare (i) a chorochromatic land use land cover map on the basis ofplot-to-plot survey; (ii) a profile of suitable length, surveyed and plotted, with differentlanduselandcoversuperimposedonit.

ii. Populationattributes:Number,sexratio,literacy,occupationalstructure,ethnicandreligiouscomposition,language.

iii. Settlement characteristics: Type of houses, Number of houses, building materials, Roof materials, amenities, etc. (internal layout of houses, same case studies).

iv. Occupational Structure: Primary, Secondary and Tertiary.

v. Education: Profile of the academic institutions- facilities, teachers-student ratio

Student survey, educational schemes, problems etc.

vi. Health (Public/ Private Health Centres): Health Profile of Area- Staff Composition, Number of beds, Types of departments and available facilities, No. of patients admitted in last three years etc.

vii. Market Morphology and Survey

viii. Specific area-based surveys as applicable e.g., Traffic and Transport, Tourist, other amenities, Governance-Law and Order etc.

ix. Discussion and Findings: Relation between physical and cultural landscape (Correlation between physical and cultural aspects with application of Statistics- product-moment correlation, rank correlation. Evaluation of problems and prospects.

x. Conclusion: Summary of the key points, implication or significance and recommendation.

xi. Bibliography/ References

e. All sections of the report should contain relevant maps, diagrams and photographs using primary and secondary data, clearly citing sources.

f. All surveys should pertain to the objective of the study. Surveys not relevant for establishing the relation between physical and cultural landscape should be avoided.

**A brief outline of field report could be -

Title Page (title of the study, course, semester, institution, name of the supervisor, designation, affiliated organization, date of submission, ii) certificate/ declaration (certificate from the supervisor/

mentor/ company, student's declaration of original work, iii) acknowledgement, iv) contents (list of chapters, sections, tables, maps, figures with page numbers, v) abstract / executive summary (objectives, methods, key findings and conclusion), vi) core chapters (introduction-background of the study, research problem, objectives, significance of the study, review of literature-summary of previous studies, theoretical/conceptual framework, study area profile- location map, features of all components, Data and methodology-types of data, sources, methods of data collection, tools and techniques, analysis and interpretation-data analysis, results/findings, discussion, suggestions/ recommendations, vii) final sections- bibliography/ references (APA/ MLA of Chicago style) viii) appendix

Marks division: Report – 75 marks (3 Credits) + Viva-voce – 25 Marks (1 Credit) = 100 Mark (4 Credits)

GEOM-DSCC-23-Th & P (HR)– Research Internship ✧100 Marks / 4 Credits

MODALITIES OF **RESEARCH INTERNSHIP** IN GEOGRAPHY
of
4-year Undergraduate Programme (**for the students-Honours with Research**)
Under Curriculum and Credit Framework

Based on National Education Policy, 2020

Overview:

Research internship is a short-term training program where a student works on mainly a research-orientedproject considering the different components or issues related to physical and / or human geography under guidance to learn/ acquire or improve the skill oraptitude for a specific job and for building research capabilities through the understating the field survey, map making techniques, study of different components of geography etc. It may help to develop research skills, practical experience, understand real-world problems, and prepare for higher studies or jobs.

Various types of Research Internship in Geography may be adopted-

a. Field based research internship- survey based observation, it includes- survey, observation and interviews (household, physical problems, rural/ urban studies like soil or river bank erosion, migration issues etc.

b. Laborary-based research internship-conducted in labs or research centers, focuses on soil testing, water quality analysis, climate date analysis etc.

c. GIS, Remote Sensing and GNSS- computer based spatial data collection and analysis, it includes- land use / land cover mapping

d. Secondary Data analysis-based internship- taking the different date from sources like-soil survey bureau, climatic data, census etc.

e. Academic Department/University-based internship- Department specific small research projects

f. Industry/ Applied Research Internship-it should be done from GIS institutes, Planning agencies, Pollution, Census, Pollution Control Board, Survey of India, NATMO, Geological Survey of India, Environmental consultancies etc.

g. NGO/ Development-based Internship- work with NGO on social issues, tourism management, environmental awareness, community development, etc.

h. Government Organization Research Internship- conducted in Departments of Municipal Office, Environment, Welfare etc.

i. Interdisciplinary Research Internship-it combines geography with economic, anthropology, sociology data science, environmental science etc.

Summary Guidelines:

a. Title: Research Internship Assessment through projects (individual research internship is mandatory)
b. Duration: Minimum of 21 days / 80 hours (may be undertaken and completed within three months from the commencement of classes of Semester-8)
c. A minimum of 25 days will be allowed for visit to other institutes for completing the research internship
d. Nature of Research Internship Project: as per the above-mentioned
e. Respective departments/Head of the Departments/ Principals or Faculty Members may directly contact relevant departments, organizations, companies to arrange the research internship for their students.
f. After the completion of the Internship Project, the student will submit a reportalong with all collected documents and a certificate will be issued to student by the Head of the Institute / Department / Supervisor / Laboratory in-charge/ Principal.

Evaluation Process:

A Viva-Voce will be conducted by the department including HoD, Supervisor, Mentor and an external expert (name to be proposed by the College with approval of UGBoS) to assess the report and knowledge gathered by the students.

a) Submission of Report: 75 Marks /3 Credits as per CU guideline (Report will be evaluated by the expert at the time of Viva-voce)

b) Viva voce: 25 marks / 1 Credit (as per CU guidelines)

c) Main components of a research internship report may be

i, Title Page (title of the study, course, semester, institution, name of the supervisor, designation, affiliated organization, date of submission, ii) Certificate/ Declaration (Certificate from the Supervisor/ Mentor/ Company, student's declaration of original work, iii) Acknowledgement, iv) Contents (list of chapters, sections, tables, maps, figures with page numbers, v) Abstract / executive summary (objectives, methods, key findings and conclusion), vi) Core chapters (Introduction-background of the study, research problem, objectives, significance of the study,review of literature-summary of previous studies, theoretical/conceptual framework, study area profile- location map, features of all components, data and methodology-types of data, sources, methods of data collection, tools and

techniques, analysis and interpretation-data analysis, results/findings, discussion, suggestions/ recommendations, final sections- bibliography/ references viii) appendix

GEOM-DSCC-24 & 25-Th (HR)–Field Based Dissertation (Report)✧150 Marks / 6 Credits

*Every student needs to participate in field-based dissertation and prepare a field report according to thefollowingguideline,failingwhichhe/shewillnotbeevaluatedfor**GEOM-DSCC-24 &25-Th & P – Field Based Dissertation (HR)***

Each student will prepare a report based on the selected topic (chosen independently or with help from the supervisor / teacher), based on primary data collected from field survey alongside secondarydatacollectedfromdifferent sources.

1. Students will select a research problem and identify its objectives.
2. Specificfeaturesshouldbeidentifiedbasedonwhich,thestudyareawillbeselected.
3. The report should be typed in English on A4 size paper in candidate's own words (Font: Times New Roman, Normal Margin, Font size 12, spacing 1.5,) within 10000 words giving due weightage to each chapterexcludingtables,photographs,maps,diagrams,referencesandappendices (within 60 pages).
4. Photographs, maps, diagrams, charts and related pictorial informationshouldnot be more than 30pages. That may be prepared with the help of suitable instruments, data, information etc.
5. Conceptual background, literature review, utilization of field instruments, methods, statistical techniques, ethical consideration, preparation of notes, references (APA or MLA or Chicago styles preferably) should be done
6. Qualitative and quantitative research will be implemented in accordance with the discussed contents of Research Methodology-I & II.
7. A final certificate will be issued by the respective teacher or teachers (it is mandatary) and will be submitteduringexamination.
8. The pre-fieldwork, field work andpost-fieldworkwillinclude: Literature Survey and collection of secondary data, Collection of primary data (household, industry, transport, tourists, environmental, social issues etc) / survey instruments will be used as per requirement / samples collections (water, soil, sediments, pollutants, etc.) will be done as per standard norms and tested accordingly.
9. TheDissertation should containthefollowingsections

Title Page (title of the study, course, semester, institution, name of the supervisor, designation, affiliated organization, date of submission, ii) certificate/ declaration (certificate from the supervisor/ mentor/ company, student's declaration of original work, iii) acknowledgement, iv) contents (list of chapters, sections, tables, maps, figures with page numbers, v) abstract / executive summary (aim and objectives, methods, key findings and conclusion), vi) core chapters

(introduction-background of the study, research problem, objectives, significance of the study, review of literature (contextualizing the content with the project in hand, establishing linkages with formulation of research questions and hypotheses etc), limitation, summary of previous studies, theoretical/conceptual framework, vii) study area profile- location map, features of physical and socio-economic components, viii) data and methodology-types of data, sources, methods of data collection, tools and techniques analysis and ix) interpretation and analysis-data analysis (tables, maps graphs, explanation of patterns and relationships) , results/findings (key outcomes of the study, direct answers to the research objectives), x) discussion- interpretation of results, comparison with earlier studies, xi) conclusion-summary of findings, final remarks, policy recommendation (if any) xii) suggestions/ recommendations-practical suggestions based on findings, xiii) final sections- bibliography/ references (APA/ MLA of Chicago style) xii) appendix (questionnaire, raw data, additional maps, tables)

[Marksdivision: Dissertation Report – 150 marks (6 Credits)+ PPT presentation -25 Marks (1 Credit), Viva-voce – 25 Marks (1 Credit) =200 Mark (8 Credits)]

GEOM-DSCC-24 & 25-P (HR)–Field Based Dissertation (Presentation and Viva-voce)✧50 Marks / 2 Credits

PPT presentation -25 Marks (1 Credit), Viva-voce – 25 Marks (1 Credit) =50 Mark (2 Credits)

SKILL ENHANCEMENT COURSE (SEC)

SEMESTERS–1 (MAJOR)& 1/2/3 (for MD)

GEOM-SEC-1/MGEO-SEC-1-1/2/3-Th – Methods in Geography ✧ 100 Marks / 4 Credits

Unit I: Field Data Collection and Compilation

1. Designing of primary survey based on diverse research problems. Relevance of pilot survey [4]
2. Sampling types and strategy based on diverse research problems [4]
3. Preparation of questionnaire and interview schedule [4]
4. Data compilation into master table [4]
5. Computer-assisted field data entry; tabulation of data into frequency distribution tables [4]
6. Statistical analysis of data: measures of central tendency and dispersion [4]

Unit II: Methods in Physical Geography

7. Use of minor survey instruments: Brunton Compass, distometer and smartphone levelling applications [4]
8. Textural analysis of grains using sieves [4]
9. Mapping and extraction of flooded areas [4]
10. Mapping areal and linear extents of riverbank and coastline shift [4]

Unit III: Methods in Human Geography

11. Dominant and distinctive functions [4]
12. Ternary diagram showing occupational patters (Ashok Mitra) [4]
13. Preparation of accessibility map.[4]
14. Preparation of flowcharts using transportation data[4]

References

Clifford, N., Cope, M., Gillespie, T.W. (Eds) 2023. Key Methods in Geography,4th ed, Sage.

Jones III, J.P., Gomez, B. (Eds) 2010. Research Methods in Geography: A Critical Introduction, Wiley-Blackwell.

Lenon B., Cleves, P. 2015. Geography of Fieldwork and Skills, Harper Collins.

Lindholm, R.C. 1987 A Practical Approach to Sedimentology, Springer.

Murthy, K.L.N. 2004. Research Methodology in Geography:A Text Book, Concept Publishing Co.

Salaria R.S. 2022. Fundamentals of Computer and Information Technology, Khanna Publishers

Sethy, S. 2022. Data Analysis and Computer Applications, Basic Computer Fundamentals, Bluerose Publishers Pvt Ltd.

Phillips, R., John J.2012. Fieldwork for Human Geography, Sage

Mahmood, A. 1999, Statistical Methods in Geographical Studies, RajeshPiub.

Singh R.L., Singh, R.P.B., 2012. Elements of Practical Geography, Kalyani Publishers

Sarkar A. ,2015, Practical Geography, A systematic Approach, Orient Blackswan.

SEMESTER –3 (for MAJOR)

GEOM-SEC-3-Th –Environmental Impact Assessment and Environmental Management Planning ✧ 100 Marks / 4 Credits

Unit I: Conceptual Framework

1. Definition and scope of Environmental Impact Assessment (EIA) and Environmental Management Planning (EMP) [4]
2. Legal and Policy Framework for Management: Air, Water, Forest. Environment Protection Act (EPA) [4]
3. Structure of governance and implementation strategies [4]

Unit II: Processes

4. Environmental appraisal: Concept and objectives [4]
5. Stages of conducting EIA: Scoping and screening using Environmental Information System (EIS) [4]
6. Preparation of inventory and matrices [4]

Unit III: Methods

7. Methodologies for EIA: Impact assessment, risk assessment, cost-benefit analysis [4]
8. Stakeholders' participation: Local bodies, citizens, relevant experts [4]
9. Prediction scenarios and mitigation, assessing alternatives [4]
10. Environmental Impact (EI) reporting [4]
11. EI monitoring and review [4]
12. Environmental audit: Relevance and process [4]
13. EIA/EMP case study of a metro rail project [4]
14. EIA/EMP case study of a highway project [4]

References

BOOKS:

Gilpin, A. 1994. Environmental Impact Assessment: Cutting Edge for the 21st Century, Cambridge University Press

Khandeshwar, S.R., Raman, N.S., Gajbhiye, A.R. 2019. Environmental Impact Assessment, Dreamtech Press

Tinsley, S. 2001. Environmental Management Plans Demystified, Rutledge.

Yerramilli, A., Manickam, V. 2020. Environmental Impact Assessment Methodologies, 3rd ed, BS

WEBSITES:

National Accreditation Board for Education & Training: National Accreditation Board for Education &Training:www.nabet.qci.org.in/eia.php

Example of an EIA report: Bengaluru Metro Rail Project: https://www.adb.org/sites/default/files/project-documents/53326/53326-001-eia-en.pdf

Example of an EIA report: Vadodara–Mumbai Expressway Project: https://www.mpcb.gov.in/sites/default/files/public_hearing/exe_summary/2021-01/nationalhighwayexesummmaryeng21012021.pdf

INTERDISCIPLINARY COURSE (IDC)

SEMESTERS –1/2/3 (MAJOR& MD)

GEOD-IDC-1/2/3- Th -Introduction to Geography ✧ 50 Marks / 2 Credits

Unit-I: Concepts in Geography

- Nature and scope of Geography [4]
- Man-environment relationship: Determinism and Possibilism

Unit-II: Regional Geography of India and West Bengal

- Regional classification of India (after R.L.Singh)
- Physiography, climate, soil and natural vegetation
- Population distribution and urbanisation

Unit-III: Contemporary Geographical Issues

- Climate change and its impact
- Hazard and Disaster: Definition and Types
- Deforestation, soil erosion and loss of Bio-diversity
- Migration and displacement

Unit-IV: Basics of Maps and Scales

- Types and elements of maps
- Scale: types and applications

GEOD-IDC-1/2/3- P- Introduction to Geography -Lab✧ 25 Marks / 1 Credit

An A4 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. Rainfall-temperature graph of any Indian station [
2. Bar diagram: Production of leading crops of some states of India
3. Pie diagram: Land use or occupational structure of West Bengal
4. Line graph: population growth of India
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 Private Ltd.
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.
Khullar, D.R., 2003. India: A Comprehensive Geography, Kalyani Publishers, Ludhiana

CCF for Undergraduate Courses in Geography

University of Calcutta

Modalities of Examinations

Theoretical Examinations: DSCC / MDC / SEC / IDC

- For every **50-mark** Theoretical Examination, broad marks division of questions is to be as follows.

Question Type	Marks	Word limit	# to be set	# to be answered
Short, definitive	2	50	8	5
Brief, explanatory	5	125	12	8

Duration of exam is to be two hours for 50 marks.

- For every **75-mark** Theoretical Examination, broad marks division of questions is to be as follows.

Question Type	Marks	Word limit	# to be set	# to be answered
Short, definitive	2	50	14	10
Brief, explanatory	5	125	7	5
Broad, descriptive / analytical	15	500	4	2

Duration of exam is to be three hours for 75 marks.

- For every **100-mark** Theoretical Examination, broad marks division of questions is to be as follows.

Question Type	Marks	Word limit	# to be set	# to be answered
Short, definitive	2	50	14	10
Brief, explanatory	5	125	10	7
Broad, descriptive / analytical	15	500	5	3

Duration of exam is to be four hours for 100 marks.

Practical Examinations: DSCC / MDC / IDC

For every **25-mark** Practical Examination, broad marks division of questions is to be as follows.

Two questions of 10+10 marks or 12+8 marks and Viva-voce of 5 marks (based on Laboratory Notebook) — 25 marks in total.

Each 12/10/8-mark question may or may not include subsections.

Duration of exam is to be two hours for 25 marks (25 × 1 course), four hours for 50 marks (25 × 2 clubbed courses) and six hours for 75 marks (25 × 3 clubbed courses).

Examination of two to three practical courses can be clubbed a single day.

General guidelines for preparation of Laboratory Notebooks and Reports

- A laboratory notebook, comprising class assignments of the practical exercises duly authenticated by respective teachers, is to be prepared and submitted. The exercises are to be drawn in pencil / mechanical pencil with photocopied representation of source materials where necessary. All texts are to be handwritten in pen on plain or ruled paper.
- Thematic maps are to be drawn on photocopied base maps.
- Coloured pencils are to be used for colouring and shading.
- The above three points also apply for preparation of field reports.
- Paper size(s) specified at the start of practical papers in the CCF need(s) to be adhered to.
- The laboratory notebook is to contain only the practical exercises as specified in the syllabus. Each exercise is ideally to be sub-sectioned, as applicable, into (i) A short description, ii) statement of problem, (iii) objective (s), (iv) materials and/or methods, (v) data used-sources (vi) calculations, (vi) results / drawings, and (vii) interpretation and (viii) application
- For surveying and levelling exercises, it is not necessary to draw the parts of the instruments.
- The laboratory exercises of all Geography DSCC practical courses in a given Semester are to be clubbed together and hard- or spiral-bound with properly captioned separator page(s).
- A separate laboratory notebook is to be prepared for Geography IDC practical course in a given Semester
- Production of the practical notebook is mandatory for appearing in the concerned practical paper.
- Preparing a new laboratory notebook or poster is not necessary for a candidate reappearing in a semester examination. She or he should carry the laboratory notebook or poster already prepared (evaluated) for (in) the last semester(s).

UNIVERSITY OF CALCUTTA

MODALITIES OF INTERNSHIP IN GEOGRAPHY (MAJOR)

of

4-year Undergraduate Programme

Under Curriculum and Credit Framework

Based on National Education Policy, 2020

Overview:

An internship is gaining **first-hand experience** by an individual besides comprehending the **way of working** in an organization, leading **to improve the skill aptitude** for a specific job or job role and/or **building research capabilities** with learning opportunities.

Types of Internship in Geography:

1. Conventional: In Conventional/Traditional internships, interns may work on specific projects or tasks **within an organization / parent college(intra-departmental) / neighbouring or collaborating colleges (inter-college).**

- Neighbouring colleges may interchange their students for an internship program and the students may be offered a course/project related to their curriculum by the teachers of the neighbouring colleges. The content of the course or outline of the project will be designed by the respective teacher/.
- It can include- the issues related to **physical, human, environmental, social, cultural, political geography, application of geospatial technology, data analysis in Geography, Application of geographical knowledge in managing environment** etc.
- After completion of the course, the respective mentor/ teacher/ supervisor will issue a completion certificate to the candidate along with his/ her opinion about the merit of the course.
- Interns can select a mentor or supervisor from other institutes for doing their summer internship.
- Even student can select a teacher / mentor/ supervisor in his / her own college in allied subjects like **sociology, anthropology, environmental science, geology, statistics, botany, chemistry, economics** and at the end of this course the teacher/ mentor will provide a completion certificate to the candidate.
- Interns may select a topic in advance learning even beyond his / her course curriculum that would be effective for their future career like computer application, learning of application-based software (RS and GIS/ domain specific), programming language under the guidance of the respective mentor.

2. **Community Engagement Programme** : Interns may work on specific projects with **NCC/NSS/ Local Clubs /NGOS/ Local Administration.**

A. **Linking learning with community service:** For example, students can conduct water and soil testing in local areas and share the results with the local community.

B. Linking research with community knowledge: Students can undertake research in partnership with the community/ Local Administration/ NGOs on solid and liquid waste disposal, biodiversity count/register etc.

C. Knowledge sharing and knowledge mobilization: Students can undertake a 'swachhta survekshana' and/or nutrition survey for mothers and children with the community/ Local Administration/ NGOs , and educate them about hygiene and nutrition.

3. **Field-based Learning/Minor Projects :** Interns may undertake a field-based learning or research project guided by a Research Organization /University/ Research Centre in Colleges etc.

Interns will be equipped to work as a quantitative or qualitative researcher in different sectors like research centres, as project staff in College/University/Other Academic Institutes, NGO's, Media houses, Freelancer / Independent Researcher/ Registered Researcher doing PhD work.

Interns may visit research institute, university, colleges, or other related institute or may do some research related work with a researcher/ scientist.

Summary Guidelines:

a. Title: Internship Assessment through projects (Group internship is allowed)
b. Duration: 15 days / 60 hours (may be undertaken at any time during the 2^{nd} /4^{th} / 6^{th} Semester)
c. Nature of Internship Project : Intra / Inter-Institutional Activities,Activities with NCC/ NSS, Or Industrial / Research Organisations/ Soft-skill/ Professional Skill / Technological Skill providing Institutes/ NGO/ MSME / Local Club / Rural Internship / Innovation / Local administration/Research Laboratory.

Evaluation Process:

A Viva-Voce will be conducted by the department including HoD, Supervisor, Mentor and an external expert (name to be proposed by the College with approval of University) to assess the report and knowledge gathered by the students.

a) Submission of Report: 50 Marks /2 Credits as per CU guideline (Report will be evaluated by the expert at the time of Viva-voce)
b) Viva-voce: 25 marks / 1 Credit as per CU guideline
c) Students will prepare a presentation on the topic assigned to them during the internship by the respective mentor.