UNIVERSITY OF PUNE				
M.A. / M. Sc Syllabus in Geography (Credit System) **From- June, 2014**				
SEMESTER – III				
COURSE CODE	**COURSE TITLE**	**CREDITS PER COURSE**	**CREDITS TO BE COMPLETED**	
	CORE COURSES		**COURSE WISE**	**SEMESTER WISE**
Gg-301	Geography of India with special Reference to Maharashtra	3	3	
	One of the following according to Specialization			
Gg-310	Tropical Geomorphology	3	3	
Gg-311	Applied climatology	3		
Gg-312	Trade and Transport Geography	3		
Gg-313	Urban Geography	3		
	One of the following			
Gg-320	Multivariate Statistics	3	3	
Gg-321	Political Geography	3		
Gg-322	Geography of Soils	3		
	One of the following according to Specialization			
Gg-330	Practicals in Geomorphology	3	3	
Gg-331	Practicals in Climatology	3		
Gg-332	Practicals in Economic Geography	3		
Gg-333	Practicals in Population and Settlement Geography	3		
	(Note : Field work / visit for duration should not be less than 2 days to be undertaken)			

Gg-302	Interpretation of Topographical Maps & Village Survey / Project work	4	4	
	ELECTIVE COURSES (Any three From the Following; but Gg-306 & Gg307 together)			
Gg-303	Research Method in Geography	3	9	
Gg-304	Social &Cultural Geography	3		
Gg-305	Practical in Watershed analysis	3		
Gg-306	Geoinformatics-III	3		
Gg-307	Practical in Geoinformatics	3		
	Total courses in the semester	**8**	**25**	**25**

SEMISTER - IV				
COURSE CODE	**COURSE TITLE**	**CREDITS PER COURSE**	**CREDITS TO BE COMPLITED**	
	CORE COURSES		**COURSE WISE**	**SEMESTER WISE**
	Three of the following			
	NOTE: Gg. 411 & 412-this group will be offered by the students who have opted Gg 208, 209, 306 and 307)			
Gg-401	Theoretical and Applied Geography	3	9	
Gg-402	Principles of Remote Sensing and GIS	3		
Gg-403	Practicals in Remote Sensing and GIS	3		
Gg-411	Geostatistics	3		
Gg-412	Practicals in Geostatistics	3		
	One of the following			
Gg-420	Regional Planning and Development	3	3	
Gg-421	Geography of Water Resources	3		
Gg-422	Biogeography	3		
Gg-423	Oceanography	3		
Gg-424	Natural and Manmade Hazards	3		
	One of the following			
Gg-440	Dissertation	4	4	
Gg-441	Principles of Regional Geography & Project Work	4		
ELECTIVE COURSES (Any three from the following)				
Gg-404	Geography of Food Security of India	3	9	
Gg-405	Geography of Health	3		
Gg-406	Practicals in Advanced Surveying	3		
Gg- 407	Regional Geography of SAARC countries	3		
	Total courses in the semester	**8**	**25**	**25**
			Total Credit	**100**

UNIVERSITY OF PUNE

MA/MSc Syllabus in Geography (Credit System)

Sem-III: Revised Syllabus (from June-2014)

Code No. Gg: 301 **Title: Geography of India with Special Reference to Maharashtra**

No. of Credits: 03 **Total Periods : 45**

Sr. No.	Topic	Sub-Topic	Learning Points	Periods
01.	Introduction	a) Geographical Location b) Economic Position c) Geological Structure d) Geological Structure	1.Geographical and relative location of India. 1.Economic position of India in Relation to World. 1. Salient features of geological structure of India and Maharashtra.	5
02.	Physiography and drainage	a) Main Physiographic Divisions b) Drainage Systems c) Physiographic	1. The northern mountains. 2. The north Indian Plain. 3. The peninsular plateau 4. The coastal lowlands and islands. 1. East flowing rivers: Ganga, Bhrahmaputra, Godavari, Krishna. 2. West Flowing Rivers: Sindhu, Tapti, Narmada. 3. Major river systems of Maharashtra: east Flowing and west flowing rivers. 1. Physiographic divisions and Drainage systems of Maharashtra	5
03	Climate	Seasons and Climatic regions	1. Various seasons and associated weather conditions. 2. Mechanism of Monsoon. 3. Major Climatic regions of India. 4, Climate of Maharashtra	5
04	Soils	Soil Types	1. Major soil types and their distribution in India. 2. Soil degradation and soil conservation. 3. Major soil types and their distribution in Maharashtra	3
05	Forest	Forest Types	1. Major forest types and their distribution in India. 2. Deforestation and conservation of forest. 3. Major forest types and their distribution in Maharashtra	3
06	Mineral and Power Resources	Distribution and Utilization	1. Iron over, manganese, bauxite. 2. Coal, Petroleum, Natural gas. 3. Major power projects in India. (Hydro, Thermal, Atomic.) 4.Mineral and Power resources in Maharashtra.	4
07	Agriculture	Distribution and Production of Major Crops	1. Rice, Wheat, Jawar, Cotton, Sugarcane. 2. Green revolution in India; its socio-economic And ecological importance. 3. Major crops of Maharashtra.	4
08	Industries	Major Industries and Development	1. Account of development of distribution of Cotton Textile, sugar, chemical, fertilizers and Engineering. 2. Problems related to industrial development. 3. Major industries and development in Maharashtra.	4

09	Population	Growth and Distribution	1. Growth and distribution of population in India. 2. Population Composition. 3. Growth and distribution of population in Maharashtra	4
10	Regional Development	Development of Different Regions	1. Developed and Underdeveloped regions of India and Maharashtra.	3

N.B. According need of topics, maps are expected.

Reference Books :

1. Agrawal A. N. - Indian economy, Problems of Development and Planning.
2. Chopra S. N. - India, An Area Study.
3. Dubey and Negi - Economic Geography of India.
4. Gopal Singh - India.
5. Memoria I.B. - Geography of India.
6. R. L. Singh - Regional Geography of India.
7. Sharma and Continuo - Economic and Commercial Geography of India.
8. Arunanchalam B. (1967) Maharashtra : A study in Physical , Regional setting and Resource Development
9. Deshpande C.D. (1971) Geograhy of Maharashtra.
10.. Dikshit K.R. (1986) Maharashtra in Maps. Maharashtra Statev Board for literature and culture, Bombay.
11. Diddee J, Jog S.R. Kale V.S. and Datye V.S. (2000) Geography of Maharashtra. Rawat publication , New Delhi

UNIVERSITY OF PUNE

MA/MSc Syllabus in Geography (Credit System)

Sem-III: Revised Syllabus (from June-2014)

Code No. Gg: 302 **Title: Interpretation of Topographical Maps and Village Survey / Project Report**

No. of Credits: 04 **Total Periods : 60**

Sr. No.	Topics	Sub-topics	Learning Points	Practicals (3 hrs)	No: of sheets (minimum)
a. Interpretation of Topographical Maps (for 50 marks)					
1	Study of S.O.I and O.S Topographical Maps (1: 50,000 Series)	1.Indexing systems and conventional signs and symbols (OS)	1. 15' 15' 2. 7.1/2' 7.1/2' 3. 5' 7.1/2'	4	2 (One each for S.O.I and O.S. sheets)
		2. Grid references.	1. 4-figure grid 2. 6-figure grid 3. International grid reference		
		3. Locational and Relief aspects of the area	1. Latitudinal & Longitudinal extension 2. Contour interval 3. Maximum and Minimum heights		
2	Interpretation of S.O.I and O.S. toposheets.	1. Patterns of Relief	1. Distribution of Spot heights, bench marks, Trigonometrical Points etc. 2. Types of Slopes (convex, concave, uniform etc.) 3. Major landforms from contour patterns	10	SOI –3 sheets OS – 3 sheets
		2. Patterns of Drainage network	1. Types-trellis, dendritic, radial, etc. 2. Streams with water, without water. 3. Influence of relief on drainage		
		3. Patterns of Vegetation.	1. Types of vegetation 2. Association of relief and drainage 3. Reserved Forest and Protected Forest		
		4. Patterns of Settlements.	1. Types, amenities, facilities and communication, etc 2. Distribution, relative size, relative distance (dispersed, nucleated etc)		
		5. Patterns in Land Use.	1. Agriculture, mining etc, areal distribution, impact of physical landscape.		
b. Village Survey / Project Report with oral (for 30 marks)					

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3	Physical Survey	Location	1. Location on toposheet (lat. & long), extension, grid reference if available, height above mean sea level, area, site and situation) 2. Map showing physical features surrounding the village./ Project area 3. Position of the village on the cross-section line. 4. Location of the village /Project area shown in the map of catchment area.	6	
		Geology and climate	Information regarding geology, climate, soils and vegetation of the village		
4	Socio-Economic Survey	Population characteristics	1. Population, population structure, facilities available 2. Information regarding households-based on 10% sample survey.		
		Village morphology	1. Plan prepared by pace survey 2. Description of the plan.		

Note:

1. The selection of the village must be based on the availability of S.O.I. toposheet and/ or Cadastral Map.
2. As far as possible the village should be selected from the nearby area, so that the students can undertake at least two field visits.
3. Collection of data / information should be undertaken by the student by visiting the various Government Offices
4. The Village Survey Report should includes all geographical and socio-economic aspects.
5. Appropriate maps, diagrams, graphs, sketches etc should be included.
6. The Report should not preferably exceed 25 pages and **a group of maximum 5 students is permissible.**
7. Village survey is equivalent to 6 Practicals.

Reference Books :

1. Tamaskar B.G. and Deshmukh V.M. (1974), Geographical Interpretation of Indian Topographical Maps.
Orient Longman Limited Bombay
2. Ramamurthy, K. (1982): Map interpretation, Madras
3. Petrie N. (1992), Analysis and Interpretation of Topographical Maps. Orient Longman Limited Calcutta.
4. Dury G.H. (1960), Map Interpretation. Sir Isaac Pitman and Sons Limited, Pitman House, Bath.
5. Meux A. H. (1960), Reading Topographical Maps. University of London Press Limited
6. Jones P. A. (1968), Field work in Geography. Longmans, Green and Company Limited
7. Archer J. E and Dalton T. H. (1968), Field work in Geography B.T. Batsford Limited London
8. Wheeler K.S. Ed (1970), Geography in the field. Blond Educational, London.
9. Gupta, K. K. and Tyagi, V. C. (1992): Working with maps, Survey of India Publication, Dehradun
10. Vaidyanadhan. R. (1968). Index to a set of 60 topographical maps, CSIR, New Delhi

UNIVERSITY OF PUNE

MA/MSc Syllabus in Geography (Credit System)

Sem-III: Revised Syllabus (from June-2014)

Code No. Gg: 303 **Title: Research Method in Geography**

No. of Credits: 03 **Total Periods : 45**

Sr. No.	Topic	Sub-topic	Learning Points	Lectures
1.	Surveying And Map projections	Definition Importance and types	1. Plane and geodetic Survey 2. Methods of Survey 3. Principles and methods of Dumpy level and theodolite survey 4. UTM projection	6
2.	SOI Toposheet	Interpretation and use	1. Indexing system of SOI Toposheet 2. Data base creation for physical and cultural features 3. Drainage basin demarcation, terrain cross profiles	6
3.	Aerial photographs and satellite images	Interpretation and use	1. Concept of stereoscopic view 2. Geometry of Aerial photograph**:** flight line, overlap, fiducial marks, Measurement of relative heights 3. Data base creation from aerial photographs and satellite images	6
4.	Statistical methods	Application	1. Nature of data Geographical data. 2. Descriptive and inferential statistics 3. Bivariate and multivariate correlation analysis 4. Testing of hypothesis: parametric and non parametric tests (Chi squared, ks, t, f)	6
5.	GIS	Use of GIS	1. Use of GIS in spatial data analysis and modelling	5
6.	Field work	Components	Field sampling Questionnaire, interviews, measurements and field mapping.	5
7.	Report writing	Technique	Research problem, survey of literature, research methods applied, analysis, conclusions References and Bibliography	6

Reference Books:

1. Shaw G and Wheller D. (1985): Statistical techniques in geographical analysis. John Wiley and sons, New- York
2. Sumner G J (1978): Mathematics for physical geographers. Edward Arnols
3. Karlekar Shrikant and Kale Mohan (2005): Statistical analysis of Geographical data, Dimond publication
4. P. A. Burrough and R.A. McDonnell, Principle of Geographical Information System, 2000, Oxford University Press.
5. Geoge Joseph (2003): Fundamental of Remote Sensing, Universities Press, Hyderabad.
6. Ebdon David (1989): Statistical for Geographers
7. King, (1975): Statistical Geography
8. Norcliffe G. B. (1977): Inferential statistics for Geographers (Hutchinson, London)
9. Rogerson P. A. (2001): Statistics for Geography (SAGE pub., London, New Delhi}
10. Singh & Kanauja : Map work and Practical Geography.
11. Maslov A. V.Gordeev A. V. Batrakov Yu. G. (1984) : Geodetic surveying, Mir Publishers, Moscow
12. Kanetkar T. P. & Kulkarni S.V. 1986. Surveying & leveling, Pune Vidyarthi Griha Prakshan, Pune
13. V. Natarajan P., Adler Ron K:. Advanced Surveying, B. 1 Publ. Bombay
14. Richardus P., Adler Ron K (1972) : Map projections, North Holland publ. Co. Amsterdam
15. Maling .H. (1973) : Co ordinates systems and map projections, George Philip, London.

UNIVERSITY OF PUNE

MA/MSc Syllabus in Geography (Credit System)

Sem-III: Revised Syllabus (from June-2014)

Code No. Gg: 304 **Title: Social and Cultural Geography**

No. of Credits: 03 **Total Periods : 45**

Sr. No.	Topic	Subtopics	Learning points	Periods
01	Introduction	Nature, Scope andDevelopment	1. Definitions 2. Early Contributions 3. Subject Matter 4. Conceptual and Methodological approaches 5. Trends and Developments	04
02	Philosophical bases Social and Cultural Geography	Bases and Concepts	1. Materialism, Idealism,Phenomenalism, Existentialism, Structuralism,Radicalism, liberalism, Positivism, Humanism 2. Origin and Diffusion of Culture	05
03	Space and Society	Structure and Processes of Social Patterns	1. Individual's space- Intimate, Personal, Socialand Public Space. 2. Theoretical space – Organic, Perceptive andSymbolic space 3. Interaction and Social relations	06
04	Social Groups	1. Activities 2. Concepts 3. Processes 4. Types and Structure	1. Groups in Society 2. Social Structure, 3. Models of Assimilation andSegregation 4. Industrialization, Migration, Urbanization, Modernization, Globalization	07
05	Socio- Cultural Regions	1. Origin anddiffusion ofculture 2. Bases ofregion formation	1. Cultural Diversities 2. Role of Race, Religion, Caste, Ethnicity, Tribe 3. Language and Dialect 4. Literacy, Education,Economic Activities, Class and Power 5. Transformations and Changes. 6. Cultural regions of the World and India	07
06	Social Well-being	1. Concepts 2. Components and Indicators 3. Measurementand Patterns	1. Quality of Life and Human Development 2. Components of Regional and SocioCultural Indicators 3. Human Development Index. 3. Methods of Measuring well-being byweighingIndicators. 4. Patterns of social well-being –States, Indiaand World	08
07	Human Settlements	1. Relation to Ideology, Social Structure and Technology.	1. Social areas in Urban and Rural Settlements. 2. Social and Physical Infrastructure. 3. Rural urban contrasts- Housing, Health,Education, Social structure, Economic andCulturalCharacteristics. 5. Impact of Technologyon HumanSettlements. 4. Redistribution of Resource for Social Justice, Equality and Welfare.	08

Reference Books:

1. AnandAijazuddin (1999) : Social Geography, Rawat Publications, New Delhi
2. Bulsara, J. F. (1970) : Patterns of Social Life in Metropilitan Areas, Popular Prakashan, Bombay
3. Censys of India (1974) : Economic and Socio-Cultural Dimensions of Rationalization Census Centenary, Monograph No. 7, Govt. of India, New Delhi
4. Coates, B. E. et. al. (1977) : Geography and Inequality, Oxford University Press, London
5. Orang, Mike (1998) : Cultural Geography. Routledge Publication, London

6. Dubey, S. C. (1991) : Indian Society, national Book Trust, New Delhi
7. Gregory, D. and Lassy, J. (1985) : Social Relations and Spatial Structures, McMillan
8. Harmondorf (1989) : Tribes of India : The Struggle for Survival, Oxford University Press, Delhi
9. Hutchinson and Smith, D. (1996) : Ethnicity : Oxford University Press, Delhi
10. Jordon and Lester, G. (1995) : The Human Mosaic, Harper and Row, New York
11. Maloney, Clarence (1974) : People of South Asia, Winston, New York
12. Massey, D. and Jess, P. (1995) : A Place in the World : Places, Cultures and Globalization, OxfordUniversity Press, New York
13. Massey, D. et. al. (Eds) (1999) : Human Geography Today, Policy Press, Cambridge.
14. Mukherjee, A. B. and Ahmad, A. (1985) : India : Culture Society and Economy, Inter – India Publication,New Delhi
15. Schwartzberg, Joseph (1978) : A Historical Atlas of South Asia, University of Chicago Press, Chicago
16. Smith David (1980) : An Exploration of India. Cornell University Press, Ithasa
17. Sopher, David (1980) : An Exploration of India, Cornell university Press, Ithasa
18. Harvey, D. (1973) : Social Justice and the City, Arnold Publishers
19. Herbert, D.T. and Smith, D. M. (1979) : Social Problems and City Geographical Perspective, OxfordUniversity Press, London
20. Hutchson and Smith, D (1996) : Ethnicity, Oxford University Press, Oxford
21. Jones, Emrys and Eyles, J. (1977) : An Introduction to Social Geography, Oxford University Press,London
22. Jones, Emrys (1975) : Readings in Social Geography, Oxford University Press, London
23. Jordon and Lester, G. (1995) : The Human Mosaic, Harper and Row, New York
24. Knoy, P. L. (1988) : Social Well-being – A Spatial Perspective, Oxford University Press, London
25. Kulkarni, K. M. (1990) : Geographical Patterns of Social Well-being Gujarath, Concept Publishing Co.,New Delhi

UNIVERSITY OF PUNE

MA/MSc Syllabus in Geography (Credit System)

Sem-III: Revised Syllabus (from June-2014)

Code No. Gg: 305 **Title: Practicals in Watershed analysis**

No. of Credits: 03 **Total Periods : 45**

Ex No.	Topic	Sub topic	Learning points	Practical(3hrs)
1	Delineation of Watershed/Drainage basin	Delineation of Watershed/Drainage basin from toposheet	3 to 5 th order basin delineation from Toposheet	1
2	Basin perimeter, shape and area	Basin perimeter, shape and area	Calculation of Basin perimeter, shape and area	1
3	Linear aspects of Drainage basin	Stream ordering(Strahler's method)	Stream ordering, Numbering, Measurement and calculation of Stream length, Mean stream length, Stream length ratio, Bifurcation ratio	2
4	Relief aspects of Drainage basin	Relief ratio, relative relief, Ruggedness number	Calculation of Relief ratio, relative relief, Ruggedness number	2
5	Aerial aspects of Drainage basin	Drainage density, Drainage frequency, Texture ratio, Form factor, circularity ratio, Elongation ratio,	Calculation of Drainage density, Drainage frequency, Texture ratio, Form factor, circularity ratio, Elongation ratio,	2
6	Preparation of DEM	Digitization of contours from Toposheet	Preparation of TIN model and Grid based DEM	2
7	Software based	Delineation of watershed	DEM based	2
8		Digitization of layers	Point ,line and Polygon	
9		Finding ridge line and valley floor	Finding ridge line and valley floor within basin/Watershed	
10	Profile drawing	DEM based	Set of Profiles at an equal interval 5 to 8 profiles	1
11	Hypsometric Integral	DEM based	Plotting of Hypsometric curve and Calculation of Hypsometric Integral	2

References:

1. King, C. A. M (1966): Techniques in Geomorphology, Edward Arnold, London
2. Monk house, F. J. and Wilkinson, H. R., (1976). Maps and Diagrams, Methuen & Co.
3. Savindra Singh (2002): Geomorphology, Prayag Pustak Bhawan, Allahabad
4. Miller, Austin (1953): The skin of the Earth, Methuen & Co. Ltd. London
5. Strahler: Physical Geography
6. Wilson, J., Gallant, J., 2000. Terrain Analysis: Principles and Applications. New York: John Wiley and Sons.
7. Rajvir Singh, (2008) Watershed Planning and Management, 2nd Edition, Yash Publishing House, Bikaner, India.
8. V. V. Dhruvanarayana, G. Sastry, U. S. Patnik. (2006)Watershed Management,
9. B. K. Kakde, (2004) Watershed Manual – A Guide for Watershed Development Practitioners and Trainers, BAIF Development Research Foundation, Pune.
10. R. Suresh (2006) Soil and Watershed Conversation Engineering, 2nd Edition, – Standard Publication Distributors, Delhi.

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MA/MSc Syllabus in Geography (Credit System)

Sem-III: Revised Syllabus (from June-2014)

Code No. Gg: 306 **Title: Geoinformatics -III**

No. of Credits: 03 **Total Periods : 45**

Sr. No.	Topic	Sub-topic	Learning Points	Periods
1	Data Analysis	Spatial	Simple to complex, Grid Operations: Zonal and Global	3
2	Spatial Interpolation	Surfaces	Digital Elevation Model, Digital Terrain Model, Applications	3
3	Spatial Analysis	Analytical tasks	Single – Layer Operations, Multiple – Layer Operations, Spatial Modelling, Topological Overlays, Point Pattern Analysis, Network Analysis, Surface Analysis, Grid Analysis	8
4	Digital Image Processing (I)	Image Rectification Georeferencing	Types of errors: Systematic & Non-systematic Sources of distortions: Atmospheric, Radiometric, Geometric and noise GCP Tools, Mapping Function, Resampling	8
5	Digital Image Processing (II)	Image Enhancement	Density Slicing, Contrast Stretching, Spatial Filtering, Edge Enhancement, Spectral Ratioing	8
6	Digital Image Processing (III)	Classification	Unsupervised: ISODATA approach Supervised: Training Stage, Classification Stage (Minimum Distance to Means, Parallel-piped & MXL Classifiers), Output Stage	11
7	Digital Image Processing (IV)	Classification Accuracy	Confusion Matrix, Producer`s Accuracy, User`s Accuracy, Mapping Accuracy	4

Reference Books:

1. P. A. Burrough and R. A. McDonnell, Principles of Geographical Information System, 2000, Oxford University Press.
2. Lo, C. P. and Albert K. W. Yeung, Concepts and Techniques of Geographic Information System, 2002Prentice –Hall, India.
3. Paul A. Lonfley, Michel F. Goodchild, D J. Maguire and D.W. Rhind, Introduction to Geographic Information Systems and Science, 2002, John Wiley and Sons Ltd.
4. Kang – tsung – Chang, Introduction to Geographical Information System, 2002, McGraw Hill.
5. George Joseph, Fundamentals of Remote Sensing, 2004, Universities Press Pvt. Ltd., Hyderabad.
6. J.R. Jensen, Remote Sensing of Environment, An Earth Resource Perspective, 2003, Pearson Education Pvt. Ltd., New Delhi.

7. Lillesand T.M. and Kiefer R.W., 2002, Remote Sensing and Image Interpretation, John Wiley and Sons New Delhi.

UNIVERSITY OF PUNE

MA/MSc Syllabus in Geography (Credit System)

Sem-III: Revised Syllabus (from June-2014)

Code No. Gg: 307 **Title: Practicals in Geoinformatics**

No. of Credits: 03 **Total Periods : 45**

Sr. No.	Topic	Sub-topic	Learning Points	Practicals (3 hrs)	No. of sheets
1	Statistics, Projections and Survey	Statistics Projections GPS	Matrix Algebra Spherical Coordinate System, DMS, DD, UTM Zones, LCC and Plyconic Orientation and Navigation	2	5
2	Aerial Photography	Measurements Interpretation	Scale and height (using parallax bar) Visual Interpretation of single aerial photograph, interpretation of stereo pair using Stereoscope	3	3
3	Satellite Images	Interpretation	Visual interpretation of LISS, PAN, WiFS and Merged Images A WiFS and High Resolution Satellite Data, Cartosat Data, IKONOS and Quick Bird etc.	3	4
4	Spatial Database	Layer Generation	Raster: Full Grid, Chain Codes and Run Length Codes Vector: Manual Digitization, Digitization Errors and Topology Building	2	5
5	Digital Image Processing	Enhancement	Linear – Contrast Enhancement Non-Linear – Square, Square root, Cube, Cube root Spatial Filtering –Mean & Median Band Ratioing, NDVI Computation	2	5
6	Software based	Image Processing GIS	Image Registration, Enhancement, Supervised Classification Unsupervised Classification Georeferencing of scanned raster image, Digitization (vectorization), Rasterization, Attribute data linking, Thematic Layer Generation	3	10

Reference Books :

1. P. A. Burrough and R. A. McDonnell, (2000) : Principles of Geographical Information System, Oxford University Press.
2. C. P. Lo and Albert, K. W. Yeung (2002) : Concepts and Techniques of Geographic Information System, 2002Prentice –Hall, India.
3. Paul A. Lonfley, Michel F. Goodchild, D J. Maguire and D.W. Rhind (2002) : Introduction to Geographic Information Systems and Science, John Wiley and Sons Ltd.
4. Kang – Tsung – Chang, (2002) : Introduction to Geographical Information System, McGraw Hill.
5. George Joseph, (2004) : Fundamentals of Remote Sensing, Universities Press Pvt. Ltd., Hyderabad.
6. J. R. Jensen, (2003) : Remote Sensing of Environment, An Earth Resource Perspective, Pearson Education Pvt. Ltd., New Delhi.

UNIVERSITY OF PUNE

MA/MSc Syllabus in Geography (Credit System)

Sem-III: Revised Syllabus (from June-2014)

Code No. Gg: 310 **Title: Tropical Geomorphology**

No. of Credits: 03 **Total Periods : 45**

Sr. No.	Topic	Subtopics	Learning Points	Periods
1.	Introduction to Tropics	1. Tropical Environment 2. Climatic and Environmental Factors	1.Definition 2. Peculiarities of tropical climate 3. Classification of Tropics 4. Morphogenetic regions 1.Temperature, rainfall, humidity vegetation	6
2.	Tropical Weathering	1.Processes and products 2. Weathering Profiles 3. Tropical Soils	1. Factors influencing the weathering-climatic, geomorphic, biotic, geologic, chronological and site factors 2. Solubility and Mobility of minerals in Tropics. Deep weathering profiles - nature, development and distribution Process of soil formation in Tropics, Clay minerals	6
3.	Duricursts and Laterites	1.Duricrusts and Laterites 2. Types 3. Classification 4. Lateritic Profiles 5. Formation 6. Landforms 7. Distribution	1. Definition, various terms used 2. Indurated laterites: Properties and world distribution 3. Classification by site, Morphology and chronology 4. A complete account of various division of Lateritic Profile 5. Theories of origin of iron in laterites 6. Landform development on laterites 7. Distribution of laterites in India	6
4.	Denudation in Tropics	1.Mechincal denudation 2. Chemical denudation 3. Stream erosion and Deposition	1. Mass movement: Types & Processes 2. Slope wash 1.Process of chemical denudation 1.Tropical rivers, process of erosion and deposition	6
5.	Tropical Landscape	The nature of Tropical Terrain	1. Relief characteristics 2. Slope and valley forms 3. Domed and boulder inselbergs 4. Hillslopes and Pediments 5. Tropical coasts	6
6.	Tropical Planation	Concepts and Processes	1.Formation and Types of planation surfaces 2. Morphology of planation surfaces 3. Peneplains, Pediplains, Etchplains, double surface of planation	6

7.	Landform development in	Role of tectonics and climatic change	Nature of changes during Quaternary - changes in climate, vegetation and	4

Reference Books :

1. Thomas, M. F. 1994. Geomorphology in the Tropics, John Wiley and Sons, Chichester
2. Thomas M.F., 1974, Tropical geomorphology, McMillan, London
2. Tricart J., 1972, Landforms of the humid tropics, forests and Savanna, Longman, London
3. Feniran A. 7 Jeje L.K., 1983, Humid tropical geomorphology
4. Douglas j. & Spencer, 1985, Environmental change & Tropical geomorphology, George Allen & Unwin,
5. Budel J. ,1982, Climatic geomorphology, Princeton University Press
6. Andrew Goudie, 1987, Environmental change
7. Andrew Goudie, 1985, Duricrusts in tropical and subtropical landscapes, Allen Unwin, London.

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MA/MSc Syllabus in Geography (Credit System)

Sem-III: Revised Syllabus (from June-2014)

Code No. Gg: 311 **Title: Applied Climatology**

No. of Credits: 03 **Total Periods : 45**

Sr. No.	Topics	Subunits	Learning points	Periods
1	Introduction	1. Nature and scope	1 Development of applied climatology 2 Atmospheric concern and awareness 3 Climate impact assessment	4
2	Basic climatic elements	1. Radiation 2. Temperature 3 Moisture 4. Evaporation and evapo-transpiration 5. Wind	Radiation -Basic relations, Radiation laws, distribution, instruments to measure radiation Temperature - Basic relations, distribution, soil temperature, instruments to measure temperature Moisture - Basic relations, humidity, clouds, precipitation, rain, snow, sleet, hail, rime, dew, distribution and instruments to measure precipitation Evaporation and evapo-transpiration - Basic relations, soil plant relationship, empirical methods to estimate evapo-transpiration, distribution and instruments Wind - Basic relations, turbulence, gustiness, instruments	1 2
3	Agro-climatology	1. Agricultural relationship of climate	1. Climate and soil 2. Climate and soil management 3. Climate pests and diseases 4. Micro-meteorological changes and behaviour of pests and diseases 5. Climate and livestock 6. Climate and crops 7. Artificial control of plant environment	5
4	Climate and Human behaviour	Climate and health	1. Human bio-meteorology 2. Climate, clothing and human control 3. Climate and health	3
5	Urban Climate	Urban climate and global environmental change (GEC)	1. Nature of global environmental change 2. Nature of urban climates 3. Impact of urban climate on GEC 4. Urban heat Island 5. Urban air Pollution problems	5
6	Climate industry, commerce and engineering	Climate and Industry	1. Significant climate variables 2. Industrial and commercial activities 3. Construction operations	3
7	Engineering applications	Climate and engineering	1. Heating degree-days. cooling towers 2. Traction ability	3
8	Climate and Transportation	Land transport, Air transport, Water transport	1. Effect of climate on land transport 2. Effect of climate on water transport 3. Effect of climate on air transport – clear air turbulence	3
9	Remote sensing in agriculture	Remote sensing and agriculture	1. Indian remote sensing 2. Satellite programming for crop condition. 3. Meteorological study monitoring 4. Detection of plant stress 5. Canopy transpiration and crop stress	3

10	Climates, past, present and future	1. Mechanisms of climatic change 2. Reconstruction of past climate 3. Theories of climatic change	1. External causes of climatic change 2. Internal causes of climatic change 3. Techniques 4. Ocean floor sediments 1. Plate tectonics 2. Volcanic activity 3. Astronomical 4 Solar variabilities	4

Reference Books :

1. Mather, J.R.(1974) : Climatology : Fundamentals and Applications, McGraw Hill, New York.
2. Hobbs, John E. (1980) : Applied Climatology, Dawson West View Press.
3. Oliver, John E. (1973) : Climate and Man's Environment, John Wiley and Sons, New York.
4. Geiger, Rudolf (1966): The Climate near the Ground, Hardward University Press.
5. Lal, M. (ed.) (1993) : Global Warming, Tata McGraw Hill, New York.
6. Oliver, John E. (1981) : Climatology, Selected Applications, V.H. Winston and Sons, London

UNIVERSITY OF PUNE

MA/MSc Syllabus in Geography (Credit System)

Sem-III: Revised Syllabus (from June-2014)

Code No. Gg: 312 **Title: Trade and Transport Geography**

No. of Credits: 03 **Total Periods : 45**

Sr. No.	Topics	Subunits	Learning points	Periods
1	Introduction	1. History of Development 2. Approaches	1. Development of Geography of Trade and Transport 2. Approaches to study 3. Significance of transportation in world and regional economies	5
2	Modes of transportation	1. Development and distribution of different modes 2. Characteristics and significance	1. Landways: Roadways, railways and Pipeline 2. Waterways: Ocean and inland 3. Airways Factors associated with growth and Characteristics of different modes of transport	6
3	Location of seaports and airports	Factors associated with their Growth	1. Physical factors 2. Economic factors 3. Political factors	5
4	Transport Network	1. Network structure 2. Measurement of Accessibility	1. Nodes and routes 2. Hierarchies 3. Hinterlands 4. Traffic flow 5.Gravity models	7
5	Urban Transport	Growth and problems	1. Growth of urban transportation 2. Transport and environmental pollution 3. Alternative transport system in mega cities of India	5
6	Trade	Concept, Development and Significance of trade	1. Concept of trade, Types of trade, Concept of Balance of trade 2. Role of trade in the world and regions	5
7	Trade Theories	Types of theories	1. Theory of comparative advantage 2.Neo-classical theory 3.Modern theory	5
8	International Trade	Trade	1. Trade areas and economic blocks 2. Various treaties of trade at international level 3. Problems and prospects of international trade in globalisation	7

Reference Books:

- Chorely R. J. and Haggett P. (1968): Network Analysis Edward Arnold, London
- Taffe, E. J. and Gauthier H. L. (1973): Geography of Transportation, Prentice-Hall
- Thoman and Conkling: Geography of International Trade
- O'Dell and Richards (1968): Railways and Geography
- Sealy (1968): Geography of Air Transportation. Hutchinson University
- Morgan: Ports and Harbours
- Singh K N (1990): Transport network in Rural Development, Institute of Rural Economic Development, Varanasi.
- Thoman, Gonkling, Vegles (1974): Geography of Economic Acivity

- Tolley R. S. and Turton B. J. 91989): Transport system, Policy and Planning Longman Group, Singapore
- White H.P. and Senior M.L. 91989): Transport Geography, Longman Group, Hongking
- Bhandari S (1992): Transport and Regional Development, Concept Publication, New Delhi
- Pande (1991): Transport Geography, Concept Publication, New Delhi
- Vaidya B C (eds)(1998): Reading in Transport Geography: A Regional Perspective, Devika Publications,New Delhi
- Saxena, H.M. : Transport Geography.

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MA/MSc Syllabus in Geography (Credit System)

Sem-III: Revised Syllabus (from June-2014)

Code No. Gg: 313 **Title: Urban Geography**

No. of Credits: 03 **Total Periods : 45**

Sr. No.	Topic	Sub-Topic	Learning Points	Periods
1	Introduction	Nature, Scope and significance of Urban Geography	1. Nature and scope 2. Significance 3. Relation to other disciplines	4
2	Urbanization	Concept and Process	1. Meaning of Urban settlement and urbanization. 2. Brief review of spatial- temporal variations in urbanization in the world 3. Urbanization curve 4. Contemporary factors of urbanization	5
3	Urban Morphology	Models of urban structure	1. Park and Burgess Model 2. Homer Hoyet Model. 3. Harris and Ullman Model 4. Characteristics and demarcation of CBD	5
4	Urban Classification	Criteria Used for Classification Functional Classification	1. Urban functions 2. Functional classification of towns and cities by C.D. Harris and H. J. Nelson	4
5	Urban Demography	Characteristics of urban populations	1. Growth of urban population 2. Density of population in cities. 3. Age, sex and occupational structure	4
6	Rural-Urban fringe	Characteristics and methods of demarcation	1. Meaning of rural-urban fringe. 2. characteristics of rural-urban fringe 3. Concepts of conurbation, megalopolis and satellite towns.	4
7	City and its Region	Concept, characteristics and demarcation	1. Concepts of city region and various synonymous terms used. 2. Criteria used to demarcate the city region	4
8	Central place concepts	Central place theory and urban Hierarchy	1. Christaller's Central Place Theory. 2. Rank-size relationship and rank-size rule 3. Hierarchy of urban settlements	5
9	Contemporary Urban issues	Nature of issues	1. Price of land and vertical and horizontal growth of cities 2. Scarcity of housing and growth of slums 3. Problems of civic amenities 4. Urban transport problem 5. Urban Environmental pollution	5
10	Urban policy and planning	Development policies and	1. Policies of Urban development. 2. Need of city planning	5

		planning	3. Elements of city plan 4. Urban development and urban policy in India 5. Use of GIS in urban planing.	

Reference Books :

1. Carter (1972) : The Study of Urban Geography, Edward Arnold,.London.
2. Hall P. (1992) Urban and Regional Planning, Routledge, London
3. Kundu, A. (1992) : Urban Development and Urban Research in India, Khanna Publication.
4. Singh. K. and Steinberg. F.(eds) (1998) : Urban India in Crisis. New Age Interns,
5. Brian.R.K. (1996) : Landscape of Settlement Prehistory to the present, Routledge, London
6. Northam : Urban Geography
7. Urban Geography : Tim Hall
8. Johnson : Urban Geography
9. K. Siddharth and S. Mukherji : Cities,. Urbanizations and Urban Systems.
10. Mayer and Kohn : Readings in Urban Geography
11. Roy Turner: Indian's Urban Future.
12. Shah Manzooor Alam : Urbanization in Developing Countries
13. Verma : Urban Geography, Rawat, Jaipur
14. Bhattacharya: Urban development in India, Shree publication.
15. Raj Bala : Urbanization in India.

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MA/MSc Syllabus in Geography (Credit System)

Sem-III: Revised Syllabus (from June-2014)

Code No. Gg: 320 **Title: Multivariate Statistics**

No. of Credits: 03 **Total Periods : 45**

Sr. No.	**Topics**	**Subtopics**	**Learning points**	**Periods**
1	Introduction	Nature and Objectives	1. Bivariate & Multivariate Analysis 2. Objectives of Multivariate Analysis a) Data reduction and simplification b) Sorting and Grouping c) Prediction d) Hypothesis Testing	6
2	Matrix and Vector Elementary Ideas	Vectors : Rows and Columns Algebra	1. Matrix : a) Definition, Elements, Order and Types b) Determinant of a matrix c) Addition, substraction and multiplication of matrices d) Transpose, adjoint and inverse of matrix e) Determination of unknowns in a simultaneous equation by matrix solution using (a) – Crammer's rule and (b) Inverse method	6
3	Curvilinear bivariate Relationships	Nature and Types Regression Equations	Nature of non linear bi-variate functions Bivariate relationships y= x^2, y=x^3, y=x^4, etc. Examples of non linear bi-variate functions in Geography Computation, plotting and interpretation of 1. Second Degree (Quadratic) equation, Y= a + bx +cx^2	8

			2. Third Degree (Cubic) equation Y= a + bx+cx^2+dx^3	
4	Multivariate Analysis	1. Multiple correlation, and regression 2. Regression equations	Meaning of multiple regression and multi-colinearity stepwise regression Computation of multiple regression equations involving two and three independent variables (by solving simultaneous equations or by using variance – covariance matrix) 1. Second order multiple regression equation, $Y= a + b_1 X_1 + b_2 X_2$ 2. Third order multiple regression equation, $Y= a + b_1 X_1 + b_2 X_2 + b_3 X_3$ 2. Calculation of Co-efficient of multiple determination (R^2) Co-efficient of multiple Co-relation (R) and Explained Variance (EV)	8
5	Trend Surface Analysis	Principle and Computation	1. Importance of Trend surface analysis in the study of spatially distributed data. Examples. 2. Computation, application and plotting of linear trend surface, Interpolation of trends. Ideas of quadratic and cubic trend surfaces.	5
6	Principal component Analysis	Principle and Computation	Extraction of first two principal components, Eigen vector, explained variance, component scores communalities, Plotting of two components in two dimensional space. Mapping of scores. Interpretation and regionalization.	6
7	Factor Analysis	Principle and Computation	Extraction of first two factors, Eigen value, Explained variance, Factor Scores, Mapping of factors and regionalization, varimax rotation.	6

Reference Books :

1. Shaw g and Wheller D. (1985) : Statistical techniques in geographical analysis. John Wiley and Sons, New York.
2. Sumner G. J. (1978) : Mathematics of Physical Geographers, Edward Arnold.
3. Shrikant Karlekar & Mohan Kale (Dec.2013) : Statistical Analysis of Geographical Data, Diamond Publication, Pune
4. Clark W. A. V. and Hosking P. L. (1986) : Statistical methods of geographers
5. Collins (1984) : Introduction to multivariate analysis, Edward Arnold
6. Jonston, R. J. (1979) : Multivariate statistics in Geography, Longman, London
7. Fortheringham, A.S., Brunsdon, G., Charlton, M. (2000) : Quantitative Geography, Perspectives on Spatial Data Analysis, SAGE.

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MA/MSc Syllabus in Geography (Credit System)

Sem-III: Revised Syllabus (from June-2014)

Code No. Gg: 321 **Title: Political Geography**

No. of Credits: 03 **Total Periods : 45**

Sr. No	Topic	**Sub- Topic**	**Learning Points**	Periods
1	Introduction to political Geography	Nature, Scope, Development	1) Definition 2) Geography & politics 3) History & development of political Geography	5
2	Approaches to the Study of Political Geography	Types of Approaches	1) Whittlesey's landscape approach 2) Functional approach 3) Centrifugal & centripetal forces, analysis of external functions, 4) Unified Field Theory	6
3	Concept of Nation & State	Geographical Perspective	1) Territoriality 2) State & Nation 3) State formation. 4) Nation building / Nationalism	5
4	Frontiers & Boundaries	1. Definition. 2. Classification	1) Definition of frontiers & boundaries 2) Distinction between frontiers & boundaries 3) Genetic, functional & morphological classification of boundaries	7
5	Global Geo-Strategic View	Land, Sea, & Air Power	Views of Mahan, Mackinder, Spyk man & Cohen	5
6	Resource Development & Power	Resources & National Strategy	1) Classification of resources 2) Resources & National strategy 3) Resource management & power of Nation	5
7	Geopolitical Significance of Indian Ocean	Geopolitics Indian Ocean Border States and England	Political Geography of SAARC region.	5
8	Political Geography of India	Contemporary Issues	1) Changing political map of India. 2) Unity in diversity. 3) Stability & instability in state politics 4) Interstate water & language Disputes. 5) Problems of border states of India 6) Emergence of new states.	7

Reference Books :

1. Alexander L.M (1963): World Political Patterns, Ram McNally, Chicago.
2. Political Geography By Sudeepta Adhikari, Rawat Publication.
3. Dikshit R.D (1996): Political Geography: A Contemporary Perspective, Tata McGraw Hill, New Delhi.
4. Dikshit R.D (1999): Political Geography: A Century of Progress, Sage, New Delhi.
5. De Blij. H. J And Glassner, M. (1968) Systematic political Geography, John Wiley, New York.
6. Pounds N.J.G (1972): Political Geography, McGraw, New York.
7. Taylor, R.J.(1989) Political Geography, Longman UK.

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MA/MSc Syllabus in Geography (Credit System)

Sem-III: Revised Syllabus (from June-2014)

Code No. Gg: 322 **Title: Geography of Soils**

No. of Credits: 03 **Total Periods : 45**

Sr. No	Topics	Sub-topics	Learning Points	**Periods**
1	Introduction	Geography and soils	1 Importance of the study of soils 2 Physical Geography and soils, Hydrolog y and soils, buried soils, Paleosoils 3 Human Geography and Soils Soils and Agriculture Soils and Forestry 4 Productivity of soil	5
2	Soil formation	Factors of soil formation.	1 Factors of soil formation including climate, biotic, topography, parent material and time 2 Parent material and soil 3 Topography and soil 4 Vegetation and soil 5 Climate and soil	6
3	Properties of Soils	1. Physical	1 Soil Texture 2 Soil Structure 3 Soil Colour 4 Bulk Density, Porosity , Pore Space 5 Soil Temperature 6 Permeability 7 Soil Water 8 Soil Moisture	12
		2. Chemical	1 Acidity and Alkalinity 2 Soil pH 3 Soil Colloids 4 Redox Potential 5 Cation, Anion exchange	
		3. Biochemical	1 Organic matter-floral and faunal 2 Humus content (process of humus formation) 3 Soil biomass	
4	Soil Profile	1. Development of soil **Profile.**	1 Soil Horizons Nomenclature 2 Development of soil profile with reference to deposition of iron, aluminum, calcium-carbonate, clays	6
		2. Genetic structure of Soils.	1 Primary minerals 2 Texture 3 Organic matter	
		3. Morphological features of soil horizons.	1 Soil Colour 2 Soil Structure	

5	Weathering and Soils	**1. Weathering Processes**	1 Physical Weathering 2 Chemical Weathering, Ion exchange 3 Secondary Clay minerals and their distribution in the profile	6
6	Soil Classification, land capability and suitability classification	1. Soils Classification Systems 2. Land capability classification and Land suitability classification	1 United states soil classification 1. Land capability classification 2. Land suitability classification	4
7	Problems related to Soil Degradation and Conservation	**1. Problems related to soil degradation.** **2. Problems related to soil conservation**	1 Salinization 2 Acidification 3 Soil fertility decline 4 Soil contamination 1 Deforestation 2 Overgrazing 3 Incorrect methods of farming	6

Reference Books :

1. Pitty A.F. (1978): Geography And Soil Properties, Methuen and Company Ltd., London.
2. White R.E. (1987): Introduction to The Principles And Practice of Soil Science, Blackwell Scientific Publications, London.
3. Fenwick I. M. and Knapp B.J. (1982): Soils - Process and Response, Unwin Brothers Ltd., The Greshman Press, Surrey.
4. Birkeland P.W. (1999): Soil and Geomorphology, Oxford University Press Inc., New York.
5. Brady Nyle C., Weil Raymond C. (2012): The Nature And Properties of Soils. Pearson Publishing, 14th Edition.
6. Thomas J.B. and Brunsden D (1977): Geomorphology And Time, Methuen and Company Ltd.
7. Bunting B.T. (1969): Geography of Soil, Hutchinson University Library, London.
8. Cruickshank J.G (1972): Soil Geography, David and Charles (publishers) Limited, Newton Abbot.
9. Foth H.D and Turk L.M (1973): Fundamentals of Soil Science, Wiley Eastern Private Limited, New Delhi.

10 Charman P.E.V and Murphy B.W. (2000): Soils : Their Properties and Management, Oxford University Press, Melbourne, Australia

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MA/MSc Syllabus in Geography (Credit System)

Sem-III: Revised Syllabus (from June-2014)

Code No. Gg: 330 **Title: Practicals in Geomorphology**

No. of Credits: 03 **Total Periods : 45**

Sr.No	**Topics**	**Subtopics**	**Learning points**	**Practicals (3 hrs)**	**No. of Sheets (Minium)**
1.	Geomorphological mapping	Use of symbols (Hert, 1986)	1. Chart showing symbols 2. Preparing a geographic map of a small area / basin – toposheet / field 3. Interpretation of the map in terms of forms and processes.	3	2
2.	Hillslope Analysis	Direct and indirect measurements	1. Using clinometers / profiles from toposheet, 2. Identification of segments 3. Dalrymple et al's nine-unit landsurface model Understanding nature of processes	3	2
3.	Field Survey	Channel cross sections Beach /Hill slope profile Soil/sediment sample collection	1. Surveying and plotting of stream or gully channel cross – section or beach profile or slope profile. 2. Quadrate or Traverse survey of sediment size on riverbed or beach. 3. Analysis of shape and size of coarse sediment (Zingg'sclassification)	5	4
		GPS survey	Preparation of beach, river channel maps etc. using GPS		
4	Laboratory work	Soil /Sediment analysis	Analysis of 1 sandy and 1 Clayey sample Plotting of data on probability graph paper and estimation of grain size parameters. Interpretation of processes	4	2

(Note : Fieldwork / Field Visit for a duration of not more than 5 days should be undertaken for the course selected)

Reference Books :

1. Hart, M. G. (1986) : Geomorphology, Pune and Applied George Allen and Unwin
2. Goudie, A. (1990) : Geomorphological Techniques, Unwin Hyman, London
3. King, C.A.M. (1966) : Techniques in Geomorphology, Edward Arnold, London
4. Aackombe, R. V. and Gardiner, V. (1983) : Geomorphological Field Manual. George Allen and Unwin, London
5. Chorley, R. J., Schumm, S. A. and Sugden, D.E. (1984) : Geomorphology, Methuen, London
6. Kale, V. S. and Gupta, A. (2001) : Introduction to Geomorphology, Orient Longman, Culcutta

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MA/MSc Syllabus in Geography (Credit System)

Sem-III: Revised Syllabus (from June-2014)

Code No. Gg: 331 **Title: Practicals in Climatology**

No. of Credits: 03 **Total Periods : 45**

Sr. No.	Topic	Subtopic	Learning Points	Practical (3 hrs)	No. of Sheets (Minimum)
1	Weather elements	Processing of weather data	Instrumentation and measurement techniques of weather elements and processing of weather data (5-10 years data)	4	3
2	Station Model	Synoptic data	Coding, decoding and plotting of synoptic data	2	3
3	Indian Daily Weather Report (IDWR)	Study and Analysis of IDWR	Study of IDWR and analysis of Temperature, Air Pressure, etc. for various stations. Charting of Systems (4 years)	4	4
4	Water balance	Principle and computation	Computation of water balance for 4 stations in different rainfall zones and irrigation scheduling	4	4
5	Climate-architecture analysis	Sketch design recommendations	The Mahoney tables: Air temperature, humidity, Rain and Wind, Diagnosis of climatic stress	1	3

Reference Books:

1. WMO No. 8 (1983): Guide to meteorological instruments and methods of observations
2. Thornthwaite, C. W. and Mather, J. R. (1957) : Instructions and Tables for computing potential evapo-transpiration and water balance, Drexel Institute of Technology, Laboratory of Climatology.
3. Indian Daily Weather Report, IMD, Pune.
4. Oliver, John E. (1973) : Climate and Man's Environment, John Wiley and Sons, New York.

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MA/MSc Syllabus in Geography (Credit System)

Sem-III: Revised Syllabus (from June-2014)

Code No. Gg: 332 **Title: Practicals in Economic Geography**

No. of Credits: 03 **Total Periods : 45**

Sr. No.	Topic	Subtopics	Learning points	Practical (3 Hrs)
1.	Techniques in Agricultural Geography	Crop-combination and agricultural efficiency	1. Crop-combination techniques - Jasbir Singh 2. Measurement of Agriculture efficiency-Kendall 3. Levels in agricultural productivity -crop yield and concentration indices ranking coefficient (Jasbir singh) with map . 4.Enyedi's productivity index of agriculture .	5
2.	Techniques in Industrial Geography	Location Analysis	Location Quotient, Lorenz Curve, Gini's coefficient, Von Thunean Model	4
3.	Techniques in Transport Geography	1. Graph theoretical measures 2. Models of spatial interaction	1. Graph theoretical measures of transport network Network indices 2. Gravity potential population surface. 3. Breaking point theory - Trade area delimitation, Law of retail trade gravitation.	4
4	**Visit to Industrial unit- Agro based Industrial Unit.**			2

Reference Books:

1. Singh, J. and Dhillon, S. S. (1994) : Agricultural Geography, Tata McGraw Hills, New Delhi
2. Yeats, M. H. (1978) : An introduction to quantitative analysis in human geography
3. Monkhouse, F. J. and Wilkison, H. R. (1976) : Map and Diagrams, Methuen and Co.
4. Kansky, N. T. (1965) : Structure of Transport Network.

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MA/MSc Syllabus in Geography (Credit System)

Sem-III: Revised Syllabus (from June-2014)

Code No. Gg: 333 **Title: Practicals in Population and Settlement Geography**

No. of Credits: 03 **Total Periods : 45**

Sr. No.	Topic	Sub-Topic	Learning Points	**Period** Each Practical of 3 Hours
1	Population Geography	1. Demographic indices	1. Mean age at marriage and fertility relationship 2. Mean age at marriage and infant mortality rate 3. Underweight children of age 1- 47 months and under 5 years mortality rate. 4. % of woman married to blood relative and infant mortality.	8
		2. Determination of Demographic Transition	1. Demographic transition – applied to Maharashtra 2. Pull-push factors affecting volume of migration – simple correlation matrix. 3. Relationship between per capita income and infant mortality	
2	Settlement Geography	Indices	1. Delimitation of CBD by Vance and Murphy 2. Relationship between Basic/ Non-basic ratio and growth rate 3. Relationship between land values and land use. 4. Gravity model by W. J. Relly and Zipf, its application (Potential Population surfaces) 5. Primary Index (Jefferson) Multiple Primacy. 6. Stages according to urbanization Curve. 7. Rate of growth and level of Urbanization. 8. Rank size rule. 9. Huft's Model. 10. Gini's Coefficient concentration index	7

Books :

1. Economic and Political Weekly – Special issue of population survey
2. Liendzore J.M. Techniques in Human Geography
3. Martin Cad : Analytical Urban Geography
4. Siddhart, K and Mukherjee, S (1999) : Cities urbanization and urban system. Transworld Media and Communication, Patana.
5. Chandana, R.C. Population, Geography
6. Yeats, M.H. (1978) : An introduction to quantitative analysis in human geography.

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MA/MSc Syllabus in Geography (Credit System)

Sem-IV: Revised Syllabus (from June-2014)

Code No. Gg: 401 **Title: Theoretical and Applied Geography**

No. of Credits: 03 **Total Periods : 45**

Sr. No.	Topics	Subtopics	Learning points	Periods
1.	Historical Development of Geographical Thought	1. Ancient period	1. A brief account of Greek, Roman, and Indian Schools of thought 2. Contributions of Herodotus, Eratosthenes, Strabo, Ptolemy.	12
		2. Medieval period	1. First Half – Dark age and brief account of Arab School. 2. Second Half – Age of Discovery, Contributions of Marco Polo, Columbus, Vasco-Da-Gama and Captain Cook.	
		3. Modern period	1. A brief account of different schools of thought – German, French, British and American. 2. Contributions of Kant, Humboldt, Ritter, W. M. Davis.	
2.	Dualism in Geography	Dualism and Dichotomies in Geography	1. Determinism and Possibilism 2. Systematic versus Regional Geography 3. Physical versus Human Geography	6
3.	Paradigms, System approaches and Models in Geography	1. Paradigms	1. Hypothesis, Theories and Laws. 2. Paradigms in Geography	10
		2. Systems	1. Structure, elements and relationship. 2. System approaches in Geography.	
		3. Models	1. Definitions and Significance. 2. Types of Models used in Geographical Studies	
4.	Recent Trends in Geography	1. Scientific methods 2. Quantitative revolution 3. Computer application	1. Field survey process studies and experimental studies. 2. Quantification and application of statistical techniques in Geography. 3. Computer based Cartography, Remote Sensing, GIS and Geo-informatics.	7
5.	Applied Geography	1. Definition 2. Application of Geographical concepts and techniques	1. Definition, Need and Significance 2. Application in land-use planning, regional planning and urban planning, resource management, environmental management, natural hazards, scenic evaluation.	10

Reference Books :

1. Hertshone, R. (1959) : Perspectives of Nature of Geography, Rand MacNally and Co.
2. Frazire, J. W. (1982) : Applied Geography, Prentice Hall, Englewood Cliffs.
3. Hussain, M. (1995) : Evolution of Geographical Thought, Rawat Pub., Jaipur
4. Coffey, W. J. (1981) : Geography : Towards a general spatial systems approach, Mathuen, London
5. Cooke, R. U. and Doornkamp, J. C. (1974) : Geomorphology in Environmental Management, Clarendon Press, Oxford.
6. Singh I. (2006) : Diverse aspect of Geographical Thought, ALFA Publications, New Delhi.
7. Dikshit, R. D. (1997) : Geographical Thought : A Contextual History of Ideas, Pub. By A. K. Ghosh, Prentice – Hall of India Pvt. M 97, New Delhi.

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MA/MSc Syllabus in Geography (Credit System)

Sem-IV: Revised Syllabus (from June-2014)

Code No. Gg: 402 **Title: Principles of Remote Sensing and GIS**

No. of Credits: 03 **Total Periods : 45**

Sr. No.	Topic	Sub-topic	Learning Points	Periods
1.	Remote Sensing	history & development	definition, concept and principles and development in India	3
2	EMR and EMS	EM Radiation and EM Spectrum	radiation principles Black body radiation, Laws of radiation	3
3	Interaction of EMR	Interaction of EMR with atmosphere and Earth's surface	Interaction of EMR with atmosphere and Earth's surface	3
4.	Platforms	Types and characteristics	Types and their characteristics	3
5	Satelites	Satellites and their characteristics	Geo-stationary and sun-synchronous	5
		Earth Resources Satellites	LANDSAT, SPOT, IRS, IKONOS satellite series	
		Meteorological satellites	INSAT, NOAA, GOES	
6.	Sensors	Types and their characteristics Optical mechanical scanners	, Across track (whiskbroom) and Along track (pushbroom) scanning MSS, TM, LISS, WiFS, PAN	4
7	Concept of Resolution	Spatial, Spectral, Temporal , Radiometric	Spatial, Spectral, Temporal , Radiometric	3
9	Basic concept and principles of Thermal , microwave and hyperspectral sensing	Basic concept and principles of Thermal , microwave and hyperspectral sensing	Thermal , microwave and hyperspectral sensing	3

10	Basic principles, types, steps and elements of image interpretation Techniques	Basic principles, types, steps and elements of image interpretation Techniques of visual interpretation and interpretation keys	Basic principles, types, steps and elements of image interpretation Techniques of visual interpretation and interpretation keys	3
11	Introduction to GIS	definitions, concept and history	definitions, concept and history of developments in the field of information systems	3
12	Data structure and formats	Data structure and formats Raster and vector data models	Data structure and formats Raster and vector data models	3
13	Data input in GIS Data base design	editing and topology	editing and topology creation in GIS, Linkage between spatial and non spatial data	3
14	Spatial data analysis	significance and type Vector and raster based analysis Buffer analysis	significance and type, Attribute Query, spatial query Vector based spatial data analysis Raster based spatial data analysis Buffer analysis	3
15	Integration of RS and GIS data	Integration of RS and GIS data	Integration of RS and GIS data and their applications	3

Reference books:

1.Campbell, J.B.2002: Introduction to Remote sensing. Taylor Publications
2.Drury, S.A., 1987: Image Interpretation in Geology. Allen and Unwin
3.Gupta, R.P.., 1990: Remote Sensing Geology. Springer Verlag
4.Jensen, J.R. 2000: Remote Sensing of the Environment: An Earth resource Perspective. Prentice Hall.
5.Joseph George, 2003 : Fundamentals of remote sensing. Universities Press
6.Lillesand, T.M., and Kieffer, R.M., 1987: Remote Sensing and Image Interpretation, John Wiley.

7.Sabbins, F.F., 1985: Remote sensing Principles and interpretation. W.H.Freeman and company

8.Anji Reddy, M. 2004 : Geoinformatics for environmental management.B.S. Publications
9.Chang.T.K. 2002 : Geographic Information Systems. Tata McGrawHill
10.Heywood.I, Cornelius S, CrverSteve. 2003: An Introduction to Geographical Information Systems. Pearson Education
11.Ram Mohan Rao. 2002: Geographical Information Systems. Rawat Publication.
12.Skidmore A.2002: Environmental modeling with GIS and Remote Sensing. Taylor and FrancisTar Bernhardsen. Geographical Information Systems. John Wiley.
13.Wise S.2002: GIS Basics. Taylor Publications

UNIVERSITY OF PUNE

MA/MSc Syllabus in Geography (Credit System)

Sem-IV: Revised Syllabus (from June-2014)

Code No. Gg: 403 **Title: Practicals in Remote Sensing and GIS**

No. of Credits: 03 **Total Periods : 45**

Sr. No.	Topic	Sub-topic	Learning Points	Practical (3hrs)	No. sheets (minimum)
1.	Aerial Photography	Concept, Measurements Interpretation	1. Electromagnetic spectrum 2. Geometry of aerial photograph: pp fiducial mark, flight line, overlap region, annotation strip 3. Determination of Scale and relative height {using parallax bar) 4. Measurement of area and distance. 5. Visual Interpretation of Stereo pair (BW and color) using Stereoscope. Preparation of maps (at least 4 stereo pairs) with calculation of overlapped area.	5	6
2.	Satellite Images	Interpretation	1. Satellite images: Annotation strip 2. Visual Interpretation of Landsat, IRS-LISS,IRS-PAN images Preparation of maps (at least 1 for each type)	5	5
3.	GIS Analysis	Introduction to GIS operations	1. Introduction to GIS- definition, application and data models (vector and raster) 2. Manual exercises (minimum 4 layers) –digitization from a toposheet quadrant 3. Raster and vector overlay, map algebra (AND, OR).from a toposheet quadrant 4. Spatial interpolation from a toposheet quadrant	5	4

Reference Books:

1. George Joseph (2003): Fundamentals of Remote Sensing, Universities Press, Hyderabad
2. Chang Kang-tsung. (2002): Introduction to GIS, Tata McGraw Hill, New Delhi.
3. Burrough, P.A. and R.A. McDonnell (2000) : Principles of Geographical Information System, Oxford University Press.
4. Vaidyanadhan, R.(1973): Index to a set of 70 aerial stereopairs, UGC, New Delhi.

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MA/MSc Syllabus in Geography (Credit System)

Sem-IV: Revised Syllabus (from June-2014)

Code No. Gg: 404 **Title: Geography of Food Security of India**

No. of Credits: 03 **Total Periods : 45**

Sr. No.	Topics	Learning points	Periods
1.	Introduction	1.Concept of food security. 2. Importance and availability of food. 3. Accessibility, utilisation food stability 4. Hunger and Malnutrition.	6
2	Economics of Food	1.Economic Growth. 2. Physical Factors affecting food security. 3. Agricultural productivity, Land Availaility, Land degradation. 4. Land rights and holding.	7
3.	Food Crops	1. Food and cash crops. 2. Distribution of major food and cash crops. 3. Production of food crops. 4. Availability of food for masses. 5. Socio-economic factor in food security.	8
4.	Food Sovereignty	1. Concept of food justice. 2. Food Sovereignty. 3. Economic constraint on access and availability, 4. Social injustice- gender inequalities. 5. Food Security conditions in India at national and state level.	10
5	India's Food Security Bill	1. India's Food Security Bill 2013. 2. Benefits and detriments of Food Security Bill. 3. Importance of Food Security in India.	8
6.	Pedagogy	1. Regional and National news analysis from magazines, journals and newspapers is essential. 2. An interdisciplinary approach will be useful in knowing the multi-dimensions of food security. 3. Study of spatio-temporal aspects by various physical and socio-economic maps.	6

Reference Books :

1. Chose Arpita (2010): ‘Globalisatin, Agriculture growth and food Security in India’.

2. Kumar (2008): “Agriculture Finance in India: the Role of NABARD’.

3. Parera (2003): Irrigation development and agrarian changes”.

4. Srivastava Sahay, Vidyarti and Singh (2010): ‘Second Green Vs. Rainbow Revolution’.

5. Mohammed Shafi : Agriculture Geography.

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MA/MSc Syllabus in Geography (Credit System)

Sem-IV: Revised Syllabus (from June-2014)

Code No. Gg: 405 **Title: Geography of Health**

No. of Credits: 03 **Total Periods : 45**

Sr. No.	Topic	Sub topic	Learning points	No of Lectures
1	Geography of health	Definition and approaches to study	Definition, development, achievements and challenges, approaches to geography of health care	5
2	Geographical factors	Geographical factors affecting human health	Geographical factors affecting human health and diseases arising from them	5
3	Classification of diseases	genetic, communicable, non – communicable, occupational, deficiency diseases, WHO classification of diseases	genetic, communicable, non – communicable, occupational, deficiency diseases, WHO classification of diseases	5
4	Ecology, etiology, transmission of major diseases	Diffusion of diseases and causes	Diffusion of Diseases and causes of the same. Deficiency disorders and problems of malnutrition	6
5	Health care systems in India		Socio-political context – Sources of health care – Demand and supply	6
6	Rural environment and health		Custom, social practice and disease 2.2. Food habit and health- 2.3. Environment and health – 2.4.Health problems of tribal	6

			communities with special reference to India	
7	**Urban environment and health**		Occupational health hazards Environmental Pollution and related impact on health in urban and peri-urban are . Relevant case studies.	6
8	Significance of primary health care centers		Planning of health care centers and health services.	6

References:

1. Akhtar, R. and Learmonth, A.T.A. (eds) (1956): Geographical Aspects of Health and Disease in India, Concept Pub. Co.
2. McGlashan, N.D(ed)(1972): Medical Geography: Techniques and Field Studies, Methuen.
3. Pacione, M. (1986):.Medical Geography: Problems and Prospect, Croom. Helm.
4. Smith, D.M.(1977): Human -Geography, A Welfare Approach, Arnold Heinemann.
5. McGlashan, N.D. and Blunde J.R.(eds)(1983):Geographical Aspects of Health, Academic Press.
6. Trevethick, R.A.(1973): Environmental and Industrial Health Hazards, William Heinemann Medical Books Ltd.
7. Bhat, V.N. (1980):Public Health in India, Amar Prakashan.
8. Banerji, D. (1985):Health and Family Planning Services in India, Lok Prakash, New Delhi.

Books for further reading:

1. Anthamatten P, (2011), Introduction to the Geography of Health, Rawat Publications, Jaipur
2. Pyle, G. F.(1979): Applied Geography, Wiley & Sons.
3. Howe, G.M.(1977): A World Geography of Human Diseases, Academic Press.
4. Denton, J.A. (1978) : Medical Geography, Houghton Mifflin, U.S.A.
5. Eyles, J. and Wood, K.(1983):The Social Geography of Medicine and Health, Croom Helm.
6. Bastide, R.(1972): The Sociology of Mental Disorder, Routledge and Kegan Paul.
7. Banerji, D. (1986) :Social Sciences and Health Services in India, Lok Prakashan, New Delhi.
8. Mishra, R.P.(1970): Medical Geography of India, National Book Trust of India.
9. Mishra, R.P.(2002)), Geography of health : a treatise on geography of life and death in India, Concept Publishing Co., New Delhi

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MA/MSc Syllabus in Geography (Credit System)

Sem-IV: Revised Syllabus (from June-2014)

Code No. Gg: 406 **Title: Practicals in Advanced Surveying**

No. of Credits: 03 **Total Periods : 45**

Sr. No.	Topic	Sub-topic	Learning Points	Practical (3hrs)
1	Introduction to GPS	GPS systems and their features	GPS systems and their features Segments of GPS (Space, Control and User), their importance and role in GPS	2
2	Absolute Position and Differential Position GPS,	Absolute Position and Differential Position GPS,	Absolute Position and Differential Position GPS,	1
		Role of Differential Position GPS in establishing controls, Factors governing accuracy in GPS positioning	Role of Differential Position GPS in establishing controls	2
3	Errors in GPS Positioning.	Different types of errors in GPS Positioning.	Different types of errors in GPS Positioning.	2
	GPS survey	GPS survey	Survey with GPS of River /Beach and preparation of cross sections and contour map using post processing software–Two exercises in the field	2
4	Total station	Basics of total station	1. Introduction 2 Advantages of total station3. Disadvantages of total station 4. Measuring angles 5 Types of total station 6 Advancement in total station technologies7 Automatic target recognition (ATR)	2
5	Surveying using total station		5.1 Introduction5.2 Fundamental parameters of total station5.2.1 Parameters for calculation5.2.2 Correction factors and constants5.3 Precautions to be taken while using total station5.4 Field equipment5.5 Setup5.6	4

			Setting up a back sight5.7 Azimuth mark5.8 Measurement with total station5.9 Total station initial setting (General setting)5.10 Field book recording5.11 Radial shooting5.12 Traverse5.13 Survey station description (Codes)5.14 Data retrieval5.15 Field generated graphics5.16 Construction layout using total station5.17 Overview of computerized survey data system5.18 Data gathering components5.19 Data processing components5.20 Data plotting5.21 Equipment maintenance5.22 Maintaining battery power5.23 Total station job planning and estimating5.24 Error sources5.25 Total survey system error sources and how to avoid them5.26 Controlling error Field survey of river /beach-Two exercises	

Reference Books

1. Surveying: Vol. II. and III by Dr. B. C. Punmia : Laxmi Publication - New Delhi.
2. Surveying and Levelling Vol. II by T. P. Kanetkar and S. V. Kulkarni Pune Vidyarthi Publication.
3. Surveying - Vol. II and III by Dr. K. R. Arora Standard Book House
4. Elements of Photogrammetry by Paul R. Wolf, McGraw Hill Publication
5. Remote sensing and Geographical Information System, By A. M. Chandra and S. K. Ghosh, Narosa Publishing House.
6. Remote sensing in Civil Engineering by J. M. Kennie and M. C. Matthews.
7. The GIS book, 5th Edition, George B Korte, PE onward Press
8. Advanced Surveying -Total Station, GIS and Remote Sensing by Satheesh Gopi, R.Sathikumar and N. Madhu , Pearson publication
9. Surveying Vol. 2 by S. K. Duggal, McGraw Hill Publication

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MA/MSc Syllabus in Geography (Credit System)

Sem-IV: Revised Syllabus (from June-2014)

Code No. Gg: 407 **Title: Regional Geography of SAARC Countries**

No. of Credits: 03 **Total Periods : 45**

Sr. No.	Topic	Learning Points	Periods
01.	Introduction	1. History of SAARC Organisation. 2. Importance and Relevance of SAARC Countries 3. General Locations of SAARC Countries- India, Pakistan, Nepal, Bhutan, Bangladesh, Shrilanka, Maldives. 4. Strategic location of India. 5. Salient Features of SAARC Organisation.	8
02.	India	Physiography, Climate, Drainage, Vegetation, Agriculture, Economic, Demographic and Cultural Aspects of India.	8
03	Pakistan	Physiography, Climate, Drainage, Vegetation, Agriculture, Economic, Demographic and Cultural Aspects of Pakistan	6
04	Bangladesh	Physiography, Climate, Drainage, Vegetation, Agriculture, Economic, Demographic and Cultural Aspects of Bangladesh	6
05	Nepal	Physiography, Climate, Drainage, Vegetation, Agriculture, Economic, Demographic and Cultural Aspects of Nepal	5
06	Bhutan	Physiography, Climate, Drainage, Vegetation, Agriculture, Economic, Demographic and Cultural Aspects of Bhutan	3
07	Shrilanka	Physiography, Climate, Drainage, Vegetation, Agriculture, Economic, Demographic and Cultural Aspects of Shrilanka	3
08	Maldives	Physiography, Climate, Drainage, Vegetation, Agriculture, Economic, Demographic and Cultural Aspects of Maldives	3
09	Afghanistan	Physiography, Climate, Drainage, Vegetation, Agriculture, Economic, Demographic and Cultural Aspects of Afghanistan	3

N.B. According need of topics, maps are expected.

Reference Books :

1. Agrawal A. N. - Indian economy, Problems of Development and Planning.
2. Chopra S. N. - India, An Area Study.
3. Dubey and Negi - Economic Geography of India.
4. Gopal Singh - India.
5. Memoria I.B. - Geography of India.
6. R. L. Singh - Regional Geography of India.
7. Sharma and Continuo - Economic and Commercial Geography of India.
8. Regional and Geographic and Economic books on respective SAARC Countries.
9. Various websites related to the countries.

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MA/MSc Syllabus in Geography (Credit System)

Sem-IV: Revised Syllabus (from June-2014)

Code No. Gg: 411 **Title: Geostatistics**

No. of Credits: 03 **Total Periods : 45**

Unit No.	Unit	Sub unit	Learning points	No. of Periods
1	Introduction to Geostatistics	Geostatistics Spatial data Terms in Spatial Analysis	Meaning, Definition, and History of Geostatistics Definition and Characteristics Types: Point pattern, continuous surfaces, Area with counts and aggregate rates Definitions of i. Spatial dependence ii. Stationarity and Isotropy iii. Anisotropy iv. Region of stationarity v. Spatial correlation vi. Auto correlation vii. Corelogram	5
2.	Exploratory spatial data analysis	ESDA/EDA Concepts of a. data distribution in space b. Univariate description c. Bivariate description	Meaning of Exploratory spatial data analysis (ESDA) and Exploratory data analysis (EDA) Data – i. Sampling, ii. Heteroginity, iii. Dependency Frequency tables, Histogram, Cumulative frequency table, Normal probability plots, Summary / Descriptive statistics Scatter plot, correlation, covariance, correlation coefficient, linear regression	10
3	Structural analysis	Meaning/definintions: Spatial autocorrelation Correlogram Concepts of	i. Spatial correlation, ii. Autocorrelation, and iii. Spatial autocorrelation Concept and "Moran's I" statistic, a. concept, b. types: Omni directional and directional i. Auto-covariance ii. Semivariances iii. Semi variogram iv. Variogram: a. Components- Nugget variance, Sill, & Range b. Variogram models	10
4	Making predictions	Spatial interpolation Types: Global interpolation Local Interpolation	Elements and types: Global versus Local, Exact versus Inexact, Stochastic versus Deterministic, Abrupt versus Smooth Trend, Order of polynomial, logistic option Thiessen polygon (Vornoii plots)	10

			Inverse Distance Weighting (IDW) Spline Kriging	
5	Cluster Analysis	Concept Cluster analysis- Construction of Dendograms, rooted and unrooted trees, interpreting phylogenetic relationships.	Concept Methods Euclidean distance Merits & demerits. Application in the studies of Earth sciences	5
6	Markov Chain Analysis	Concept	Concept and characteristics Application in the field of Earth Sciences	5

Reference Books:

E.H. Isaaks and R.M. Srivastava, 1989, An Introduction to Applied Geostatistics, Oxford University Press, 561 pages.
Davis, J. C., (2002): Statistics and data analysis in geology, third edition, John Wiley & Sons, Singapore
Using ArcGIS Geostatistical Analyst. GIS by ESRI (2001)
P.K. Kitanidis, 1997, Introduction to Geostatistics: Applications in Hydrogeology, Cambridge University Press, 249 pages.
R.A. Olea, 1999, Geostatistics for Engineers and Earth Scientists, Kluwer Academic Publishers, 303 pages.
Sharma, D. D, (2009): Geostatistics with applications in Earth sciences, Jointly published with Capital Publishing Company. Originally published by Capital Publishing Company, 2002, 2nd ed. 2009, XVIII, 206p. 80 illus.. With CD-ROM.

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MA/MSc Syllabus in Geography (Credit System)

Sem-IV: Revised Syllabus (from June-2014)

Code No. Gg: 412 **Title: Practicals in Geostatistics**

No. of Credits: 03 **Total Periods : 45**

Unit No.	Unit	Sub unit	Learning points	Practical (3 hrs)
1	Exploratory spatial data analysis	a. Univariate description b. Bivariate description	Frequency tables, Histogram, Cumulative frequency table, Normal probability plots, Summary / Descriptive statistics Scatter plot, correlation, covariance, correlation coefficient, linear regression (taking at least two discrete problems plotting/obtaining the univariate and bivariate descriptors and interpreting them with the knowledge of the concepts learnt in chapter II of course Gg 411)	4
2	Structural analysis	Variogram	Plotting of variogram* (Use of software)	3
3	Spatial interpolation	Local Interpolation	Thiessen polygon (Vornoii plots) (manual and software) Inverse Distance Weighting (IDW)* Spline* Kriging* (use of software)	4
4	Cluster Analysis		Problems and interpretation of results (manually and using software)	2
.5	Markov-chain analysis		Problems and interpretation of results (manually and using software)	2

Note that wherever software usage is given the students are supposed to take out a print out of the process along with the final result and put them in the journal. Interpret the results wherever applicable.

References:

Simon W. Houlding (2000): Geostatistics: Modeling and Spatial Analysis, Springer; Har/Cdr edition (8 June 2000), **CD-ROM:** 161 pages

Cressie, N.A.C. (1993), Statistics for Spatial Data, New York: John Wiley & Sons, Inc.

Duetsch, C.V. and Journel, A.G. (1992), GSLIB: Geostatistical Software Library and User's Guide, New York: Oxford University Press.

Hohn, M.E. (1988), Geostatistics and Petroleum Geology, New York: Van Nostrand Reinhold.

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MA/MSc Syllabus in Geography (Credit System)

Sem-IV: Revised Syllabus (from June-2014)

Code No. Gg: 420 **Title: Regional Planning and Development**

No. of Credits: 03 **Total Periods : 45**

Sr. No.	Topic	Learning Points	Periods
01.	Concept and Role of Regional Planning	1. The Concept and Need of Regional Planning 2. Role of Geography in Regional Planning. 3. Approaches in Regional Planning. 4. Hierarchy of Planning 5. Types of Planning 6. Levels of Planning	7
02.	Region	1. Concept of a Region. 2. Type of a Region. 3. Concept of Planning Region. 4. Indicators of Developments 5. Measurement of Regional Development.	5
3	Surveys of Regional Planning	1. Regional, 2. Techno-Economic 3. Diagnostic surveys.	6
4	Methodology and Techniques	1. Methodology of regional Planning 2. Techniques of regional planning. 3. New trend in regional planning	6
5	Planning Strategies	1. Concept of Planning Strategies in Regional Development. 2. Concentration versus dispersal 3. Case studies from developed and developing countries.	8
6	Regional Policies	1. Regional Policies in India's Five Year Plans. 2. Experience of Regional Planning in India. 3. Multilevel planning (State, District and Block Level Planning).	10
7	Regionalisation	1. Concept of Regionalisation. 2. Planning of Metropolitan regions. 3. Planning of tribal, Hilly areas, command areas, river basins. 4. National Capital Region.	10

Reference Books:

1. Chandana, R. C. (2000): Regional Planning - A Comprehensive Text, Kalyani Publishers, Ludhiana
2. Friedmann, J Alanso W (1967): Regional Development and planning - A Reader, MIT Press Mass
3. Mishra R. P (Ed.) (1992): Regional Planning, Concepts, Techniques, Policies and Case Studies, Concept Pub. New Delhi.
4. Dube K. N. (ed) (1990): Planning and Development in India, Asia Publishing House, New Delhi
5. Govt. of India (1986), Regional Plan 2001 - National Capital Region, NCRPB, Ministry of Urban Development, New Delhi
6. Bhat, L. S. (1973): Regional Planning in India, Statistical Publishing Society, Kolkata.

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MA/MSc Syllabus in Geography (Credit System)

Sem-IV: Revised Syllabus (from June-2014)

Code No. Gg: 421 **Title: Geography of Water Resources**

No. of Credits: 03 **Total Periods : 45**

Sr. No.	Topic	Sub-Topic	Learning Points	Periods
1.	Water Resources	Water Resources	Water as most important and renewable resource, Hydrological Cycle – Evaporation, Evapotranspiration, Precipitation, percolation and runoff. Distribution of World's surface and surface water resources including glaciers, ice caps, river channels, lakes and reservoirs and ground water.	10
2.	Water Supply	Utilization Methods Agriculture	Water supply and utilization methods of estimation – agricultural, industrial, municipal and domestic uses of water Agricultural cropping pattern – Water requirement of crop : Soil – water – crop relationships, moisture surplus and deficit regions – water balance and drought – measure and minor irrigation : methods of distribution of water to farms, water harvesting techniques, soil water conservation.	10
3.	Water Utilization	Industrial Utilization	Industrial demand for water and utilization typewise, regionwise industrial affluents, water pollution and treatment. Municipal demand and use of water – Commercial, Institutional and Domestic	8
4.	Problems and Management	Problems and Perspectives	Problems of water resource – abundance and scarcity – floods and draughts. Measures of water managements – including afforestation , channel improvement, river embankments and land use regulation.	8
5.	Water Conservation	Conservation and Planning	Conservation and planning for the development of water resource, integrated basin planning, special remedies for collection of rain water so as to increase of ground water level, water shed management, international, inter-state water disputes, treaties, accords and agreements, some case studies – India Water Treaty, Farakka Brahmaputra, Cauveri, Krishna Water Dispute. Ganga-Cauveri Proposed Garland Project- Its Benefits and Drawbacks.	9

Reference Books :

1. John, J. A. (1997) : Global Hydrology : Processes, Resources and Environment Management, Longman Publishers
2. Law, B. C. (Ed. 1968) : Mountains and Rivers of India, IGU National Committee for Geography, Calcutta.
3. Matter, J. R. (1984) : Water Resources Distribution, Use and Management, John Wiley, Maryland.
4. Newson, M. (1992) : Land , Water and Development, River Basin Systems and their Sustainable Management, Rowfledge, London.
5. Rao, K. L. (1979) : India's Water Wealth, Orient Longman, New Delhi
6. Singh, R. A. and Singh, S. R. (1979) : Water Management Principles and Practices, Tara Publication, Varanasi

7. Kates, R. W. and Buston, T. (Ed. 1980) : Geography, Resources and Environment, Ottawa

8. Tideman, E. M. (1996) : Water Shed Management : Guidelines for Indian Conditions, Omeaga, New Delhi.
9. Agarwal, Anil and Sunita Narayan, (1997) : Dying Wisdom : Rise, Fall and Potentials of India's Traditional water Harvesting System.
10. Michel, A. M. (1978) : Irrigation : Theory and Practicles, Vikas Publishing House Pvt. Ltd., New Delhi
11. Economic and Social Commission for Asia and Pacific United Nations: Guidelines for the preparation of National Master Water Plans, 1989.
12. Pareira H.C. Landuse and Water Resources, Cambridge University Press, 1973.

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MA/MSc Syllabus in Geography (Credit System)

Sem-IV: Revised Syllabus (from June-2014)

Code No. Gg: 422 **Title: Biogeography**

No. of Credits: 03 **Total Periods : 45**

Sr. No.	Topic	Sub-Topic	Learning Points	Periods
01.	Introduction	Nature, Scope and Relevance	1. A basic biogeography processes 2. Role of biogeography in environmental Studies. 3. History of the discipline	4
02.	Biogeography patterns	Basic Patterns	1. Zoogeographical provinces. 2. Floral kingdom. 3. Altitudinal zonation. 4. Eco-geographic trends.	5
03	Biogeography processes	Basic Processes	1. Evolution and Adaptation. 2. Speciation. 3. Extinction. 4. Dispersal and colonization.	4
04	Distribution	Patterns	1. Habitats and Microhabitats 2. Limits of distribution. 3. Endemics. 4. Relicts. 5. Disjunction Patterns 6. Patterns of rarity 7. Patterns of biodiversity	5
05	Physical limitation of life	Limitations	1. Environmental gradients. 2. Interaction of factors. 3. Patterns of Climate. 4. Biomes and life forms 5. Soil. 6. Ecological succession 7. The ecosystem 8. Microclimates	6
06	Life on islands	Variety and problems	1. Island as an area of isolation, problems of Access. 2. Variety of island habitats 3. Hazards of island life 4. Opportunity for adaptive radiation.	5
07	Ancient patterns in distribution of plants and animals	Distribution	1. Evolution of life on Earth 2. Gondwanaland and Laurasia 3. The idea of continental drift 4. The evidence of palacomagnetism. 5. Changing patterns of continents 6. Effect on Climate	6
08	The Terrestrial Biomes	Major Biomes	Tundra, Taiga, Temperate Broadleaf Deciduous Forst, Tropical Broadleaf Evergreen Forest, Tropical Savanna, Desert scrub, Mid-latitude Grassland and Mediterranean Scrub (With reference to regional climate, vegetation structure, ecological succession, species richness, geographic affinities, soils, faunal adaptations, mapping at a global scale).	10

References Books :

1. Cox. C.D. and Moore P.D. (1993) : Biogeography : An Ecological and Evolutionary Approach 5th edn. Blackwell.
2. Huggett R.J. (2004) : Fundamentals of Biogeography, Routledge
3. Llies J. (1974) : Introduction to Zoogeography, McMillan, London.
4. Khoshoo T.N. and Sharma M. (edn.)(1991) : Indian Geosphere-Biospher Har-Anand Publication, Delhi.
5. Lapedes D.N. (ed)(1974): Encyclopedia of Environmental Science, McGraw Hill
6. Mathur H.S. (1998) : Essentials of Biogeography, Anuj Printers, Jaipur.
7. Pears, N. (1985) : Basic Biogeography 2nd edn. Longman, London,1985
8. Simmon I.G.(1974) : Biogeography, Natural and Cultural, Longman, London, 1985
9. Tivy, J (1992) : Biogeography : A study of Plants in Ecosphere, Oliver an Boyd
10. Ian N Healey, C Barry Cox, Peter D Moore (1972) : Biogeography an ecological and evolutionary approach, Blackwell, Oxford
11. Pielou E.C. (1973) : Biogeography, John Wiley. New York.
12. Husain M. (1994) : Biogeography, Anmol Publication, New Delhi.

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MA/MSc Syllabus in Geography (Credit System)

Sem-IV: Revised Syllabus (from June-2014)

Code No. Gg: 423 **Title: Oceanography**

No. of Credits: 03 **Total Periods : 45**

Sr. No.	Topic	Subtopics	Learning points	Periods
1.	Introduction	Nature and Scope	1.Definition and Meaning of Oceanography 2. Foundation of Modern Oceanography 3. Contribution of Oceanographers in the subject 4. Post-war Oceanography 5. Modern Trends	5
2.	Origin of the Ocean Basins	Global Plate Tectonics	1. Continental Drift 2. Seafloor Spreading 3. Plate Tectonics 4. World Oceans and their formations	6
3.	The Ocean Floor	Relief of the Ocean Bottom	1. Continental Margin 2. Oceanic Ridges and Rises 3. Abyssal Plains 4. Oceanic Trenches 5. Volcanoes, Coral Reefs and Atolls	5
4.	Properties of Sea Water	Temperature Density Salinity Dissolved gases Other physical properties	1. Factors affect temperature on water and distribution 2. Factors affecting density 3. Origin and composition of sea salt and residence time 4. Carbon dioxide and carbonate cycles 5. Viscosity 6. Surface tension	7
5.	Waves	Waves characteristics and properties	1. Ideal sea waves 2. Wave height, length and period 3. Formation of sea and swell 4. Capillary, gravity, shallow water and deep Water waves 5. Internal and standing waves 6. Seismic waves (Tsunami) and storm surges 7. Wave reflection, refraction and diffraction 8. Breaking of waves	6
6.	Tides Tidal Currents	Tidal forces and theories Tidal currents and effects	1. Tide generating forces 2. Equilibrium Theory of Tides 3. Dynamical Theory of Tides 4. Spring Tides 5. Neap Tides 6. Tidal Currents and their Channels 7. Tidal Bores 8. Tidal effects in coastal areas	6
7.	Ocean Currents	Ocean Circulation, Their causes and effects	1. Types of Currents, drift currents, geostrophic Currents, thermohaline circulation. 2. Factors responsible for ocean currents 3. Ocean current in Pacific, Atlantic and Indian Ocean	5
8.	Marine Sediments	Sediments on the ocean floor	1. Lithogenous particles (Derived from Rocks) 2. Biogenous particles (derived from organisms) 3. Hydrogenous particles (derived from water) 4. Distribution of sediment deposits 5. Oceanic ooze 6. Correlation and age determination	5

Reference Books:

1 Basu S.K. (2003) (ed): Handbook of Oceanography, Global Vision, Delhi
2 Davis Richard A. (1972): Oceanography, Addition Wesley Publishing Co.
3 Garrison Tom (1999): Oceanography, Brooks/ Cole Wadsworth, New York
4 Garrison Tom (2004): Essentials of Oceanography. Thompson, Australia
5 Grant Gross M. (1982): Oceanography, Prentice hall, Ince, New Jersey
6 King Cuchlain A. M (1962): Oceanography for Geographers (ED) Edward Arnold
7 Sharma & Vatal (1962): Oceanography for Geographers. Chaitanya Publishing House, Allahabad
8 Thurman Harold V. (1985): Introductory Oceanography. Bell & Howell Co. London
9 Weisberg J. and Howard P. (1974): Introductory Oceanography. McGraw Hill, Kogakusha, Tokyo.

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MA/MSc Syllabus in Geography (Credit System)

Sem-IV: Revised Syllabus (from June-2014)

Code No. Gg: 424 **Title: Natural and Manmade Hazards**

No. of Credits: 03 **Total Periods : 45**

Sr. No.	Topics	Subtopics	Learning points	Periods
1.	Introduction to natural hazard and disasters. Risk and risk assessment.	Definition	Definition, types of hazards Definition, Hazard, Risk and Vulnerability Assessment	3
2.	Climatic Hazards	Storms as Hazards	Causes, probability of occurrence, areas affected and effects of cyclonic storms, dust storms, thunderstorms lightning and hail storm, Case study of Maharashtra Hail Storm 2014.	4
		Drought as a Hazard	Causes, probability of occurrence, areas affected and effects of droughts	4
		Floods as Hazards	Causes and effects and areas affected by high magnitude floods and flash floods. Case Study of Kedarnath Flood in 2013.	4
3.	Geological Hazards	Earthquakes and Tsunamis	Cause and effects and areas affected by earthquakes and tsunamis	3
4.	Geomorphic Hazards	Land instability	Cause and affects and areas affected by landslides, subsidence, erosion, deposition	3
5.	Man-made Hazards	Introduction	Types of man induced hazards – physical, chemical, biological, and pollution. Factors contributing to man-made hazards.	3
		Physical Hazards	Cause and effects of Landslides, Soil erosion, forest fires, desertification etc. Impact of large river projects such as the Sardar Sarovar, the Tehri Dam etc., impact of excessive irrigation, effects of thermal and hydel power stations.	6
		Chemical Hazards	Nuclear Hazards, release of toxic elements in the air, soil and water, oil spills etc.	4
		Biological Hazards	Effects of Population growth – its impact on biodiversity, effects of over exploitation of resources, ecological disturbances – such as soil development, hydrological cycle, pollution etc.	5
6.	Global issue and National issues	Global Warming	Effects of global warming, ozone depletion Pollution of rivers with religious importance in India.	3
7.	Disaster Management and Measures	Structural and Non-structural Measures	Disaster prevention, mitigation, preparedness, response, recovery and rehabilitation	3

Reference Books :

1. Turk J. (1985) : Introduction to Environmental Studies, Saunders, College Publication, Japan
2. Singh Savindra (2000) : Environmental Geography, Parag Pustak Bhavan, Allahabad
3. Morrisawa M (Ed) (1994) : Geomorphology and Natural Hazards, Elsevier, Amsterdam
4. Hart M. G. (1986) : Geomorphology, Pure and Applied, George Allen and Unwin, London
5. Valdiya K. S. (1987) : Environmental Geology, Tata McGraw Hill, New Delhi

6. Bryant Edward (2000) : Natural Hazards, Cambridge University Press
7. Daly Herman E. (1996) : Beyond Growth, Beacon Press, Boston
8. Daly Herman E and Twonseed Keneth N (Ed) (1993) : Valuing the earth – Economics, Ecology and Ethics, MIT Press, London
9. Agarwal Anil and Narain Sunita (Ed) (1999) : State of India's Environment The Citizens Report, Centre for Science and Environment, New Delhi
10. Rangachari R, Sengupta Nirmal, et al (2000) : WCD Case Study Large Dams : India's Experience Final Report, Secretariate of World Commission on Dams
11. Dupont, R.R. Baxter, T.E. and Theodore, L. (1998) : Environmental Management :- Problems and Solutions, CRC Press
12. Smith, K. (2001) : Environmental Hazards : Assessing Risk and Reducing Disaster, Routledge.

UNIVERSITY OF PUNE

MA/MSc Syllabus in Geography (Credit System)

Sem-IV: Revised Syllabus (from June-2014)

Code No. Gg: 440 **Title: Dissertation**

No. of Credits: 04 **Total Periods : 60**

1- The students shall declare the option of dissertation at the beginning of the 3rd semester.

2- A Post Graduate recognized teacher in a department is eligible to guide the students.

Write up : General Guide Lines :-

1. The final report should cover the following aspects.
   a. Introduction to the problem.
   b. Aims and objectives of the study.
   c. Methodology
   d. Analysis, description and interpretation.
   e. Results
   f. Conclusions
   g. References
   h. Bibliography

2. Every table, figure, photograph should have a caption and with references.
3. The list of references should be given at the end and all the references should be complete in all respects (author(s)) name, year, title of the article or book, name of the journal, name of the publisher of the book and place of publication, volume of journal and page numbers)
4. The total number of pages should be minimum 50, including text, figures, tables, photographs, references and appendices.
5. At the time of viva-voce presentation may be given with the help of equipments which are available in the respective department.

UNIVERSITY OF PUNE

MA/MSc Syllabus in Geography (Credit System)

Sem-IV: Revised Syllabus (from June-2014)

Code No. Gg: 441 **Title: Principles of Regional Geography and Project Work**

No. of Credits: 04 **Total Periods : 60**

Theory of Principles of Regional Geography = 2 credits.

Project Work = 2 credits.

Sr. No.	Topic	Learning Points	Periods
01.	Introduction	1. Definition and Concept of Regional Geography. 2. Principles and importance of Regional Geography.	5
2	Regionalisation and Planning	1. Regional Approach 2. Planning through Regionalisation	5
3	Theoretical Structure of Planning	1. Central Place Theory 2. Growth Pole Theory 3. Gunnar Myrdal's Cumulative Causation. 4. Application of these theories in India.	7
4	Regional Disparities	1. Causes, Effects of Regional Disparities. 2. Remedies on Disparities.	5
5	Presentation	Student Presentation on any one topic related to Regional Geography with issues and solutions.	8

Reference Books:

1. Chandana, R. C. (2000): Regional Planning - A Comprehensive Text, Kalyani Publishers, Ludhiana
2. Friedmann, J Alanso W (1967): Regional Development and planning - A Reader, MIT Press Mass
3. Mishra R. P (Ed.) (1992): Regional Planning, Concepts, Techniques, Policies and Case Studies, Concept Pub. New Delhi.
4. Dube K. N. (ed) (1990): Planning and Development in India, Asia Publishing House, New Delhi
5. Govt. of India (1986), Regional Plan 2001 - National Capital Region, NCRPB, Ministry of Urban Development, New Delhi
6. Bhat, L. S. (1973): Regional Planning in India, Statistical Publishing Society, Kolkata.
7. MacLeod and Jones M. (2001): Renewing The Geogrpahy of Regions, Environment and Planning.

Project Work Guidelines:

1- The students shall declare the option of project work at the beginning of the 3rd semester.

2- A Post Graduate recognized teacher in a department is eligible to guide the students.

3. Project Work Report should be done by each student separately under the guidance of the teacher.

4. Topics might be in the view of regional geographical approach of regional issues.

Write up : General Guide Lines :-

1. The Project Work Report should cover the following aspects.
   a. Introduction to the problem.
   b. Aims and objectives of the study.
   c. Methodology
   d. Analysis, description and interpretation.
   e. Results
   f. Conclusions
   g. References
   h. Bibliography

2. Every table, figure, photograph should have a caption and with references.
3. The list of references should be given at the end and all the references should be complete in all respects (author(s)) name, year, title of the article or book, name of the journal, name of the publisher of the book and place of publication, volume of journal and page numbers)
4. The total number of pages should be minimum 25, including text, figures, tables, photographs, references and appendices.
5. At the time of viva-voce presentation may be given with the help of equipments which are available in the respective department.