Maharaja Ganga Singh University, Bikaner

SYLLABUS

M.A./M. Sc. in GEOGRAPHY (Semester)

(Choice Based Credit System)

Session: - 2024-25

Table of Contents

Sr. No.	Item	Page No.
1	**Background**	**3-4**
2	**Programme Outcomes**	**4-5**
3	**Programme Specific Outcomes**	**5**
4	**Postgraduate Attributes**	**5-6**
5	**Structure of Masters Course**	6-7
6	**Learning Outcome Index**	**8**
7	**Semester-wise Courses and Credit Distribution**	**9-10**
8	**Detailed Course-level Syllabus**	**11-40**
9	**Teaching-Learning Process**	**41**
10	**Blended Learning**	**41**
11	**Assessment and Evaluation**	**41-42**
12	**Keywords**	**42**
13	**References**	**43**

Background

Considering the curricular reforms as instrumental for desired learning outcomes, all the members of the Board of Studies made rigorous attempts to revise the curricula of Postgraduate Programmes in alignment with National Education Policy-2020 and UGC Quality Mandate for Higher Education Institutions2021. The process of revising the curriculum could be prompted with the adoption of "Comprehensive Roadmap for Implementation of NEP". The roadmap identified the key features of the Policy and elucidated the Action Plan with well-defined responsibilities and indicative timeline for major academic reforms.

The process of revamping the curriculum started with a series of webinars and discussions conducted by the University to orient the teachers about the key features

of the Policy, enabling them to revise the curriculum in sync with the Policy. Proper orientation of the faculty about the vision and provisions of NEP-2020 made it easier for them to appreciate and incorporate the vital aspects of the Policy in the revised curricula focusing on creating holistic, thoughtful, creative, and well-rounded individuals equipped with the key 21st century skills 'for the development of an enlightened, socially conscious, knowledgeable, and skilled nation'.

With NEP-2020 in background, the revised curricula articulate the spirit of the Policy by emphasizing upon integrated approach to learning; innovative pedagogies and assessment strategies; multidisciplinary and cross-disciplinary education; creative and critical thinking; ethical and Constitutional values through value-based courses; 21st century capabilities across the range of disciplines through life skills, entrepreneurial and professional skills; community and constructive public engagement; social, moral and environmental awareness; Organic Living and Global Citizenship Education (GCED); holistic, inquiry-based, discovery-based, discussion-based, and analysis based learning; exposure to Indian knowledge system, cultural traditions and classical literature through relevant courses offering 'Knowledge of India'; fine blend of modern pedagogies with indigenous and traditional ways of learning; flexibility in course choices; student-centric participatory learning; imaginative and flexible curricular structures to enable creative combination of disciplines for study; offering multiple entry and exit points; breaking the silos of disciplines; integration of extra-curricular and curricular aspects; exploring internships with local industry, businesses, artists and crafts persons; closer collaborations between industry and higher education institutions for technical, vocational and science programmes; and formative assessment tools to be aligned with the learning outcomes, capabilities, and dispositions as specified for each course. The University has also developed consensus on adoption of Blended Learning with 10% component of online teaching and 90% face to face classes for each programme.

The revised curricula of various programmes could be devised with concerted efforts of the Faculty, Heads of the Departments, Members of the Board of Studies, and Deans of Schools of Study. The Vice Chancellor of the University conducted series of meetings with Heads and Deans to deliberate upon the vital parameters of the revised curriculum to formulate a uniform template featuring Background, Programme Outcomes, Programme Specific Outcomes, Postgraduate Attributes, Structure of Masters Course, Learning Outcome Index, Semester-wise Courses and Credit Distribution, Course-level Learning Outcomes, Teaching Learning Process, Blended Learning, Assessment and Evaluation, Keywords, References and Appendices.

To ensure the implementation of curricular reforms envisioned in NEP-2020, the University has decided to implement various provisions in a phased manner. Therefore, the curriculum may be reviewed annually so as to gradually include all relevant provisions of NEP-2020.

Programme Outcomes (PO)

Vision

To build responsive, responsible, sensitive, creative, and thoughtful citizens with a comprehensive understanding of regional, national, and international perspectives.

Mission

To strive towards the educational, cultural, economic, environmental and social advancement of the region and the nation at large by providing multidisciplinary liberal education involving arts, sciences, social sciences, education, law and commerce & management and quality programmes which inculcate and enhance students' creative and innovative insights, equipping them with both professional and vocational skills, leading to Bachelors', Masters', Professional, Vocational and Doctorate Programmes.

Program Objectives:

1. To disseminate knowledge of Earth's highly varied physical environment.

2. To provide an understanding of mankind's adaptation to, and settlement in, varied environmental settings.

3. To enhance an understanding of the spatial organization at local, regional, and global scales.

4. To provide practical training on the use of survey instruments and geo-spatial analytical techniques for Geographical analyses.

5. To sensitize students about the unprecedented pace and scale of adverse environmental impact of human activities during last 100 years.

6. To empower students with spatial analysis and decision making skill sets which help promotion of sustainable development and environmental conservation.

7. To prepare students for successful careers in academic and research institutes, as technical advisors to administrative departments dealing with spatial decision making, geo-spatial consultants to industries, businesses and NGOs.

Programme Outcomes (PO)

The PG Courses of Faculty of Social Science will be able:

PO	Description
PO1	To acquaint students with recent knowledge and techniques in social and applied spatial sciences.
PO2	To develop understanding of environmental and socio-cultural basis of life.
PO3	To provide insight into ethical implications of scientific research for sustainable development and environmental protection.
PO4	To develop problem solving innovative thinking with robust communication and writing skills in youth.
PO5	To understand application of spatial knowledge for human wellbeing and sustainable development.
PO6	To impart practical and project based vocational training for preparing youth for a career in research and entrepreneurship for self-reliance.

Program Specific Outcome (PSO)

PSO	Description
PSO-1	To contribute to sustainable development and wise use of resources for benefit of society through education and research on environment with an inter-disciplinary approach with focus on spatial relationships.
PSO-2	To provide knowledge on natural and built environments and their dynamic interaction for promotion of the quest of sustainability.
PSO-3	To create awareness on forest and biodiversity conservation, global warming and climate Change, and human adaptation possibilities and strategies.
PSO-4	To educate students on assessment of environmental footprint of human activities in simple to complex socio-economic setups.
PSO-5	To give knowledge on concepts, tools and modern techniques for mapping of Earth surface, change detection, modelling of environmental and socio-economic processes and scenario generations.
PSO-6	To educate students on urban and regional development and planning.

Post Graduate Attributes

The graduate attributes of our students shall be aligned with those of our University in terms of touching "the life of every student through inculcating virtues of empathy, ethics, efficiency, and respect for diversity, prudence and creativity with compassion". We wish to achieve this through rigorous teachings and research effort, which remains the basic tenet of our teaching-learning philosophy. The following are the University's graduate attributes which we emphasize.

- In-depth domain knowledge
- Interdisciplinary perspective
- Competence for research and innovation
- Analytical competence
- Critical thinking
- Problem solving competence
- Decision making
- Information technology skills
- Ability to work independently
- Capacity for creativity
- Contribute to societal well-being & sustainability.

Structure of Programme

Semester 1: Four Core Compulsory Theoretical Courses, Two Practical Courses and One Foundation Course

GFC-100	Geography Foundation Course	Elementary Concepts of Geography
GCC-101	Geography Core Compulsory	Geo-tectonics and Geomorphology
GCC-102	Geography Core Compulsory	Climatology
GCC-103	Geography Core Compulsory	Oceanography
GCC-104	Geography Core Compulsory	Evolution of Geographical Thought
	Practicals	
	Practical 1 (Combined Practical for GCC - 101 and GCC-102)	
	Practical 2 (Combined Practical for GCC -103 and GCC-104)	

Semester 2: Four Core Compulsory Theoretical Courses, Two Practical Courses and One Foundation Course

GFC-200	Foundation Course	Human Values
GCC-201	Geography Core Compulsory	Economic Geography: Concepts, Principles and Techniques
GCC-202	Geography Core Compulsory	Population Geography
GCC-203	Geography Core Compulsory	Quantitative Methods in Geography
GCC-204	Geography Core Compulsory	Environmental Geography
Practicals		
Practical 3 (Combined Practical for GCC-201 and GCC-202)		
Practical 4 (Combined Practical for GCC-203 and GCC-204)		

Learning outcome Index of the courses

(i)Programme outcome (PO) and programme Specific Outcome (PSO)

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
PO1	✓	✓		✓	✓	✓
PO2	✓		✓	✓		✓
PO3		✓	✓		✓	
PO4	✓	✓		✓		✓
PO5			✓	✓		✓
PO6		✓			✓	

(ii)Programme Specific Outcome (PSO) and Core Courses

	GCC 101	GCC 102	GCC 103	GCC 104	GCC 201	GCC 202	GCC 203	GCC 204	GCC 301	GCC 302	GCC 401	GCC 404
PSO1	✓		✓	✓	✓		✓		✓	✓		✓
PSO2	✓	✓				✓			✓		✓	✓
PSO3		✓		✓				✓				✓
PSO4	✓		✓	✓		✓	✓			✓		✓
PSO5			✓		✓				✓		✓	✓
PSO6	✓	✓		✓	✓						✓	✓

(iii) Programme Specific Outcome (PSO) and Elective Courses

	GCE 303 A	GCE 303 B	GEO 304 A	GEO 304 B	GCE 402 A	GCE 402 B	GCO403A	GEO403 B
PSO1	✓	✓	✓	✓	✓	✓		✓
PSO2		✓	✓	✓	✓	✓		
PSO3	✓		✓	✓		✓	✓	
PSO4		✓		✓	✓			
PSO5	✓		✓		✓		✓	✓
PSO6	✓	✓				✓		✓

Semester Wise Credit Distribution as per

CHOICE BASED CREDIT SYSTEM (CBCS)

Paper Code	**Paper Name**	**Course**	**Lecture**	**Tutorial**	**Practical**	**Total Credits**	**Maximum Marks**		**Minimum Passing Marks (%)**
							Internal Marks	**External Marks**	
Semester-I									
Theory Papers									
GFC-100	Elementary Concepts of Geography	Foundation Course	1	1	-	2 (Non-CGPA)	-	-	S/NS
GCC-101	Geo-tectonics and Geomorphology	Core Compulsory	3	1	-	4	20	80	36
GCC-102	Climatology	Core Compulsory	3	1	-	4	20	80	36
GCC-103	Oceanography	Core Compulsory	3	1	-	4	20	80	36
GCC-104	Evolution of Geographical Thought	Core Compulsory	3	1	-	4	20	80	36
Total Theory Marks							80	320	
							400		72 (36% aggregate)
Practical									
GPC-105	Practical 1 (Combined Practical for GCC 101 and GCC-102)	Core Compulsory	-	-	8	4	20	80	36 (36% aggregate)
GPC-106	Practical 2 (Combined Practical for GCC 103 and GCC-104)	Core Compulsory	-	-	8	4	20	80	36 (36% aggregate)
Total Credits						**24**	**Grand Total**	**600**	36 (36% aggregate)

Semester-II									
Theory Papers									
GFC-200	Human Values	Foundation Course	1	1	-	2 (Non-CGPA)	-	-	S/NS
GCC-201	Economic Geography: Concepts, Principles and Techniques	Core Compulsory	3	1	-	4	20	80	36
GCC-202	Population Geography	Core Compulsory	3	1	-	4	20	80	36
GCC-203	Quantitative Methods in Geography	Core Compulsory	3	1	-	4	20	80	36
GCC-204	Environmental Geography	Core Compulsory	3	1	-	4	20	80	36
Total Theory Marks							80	320	
							400		(36% aggregate)
Practical									
GPC-205	Practical 1 (Combined Practical for GCC 201 and GCC-202)	Core Compulsory	-	-	8	4	20	80	36 (36% aggregate)
GPC-206	Practical 2 (Combined Practical for GCC 203 and GCC-204)	Core Compulsory	-	-	8	4	20	80	36 (36% aggregate)
Total Credits						**24**	**Grand Total**	**600**	

- A candidate shall be required to obtain 36% marks to pass in theory, practical and internals separately.
- The marks of Internal Evaluation – 20 Marks theory paper, 20 Marks practical paper - should be given based on seminar/assignments/presentations/class tests/logical thinking/application of knowledge and skills, other activities etc. based on syllabus.

Scheme of Semester - End DCCT (Theory) Paper Examination

1. English/Hindi shall be the medium of instructions and examination.
2. There will be semester end examination.
2. Each Theory paper is of 100 Marks (4 Credits).
3. The evaluation scheme shall comprise external evaluation and internal evaluation. The internal evaluation will carry 20 marks while the Semester-end examination will carry 80 marks for each Theory paper.
4. The duration of the written examination for the theory paper shall be three hours.
5. A course will contain 5 units.
6. The question paper shall contain three sections.

Maximum Marks: 80
Duration: 3 Hrs.

Section A

(10 x 1 = 10 marks)

Section A (10 marks) shall contain 10 questions, two from each Unit. Each question shall be of 1 mark. All the questions are compulsory. Section A will be prepared such that questions (i) through (v) are multiple-choice questions, while questions (vi) through (x) will be fill-in-the-blank questions.

Section B

(5 x 5 = 25 marks)

Section B (25 marks) shall contain 5 questions (two from each unit with internal choice). Each question shall be of 5 marks. The candidate is required to answer all 5 questions. The answers should not exceed 150 words.

Section C

(3 x 15 = 45 marks)

Section C (45 marks) shall contain 5 questions, one from each Unit. Each question shall be of 15 marks. The candidate is required to answer any three questions by selecting these three questions from different units. The answers should not exceed 500 words.

Scheme of End Semester DCCP (Practical) Paper Examination

1. Each Practical Paper in Geography is combined practical for two theory papers, hence each Practical paper will carry 100 marks (4 Credits).
2. Evaluation scheme shall comprise external evaluation and internal evaluation. The internal evaluation will carry 20 marks while the end Semester examination will carry 80 marks for each Practical paper.
2. The duration of the practical examination shall be six hours.
3. Scheme: 8 periods per week (for each of the practical paper) per batch of 40 students.

1. Distribution of marks:	**Marks**
1. Lab work/ Written work: 2 hrs duration	40
2. Record work & viva- voce: 2 hr duration	15 +5 =20
3. Field survey & viva-voce: 2 hr duration	15 +5 =20
4. Internal Evaluation	20
Total	100

Note: The candidate is required to answer/attend any 4 exercises (10 marks each) out of 6 exercises during Lab Work/ Written work and 40 candidates shall be examined in one batch.

M.A./M.Sc. First Semester

GFC-100	Elementary Concepts of Geography
GCC-101	Geo-tectonics and Geomorphology
GCC-102	Climatology
GCC-103	Oceanography
GCC-104	Evolution of Geographical Thought
GPC-105	Practical 1 (Combined Practical for GCC 101 and GCC-102)
GPC-106	Practical 2 (Combined Practical for GCC 103 and GCC-104)

Course Title: Elementary Concepts of Geography
Course Code: GFC – 100

Time: 3 Hours **M.M. 80+20**

UNIT I

Subject matter of Geographical inquiry: description and explanation of spatial patterns of physical environment and cultural landscape as an interdisciplinary science.

UNIT II

Attributes of Place: Location and Locality, Geometry, Geographical Environment. Ascertaining location on Earth's Surface: Determination of latitude and Longitude, Concepts of Distance, Direction and Scale.

UNIT III

Evolution of mapping techniques. Age of Exploration and Discovery of Continents.

UNIT IV

The dynamic relationship between Man and Environment: Determinism vs Possibilism; Dualisms in Geography: Physical and Human Geography; Land use and occupations of Man.

UNIT V

Approaches to Regional study: Uniqueness of Region, Region as an Organism; Unit for Spatial Planning and Organization. Theoretical (agricultural, industrial,

and central place models) and Applied Geography (spatial diffusion and GIS based mapping and environmental simulations).

Suggested Reading:

Adhikari, S. (1992). Geographical Thought. Allahabad: Chaitanya Pub. House.
Blis, H. J. (1971). Geography Regions and Concepts. New York: John Wiley of Sons INC.
Board, C., Chorley, R., & Stoddart, D. (1974). Progress in Geography.
International Reviews of Current Research Vol - 6.
Bunge, W. (1962). Theoritical Geography. London: Glenerp.
Chorley, R., & Haggett, P. (1965). Frontiers in Geographical Teaching. Oxford: OUP.
Coffey, W. (1981). Geography - Towards a General Spatial System Approach. USA: British Library Cataloguing in Pub.Data.
Dickinson, R. (1969). Makers of Modern Geography. Ludhiana: Lyall Book Depot.
Dikshit, R. (2006). Geographical Thought - A Contextual History of Ideas. New Delhi: Prentice Hall of India Private Limited.
Dikshit, R. (1994). The Art and Science of Geography:Selected Reading. New Delhi: Prentice Hall India Ltd.
Dunbar, G. (1991). Modern Geography:An Encyclopedic Survey. Chicago: St.James Press.
Freeman, T. (1971). A Hundred Years of Geography. London: Gerald Duckworth & Co.Ltd.
Gregory, D., & Walford, R. (1988). Horizons in Human Geography. London: Macmillan.
Hartshorne, R. (1968). Perspectives on the Nature of Geography. John Murray,London: Association of American Geographers,Great Britain.
Hartshorne, R. (2002). The Nature of Geography. New Delhi: Rawat Pub.Co.
Harvey, D. (2003). Explanation in Geography. New Delhi: Rawat Pub.Co.
Harvey, D. (1979). Social Justice and the City. Great Britain: The Pitman Press,Bath.
Harvey, E., & Holly, B. P. (2002). Themes in Geographical Thought. New Delhi: Rawat Pub.Co.
Husain, M. (2007). Models in Geography. New Delhi: Rawat Pub. Co.
Hussain, M. (1995). Evolution of Geographical Thought,3rd edition. New Delhi: Rawat Pub.co.
Hussain, M. (1994). Regional Geography. New Delhi: Anmol Pub.Ltd. Johnston, R. (2000). Geography and Geographers. London: Oxford University
Press,New York.Edward Arnold.
Johnston, R., & Hemer, J. (1990). Regional Geography:Current Developments and Future Prospects. London & New York: Routledge Publishers. Legg, S. (2007). Spaces of Colonialism. UK: Blackwell Publishing.
Massey, D. (1994). Space,Pace and Gender. Minnesota: University of Minnesota Press.
Messy, D., & Allen, J. (1984). Geography Matters:A Reader,. Cambridge: Cambridge University Press.

Moss, P. (2002). Feminist Geography in Practice Research and Methods. UK: Blackwell Pub.Co.
Murdoch, J. (2006). Post-Structuralist Geography. New Delhi: Sage Publications Limited.
Pandey, P. (1983). Modern Geographical Trends. New Delhi: Todays and Tommorow Printers andPublishers.
Peet, R. (2003). Radical Geography. New Delhi: Rawat Pub.Co.
Peet, R., & Thrift, N. (1989). New Models in Geography. Boston,Sydney,Wellington: Unwin Hyman.
Raju, S., & Lahiri-Dutt, K. (2011). Doing Gender Doing Geography Emerging Research in India. UK: Routledge.

Course Title: Geo-tectonics and Geomorphology
Course Code: GCC- 101

Time: 3 Hours **M.M. 80+20**

Unit I

Origin of Earth's Magnetic Field; Paleomagnetism; Plate Tectonics as a Unified Theory of Global Tectonics; Tectonic and Neo-tectonic processes; Earth's Interior-with special reference to Seismology; Earth Movements;

Unit II

Endogenetic Processes- Faulting and Folding; Vulcanism and associated structures.
Exogenetic Processes; Weathering; Mass Movement, Denudation, Deposition.

UNIT III

Fluvial Processes: Erosional and Depositional Landforms
Aeolian Processes: Erosional and Depositional Landforms
Glacial Processes: Erosional and Depositional Landforms
Marine Processes: Erosional and Depositional Landforms

UNIT IV

Models of Landform development by Hutton, Davis, Penck, and King
Application of Geomorphology in Feasibility Assessment of Engineering and Industrial Projects;
Application of Geomorphic knowledge to Hazard Risk Assessment studies

UNIT V

Concept of Morphogenetic Region - classification schemes and characteristics;
Regional geomorphology of Thar Desert, Aravalli Region, Hadoti Plateau, Deccan Trap, Chhota Nagpur; Western Ghats

Suggested Readings:

Ahmed, E., 1985, Geomorphology, Kalyani Publishers, New Delhi.

Ahmed, E., 1972, Coastal Geomorphology of India, Orient Longman.

Chorley, R., Schumm, S. and Sugden, D.E. 1994. Geomorphology, Methuen, London.

Cook and Doorncamp. 1988. Geomorphology in Environment Management, London

Dayal, P., 1995, A Textbook of Geomorphology, Shukla Book Depot. Patna

Dury, G.H.,1967, Essays in Geomorhology, Heinemann Educational Books Ltd, London

Faniran, A. and Jeje, L.K. 1983. Humid Tropical Geomorphology, Longman, London

Fairbridge, R.W., 1968, The Encyclopaedia of Geomorphology, (Edge), Rainhold Book Corporation,
New Youk

Goguel, J. and Thalmann, H. E., 1962, Tectonics, W.H.Freeman and Compnay

Kale, V.S. and Gupta, A. 2001. Introduction to Geomorphology, Orient Longman Ltd., Hyderabad

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

King, L.C., 1965 Morphology of the Earth, Oliver and Boyd, Edinburgh.

Leopold,L.B., et al, 1964, Fluvial Processes in Geomorphology, Eurasia Publishing House, New Delhi.

Mitchell, C.W 1991. Terrain Evaluation, 2nd edition, Longman Scientific & Technical, Harlow

Morisawa, M. (editor) 1994. Geomorphology and Natural Hazards, Elsevier, Amsterdam.

Morisawa, M. 1985. Rivers, Longman, London.

Melhorn, W.N. and R. C. Flemal, 1975, Theories of Landform Development, George Alen and Unwin.

Ollier, C.D. 1981: Tectonic Geomorphology, Longman Scientific & Technical, London.

Petts, G. and Foster, I. 1985. Rivers and Landscapes, Edward Arnold, London.

Petts, G.E. and Amoros, C. (editors) 1996. Fluvial Hydrosystems, Chapman and Hall, London.

Rice, R.J. 1988. Fundamentals of Geomorphology, 2nd edition, Longman Scientific and Technical, London.

Selby, M.J. 1985. An Introduction to Geomorphology, Clarendon, Oxford.

Sharma, H.S. 1987. Tropical Geomorphology: A Morphogenetic Study of Rajashan, South Asia Books, Jaipur.

Starkel, L. and Basu, S. 2000 Rains, Landslides and Floods in the Darjeeling Himalaya, Indian National Science academy, New Delhi.

Strahler, A. N. and Strahler, A. H., 1978, John Wiley and Sons, New York

Summerfield, M.A. (Editor) 1991. Global Geomorphology: An Introduction to the Study of Landforms, John Wiley and Sons Ltd., New York.

Singh, Savindra, 2000. Geomorphology, Prayag Pustak Bhavan

Thornbury, W.D. 1969. Principles of Geomorphology, Wiley Eastern Limited, New Delhi.

Tinkler, 1985. A Short History of Geomorphology, Croom Helm Ltd., Beckenham.

Valdiya, K.S. 1998. Dynamic Himalaya, University Press (India) Ltd., Hyderabad.

Wilson, J.P. and Gallant, J.C. (editors) 2000. Terrain Analysis: Principles and Applications, John Wiley, and Sons Ltd. New York.

Wirthmann, A. 2000. Geomorphology of the Tropics, Translated by Busche, D. Springer-Verlag, Berlin.
Wooldridge, S.W., 1965, An Outline of Geomorphology, Longman Young, A., 1972, Slopes, T. and A. Constable Ltd, Edinburgh

Course Title: Climatology
Course Code: GCC -102

Time: 3 Hours **M.M. 80+20**

Unit I

Composition and Structure of atmosphere;
Insolation: latitudinal distribution over the Earth
Geographic Influences on Temperature distribution over Earth surface:
Temperature: Environmental Lapse Rate and Inversion;

Unit II

Pressure and Wind Distribution; Forces controlling Motion of air;
Evaporation and cloud formation;
General Circulation in the atmosphere;
Jet Stream;
Local Winds
Air Masses and Fronts- types, characteristics and weather conditions;

Unit III

Precipitation- causes, forms, types.
Adiabatic processes and Instabilities;
Tropical Cyclones- Distribution, Characteristics and Origin;
Temperate Cyclones- Distribution, Characteristics and Origin;
Monsoon- Characteristics and Theories of Origin,
Spatial distribution of Precipitation over the Earth

Unit IV

Extreme Weather Events- Cloudbursts; Tornado, Typhoons, Hailstorms, Wind Storms, Heat Wave, Cold Wave, Fog.
Ocean-Atmospheric Interaction- El Nino, Southern Oscillation (ENSO) and La Nina;
Climatic classification schemes of Koeppen and Thornthwaite;
Salient characteristics of different Climatic types identified by Koeppen.

UNIT V

Global Warming- Causes and evidence
Climate Change: theories of astronomical and anthropogenetic causes;
Climate Change – Spatial variations in Environmental and Social Impacts;
Climate Change – Mitigation and Adaptation Strategies
Urban Heat Island; Concept of Heat Index

Suggested Readings:

Anthes, R. 1997: Meteorology, 7th edition, Prentice-Hall Inc., Upper Saddle River
Barry, R.G. and Chorley, R.T. 1992: Atmosphere, Weather and Climate, 6th edition, Routledge, London
Brigg, G.R. 1996 : The Ocean and Climate, Cambridge University Press, Cambridge
Cock, N.K. 1995 : Geohazards: Natural and Human, Prentice Hall, Englewood Cliffs Critchfield, H.J.
1983: General Climatology, 4th edition, Prentice Hall India Ltd., New Delhi
Das, P.K. 1995 : Monsoons, 2nd edition, National Book Trust, New Delhi
Elsom, D.M. 1992 : Atmospheric Pollution: A Global Problem, 2nd edition, Blackwell Pub. Co., London
Lal, D.S. 1993 : Climatology, 3rd edition, Chaitanya Pub. House, New Delhi
Linacre, E. and Geerts, B. 1997 : Climates and Weather Explained, Routledge, London
Lutgens, F.K.. and Tarbuck, E.J. 1998 : The Atmosphere: An Introduction to Meteorology, 7th edition,
Prentice-Hall Inc., Upper Saddle River
Moran, J.M. and Morgan, M.D. 1997 : Meteorology: The Atmosphere and the Science of Weather, 5th edition, Prentice-Hall Inc.
Pant, G.B. and Kumar, R.K. 1997: Climates of South Asia, John Wiley and Sons Ltd., Chichester
Smith, K. 1996 : Environmental Hazards: Assessing Risk and Reducing Disaster, 2nd edition, Routledge,
LondonTaylor, J.A. (editor) 1974 : Climatic Resources and Economic Activity, David & Charles, London
Byers H .R. 1959: General Meteorolgy, Mcgraw Hill Book Company
Oliver J.E. & Hioddore J.J, 2003.: Climatology: An atmospheric science, Pearson
Lal, M, 1993: Global Warming: concern for tomorrow,Tata Mcgraw Hill

Course Title: Oceanography
Course Code: GCC-103

Time: 3 Hours **M.M. 80+20**

Unit -I

Subject matter of oceanography and relation with other environmental sciences;
Origin of ocean basins: Wegner's drift hypothesis, Sea floor spreading and Plate Tectonics.
Distribution pattern of land and ocean over Earth and impacts upon climatic patterns

Unit-II

Elements and characteristics of ocean floor: continental shelf; slope; ridge; abyssal plains; submarine canyons; trenches
Configuration of ocean floors of Indian, Pacific, Atlantic, and Arctic oceans

Unit-III

Horizontal and vertical profile of Temperature variations in oceanic water: causes and impacts;
Salinity variations in oceans; causes and impacts;
Density of oceans;
Coral reefs - origin theories and distribution;

UNIT IV

Tides: theories and environmental impacts
Warm and Cold ocean currents – distribution and their impact on regional climate and economy;
Fisheries – distribution, prospects and problems
Fossil fuel resources in Ocean basins – Problems and Prospects

UNIT V

Global Warming and Sea-level rise: evidence, mechanism, and impacts.
Pollution of oceanic waters: sources and environmental impacts
Potential of waves and tides as sources of renewable energy generation
Major Oceanic trade routes - economic and Geo-Political significance
Tsunami hazard in coastal regions and its Mitigation

Suggested Readings:

Denny, M., 2008, How the Ocean works: An introduction to Oceanography, Princeton University Press, New Jersey.
Garrison, T., 1995, Essentials of Oceanography Wardsworth Pub. Co., London.
S. Kerhsaw., 2004, Oceanography: An Earth Science Perspective, Routledge, UK. Sharma, R.C. and V. Vatal., 1986. Oceanography for Geographers, Chatanaya Publishing, Allahabad.
Shepart, F., 1969, The Earth Beneath the Sea, Athneum, Rev. ed., New York.
Singh, Savindra., Oceanography, 2014, Pravalika Publications, Allahabad. Thurman, V. Harold., 1987, Essentials of Oceanography, A Bell & Howell Company, Columbus/ Toronto/ Sydney.
Von Arx, W.S., 1962, An Introduction to Physical Oceanography, Addison, Wesley, New York

Course Title: Evolution of Geographical Thought
Course Code: GCC -104

Time: 3 Hours **M.M. 80+20**

Unit-I

Geography - Definition and subject matter
Historical development of the Geographical knowledge - Contribution of Greeks (Homer, Thales, Hecataeus, Anaximander, Herodotus, Eratosthenes, Posidonius} and the Romans (Strabo and Ptolemy) scholars in the ancient world;
Geographical knowledge in the Vedas;
Geography knowledge in the Puranas: continents. oceans, mountain chains and river systems; and described in Puranas
Development of geography in India.

Unit-II

Impact of Dark Ages in Europe upon the process of advancement in Geographical knowledge;

Development of Geographical knowledge in the Islamic world in Middle Ages – understanding of Climatological, Geological and Geomorphic processes and mapping of known areas of Asia, Europe and Africa;

Age of explorations: the great voyages by Columbus, Vasco de Gama, Marco Polo, Magellan, and Captain Cook, and the discoveries of continents, island chains and the over-land/sea-bound trade routes between Europe and Asia.

Establishment of idea of Heliocentric Universe in 16^{th} and 17^{th} Centuries – contributions of Copernicus, Kepler, Galileo, Newton

Unit-III

The emergence of scientific geography in the 18th and 19th centuries - Contribution of Kant, Humboldt and Ritter.

Geographical contribution of Ratzel, Hettner, Richthophen, Vidal-de-la Blache, Jean Brunhes, Mackinder, Dudley Stamp, Semple, Huntington, W.M. Davis, Carl Sauer, Isaiah Bowman, David Harvey, Griffith Taylor

UNIT IV

Paradigms in Geography:
Environmental Determinism
Areal Differentiation
Positivism and quantitative revolution;
Locational Analysis in Geography

Behavioral Geography
Radicalism and Development of Critical Geography;
Humanistic Geography

UNIT V

Dualisms in Geography: Environmental Determinism vs Possibilism; Physical vs Human Geography; Regional vs Systematic Geography; Idiographic vs Nomothetic Approaches; Theoretical vs Applied Geography.

Welfare approach in Geography; Geography of equality, Social Justice and Environmental Justice; Feministic Geography.

Impact of Advances in Geo-spatial Technologies.

Post modernism in Geography.

Perspectives on the Nature of Geography.

Practical 1 (Combined Practical for GCC-101 and GCC-102)

Time: 6 Hours **M.M. 80+20**

Topographical maps - numbering system.

Physiographic study of an area carried out by analyzing toposheets using following techniques (a) serial, superimposed, projected and composite profiles; (b) altimetric frequency and (c) hypsometric curves of drainage basins; (d) slope analysis (Robinson method and Wentworth method), (e) drainage analysis and stream ordering

Interpretation of Topographical maps of (a) the Himalayan belt (1:250000 scale) toposheet (b) Coastal area on (1:250000 scale) toposheet and (c) Northern plain on (1:250000 scale) toposheet, (d) Peninsular Plateau on (1:250000 scale) toposheet, and (e) Thar desert on (1:250000 scale) toposheet. Interpretation should be in based on information related to relief, drainage, vegetation, agriculture, scrub-land, transport, and settlements in an area.

Preparation of Land-use/Land-cover map of a village and its surroundings using a printed **Google Earth Image** AND/OR **Village Revenue map** and field visit for identification of different land use/cover units in the printed image/map.

Practical 2 (Combined Practical for GCC -103 and GCC-104)

Time: 4 Hours **M.M. 80+20**

Weather and climatic data representation techniques: Isotherms, Isobar, Isohytes, Climograph, Hythergraph, Climatograph, Ergograph, Rainfall dispersion diagrams, Concept of Aridity index, Concept of Heat index, Water balance analysis.

Components and Interpretation of Indian Daily Weather Maps of January, April, August, October months

Environmental survey of nearby village/urban ward.

Suggested Readings:

Dickinson, G.C.: Statistical mapping of statistics, London
Khan, Z A: Text book of Practical Geography, Concept, New Delhi, 1998.
Lawrence, GRP: Cartographic Methods, London, 1971.
Monkhouse, FJ & Wilkinson HR: Map & Diagram, Methuen, London, 1994.
Robinson AH et,al. : Elements of Geography, John Willey, New York, 1995.
Sarkar, A K: Practical Geography: A Systematic Approach, Oriental Longman, Calcutta, 1997.
Saroj K. Pal: statistics for Geosciences- Techniques and applications, Concept, New Delhi, 1998.

M.A./M.Sc. Second Semester

GFC-200	Human Values
GCC-201	Economic Geography: Concepts, Principles and Techniques
GCC-202	Population Geography
GCC-203	Quantitative Methods in Geography
GCC-204	Environmental Geography
GPC-205	Practical 1 (Combined Practical for GCC 201 and GCC-202)
GPC-206	Practical 2 (Combined Practical for GCC 203 and GCC-204)

Course Title: Economic Geography: Concepts, Principles and Techniques
Course Code: GCC-201

Time: 3 Hours **M.M. 80+20**

Unit I

Definition, Scope, and development of Economic Geography.
Economic activities and sectors (primary, secondary, tertiary, and quaternary).
Concept of economic development, indicators of development,
Geographical basis of economic activities: systematic approach and spatial approach.

Unit II

Von Thunen's model of agriculture location and its modification.
Agricultural Regions- Concepts and techniques of Delineation;
World Agricultural Systems and Regions.

Unit III

Industrial Location theories: Weberian Location analysis; Losch's economics of locations; Isard's space economy.
Spatial Distribution of Iron & Steel, Cotton Textile, Petro Refining Industries, Technology Industries;
Major Industrial Regions of the World;

UNIT IV

Primate City, Rank Size Rule, Christaller's Theory of Central Places;
Spatial Patterns of Urbanization in Developed and Developing countries
Basic Elements of World Economy;
Spatial Structure of World Economy.
Sustainable development, Human Development.

Concept of Accessibility and Connectivity; Transportation: Modes, Comparative Cost Advantage; Networks- Types and Network Graphs; Connectivity of Networks and their Measurement Indices.

UNIT V

GATT and World Trade Organization (WTO),
Significance of Globalization in World and Regional Economies.
Concept of Economic region;
Techniques of delimitation of economic regions,

Suggested Readings:

Alexander, J.W. (1963) Economic Geography, Prentice - hall Inc

Boyce, Ronald Reed (1974) The Bases of Economic Geography, Holt, Rine Hart and Winston Inc, New York.
Brereton, E. 1992: Resource Use and Management, Cambridge University Press, Cambridge.
Datt, R. & K.P.M. Sundaram (2006) Indian Economy, Prentice - hall Inc
Elliotte, j. A. 1994: An Introduction to Sustainable Development: The Developing World, Routledge, London.
Hurst, Michael E. Eliot (1974) Transportation Geography: Comments and Readings, Mc. Graw-Hill Book Company Ltd.
Johnston, R.J., Taylor, P.J. and Watts, M.J. (editors): 1995: Geographies of Global Change: Remapping the World in the Late Twentieth Century, Blackwell, Oxford.
Mitchell, B. 1997: Resources and Environment Management, Addison Wesley Lon~an Ltd., Harlow. Pickering, K. and Owen, L.A. 1997: An Introduction to Global Environmental Issues, 2nd edition, Routledge, London.
Taaffe E.J. & H. L. Gauthier (1973) Geography of Transportation, Prentice-hall Inc.
United Nations Populations Fund 1997: India Towards Population and Development Goals, Oxford University Press, New Delhi.
Unwin, T. (editor) 1994: Atlas of World Development, John Wiley and Sons Ltd., Chichester.
World Bank 1996: From Plan to Market: World Development Report 1996, Oxford University Press, Oxford.
World Resources Institute 1998: World Resources 1998-99: A Guide to the Global Environment, Oxford University Press, Oxford

Course Title: Population Geography
Course Code: GCC -202

Time: 3 Hours **M.M. 80+20**

Unit I

Nature and Scope of Population Geography vis- a -vis Demography

Sources of Population Data: Census, Sample Survey, Vital Statistics, International Sources.

World Population Growth: Trends in Developing and Developed Countries

Environmental and Social factors of Population Distribution

Spatial Distribution pattern of Population in the 21st Century

Unit II

Population Composition and Characteristics in the Developed and Developing countries in context of the variables of: Age, Sex, Rural-Urban, Occupational Structure, Literacy and Education.

UNIT III

Components of Population Change.

Fertility: Measurement Techniques, Social and Economic Theories, Global and Regional Trends.

Mortality: Measurement Techniques, Life Table, Global and Regional Trends.
Migration: Types, Streams, Ravenstein's Law, Theory of Intervening Opportunities, Gravity Model

UNIT IV

Theories of Population Change: Malthusian, Neo-Malthusian,
Concept of Population Explosion
Concept of Optimum Population;
Demographic Transition Theory.

UNIT V

Development and Environmental Conservation Dilemma.
Population Policies in Developed and Developing Countries.
Population Projection: Techniques and World Scenario.
Diaspora, and Identity Crisis.

Suggested Readings:

Asha A. Bhende, Tara Kanitkar (1978), Principles Of Population Studies, Himalaya Publishing House.
Jacob S. Siegel and David A. Swanson (2004), The Methods and Materials of Demography
K. Srinivasan (1998) 'Basic Demographic Techniques and Applications', New Delhi: SAGE India.
R.C. Chandna (1986), A Geography of Population, Kalyani Publishers.
Shryock, H.S. and J.S. Siegel (1971). The Methods and Materials in Demography (Vol. I and II), Washington DC, US Bureau of Census.
Agarwala and Sinha, 1977, India's Population Problems, Tata McGraw-Hill Publishing Co. Ltd., New Delhi
Bird, J., 1977: Centrality and Cities, Routledge, London
Borooah, G.L., 1938, Population Geography of Assam, Mitali Publications
Cassen, R.H., 1978, India: Population, Economy and Society, English language Book society and Macmillan
Chandna R.C. 2005: Population Geography, Kalyani publishers
Chitambar, J.B. 1993: Introductory Rural Sociology, Wiley Eastern, New Delhi
Clout, Hugh D., 1972, Rural Geography-An Introductory survey, Pergamon Press
Dickinson, R.E. 1968: City and Region: A Geographical Interpretation, Routledge and Kegam Paul Ltd. London.
Diddee, J., 1997: Indian Medium Towns, Rawat Publications, Jaipur.
Flint C and Flint.D, 1999: Urbanisation Changing Environments, Collins, London
Garnier, J. Beaujeu, 1966, Geography of Population, Commonwealth Printing Press Ltd.
Ghosh, S. 1998: Introduction to Settlement Geography, Orient Longman Ltd., Calcutta
Hassan, M. Izhar, 2005, Population Geography, Rawat Publications

Herbert, David and Thomas, Colin, 1982: Urban Geography A First Approach,Jhon Wiley & Sons, New Delhi
Hudson, F.S. 1970: Geography of Settlements, Macdonald and Evans Ltd., PlymouthHusain,
Kuppuswany, B., 1975, Population and Society in India, Popular Prakashan, Bombay
Law.N,Smith.D,(1991),Decision Making Geography, Stanley Thornes Pub. Ltd, Leckhampton
Mandal, R.B. (2000): Urban Geography: A Textbook, Concept Pub. Co., New Delhi.
Mandal, R.B. 1988: Systems of Rural Settlements in Developing Counties, Concept Pub. Co., New Delhi
Mandal, R.B., Uyanga, J. and Prasad, H., 2007, Introductory Methods in Population Analysis, Concept Publishing Company

Course Title: Quantitative Methods in Geography
Course Code: GCC- 203

Time: 3 Hours **M.M. 80+20**

Unit I

Introduction: Types of Data: Nominal, Ratio, Interval, Discrete, Continuous;
Concepts of population, sample; parameter, statistics;
Sampling Techniques: Survey, Schedule, Questionnaire

Unit II

Measures of central tendency: Mean, Mode, Median.
Measurement of dispersion: standard deviation, and variance;

Unit III

Correlation and Regression analysis, Indices of inequality and disparity.

UNIT IV

Concept of Probability. Probability Distribution – Normal, Binomial and Poisson. Permutation and Combination. Standard Error of Mean; Confidence interval; Test of Significance.

UNIT V

Hypothesis formulation – Null Hypothesis and Alternate Hypothesis.
Hypothesis testing: Student T Test, Z Test; Chi-Square, Mann-Whitney Test and Mann-Kendall Test;
Pattern Analysis: nearest neighbour analysis;
Time Series analysis.

Suggested Readings:

Alvi, Z. 1995: Statistical Geography: Methods and Applications, Rawat Pub. New Delhi.
Pal, S.K. 1999: Statistics for Geoscientists, Concept publishing Company, New Delhi
Silk, J. 1979: Statistical techniques in Geography, George Allen and Unwin, London
Ahuja, R. (2001). Research Methodology. Kolkata: Rawat Publication.
Das, D. L. (2000). Practice of Social Research. New Delhi: Rawat Publication.
Harper, C., & Marcus, R. (2007). Research for Development: A practical Guide. New Delhi: Vistaar Publication.
Kothari, C. (2009). Research Methodology: Methods and Techniques. Kolkata: New Age International Publishers.
Misra, H., & Singh, V. (1998). Research Methodology in Geography: Social and Policy Dimension. New Delhi: Rawat Publication.
Misra, R. (2001). Research Methodology: A handbook. New Delhi: Concept Publishing Company.
Mondal
Panneerselvam, R. (2009). Research Methodology. Learning private limited. Singh, K. (2007). Quantitative Social Research Methods. New Delhi: Sage Publication.
Somekh, B., & Lewin, C. (2005). Research Methods in Social Science. New Delhi: Vistaar Publication.

Course Title: Environmental Geography
Course Code: GCC-204

Time: 3 Hours **M.M. 80+20**

Unit I

Environmental Geography: Concepts and Study of Ecological History;
Approaches to Environmental Studies: Environmentalist, Holistic, Organismic and Human Ecological;

Environmental pollution- meaning, types, sources, causes and impacts; Air, Water and Land pollutions;

Unit-II

Ecosystem: Meaning and concepts of ecosystem, Classification and components of eco-system, Trophic structure, Ecological pyramid, Energy flow and Biogeochemical cycle; Global Ecological regions

Unit-III

Deforestation: causes and impacts
Biodiversity Degradation: Hot Spots and environmental impacts;
Greenhouse effect and Global warming;
Ozone depletion, causes of spatial-temporal variations in Ozone Hole formation over the Arctic and Antarctic regions;

UNIT IV

Land Degradation and Desertification in different environmental regions.

Production Technology and Environmental Change, Technological Fix; Carbon Concentration and Sequestration; Red, Brown and Green Technology;

UNIT V

Global Resource Scarcity with special reference to Food and Energy;
Relationship between population increase and environmental degradation
Tragedy of the commons;
Environmental politics of Resource and Development with Special Reference to Climate Change,
Earth Summits, and Protocols and concept of Sustainable Development

Suggested Readings:

Adams, W.M. 1995: Green Development: Environmental Sustainability in the Third World, Rout1edge, London

Alexander, D. 1993: Natural Disasters, Research Press, New Delhi Allaby, M. 1996: Basics of Environmental Science, Routledge, and London Allaby, M. 2006: The Encyclopaedia of Natural Calamities, Viva, Kolkata.

Arnold, D. & Guha, R. 1995: Nature, Culture & Imperialism, OUP, New Delhi Barrow, C. J. (2003). Environmental Change and Human Development. Arnold Publication.

Bhattacharra, R.N. (Ed.) Reprint, 2007. Environmental Economics – An Indian Perspective, Oxford University Press, New Delhi.

Blaikie, P., Cannon, To Davis, I. and Wisener, 1994: At Risk: Natural Hazards, People's Vulnerability and Disasters, Routledge, London

Brown, J.H. & Lomolino, M.V. 1998: Biogeography, Sinauer Associates, USA.

Bryant, E.A. 1991: Natural Hazards, Cambridge University Press, And Cambridge.

Buchholz, R.A. 1993: Principles of Environmental Management, the Greening of Biosphere, Prentice Hall Inc., New Jersey

Canter, L. W. 1996: Environmental Impact Assessment, 2nd edition, McGraw Hill, New York.

Chambers, R., Saxena, N.C. & Shah, T. 1989; To the Hands of the Poor: Water and Trees, Oxford & IBH, New Delhi.

Chary, S. N. (2008). Environmental Studies. Macmillan Publication.

Cox, C.B & Moore, P.D. (2000) Biogeography - An Ecological & Evolutionary Approach, Blackwell Science Ltd, Oxford, London

Das, M.C. 1993: Fundamentals of Ecology, Tata Mc Graw Hill, New Delhi.

Echlom, E.P. 1991: Down To Earth, EWP, New Delhi.

Elsom, D.M. 1992: Atmospheric Pollution: A Global Problem, 2nd edition, Blackwell Pub. Co., London.

Farmer, A. 1997 : Managing Environmental Pollution, Routledge, London.

Gadgal, M. & Guha, R. 1993 ; This Fissured Land- An Ecological History of India, O U P, New Delhi.

Gilpin, A. 1996 : Dictionary of Environment and Sustainable Development, John Wiley and Sons Ltd., Chichester:
Gilpin, A. 1997 : Environmental Impact Assessment: Culling Edge for the Twentyfirst Century, Cambridge University Press, Cambridge: 181p.
Hugget, R. & Cheesman, I.(2002) Topography & The Environment, Prentice Hll, New York, London.
Huggett, R.J (Reprint 2002) Fundamentals of Biogeography, Routledge, London & New York.
Hynes, R. (1982). Environmental Science Methods. London: Chapman & Hall. I.G. Simmons – Ecology of Natural Resources, New York.
Johansen, B. E. (2006). Global Warming in the 21st Century. Atlantic Publication.
Maiti, S. K. (2001). Handbook of Methods in Environmental Studies, Water and Waste Water Analysis. Jaipur: ABD Publishers.
Malhotra, R. (2008). Global Warming . Global Vision Public House.
Marsh, W.M. and Grossa, J.M. 1996: Environmental Geography: Science, Landuse and Earth Systems, John Wiley and Sons Inc., New York.
Mathur, M.H. & Marsden, D. 1998 : Development Projects and Impoverishment Risk, OUP, New Delhi.
Marsh, W.M. & Grossa(Ir). I.(1996) Environmental Geography- Science, Land use & Earth Systems, John Willey & Sons, New York
Manivasakam, N. 1984 ; Environnental Pollution, NBT, New Delhi.
Mackenzie, A., Ball, A.S. & Virdee, S.R. (Reprient 2001). Instant Notes in Ecology, Viva Books PrivateLtd. New Delhi, Mumbai & Chennai.
Middleton, N & Keefe, P.O (2001) Redefining Sustainable Development, Pluto Press, London, Sterling & Virginia.
Mishra, R. N. (2008). Environment and Forest Resource Management . New Delhi: Sonali Publication, .
Odum, E.P. 1971 : Fundamentals of Ecology, WB Saunders, USA
Park, C. 1998: The Environment: Principles and Applications, Routledge, London:43
Pickering, K. and Owen, L.A. 1997 : An Introduction to Global Environmental Issues, 2nd edition, Routledge, London:
R. Guha(Ed) 1994: Social Ecology, OUP, New Rajagopalam, R. (2005). Environmental Studies. Oxford University.
Roberts, N. (editor) 1994: The Changing Global Environment, 3rd edition, Blackwell Pub. Co., London.
Rosenbaurn, W.A. 1991: Environmental Politics & Policy, EWP
Sukla, R S. & Chandel, P.S. 1991: Plant Ecology, S.Chand & Co. Ltd., New Delhi.
Speth, I.G. (Reprint 2005) Global Environmental Challenges – Transitions to a Sustainable World, Orient Longman, New Delhi.
Tivy, J & Hare, O.G.(1981) Human Impact On The Ecosystem, Oliver & Boyd, Edinburg & New York.
Turk, I. & Turk. A. (1988) Environmental Science, Saunders College Publishing, New York.
Ta'I, B., Murphy, P. & Rana, P.S. (Ed.2007) Environmental Impact Assessment, Indo-Australian Perspective, Bookwell, New Delhi.
New York.
Vogler, J. 1995: The Global Commons: A Regime Analysis, John Wiley and Sons Ltd., Chichester
Wathern, P. (editor) 1988: Environmental Impact Assessment: Theory and Practice, Routledge, London.

Whyte, I.L.1995: Climate Change and Human Society, Arnold, London.
Woodward, F.I. 1992: Global Climatic Change: The Ecological Consequences, Academic Press, London.

Practical 3 (Combined Practical for GCC -201 and GCC-202)

Time: 4 Hours **M.M. 80+20**

General principles and classification of projections: mathematical construction, properties, limitations, and uses of Zenithal (Polar cases: Stereographic, Orthographic, Gnomonic, Equal Area) , Conical (Simple conical projection with one standard parallel; Simple conical projection with two standard parallels; Bonne's projection, Polyconic projection); Cylindrical projections (Mercator, Gall's, Equal Area) and Conventional Projections (Mollweide and Sinusoidal);

Distortions related to different projections: distance; direction; area and scale variation.

Concept of UTM Projection and Conversion of Latitude and Longitude to UTM coordinates.

Methods of socio-economic surveying: Questionnaire; Interview; Focus Group Discussion; Participatory Observation

Difference between Schedule and Questionnaire

Socio-Economic Survey of nearby village or Urban Ward: Collection of demographic and socio-economic data at household level (Duration one week) through primary fieldwork and preparation of analytical survey report to assess the development of an area highlighting the socio-economic conditions, problems, and suggestions for the development.

Practical 4 (Combined Practical for GCC -203 and GCC-204)

Time: 4 Hours **M.M. 80+20**

Representation of Population Distribution Characteristics: Arithmetic Density; Physiological Density; Agricultural Density

Measures of Urbanization: Choropleth map of Degree of urbanization;
Choropleth map of Urban-Rural ratio; Graphical Representation of Tempo of Urbanisation;

Agriculture land-use intensity mapping; Crop diversification; Kendall's Ranking Method ; Bhatia's method

Pyramid Diagram;

Ogive (Cumulative Frequency Curve);

Location Quotient for agricultural and industrial data mapping;

Lorenz Curve for inequality measurement;

Calculation of Human development index, Poverty index, Gender related development index.

Plain Table Survey: Radiation, Intersection, Traversing and Three Point problem.

Suggest Readings:

Kellaway, G. P. 1970: Map Projections, Methun and Co. Ltd., London.

Monkhouse F.J. and Wilkinson, H.R. 1971: Maps and Diagrams: Their Compilation and Construction, B.I. Publications Private Limited, New Delhi.

Maceachren, A. M. and Taylor, D. R. F. 1994: Visualization in Modern Cartography, Permamon. UK.

Dorling, D. and Fairbirn, D. 1997: Mapping Ways of Representing the World, Longman. England.