

**M.Sc. Geography Programme**  
(Title of Papers)

Semester	Paper Code	Classification	Title
I	GYH 401	Theory (Hard Core)	Advanced Geomorphology
I	GYH 402	Theory (Hard Core)	Advanced Climatology
I	GYH 403	Theory (Hard Core)	Advanced Oceanography
I	GYH 404	Theory (Hard Core)	Economic Geography
I	GYP 405	Practical (Hard Core)	Techniques in Physical Geography
I	GYP 406	Practical (Soft Core)	Interpretation of Maps
II	GYH 451	Theory (Hard Core)	Development of Geographic Thought
II	GYH 452	Theory (Hard Core)	Geography of Resources
II	GYH 453	Theory (Hard Core)	Basics of Remote Sensing
II	GYS 454	Theory (Soft Core)	Geography of Settlements
II	GYE 455	Theory OEC	Environmental Geography
	GYE 456		Geography of Tourism
	GYE 457		Resources Conservation and Management
II	GYP 458	Practical Soft Core	Statistical Methods in Geography
II	GYP 459	Practical Soft Core	Cartographic Methods
III	GYH 501	Theory Hard Core	Urban Geography
III	GYH 502	Theory	Research Methodology

		Hard Core	
III	GYH 503	Theory Hard Core	Fundamentals of GIS & GPS
III	GYS 504	Theory Soft Core	Natural Disaster Management
	GYS 505		Coastal Management
III	GYE 506	Theory OEC	Geography of India (With Special Reference to Karnataka)
	GYE 507		Medical Geography
	GYE 508		Physical Geography
III	GYP 509	Practical Soft Core	Interpretation of Aerial Photographs and Satellite Imageries
III	GYP 510	Practical Soft Core	Applications in GIS & GPS
IV	GYH 551	Theory Hard Core	Agricultural Geography
IV	GYH 552	Theory Hard Core	Regional Planning & Development
IV	GYS 553 Or GYS 554	Theory Soft Core	Population Geography
			Environmental Geography
IV	GYS 555 Or GYS 556	Theory Soft Core	Cultural Geography
			Medical Geography
IV	GYP 557	Practical- Soft Core	Research Techniques in Human Geography
IV	GYP 558	Dissertation, field study Tour/Viva- Voce	Dissertation, field Study Tour/Viva-Voce

Dr.D.P.Angadi  
Chairman, BOS

**Mangalore University  
Department of Studies in Geography  
M.Sc. Degree Programme**

**(CHOICE BASED CREDIT SYSTEM- SEMESTER SCHEME)**

**Syllabus for M.Sc. Programme in**

**GEOGRAPHY**

**(From the Academic Year 2016-17 onwards)**

**Mangalore University**

# **M.Sc. Degree Programme in Geography**

## **CHOICE BASED CREDIT SYSTEM (CBCS) SEMESTER SCHEME**

### **COURSE PATTERN AND SCHEME OF EXAMINATION**

**(Year 2016-17 onwards)**

## **PREAMBLE**

Revision of Syllabi for the two years Master Degree (Choice Based Credit System- Semester Scheme) Programmes in Geography.

PG BOS in Geography has revised and prepared the Syllabi (CBCS) based for all the four Course – Geography in its meeting held on 02-06-2016 and implemented it from the same academic year. Now the University has asked the PG BOS in Geography to revise the syllabi by giving certain Guidelines (Ref: No: MU/ACC/CR.38/CBCS (PG) 2015-16 dated: 05-05-2016) based on UGC letter) for all the four Courses (Programmes) to offer Hard Core, Soft Core and Open Elective course papers with credits to each course amounting to 92 credits for the entire programme.

Accordingly, the PG BOS in Geography prepared the syllabi for all the four programmes. It has prepared course pattern by proposing 11 Hard Core theories course and 7 Practical Course (I, II, III and IV Semester) one Project Work (4<sup>th</sup> Semester with Four Credits) with a provision to have one project work in lieu of one of the Practical in 4<sup>th</sup> Semester in each programme with 3 Credits each (Project Work- 4 Credit with total of 52 Credits). BOS is offering, 1,3,3 and 3 (Total 10 Courses) Soft Core Courses respectively in 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> Semesters of a programme. Students shall opt any 2,2, 3&3 (Total of 6 Courses) Courses respectively in 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> Semesters. All the soft papers are of 3 Credits. Programme consist of 7 soft core Practical courses (2 Courses each in 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> Semesters of the programme with 3 credits each) with a total of 30 Credits (3 theory X 3 Credits + 7 Practicals X 3 Credits). BOS has also proposed 2 open electives (1 each in 2<sup>nd</sup> & 3<sup>rd</sup> Semesters of the programme with 3 credits each (6 Credits). All together total credits come to 92 from teaching. I have prepared a draft course pattern by considering all the points mentioned in the above said letter from the Registrar and placing it before the BOS meeting.

Detailed syllabi for 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, & 4<sup>th</sup> Semesters are prepared and enclosed.

**Course/ Credit Pattern:**

Semester Credits	Hard Core (H) (T)	Soft Core (S) (T)	Elective(E) (T)	Practical	Tutorial	Total Credits
First	16	-	-	4 (H) +3 (S)	-	23
Second	12	03	03	06 (S)	-	24
Third	09	03	03	06 (S)	-	24
Fourth	08	03	-	06 (S)	-	21
Total	49	12	06*	4 (H)+21 (S)		92

Total Credits from all the four Semesters (1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup>): 23+24+24+21= **92**

Total Hard Core Credits= 49 (T) +4 (P) =53=**57.60%**

Total Soft Core Credits= 12 (T) + 21(P) =33=**35.86%**

\*Open Elective Credits= 6= 6.52% (Not to considered for calculating the CGPA)

H= Hard Core, S= Soft Core, P= Practical/Project

Dr. D. P. Angadi  
Chairman, BOS (PG)

**Consolidated Course and Title**  
**Programme: M.Sc. in Geography**

**1<sup>st</sup> Semester**

**2<sup>nd</sup> Semester**

Course Code	Course Title	Course Code	Course Title
GYH 401	Advanced Geomorphology	GYH 451	Development of Geographic Thought
GYH 402	Advanced Climatology	GYH 452	Geography of Resources
GYH 403	Advanced Oceanography	GYH 453	Basics of Remote Sensing
GYH 404	Economic Geography	GYS 454 Or GYS 455	Geography of Settlements Or Geography of Tourism
GYP 405	Techniques in Physical Geography	GYE 456 or GYE 457 or GYE458	Environmental Geography  Geography of Tourism  Resources Conservation and Management
GYP 406	Interpretation of Maps	GYP 459	Statistical Methods in Geography
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**3<sup>rd</sup> Semester****4<sup>th</sup> Semester**

GYH 501	Urban Geography	GYH 551	Agricultural Geography
GYH 502	Research Methodology	GYH 552	Regional Planning & Development
GYH 503	Fundamentals of GIS & GPS	GYS 553 Or GYS 554	Population Geography Or Environmental Geography
GYS 504 Or GYS 505	Natural Disaster Management Or Coastal Management	GYS 555 Or GYS 556	Cultural Geography Or Medical Geography
GYE 506 Or GYE 507 Or GYE 508	Geography of India (With Special Reference to Karnataka) Or Medical Geography Or Physical Geography	GYP 557	Research Techniques in Human Geography
GYP 509	Interpretation of Aerial Photographs and Satellite Imageries	GYP 558	Dissertation, field Study Tour/Viva-Voce
GYP 510	Applications in GIS & GPS	-	-----

From  
Dr. Dasharatha P. Angadi  
Chairman BOS Geography P.G.  
Mangalore University

Mangaluru  
20-07-2016

To,  
The Registrar,  
Mangalore University,  
Mangalagangothri-574 199

(Through the Dean, Faculty of Science& Technology, Mangalore University)

Sir,

Sub: Submission of **M.Sc. Geography Syllabus** (CBCS) regarding,  
Ref: As per suggestions from faculty meeting held on 13-07-2016

With reference to the above subject, i hereby enclosed a copy of the syllabus of M.Sc. Geography after approval from the Dean Science and Technology, Mangalore University.

This is for your kind approval and further action.

Thanking You,

Encl:

1. As above
2. Letters from BOS members

Yours faithfully,

( D. P. Angadi )



## I SEMESTER

### GYH 401: Advanced Geomorphology

- Unit 1:** Geomorphology: Definition and its fundamental concepts. Interior of the earth: structure and convectional currents. Theory of isostasy: Views of Pratt and Airy. Geological time scale. -10
- Unit 2:** Theory of Plate tectonics and sea floor spreading, Wegener's theory of continental drift. Earth movements: Orogenic, epeirogenic movements and resultant landforms: Folds and faults and their types. Volcanoes: reasons, types of eruptions, significance, volcanic activity, products, landforms, geographical distribution and major volcanic eruptions occurred. -10
- Unit 3:** Earthquakes: Causes, measuring earthquake, landforms, geographical distribution and key earthquakes so far. tsunamis: Causes, consequences and major tsunamis taken places. -10
- Unit 4:** Process of weathering and mass wasting, landforms produced by – Drainage system and drainage patterns. Glaciers, wind, underground water and sea waves: process of these and land forms produced. Critical study of the concept of cycle of erosion – W.M. Davis and W. Penck –Recent trends in geomorphology. -12

#### References:

1. Ahmed E. (1985) Geomorphology, Kalyani Publishers, New Delhi.
2. Strahler A.N. (1968) The Earth Sciences, Harper & Row Intl. Edn, New York
3. Thornberry W.D. (1969) Principles of Geomorphology 2nd Edition, Wiley Intl. Edn. & Wiley Eastern Reprints 1984.
4. Verstappen H. (1983) Applied Geomorphology, Geomorphological Surveys for Environmental Development, Elsevier, Amsterdam
5. Woodridge S.W and R.S. Morgan (1991) An Outline of Geomorphology, The Physical Basis of Geography, Orient Longman, Kolkata.
6. Dayal P. (1995) A Text Book of Geomorphology 2nd edition. Sukla Book/Dept. Patna.
7. Homes A. (1965) Principles of Physical Geology, 3rd Edition, ELBSS Edn.
8. Goudie Andrew et.al. (1981) Geomorphological Techniques, George Allen & Unwin, London.
9. Bloom A.L. (1978) Geomorphology: A Systematic Analysis of Late Cenozoic Landforms Prentice – Hall of India, New Delhi.
10. Brunsdon D. (1985) Geomorphology in the Service of Man: The Future of Geography, Methuen, U.K.
11. Worcester P.G. (1965), A Text Book of Geomorphology, Can North and 2nd Edition, East West Edn. New Delhi.
12. Board Shaw M.J. Et. Al. (1979) The Earth's Changing Surface, Hodder & Stoughton London.
13. J.A. Steers: Unstable Earth
14. <http://www.solarviews.com/eng/earth.htm>
15. <http://www.moorlandschool.co.uk/earth/tectonic.htm>
16. <http://library.thinkquest.org/5818/maps.html>

## I SEMESTER

### GYH 402: Advanced Climatology

- Unit 1:** Definitions, nature, scope and content of climatology. Elements of weather and climate. Origin, composition and **structure** of atmosphere. Temperature: Solar radiation principles, solar budget, greenhouse effects, horizontal and vertical distribution of temperature & inversion of temperature. Global warming and global cooling. -12
- Unit 2:** Atmospheric pressure: Pressure gradient, coriolis effect, horizontal and vertical distribution of air pressure and pressure belts. Winds: planetary, monsoons, local winds, jet streams. Mechanism of monsoon. Humidity and precipitation. El-nino and la nina phenomena, el-nino-southern oscillation (ENSO). -12
- Unit 3:** Air masses: Definition, nature, source region, classification of air masses. Fronts -frontogenesis and frontolysis, classification of fronts, frontal zones. Cyclones: types, tropical cyclones-Origin, types and structure of tropical cyclone. Distribution of tropical and temperate cyclones, features of temperate cyclone, source region, and origin of temperate cyclone. Polar front, study of weather disturbances through satellites. -16
- Unit 4:** Classification of world climates: Koppen's & Thornthwaite classification. Changes in world climate: Global warming, depletion of ozone layer & greenhouse effect. Weather forecasting, problems and prospects of weather forecasting in india. - 14

### References

1. Savindra Singh (2005): Climatology, Prayag Pustak Bhawan, 20-A, University Road, Allahabad- 02. UP.
2. Critchfield H.J. (2005): General climatology, prentice Hall of India, Pvt. Ltd. New Delhi-01
3. Lal D.S (2009): Physical Geography, Sharada Pustak Bhawan, II, University Road, Allahabad – UP.
4. Siddhartha K (2005): Atmosphere, weather and climate, Kisalaya Publications Pvt.ltd., C—2, Padma apartment, Mehruli, New Delhi-30.
5. Lal D.S. (2005): climatology: Sharadu Pustak Bhawan, 11, University Road, Allahabad -02, UP.
6. Dasagupta A and Kapoor A.N. (1978): Principles of Physical Geography, Chand S & Co. Ltd. New Delhi.
7. Strahler A.N. (1976): The earth sciences, Harpu & Row, Intl. Ed. New York.
8. Alka Goutam (2012): Climatology, Prayag Pustak Bhavan, 20 A, University Road, Allahabad – 02, UP
9. <http://apollo.lsc.vsc.edu/classes/met430/viberts/pres2/India.html>
10. <http://library.thinkquest.org/5818/maps.html>

## **I SEMESTER**

### **GYH 403: Advanced Oceanography**

- Unit 1:** Scope and content of oceanography: Configuration of ocean floor- continental shelf, slope, ocean plains and ocean deeps. -13
- Unit 2:** Origin of submarine: Relief-submarine relief of the atlantic, the pacific and the indian ocean. Physical and chemical properties of ocean waters: Composition, temperature and salinity. -14
- Unit 3:** Movements and circulation of ocean water: Waves, tides, currents and their effects. Coastal ecology- Coastal dunes and mangroves. -13
- Unit 4:** Ocean deposits: Types and distribution, coral reefs: Origin, types and theories of origin of coral reefs (Darwin, Dally and Murray), impact of human activities on the marine environment. Recent trends in oceanography. -14

#### **References:**

1. Lal. D.S. (2003) Oceanography, Sharada Pustak Bhavan, Allahabad 02.
2. King Cuchalaine A.M. (2000) Oceanography for geographers, Edward Arnold publications, London.
3. Savindra Singh (2004): Physical geography, Prayog Pustak Bhavan, Allahabad -02
4. Siddharth (2005) Oceanography: A brief introduction, Rawat Publishers. New Delhi.
5. Sharma RC (2000) Oceanography for Geographers, Chaitanya Publishers, Allahabad -02
6. Vattal and Sharma (2003), Oceanography for Geographers, Chaitanya Publishers, Allahabad -02
7. Yadav A.S. (2002): Geography of Minerals of Oceans, concept Publishers, New Delhi,
8. Basu S.K. (2003): Hand book of oceanography, Global vision, Delhi.
9. Garisson Tom (1999): Oceanography, Cole, Wadsworth, New York.
10. Sharma and Vattal (1962) Oceanography for Geographers, Chaitanya Publication House, Allahabad.
11. Turman Harold (1985); Introductory Oceanography, Bell & Howell Co. London.
12. <http://drs.nio.org/drs/index.jsp>

## I SEMESTER

### GYH 404: Economic Geography

**Unit 1:** Nature, scope and importance of economic geography, evolution of economic geography, approaches to economic geography, concept of economy, spatial structure of the economy, economy and economic geography. -13

**Unit 2:** Primary economic activities: Hunting, fishing, food gathering, herding, timbering, agriculture and mining. Commercial economic activities: Dairying, mixed farming, poultry, and plantations. Fishing: marine, fresh water and aquaculture. Issues and challenges for the development of fishing. -14

**Unit 3:** Knowledge-based technologies: Electronic age, spatial information technology, telecommunication, high tech-transport, effects of liberalization, privatization and globalization (LPG) on economic activities in the world and India. -14

**Unit 4:** Economic development: Growth and development, definition, concept, contents of development and sustainable development. Human resource development: Concept, measurement, indicators and components. -13

#### References:

1. Alexander (1975): Economic Geography.
2. Guha J.L. and Chattoraj (2004), A New approach to economic geography, A study of resources, the world Press pvt. Ltd. Calcutta.
3. Zimmerwan- World resources and industries
4. Khanna K.K. and Gupta V.K (1993) Economic and Commercial Geography, Sultan Chand, New Delhi.
5. Mallappa P. (2004) Udyam Saupahmagalu, Chetan Book House, Mysore.
6. Roy. PR. (2001) Economic Geography- A study of Resources, New Central Book Agency, (p) ltd. Calcutta.
7. P. Hagget (1997), Geography, A Modern Synthesis, Haper and Roo publications, New York.
8. Dubey RN. And Negi BS (2002)- Economic Geography of India, Kitabmahal, Allahabad.
9. [http://www.nationmaster.com/graph/geo\\_nat\\_res-geography-natural-resources](http://www.nationmaster.com/graph/geo_nat_res-geography-natural-resources)

**I SEMESTER**  
**GYP 405: Techniques in Physical Geography**

- Unit 1:** Profile: Definition and uses, profile drawing and types of profiles. – 13
- Unit 2:** Morphometric analysis (linear features). Morphometric, stream ordering, bifurcation ratio and drainage density. – 14
- Unit 3:** Slope Analysis: Meaning, definition- Smith's method and Wentworth's method. - 14
- Unit 4:** Climatic graphs: hyther-graphs, climo-graphs and ergo-graph. - 13

**Reference:**

1. Monkhouse F.J and Wilkinson HR (1952) Maps and Diagrams, their compilations and concentration, Muthuen & Co. London.
2. Harwel JD, Newson MD. (1973)- Techniques in Physical Geography, Mc. Millan Edu. Ltd. London.
3. Mishra RP. And Ramesh A (1968) – Fundamentals of Cartography, Prasaranga, University of Mysore, Mysore.
4. Robinson & Marison (1995), Elements of Cartography USA.
5. R.L. Singh (2010) Practical Geography, Sharada Pustak Bhavan, 11, University Road, Allahabad, UP - India

## I SEMESTER

### GYP 406: Interpretation of Map Analysis

- Unit 1:** Interpretation of SOI top maps: Conventional signs and symbols- marginal information- physiography – natural and man made drainage – natural and human induced vegetation – transportation and settlements. - 14
- Unit 2:** Interpretation of Indian daily weather maps, sources of weather data IMD- satellite and modern remote wireless techniques of data collection. Atmospheric pressure gradient and isobar trends- Wind direction –wind vane – other weather phenomena. -14
- Unit 3:** Identification of Rocks-Five each in igneous, sedimentary, and Metamorphic Rocks. Identification of some minerals and rocks (select 5). -13
- Unit 4:** Drawing one and two point perspective block diagrams. Sketches and photographs of landforms. -13

#### References:

1. Monkhouse F.J. & H.R. Wilkinson (1952) Maps and Diagrams, their compilations and concentration, Methuen & Co. London.
2. Ashis Sen (1997) Systematic Practical Geography, Oriental Longman Ltd. Kolkata
3. Namowitz S.N. & Donald B. Stone (1965) Earth Science – The World We Live in 3rd Edition, D. Van Nostrand and company Inc. New Jersey, USA, pp. 3-59
4. Mishra R.P. (1969) Fundamentals of Cartography, Prasaranga University of Mysore.
5. Harwell J.D. & M.D. Newson (1973) Techniques in Physical Geography, Macmillan Edn, Ltd. London.
6. R.L. Singh (2010) Practical Geography, Sharada Pustak Bhavan, 11, University Road, Allahabad, UP - India

## II SEMESTER

### GYH 451: Development of Geographic Thought

**Unit 1:** The field of geography: Definition and meaning of geography: Nature and scope of geography. Geography as a social and natural science. Evaluation of geographic thought. Limits in geography. Traditions in geography: Area differentiation, landscape theme, Environment theme, spatial distribution and geometric theme. Inter-disciplinary and intra-disciplinary approaches in geography. -13

**Unit 2:** Pioneers and their contributions to geography: Ancient period – greek, romans, indians and chinese. Medieval period - Arabs and geographical discoveries. Modern period – Alexander von Humboldt, Carl Ritter and Darwin. School of geography – German, French, British, American and Russian. - 15

**Unit 3:** Dualism and dichotomies in geography – Determinism, possibilism, neo-determinism and social determinism. Quantitative revolution. Geographical models—need, features, types and classification. Theory building. Geographical paradigms. - 13

**Unit 4:** Explanations in geography-cognitive, cause & effect, temporal & functional, systems analysis and regional concepts. Modern themes in geographical thought – positivism, pragmatism, functionalism, existentialism, idealism, realism, marxism, radicalism, behaviouralism, and humanism. -13

#### References:

1. Adhikari S. (2004) Fundamentals of Geographic thought, concept publishers, New Delhi.
2. Dikshit R.D. (2001). Geographical Thought: A Conceptual History of ideas, Prentice Hall publishing Company, New Delhi-2
3. Harvey ME (2002) Theme in Geographical thought, R.K. Publications and distributors, Ansari Road, New Delhi – 2.
4. Majid Hussain (2001) Evolution of Geographic thought, Rawat Publications, New Delhi-02
5. David Harvey (2000) Explanations in Geography, Macmillan, New York.
6. Peter Hagget (1972): Geography: A Modern Synthesis
7. Frazier J.W. (1982); Applied Geography, Prentice Hall, New Delhi.
8. Singh. I (2006): Diverse aspect of Geographical thought: ALFA Publications, New Delhi.
9. Dikshit R.D. (1997) Geographical Thought: A Contextual History of Ideas, Prentice hall of India, New Delhi.

## II SEMESTER

### GYH 452: Geography of Resources

- Unit 1: Consciousness and Definition of Resources:** The concept of resource-wealth-resistance and neutral stuffs. Resource creating factors, classification of resources. -11
- Unit 2: Soil:** Soil formation, factors influencing soil formation, soil characteristics and soil profile, classification of soil (zonal types) soil erosion, soil conservation. -11
- Unit 3: Water and Forest Resources:** Water resources and its development in india, water conservation, water cycle and water budget. Types of forests and their distribution, forest products –timber and paper, decay of forests, conservation of forests and distribution, forest products-timber and paper, forest decay, forest conservation. -11
- Unit 4: Livestock:** Livestock rearing in the world and livestock regions, products: milk, meat and wool. Major fishing grounds of the world. -09
- Unit 5: Mineral resources:** classification of major minerals, their distribution and production, petroleum, coal, iron ore, bauxite and copper. Mineral conservation and mineral policy of India. -12

#### References:

1. Guha J.L. and Chatteraj (2004), A new approach to economic Geography, A study of Resources, the World Press Pvt. Ltd. Calcutta.
2. Zimmerman- World resources and industries
3. Khanna K.K. and Gupta V.K (1993) Economic and commercial geography, Sultan chand, New Delhi.
4. Mallappa P. (2004) Udyam Sampanmulagalu, Chethan Book House, Mysore
5. Roy. PR. (2001) Economic Geography- A study of Resources, New Central Book Agency, (p) Ltd. Calcutta.
6. P. Hagget (1997), Geography, A Modern Synthesis, Haper and Rao publications, New York.
7. Dubey R.N. And Negi B.S. (2002)- Economic Geography of India, Kitab Mahal, Allahabad.
8. [http://www.nationmaster.com/graph/geo\\_nat\\_res-geography-natural-resources](http://www.nationmaster.com/graph/geo_nat_res-geography-natural-resources)



## II SEMESTER

### GYH 453: Basics of Remote Sensing

- Unit 1: Remote Sensing:** Definition, electromagnetic radiation (EMR) and electro magnetic spectrum, interaction of EMR with the atmosphere and with the surface feature. Atmospheric window, spectral signature of common land covers (minerals, rocks, water, vegetation and urban area) concept and types of resolutions. history of remote sensing. -14
- Unit 2: Fundamentals of Aerial Photography:** Classification of aerial photographs on the basis of height and tilt, components of the camera, film, aerial platforms. Elements of Aerial photo interpretation: Formats of Imageries: Digital and Analog data. -13
- Unit 3: Sensor & Platforms:** Sensors: active and passive sensors, electro mechanical and optical sensors. Platforms: types, characteristics, payload of launch vehicles, -SLV, PSLV, GSLV, AGSLV, orbit positioning issues, errors induced due to platform disturbances. **Microwave remote sensing:** thermal remote sensing, interferometry SAR, SLAR. Future of remote sensing, Digital image processing, Organizations into remote sensing, -14
- Unit 4: Application of Remote Sensing:** Disaster mitigation and management, geology, soil mapping, ocean resource mapping, EIA, wetland management, forest resource management. -13

#### References:

1. Lillisand T.M and Keifer R.W, (1994), Remote Sensing and Image Interpretation, Jhon Willey & sons, New York.
2. Rampall, K.K. (1999), hand book of Aerial Photography and Interpretation, Concept Publishing Co., New Delhi.
3. Sabins, F.F. Jr, (1987), Remote Sensing; Principles and Interpretation, W.h. Freeman & Co., New York.
4. Jenson R. Jhon, (2003), Remote Sensing of the Environment-An Earth Resource Perspective, Pearson Education Pvt. Ltd., Indian Branch, Patparganj, Delhi, India.
5. LRA Narayanan, Remote sensing and its Applications, (1999), Universities Press (India) Ltd., Hyderabad.
6. <http://rst.gsfc.nasa.gov/Front/tofc.html>.
7. <http://earthobsevatory.nasa.gov/Library/RemoteSensing>

## II SEMESTER

### GYS 454: Geography of Settlements

**Unit 1: General introduction, evolution & distribution of settlements:** nature, scope, significance and recent trends in settlement geography. **Evolution of Settlements in India:** Emergence of village settlements, origin and growth of towns; Basic and non-basic concepts in settlement formation. distribution of settlements, spacing of settlements -application of models of Christaller and Losch. -14

**Unit 2: The Functional classification of Settlements:** Rural and urban settlements. **Rural Settlements** - Types of rural settlements, house types, morphology and functions of rural settlements; rural service centers and their role in urbanization process. Indian rural settlements in different micro environmental conditions: (a) Mountains (b) Desert Region (c) In the vicinity of urban centers. -13

**Unit 3: Urban Settlements** - Classification of urban places: Non-functional and functional. Morphology of Indian cities and its comparison with western cities; functional relations between urban settlements and their umlands. -13

**Unit 4: Theories in Settlement Geography** – CBD, centrifugal and centripetal forces theory, urban fringe, urban structures theories. Rank size relationship. **Settlement Geography of selected Indian Cities:** Mumbai, Kolkata, Bangalore, Delhi, Chennai, Hyderabad, Pune, Lucknow, Patna, Jaipur and Chandigarh. -13

#### References:

1. Hudson, F. S. (1976) Geography of Settlements, Macdonald, London.
2. Northam Ray, M. (1979). Urban Geography, John Wiley and Sons, New York.
3. Ambrose, Peter, 1970: Concepts in Geography, Vol.-I, Settlement Pattern, Longman.
4. Baskin, C., (Translator) 1996: Central Places in Southern Germany, Prentice-Hall Inc. Englewood Cliffs New Jersey.
5. Haggett, Peter, Andrew D. Cliff and Allen Frey (Ed.) 1979: Locational Models Arnold Heinemann.
6. King, Leslie, J., 1986: Central Place Theory, Saga Publications, New Delhi.
7. Mayer, M. Harold and Clyde F. Kohn (Ed.) 1967 Readings in urban Geography, Central Book Depot, Allahabad.
8. Mitra, Ashok, Mukherjee S and Bose, R., 1980: Indian Cities Abhinav Publications, New Delhi.
9. Nangia, Sudesh, 1976: Delhi Metropolitan Region, K.B. Publications, New Delhi.
10. Prakash, Rao, V. L. S., 1992: Urbanization in India: Spatial Dimensions, Concept Publishing Co., New Delhi.
11. Ramachandran, R., 1992: Urbanization and Urban Systems in India, Oxford University Press, New Delhi.
12. Singh, R. L. and Kashi Nath Singh (Ed.) 1975: Readings in Rural Settlement Geography, National Geographical Society of India, Varanasi.

## II SEMESTER

### GYS 455: Geography of Tourism

- Unit 1: Geography of tourism:** Definition, nature, scope and extent. Concept of tourism, importance of tourism. Relationship between geography and tourism, **Tourism promotion** – Ecotourism, agro-tourism, heritage tourism and adventure tourism. **Factors affecting tourism** – Physical and cultural factors. Tourism motivation, tourism as an industry. – 14
- Unit 2: The Classification of tourism and tourists: Types of tourism** – Domestic and international tourism- Adventure, wildlife, medical, pilgrimage, business, leisure, pleasure, eco and cultural tourisms. Comparison between mass and alternative tourism. **Tourists types** – local, national and international. **Impact of tourism** – Economic impact, physical and environmental impact, socio-cultural impact. – 13
- Unit 3: Infrastructural approach for the development of tourism** – Mode of transportation, agencies, guides, license, hotels, resorts, youth hostels, home stays, govt. TB,. Role of foreign capital and impact of globalization on tourism, environmental law and tourism government policies for planning and promotion of tourism in India. State level tourism planning in India with special reference to karnataka. – 13
- Unit 4: Case Studies** – Major tourist centers. **Hill Station** – Mount abu, shimla, kudremukha. **Beach Points** – Mangaluru, vizag, panaji, marina beach. **Historical Centers** – Badami, bijapur, mysore, ellora and tajmahal. **Religious Centers** – Shirdi, kanyakumari, tirupathi and dharmastala. **Dams** - T B dam, Bhakra nangal, DVC. **National Parks** – Dachigam national park, gir national park, Nanda devi national park, periyar national park. – 14

### References:

1. Bhatia A.K (1996): Tourism Development: Principles and Practices. Sterling Publishers, New Delhi.
2. Inskip. E (1991): Tourism Planning: An Integrated and Sustainable Development Approach Van.
3. Kaul R.K (1985): Dynamics of Tourism and Recreation, Inter- India, New Delhi.
4. Kaur, J. (1985): Himalyan Pilgrimages and New Tourism, Himalyan Books, New Delhi
5. Lea, J. (1988): Tourism and development in the third world
6. Milton, D. (1993): Geography of World Tourism, Prentice Hall, New York
7. Peace, D. G. (1987): Tourism To-Day: A geographical Analysis, Harlwo, Longman
8. Robinson, H. A.(1996): A geography of tourism, McDonald and Evans, London
9. Sharma, J. K. (ed.)(2000) : Tourism, Planning and Development- A new perspective, Kanishka
10. Singh, R. L. and Kashi Nath Singh (Ed.) 1975: Readings in Rural Settlement Geography, National Geographical Society of India, Varanasi

## II SEMESTER

### GYE 456 : Environmental Geography

- Unit 1:** Nature and interdisciplinary aspect of environmental geography. Ecological approaches. Definition and meaning of environment, habitat. Ecological niche. bio-sphere and biodiversity. -13
- Unit 2:** Ecosystem: Structure and functioning of ecosystem, pond as a ecosystem, food chains, food webs, food pyramid. Biomes – equatorial to tundra i.e 11 types. Man and environmental relationships. Resource use and ecological imbalance with reference to soil, forests and energy resources. Man made ecosystem - Urban, ecotourism, national parks and sanctuaries. Depletion of ozone, green house effect and acid rain. - 12
- Unit 3:** Man induced changes in environment: Environmental pollution, i.e. Air, water, noise, solid waste with special reference to India. Environmental hazards, i.e. earth as warehouses, flood, famines, landslides, avalanches, forest fires, impact of green revolution and extinction of species. - 11
- Unit 4:** Principles of environmental management- Environmental policy of India, (post 2000AD). Environment impact assessment (EIA). Global summits and agencies of environment conservation -10

#### References:

1. Strahler A.N. (1968) The Earth Sciences, Harper International Education, New York.
2. Richard H.B. (2004) Physical Geography, Heinmann Simple Services, Rupa & company, New Delhi
3. Robinson H. (1982) Bio Geography, ELBS, New York.
4. Healey I.N. and Moore P.D. (1973) Bio-Geography, Backwell Oxford, U.K.
5. Strahler A.N. and Strahler A.H. (1973) Environmental Geo Science, Hamilton, California, USA.
6. Savindra Singh (2004) Environmental Geography, Prayog Pustak Bhawan, Allahabad, India.
7. Paul Selman (2000) Environmental Planning, Sage Publications, New Delhi
8. Cheryl Simon Silve and Ruth S. De Fries (1991) One Earth One Future-Our chaining Global Environment, National Academy of Sciences, Affiliated to East West Press Pvt. Ltd. New Delhi.
9. Strahler A.N. and Strahler A.H. (1977) Geography and Man's Environment, John Wiley & Sons, New York
10. Goldsmith Edward et al. (1988) The Earth Report – The Essential Guide to Global Issues, Price Stern Solan Inc. California, USA

## II SEMESTER

### GYE 457: Geography of Tourism

**Unit 1: Geography of tourism:** Definition, nature, scope and extent. Concept of tourism, importance of tourism. Relationship between geography and tourism, **Tourism promotion** – Ecotourism, agro-tourism, heritage tourism and adventure tourism. **Factors affecting tourism** – Physical and cultural factors. Tourism motivation, tourism as an industry. – 14

**Unit 2: The Classification of tourism and tourists: Types of tourism** – Domestic and international tourism- Adventure, wildlife, medical, pilgrimage, business, leisure, pleasure, eco and cultural tourisms. Comparison between mass and alternative tourism. **Tourists types** – local, national and international. **Impact of tourism** – Economic impact, physical and environmental impact, socio-cultural impact. – 13

**Unit 3: Infrastructural approach for the development of tourism** – Mode of transportation, agencies, guides, license, hotels, resorts, youth hostels, home stays, govt. TB,. Role of foreign capital and impact of globalization on tourism, environmental law and tourism government policies for planning and promotion of tourism in India. State level tourism planning in India with special reference to karnataka. – 13

**Unit 4: Case Studies** – Major tourist centers. **Hill Station** – Mount abu, shimla, kuduremukha. **Beach Points** – Mangaluru, vizag, panaji, marina beach. **Historical Centers** – Badami, bijapur, mysore, ellora and tajmahal. **Religious Centers** – Shirdi, kanyakumari, tirupathi and dharmastala. **Dams** - T B dam, Bhakra nangal, DVC. **National Parks** – Dachigam national park, gir national park, Nanda devi national park, periyar national park. – 14

#### References:

11. Bhatia A.K (1996): Tourism Development: Principles and Practices. Sterling Publishers, New Delhi.
12. Inskip. E (1991): Tourism Planning: An Integrated and Sustainable Development Approach Van.
13. Kaul R.K (1985): Dynamics of Tourism and Recreation, Inter- India, New Delhi.
14. Kaur, J. (1985): Himalyan Pilgrimages and New Tourism, Himalyan Books, New Delhi
15. Lea, J. (1988): Tourism and development in the third world
16. Milton, D. (1993): Geography of World Tourism, Prentice Hall, New York
17. Peace, D. G. (1987): Tourism To-Day: A geographical Analysis, Harlow, Longman
18. Robinson, H. A.(1996): A geography of tourism, McDonald and Evans, London
19. Sharma, J. K. (ed.)(2000) : Tourism, Planning and Development- A new perspective, Kanishka
20. Singh, R. L. and Kashi Nath Singh (Ed.) 1975: Readings in Rural Settlement Geography, National Geographical Society of India, Varanasi.

## II SEMESTER

### GYE 458: Resources Conservation and Management

- Unit 1: Consciousness and definition of resources:** The concept of resource-wealth-resistance and neutral stuffs. Resource creating factors, classification of resources. -11
- Unit 2: Soil:** soil formation, factors influencing soil formation, soil characteristics and soil profile, classification of soil (zonal types) soil erosion, soil conservation. -11
- Unit 3: Water and Forest Resources:** Water resources and its development in India, water conservation, water cycle and water budget. Types of forests and their distribution, forest products –timber and paper, decay of forests, conservation of forests and distribution, forest products-timber and paper, forest decay, forest conservation. -11
- Unit 4: Mineral resources:** Classification of major minerals, their distribution and production, petroleum, coal, iron ore, bauxite and copper. Mineral conservation and mineral policy of India. -12

### References:

1. Guha J.L. and Chattoraj (2004), A New approach to economic Geography, A study of Resources, the World Press Pvt. Ltd. Calcutta.
2. Zimmerman- World resources and industries
3. Khanna K.K. and Gupta V.K (1993) Economic and Commercial Geography, Sultan Chand, New Delhi.
4. Mallappa P. (2004) Udyam Sampanmulagalalu, Chethan Book House, Mysore
5. Roy. PR. (2001) Economic Geography- A study of Resources, New Central Book Agency, (p) Ltd. Calcutta.
6. P. Hagget (1997), Geography, A Modern Synthesis, Haper and Rao publications, New York.
7. Dubey R.N. And Negi B.S. (2002)- Economic Geography of India, Kitab Mahal, Allahabad.
8. [http://www.nationmaster.com/graph/geo\\_nat\\_res-geography-natural-resources](http://www.nationmaster.com/graph/geo_nat_res-geography-natural-resources)

## II SEMESTER

### GYP 459: Statistical Methods in Geography

- Unit 1:** Processing of data: Data, preparation of frequency table, graphical presentation of frequency, histograms, frequency polygon and ogive curves. -13
- Unit 2:** Measurement of central tendency: Mean median and mode, meaning, computation and uses. -14
- Unit 3:** Measures of dispersion: Mean deviation, standard deviation, quartile deviation and coefficient variation, quartiles, deciles and percentiles. -14
- Unit 4:** Measures of association: Correlation- meaning and methods, rank order correlation, product moment correlation and regression coefficients. -13

#### References:

1. Haymond and Mccullah (1974), Quantitative Techniques in Geography, An introduction, Oxford London.
2. Aslam Mohamed (1977), Statistical Methods in Geographical Studies, Rajesh Publications, New Delhi.
3. Gupta CB. (1979), An Introduction to Statistical Methods, Vikas Publishing house Pvt. Ltd. New Delhi.
4. Murray R. Spiegel (1972): Theory and Problems of Statistics, Mc. Grawhill Book co. New York.
5. Singh RL. (1979): Elements of Practical Geography, Kalyani Publishers, New Delhi

## **II SEMESTER**

### **GYP 460: Cartographic Methods**

- Unit 1:** Representation of geo-eco-socio-data: Proportional symbols-mono and multiple dots, circles- Spheres and cubes. -14
- Unit 2:** Block Pile diagrams – Pie diagrams - Flow diagrams. -13
- Unit 3:** Graphs-Triangular graphs, semi-log and log-log graphs. Population pyramid. -13
- Unit 4:** Preparation of choropleth, isopleth, choro-chromatic and choro-schematic maps. - 14

### **References**

1. Monkhouse F.J. & H.R. Wilkinson (1952) Maps and Diagrams, their compilation and concentration, Methuen & Co, London
2. Harwell J.D & M.S. Newson (1973) Techniques in Physical Geography, Macmillan Edn. Ltd, London.
3. Mishra R.P. & Ramesh A (1968) Fundamentals of Cartography, Prasararanga, University of Mysore.
4. Menno-Jan Kraak & Ferjan Ormeling (2003) Cartography Visualization of Geospatial Data, Pearson Edn Pvt. Ltd. (Singapore) New Delhi.
5. Nag P (1992) Thematic Cartography and Remote Sensing, concept Publishing Co. New Delhi.
6. David Greenhold: Mapping
7. Fisher & Miller OM :World maps and globes
8. Lawrence GRO Cartographic methods
9. Meena Jan Kraack Ferjan Ormeling: Cartography
10. Monk house F.J: Maps and diagrams
11. Misra R.P. and Ramesh A: Fundamentals of Cartography
12. Raisz E: Principles of Cartography
13. Robinsons A: Elements of Cartography United Nations World Cartography



### III SEMESTER

#### GYH 501: Urban Geography

- Unit 1:** Nature of urban geography-Definition of urban settlements (towns, cities and metro etc.) -Census definition of settlements, (India)-Urbanization through times-Current factors, trends of urbanization in the world and India. Growth of the world and Indian cities. -14
- Unit 2:** Urban population density and land value curves- Urban land use – vertical and horizontal growth of cities, concentric, zonal and multiple nuclei theories of urban structure. -13
- Unit 3:** Urban functions- Basic and non-basic urban hierarchy- Rank-size Rule – central place theory functional classification of towns by C.D. Harris and H.J. Nelson. Urban issues & challenges: Water supply, traffic congestion, solid waste, smog, sewage and drainage system -14
- Unit 4:** Concept of city, region and urban hinterland – Urban sprawl, urban slums, urban crimes and their trends with reference to India, concept and issues of Peri-urbanization. Elements of urban planning, Urban renewal, Policies of urban development in India, master plans CDP of Bangalore 2015. -13

#### References:

1. Beanjen-Garnier J&G. Chabot (1967) Urban Geography, John- Wiley, NewYork.
2. Northham Ray M. (1975) Urban Geography, John Wiley & Sons, Inc. New York
3. Ranan Paddison (2001) Hand Book or Urban Studies, University of Glasgow, U.K., Sage Publications, New Delhi.
4. Peter Roberts (2000) Urban Regeneration, University of Dundee, U.K., Sage Publication, New Delhi.
5. Saskia Sassen (2000) Cities in a World Economy, University of Chicago, USA, Sage Publications, New Delhi.
6. Stephen Ward (2004) Planning and Urban Change, Sage Publications, New Delhi
7. Karen Stromme Christensen (1999) Cities and Complexity, University of California, Berkely USA, Sage Publication, New Delhi.
8. Mayer H.M. & Kohn CF (1967) Urban Geography, Central Depot, Allahabad, India
9. King Leslie J. & Regional G. Golledge (1978) Cities, Space and Behaviour.
10. The Elements of Urban Geography, Pentice-Hall, Inc. Englewood Cliffs, New Jersey, USA.
11. Mandal R.B. (2002) Urban Geography – A Text Book, Concept Publishing Company, New Delhi.
12. Siddhartha K & S. Mukarjee (1996). Cities, Urbanization and Urban Systems, Transworld Media and Communication Pvt. Ltd. New Delhi
13. Johnson James H (1966) Urban Geography – An Introductory Analysis, Pergamon Press Oxford, London
14. [www.geography.about.com/cs/cities/urbanl/geo/](http://www.geography.about.com/cs/cities/urbanl/geo/)
15. [www.brixworth.demon.co.uk/leeds/](http://www.brixworth.demon.co.uk/leeds/)

**III SEMESTER**  
**GYH 502: Research Methodology**

**Unit – 1.** Research: Meaning, definitions, objectives, characteristics and types. Steps involved in research and research ethics.

-13

**Unit- 2.** Research process: Identification of problem, review concepts and theories, review previous research finding, formulate hypotheses, design research (including sample design), data collection (Execution), data analyze, testing of hypotheses, generalization and interpretation, report writing conclusions and bibliography.

-13

**Unit -3.** Research methods: Research methods versus methodology. Research and scientific method. Problems encountered by researchers in India. Sampling techniques for geographical analysis.

-14

**Unit -4.** Forms of research: Paper, article, workshop, seminar, conference and symposium. Thesis writing: Its characteristics and format. Research approaches. Developing the objectives, significance of research.

-14

**References:**

**Text Books**

1. Gilbert, N. 2001: **Researching Social Life**, Sage, London.

**References:**

2. Flowerdew, R. and D. Martin 2005: **Methods in Human Geography: A Guide for students doing a research project**, Prentice Hall, New York.
- 3 Clifford, N.J. and G. Valentine 2003: **Key methods in Geography**, Sage, London.
4. Leedy, P. D. and J.E. Ormrod 2001: **Practical Research: Planning and Design**,

**Web resources:**

- <http://computer.org> - <http://www.acm.org>
- <http://www.intute.ac.uk/socialsciences/>

### III SEMESTER

#### **GYH 503: Fundamentals of Geographical Information System (GIS) and GPS**

**Unit 1: Basic spatial perspective and GIS concepts:** GIS definitions, concept of spaces, approaches and components, history and development of GIS. **Spatial & Non-spatial Data:** Data information, data type, data sources, characteristics of spatial and non-spatial data, raster and vector data models, geographical matrix, data stream.

-13

**Unit 2: Data Collection:** Data capture & geo-processing sources, input methods for spatial & non-spatial data, editing, re-projection, geometric transformation, geo-referencing, display. Map scale precision & accuracy. **Database management system:** Characteristics, components, data quality: Definition, components of geographic data quality. Accuracy, precision, error and uncertainty. Data assessment and evaluation. Linking spatial & non-spatial data. Database types: Hierarchical, network, relational and object oriented.

-14

**Unit 3: Manipulation and Analysis of Data:** Measurement of lengths, perimeter and areas, queries, buffer analysis, topology, neighborhood operations, network operations, overlay analysis, location-allocation analysis problems, and surface analysis. Interpolation and its methods.

-13

**Unit 4:** Global positioning system: Concept, GPS reference systems, components-space segment, control segment, user segment. GPS signal propagation and quality, GPS observations: Pseudo ranges, differential GPS, relative positioning, errors in GPS observations, GPS observation techniques-Static, rapid static, Pseudo kinematic, kinematic, real time kinematic(RTK).

-14

#### **References:**

1. Ian Heywood, Sarah Cornelius & Steve Carver, (2000), An Introduction to Geographic Information Systems, Addition Wesley Longman Limited, New York.
2. Kang-stung Chang, (2002), Introduction to Geographical Information Systems, Tata McGraw-Hill Publishing Company Limited, New Delhi,
3. Stat J & JE Estes, (1990), Geographic Information Systems: An Introduction, New Jersey, Prentice-Hall ,
4. Kang-stung Chang,(2002),Introduction to Geographic Information Systems, Tata McGraw Hill, New Delhi,
5. AUTOCAD Drafting Package, Autodesk Inc, (2003)
6. Aronoff, S,(1991),Geographic Information Systems: A Management perspective, WDL Publications, Ottawa, Canada.
7. David J Maguire, Michael F Goodchild & David W Rhind (Ed.), (1991), Geographic Information Systems, Longman Scientific & Technical co-published in the USA with John Diley & Sons, Inc. New York.

## III SEMESTER

### GYS 504: Natural Disaster Management

**Unit 1: Environment hazards & disasters:** Meaning & approaches, causes and consequences of disaster: Physical, economic and cultural, national and international organizations into disaster management. Types of environmental hazards and disaster: Natural disaster- Earthquake, tsunamis, landslides, volcanic eruption, cyclones, tornados, floods, droughts, heat waves and coldwaves. Man induced hazards-Soil erosion, release of toxic chemicals, nuclear explosion, population explosion and resultant environmental disasters.

-15

**Unit 2: Emerging approaches to Disaster management:** (1) Pre-disaster stage (Preparedness)- hazard zonation maps-predictability and forecasting warning, land use zoning, information, education & communication (IEC), disaster resistance house construction, population reduction in vulnerable area and awareness. (2) Emergency stage- Rescue training for search and operation at national and regional level, ground management plan preparation, immediate relief, assessment surveys. (3) Post disaster stage rehabilitation – Political administrative aspects, social aspect, economic aspect, cultural aspect and environmental aspects.

-15

**Unit 3: Natural Disaster mitigation:** Relief measure, role of GIS in Relief measures, role of GPS in search and rescue, role of remote sensing in prediction of hazards and disasters, measures of adjustment of natural hazards.

-12

**Unit 4: Disaster in Indian context:** A regional survey of land subsidence, coastal disaster, cyclonic disaster & disaster in hills, terror attacks, communal clashes, remedial measures. National and international policies for disaster management.

- 12

#### References:

1. R.B.Singh (Ed) ,1990: Environmental Geography, Heritage Publishers New Delhi
2. Savinder Singh, 1997: Environmental Geography, Prayag Pustak Bhawan.
3. Kates,B.I & White,1978: G.F The Environment as Hazards, oxford, New York.
4. R.B. Singh (Ed), 2000: Disaster Management, Rawat Publication, New Delhi.
5. H.K. Gupta (Ed), (2003): Disaster Management, Universities Press, India.
6. R.B. Singh,(1994),Space Technology for Disaster Mitigation in India (INCED), University of Tokyo.
7. Dr. Satender, (2003), Disaster Management t in Hills, Concept Publishing Co., New Delhi.
8. A.S. Arya Action Plan for Earthquake, Disaster, Mitigation in V.K. Sharma (Ed) (1994), Disaster Management IIPA Publication New Delhi.
9. R.K. Bhandani An overview on Natural & Man-made Disaster & their Reduction ,CSIR, New Delhi

### III SEMESTER

#### GYS 505: Coastal Management

**Unit 1: Coastal Management: Physical Aspects:** Definition of coastal zone and related nomenclature. Coastal processes: Wave, tide and wind. Coastal currents and cells. Coastal morphodynamics: Micro, macro and biogenic forms. Systems of change in coasts: cyclical and progressive. Classification of coasts based on processes and sediment characteristics. -14

**Unit 2: Coastal biogeography:** Special reference to sea weeds, mangroves, dune vegetation and corals, their ecological and economic significance. Natural coastal hazards and their management: Sea level rise, erosion, sedimentation and tropical cyclones. Techniques of monitoring changes in coastal processes and landforms. -14

**Unit 3: Coastal Management: Human Aspects:** Coastal regulations with special reference to India. Human utilization of coasts, environmental impacts and management: Navigation, mining, fishing and fish-processing, off-shore oil exploitation, reclamation and tourism. Coastal engineering and its impacts: Ports and harbors, measures for prevention of erosion and sedimentation. -12

**Unit 4: Coastal pollution:** Sources, impacts and management. Integrated Coastal Management: Concepts, techniques and applications. Karnataka coast: Major environmental issues, problems and their management Application of Remote Sensing with special reference to Fishery Monitoring Surface waters in Coastal Regulatory Zone (CRZ) Study of Suspended mineral in water Study of Chlorophyll in water Measurement of Sea Surface Temperature (SST). -12

#### Reference:

1. Bird, E.C.F. 2000. An Introduction to Coastal Geomorphology, John Wiley and Sons Ltd. New York: 340 p. [Topics 2.3, 4.4]
2. Carter, R.W.G. 1988. Coastal Environments: An Introduction to the Physical, Ecological and Cultural Systems of Coastlines, Academic Press, London: 617p. [Topic 2.3]
3. Chow, V.T, Maidment, D.R. and Mays, L.W. 1988. Applied Hydrology, McGraw-Hill, New York: 572 p. [Topic 3.2]
4. Garrison, T. 1993. Oceanography: An Invitation to Marine Science, Wadsworth Pub. Co., Belmont: 540 p. [Topics 4.1, 4.2, 4.3]
5. Johnson, H.D. and Baldwin, C.T. 1996. 'Shallow clastic seas.' In Reading H.G. (editor): Sedimentary Environments: Processes, Facies and Stratigraphy, 3rd edition, Blackwell Science Ltd. Oxford: pp 232–280. [Topic 2.3]
6. Knighton, D.1998 : Fluvial Forms and Processes: A New Perspective, Arnold, London: 385p. [Topics 2.1, 2.2]
7. Morisawa, M. 1985. Rivers, Longman, London: 222p. [Topics 2.1, 2.2, 3.1]
8. Murthy, K.S. 1998. Watershed Management in India, 3rd edition, Wiely Eastern Ltd. / New Age International Ltd., New Delhi: 198p. [Topic 3.4]
9. Newson, M. 1992. Land Water and Development, River Basin Systems and their Sustainable Management, Routledge, London: 350p. [Topic 3.4]

### III SEMESTER

#### GYE 506: Geography of India with Special Reference to Karnataka

- Unit 1:** Physical setting of India: Location, physiographic divisions, natural drainage systems and their distribution. Climate: seasons & climatic regions. Soils: Types, distribution, erosion and conservation. Natural vegetation: Types and distribution, degradation and conservation. -14
- Unit2:** Agriculture: Major agricultural crops: Rice, wheat, cotton, sugarcane, maize, jowar, tea, coffee, rubber, mulberry crops. Green revolution in India and food security. Irrigation: Major river projects. -13
- Unit 3:** Distribution, production and trade of important minerals & power resources: Iron-ore, manganese, mica, copper, bauxite, coal, petroleum, natural gas, atomic energy, hydal and thermal power. Growth, development and distribution of major industries: Iron & steel, engineering, cement, paper, fertilizers, cotton textiles, and silk, knowledge-based industries industrial regions of India. -14
- Unit 4:** Growth & development of transportation transport system: Roads, railways, airways and inland water. Population: Growth and distribution, composition and density, literacy, sex ratio, fertility & mortality & health services. -13

#### References:

1. Khullar DR. (2009): India: A Comprehensive Geography, Kalyani Publishes, New Delhi, Hyderabad, Kolkata.
2. Alka Gautam (2009) Geography of India, Sharada pustak bhawan, University Road, Allahabad – UP.
3. Sharma TC & Coutinho O (2005) : Economic and Commercial geography of India, Vikas Publishing House Ltd., New Delhi-14
4. Tiwari RC. (2008) Geography of India, Prayag Pustak Bhavan, 20-A, University Road, Allahabad- UP
5. Pritivish Nag & Smita Sengupta (1992) Geography of India, Concept Publishing Company, New Delhi – 59.
6. Ranganath (2007) Geography of India, Vidhyanidhi Prakashan, Station Road, Gadag-01.
7. Phani Deka & Abani Bhagabati (1992) Geography: Economic and Regional, Wiley Eastern Limited, Ansari Raod, Daryaganj, N. Delhi-01.
8. Majid Husain (2008): Geography of India, Tata Mc. Graw Hill publishing co. Ltd. N. Delhi.
9. Singh R.L. (1971); India A Regional Geography, National Geographical Society of India, Varanasi, UP.
10. Jagadish Singh (2003): India: A Comprehensive Systematic Geography, Gyanodaya Prakashan Gorakhpur- UP.
11. India: Year Books- 2005-2010.
12. <http://www.mapsofindia.com/geography/>

**III SEMESTER**  
**GYE 507: Medical Geography**

- Unit- 1. Concepts and Traditions:** Definition, scope, elements, growth of medical Geography methods and techniques. -10
- Unit-2. Human-Environment Interaction:** Health and environment-concept of health, geographical approaches of health, natural environment and health-Inorganic and organic, social environment and health: Food intake, perception of diseases, treatment of diseases, Socio-economic conditions and health. -14
- Unit-3 Modernization, population change and health: Disease classification-** genetic, communicable, non-communicable, occupational, deficiency diseases, WHO classification of diseases. **Diseases diffusion:** Meaning, factors/barriers, phases, types of diffusion. **Epidemiological Transition-** The theory of epidemiological transition (Omran theory) factors of transition- Demographic, changes in risk factors, practices of modern medicine & Indicators. -14
- Unit- 4 Global Inequalities in Health resources:** Concept of health care, levels of health care, social context of disease, health care accessibility and utilization, health care system worldwide, health care services in India, health care policy in India. -13

**Reference:**

1. Husain Majid (1994): 'Medical Geography', Amol Publication Pvt.ltd. New Delhi
2. Learmonth A T A (1978): 'Patterns of diseases and hunger', a case study in Medical Geography, David and Charles, Victoria.
3. May J M (1970): 'The world atlas of diseases' National Book Trust, New Delhi.
4. Mc. Glashan N.D (1972): 'Medical Geography, Methuen, London.
5. Misra R P (1970): 'Medical Geography' National Book Trust, New Delhi.
6. Rais A S Learmonth A T A (1990): 'Geographical aspects of health and diseases in India' Rawat Publication, Jaipur.
7. Stamp L. D. (1964): 'Some aspects of Medical geography', Oxford University Press Oxford.
8. M.S.Meade and R.J. Erickson (2005): Medical Geography Guilford press.

**III SEMESTER**  
**GYE 508: Physical Geography**

- Unit: 1 Introduction to Physical Geography:** Elements, scope, geography as environmental science, history and future of physical geography. -12
- Unit: 2 Maps, Remote Sensing and GIS:** Introduction of maps, location, distance on maps, map location and time zone, topographical maps, introduction to remote sensing and introduction to geographic information systems. -14
- Unit: 3 The Science of Physical Geography:** [Scientific method](#), the hypothetico-deductive method, [concepts of time and space in physical geography](#), [study of form or process?](#) [descriptive statistics](#), [hypothesis testing](#), [inferential statistics: comparison of sample means](#), [inferential statistics: Regression and correlation](#). -14
- Unit: 4 The Universe, Earth, Natural Spheres and Gaia:** Evolution of the universe, early history of the earth, the natural spheres and the gaia hypothesis. Introduction of atmosphere, hydrosphere, lithosphere and biosphere. -14

**Reference:**

1. Strahler, Alan and Strahler, Arthur (2003): [Introducing Physical Geography](#) 3rd edition. Wiley & Sons, New York.
2. Christopherson, Robert W. (2003): [Geosystems](#) 5th edition. Prentice Hall,
3. [Fundamentals of Physical Geography, 2nd Edition, by M. Pidwirny, 2006](#)
4. Jump up^ Pidwirny, Michael; Jones, Scott (1999–2015). "[Physical Geography](#)".
5. Jump up^ Marsh, William M.; Kaufman, Martin M. (2013). [Physical Geography: Great Systems and Global Environments](#). Cambridge University Press.
6. *Jump up*^ Eratosthenes (2010). Eratosthenes' "Geography". Fragments collected and translated, with commentary and additional material by Duane W. Roller. [Princeton University Press](#). .
7. ^ Jump up to:<sup>a b</sup> Avraham Ariel, Nora Ariel Berger (2006). "[Plotting the globe: stories of meridians, parallels, and the international](#)". [Greenwood Publishing Group](#). p.12.



### III SEMESTER

#### **GYP 509: Interpretation of Aerial Photo and Satellite Imagery**

- Unit 1:** Comparison of features in toposheets, aerial photographs and satellite imageries. Determination of scales of aerial photographs. - 13
- Unit 2:** Procedure of taking aerial photographs, types of aerial photographs, medium of aerial photographic interpretation, test for stereographic view. - 14
- Unit3:** Elements of aerial photographs, stereographic interpretation of aerial photographs and manual preparation of land use maps. - 14
- Unit 4:** Interpretation of satellite imagery, identification of features through signatures, color identifications. Preparation of thematic maps using the satellite imagery. - 13

#### **References:**

1. Paul R. Wolf (1999) Elements of Photogrammetry, Mc. Grawhill, International Book Company, New Delhi.
2. Averte and GL. Berrin (2001) Fundamentals of Remote Sensing and Aerial Photo interpretation, Mc Millan, New York.
3. Singh and Sharma (2004) Introduction of Remote Sensing, Rawath Publications, New Delhi
4. George Joseph (2002) Fundamentals of Remote Sensing, University press Pvt. Ltd. Hyderabad-29
5. A Verte and GL. Berrin (2001); Fundamentals of Remote Sensing and Aerial Photo Interpretation, Mc. Millan, New York.

### III SEMESTER

#### GYP 510: Applications of GIS & GPS

**Unit 1:** Identification of spatial data: Point, line and polygon features, representation of spatial features: Raster and vector data model, data structure. -13

**Unit 2:** Overlay analysis, change analysis and buffer analysis. Scanning, integration of attribute data. Geographic analysis, digital terrain models- Application. - 14

**Unit 3:** Introduction to arc-view, GIS software: Digitizing, attribute data editing, query building and executing, typology, symbology and layout. Data representation: Dot map, choro-pleth, located bar and pie maps. - 14

**Unit 4:** Introduction to GPS, finding latitude, longitude and altitude, tracking in GPS, routing in GPS. -13

#### References:

1. Peter A. Burrough and Rachael A. McDonnell (1998) Principles of Geographic Information systems, Oxford University Press, New York.
2. Aronoff S. (1989) Geographic Information System, A Management Perspective, WDL Publications, Ottawa, Canada
3. Ian Heywood, Sarah Cornelius, Steve Carver (2003), An Introduction to Geographic Information System, Pearson Education Ltd., India
4. Chrisman N.R. (1997) Exploring Geographic Information System, Wiley, New York.
5. [www.gisdevelopment.net/tutorials/human008.html](http://www.gisdevelopment.net/tutorials/human008.html)
6. [www.gisloungue.com/remotesensing.html](http://www.gisloungue.com/remotesensing.html).

## IV SEMESTER

### GYH 551: Agricultural Geography

**Unit1:** Definition, nature, scope, and significance of agricultural geography; Origin & evolution of agriculture, approaches: Commodity, systematic, regional and systems approaches. – 14

**Unit 2:** Determinants of agriculture: Physical, socio-economic, cultural, institutional, technological and political. Land holding and land tenure systems, land use policy and planning, irrigation and dry-farming, command area development. – 13

**Unit 3:** Measures of agriculture: Cropping pattern, crop combinations, crop diversification, intensity of cropping, degree of commercialization, agricultural efficiency and productivity, HYV seeds. Classification of agriculture: Whittlesey's classification of world agriculture, Von-Thunen's theory of agriculture and its relevant modifications, game theory & decision making. Role of WTO in agriculture. – 14

**Unit 4:** Green revolution, white revolution, blue revolution, yellow revolution, horticulture & floriculture. Agriculture: Sustainable development. Remote sensing & agriculture. Emerging impact on agriculture: Food security, salinization and land degradation. Employment in agricultural sector, use of modern technologies. – 13

#### References:

1. Mohammad Shafi (2006): Agricultural Geography, Dorling Kindessley (India) Pvt. Ltd. New Delhi.
2. Negi. B.S. (2003) Indian Agriculture: problems, Progress & Prospects, Vikas publishing house Pvt. Ltd. S. Ansari Road, Daryagani, New -Delhi-2.
3. Majid Hussain (2000): Agricultural Geography, Ed Anmol Publishing Pvt. Ltd. Ansari Road, Daryagani, New Delhi-2.
4. Shafi M. (1999): Agricultural Geography, Kedarnath Ram Nath, 132, RG College road, Meetat UP-1.
5. Singh & Dhillion (2000): Agricultural Geography, Prayog Pustak Bhavan, 20 A, University Road, Allahabad-211002, UP.
6. Jasbir Singh (2001): Agricultural geography, Prayog Pustak Bhavan, 20 A, University Road, Allahabad-211002, UP
7. Memonia CB (1998): Agricultural Problems in India: Prayog Pustak Bhavan, 20 A, University road, Allahabad-211002, UP.
8. Majid Husain (2007): Systematic Agricultural Geography, Rawath Publications, Jawahar Nagar, Jaipur, New Delhi – 92.
9. Goh Cheng Leong & Gillian C. Morgan (2009): Human and Economic Geography, Oxford University Press, New Delhi, New York.
10. The Hindu Publications: 2005 to 2010; Survey of Indian Agriculture.
11. [www.agri.geog.in](http://www.agri.geog.in)

**IV SEMESTER**  
**GYH 552: Regional Planning and Development**

- Unit 1:** Concept of region: Types, hierarchy and characteristics of regions, delineation methods of regions – Formal, functional and nodal. Geography and regional planning. Concept and scope of regional planning. Regional approaches. Principles, methods, techniques of regional planning, need for planning. – 14
- Unit 2:** Conceptual and theoretical frame work of regional planning: Growth pole and growth foci. Planning processes: Sectoral, multilevel, decentralized planning. Integrated area development planning (IADP). Planning for tribal and hill areas, drought prone areas, command areas and watershed. Planning for metropolitan region: CDP, satellite towns, urban green belt. – 13
- Unit 3:** Concept of development, indicators of development. Regional imbalance. regional development strategies. Problems and issues in regional planning. sustainable development of regions. Regionalization of India: Based on natural, economic and administration (macro and meso levels only). – 14
- Unit 4:** Theories of regional development: Central place theory, diffusion theory (Hegerstand's). The role of locational theories in regional planning process. An evaluation of regional disparities / imbalances – backward regions of India. Identification of backward areas, planning backward area. Causes and consequences regional disparities. Measures of disparities. Harnessing the information through GIS, remote sensing, GPS for regional planning and development. – 13

**References:**

1. Tiwari R. C. (2005) Geography of India, Prayoug Pustak Bhavan, Allahabad
2. Singh Jagadish (2003) India – A Comprehensive Systematic Geography, Gyanodaya Prakashan, Gorakhpur, U.P.
3. Mishra RP (1969) Regional Planning Concepts- Techniques Policies and Case Studies, Prasaranga, University of Mysore.
4. V.K.R.V. Rao (1978). Planning in Perspective, Allied Publishers Private Limited, Bombay.
5. Mahesh Chand and Viney K. Puri (1985)n Regional Planning in India, Allied Publishers Pvt. Ltd., Bombay
6. Mishra R.P. (1979) Regional Planning and National Development, Vikas Publishing House Pvt. Ltd., New Delhi.
7. Laxmidevi (1997) Planning, Development and Regional Disparities, Anmol Publication Pvt. Ltd., New Delhi.

**IV SEMESTER**  
**GYS 553: Population Geography**

- Unit1:** Nature and scope of population geography, population geography and demography, Sources of population data. Density and distribution of population and its pattern in the world, factors influencing distribution of the world population. -14
- Unit 2:** Population change: Growth of population in the world and India, components of population change, fertility, mortality and migration. determinants of fertility and mortality, demographic transition theory. -13
- Unit 3:** Migration- Meaning and types, causes and consequences, theories of migration – Ravenstein & lee. -13
- Unit 4:** Population and resources, optimum population, population resource regions, malthus population theory, population policy of India. -14

**References:**

1. Chandan R.C. (2009), Geography of Population, Kalyani Publishers, Ansari Road, Daryaganj, New Delhi-2.
2. Majid Hussain (1999), Human Geography, Rawat publications, Jaipur.
3. Trewartha G.T. (1959) A Geography of Population, World Patterns, John- Wiley and Sons Inc. New York.
4. Ghosh BN. (1987) Fundamentals of population Geography, Sterling publishing company, New Delhi
5. Jingam ML. B.K. Bhat, JN Deasi (2003) Demography, Urinda Publishers Pvt. Ltd. Delhi.
6. R.K. Tripathi ((2000) Population Geography, Common Wealth Publishers, New Delhi.
7. Kayastha SL. (1998) Geography of Population, Rawat publications, Jaipur.
8. Clerk I (1984) Geography of Populations, Approaches and Applications, Pergamon Press, Oxford, UK.

**IV SEMESTER**  
**GYS 554: Environmental Geography**

- Unit 1:** Nature and interdisciplinary aspect of environmental geography. Ecological approaches. Definition and meaning of environment. Habitat, ecological niche, Bio-sphere and Biodiversity. -13
- Unit 2:** Ecosystem: Structure and functioning of ecosystem, pond as ecosystem, food chains, food webs, food pyramid. Biomes – equatorial to tundra i.e 11 types. Man and environmental relationships. Resource use and ecological imbalance with reference to soil, forests and energy resources. Man made ecosystem - Urban, ecotourism, national parks and sanctuaries. Depletion of ozone, greenhouse effect and acid rain. – 12
- Unit 3:** Man induced changes in environment: Environmental pollution, i.e. air, water, noise, solid waste with special reference to India. Environmental hazards, i.e. earth as warehouses, flood, famines, land slides, avalanches, forest fires, impact of green revolution and extinction of species. – 11
- Unit 4:** Principles of environmental management- Environmental policy of India, (post 2000AD). Environment impact assessment (EIA). Global summits and agencies of environment conservation. -10

**References:**

11. Strahler A.N. (1968) The Earth Sciences, Harper International Education, New York.
12. Richard H.B. (2004) Physical Geography, Heinmann Simple Services, Rupa & company, New Delhi
13. Robinson H. (1982) Bio Geography, ELBS, New York.
14. Healey I.N. and Moore P.D. (1973) Bio-Geography, Backwell Oxford, U.K.
15. Strahler A.N. and Strahler A.H. (1973) Environmental Geo Science, Hamilton, California, USA.
16. Savindra Singh (2004) Environmental Geography, Prayog Pustak Bhawan, Allahabad, India.
17. Paul Selman (2000) Environmental Planning, Sage Publications, New Delhi
18. Cheryl Simon Silve and Ruth S. De Fries (1991) One Earth One Future-Our chaining Global Environment, National Academy of Sciences, Affiliated to East West Press Pvt. Ltd. New Delhi.
19. Strahler A.N. and Strahler A.H. (1977) Geography and Man's Environment, John Wiley & Sons, New York
20. Goldsmith Edward et al. (1988) The Earth Report – The Essential Guide to Global Issues, Price Stern Solan Inc. California, USA

## IV SEMESTER

### GYS 555: Cultural Geography

**Unit 1:** Nature of cultural geography- Concept and meaning of culture-elements of culture, convergence and divergence of culture-cultural change. – 13

**Unit2:** Cultural diversity: Human races-caucasoids, mongoloids and negroids- World's major regions-major languages of the World, and India's cultural Regions. Ethnic groups, case study, bushman, pygmies and eskimos. tribals of India. -14

**Unit 3:** Major human activities and cultural and occupations of man; Agriculture including its origin & diffusion, industrialization and its impact on culture and modernization broad features and impact in culture. -13

**Unit 4:** Culture and social well-being: Cultural indicators and human development index (HDI) at global, India and Karnataka Level. Human settlements: Rural and urban settlement patterns. Economic and social characteristics- Impact of technology on human settlements. Emerging issues of aged population and their care. -14

#### References:

1. Robestein J.H. & Robert S. Barren (1990) the cultural Landscape An Introduction to Human Geography, Prentice Hall of India Pvt. Ltd. New Delhi – 1
2. Singh R.Y. (2003) Geography of Settlements. Rawat Publications, Jaipur.
3. Hussain M. (1999) Human Geography, 2nd Edition, Rawat Publication, Jaipur
4. Tirtha Ranjit (2002) Geography of India 2nd Edition, Rawat Publication, Jaipur
5. [www.fortunecity.com/victorian/updike/188.culture.html](http://www.fortunecity.com/victorian/updike/188.culture.html)
6. [www.utexas.edu/depts/grg/sanders/GRG305/industrialgeography.html](http://www.utexas.edu/depts/grg/sanders/GRG305/industrialgeography.html)

## IV SEMESTER

### GYS 556: Medical Geography

**Unit- 1. Concepts and traditions:** Definition, scope, elements, Growth of medical geography methods and techniques. - 10

**Unit- 2. Human-Environment Interaction:** Health and environment-concept of health, geographical approaches of health, natural environment and health-inorganic and organic, social environment and health: Food intake, perception of diseases, treatment of diseases, socio-economic conditions and health. - 14

**Unit- 3. Modernization, population change and health: Disease classification** genetic, communicable, non-communicable, occupational, deficiency diseases, WHO classification of diseases. **Diseases diffusion:** Meaning, factors/barriers, phases, types of diffusion. **Epidemiological transition**-The theory of epidemiological transition (Omran theory) factors of transition- Demographic, changes in risk factors, practices of modern medicine. Indicators. -14

**Unit- 4. Global Inequalities in Health resources:** Concept of health care, levels of health care, social context of disease, health care accessibility and utilization, health care system worldwide, health care services in India, health care policy in India. -12

#### Reference:

1. Husain Majid (1994): 'Medical Geography', Amol Publication Pvt.Ltd. New Delhi
2. Learmonth A T A (1978): 'Patterns of diseases and hunger', a case study in Medical Geography, David and Charles, Victoria
3. May J M (1970): 'The world atlas of diseases' National Book Trust, New Delhi
4. Mc. Glashan N.D (1972): 'Medical Geography, Methuen, London
5. Misra R P (1970): 'Medical Geography' National Book Trust, New Delhi
6. Rais A S Learmonth A T A (1990): 'Geographical aspects of health and diseases in India' rawat Publication, Jaipur
7. Stamp L. D.(1964): 'Some aspects of Medical geography', Oxford University Press Oxford
8. M.S.Meade and R.J. Erickson (2005), Medical Geography Guilford press.



## IV SEMESTER

### GYP 557: Research Techniques in Human Geography

**Unit1:** Network analysis: Alfa, beta and gama indices, accessibility matrices: 'C' matrix and shortest path matrix. - 13

**Unit 2:** Nearest neighbor analysis, location quotient, rank size relationship, functional classification of towns. - 14

**Unit3:** Analysis of crop combination and mapping – J.C. Weaver's, and Doi's. Crop diversification and crop intensity. -14

**Unit 4:** Index of diversification, population potential and centographic analysis. -13

#### References:

1. Aslam Mohamood (1977) Statistical Methods in Geographical Studies, Rajesh Publications, New Delhi
2. Gupta C.B. (1979) An Introduction to Statistical Methods, Vikas Publishing House Pvt. Ltd. New Delhi.
3. Murray R.
4. Toffee R. Transportation Geography, Prentice Hall Publication, New York.

## IV SEMESTER

### GYP 558: Dissertation, field Study Tour/Viva-Voce

- Unit 1:** Methods of field investigation and its importance in geography. -14
- Unit 2:** Field work of different areas and levels (Micro-Meso-Macro). -13
- Unit 3:** Collection of field data, sampling methods and preparation of questionnaires. -14
- Unit 4:** Data input, processing, representation, analysis and interpretation (Using computer and GIS techniques) report writing. -13

#### Note:

1. Field study tour is a part of IV semester. Study tour is compulsory and to be conducted between end of the III semester and in the beginning of the IV semester for a duration of two weeks. Study tour report submission is compulsory.
2. Viva-Voice based on dissertation and study tour report.

#### References:

1. Ahuja (2004) Research Methods, R.K. Books, New Delhi
2. Kothari (1990) Research Methodology – Wiley Eastern Ltd. New Delhi.
3. Gopal M.H. (1970) Introduction to Research Procedure in Social Science, Asia Publishing House, Bombay.
4. Young Pauline V. (1980) Scientific Survey and Research, Prentice Hall, New Delhi.
5. Limb (2001) Quantitative Methodologies for Geographer R.K. Books, New Delhi.
6. Mishra R.P. (2001) Research Methods in Geography, R.K. Books, New Delhi.
7. Pal (2005). Computing Techniques in Geography, R.K. Books, New- Delhi.

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