



University of Gour Banga

Syllabi for
Three Years Degree Honours Course
(Under 1+1+1 System)

SUBJECT: GEOGRAPHY

**University of Gour Banga
P.O. – Mokdumpur,
Dist. – Malda
West Bengal
PIN - 732103**

**Distribution of Marks**

Total Marks = 800 (200+200+400)

Theory = 500 (150+150+200)

Practical = 300 (50+50+200)

MCO Type Question Pattern

50 Marks = 1Marks x 50 MCQs

Descriptive Type Question pattern

50 Marks = 10 Marks x 2 Questions + 5 Marks x 6 Questions

30 Marks = 10 Marks x 1 Question + 5 Marks x 4 Questions

20 Marks = 10 Marks x 1 Question + 5 Marks x 2 Questions

Word limits for each category of descriptive type questions:

10 marks: 600 - 700

5 marks: 300 - 350

Duration of Examination:

1. MCO paper of 50 marks: 1:30 hours

2. Theory paper of 50 marks: 2 hours

2. Practical paper of 50 marks: 4 hours



SUMMARY OF SYLLABUS

Paper	Allotted Marks	Type	Modules & Topics	Question Pattern	Allotted Time
PART-I : 200 marks					
I	50	Theoretical (MCQ)	Module 1: Geotectonic	1 marks x 50 MCQs = 50 (At least 12 MCQs from each Module) Total = 50	1 Hour & 30 minutes
			Module 2: Oceanography		
			Module 3: Geomorphology		
			Module 4: Hydrology		
II	50	Theoretical (Descriptive)	Module 1: Geotectonic	10 marks x 1 Question = 10 5 marks x 4 Questions = 20 Total = 30	2 Hours
			Module 2: Oceanography	10 marks x 1 Question = 10 5 marks x 2 Questions = 10 Total Marks = 20	
III	50		Module 3: Geomorphology	10 marks x 1 Question = 10 5 marks x 4 Questions = 20 Total Marks = 30	2 Hours
			Module 4: Hydrology	10 marks x 1 Question = 10 5 marks x 2 Questions = 10 Total Marks = 20	
IV	50	Practical	Module 5: Practical - 1	50 Marks	4 Hours
PART-II: 200 marks					
V	50	Theoretical (MCQ)	Module 6: Economic Geography	1 marks x 50 MCQs = 50 (At least 12 MCQs from each Module) Total Marks = 50	1 Hour & 30 minutes
			Module 7: Regional Development		
			Module 8: Climatology		
			Module 9: Soil & Bio-geography		
VI	50	Theoretical (Descriptive)	Module 6: Economic Geography	10 marks x 1 Question = 10 5 marks x 4 Questions = 20 Total Marks = 30	2 Hours
			Module 7: Regional Development	10 marks x 1 Question = 10 5 marks x 2 Questions = 10 Total Marks = 20	
VII	50		Module 8: Climatology	10 marks x 1 Question = 10 5 marks x 4 Questions = 20 Total Marks = 30	2 Hours



			Module 9: Soil & Bio-geography	10 marks x 1 Question = 10 5 marks x 2 Questions = 10 Total Marks = 20	
VIII	50	Practical	Module 10: Practical - 2	50 Marks	4 Hours
PART-III: 400 marks					
IX	50	Theoretical (MCQ)	Module 11: Population Geography	1 marks x 50 MCQs = 50 (At least 3 MCQs from each Module) Total Marks = 50	1 Hour & 15 minutes
			Module 12: Settlement Geography		
			Module 13: Geographical Thought		
			Module 14: Social and Cultural Geography		
			Module 15: Political Geography		
			Module 16: Geography of India		
X	50	Theoretical (Descriptive)	Module 11: Population Geography	10 marks x 1 Question = 10 5 marks x 4 Questions = 20 Total Marks = 30	2 Hours
			Module 12: Settlement Geography	10 marks x 1 Question = 10 5 marks x 2 Questions = 10 Total Marks = 20	
XI	50	Theoretical (Descriptive)	Module 13: Geographical Thought	10 marks x 1 Question = 10 5 marks x 4 Questions = 20 Total Marks = 30	2 Hours
			Module 14: Social and Cultural Geography	10 marks x 1 Question = 10 5 marks x 2 Questions = 10 Total Marks = 20	
XII	50	Theoretical (Descriptive)	Module 15: Political Geography	10 marks x 1 Question = 10 5 marks x 2 Questions = 10 Total Marks = 20	2 Hours
			Module 16: Geography of India	10 marks x 1 Question = 10 5 marks x 4 Questions = 20 Total Marks = 30	
XIII	50	Practical	Module 17: Practical - 3	50 Marks	4 Hours
XIV	50	Practical	Module 18: Practical - 4	50 Marks	4 Hours
XV	50	Practical	Module 19: Practical - 5	50 Marks	4 Hours
XVI	50	Practical	Module 20: Practical - 6	50 Marks	4 Hours



PART – I

Paper-I (Theoretical – MCQ Type) : Marks: 50

MODULE 1 to MODULE 4 [Detailed Syllabus under Paper II and III below]

= QUESTION PATTERN =

- **Multiple choice type questions (1 mark):** A total of FIFTY questions will be set, taking at least twelve questions from each of Module-1 to Module-4 below. Four options of answer to be given for each question; out of which the correct answer to be selected.

Paper II (Theoretical – Descriptive Type) : Marks: 50

1.0. MODULE 1 : GEOTECTONIC

30 Marks

= QUESTION PATTERN =

- **Long answer type questions (10 marks):** TWO questions will be set, one from each unit below. Out of which ONE question to be answered (word limit: 600-700 words for each answer).
- **Semi-long answer type questions (5 marks):** EIGHT questions will be set, taking at least one from each remaining four units not covered by long answer type questions above; out of which FOUR questions to be answered (word limit: 300-350 words for each answer).

- 1.1. Origin of the earth: Supernova and Big Bang Theory; Geological time scale: concept on the geological history of the earth
- 1.2. Structure of Earth: Thermal and physical state of the Earth's interior with special reference to seismology
- 1.3. Continental Drift and Sea-floor Spreading: Evidences and mechanisms
- 1.4. Theories of Isostasy: Airy and Pratt; Mountain building theories: Kober and Holmes
- 1.5. Plate tectonics: Forces acting on lithospheric plates, plate motion, plate boundaries and resultant landforms; Origins of fold-mountains (particularly the Himalayan Mountain System), volcanism and earthquakes in the light of plate tectonics
- 1.6. Surface expression of earth movement : Different types of folds and faults

Suggested Readings:

1. Condie, Kent C. 2013: Plate Tectonics and Crustal Evolution, Elsevier.
2. Condie, Kent C. and Pease, V. 2008: When Did Plate Tectonics Begin on Planet Earth?, Geological Society of America.
3. Cox, A. and Hart, R.B. 1986: Plate Tectonics: How it Works, Blackwell Scientific Publications, Oxford.
4. Duff, P.M.D. (editor) 1993: Holmes' Principle of Physical Geology, Taylor & Francis.



5. Frisch, W., Meschede, M. and Blakey, Ronald C. 2010: Plate Tectonics: Continental Drift and Mountain Building, Springer Science & Business Media.
6. Gubbins, D. 1990: Seismology and Plate Tectonics, Cambridge University Press, Cambridge.
7. Hallam, A. 1973: A Revolution in Earth Science: From Continental Drift to Plate Tectonics, Oxford. University Press, London.
8. Keary, P. and Vine, M. 1997: Global Tectonics, 2nd edition. Blackwell Scientific publications, Oxford.
9. Ollier, C.D. 1981: Tectonics and Landforms, Longman, London.
10. Sanders, J.E. 1981: Principles of Physical Geology, Wiley Science.
11. Strahler, A.N. and Strahler, A.H. 1984: Elements of Physical Geography, John Wiley, New York.
12. Tarbuck, E.J., Lutgens, F.K. and Tasa, D. 2003: Earth Science, 10th edition, Printice Hall, Englewood Cliffs.

2.0. MODULE 2 : OCEANOGRAPHY

20 Marks

:: QUESTION PATTERN ::

- **Long answer type questions (10 marks):** TWO questions will be set, one from each unit below. Out of which **ONE** question to be answered (word limit: 600-700 words for each answer).
- **Semi-long answer type questions (5 marks):** FOUR questions will be set, taking at least one from each remaining two units not covered by long answer type questions above; out of which **TWO** questions to be answered (word limit: 300-350 words for each answer).

- 2.1. Ocean floor: Characteristics and features; Physical properties of sea-water: Temperature, Salinity and Density
- 2.2. Ocean currents: causes and significance; currents of the Indian Ocean
- 2.3. Marine deposits: origin, classification and distribution
- 2.4. Coral reefs and atolls: characteristics and theories of origin (after Darwin); Resource potential of oceans.

Suggested Readings:

1. Affholder, M. and Valiron, F.2001: Descriptive Physical Oceanography, CRC Press.
2. Apel, J. 1987: Principles of Ocean Physics, Academic Press, London.
3. Cundy, A. and Kershaw, S., 2013: Oceanography: an Earth Science Perspective, Routledge.
4. Garrison, T., 2009: Essentials of Oceanography, Brookes-Cole, USA.
5. King, C.A.M. 1962: Oceanography for Geographers, Arnold, London.
6. King, C.A.M., 1972: Beaches and Coasts, Arnold, London.
7. Paul, R. Pinet, 2008: Invitation to Oceanography, Jones & Bartlett Publishers.
8. Sharma, R.C. & Vatal, M., 1992: Oceanography for Geographers, Chaitanya Publishing House, Allahabad.
9. Shepard, F.P., 1963: Submarine Geology, Harper and Row, New York.
10. Siddharth, K., 1999: Oceanography: A brief introduction, Kishalaya Publisher, Noida.
11. Steers, J.A. 1953: The Sea Coast, Collins, London.
12. Sverdrup, H.U. 1942: The Oceans, their Physics, Chemistry and General Biology, Prentice-Hall, New York.



Paper III (Theoretical – Descriptive Type) : Marks: 50

3.0. MODULE 3 : GEOMORPHOLOGY

30 Marks

:: QUESTION PATTERN ::

- Long answer type questions (10 marks): TWO questions will be set, one from each unit below. Out of which ONE question to be answered (word limit: 600-700 words for each answer).
- Semi-long answer type questions (5 marks): EIGHT questions will be set, taking at least one from each remaining four units not covered by long answer type questions above; out of which FOUR questions to be answered (word limit: 300-350 words for each answer).

- 3.1. Fundamental concepts in geomorphology.
- 3.2. Denudation: weathering processes & their topographic expressions, Processes of mass wasting.
- 3.3. Processes of erosion, deposition and resulting landforms: river, wind, glacier, underground water and waves.
- 3.4. Cycle of erosion and its interruption: Davis, Penck; Dynamic Equilibrium theory of Hack.
- 3.5. Drainage development and landforms associated with uniclinal, folded and faulted structures with examples from India.
- 3.6. Disasters associated with geomorphic processes and their management with special reference to landslide in Darjeeling Himalayas and left bank erosion of Ganga in Malda.

Suggested Readings:

1. Bland, W. And Rollis, D. 1998. Weathering, Hodder & Stoughton.
2. Bloom, A.L. 1998. Geomorphology: A Systematic Analysis of Late Cenozoic Landforms, 3rd edition, prentice Hall India Ltd.
3. Burbank, D.G. and Anderrson, R.S. 2001. Tectonic Geomorphology: A Frontier in Earth Science, Blackwell Science Inc. London.
4. Carter, R.W.G. 1988. Coastal Environments: An Introduction to the Physical Ecological and Cultural Systems of Coastlines, Academic Press, London.
5. Faniran, A. And Jeje, L.K. 1983. Humid Tropical Geomorphology, Longman, London.
6. Knighton, D. 1998. Fluvial Forms and Processes: A new Perspective, Arnold, London.
7. Ollier, C.D. 1975: Weathering, Longman, London
8. Selby, M.J. 1985. An introduction to geomorphology, Clarendon, Oxford.
9. Singh, S. Geomorphology, Prayag Pustak Bhavan, Allahabad.
10. Skinner, Brian J. and Stephen C. Porter (2000), The Dynamic Earth: An introduction to physical Geology, 4th Edition, John Wiley and Sons.
11. Small, R.J. 1978: The Study of Landforms, Cambridge University Press, Cambridge.
12. Summerfield, M.A. (editor) 1991, Global Geomorphology: An Introduction to the Study of Landforms, John Wiley and Sons Ltd., New York.
13. Thronbury, W.D. 1969. Principles of Geomorphology, Wiley Easterb Limited, New Delhi.



14. Woodroffe, C.D. 2002. Coasts: Form, process and Evolution, Cambridge University Press, Cambridge.
15. Woolridge, S.W. and Morgan, R.S. 1959. Outline of Geomorphology: The Physics, Basis of Earth, Longman, London.

4.0. MODULE 4 : HYDROLOGY**20 Marks****:: QUESTION PATTERN ::**

- **Long answer type questions (10 marks):** TWO questions will be set, one from each unit below. Out of which **ONE** question to be answered (word limit: 600-700 words for each answer).
- **Semi-long answer type questions (5 marks):** FOUR questions will be set, taking at least one from each remaining two units not covered by long answer type questions above; out of which **TWO** questions to be answered (word limit: 300-350 words for each answer).

- 4.1. Modes of occurrence of water in the earth, hydrological cycle; Basin characteristics and river basin morphometry: Slope, Hypsometric Curve, Elongation Ratio, Long profile, Sinuosity.
- 4.2. Runoff: Factors affecting runoff; evaporation, transpiration and infiltration process
- 4.3. Ground water: Concept and types of aquifers, movement, storage, utilization and related problems.
- 4.4. Conservation of water resource: special reference to rain water harvesting.

Suggested Readings:

1. Black, Peter E., 1996: Watershed Hydrology, Lewis Publishers.
2. Chorley, R.J., 1969 : Water, Earth and Man, Methuen, London.
3. Chow, V. T., Maidment, D.R. and Mays, L.W. 1988: Applied Hydrology, McGraw Hill, New York.
4. Fetter, C.W., 1990: Applied Hydrology, CBS Publisher and Distributors, New Delhi.
5. James, A., 2011: Watershed Modelling, Island Press, Andrew Ford.
6. Linsley, K., Kohler, M. and Paulhus, J.L. 1975: Applied Hydrology, Tata McGraw Hill, New York.
7. Meinzer, O.E. 1942: Hydrology, Dover Publication Inc. New York.
8. Rahgunath, H.M. 1997: Hydrology- Principles, analysis, Design, New Age International Pvt. Ltd, New Delhi.
9. Singh, V.P., 1989: Hydrologic System, Prentice-Hall, Englewood Cliffs.
10. Small, R.J. 1989: Geomorphology and Hydrology, Longman Group Ltd, London.
11. Todd, D.K. 1959: Ground Water Hydrology, John Wiley and Sons, New York
12. Walters, D. 2010: Physical Hydrology, Routledge.
13. Walton, W.C. 1970: Ground Water Resource Evaluation, McGraw Hill, Tokyo.
14. Ward, A.D. and Trimble, S.W. 2004: Environmental Hydrology: Lewis Publishers.



PAPER –IV (Practical) : 50 Marks

5.0. MODULE 5: PRACTICAL – 1	50 Marks
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5.1. Scale:	10 Marks
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Principles & Types; Drawing Linear, Comparative, diagonal & Vernier scale. Scale Conversion.

5.2. Cartograms:	15 Marks
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Choropleth, Dot and Sphere, representation of agricultural & socio-economic data by Pie-chart & Proportional Divided Circles, Age-sex Pyramid, Proportional Cubes, Chorochromatic maps, representation of traffic and transport by Flow Diagram.

5.3. Topographical map (SOI – Old Series & OSM):	20 Marks
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Interpretation of SOI topographical maps of plateau areas, representative profile and broad physiographic divisions, Serial, Superimposed, Composite and Projected profiles. Morphometric indices: Relative Relief (after Smith), Dissection Index (after Dov Nir), Average Slope (after Wentworth), Drainage Density, Stream Ordering (after Strahler) and Bifurcation Ratio, Road Density, Transect Chart for relating physical and cultural features.

5.4. Laboratory notebook and viva-voce:	2+3=5 Marks
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Suggested Readings:

1. Mishra, R.P., Ramesh, A. 2000: Fundamentals of Cartography, Concept Publishing Company, New Delhi.
2. Monkhouse F.J. and Wilkinson, H.R. 1971: Maps and Diagrams: their Compilation and Construction, B.I. Publications private Limited, New Delhi, 527p.
3. Negi, B.S., 2005: Practical Geography, Keidar Nath Ram Nath Publications, New Delhi.
4. Pal, S.K. 1999: Statistics for Geoscientists, Concept Publishing Company, New Delhi.
5. Robinson, A.H., Sale, R.D., Morrison, J. 1984: Elements of Cartography, Wiley, New York.
6. Salisbury, Rollin D. and Atwood W.W., 2007: The interpretation of topographic maps, Harvard University.
7. Sarkar, A. 1997. Practical Geography: A systematic Approach, Orient Longman Ltd., Hyderabad.
8. Sen, P.K. 1989: Geomorphological Analysis of Drainage Basin: An Introduction to Morphometric and Hydrological parameter, university of Burdwan, Badhaman.
9. Silk, J. 1979: Statistical techniques in Geography, George Allen and Unwin, London.
10. Singh, R.L. and Singh, R.P.B. 1991: Elements of practical Geography, Kalyani Pub. New Delhi.
11. Steers, J.A. 1965: An Introduction to Map projections, 14th edition, University of London Press, London.
12. Tamaskar, B., Tamaskar, G. and Deshmikh, V.M., 1995: Geographical Interpretation of Indian Topographical Map
13. Walford, P. 1995: Geographical Data Analysis, John Wiley and Sons Inc., New York.



PART - II

Paper-V (Theoretical – MCQ Type) : Marks: 50

MODULE 6 to MODULE 9

[Detailed Syllabus under Paper VI and VII below]

|| QUESTION PATTERN ||

- **Multiple choice type questions (1 mark):** A total of FIFTY questions will be set, taking at least twelve questions from each of Module-6 to Module-9 below. Four options of answer to be given for each question; out of which the correct answer to be selected.

Paper VI (Theoretical – Descriptive Type) : Marks: 50

6.0. MODULE 6 : ECONOMIC GEOGRAPHY

30 Marks

|| QUESTION PATTERN ||

- **Long answer type questions (10 marks):** TWO questions will be set, one from each unit below. Out of which ONE question to be answered (word limit: 600-700 words for each answer).
- **Semi-long answer type questions (5 marks):** EIGHT questions will be set, taking at least one from each remaining four units not covered by long answer type questions above; out of which FOUR questions to be answered (word limit: 300-350 words for each answer).

- 6.1. Resources: Definition, classification, functional theory, significance and environmental aspects and resource conservation
- 6.2. Natural resources: Land as a resource; Forest as a resource and environmental significance of forest.
- 6.3. Power resources: Conventional: coal, petroleum, hydel: use, distribution (world perspective) and conservation. Non-Conventional-solar, nuclear: Potentiality and feasibility
- 6.4. Primary activities: Intensive rice cultivation (Asia), plantation agriculture: Tea (India)
- 6.5. Secondary activities: Theory of industrial Location: Weber; Petrochemicals and Food Processing: Location, problems and prospects (India)
- 6.6. Tertiary activities: Transport and communication – types and importance.

Suggested Readings:

1. Alexandersson, C, 1971: Geography of Manufacturing, Prentice Hall India, New Delhi.
2. Berry, B.J.L., Conklin, E.C. and Ray, M. D. 1976: The geography of Economic Systems, Prentice Hall, New Jersey.
3. Bradford, M.G. and Kent, W.A. 1977: Human Geography, Theories and Applications, Oxford University Press, Oxford.



4. Gourtney, P. 1965: Plantation Agriculture, G. Bell and Sons, London.
5. Guha, J.L. and Chattaraj, P.R. 1989: A New Approach to Economic Geography: A Study of Resources, World Press, Kolkata.
6. Hartshorn, T.A. and Alexander, J.W. 1988: Economic Geography, Prentice Hall India, New Delhi.
7. Isard, W. et al 1956: Location, Space and Economy, Technology Press of MIT and John Wiley, New York.
8. Jones, C.F. and Darkerwald, G.G. 1954: Economic Geography, Macmillan, New York.
9. Leong, G.C. and Morgan, G.C. 1975: Human and Economic Geography, Oxford University Press, Hong Kong.
10. Miller, E. 1962: A Geography of Manufacturing, Prentice Hall, Englewood Cliff, N. J.
11. Morgan, W.B. and Manton, R.J.C. 1971: Agricultural geography, Methuen, London.
12. Paterson, J.H. 1976: Land, Work and Resources- An Introduction to Economic Geography, Edward Arnold, London.
13. Pickering, K. and Owen, I.A. 1997. An Introduction to Global Environment Issues, 2nd edition, Routledge, London.
14. Sen, A. 1990: Jibanjatra O Arthaniti (Bengali) Ananda Publishers, Kolkata.
15. Simmons, I. G. 1981: The Ecology of Natural Resources, ELBS/ Edward Arnold, London.
16. Singh, J., 1974: An Agricultural Atlas of India: A Geographical Analysis, Vishal Publications, Kurukshetra.
17. Smith, D.N. 1971: Industrial Location- An Economical Geographical Analysis, John Wiley, New York.
18. Thoman, R.S. and Corbin, P.B. 1968: Geography of Economic Activity, McGraw Hill, New York.
19. Wheeler, J.O. and Muller, P.O., 1986: Economic Geography, John Wiley, New York.
20. Zimmermann, E.W. 1956: World Resources and Industries, Harper Brothers, New York.

7.0. MODULE 7: REGION, REGIONAL PLANNING & DEVELOPMENT 20 Marks

:: QUESTION PATTERN ::

- **Long answer type questions (10 marks):** TWO questions will be set, one from each unit below. Out of which **ONE** question to be answered (word limit: 600-700 words for each answer).
- **Semi-long answer type questions (5 marks):** FOUR questions will be set, taking at least one from each remaining two units not covered by long answer type questions above; out of which **TWO** questions to be answered (word limit: 300-350 words for each answer).

- 7.1. Concept of region (formal, functional and planning region) and regional development; Regionalization and Schemes of regionalization in India: R.L. Singh
- 7.2. Indicators of development and under-development: HDI and HPI (Indian scenario)
- 7.3. Theories: Growth pole and Myrdal; Regional imbalances (Indian scenario) and remedies;
- 7.4. Regional Planning in India: rural and urban planning , centralized and decentralized planning.

Suggested Readings:

1. Brock, J.O.M. and Webb, J.W. 1973: A Geography of Mankind, McGraw Hill, New York.
2. Chand, M. and Puri, V.K. 2004: Regional Planning in India, Allied Publishers, New Delhi.
3. Chandana, R.C. 2005: Regional Development and Planning, Kalyani Publishers, New Delhi.
4. Di Blij, H. and Muller, O. 1993: Geography: Regions and Concepts, John Wiley and Sons, N.Y.
5. Gore, M.S. 1985: Social Aspects of Development, Rawat Publications, Jaipur.



6. Human Development Report: Published annually by Oxford University Press.
7. Isard, W. et al 1960: Methods of Regional Analysis, Technology Press of MIT and John Wiley, New York.
8. Jackson R.H. and Husman, L.E. 1991: World Regional Geography: Issues for Today, John Wiley and Sons, N.Y.
9. Jhingan, M.L. 1978: Economics of Development and Planning, Vikash Publishing House, New Delhi.
10. Kulkarni, A.R. 1872: Growth Centres in Regional Planning, Mouton and Co., Paris.
11. Mishra, R.P. 2002: Regional Planning: Concepts, Techniques, Policies and Case Studies, Concept Publishing Co., New Delhi.
12. Nagle, G. and Spencer, K. 1997: Sustainable Development, Hodder and Stoughton, London.
13. Sayer, J., Campbell, B. 2003: The Science of Sustainable Development: Local Livelihoods and the Global Environment, Cambridge University Press, Cambridge.
14. Sharma, P.R. (editor) 1993: Regional Policies and Development in the Third World, Rishi Publication, Vranasi.
15. Sundaram, K.V. 1997: Decentralized Multilevel Planning: Principles and Practice, Concept Publishing Co., New Delhi.

Paper VII (Theoretical – Descriptive Type) : Marks: 50

8.0. MODULE 8 : CLIMATOLOGY

30 Marks

:: QUESTION PATTERN ::

- **Long answer type questions (10 marks):** TWO questions will be set, one from each unit below. Out of which **ONE** question to be answered (word limit: 500-700 words for each answer).
- **Semi-long answer type questions (5 marks):** EIGHT questions will be set, taking at least one from each remaining four units not covered by long answer type questions above; out of which **FOUR** questions to be answered (word limit: 300-350 words for each answer).

- 8.1. Composition and structure of atmosphere; Importance of ozone layer, ozone depletion.
- 8.2. Insolation and heat budget, Horizontal and vertical distribution of temperature, inversion of temperature; Global warming and greenhouse effect.
- 8.3. Atmospheric pressure: horizontal and vertical distribution; Pressure belts of the world and resulting wind systems; General circulation of the atmosphere; Upper air circulation: jet stream and Rossby Waves.
- 8.4. Atmospheric moisture: processes and forms of condensation; Mechanisms of precipitation: Ice crystal Theory, Collision-Coalescence Theory; Types of precipitation.
- 8.5. Tropical cyclones and mid-latitude cyclones: genesis and characteristics
- 8.6. Indian Monsoon: Mechanisms (Koteswaram and Jet Stream) and variations (El Nino and La Nina); Classification of world climates: Koppen

Suggested Readings:



1. Anthes, R. 1987: Meteorology, 7th edition, Prentice- Hall Inc., Upper Saddle River.
2. Barry, R. G. and Chorley, R.T 1998: Atmosphere, Weather and climate, 7th edition Rout ledge, London.
3. Blair, T.A. and Fite, R.C. 1965: Weather Elements: A Text in Elementary Meteorology, Prentice Hall, New York.
4. Coch, N. K. 1995: Geohazards: Natural and human Prentice Hall, Englewood cliffs.
5. Chritchfield, H. J. 1983 : General Climatology, 4th edition, Prentice Hall India Ltd., New Delhi.
6. Das, P. K. 1995: Monsoon, 2nd edition, National Book Trust, New Delhi.
7. Henderson-Sellers, A. and Robinson, P.J. 1966: Contemporary Climatology, ELBS/ Longman.
8. Lal, D.S. 1993 : Climatology, 3rd edition, Chaitanya Pub. House, New Delhi.
9. Lutgens, F.K. and Tarbuck, E. J. 1998 : The Atmosphere : An Introduction to Meteorology, 7th edition, Prentice-Hall Inc., Upper Saddle River.
10. Mather, J.R.,1974.: Climatology: Fundamentals and Applications, McGraw Hill, New York
11. Moran, J.M. and Morgan, M. D. 1997 : Meteorology : The atmosphere and the Science of Weather, 5th edition, Prentice-Hall Inc., Upper Saddle River.
12. Musk, L.F. 1988: Weather Systems, Cambridge University Press, Cambridge.
13. Petterson, S. 1958: Introduction to Meteorology, McGraw Hill, Tokyo.
14. Pant, G. B. and Kumar, R.K. 1997 : Climates of South Asia, John Wiley and Sons Ltd., Chichester.
15. Trewartha, G.T. 1968: An Introduction to Climatology, McGraw Hill, New York.

9.0. MODULE 9 : SOIL GEOGRAPHY AND BIO-GEOGRAPHY

20 Marks

:: QUESTION PATTERN ::

- **Long answer type questions (10 marks):** TWO questions will be set, one from Unit-9.1.0. and another from Unit-9.2.0. below. Out of which **ONE** question to be answered (word limit: 600-700 words for each answer).
- **Semi-long answer type questions (5 marks):** A total of **FOUR** questions will be set; **TWO** from Unit-9.1.0. taking one from each remaining two sub-units not covered by long answer type questions above with an 'OR' in between and other **TWO** from Unit-9.2.0. in the same pattern.

9.1.0. Soil Geography

9.1.1. Factors of soil formation; Soil profile development: Laterite

9.1.2. Physical properties of soil: Texture, structure and their influence on soil fertility;

9.1.3. Chemical properties of soil: pH, NPK and their influence on soil fertility

Suggested Readings:

1. Biswas, T.D. and Mukherjee, S.K. 1997: Textbook of Soil Science, Tata-McGraw Hill.
2. Brady, N.C. and Weil, R.R. 1996: The Nature and Properties of Soil, 11th edition, Longman, London.
3. Buckman, H.R. and Brady, N.C. 1974: Nature and Properties of Soil, McMillan, New York.
4. Bunting, A. 1965: Geography of Soil, Hutchinson, London.
5. Daji, J.A., Kadam, J.R. and Patil, N.D. 1996: A Textbook of Soil Science, Media Promoters and Publishers Pvt Ltd, Mumbai.
6. De, N.K. and Jana, N.C.1997: Land – Multifaceted Appraisal and Management, Sribhumi Publishing Company, Kolkata.
7. Floth, H.D. 1990. Fundamentals of Soil science, 8th edition, John Wiley and Sons, New York.
8. Foth, H.D. and Schafer, J.W. 1980: Soil Geography and Land Use, John Wiley, New York.
9. Joffe, J.S. 1965: ABC of Soil, Oxford Book Co., Kolkata.
10. Morgan, R.P.C. 1995: Soil Erosion and Conservation, 2nd edition, Longman, London.



11. Schwab, G.O., Fangmer, D.D. and Elliot, W.J. 1996: Soil and Water Management Systems, 4th edition, John Wiley and sons Inc., New York.
12. Young, A. 2000: Land Resource: Now and Future, Cambridge University Press, Cambridge.

9.2.0 Bio-geography

- 9.2.1. Concepts of ecology, ecosystem, Biome, Ecotone and Community (definition and components)
- 9.2.2. Laws of thermodynamics and energy flow in ecosystem; Concept of trophic levels, food chain, food web and bio-geochemical cycles (carbon and nitrogen)
- 9.2.3. Concept of Biodiversity with illustrations from West Bengal; Wetlands: Definition, characteristics, degradation and need for conservation of wetlands

Suggested Readings:

1. Chapman, J.L. and Reiss, M.J. 1992: Ecology Principles and Applications, Cambridge University Press, Cambridge.
2. Dash, M.C., 2001: Fundamental of Ecology, 2nd edition, Tata McGraw-Hill, New Delhi.
3. Huggett, R. 1998: Fundamentals of Biogeography, Routledge, London.
4. Joy, T. et al 1989: Human Impact on The Ecosystem, Oliver and Boyd, London.
5. Kendeigh, S.C. 1975: Ecology with Special Reference to Man and animals, Prentice Hall, New York.
6. Khinchi, Shyam S. (editor) 2015: Biodiversity Distribution and Conservation, Pointer Publishers, Jaipur.
7. Komondy, E.J. 1991: Concepts of Ecology, Prentice Hall India, New Delhi.
8. Myers, A. A. and Giller, P.S. (editors) 1988: Analytical Biogeography: an Integrated Approach to the Study of Animal and Plant Distribution, Chapman and Hall, London.
9. Nebel, J.B. 1981: Environmental Science, Prentice Hall, New York.
10. Odum, E.P. 1971: Fundamentals of Ecology, W.B. Sanders, Philadelphia.
11. Sharma, P. D. 1996: Ecology and Environment, 7th edition, Rastogi Publications, Meerut.
12. Shukla, R.S. and Chandel, P.S. 1930: Plant Ecology and Soil Science, S Chand, New Delhi.
13. Simmons, I. G. 1981: The Ecology of Natural Resources, ELBS/ Edward Arnold, London.
14. Simmons, I.G. 1980: Bio-geographical Processes, George Allen and Unwin, London.
15. Spellerberg, I. F. and Sarwyer, J. W. D. 1999: An Introduction to Applied Biogeography, Cambridge University Press, Cambridge.
16. Watts, D. 2000: Principles of Biogeography: An Introduction to Functional Mechanisms of Ecosystems, McGraw Hill, London.
17. Weddell, B. J. 2002: Conserving Living Natural Resources in the Context of a Changing World, Cambridge University Press, and Cambridge.

Paper - VIII (Practical) : 50 Marks

10.0. MODULE 10: PRACTICAL- 2	50 Marks
10.1.0. Area Measurement by graphical method	5 marks
10.2.0. Map Projections:	20 Marks



Depiction of area, definition, principles, classification, choice, properties, limitations, and uses of the followings projections.

a) Polar Zenithal Gnomonic, b) Simple Conical (one standard parallel), c) Bonne's projection, d) Polyconic projection, e) Sinusoidal projection, f) Cylindrical Equal Area Projection & g) Mercator's projection.

10.3.0. Surveying:**20 Marks**

10.3.1. Concept of surveying & map making,

10.3.2. Prismatic Compass Survey (closed traverse)

10.3.3. Plane Table Survey (Radiation method)

10.3.4. Leveling by Dumpy Level along a given line with at least one change point (plotting by rise & fall and also collimation method)

10.3.5. Contouring (radial method using Dumpy level and Plane Table with at least four radial lines and at least four point along each line).

10.3.6. Determination of height of an object with accessible [distance unknown following stadia/low degree (1") method] and inaccessible base (instrument and object located in the same vertical plane) by Theodolite.

10.4.0. Laboratory Notebook and viva-voce**2+3=5 Marks****Suggested Readings:**

1. Elfic, M.H., Fryer, J.G. Brinkner, R.C. and Wolf, P.R. 1994: Elementary Surveying, 8th edition, Harper Collins Publishers, London.
2. Hussain, S.K. and Nagaraj, M.S. 1992: Textbook of Surveying, S. Chand and Co. Ltd., New Delhi.
3. Kanetkar, T.P. and Kulkarni, S.V. 1988: Surveying and leveling, Part I, Pune Vidyarthi Griha Prakashan, Pune.
4. Kellaway, G.P. 1979: Map Projections, 1st Indian edition, B.I. Publication, Delhi
5. Kochher, C.L. 1993: A Textbook of Surveying, S.K. Katariya and Sons, Delhi.
6. Mishra, R.P. Ramesh, A. 2000: Fundamentals of Cartography, Concept Publishing Company, New Delhi.
7. Robinson, A.H., Morrison, J.L., Muehrcke, P.C., Kimerling, A.J. and Guptill, S.C. 1995: Elements of Cartography, John Wiley and Sons, New York.
8. Roy, P. 1988: An Analytical Study of Map Projections, Vol I, Kolkata.
9. Sarkar, A. 1997: Practical Geography: A Systematic Approach, Orient Longman Ltd. Hyderabad.
10. Singh, R.L. and Singh, R.P.B. 1991: Elements of Practical Geography, Kalyani Pub. New Delhi.
11. Steers, J.A. 1965: An Introduction to Map Projections, 14th edition, university of London Press, London.
12. Venkatramaiah, C. 1996: A textbook of Surveying. University Press/ Orient Longman Ltd. Hyderabad.



PART - III

Paper-IX (Theoretical – MCQ Type) : Marks: 50

MODULE 11 to MODULE 16 [Detailed Syllabus under Paper X and Paper XII below]

:: QUESTION PATTERN ::

- **Multiple choice type questions (1 mark):** A total of FIFTY questions will be set, taking at least eight questions from each of Module-11 to Module-16 below. Four options of answer to be given for each question; out of which the correct answer to be selected.

Paper X (Theoretical – Descriptive Type) : Marks: 50

11.0. MODULE 11 : POPULATION GEOGRAPHY

30 Marks

:: QUESTION PATTERN ::

- **Long answer type questions (10 marks):** TWO questions will be set, one from each unit below. Out of which ONE question to be answered (word limit: 600-700 words for each answer).
- **Semi-long answer type questions (5 marks):** EIGHT questions will be set, taking at least one from each remaining four units not covered by long answer type questions above; out of which FOUR questions to be answered (word limit: 300-350 words for each answer).

- 11.1. Definition, scope and content of population geography; Basic sources of data.
- 11.2. Factors influencing spatial distribution and density of population; Concept of under population, optimum population and over population; population growth in India: trends, causes and consequences.
- 11.3. Theories of population growth: Malthus; Demographic Transition Theory; Population-resource relationship: population-resource regions after Ackerman.
- 11.4. Population structure & composition: age-sex structure, rural-urban, economic composition of population with special reference to India
- 11.5. Demographic attributes: determinants and measures of Fertility and Mortality; Migration: types, causes, & consequences;
- 11.6. Population Policy of India (Post-independence): objectives, success and challenges.

Suggested Readings:

1. Agarwala, S.N. 1985: India's Population Problems, Tata McGraw hill, New Delhi.
2. Barckley, L.W. 1985: Techniques of Population Analysis, John Wiley and Sons, N.Y.
3. Beaujeu- Garnier, J 1966; Geography of Population, Longman, London.
4. Bhende, A.A. and Kanetkar, T. 1976: Principles of Population Studies, Himalayan Publishing House, Mumbai.
5. Carter, H.1975: The Study of Urban Geography, Edward Arnold, London.
6. Chandna, R.C. 1986: A Geography of Population, Kalyani Publishers, New Delhi.



7. Clarke, J. I. 1971: Population Geography and the Developing Countries, Pergamon Press, Oxford.
8. Clarke, J. I. 1972 Population Geography, Pergamon Press, Oxford.
9. Daniels, P., Bradshaw, M. and Others, 2004: Human Geography, Pearson Education, New Delhi.
10. Hassan, M.H. 2005: Population Geography, Rawat Publications, New Delhi.
11. Pater, C. 1975: Demography: A Systematic Exposition, Jawahar Publishers and Distributors, New Delhi.
12. Srinivasan, K. 1998: Basic Demographic Techniques and Application, Sage Publication, New Delhi.
13. Srivastava, D.S. 1994: Demography and Population Studies, Vikash Publishing House Pvt. Ltd., New Delhi.
14. Trewartha, G.T. 1969: A Geography of Population- World Patterns, John Wiley, New York.
15. Trewartha, G.T. 1972: The Less Developed Realms-A Population Geography, McGraw Hill, New York.
16. Woods R., 1979: Population Analysis in Geography, Longman, London.
17. Zacharia, E. and Sinha, V.C., 1985 : Elements of Demography, Allied publishers Pvt Ltd, New Delhi
18. Zelinsky, W. 1966: A Prologue to Population Geography, Prentice Hall India, New Delhi.

12.0. MODULE 12: SETTLEMENT GEOGRAPHY

20 Marks

:: QUESTION PATTERN ::

- Long answer type questions (10 marks): TWO questions will be set, one from each unit below. Out of which ONE question to be answered (word limit: 600-700 words for each answer).
- Semi-long answer type questions (5 marks): FOUR questions will be set, taking at least one from each remaining two units not covered by long answer type questions above; out of which TWO questions to be answered (word limit: 300-350 words for each answer).

- 12.1. Definition, scope and content of settlement geography.
- 12.2. Rural settlements: Origin, type and morphology, effects of physical and cultural environment on location, morphology and patterns with special reference to India
- 12.3. Urban settlements: Origin, Census definition and size classification of Indian cities, Concept of urban agglomeration; Basic concepts of rural urban fringe
- 12.4. Functional classification of cities (A. Mitra); Morphology & internal structure of urban centers (Burgess, Hoyt and Harris & Ullman); Hierarchy of settlements and Central Place Theory (Christaller)

Suggested Readings:

1. Carter, H. 1975: The Study of Urban Geography, Edward Arnold, London.
2. Daniel, P. and Hopkins, M. 1989: A Geography of Settlement, Oliver and Boyd, Essex.
3. Dickinson, R.E. 1964: City and Regions, Routledge & Kegan Paul Ltd., London.
4. Ghosh, S. 1998 : Settlement Geography, Orient Longman Ltd., Kolkata.
5. Hudson, F.S. 1977: A Geography of Settlements, Macdonald & Evans Ltd., Plymouth.
6. Johnson, J.H. 1977 Urban Geography- An Introductory Analysis, Pergamon press, Oxford.
7. Johnston, R.J. 1984: Urban Geography, Penguin, London.
8. Pathak, C.R. 2002: Spatial Structure and Process of Development in India, regional Science Association, Kolkata.



9. Mandal, R.B. 2001: Introduction to Rural Settlements, Concept Publishing Company, New Delhi.
10. Mayer, H.M. & Kohn, C.F. (editors) 1959: Readings in Urban Geography, The University of Chicago Press, Chicago.

Paper XI (Theoretical – Descriptive Type) : 50 Marks

13.0. MODULE 13 : GEOGRAPHICAL THOUGHT

30 Marks

= QUESTION PATTERN =

- **Long answer type questions (10 marks):** TWO questions will be set, one from each unit below. Out of which **ONE** question to be answered (word limit: 600-700 words for each answer).
- **Semi-long answer type questions (5 marks):** EIGHT questions will be set, taking at least one from each remaining four units not covered by long answer type questions above; out of which **FOUR** questions to be answered (word limit: 300-350 words for each answer).

- 13.1. Definition, scope and evolution of geography as a discipline: ancient, medieval and modern period, contributions of British (Peter Haggett), French (Vidal de la Blache), German (Ferdinand von Richtofen) and American (Hartshorne) schools, relation of geography to other sciences
- 13.2. Man-environment relationship: Determinism, Possibilism, Neo-determinism and Ecological approach
- 13.3. Conceptualizing Location, Space and Time
- 13.4. Regional Differentiation and spatial organization in geography
- 13.5. Dualism and dichotomy in geography: Regional versus Systematic and Physical versus Human
- 13.6. Concept of Paradigm shift in geography: Quantitative Revolution, Radical Geography, Humanistic and Behavioural Geography

Suggested Readings:

1. Adhikari, S. 1992: Geographical Thought, Chaitanya Pub. House, Allahabad.
2. Binege, W. 1962: Theoretical Geography, Glenerp, London.
3. Chorley, R.J. and Hoget, P. (editors) 1965: Frontiers in Geographical Teaching, OUP, Oxford.
4. Dikshit, R.D. (editor) 1994: The Art and Science of Geography: Selected Readings, Prentice Hall India Ltd., New Delhi.
5. Dhunbar, G.S. (editor) 1991: Modern geography: An Encyclopedic Survey, St. James Press, Chicago.
6. Gregory D. And Walford, R. (editors) 1998: Horizons in Human Geography, Macmillan, London.
7. Harvey, D. 1969: Explanations In Geography, London.
8. Hartshorne, R. 1939: The Nature of Geography: Association of American Geographers, USA.
9. Hussain, M. 1995: Evolution of geographical thought, 3rd edition, Rawat Pub. Co., New Delhi.
10. Johnston, R.J., Gregory, D., Pratt, G. and Watts, M. 2000: The Dictionary of human Geography, 4th edition, Blackwell Pub. Ltd., London.



11. Matthews, J.A. and Herbert, J.A. 2004: Unifying Geography: Common Heritage, Shared Future? Routledge, London.
12. Messy, D and Allen, J. (editors) 1984: Geography Matters: A Reader, Cambridge University Press, Cambridge.
13. Peet, R. (editor) 1977: Radical Geography, Methuen, London.
14. Peet, R. 1998: Modern Geographical thought, Blackwell, London.

14.0. MODULE 14: SOCIAL AND CULTURAL GEOGRAPHY

20 Marks

:: QUESTION PATTERN ::

- **Long answer type questions (10 marks):** TWO questions will be set, one from each unit below. Out of which **ONE** question to be answered (word limit: 600-700 words for each answer).
- **Semi-long answer type questions (5 marks):** FOUR questions will be set, taking at least one from each remaining two units not covered by long answer type questions above; out of which **TWO** questions to be answered (word limit: 300-350 words for each answer).

- 14.1. Definition, scope and content of social and cultural geography.
- 14.2. Social processes, social groups, social structure, social well-being, social inequality; Social elements: caste, class, religion, ethnicity, language
- 14.3. Social problems of Indian villages; Gender inequality and Women Empowerment; Tribes of India (Santal, Garo and Toto)
- 14.4. Concepts of culture, community and society, cultural groups, cultural region, cultural realm, cultural hearth, cultural landscape

Suggested Readings:

1. Ahmed, A. 2004 : Social Geography, Rawat Publication, New Delhi.
2. Beaujeu Garnier, 1976: Methods and Perspective in Geography, Longman, London.
3. Chapman, K. 1979: People, Pattern and Process – An Introduction to Human Geography, Edward Arnold Ltd., London.
4. De Blij, H.J. and Murphy, A.B. 2002: Human Geography: Culture, society and space, 7th edition, John Wiley and Sons, New York.
5. Dickinson, R. E. 1964: City and Region, Routledge, London.
6. Dwivedi R.L.2004: Fundamentals of Political Geography, Chaitanya Publishing House, Allahabad.
7. Guha, R. C. 2008: Social Ecology, Oxford University Press, California.
8. Hussain, M. 1994: Human Geography, Rawat Publications Co., New Delhi.
9. Jones, Emrys 1965: Human Geography, Chatto and Windles, London.
10. Jones, E. and Eyles, J. 1977: An Introduction to Social Geography, Oxford University Press, Oxford.
11. Kolars, J. E. and Nyestuen, J. D. 1974: Geography, McGraw Hill Book Co., New Work, London.
12. Leong, G. C. and Morgan, G. C. 1975: Human and Economic Geography, Oxford University Press, Hong Kong.
13. Rubenstein, J. M. and Becon, J. M. 1990: Cultural Geography, John Wiley and Sons Inc., New York.
14. Spencer, J. E. and Thomas, W. L. 1969: Cultural Geography, John Wiley and Sons Inc., New York.



Paper XII (Theoretical – Descriptive Type) : 50 Marks

15.0. MODULE 15: POLITICAL GEOGRAPHY

20 Marks

:: QUESTION PATTERN ::

- **Long answer type questions (10 marks):** TWO questions will be set, one from each unit below. Out of which **ONE** question to be answered (word limit: 600-700 words for each answer).
- **Semi-long answer type questions (5 marks):** FOUR questions will be set, taking at least one from each remaining two units not covered by long answer type questions above; out of which **TWO** questions to be answered (word limit: 300-350 words for each answer).

- 15.1. Definition, scope and content of political geography
- 15.2. Concept of state, nation, frontier, boundary and territory
- 15.3. Geostrategic ideas of Ratzel, Mackinder and Spykman
- 15.4. Concept of Cold war: Bipolarisation and Unipolarisation; Geopolitical importance of India (since 1947) and Indian Ocean.

Suggested Readings:

1. Adhikari, S. 2004: Political Geography, Rawat Publication, New Delhi.
2. Agnew, Jon (Edited) 1997: Political geography: A Reader, Arnold, London.
3. Blacksell, M. 2006: Political Geography, Psychology Press.
4. Dikshit, R.D. 1999: Political Geography, Tata-McGraw Hill Education, New Delhi.
5. Diwedi, R.L. 2004: Fundamentals of Political Geography, Chaitanya Publishing House, Allahabad.
6. Freeman, T. W., 1961: Hundred Years of Geography, Gerald Duckworth and Co., London.
7. Gallaher, C., Dahlman, Carl T. and Others, 2009: Key Concepts in Political Geography, Sage.
8. Jones, M., Jones R. and Others, 2014: An Introduction to Political Geography: Space, Place and Politics, Routledge.
9. Kasperson, Roger E. and Minghi, J.V. 2011: The Structure of Political Geography, Transaction Publishers.
10. Pound, J. 1990: Introduction to Political Geography, Oxford Publication.

16.0. MODULE 16: GEOGRAPHY OF INDIA

30 Marks

:: QUESTION PATTERN ::

- **Long answer type questions (10 marks):** TWO questions will be set, one from each unit below. Out of which **ONE** question to be answered (word limit: 600-700 words for each answer).
- **Semi-long answer type questions (5 marks):** EIGHT questions will be set, taking at least one from each remaining four units not covered by long answer type questions above; out of which **FOUR** questions to be answered (word limit: 300-350 words for each answer).

- 16.1. The Land: major physiographic divisions of India, origin and geomorphological characteristics of the Indo-Gangetic Plain;
- 16.2. Evolution and characteristics of Indian drainage systems (peninsular- Narmada, Extra-peninsular (antecedent- Brahmaputra)



- 16.3. Climate: Climatic zones of India; Soil: Soil zones of India (distribution, characteristics and significance); Vegetation: Vegetation zones, Depletion of forests and forest conservation
- 16.4. Agriculture: Agricultural regions of India, modernization of agriculture and related problems
- 16.5. Industries: Industrial regions of India with special emphasis on the Hoogly Industrial Region, Census classification of workers in India(1991 & 2001); changing concepts of location of industry with special reference to automobile and electronics industry
- 16.6. Processes of globalization and liberalization and their impacts on Indian economy.

Suggested Readings:

1. Dutta, R. And Sundaram, K.P.M. 1999: Indian Economy, S. Chand and Cooperation Limited, New Delhi.
2. Guha, J.L. and Chattoraj, P.R. 1998: A new approach to Economic Geography: A Study of Resources, 15th edition, World Press, Calcutta.
3. Khullar, D.R. 1999: A Comprehensive Geography of India, Kalyani Publishers, New Delhi.
4. Kumar, R. 1985: Fundamentals of Historical Geology and Stratigraphy of India, Wiley-Eastern, New Delhi.
5. Mamoria, C.B. 1996: Economic and Commercial Geography of India, revised edition, Shivalal Aggarwala and Co., Agra.
6. Mathur, S.M. 1986: Physicalgeogy of India, National Book Trust, New Delhi.
7. Pathak, C.R. 2002: Spatial Structure and Process of Development in India, regional Science Association, Kolkata.
8. Sen, P.K. and Prasad, N. 2002: An Introduction to Geomorphology of India, Allied Publishers, Delhi.
9. Ray Chaudhuri, J. 2001: An Introduction to Development and Regional Planning, Orient longman Ltd., Hydrabad.
10. Sharma, T.C. and Coutinho, D. 1998: Economic and Commercial Geography of India, 3rd edition, Vikash Pub. House pvt. Ltd, New Delhi.
11. Shiva, V. 1992: The Violence of the green revolution: Agriculture, Ecology and Politics in the Southm, 2001 reprint, Other India Press, Mapusa.
12. Singh, R.L. (editor) 1971: India; A Regional Geography, national Geographical Society of India/UBS pub. Dictributors Ltd., New Delhi.

Paper XIII (Practical) : 50 Marks

17.0. MODULE 17: PRACTICAL- 3

50 Marks

17.1.0. IDENTIFICATION OF ROCKS & MINERALS (MEGASCOPIC STUDY):

10 Marks

Granite,	Basalt,	Dolerite,	Pegmatite,	Sandstone,
Limestone,	Conglomerate,	Shale,	Quartzite,	Schist,
Gneiss,	Slate,	Phyllite,	Quartz,	Feldsper,
Mica,	Talc,	Graphite,	Magnetite,	Haematite,
Chalcopyrite,	Bauxite,	Calcite,	Galena	Laterite.

**17.2.0. STATISTICAL METHODS:****35 Marks**

- 17.2.1. Statistics: definition, applications and limitations.
- 17.2.2. Basic concepts: data, parameter, constant, variables & sampling techniques.
- 17.2.3. Tabulation of statistical data: parts of a statistical table, general rules of tabulation, types of statistical tables; Frequency distribution table.
- 17.2.4. Methods of data presentation: Histogram, Frequency polygon, Frequency curve, Cumulative frequency curve (Ogive)
- 17.2.5. Measure of central tendencies: Mean (arithmetic), Median, Mode; Partitioned values: Quartiles, Deciles and Percentiles.
- 17.2.6. Measure of dispersions: Range, Quartile Deviation, Mean Deviation (about Mean) & Coefficient of Mean Deviation, Standard Deviation & Coefficient of Variation.
- 17.2.7. Study of relationship: Bivariate correlation (Karl Pearson's Correlation Coefficient and Spearman's Rank Correlation Coefficient), Test of Significance for small samples: t-test; Scatter diagram; Linear Regression Equation of Y on X and Standard Error of Estimate.

17.3.0. LABORATORY NOTE BOOK AND VIVA-VOCE:**2+3 = 5 Marks****Suggested Readings:**

1. Alvi, Z. 1995: Statistical Geography-Methods & Application, Rawat Publications, Jaipur.
2. Pillai, R.S.N. and Bagavathi, 2003: Practical Statistics, S Chand & Co., New Delhi.
3. Clark, W.A.V. and Hosking, P.L. 1986: Geographical Methods for Geographers, John Wiley and Sons, New York.
4. Croxton, F.E., Cowden, D.J. & Klein, S. 1969: Applied General Statistics, Prentice Hall of India Pvt. Ltd., New Delhi
5. Dickinson, G.C. 1973: Statistical Mapping and Presentation of Statistics, Edward Arnold.
6. Goon, A.M., Gupta, M.K. & Dasgupta, B. 1992: Fundamentals of Statistics, Volume 1, The World Press Pvt. Ltd., Kolkata.
7. Gregory, S. 1985: Statistical Methods and the Geographer, Longman, London.
8. Mahmood, A. 1998: Statistical Methods in Geographical Studies, Rajesh Publications, New Delhi.
9. Mottana, A., Crespi, R. and Others 1977: Guide to Rocks and Minerals, Simon & Schuster Inc.
10. Norcliffe, G.B. 1977: Inferential Statistics for Geographers-An Introduction, Hutchinson and Co., London.
11. Pal, S.K. 1998: Statistics for Geo-Scientists- Techniques and Application, concept Publishing Company, New Delhi.
12. Pough, Frederick H. 1996: A Field Guide to Rocks and Minerals, Houghton Mifflin Harcourt.
13. Sarkar, A. 1997: Practical geography: A systematic Approach, Orient Longman Ltd., Hyderabad.
14. Sirkin, Mark R. 2006: Statistics for Social Sciences, Sage Publications.



Paper XIV (Practical) : 50 Marks

18.0. MODULE 18: PRACTICAL- 4	50 Marks
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18.1.0. DATA COLLECTION TECHNIQUES:	10 Marks
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18.1.1. Sources of Data: Primary & Secondary; Methods of data collection: Mechanics of schedule and questionnaire – advantages and limitations.

18.1.2. Preparation of model schedule and questionnaire for physical and socio-economic survey.

18.2.0. APPLIED GEOGRAPHICAL TECHNIQUES:	20 Marks
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18.2.1. Analysis of spatial distribution and interactions: Nearest Neighbour Index, Rank Size Rule (Zipf's distribution);

18.2.2. Measures of inequality: Lorenz's Curve and Gini's Coefficient, Location Quotient;

18.2.3. Combination analysis: Crop Combination (Weaver's method);

18.2.4. Analysis of hydro-meteorological data: Hydrograph and Rating Curve, Rainfall Dispersion Diagram, Climograph (after Taylor);

(12+8 = 20 Marks)

18.2.0. INTERPRETATION OF GEOLOGICAL MAPS:	15 Marks
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Drawing of section and interpretation of geological maps of a) horizontal / unclinal structures, b) folded structures with unconformities and intrusions.

18.3.0. LABORATORY NOTE BOOK AND VIVA-VOCE:	2+3=5 Marks
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Suggested Readings:

1. Basu, R. and Bhaduri, S. (editor) 2007: Contemporary Issues and Techniques in Geography, Progressive Publishers, Kolkata.
2. Bennett, Gordon D. and Patton, Jeffrey C. 2005: Applied Human Geography, Kendall/Hunt Publishing Company, Iowa.
3. Cole, J. P. and King, C.A.M., 1968: Quantitative Geography, Techniques and Theories in Geography, John Wiley & Sons Ltd, Glasgow.
4. Dury, G.H. 1972: Map Interpretation, Pitman Publishing, London.
5. Fukuda-Parr, S and Shiva Kumar, A.K. (editors) 2003: Readings in Human Development, Oxford University Press, New Delhi.
6. Ishtiaque, M. 1989: Practical Geography, Heritage Publishers, New Delhi.
7. Hammond, R, and McCullagh, P. 1978: Quantitative Techniques in Geography: An Introduction, Oxford University Press, Oxford.
8. Maltman, A. 1990: Geological Maps; An introduction, Open University Press, Buckingham.
9. Mahamood, A. 2008: Statistical Methods in Geographical Studies, Rajesh Publications, New Delhi.
10. Platt, J.J., 1956 : Selected Exercises upon Geological Maps, Part I, Unwin, London.



11. Tucker, Maurice E. 2011: *Sedimentary Rocks in the Field: A Practical Guide*, John Wiley & Sons.
12. Young, Pauline V. 2009: *Scientific Social Surveys and Research*, PHI Learning Pvt. Ltd., New Delhi.

Paper XV (Practical) : 50 Marks

19.0. MODULE 19: PRACTICAL- 5

50 Marks

19.1.0. REMOTE SENSING AND G.I.S.:

15 Marks

- 19.1.1. Remote Sensing: Definition, stages, applications, advantages and limitations.
- 19.1.2. Energy source: Shortwave & Long-wave EMR.
- 19.1.3. Remote Sensing Platforms: Ground, Air and Space Bourne Platforms.
- 19.1.4. Satellites: Geostationary and Sunynchronous; IRS Satellites.
- 19.1.5. Sensors: Whisk-broom and Push-broom types.
- 19.1.6. Resolution: Spatial, Spectral, Temporal and Radiometric.
- 19.1.7. G.I.S.: Definition, Components, Hardware and Software requirement, advantages and limitations. Data structure of G.I.S.: Raster and Vector – advantages and disadvantages.
- 19.1.8. Global Positioning System (GPS): Definition, basic principles of position calculation, GPS Signals, applications and advantages.

19.2.0. FIELD REPORT

30 Marks

19.2.1. Field Report Preparation

General Guideline for the preparation of Field Report:

- Participation of each student in the Field Work is mandatory & Certificate of Supervisor regarding the participation in Field Work is to be attached in the Report.
- Field report is to be prepared by the student in his/her own hand writing.
- No part of the report should contain any photocopied or Printed/typed material.
- Length of the report not to exceed 3000 words.
- The Field Report should contain up to 10 pages for diagrams and maximum of 4 pages for photographs.



- The report is to be prepared for a C.D. Block /P.S./ Mouza/ G. P./ Municipality/ Sub- division/ Drainage Basin area primarily on the basis of field survey.
- Questionnaire(s)/ schedule(s) are to be prepared for collection of primary data and one of the same as filled in during the field work, duly signed by the concerned teacher, be annexed with the field report.
- The report should be prepared normally with primary data collected by field survey.
- Incorporation of secondary data should not exceed 1/5th of the total report.

(20 Marks)

19.2.2. Viva-voce on Field Report

- Duration of viva-voce: not to exceed 10 minutes. Each part is to be evaluated by separate examiner simultaneously.

(10 Marks)

19.3.0. LABORATORY NOTE BOOK AND VIVA-VOCE:

2+3=5 Marks

Suggested Readings:

1. Burrough, P.A., 1998: Principles of Geographical Information system for land resources assessment, 2nd edition, Oxford University press, New York.
2. Campbell, J.B. 1996: Introduction to Remote Sensing, 2nd Edition, Taylor & Francis, London.
3. Curram, P.J. 1988: Principles of Remote Sensing, FIBS Edn., Longman group, U.K. Ltd.
4. Curram, P.J. 1980: Multispectral remote sensing of vegetation amount, progress in Physical Geography.
5. Demers, M.N. 1997: Fundamentals of geographic information system, Wiley, New York.
6. Guha, P.K. 2003: Remote Sensing for the Beginner, Affiliated East-West Press Pvt. Ltd., New Delhi.
7. Jensen, J.R., 2000: Remote Sensing of the environment: An earth resource perspective, prentice Hall, upper saddle river, N.J.
8. Joseph George, 2003: Fundamental of Remote Sensing, University Press (India) Pvt. Ltd., Hyderabad.
9. Laurini, R. And Thompson, D. 1992: Fundamentals of Spatial Information System, London, Academy Press.
10. Lillesand, t.M. and Kieffer, R.W.2003: Remote sensing and Image interpretation, 5th Edition, Wiley, New York.
11. Narayan, L.R.A. 1999: Remote Sensing and Its Application, Universities Press (India) Ltd., Hyderabad.
12. Rajan, M.S. 1995: Space Today, 2nd edition, National Book Trust, New Delhi.
13. Rao, U.R. 1996: Space Technology for Sustainable Development, Tata McGraw Hill, New Delhi.
14. Sabins, F.F. 1997: Remote Sensing. Principles and Applications, 3rd edition, W.H. Freeman & Company, New York.



Paper XVI (Practical) : 50 Marks

20.0. MODULE 20: PRACTICAL- 6	50 Marks
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20.1.0. MEASUREMENT OF WEATHER ELEMENTS BY METEOROLOGICAL INSTRUMENTS: 5 Marks

Rotational Anemometer, Rain Gauge, Hygrometer, Maximum & Minimum Thermometer, Fortin's Barometer.

20.2.0. WEATHER MAP: 10 Marks

Interpretation of weather maps: pre-monsoon, monsoon and post-monsoon.

20.3.0. INTERPRETATION OF AERIAL PHOTOGRAPH & SATELLITE IMAGERY: 10 Marks

20.3.1. Mirror Stereoscope: Components and working principle; Interpretation of aerial photographs using mirror stereoscope.

20.3.2. Satellite imagery: General characteristics, Concept of False Colour Composition; Standard FCC. Visual interpretation of Standard FCC Satellite Imagery.

20.4.0. USE OF G.I.S. SOFTWARE: 10 Marks

20.4.1. Map Import, Georeferencing and Digitization (point, line and polygon layers).

20.4.2. Coordinate System Transformation.

20.4.3. Addition of attributes to the map and preparation of thematic maps (choropleth, bar and pie diagram).

20.5.0. BASIC OPERATIONS ON SPREADSHEET (Ms Excel 2007 or later): 10 Marks

20.5.1. Derivation of result using Excel Formulas: Sum, Product, Mean, Median, Mode, Quartile, Percentile, Standard Deviation and Correlation Coefficient

20.5.2. Preparation of cartograms : Bar diagram, pie diagram, line graph, scatter diagram, trend line.

20.6.0. LABORATORY NOTE BOOK AND VIVA-VOCE: 2+3=5 Marks

Suggested Readings:

1. Chaston, Peter R. 2009: Weather Maps: How to Read and Interpret All the Basic Weather Charts, Chaston Scientific Incorporated.
2. Conway, Eric D. 1997: An Introduction to Satellite Image Interpretation, Maryland Space Grant Consortium.
3. Held, B. 2010: Microsoft Excel Functions & Formulas, Wordware Publishing, Inc.



4. Hoffman, Robert R. and Markman, Arthur B. 2001: Interpreting Remote Sensing Imagery, CRC Press.
5. Jensen, J.R., 2000: Remote Sensing of the environment: An earth resource perspective, prentice Hall, upper saddle river, N.J.
6. LeCorps, R. 2002: Microsoft Excel Fundamentals, RGL Learning & Publishing.
7. Lillesand, t.M. and Kieffer, R.W.2003: Remote sensing and Image Interpretation, 5th Edition, Wiley, New York.
8. Lueder, Donald R. 2008: Aerial photographic interpretation: principles and applications, McGraw Hill Publication.
9. Rampal, K.K. 1999: Handbook of Aerial Photography and Interpretation, Concept Publishing Co., New Delhi.
10. Sarkar, A. 1997: Practical geography: A systematic Approach, Orient Longman Ltd., Hyderabad.

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