

UNIVERSITY OF PUNE

DEPARTMENT OF GEOGRAPHY

Credit System (M.A./M.Sc. Geography): Details of the Courses and Credits – 2014

COURSE CODE	COURSE TITLE	CREDITS per Course	Credits to be completed	
			Course-wise	semester-wise
SEMESTER I				
Core Courses (All courses are compulsory)				
1011	Principles of Geomorphology	4	4	
1021	Principles of Climatology	4	4	
1031	Principles of Economic Geography	4	4	
1041	Principles of Population and Settlement Geography	4	4	
1010	Practicals in Physical Geography	3	3	
1020	Practicals in Human Geography	3	3	
1030	Statistical Methods	2	2	
Total credits in Semester I		24	24	24
SEMESTER II				
Any one of the following specializations				
2111	Coastal Geomorphology	3	3	
2121	Synoptic Climatology	3		
2131	Agricultural Geography	3		
2141	Population Geography	3		
One of the following, as per the specialization				
2110	Practicals in Coastal Geomorphology	2	2	
2120	Practicals in Synoptic Climatology	2		
2130	Practicals in Agricultural Geography	2		
2140	Practicals in Population Geography	2		
One of the following, as per the specialization				
2211	Fluvial Geomorphology	3	3	
2221	Applied Climatology	3		
2231	Geography of Tourism	3		
2241	Urban Geography	3		
One of the following, as per the specialization				
2210	Practicals in Fluvial Geomorphology	2	2	
2220	Practicals in Applied Climatology	2		
2230	Practicals in Geography of Tourism	2		
2240	Practicals in Urban Geography	2		
Compulsory Courses				
2311	Fundamentals of Remote Sensing	2	2	

COURSE CODE	COURSE TITLE	CREDITS per Course	Credits to be completed	
			Course-wise	semester-wise
2310	Practicals in Remote Sensing	3	3	
2320	Surveying Practicals	3	3	
2330	Statistical Methods in Geography	4	4	
2340	Practicals in Interpretation of Topographical Maps	4	4	
	Total credits in Semester II	56	26	26
	SEMESTER III			
	One of the following, as per the specialization			
3111	Tropical Geomorphology	3	3	
3121	Monsoon Climatology	3		
3131	Geography of Trade and Transport	3		
3141	Geography of Rural Settlements	3		
	One of the following, as per the specialization			
3110	Practicals in Tropical Geomorphology	2	2	
3120	Practicals in Monsoon Climatology	2		
3130	Practicals in Geography of Trade and Transport	2		
3140	Practicals in Geography of Rural Settlements	2		
	One of the following, as per the specialization			
3211	Geomorphology - Theoretical and Applied	3	3	
3221	Agro-Meteorology	3		
3231	Geography of Development	3		
3241	Geography of Population Resources	3		
	One of the following, as per the specialization			
3210	Practicals in Geomorphology - Theoretical and Applied	2	2	
3220	Practicals in Agro-Meteorology	2		
3230	Practicals in Geography of Development	2		
3240	Practicals in Geography of Population Resources	2		
	Any one group out of the following, adding to 5 credits			
3311	Introduction to Computer programming: Theory	2	5	
3310	Introduction to Computer programming: Practicals	3		
3321	Geography of South Asia - I	2		
3322	Geography of South Asia - II	3		
	Any one group out of the following, adding to 5 credits			
3411	Multivariate Statistics in Geography: Theory	2	5	
3410	Multivariate Statistics in Geography: Practicals	3		
3421	Geography of India with special reference to Maharashtra	2		
3422	Geography of Environment	3		

COURSE CODE	COURSE TITLE	CREDITS per Course	Credits to be completed	
			Course-wise	semester-wise
Compulsory Courses				
3511	Fundamentals of GIS: Theory	2	5	
3510	Fundamentals of GIS: Practicals	3		
	Total credits in semester III	65	25	25
SEMESTER IV				
Any one group out of the following, adding to 5 credits				
4111	Social Geography	3	5	
4112	Cultural Geography	2		
4121	Biogeography - Plant Geography	3		
4122	Biogeography - Zoogeography	2		
4131	Advanced Surveying - Theory	2		
4130	Advanced Surveying - Practicals	3		
Any one group out of the following, adding to 5 credits				
4211	Advance course in Remote Sensing	3	5	
4212	Advance course in GIS	2		
4221	Hazard Management: Natural	2		
4222	Hazard Management: Manmade	3		
Any one group out of the following, adding to 5 credits				
4311	Watershed Management: Concepts and Issues	3	5	
4310	Watershed Management: Practicals	2		
4321	Regional Planning: Part I	3		
4322	Regional Planning: Part II	2		
Compulsory Courses				
4411	Development of Geographical Thought	3	5	
4412	Research Methodology in Geography	2		
Any one group out of the following adding to 5 credits or dissertation				
4511	Oceanography	3	5	
4512	Geography of Soils	2		
4521	Political Geography	3		
4522	Geography of Health	2		
4531	Dissertation	5		
	Total credits in semester IV	55	25	25
CREDITS		OFFERED		REQUIRED
TOTAL CREDITS		200		100

Semester I

Code No: Gg: 1011		Title: Principles of Geomorphology
No. of Credits: 4		No. of Periods: 60
Sr. No.	Topics	Lectures
1	Introduction to Geomorphology	4
2	Interior of the Earth	4
3	Holme's convection current theory, Theory of isostasy, Wegener's continental drift theory	8
4	Palaeomagnetism, seafloor spreading, plate tectonics	10
5	Diastrophism, folds, faults	7
6	Weathering, mass movement and hillslopes	10
7	Fluvial processes and landforms	3
8	Coastal processes and landforms	3
9	Deserts landforms: Work of Water and Wind	5
10	Glacial processes and landforms	3
11	Karst processes and landforms	3

Books:

1. Tarbuck, E. J. and Lutgens, F. K. (2009): Earth Science, Prentice Hall, New Jersey
2. Strahler, A. H. and Strahler, A. N. (1992): Modern Physical Geography, John Wiley and Sons, New Jersey
3. Ollier, C. D. (1981): Tectonics and Landforms, Longman, London
4. Kale, V. S. and Gupta, A. (2010): Introduction to Geomorphology, Universities Press, Hyderabad
5. Singh, S. (2002): Geomorphology, Prayag Pustak Bhawan, Allahabad

Code No: Gg: 1021		Title: Principles of Climatology
No. of Credits: 4		No. of Periods: 60
Sr. No.	Topics	Lectures
1	Nature and scope of Climatology, development of modern Climatology and Tropical Climatology	5
2	Earth's atmosphere: evolution, structure and chemical composition	8
3	Solar radiation and terrestrial radiation: electromagnetic spectrum, latitudinal and seasonal variations, effect of atmosphere, green house effect and heat budget	8
4	Temperature measurements and controls, lapse rate and inversion of temperature	6
5	Atmospheric pressure and winds: pressure measurement and distribution, wind observation and measurement, factors affecting wind, geostrophic wind and gradient wind, local winds, models of general circulation of the atmosphere, Jet Stream	8
6	Atmospheric moisture: forms of condensation and precipitation, hydrological cycle	6
7	Stable and unstable atmosphere: environmental lapse rate, dry and wet adiabatic lapse rate and atmospheric stability	4
8	Air masses: classification and modification	4
9	Fronts: characteristics and types	5
10	Classification of climates: Thornthwaite's and Koppen's classification	6

Books:

1. Lutgens, F. K., Tarbuck, E. J. and Tasa, D. G. (2012): The Atmosphere: An Introduction to Meteorology, Prentice Hall, New Jersey
2. Lal, D. S. (1998): Climatology, Chaitanya Publishing House, Allahabad
3. Navarra, J. G. (1979): Atmosphere, Weather and Climate, W. B. Saunders Company, Philadelphia
4. Ayoade, J. O. (1983): Introduction to Climatology for the Tropics, John Wiley and Sons Ltd., New York
5. Critchfield, H. J. (1998): General Climatology, Prentice Hall, Englewood Cliffs

Code No: Gg: 1031		Title: Principles of Economic Geography
No. of Credits: 4		No. of Periods: 60
Sr. No.	Topics	Lectures
1	Nature of Economic Geography	3
2	Approaches to the study of Economic Geography	2
3	Concepts and principles in Economic Geography	6
4	Economic landscape and economic systems	5
5	Evolution of world economy	3
6	Factors of production (industrial location)	3
7	Modes of transport and cost of transport	4
8	Trade theories	5
9	Models of industrial location	6
10	Industrial regions	8
11	Measurement of development	4
12	Economic geographies of the contemporary world	5
13	Economic Geography and policy challenges	6

Books:

1. Smith, D. M. (1971): Industrial Location: An Economic Geographical Analysis, John Wiley and Sons, New York
2. Hartshorne, T. A. and Alexander, J. W. (2010): Economic Geography, PHI Learning, New Delhi
3. Lloyd, P. and Dicken, B. (1972): Location in Space: A Theoretical Approach to Economic Geography, Harper and Row, New York
4. Siddhartha, K. (2000): Economic Geography: Theories, Process and Patterns, Kisalaya Publications, New Delhi
5. Knox, P., Agnew, J. and McCarthy, L. (2008): The Geography of the World Economy, Hodder Arnold, London
6. Berry, B. J. (1976): Geography of Economic Systems, Prentice Hall, Englewood Cliff
7. Boyce, R. D. (1974): Bases of Economic Geography, Holt, Rinehart and Winston, New York

Code No: Gg: 1041 Title: Principles of Population and Settlement Geography		
No. of Credits: 4		No. of Periods: 60
Sr. No.	Topics	Lectures
1	Introduction to Human Geography	2
2	Population Geography: Definition, scope, nature, relation with other branches	10
3	Settlement Geography: Definition, scope, nature, relation with other branches	10
4	Study of branches in Population Geography	6
5	Study of branches in Settlement Geography	6
6	Basic models in Population Geography	5
7	Basic models in Settlement Geography	5
8	Recent trends in Population Geography	5
9	Recent trends in Settlement Geography	5
10	Development of Population and Settlement Geography in less developed countries and more developed countries	6

Books:

1. Hussain, M. (1999): Human Geography, Rawat Publication, Jaipur
2. Garnier, B. (1966): Geography of Population, Longman, London
3. Bhende, A. A. and Kanitkar, T. (2008): Principles of Population Studies, Himalaya Publishing House, Mumbai
4. Chandana, R. C. and Sidhu, M. S. (1980): Introduction to Population Geography, Kalyani, New Delhi
5. Sawant, S. B. (1994): Population Geography, Mehta Publishing House, Pune
6. Clarke, J. F. (1965): Population Geography, Pergamon Press, Oxford

Code No: Gg: 1010		Title: Practicals in Physical Geography
No. of Credits: 3		No. of Practicals: 15
Sr. No.	Topics	Practicals
Section : A : Geomorphology		
1	Profile analysis: longitudinal, superimposed, projected and composite, intervisibility of terrains	2
2	Block diagrams	2
3	Slope and aspect maps	2
4	Hypsometric curve and integral	2
Section : B : Climatology		
1	Scientific notation and conversion of different units	2
2	Preparation of climatic maps and diagrams: wind roses, circular graph, climograph and water budget diagram	4
3	Koppen's classification	1

(Note : For 3 credits 3 hrs. practical per week)

Books:

1. King, C. A. M. (1966): Techniques in Geomorphology, Edward Arnold Ltd., London
2. Miller, A. A. (1953): The Skin of the Earth, Methuen and Co. Ltd., London
3. Strahler, A. N. (1964): Quantitative Geomorphology of Drainage Basins and Channel Networks, In: Handbook of Applied Hydrology, Ven Te Chow, Ed., Section 4-II, McGraw-Hill Book Company, New York
4. Monkhouse, F. J. and Wilkinson, H. R. (1971): Maps and Diagrams, Methuen and Co., London
5. Singh, S. (1998): Geomorphology, Prayag Pustak Bhawan, Allahabad

Code No: Gg: 1020		Title: Practicals in Human Geography	
No. of Credits: 3		No. of Practicals: 15	
Sr. No.	Topics	Practicals	
Section : A			
1	Methods of representing and mapping of population data	3	
2	Methods of field study : preparation of questionnaire / interview schedules	2	
3	Application of models using data	2	
Section : B			
1	Methods of representing and mapping of economic data	3	
2	Measures of transport network	3	
3	Methods of field study : preparation of questionnaire for land use	2	

(Note : For 3 credits 3 hrs. practical per week)

Books:

1. Liendsor, J. M. (1997): Techniques in Human Geography, Routledge, London
2. Lloyd P. and Dicken, B. (1972): Location in Space: A Theoretical Approach to Economic Geography, Harper and Row, New York
3. Wood, A. and Roberts, S. (2011): Economic Geography: Places, Network and Flows, Routledge, London
4. Chorley, R. J. and Hagget, P. (1972) Socio-economic Models in Geography, Methuen and Co., London
5. Monkhouse, F. J. and Wilkinson, H. R. (1971): Maps and Diagrams, Methuen and Co., London

Code No: Gg: 1030		Title: Statistical Methods
No. of Credits: 2		No. of Practicals: 15
Sr. No.	Topics	Practicals
1	Geographical data: discrete and continuous series, scales of measurements, frequency distribution and graphical representation	2
2	Central tendency : concept, arithmetic mean, mode, median for ungrouped and grouped data	4
3	Measures of dispersion: absolute and relative measures, range, standard deviation (grouped and ungrouped data), variance, quartile deviation, coefficient of variability	3
4	Skewness and kurtosis	2
5	Geometric mean, harmonic mean, quadratic mean	2
6	Time series analysis : moving averages (3 and 5 unit cycles)	2

(Note : For 2 credits 2 hrs. practical per week)

Books:

1. Hammond, R. and McCullagh, P. (1991): Quantitative Techniques in Geography, Clarendon Press, Oxford
2. Ebdon, D. (1977): Statistics in Geography, Basil Blackwell, Oxford
3. Gregory, S. (1978): Statistical Methods for Geographers, Longman, London
4. Frank, H. and Althoen, S. C. (1994): Statistics: Concepts and Applications, Cambridge University Press, Cambridge
5. Mann, P. S. (2007): Introductory Statistics, John Wiley and Sons, New Delhi
6. Rogerson, P. A. (2010): Statistical Methods for Geography, Sage Publications, London

Semester II

Code No: Gg: 2111		Title: Coastal Geomorphology
No. of Credits: 3		No. of Periods: 45
Sr. No.	Topics	Lectures
1	Introduction: definition of coast, coastline, shore, shoreline, coastal zone	3
2	Coastal systems and energy: waves, tides and currents	10
3	Sea – level changes	4
4	Coastal landforms and processes : erosional, depositional and constructional	10
5	Coastal sediments	3
6	Wave, tides and fluvial dominated coasts	5
7	Types and classification of coasts	4
8	Coastal environment and vulnerability	3
9	Human impact on coastal environment	3

Books:

1. Bird, E. C. (2000): Coastal Geomorphology: An Introduction, John Wiley and Sons, Chichester
2. Bloom, A. L. (2002): Geomorphology: A Systematic Analysis of Late Cenozoic, Landforms, Prentice-Hall of India, New Delhi
3. Goudie, A. S. (Eds.) (2004): Encyclopedia of Geomorphology, Routledge, London
4. Ivan, V. (2006): Global Coastal Change, Blackwell publishing, Oxford
5. King, C. A. M. (1972): Beaches and Coasts, Edward Arnold, London
6. Pethick, J. (1984): An Introduction to Coastal Geomorphology, Arnold-Heinemann, London

Code No: Gg:2121		Title: Synoptic Climatology
No. of Credits: 3		No. of Periods: 45
Sr. No.	Topics	Lectures
1	Introduction and scope of Synoptic Climatology, weather observations and analysis	4
2	Synoptic scale motion: laws of motion	3
3	Synoptic charts and maps, atmospheric stability: dry adiabatic lapse rate and saturated adiabatic lapse rate, changes in stability	7
4	Air masses: characteristics, identification and modification	5
5	Fronts: frontogenesis, frontolysis, frontal types and frontal weather	4
6	Cyclones and anticyclones: wave cyclone, tropical cyclone, Rossby waves and western disturbances, anticyclones: cold and warm core systems, anticyclonic weather	7
7	Weather patterns: precipitation processes, heat and cold waves, thunderstorms	6
8	Synoptic scale forecasting: types and methods	4
9	Application of Synoptic Climatology in pollution studies, aviation and navigation	5

Books:

1. Barry, R. G. and Perry, A. H. (1973): Synoptic Climatology: Methods and Applications, Methuen and Co. Ltd., London
2. Rama Sastry, A. A. (1984): Weather and Weather Forecasting, Publications Division, Ministry of Information and Broadcasting, Government of India, New Delhi
3. Petterson, S. (1969): Introduction to Meteorology, McGraw Hill, New York
4. Stringer, E. T. (1972): Foundations of Climatology, W. H. Freeman and Company, New York
5. Navarra, J. G. (1979): Atmosphere, Weather and Climate, W. B. Saunders Company, Philadelphia

Code No: Gg: 2131		Title: Agricultural Geography
No. of Credits: 3		No. of Periods: 45
Sr. No.	Topics	Lectures
1	Nature, scope and significance of Agricultural Geography Various approaches to study of Agricultural Geography	3
2	Origin and dispersal of agriculture	3
3	Physical and economic factors affecting agriculture	6
4	Basis of agricultural classification. Agricultural types: intensive, subsistence, extensive, commercial and plantation agriculture	6
5	Agricultural regionalization	4
6	Agricultural land use models critical review – contemporary perspective	4
7	Measures of agricultural productivity	4
8	Crisis of agriculture. Aspects of food security and world patterns of hunger	6
9	Land use survey and land classification	6
10	Globalization and agriculture	3

Books:

1. Grigg, D. (1995): An Introduction to Agricultural Geography, Routledge, London
2. Singh, J. and Dhillon, S. S. (1994): Agricultural Geography, Tata McGraw Hill Publishing Co. Ltd., New Delhi
3. Symons, L. (1970): Agricultural Geography, G. Bell and Sons Ltd., London
4. Hussain, M. (1978): Agricultural Geography, Rawat Publication, Jaipur
5. Vaidya, B. C. (1997): Agricultural Land use in India, Manak Publications, New Delhi

Code No: Gg: 2141		Title: Population Geography
No. of Credits: 3		No. of Periods: 45
Sr. No.	Topics	Lectures
1	Introduction to Population Geography, its relation with other disciplines, population structure and characteristics	5
2	Concept of mortality and theories in population growth	6
3	Concept and theories of fertility	6
4	Concept and theories of migration	3
5	Population projection	3
6	Population policies	5
7	Population issues : Indian scenario	5
8	Population issues : World scenario	5
9	Demographic transition in present situation	4
10	Importance of research in Population Geography	3

Books:

1. Aggarwal, S. M. (1974): India's Population Problems, McGraw Hill Publishing Co. Ltd., New Delhi
2. Coale, A. J. and Hoover, E. M. (1958): Population Growth and Economic Development in Low Income Countries, Amit Publishers, New Delhi
3. Desoza, A. A. (1983): Indian Population Problem in Perspective and Social Action, Concept Publications, New Delhi
4. Bhende, A. A. and Kanitkar, T. (2011): Principles of Population Studies, Himalaya Publishing House, Mumbai
5. Hazel, B. R. (1994): Population Geography, Singapore Publishers Pvt. Ltd., Singapore
6. Berelson, B. (1974): Population Policy in Developed Countries, MacMillan, London
7. Chandana, R. C. (2013): Population Geography, Kalyani Publications, Delhi

Code No: Gg: 2110		Title: Practicals in Coastal Geomorphology	
No. of Credits: 2		No. of Practicals: 15	
Sr. No.	Topics	Practicals	
1	Identification of coastal features using topographical maps/ satellite images	3	
2	Monitoring of wave parameters in surf zone and tide levels. Wave and tide level data analysis	3	
3	Beach profile: planimetric and cross profiles	3	
4	Textural analysis of coastal sediments	3	
5	Geomorphic mapping of coastal features	3	

(Note : For 2 credits 2 hrs. practical per week)

Books:

1. Bloom, A. L. (2002): Geomorphology: A Systematic Analysis of Late Cenozoic, Landforms, Prentice-Hall of India, New Delhi
2. Carter, R. W. G. (1988): Coastal Environments, Academic press Ltd., London
3. Dackombe, R. V. and Gardiner, V. (1983): Geomorphological Field Manual, George Allen and Unwin, London
4. Goudie, A. (1990): Geomorphological Techniques, Routledge, London
5. King, C. A. M. (1972): Beaches and Coasts, Edward Arnold, London
6. Pethick, J. (1984): An Introduction to Coastal Geomorphology, Arnold-Heinemann, London
7. Smith, M. J., Paron, P. and Griffiths, J. (2011): Geomorphological Mapping, Elsevier, Amsterdam

Code No: Gg: 2120		Title: Practicals in Synoptic Climatology
No. of Credits: 2		No. of Practicals: 15
Sr. No.	Topics	Practicals
1	Instrumentation and measurement techniques of weather elements and processing of weather data	7
2	Station model: coding, decoding and plotting of synoptic data	4
3	Climatic map analysis: daily weather reports	4

(Note : For 2 credits 2 hrs. practical per week)

Books:

1. WMO No. 8 (1983): Guide to Meteorological Instruments and Methods of Observation
2. Navarra, J. G. (1979): Atmosphere, Weather and Climate, W. B. Saunders Company, Philadelphia

Code No: Gg: 2130 Title: Practicals in Agricultural Geography		
No. of Credits: 2		No. of Practicals: 15
Sr. No.	Topics	Practicals
1	Methods of crop concentration and diversification	5
2	Crop combination techniques	5
3	Measurement of agricultural efficiency	5

(Note : For 2 credits 2 hrs. practical per week)

Books:

1. Ali, M. (1979): Dynamics of Agricultural Development in India, Concept Publication, New Delhi
2. Hussain, M. (1978): Agricultural Geography, Rawat Publication, Jaipur
3. Singh, J. and Dhillon, S. S. (1994): Agricultural Geography, Tata-McGraw Hill Publication, New Delhi
4. Yeats, M. H. (1978): An Introduction to Quantitative Analysis in Human Geography, John and John Company, Chicago

Code No: Gg: 2140		Title: Practicals in Population Geography
No. of Credits: 2		No. of Practicals: 15
Sr. No.	Topics	Practicals
1	Rate of population change, population projection	3
2	Calculation of total fertility rate	3
3	Construction of life table	3
4	Singulate mean age at marriage	3
5	Collection of data on a given problem and report writing	3

(Note : For 2 credits 2 hrs. practical per week)

Books:

1. Pathak, K. B. and Ram, F. (2013): Techniques of Demographic Analysis, Himalaya Publishing House, Mumbai
2. Agarwala, S. N. (1962): Age at Marriage in India, Kitab Mahal Pvt. Ltd., Allahabad
3. Barclay, G. W. (1958): Techniques of Population Analysis, John Wiley and Sons, New York
4. Mandal, R. B., Uyanga, J. and Prasad, H. (2007): Introductory Methods in Population Analysis, Concept Publishing Company, New Delhi
5. Wilkinson, F. J. and Monkhouse H. R. (1966): Maps and Diagrams: Their Compilation and Construction, Methuen and Co., London
6. Siegel, J. S. and Swanson, D. A. (2004): The Methods and Materials of Demography, Academic Press, Boston

Code No: Gg: 2211		Title: Fluvial Geomorphology
No. of Credits: 3		No. of Periods: 45
Sr. No.	Topics	Lectures
1	Drainage basin and network: laws of drainage composition	3
2	Mechanics of fluvial erosion: overland flow, throughflow and groundwater flow. Hydrographs	5
3	Open channel hydraulics: type of flows, stream energy hydraulic geometry	8
4	Sediment transport: suspended and bedload	5
5	Channel geometry: bedrock and alluvial rivers	8
6	Concept of grade: graded profile, dynamic equilibrium	3
7	Landforms of fluvial erosion: erosional processes	4
8	Landforms of fluvial deposition: depositional processes, flood plains. River terraces	4
9	River metamorphosis and Quaternary fluvial systems	3
10	River channel management	2

Books:

1. Leopold, L. B., Wolman, M. G. and Miller, J. P. (1964): Fluvial Processes in Geomorphology, W. H. Freeman, San Francisco
2. Schumm, S. A. (1977): Fluvial Systems, Wiley, New York
3. Kale, V. S. and Gupta, A. (2010): Introduction to Geomorphology, Universities Press, Hyderabad
4. Fryirs, K. A. and Brierley, G. J. (2013): Geomorphologic Analysis of River Systems, Wiley-Blackwell, Chichester
5. Downs P. W. and Gregory K. J. (2004): River Channel Management, Arnold, London
6. Charlton, R. (2008): Fundamentals of Fluvial Geomorphology, Routledge, Oxon
7. Robert, A. (2003): River Processes- An Introduction to Fluvial Dynamics, Arnold, London

Code No: Gg: 2221		Title: Applied Climatology
No. of Credits: 3		No. of Periods:45
Sr. No.	Topics	Lectures
1	Nature and scope of Applied Climatology: atmospheric concern and awareness	6
2	Climate and the physical environment	5
3	Climate and biological environment	5
4	Climate and industrial and commercial activities	5
5	Climate and transport services	5
6	Climate and human comfort	5
7	Urban climate and global environment change: adaptation and mitigation	7
8	Climate Change: data sources, methods and theories. Past, present and future climate scenarios, impacts, future strategies and adaptations	7

Books:

1. Thompson, R. D. and Allen, P. (1997): Applied Climatology: Principles and Practice, Routledge, London
2. Oliver, J. E. (1973): Climate and Man's Environment: An introduction to Applied Climatology, John Wiley and Sons, New York
3. Mather, J. R. (1974): Climatology: Fundamentals and Applications, McGraw Hill, New York
4. Kelkar, R. R. (2010): Climate Change: A Holistic View, BS Publication, Hyderabad
5. Kelkar, R. R. (2008): Monsoon Prediction, BS Publication, Hyderabad

Code No: Gg: 2231		Title: Geography of Tourism
No. of Credits: 3		No. of Periods: 45
Sr. No.	Topics	Lectures
1	Definition, nature and scope Relation between geography and tourism	3
2	Factors affecting tourism	4
3	Types of tourism	6
4	Infrastructure and support system for tourism	6
5	Development and planning for tourism	6
6	Economic, social, physical and cultural impacts of tourism	6
7	Evaluation of tourism potential	4
8	Tourism development in India	6
9	Globalization and tourism	4

Books:

1. Robinson, H. (1996): A Geography of Tourism, Macdonald and Evans, London
2. Bhatia, A. K. (1996): Tourism Development: Principles and Practices, Sterling Publisher Ltd., New Delhi
3. Bhatia, A. K. (1991): International Tourism - Fundamentals and Practices, Sterling Publisher, New Delhi
4. Das, M. (1999): India: A Tourist Paradise, Sterling Publishers, New Delhi
5. Smith, L. J. S. (2010): Tourism Analysis: A Handbook, Halstead Press, Sydney
6. Pearce, D. G. (1987): Tourism Today: A Geographical Analysis, Longman, Harlow
7. Lew, A. A., Hall, C. M. and Williams, A. M. (ed) (2014): Tourism, Wiley-Blackwell, Hoboken

Code No: Gg: 2241		Title: Urban Geography
No. of Credits: 3		No. of Periods: 45
Sr. No.	Topics	Lectures
1	Introduction: urbanism, urbanization and Urban Geography	3
2	The origins and growth of cities: World and India	6
3	Urban renewal, gentrification, suburbanization, urban fringe, rural- urban fringe	6
4	Foundations of urban system and urban morphology	3
5	Urban systems in transition and changing downtown (CBD)	3
6	Urban Form: examples from more developed countries	5
7	Changing metropolitan form and metropolitanization	6
8	Urbanization in the less developed countries and more developed countries	6
9	Urban land use in the less developed countries and more developed countries, functional classification of towns	4
10	Globalization and urbanization and its impact on less developed countries, recent trends in Urban Geography	3

Books:

1. Pacione, M. (2009): Urban Geography, Routledge, New York
2. Carter, H. (1979): The Study of Urban Geography, Arnold Heinemann, London
3. Bose, A. (1980): India's Urbanisation, Tata McGraw Hill, New Delhi
4. Siddharth, K. and Mukherjee, S. (2013): Cities, Urbanization and Urban System, Kisalaya Publishing, New Delhi
5. Hall, T. (2006): Urban Geography, Routledge, London
6. Ramchandran, R. (1997): Urbanization and Urban Systems in India, Oxford University Press, New Delhi

Code No: Gg: 2210		Title: Practicals in Fluvial Geomorphology
No. of Credits: 2		No. of Practicals: 15
Sr. No.	Topics	Practicals
1	Drainage basin and network morphometry. Longitudinal profile and Hack's stream gradient index	4
2	Calculation of runoff, sediment load and sediment yield	2
3	Calculation of hydraulic geometry equations	2
4	Measurement of channel cross-section in the field, study of erosional and depositional features in the field Creating sketch maps	5
5	Calculation of velocity and discharge using Manning equation. Estimation of unit stream power and shear stress	2

(Note : For 2 credits 2 hrs. practical per week)

Books:

1. Leopold, L. B., Wolman, M. G. and Miller, J. P. (1964): Fluvial Processes in Geomorphology, W. H. Freeman, San Francisco
2. Schumm, S. A. (1977): Fluvial Systems, Wiley, New York
3. Kondolf, G. M. and Piegay, H. (2003): Tools in Fluvial Geomorphology, Wiley, Chichester
4. Charlton, R. (2008): Fundamentals of Fluvial Geomorphology, Routledge, Oxon
5. Robert, A. (2003): River Processes - An Introduction to Fluvial Dynamics, Arnold, London

Code No: Gg: 2220		Title: Practicals in Applied Climatology
No. of Credits:2		No. of Practicals:15
Sr. No.	Topics	Practicals
1	Climatic classification: Thornthwaite	4
2	Climate and architectural analysis, comfort indices, identification of heat and cold waves	6
3	Statistical analysis of climatic data	5

(Note : For 2 credits 2 hrs. practical per week)

Books:

1. Oliver, J. E. (1981): Climatology: Selected Applications, V. H. Winston and Sons, London
2. Keith, S. (1975): Principles of Applied Climatology, Wiley the University of Michigan
3. Griffiths, J. F. (1966): Applied Climatology: An introduction, Oxford University Press, London
4. Hobbs, J. E. (1980): Applied Climatology: A Study of Atmospheric Resources, W. Dawson, University of California, California
5. Fitzroy, R. (2012): The Weather book, A manual of Practical Meteorology, Green, Longman, Cambridge

Code No: Gg: 2230 Title : Practicals in Geography of Tourism		
No. of Credits: 2		No. of Practicals : 15
Sr. No.	Topics	Practicals
1	Sources of data	3
2	Perception studies	3
3	Tourism site suitability/ tourism development analysis	4
4	Analysis of tourism impacts and report writing	5

(Note : For 2 credits 2 hrs. practical per week)

Books:

1. Kaul, R. K. (1985): Dynamics of Tourism and Recreation, Inter India, New Delhi
2. Pearce, D. (1987): Tourism Today: A Geographical Analysis, Longman Scientific and Technical, New York
3. Smith, L. J. S. (2010): Practical Tourism Research, CABI, Wallingford
4. Smith, L. J. S. (2010): Tourism Analysis: A Handbook, Halstead Press, Sydney

Code No: Gg: 2240		Title: Practicals in Urban Geography
No. of Credits: 2		No. of Practicals:15
Sr. No.	Topics	Practicals
1	Basic measures for urbanization	2
2	Calculation of CBD by Vance and Evan's method	3
3	Size of locality of residence of median inhabitant	3
4	Index of city distribution, methods of urban renewal and calculation of urban sprawl	4
5	Collection of data on a given problem and report writing	3

(Note : For 2 credits 2 hrs. practical per week)

Books:

1. Pathak, K. B. and Ram, F. (2013): Techniques of Demographic Analysis, Himalaya Publishing House, Mumbai
2. Haggett, P. (1965): Locational Analysis in Human Geography, Edward Arnold, London
3. Siddharth, K. and Mukherjee, S. (2013): Cities, Urbanization and Urban System, Kisalaya Publishing Pvt. Ltd., New Delhi
4. Wilkinson, F. J. and Monkhouse H. R. (1966): Maps and Diagrams – Their Compilation and Construction, Methuen and Co., London
5. Hall, T. (2006): Urban Geography, Routledge, London
6. Pacione, M. (2009): Urban Geography- A Global Perspective, Routledge, London
7. Ramachandran, R. (1997) Urbanization and Urban Systems in India, Oxford University Press, Delhi

Code No: Gg: 2311		Title: Fundamentals of Remote Sensing	
No. of Credits: 2		No. of Periods: 30	
Sr. No.	Topics	Lectures	
1	Introduction to remote sensing	3	
2	Characteristics of electromagnetic radiation (EMR): EMR spectrum, blackbody, radiation laws	4	
3	Interaction of EMR with atmosphere and Earth's surface: reflection, absorption, transmission, scattering and refraction. Atmospheric windows	4	
4	Fundamentals of aerial photography	3	
5	Geometric characteristics of aerial photographs	3	
6	Image displacement, parallax and stereoscopy Introduction to digital photogrammetry	3	
7	Basics of satellite remote sensing: definition, principle, stages and types	3	
8	Platforms and orbits	2	
9	Sensors and scanning systems	3	
10	History of Indian remote sensing program	2	

Books:

1. Sabins, F. F. (1996): Remote Sensing: Principles and Interpretation, W. H. Freeman and Company, San Francisco
2. Tempfi, K., Kerle, N., Huurneman, G. and Janssen, L. F. (Eds) (2009): Principles of Remote Sensing – An Introductory Text Book, The International Institute for Geoinformation Science - Netherlands
3. Lillesand, T. M. and Ralph, K. W. (2008): Remote Sensing and Image Interpretation, John Wiley and Sons, Singapore
4. Campbell, J. B. (2002): Introduction to Remote Sensing, Taylor and Francis, London
5. Joseph, G. (2003): Fundamentals of Remote Sensing, University Press, Hyderabad

Code No: Gg: 2310		Title: Practicals in Remote Sensing
No. of Credits: 3		No. of Practicals: 15
Sr. No.	Topics	Practicals
1	Determination of scale of aerial photographs	1
2	Determination of object height on aerial photographs	1
3	Interpretation of single vertical aerial photographs	1
4	Interpretation of stereo pair of aerial photographs	4
5	Introduction to reference system of IRS satellites, data products and formats	2
6	Interpretation of satellite images	6

(Note : For 3 credits 3 hrs. practical per week)

Books:

1. Sabins, F. F. (1996): Remote Sensing: Principles and Interpretation, Freeman and Company, San Francisco
2. Tempfli, K., Kerle, N., Huurneman, G and Janssen, L. F. (Eds) (2009): Principles of Remote Sensing – An Introductory Text Book, The International Institute for Geoinformation Science - Netherlands
3. Lillesand, T. M. and Ralph, K. W. (1999): Remote Sensing and Image Interpretation, John Wiley and Sons, Singapore
4. Campbell, J. B. (2002): Introduction to Remote Sensing, Taylor and Francis, London
5. Schowengerdt, R. A. (2006): Remote Sensing: Models and Methods for Image Processing Academic Press, Boston

Code No: Gg: 2320		Title: Surveying Practicals
No. of Credits: 3		No. of Practicals: 15
Sr. No.	Topics	Practicals
1	Introduction to surveying and leveling	1
2	Dumpy level survey: rise and fall method, collimation level method, profile drawing and contouring	5
3	Theodolite survey: intersection method, tacheometric method, contouring	5
4	GPS: road mapping	2
5	Introduction to total station with demonstration	1
6	Introduction to DGPS with demonstration	1

(Note : For 3 credits 2 hrs. practical per week)

Books:

1. Kanetkar, T. P. and Kulkarni, S.V. (1960): Surveying and Leveling- Part I and II, A. V. Ghriha Prakashan, Pune
2. Pugh, J. C. (1975): Surveying for Field Scientists, Methuen and Co. London
3. Basak, N. N. (1994): Surveying and Levelling, Tata McGraw-Hill Education, Delhi
4. Roy, S. K. (2004): Fundamentals of Surveying, PHI Learning, New Delhi
5. Bhavikatt , S. S. (2009): Surveying and Levelling, I. K. International, New Delhi

Code No: Gg: 2330		Title: Statistical Methods in Geography	
No. of Credits: 4		No. of Periods: 60	
Sr. No.	Topics	Lectures	
1	Bivariate analysis: covariance, correlation and regression (linear, exponential, logarithmic, power-law), explained variance, residuals, mapping of residuals	20	
2	Probability: normal, binomial and poisson	15	
3	Inferential statistics: samples and population, sampling distribution, standard error of mean and best estimate of standard deviation, concept of random numbers, large and small samples Hypothesis testing: formulation, rejection rule, one and two tailed tests, significance level, degrees of freedom, type I and type II errors	12	
4	Student <i>t</i> test ANOVA : one-way, two-way (single and multiple entry) Chi-square test: one-way and two-way	13	

Books:

1. Hammond, R. and McCullagh, P. (1991): Quantitative Techniques in Geography, Clarendon Press, Oxford
2. Frank, H. and Althoen, S. C. (1994): Statistics: Concepts and Applications, Cambridge University Press, Cambridge
3. Mann, P. S. (2007): Introductory Statistics, John Wiley and Sons, New Delhi
4. Borradaile, G. (2003): Statistics of Earth Science Data, Springer, New York
5. Rogerson, P. A. (2010): Statistical Methods for Geography, Sage Publications, London

Code No: Gg:2340 Title: Practicals in Interpretation of Topographical Maps		
No. of Credits: 4		No. of Practicals: 15
Sr. No.	Topics	Practicals
Section: A		
1	Introduction to map scales and projections	2
2	Introduction to SOI topographical maps: numbering, scales, grid reference, signs and symbols, colour system	2
3	Study and interpretation of SOI maps	4
Section: B		
1	Introduction to OS topographical maps: grid reference, signs and symbols and interpretation	3
2	Introduction to USGS topographical maps: grid reference, signs and symbols and interpretation	4

(Note : For 4 credits 2 hrs. practicals twice a week)

Books:

1. Ramamurthy, K. (1982): Map Interpretation, Rex Printer, Madras
2. Vaidyanadhan, R. (1968): Index to a Set of Sixty Topographic Maps: Illustrating Specified Physiographic Features From India, Council of Scientific and Industrial Research, Ministry of Education, Government of India
3. Gupta, K. K. and Tyagi, V. C. (1992): Working with Maps, Survey of India Publication
4. Tamaskar, B. G. and Deshmukh, V. M. (1974): Geographical Interpretation of Indian Topographical maps, Orient Longman, Kolkata
5. Dury, G. H. (1972): Map Interpretation, Pritman and Sons, London
6. Singh, G. (1996): Map Work and Practical Geography, Vikas Publication, New Delhi

Semester III

Code No: Gg: 3111		Title: Tropical Geomorphology
No. of Credits: 3		No. of Periods:45
Sr. No.	Topics	Lectures
1	Introduction to tropics: tropics as part of Gondwana, its special features and major landforms Tropical hydrology: climate; rainfall erosivity, temperature, winds, tropical disturbances and water balance. Role of vegetation Climatic Geomorphology and morphogenetic regions Geomorphology in the tropics	6
2	Weathering processes and profiles in humid tropical environment	6
3	Duricrusts and types: laterite - processes, profiles and landforms	6
4	Hillslopes, pediments and gullies	3
5	Rivers in tropics: discharge, sediment load, cross sectional characteristics and floodplain morphology	3
6	Tropical coasts and deltas	3
7	Distribution and types of karst in tropics	2
8	Tropical planation: etchplain, peneplain, pediplain and inselbergs	5
9	The arid tropics: hydrology, landforms and aeolian geomorphology	5
10	Quaternary climate changes and landforms in tropics	3
11	Anthropogenic alteration of geomorphic processes in tropics	3

Books:

1. Faniran, A. and Jeje, L. K. (1983): Humid Tropical Geomorphology, Longman, London
2. Thomas, M. F. (1994): Geomorphology in the Tropics: A study of Weathering and Denudation in Low Latitudes, John Wiley and Sons, Chichester
3. Gupta, A. (2011): Tropical Geomorphology, Cambridge University Press, London
4. Budel, J. (1982): Climatic Geomorphology, Princeton University Press, Princeton
5. Goudie, A. (1985): Duricrusts in Tropical and Sub Tropical Landscapes, Alien Unwin, Australia
6. Goudie, A. S. (2004): (Eds.), Encyclopedia of Geomorphology, Routledge, London

Code No: Gg:3121		Title: Monsoon Climatology
No. of Credits: 3		No. of Periods:45
Sr. No.	Topics	Lectures
1	Introduction and scope of Monsoon Climatology. Historical background and economic importance	3
2	Different concepts regarding origin of monsoon. The Asian Monsoon: East and South Asian Monsoon. Classical theory of Indian Monsoons	6
3	Monsoon model: driving mechanism, realistic monsoon model	5
4	Monsoon Climatology: normal temperature, wind and pressure, dates of onset and withdrawal, monsoon rainfall	5
5	Regional aspects of Indian monsoon: semi- permanent system – heat low, monsoon trough, easterly jet, Tibetan high	6
6	Interseasonal variation: active and break period, depressions, trough of low pressure, mid-Tropospheric disturbances, offshore and onset vortices, effect of orography	6
7	Interannual variation: variability of summer monsoon rainfall, snow cover, meteorological teleconnections. Walker circulation, the role of ocean and upper atmosphere	8
8	Monsoon forecast: different time scales, factors for forecasting, power regression and parametric model, MONEX and IIOE	6

Books:

1. Rao, Y. P. (1976): Meteorological Monograph Synoptic Meteorology No. 1/1976 Southwest Monsoon, IMD
2. Das, P. K. (1991): The Monsoons, National Book Trust, New Delhi
3. Keshavamurty, K. N. (1992): The Physics of Monsoons, Allied Publishers Limited, New Delhi
4. Fein, J. S. and Stephens, P. L. (1987): Monsoons, John Wiley and Sons, New York
5. Pant, G. B. and Rupa Kumar, K. (1997): Climates of South Asia, John Wiley and Sons, Chichester

Code No: Gg: 3131 Title: Geography of Trade and Transport		
No. of Credits: 3		No. of Periods: 45
Sr. No.	Topics	Lectures
1	Nature and scope of Trade Geography	5
2	International trade characteristics	5
3	Trade theories	5
4	Meaning and scope of Transport Geography	5
5	Factors associated with seaport and airport	8
6	Modes of transportation in India	5
7	Transport network and patterns of movement	7
8	Urban transport problems	5

Books:

1. Alexander, J. W. (1993): Economic Geography, Prentice Hall, New Jersey
2. Taffee, S. G. and Gawther, T. S. (1973): Geography of Transportation, Prentice Hall, New Jersey
3. Thomas, S. L. and Conkling, V. (1971): Geography of International Trade, McGraw Hill, New York
4. Thomas, S. L. and Conkling, V. (1974): The Geography of Economic Activity, McGraw Hill, New York
5. White, H. P. and Senior, M. L. (1984): Transport Geography, John and John Company, Chicago

Code No: Gg: 3141		Title: Geography of Rural Settlements	
No. of Credits: 3		No. of Periods: 45	
Sr. No.	Topics	Lectures	
1	Introduction: definition, nature, scope and paradigm shift	3	
2	Evolution and development of rural settlement from ancient to 21 st Century	6	
3	Size, spacing, types, pattern of rural settlements	6	
4	Changing morphology and segregation of rural settlements	3	
5	Spatial distribution of rural settlements	3	
6	Rural dwelling and house types in India	5	
7	Ruralization in Indian scenario	6	
8	Measures of development of amenities and infrastructure in rural India	6	
9	World scenario of development of rural settlements	4	
10	Role of GIS and RS in rural Settlements	3	

Books:

1. Mandal, R. B. (2001): Introduction to Rural Settlement, Concept Publishing Company, New Delhi
2. Singh, R.Y. (1994): Geography of Settlements, Rawat Publications, Jaipur
3. Alam, M. and Gopi, K. N. (1982): Settlement System of India, Oxford and IBH Publication, New Delhi
4. Haggett, P. (1965): Locational Analysis in Geography, Edward Arnold, London
5. Woods, M. (2005): Rural Geography, Sage Publication, London

Code No: Gg: 3110 Title: Practicals in Tropical Geomorphology		
No. of Credits: 2		No. of Practicals: 15
Sr. No.	Topics	Practicals
1	Bowen's weathering reaction series Golditch's weathering reaction series	2
2	Calculation and interpretations of Si/Sesquioxide ratios and chemical weathering indices	2
3	Clay mineralogy, listing of important clay minerals and their properties	2
4	Universal soil loss equation	6
5	Hydrographs of tropical rivers	1
6	Field study of the landscapes/ weathering profiles/ laterite profiles	2

(Note : For 2 credits 2 hrs. practical per week)

Books:

1. Faniran, A. and Jeje, L. K. (1983): Humid Tropical Geomorphology, Longman, London
2. Thomas, M. F. (1994): Geomorphology in the Tropics: A Study of Weathering and Denudation in Low Latitudes, John Wiley and Sons, Chichester
3. Gupta, A. (2011): Tropical Geomorphology, Cambridge University Press, London
4. Budel, J. (1982): Climatic Geomorphology, Princeton University Press, Princeton
5. Goudie, A. (1985): Duricrusts in Tropical and Sub Tropical Landscapes, Alien Unwin, Australia
6. Morgan, R. P. C. (1986): Soil Erosion and Conservation, Longman Group Ltd., <http://as.wiley.com/WileyCDA/WileyTitle/productCd-1405117818.html>

Code No: Gg: 3120 Title: Practicals in Monsoon Climatology		
No. of Credits: 2		No. of Practicals: 15
Sr. No.	Topics	Practicals
1	Study of Indian Daily Weather Report (IDWR) Preparation of report about the monsoon activity during a particular week with respect to temperature, rainfall, semi-permanent system and their outlook Note: Based on map discussion	5
2	Analysis of temperature, pressure, etc. for various stations using IDWR. Charting of system using IDWR	3
3	Representation of weather elements using IDWR	3
4	T-Phigram	4

(Note : For 2 credits 2 hrs. practical per week)

Books:

1. Daily and weekly weather reports of IMD

Code No: Gg: 3130		Title: Practicals in Geography of Trade and Transport	
No. of Credits: 2		No. of Periods: 15	
Sr. No.	Topics	Practicals	
1	Graph theoretical measures of transport network	5	
2	Gravity, potential population surface, breaking point theory, trade area delimitation, law of retail trade gravitation	5	
3	Model of transport development	2	
4	Transport survey	3	

(Note : For 2 credits 2 hrs. practical per week)

Books:

1. Alexander, J. W. (1993): Economic Geography, Prentice Hall, New Jersey
2. Kansky, N. T. (1965): Structure of Transport Network, Hermant Publication, New York
3. Yeats, M. H. (1978): An Introduction to Quantitative Analysis in Human Geography, John and John Company, Chicago

Code No: Gg: 3140 Title: Practicals in Geography of Rural Settlements		
No. of Credits: 2		No. of Practicals: 15
Sr. No.	Topics	Practicals
1	Methods of concentration of rural settlements	3
2	Chi-square test for environmental factors responsible for pattern variation of settlements	3
3	Measurement of shape (pattern) of rural settlements	3
4	Methods for measuring spacing of settlements	3
5	Collection of data on given problem and report writing	3

(Note : For 2 credits 2 hrs. practical per week)

Books:

1. Mandal, R. B. (2001): Introduction to Rural Settlement, Concept Publishing Company, New Delhi
2. Haggett, P. (1965): Locational Analysis in Geography, Edward Arnold, London
3. Wilkinson, F. J. and Monkhouse, H. R. (1966): Maps and Diagrams: Their Compilation and Construction, Methuen and Co., London

Code No: Gg: 3211 Title: Geomorphology - Theoretical and Applied		
No. of Credits: 3		No. of Periods: 45
Sr. No.	Topics	Lectures
1	History of Geomorphology. Paradigms in Geomorphology. General System Theory	5
2	Concepts: uniformitarianism, neocatastrophism equilibrium, complex response, geomorphic thresholds	7
3	Space and time in geomorphology, time: cyclic, graded, steady. Magnitude and frequency. Spatial scales: micro, meso and macro	5
4	Climatic Geomorphology and Tectonic Geomorphology	4
5	Theories, techniques and fieldwork (including field experiments) in geomorphology	4
6	Geomorphometry: general and specific, fractals	5
7	Applied Geomorphology : nature and objectives	1
8	Geomorphic hazards:fluvial, coastal and hillslope	7
9	Applied fluvial and coastal geomorphology	5
10	Geoheritage and geomorphosites	2

Books:

1. Hart, M. G. (1986): Geomorphology, Pure and Applied, George Allen and Unwin, London
2. Chouly, R. J., Schumm, S. A. and Sugden, D. E. (1984): Geomorphology, Methuen, London
3. Hails, J. R. (1977): Applied Geomorphology, Elsevier, Amsterdam
4. Goudie, A. S. (Eds.) (2004): Encyclopedia of Geomorphology, Routledge, London
5. Gregory K. J. and Goudie, A. S. (2011): Handbook of Geomorphology, SAGE, London

Code No: Gg: 3221		Title: Agro-Meteorology
No. of Credits: 3		No. of Periods: 45
Sr. No.	Topics	Lectures
1	Nature and scope of Agro-meteorology, Agro-climatology of field crops	5
2	Plants and energy related agro-meteorological element	5
3	Plant and moisture related agro-meteorological element	5
4	Water loss and its measurements	5
5	Climate and biological hazards	5
6	Application of RS and GIS in Agro-meteorology	5
7	Agro-meteorological database management and its application	5
8	Agro-climatic classification	5
9	Introduction to dynamic crop simulation modeling/ DSS	5

Books:

1. Doorenbos, J. and Pruitt, W.O. (1977): Guidelines for Predicting Crop Water Requirements, FAO (United Nations)
2. Chang, J. H. (2009): Climate and Agriculture: An Ecological Survey, Transaction Publisher, Chicago
3. Thornthwaite, C. W. and Mather, J.R. (1957): Instructions and Tables for Computing Potential Evapotranspiration and Water Balance, Drexel Institute of Technology, Laboratory of Climatology
4. Mavi, H. S. (1996): Introduction to Agrometeorology, Oxford and IBH Publishing Co., New Delhi
5. Kakade, J. R. (1985): Agricultural Climatology, Metropolitan Book Co., New Delhi

Code No: Gg: 3231		Title: Geography of Development
No. of Credits:3		No. of Periods: 45
Sr. No.	Topics	Lectures
1	Definition, relation between geography and development	3
2	Concepts and principles of development	6
3	Developed and developing economies	4
4	Culture and development	4
5	Rural agricultural development	3
6	Urban industrial development	3
7	Poverty	4
8	Indices of human development	3
9	Geographies of inequities and uneven development	5
10	Strategies of development	4
11	Theories of development	6

Books:

1. Dutta, R. and Sundaram, K. P. M. (2002): Indian Economy, S. Chand Publications, New Delhi
2. Hodder, R. (2000): Development Geography, Routledge, London
3. Potter, R. B., Binns, T., Elliot, J. A. and Smith, D. (1999): Geographies of Development, Longman, London
4. UNDP (2002): Human Development Report, Oxford University Press, Oxford
5. Desai, V. and Potter, B. R. (Eds.) (2011): The Companion to Development Studies, A Hodder-Viva Edition, London
6. Haynes, J. (2008): Development Studies, Polity Short Introduction Series
7. Peet, R. (2005): Theories of Development, Rawat Publications, Jaipur

Code No: Gg: 3241		Title: Geography of Population Resources
No. of Credits: 3		No. of Periods: 45
Sr. No.	Topics	Lectures
1	Introduction: definition, nature and scope	3
2	Role of population resource in geography	6
3	Manpower planning: sector wise	6
4	Manpower management in India	3
5	Models for development of human resources in India	3
6	Case studies of manpower development in Japan and Switzerland	5
7	Scarcity and unemployment of manpower	6
8	Status and roles of women and men. Demographic implications of recent changes in gender roles, families and household	6
9	Poverty and wealth	4
10	Technology and population development	3

Books:

1. Rao, V. K. R. V. (1966): Education and Human Resource Development, Allied Publishers, Bombay
2. Stockwell, E. G. (1968): Population and People, Quadrangle Books, Chicago
3. UN (1962): Demographic Aspects of Manpower, Report 1, Sex and Age Patterns of Participation in Economic Activities, Population Studies No. 33, New York
4. UN (1973): The Determinants and Consequences of Population Trends, Vol. I, ST/SOA/SER.A/50, Population Studies No. 50, New York
5. Shivkumar, A. K., Panda, P. and Ved, R.R. (2013): Handbook of Population and Development in India, Oxford University Press, Oxford

Code No: Gg: 3210 Title: Practicals in Geomorphology - Theoretical and Applied		
No. of Credits: 2		No. of Practicals: 15
Sr. No.	Topics	Practicals
1	Mapping landscape materials: texture, shape, colour Zingg's shape classification. Use of Munsell colour chart Introduction to use of Sedigraph in textural analysis	4
2	Estimation of fractal dimension of a line	2
3	Exercises in terrain classification: composite score method, Crofts (1973) critical slope for specified activates	6
4	Study of sedimentary sequences in the field Study of facies and major sedimentary structures Mialls' facies notations/lithocodes	3

(Note : For 2 credits 2 hrs. practical per week)

Books:

1. Goudie, A. (1990): Geomorphological Techniques, Unwin Hyman, London
2. Dackombe, R. V. and Gardiner, V. (1983): Geomorphological Field Manual, George Allen and Unwin, London
3. Cooke, R. U. and Doornkamp, J. C. (1974): Geomorphology in Environment Management, Clarendon Press, London
4. Goudie, A. S. (Eds.) (2004): Encyclopedia of Geomorphology, Routledge, London

Code No: Gg: 3220		Title: Practicals in Agro-meteorology
No. of Credits: 2		No. of Practicals:15
Sr. No.	Topics	Practicals
1	Estimation of PE and crop evapotranspiration	5
2	Crop phonological stages and crop weather calendar	5
3	Computation of water balance	3
4	Computation of evapometric irrigation scheduling	2

(Note : For 2 credits 2 hrs. practical per week)

Books:

1. Doorenbos, J. and Pruitt, W. O. (1977): Guidelines for Predicting Crop Water Requirements, FAO (United Nations)
2. Mavi, H. S. (1996): Introduction to Agrometeorology, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi
3. Thornthwaite, C. W. and Mather, J. R. (1957): Instructions and Tables for Computing Potential Evapotranspiration and Water Balance, Drexel Institute of Technology, Laboratory of Climatology

Code No: Gg: 3230		Title: Practicals in Geography of Development
No. of Credits:2		No. of Practicals: 15
Sr. No.	Topics	Practicals
1	Indices of human development	2
2	Indices of regional development	2
3	Collection of demographic and socio-economic data at household level from primary and / or secondary sources and preparation of an analytical survey report to assess the development of an area	11

(Note : For 2 credits 2 hrs. practical per week)

Books:

1. Lawson, V. A. (2007): Making Development Geography, Hodder Arnold, London
2. Liendsor, J. M. (1997): Techniques in Human Geography, Routledge, New York

Code No: Gg: 3240 Title: Practicals in Geography of Population Resources		
No. of Credits: 2		No. of Practicals: 15
Sr. No.	Topics	Practicals
1	Human development index	2
2	Poverty index	2
3	Gender related development index	2
4	Models for population resource development	2
5	Collection of data on a given problem and report writing	7

(Note : For 2 credits 2 hrs. practical per week)

Books:

1. Mandal, R. B., Uyanga, J. and Prasad, H. (2007): Introductory Methods in Population Analysis, Concept Publishing Company, New Delhi
2. Taylor, P. J. (1977): Quantitative Methods in Geography, Houghton Mifflin Co., Boston
3. Shryock, H. S. (1970): The Methods and Materials of Demography, Academic Press, New York
4. Wilkinson, F. J. and Monkhouse, H. R. (1966): Maps and Diagrams – Their Compilation and Construction, Methuen and Co., London

Code No: Gg: 3311 Title: Introduction to Computer Programming: Theory		
No. of Credits: 2		No. of Periods: 30
Sr. No.	Topics	Lectures
1	Introduction to Computer Programming Introduction to computer system : hardware and software Introduction to programming methodology, logic of computer program : algorithmic approach Algorithm : definition, characteristics, advantages and limitations Flowcharts : definition, symbols of flow chart Pseudocode : definition and basic logic structures (sequence logic, selection logic and iteration logic), advantages and limitations) Types of programming languages : low level and high level	6
2	Introduction to 'C' language 'C' language : history, importance, structure of a 'C' program 'C' character set (letters, digits, special characters and white spaces), C tokens, keywords and identifiers Constants (numeric and character), variables (variable name, basic data types, declaration of variables, initializing of variables). Operators: arithmetic: increment/decrement (prefix, postfix): advanced assignment operators Input / Output functions	12
3	Program looping Unconditional loop and conditional loop, relational operators in loop 'for loop', 'while loop' and 'do-while loop' Decision making statements -if, if-else, with conditional operators and logical operators	12

Books:

1. Kernighan, B. W. and Ritchie, D. M. (1988): The C programming Language Published by Prentice-Hall, New York (eBook)
2. King, K. N. (2008): C Programming: A Modern Approach, W. W. Norton Company, New York, London
3. Balagurusamy, E. (2006): Object oriented programming with C++: Tata McGraw- Hill Publication, New Delhi

Code No: Gg: 3310 Title: Introduction to Computer Programming: Practicals		
No. of Credits: 3		No. of Practicals:15
Sr. No.	Topics	Practicals
1	Creating programs in 'C' for analysis of univariate alphanumeric data: use of keywords	3
2	Creating programs in 'C' for analysis of bivariate alphanumeric data : use of keywords	4
3	Creating programs in 'C' for analysis of multivariate alphanumeric data : use of keywords	4
4	Creating and reading files	4

(Note : For 3 credits 3 hrs. practical per week)

Books:

1. Kernighan, B. W. and Ritchie, D. M. (1988): The C Programming Language Published by Prentice-Hall, New York (eBook)
2. King, K. N. (2008): C Programming: A Modern Approach, W.W. Norton Company, New York, London
3. Balagurusamy, E. (2006): Object oriented programming with C++, Tata McGraw- Hill Publication, New Delhi

eBooks and Manuals

1. Introduction to the C Programming Language, Science and Technology Support High Performance Computing, Ohio Supercomputer Center, Columbus, USA (pdf)
2. Algorithm, Flowcharts, Data Types and Pseudocode: MT 512 Programming Design Oxford University Computing Services Programming in C

Code No: Gg: 3321		Title: Geography of South Asia- I
No. of Credits: 2		No. of Periods:30
Sr. No.	Topics	Lectures
1	South Asia as territorial entity	1
2	Physical bases I : geology, relief and drainage	5
3	Physical bases II : climate, soil and vegetation	5
4	People and cultural mosaic : structure, spatial pattern and density, ethnicity, languages and religion	5
5	Agricultural systems in South Asia: nature and contemporary crisis	4
6	Urbanization: levels and pattern, contemporary issues	4
7	South Asia in the global economy: industry, tourism and trade	6

Books:

1. Farmer, B. H. (1993): An Introduction to South Asia, Routledge Publications, London
2. Johnson, B. L. C. (1981): South Asia, Heinemann Educational Books Ltd., Exeter
3. Vidyarthi, L. P. (1979): Pattern of Culture in Southern Asia, Oscar Publications, New Delhi
4. Stamp, L. D. (1958): Asia: Regional and Economic Geography, Methuen and co. Ltd., London
5. Aijazuddin, A. (2009): Geography of the South Asian Subcontinent: A Critical Approach, D.K. Agencies (P) Ltd., New Delhi

Code No: Gg:3322		Title: Geography of South Asia - II
No. of Credits: 3		No. of Periods: 45
Sr. No.	Topics	Lectures
1	South Asia as a region in the world system	2
2	Strategic importance of the region, geographical background of the modern problems	3
3	Population, poverty and development	6
4	Politics of culture and resultant pattern Conflict and resolutions	4
5	Migration trends and issues	4
6	Water distribution disputes	6
7	Major environmental issues	8
8	Border disputes	6
9	Regional integration and cooperation: SAARC: introduction and future challenges	6

Books:

1. Farmer, B. H. (1993): An Introduction to South Asia, Routledge Publications, London
2. Johnson, B. L. C (1981): South Asia, Heinemann Educational Books Ltd., Exeter
3. Mollinga, P. A. (2000): Water for Food and Rural Development Approaches and Initiatives in South Asia, Sage, New Delhi
4. Gonsalves, F. and Jetly, N. (1999): The Dynamics of South Asia: A Regional Co-operation and SAARC, Sage, New Delhi
5. Shafi, M. (2000): Agriculture Geography of South Asia, McMillan India, New Delhi

Code No: Gg: 3411 Title: Multivariate Statistics in Geography: Theory		
No. of Credits: 2		No. of Periods: 30
Sr. No.	Topics	Lectures
1	Geographical data and multivariate analysis	1
2	Elementary ideas of matrix algebra	3
3	Non-linear bivariate relationships	4
4	Multivariate analysis : multiple regression and correlation	3
5	Trend surface analysis (TSA) :computation of linear trend and ideas of quadratic and cubic surfaces	3
6	Principal component analysis (PCA)	4
7	Factor analysis (FA)	3
8	Logistic model	2
9	Canonical correlation analysis	3
10	Discriminant analysis :2 variables	2
11	Harmonic analysis :Fourier series: basic idea computation of first approximation to harmonic series	2

Books:

1. Johnston, R. J. (1978): Multivariate Statistics in Geography, Longman, London
2. Yeats, M. H. (1974): An Introduction to Quantitative Analysis in Human Geography, McGraw-Hill, New York
3. Summer, G. (1978): Mathematics for Physical Geographers, John Wiley, New York
4. Rogerson, P. A. (2010): Statistical Methods for Geography, Sage Publications, London
5. Acevedo, M. F. (2012): Data Analysis and Statistics for Geography, Environmental Science, and Engineering, CRC Press, London

Code No: Gg: 3410 Title: Multivariate Statistics in Geography: Practicals		
No. of Credits: 3		No. of Practicals: 15
Sr. No.	Topics	Practicals
1	Exercises in matrix algebra	1
2	Exercises in non-linear bivariate relationships multivariate analysis: multiple regression and correlation trend surface analysis :linear trend	4
3	Exercises in principal component analysis and factor analysis	5
4	Exercises in: logistic model canonical correlation analysis discriminant analysis : 2 variables harmonic analysis : computation of first approximation to harmonic series	5

Note: 1. Exercises on calculators and/or MSExcel. For 3 credits 3 hrs. practical per week

Books:

1. Johnston, R. J. (1978): Multivariate Statistics in Geography, Longman, London
2. Yeats, M. H. (1974): An Introduction to Quantitative Analysis in Human Geography, McGraw-Hill, New York
3. Summer, G. (1978): Mathematics for Physical Geographers, John Wiley, New York
4. Acevedo, M. F. (2012): Data Analysis and Statistics for Geography, Environmental Science and Engineering, CRC Press, London
5. Rogerson, P. A. (2010): Statistical Methods for Geography, Sage Publications, London

Code No: Gg: 3421 Title: Geography of India with special reference to Maharashtra		
No. of Credits:3		No. of Periods: 45
Sr. No.	Topics	Lectures
1	Space relations of India with the world, with special reference to SAARC countries	3
2	Physiographic and geological setup Salient features of Deccan Volcanic province	4
3	Mechanism and characteristics of Indian monsoon	4
4	Soils and natural vegetation	2
5	Agriculture: nature, problems and prospects	4
6	Natural resources: mineral and energy	4
7	Industrial regions and belts of India Industrial scenario in Maharashtra	4
8	Transport network : means, modes and patterns	4
9	Population and settlement scenario	8
10	Tourism development	4
11	Domestic and International trades	4

Books:

1. Hussain, M. (2013): Geography of India, Tata McGraw Hill, New Delhi
2. Singh, R. L. (1993): India: A Regional Geography, National Geographical Society of India, Varanasi
3. O. H. K. Spate (1954): A General and Regional Geography, Methuen publisher, London
4. Deshpande, C. D. (1971): Geography of Maharashtra, National Book Trust, India; India Book House, Bombay
5. Diddee, J., Jog S. R., Kale, V.S. and Datye, V. S. (2002): Geography of Maharashtra, Rawat Publication, Jaipur
6. Deshpande, G. G. (1998): Geology of Maharashtra, Geological Society of India, Bangalore
7. India Year Book (2014): Publication Division, New Delhi
8. MoIB, GoI (2014): India 2014- A Reference Annual, Publication Division, Ministry of Information and Broadcasting, Government of India, New Delhi

Code No: Gg:3422		Title: Geography of Environment
No. of Credits:2		No. of Periods: 30
Sr. No.	Topics	Lectures
1	Introduction, scope and approaches	3
2	Concepts and principles	4
3	Structure and function of ecosystem	5
4	Air, water and noise pollution: sources, effects and remedies	6
5	Human-environment relationships: historical progression, adaptation, environment and development, human rights	6
6	National and international efforts for conservation and protection of environment	6

Books:

1. Chandna, R. C. (2002): Environmental Geography, Kalyani, Ludhiana
2. Cunningham, W. P. and Cunningham, M. A. (2004): Principles of Environmental Science: Inquiry and Applications, Tata McGraw Hill, New Delhi
3. Goudie, A. (2001): The Nature of the Environment, Blackwell, Oxford
4. Miller, G. T. (2004): Environmental Science: Working with the Earth, Thomson Brooks Cole, Singapore
5. MoEF (2006): National Environmental Policy-2006, Ministry of Environment and Forests, Government of India, New Delhi
6. Singh, S. (1997): Environmental Geography, Prayag Pustak Bhawan, Allahabad
7. UNEP (2007): Global Environment Outlook: GEO4: Environment For Development, United Nations Environment Programme

Code No: Gg: 3511		Title: Fundamentals of GIS: Theory
No. of Credits: 2		No. of Periods: 30
Sr. No.	Topics	Lectures
1	Introduction to GIS: definition, development, components, objectives, hardware and software requirements	7
2	The basis of GIS mapping: map projections, datum and coordinate systems	6
3	Data types and data inputs: spatial data and attributes, data input, scanning, digitization, error corrections and topology	6
4	Data models: vector and raster, spatial and non-spatial data models	6
5	Data visualization: types of visualization, map layout design and symbology	5

Books:

1. Burrough, P. A. and McDonnell, R. A. (1998): Principles of Geographical Information Systems, Oxford University press Inc., New York
2. Chang, K. T. (2008): Introduction to Geographic Information Systems, Avenue of the Americas, McGraw-Hill, New York
3. Environmental Systems Research Institute, Inc. (1998): Understanding GIS: The ARC/INFO Method, ESRI Press, Redlands
4. Goodchild, M. F. (2003): Geographic Information Science and System for Environmental Management, Annual Review of Environment and Resource 28: 493-519
5. Lillesand, T. M., Kiefer, R. W. and Chipman, J. W. (2004): Remote Sensing and Image Interpretation, Wiley, New York
6. Robinson, A. H., Morrison, J. L., Muehrcke, P. C., Kimerling, A. J. and Guptill, S. C. (1995): Elements of Cartography, Wiley, New York
7. Tomlin, C. D. (1990): Geographic Information Systems and Cartographic Modeling, Prentice Hall, Englewood Cliffs

Code No: Gg: 3510		Title: Fundamentals of GIS: Practicals
No. of Credits: 3		No. of Practicals: 15
Sr. No.	Topics	Practicals
1	Map elements: scale, projection, coordinate systems	2
2	Introduction to GIS software (open source)	2
3	Data inputs scanning/acquiring data	2
4	Georeferencing of maps	2
5	Digitization and attribution	3
6	Topology: error detection and correction	2
7	Data visualization, map layout design and symbology	2

(Note : For 3 credits 3 hrs. practical per week)

Books:

1. Burrough, P. A. and McDonnell, R. A. (1998): Principles of Geographical Information Systems, Oxford University press Inc., New York
2. Chang, K. T. (2008): Introduction to Geographic Information Systems, Avenue of the Americas, McGraw-Hill, New York
3. Environmental Systems Research Institute, Inc. (1998): Understanding GIS: The ARC/INFO Method, ESRI Press, Redlands
4. Quantum GIS User Guide, <http://docs.qgis.org/1.8/pdf/QGIS-1.8-UserGuide-en.pdf>
5. Thiede, R., Sutton, T., Duster, H. and Sutton, M. (2013): The Quantum GIS Training Manual, Locate Press LLC, USA

Semester IV

Code No: Gg: 4111		Title: Social Geography
No. of Credits:3		No. of Periods: 45
Sr. No.	Topics	Lectures
1	Social Geography: definition, nature, scope, significance and approaches	3
2	Roots of Indian Social Geography: social organization, tribal formation, linguistic heterogeneity, communal configuration, social differentiation and regional formations	5
3	Tribal Formation: definition, nomenclature , linguistic variations, distribution, developmental impact	5
4	Caste: origin, forms and distribution	4
5	Language and dialects: origin, linguistic diversity in Indo-geographical patterning, major domains, language shifts and retention	5
6	Religion in India: types, distribution and social expression of religious identity	4
7	Society, material life and geography: work, class and social life, place of leisure, communities	5
8	Power, identity and social geography: race and ethnicity; geography of gender and sexuality	5
9	Social Geography and social problems: housing, space and society; crime, space and inequality; geography of poverty	5
10	Social basis of regional inequalities and disparities; concept of social well-being	4

Books:

1. Ahmad, A. (1993): Social Structure and Regional Development, Rawat Publications, Jaipur
2. Ahmad, A. (1999): Social Geography, Rawat Publications, Jaipur
3. Ahmad, A. (2012): Social Geography of India, Concept Publishing Company, New Delhi
4. Knox, P. L. (1975): Social Wellbeing- A Spatial Perspective, Oxford University Press, London
5. Pain, R., Barke, M., Fuller, D., Gough, J., MacFarlane, R. and Mowl, G. (2001): Introducing Social Geographies, Arnold and Oxford University Press, New York
6. Panelli, R. (2004): Social Geographies: From Difference to Action, Sage Publications, London
7. Sopher, D. (1980): An Exploration of India: Geographical Perspectives on Society and Culture, Cornell Press, New York

Code No: Gg: 4112		Title: Cultural Geography
No .of Credits:2		No. of Periods: 30
Sr. No.	Topics	Lectures
1	Cultural Geography: definition, nature, scope and significance	5
2	Concept of culture : morphology of landscape, cultural theory, cultural landscape	6
3	Themes in Cultural Geography: cultural regions, determinism and possibilism, cultural adaptation	3
4	Cultural realms: cultural assimilation, integration and dissemination	4
5	Cultural groups with reference to India: ethnicity, religion and language	3
6	Production of cultural spaces: meaning, ideology and its representation	3
7	Cultural politics	3
8	Globalization of culture	3

Books:

1. Anderson, K., Domosh, M., Pile, S. and Thrift, N. (2003): Handbook of Cultural Geography, SAGE Publications, London
2. Blunt, A., Gruffudd, P., May, J., Ogborn, M. and Pinder, D. (2003): Cultural Geography in Practice, Edward Arnolds Limited, London
3. Domosh, M., Neumann, R. P., Price, P. L. and Jordon-Bychkov, T. G. (2009): The Human Mosaic- A Cultural Approach to Human Geography, WH Freeman, New York
4. Duncan, J. S., Johnson, N. C., and Schein, R. H. (2004): A Companion to Cultural Geography, Blackwell Publishing Ltd, Oxford
5. Iaian, R. and Richards, P. (2003): Studying Cultural Landscapes, Oxford University Press, London
6. Jordon, G. (1995): Cultural Politics, Blackwell, Oxford
7. Mike, C. (1998): Cultural Geography, Routledge, London

Code No: Gg: 4121		Title: Biogeography - Plant Geography
No. of Credits: 3		No. of Periods: 45
Sr. No.	Topics	Lectures
1	Plant Geography: scope and development	3
2	Functioning and development of ecosystem	3
3	Evolution of plants	3
4	Plants and their classification: taxonomic, ecological and climatic. Raunkiaer's and Grime's classification	6
5	Floristic survey	4
6	Plants and their environment	6
7	Plants and atmospheric factors	5
8	Plants and edaphic factors	5
9	Major biomes of the world: forests, grasslands and deserts	5
10	Anthropogenic effects on plants	5

Books:

1. Mathur, H. S. (2003): Essentials of Biogeography, Pointer Publishers, Jaipur
2. Robinson, H. (1972): Biogeography, MacDonald and Evans, London
3. Pears, N. (1977): Basic Biogeography, Longman Group, London
4. Seddon, B. A. (1971): Introduction to Biogeography, Gerald Duckworth and Co., London
5. Tivy, J. (1993): Biogeography: A Study of Plants in the Ecosphere, Longman, London

Code No: Gg: 4122 Title: Biogeography - Zoogeography		
No. of Credits: 2		No. of Periods: 30
Sr. No.	Topics	Lectures
1	Zoogeography: scope and development	2
2	Evolution of animals	5
3	Animal characteristics, environmental adaptations; camouflaging and luminescence	5
4	Taxonomic classification of animals	4
5	Zoo-geographical regions of the world	4
6	Dispersal of mammals, birds, reptiles, fishes	6
7	Anthropogenic effects on animals	4

Books:

1. Mathur, H. S. (2003): Essentials of Biogeography, Pointer Publishers, Jaipur
2. Darlington, P. J. (1957): Zoogeography: the Geographical Distribution of Animals, John Wiley and Sons, New York
3. Robinson, H. (1972): Biogeography, MacDonald and Evans, London
4. Seddon, B. A. (1971): Introduction to Biogeography, Gerald Duckworth and Co., London
5. Pears, N. (1977): Basic Biogeography, Longman Group, London

Code No: Gg: 4130		Title: Advanced Surveying - Practicals
No. of Credits: 3		No. of Practicals: 15
Sr. No.	Topics	Practicals
1	Introduction to Total Station	1
2	Total Station Survey: area selection, setting up of the instrument at the base station, taking points using the reflector	2
3	Total Station data processing: download the point data, import the file into GIS, creation of shapefile and generation of Digital Elevation Model	4
4	Introduction to the principles of differential GPS (dGPS)	1
5	dGPS Survey : area selection, setting up of the instrument at the base station, taking points using rover and storing them	2
6	dGPS data processing: download the point data, import the file into GIS, creation of shapefile and generation of Digital Elevation Model	5

(Note : For 3 credits 3 hrs. practical per week)

Books:

1. Jeff, H. (1995): Differential GPS Explained, Trimble Navigation
2. Satheesh, G., Sathikumar, R. and Madhu, N. (2007): Advanced Surveying: Total Station, GIS and Remote Sensing, Pearson Education, Delhi
3. Mohinder, S. G., Lawrence, R. W. and Angus, P. A. (2001): Global Positioning Systems, Inertial Navigation and Integration, John Wiley and Sons Inc., New York
4. Lawrence, L. and Alex, L. (2008): GPS Made Easy: Using Global Positioning Systems in the Outdoors, Rocky Mountain Books, Calgary
5. Stinespring, B. M. (2000): The Experimental Evaluation of a DGPS Based Navigational System for the ARIES AUV, Monterey, California: Naval Postgraduate School; Springfield

Code No: Gg: 4131		Title: Advanced Surveying - Theory	
No. of Credits: 2		No. of Lectures: 30	
Sr. No.	Topics	Lectures	
1	Introduction to Total Station: principle and function	3	
2	Use of Total Station in topographical survey	3	
3	Application of Total Station in various fields	3	
4	Pre-planning for survey	2	
5	Introduction to differential GPS (dGPS): principle and function	4	
6	Use of dGPS in topographical survey	3	
7	Application of dGPS in various fields	3	
8	Pre-planning for dGPS survey	2	
9	Application of dGPS points in DEM generation from stereo images	4	
10	Comparison of the Total Station with dGPS in topographical surveying	3	

Books:

1. Jeff, H. (1995): Differential GPS Explained, Trimble Navigation
2. Satheesh, G., Sathikumar, R. and Madhu, N. (2007): Advanced Surveying: Total Station, GIS and Remote Sensing, Pearson Education, Delhi
3. Mohinder, S. G., Lawrence, R. W. and Angus, P. A. (2001): Global Positioning Systems, Inertial Navigation and Integration, John Wiley and Sons Inc., New York
4. Lawrence, L. and Alex, L. (2008): GPS Made Easy: Using Global Positioning Systems in the Outdoors, Rocky Mountain Books, Calgary
5. Stinespring, B. M. (2000): The Experimental Evaluation of a DGPS Based Navigational System for the ARIES AUV, Monterey, California: Naval Postgraduate School, Springfield

Code No: Gg: 4211 Title: Advance course in Remote Sensing		
No. of Credits: 3		No. of Periods: 45
Sr. No.	Topics	Lectures
1	Introduction to Advanced Remote Sensing	5
2	Microwave remote sensing	5
3	Thermal remote sensing	5
4	Hyperspectral remote sensing	5
5	Introduction to digital image and data products	3
6	Stages of digital image processing	8
7	Image processing techniques	8
8	Image classification and analysis	6

Books:

1. Drury, S. A. (2001): Image Interpretation in Geology, Blackwell, Oxford
2. Jensen, J. R. (2004): Introductory Digital Image Processing, Prentice Hall, New Jersey
3. Lillesand, T. M., Kiefer, R. W. and Chipman, J. W. (2008): Remote Sensing and Image Interpretation, John Wiley and Sons, Wiley India Pvt. Ltd., New Delhi
4. Navalgund, R. R. and Ray, S. S. (2011): Hyperspectral Data, Analysis Techniques and Applications, Indian Society of Remote Sensing, Dehradun
5. Sabins, F. F. (1996): Remote Sensing: Principles and Interpretation, W. H. Freeman and company, New York

Code No: Gg: 4212		Title: Advance course in GIS
No. of Credits: 2		No. of Periods: 30
Sr. No.	Topics	Lectures
1	Database management system	5
2	RDBMS: concepts and components	5
3	Spatial data analysis: vector based	5
4	Spatial data analysis: raster based	5
5	Recent trends in GIS	5
6	Applications of GIS	5

Books:

1. Chang, K. T. (2008): Introduction to Geographic Information Systems, Avenue of the Americas, McGraw-Hill, New York
2. Burrough, P. A. and McDonnell, R. A. (1998): Principles of Geographical Information Systems, Oxford University press Inc., New York
3. Williams, J. (1995): Geographic Information from Space: Processing and Applications of Geocoded Satellite Images, John Wiley and Sons, New York
4. DeBarry, P. A. (1999): GIS Modules and Distributed Models of the Watershed: A Report from ASCE Task Committee on GIS Modules and Distribution, ASCE
5. Environmental Systems Research Institute, Inc. (1998): Understanding GIS: The ARC/INFO Method, CA: ESRI Press, Redlands

Code No: Gg:4221		Title: Hazard Management : Natural
No. of Credits: 2		No. of Periods: 30
Sr. No.	Topics	Lectures
1	Introduction to natural hazards and disaster	2
2	Concepts in hazard management	6
3	Meteorological hazards and management	6
4	Geological hazards and management	4
5	Hydrological hazards and management	6
6	Geomorphic hazards and management	6

Books:

1. Hart, M. G. (1986): Geomorphology: Pure and Applied, George Allen and Unwin, London
2. Goudie, A. (1990): Geomorphological Techniques, Unwin Hyman, London
3. Valdiya, K. S. (1987): Environmental Geology, Tata McGraw Hill, New Delhi
4. Alexander, D. (1993): Natural Disasters, Springer, Berlin
5. Kusky, T. (2012): Encyclopedia of the Hazardous Earth, Viva Books, New Delhi

Code No: Gg: 4222		Title: Hazard Management: Manmade
No. of Credits: 3		No. of Periods: 45
Sr. No.	Topics	Lectures
1	Historical perspective of man environment interaction	3
2	Disaster management	4
3	Man induced physical hazards and management	7
4	Chemical and nuclear hazards and management	7
5	Man induced biological hazards and management	6
6	Pollution: types and mitigation	6
7	Global issues : economic recession/ crisis, socio-cultural hazards	6
8	Climate change: trends and projections, implication, mitigation and adaptation	6

Books:

1. Turk, J. (1985): Introduction to Environmental Studies, Saunders College Pub., Japan
2. Singh, S. (2000): Environmental Geography, Prayag Pustak Bhavan, Allahabad
3. Singh, S. and Singh, J. (2013): Disaster Management, Pravalika Publications, Allahabad
4. Goudie, A. S. (2013): The Human Impact on the Natural Environment, Wiley-Blackwell, Oxford

Code No: Gg: 4311 Title: Watershed Management: Concepts and Issues		
No. of Credits: 3		No. of Periods: 45
Sr. No.	Topics	Lectures
1	Watershed: concept and significance of watershed based development	2
2	Watershed characteristics : geomorphology and hydrology; drainage basin, network and channel morphology	7
3	Watershed hydrology: hydrologic cycle, water balance, climate and precipitation, soils and infiltration, interception and evapotranspiration, groundwater, streamflow and runoff, water quality, aquatic ecosystems (eutrophication, habitat disturbance, etc.)	16
4	Watershed resource appraisal: physical, hydrological, land use/cover. Land capability classification	5
5	Watershed management and planning: objectives, integrated watershed management, sustainable watershed management	2
6	Issues in water resources: point source pollution, agricultural and urban non-point source pollution, erosion, water scarcity, flooding, drinking water protection, wastewater treatment and septic systems	6
7	Soil and water conservation measures	5
8	Watershed programs: benefit-cost analysis	2

Books:

1. Murthy, J. V. S. (1994): Watershed Management in India, Wiley Eastern Ltd., New Delhi
2. Mutreja, K. N. (1990): Applied Hydrology, Tata McGraw-Hill Pub. Co. Ltd., New Delhi
3. Heathcote, I. W. (2009): Integrated Watershed Management: Principles and Practice, John Wiley and Sons, New York
4. Cech, T. V. (2003): Principles of Water Resources: History, Development, Management, and Policy, John Wiley and Sons, New York
5. Brooks, K. N., Folliott, P. F. and Magner, J. A. (2012): Hydrology and the Management of Watersheds, Wiley-Blackwell, Oxford

Code No: Gg: 4310		Title: Watershed Management: Practicals
No. of Credits: 2		No. of Practicals: 15
Sr. No.	Topics	Practicals
1	Mapping and demarcation of watershed using DEM	1
2	Morphometric analysis of watershed	2
3	Areal Precipitation : Thiessen polygon, Isohyetal methods Analysis and interpretation of rainfall data Water balance estimation	4
4	Estimation of runoff and streamflow, flow duration curve, return period, analysis and interpretation of streamflow data	2
5	Groundwater contouring and interpretation regarding movement and flow direction	2
6	Land capability classification	2
7	Soil loss estimation	2

Note: 1. The students may visit a watershed. 2. For 2 credits 2 hrs. practical per week

Books:

1. Murthy, J. V. S. (1994): Watershed Management in India, Wiley Eastern Ltd., New Delhi
2. Pranjape, S., Joy, K. J., Machado, T., Varma, A. K. and Swaminathan, S. (1998): Watershed-Based Development, Bharat Gyan Vigyan Samithi, New Delhi
3. Mutreja, K. N. (1990): Applied Hydrology, Tata McGraw-Hill Pub. Co. Ltd., New Delhi
4. Singh, R. J. (2000): Watershed Planning and Management, Yash Publishing House, Bikaner
5. Strahler, A. N. (1964): Handbook of Applied Hydrology, Ven Te Chow, Ed., Section 4-II, McGraw-Hill Book Company, New York

Code No: Gg: 4321		Title: Regional Planning: Part I
No. of Credits: 3		No. of Periods: 45
Sr. No.	Topics	Lectures
1	Nature and scope of Regional Planning	10
2	Role of geography in Regional Planning	10
3	Regional, techno-economic and diagnostic surveys	5
4	Methodology and techniques of Regional Planning	10
5	Regional development and planning strategies: Case studies from developed and developing countries	10

Books:

1. Chand, M. and Puri, V. K. (2003): Regional Planning in India, Allied Publishers Pvt. Ltd., New Delhi
2. Chandana, R. C. (2000): Regional Planning: A Comprehensive Text, Kalyani Publishers, Ludhiana
3. Friedmann, J. and Alanson, W. (1967): Regional Development and Planning: A Reader, MIT Press, New York
4. Mishra, R. P. (1992): Regional Planning, Concepts, Techniques, Policies and Case Studies, Concept Publication, New Delhi
5. Mishra, H. N. (2005): Regional Planning, Rawat Publication, Jaipur
6. Glasson, J. and Marshall, T. (2007): Regional Planning, Routledge, New York

Code No: Gg: 4322		Title: Regional Planning: Part II
No. of Credits: 2		No. of Periods: 30
Sr. No.	Topics	Lectures
1	Salient features of Indian five year plans	8
2	State, district and block level planning	6
3	Regional planning and disparities in India	8
4	Natural and cultural orientation of regional planning India	8

Books:

1. Bhat, L. S. (1973): Regional Planning in India, Statistical Publishing Society, Kolkata
2. Chand, M. and Puri, V. K. (2003): Regional Planning in India, Allied Publishers Pvt. Ltd., New Delhi
3. Chandana, R. C. (2000): Regional Planning- A Comprehensive Text, Kalyani Publisher, Ludhiana
4. Dube, K. N. (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. Mishra, R. P. (2002): Regional Planning in India- Concept Publication, New Delhi
7. Mishra, H. N. (2005): Regional Planning, Rawat Publication, Jaipur
8. India Year Book (2014): Publication Division, New Delhi

Code No: Gg: 4411		Title: Development of Geographical Thought	
No. of Credits:3		No. of Periods: 45	
Sr. No.	Topics	Lectures	
1	Geographical knowledge of the ancient world: Greek-Roman Period. Contributions of explorers	6	
2	Geography of medieval period: contributions by Arab geographers	3	
3	Contribution of modern geographers	8	
4	Dichotomy and dualism	5	
5	Conceptual development: areal differentiation, regional synthesis, locational and spatial analysis	6	
6	Quantitative revolution; radical, behavioural, human and welfare approach	4	
7	Evolutionary biology and geographical thought The political economy perspective in Human Geography	4	
8	Exploration in geography : temporal exploration, Marxist geography, radical geography, geography of gender	3	
9	Modern geographical thoughts, geography and public policy	6	

Books:

1. Arild, H. J. (1999): Geography: History and Concepts, SAGE Publications, London
2. Hussain, M. (1984): Evolution of Geographical Thought, Rawat Publications, Jaipur
3. Dikshit, R. D. (1997): Geographical Thought: Contextual History of Ideas, Prentice Halls, New Delhi
4. Chorley, R. J. (Ed): Directions in Geography, Matheun and Co., London
5. Richard, P. (1998): Modern Geographical Thought, Blackwell, Singapore
6. Warf, B. (Ed) (2006): Encyclopedia of Human Geography, SAGE Publications, New Delhi
7. Goudie, A. (Ed) (2004): Encyclopedia of Geomorphology, Routledge, London
8. Gregory, D., Johnston, R., Pratt, G., Watts, M. and Whatmore, S. (2009): The Dictionary of Human Geography, Wiley-Blackwell, Singapore

Code No: Gg: 4412 Title: Research Methodology in Geography		
No. of Credits: 2		No. of Periods: 30
Sr. No.	Topics	Lectures
1	Methods of geographical studies	2
2	Research: Definition, types (pure and applied) Classification	4
3	Routes of Explanation: inductive and deductive	3
4	Hypothesis, theories, laws and models	4
5	Research question, objectives and significance of research	3
6	Research design: data collection and analysis	4
7	Recent trends in geographical research: physical and human geography	6
8	Presentation of research findings: report writing and presentation	2
9	Scientific journals (impact factor, citation)	1
10	Ethics in scientific research	1

Books:

1. Montello, D. and Sutton, P. (2013): An Introduction to Scientific Research Methods in Geography and Environmental Studies, SAGE Publications
2. Gomez, B. and Jones, J. P. III (2010): Research Methods in Geography: A Critical Introduction, John Wiley and Sons
3. Warf, B. (Ed)(2006): Encyclopedia of Human Geography, SAGE Publications, London
4. Goudie, A. (Ed) (2004): Encyclopedia of Geomorphology, Routledge, London
5. Gregory, D., Johnston, R., Pratt, G., Watts, M. and Whatmore, S. (2009): The Dictionary of Human Geography, Wiley-Blackwell, Singapore

Code No: Gg: 4511		Title: Oceanography
No. of Credits: 3		No. of Periods: 45
Sr. No.	Topics	Lectures
1	Nature and scope	2
2	Age and origin of oceans	3
3	Morphology of major ocean bottom	6
4	Oceanic waves and tsunamis	4
5	Tides: types and theories	4
6	Ocean currents: origin and distribution	6
7	Temperature, salinity and density distribution	10
8	Marine deposits and coral reefs	5
9	Climatic and eustatic changes	5

Books:

1. Pinet, P. R. (2009): Invitation to Oceanography, Jones and Bartlett Publishers, Boston
2. Gross, G. M. (1990): Oceanography, Macmillan Publication, New York
3. Garrison, T. (1993): Oceanography – An Invitation to Marine Science, Wadsworth Publication Co., California
4. Stowe, K. S. (1979): Ocean Science, John Wiley and Sons, New York
5. Thurman, H. V. and Trujillo, A. P. (1997): Introductory Oceanography, Prentice Hall, New Jersey
6. Joseph, W. S. and Parish, H. I. (1974): Introductory Oceanography, McGraw Hill, Tokyo

Code No: Gg: 4512		Title: Geography of Soils
No. of Credits: 2		No. of Periods: 30
Sr. No.	Topics	Lectures
1	Introduction to soil geography, origin, soil profile and soil taxonomy	4
2	Weathering and soils, soil forming processes and factors	5
3	Physical properties of soil : texture, structure, moisture, colour, porosity and permeability	7
4	Chemical properties of soils, soil clays, cation exchange, humus, organic matter, pH and NPK	7
5	Classification of tropical soils, soil types: zonal, azonal and intrazonal	4
6	Soils and environmental problems	3

Books:

1. Miller, R. W. and Donahue, R. L. (1992): Soils: An Introduction to Soils and Plant Growth, Prentice-Hall of India, New Delhi
2. Brady, N. C., and Weil, R. R. (2008): The Nature and Properties of Soils, Prentice Hall, New Jersey
3. Pitty, A. F. (1978): Geography and Soil Properties, Methuen and Co., London
4. Bridges, E. M. and Davidson, D. A. (1982): Principles and Applications of Soil Geography, Longman Group, London
5. Daji, J. A. (1970): A Textbook of Soil Science, Asia Publication House, New York
6. Birkeland, P. W (1999): Soils and Geomorphology, Oxford University Press, New York

Code No: Gg: 4521		Title: Political Geography
No. of Credits: 3		No. of Periods: 45
Sr. No.	Topics	Lectures
1	Definition, nature, scope and approaches	4
2	Concepts in Political Geography	5
3	State, nation and nation-state	4
4	Frontiers and boundaries	4
5	Global strategic views	6
6	Electoral studies in Political Geography	8
7	Geographical basis of Indian federalism; emergence of new states; international boundary of India and related issues	8
8	Water dispute in India : interstate and international	6

Books:

1. Adhikari, S. (1997): Political Geography, Rawat Publications, Jaipur
2. Dikshit, R. D. (1994): Political Geography, Tata McGraw Hill Publication, New Delhi
3. Glassner, M. L., De Blij, H. J. and Yacher, L. (1980): Systematic Political Geography, John Wiley
4. Cox, K. (2002): Political Geography: Territory, State and Society, Wiley-Blackwell
5. John, R. S. (2002): An introduction to Political Geography, Taylor & Francis

Code No: Gg: 4522		Title: Geography of Health
No. of Credits: 2		No. of Periods: 30
Sr. No.	Topics	Lectures
1	Introduction, definition, development and significance Dualism between Medical and Health Geography	5
2	Human ecology of disease Landscape epidemiological approaches Social and spatial epidemiological perspectives Health transition	10
3	Geographical perspective on health care provisions in developed and developing countries Spatial aspects of health care planning	6
4	Indian health care delivery system: public and private sectors, reproductive and child health, millennium development goals	5
5	Climate change and public health, adaptation and mitigation	4

Books:

1. Hazra, J. (Ed.) (1997): Health Care Planning in Developing Countries, University of Calcutta, Calcutta
2. May, J. M. (1959): Ecology of Human Diseases, M.D. Publications, New York
3. Philips, D. R. (1990): Health and Health Care in Third world, Longman, London
4. Stamp, L. D. (1964): Geography of Life and Death, Cornell University, Ithaca
5. Curtis, S. (2004): Health and Inequality: Geographical Perspectives, Sage Publications, London
6. Brown, T., McLafferty, S., Moon, G. (2010): A Companion to Health and Medical Geography, Wiley Blackwell, UK
7. Pati, B. and Harrison, M. (2009): The Social History of Health and Medicine in Colonial India, Routledge, London

Code No: Gg: 4531		Title: Dissertation
No. of Credits: 5		
Sr. No.	Topics to be covered	
1	Introduction to the problem and study area, literature review	
2	Methodology	
3	Results	
4	Conclusions	
5	References	

Books:

1. Flowerdew, R. and Martin, D. (2005): *Methods in Human Geography: A Guide for Students Doing a Research Project*, Prentice Hall, Harlow
2. Gomez, B. and Jones, J. P. (eds) (2010): *Research Methods in Geography: A Critical Introduction*, Wiley-Blackwell, Chichester
3. Hay, I. (2012): *Communicating in Geography and the Environmental Sciences*, Oxford
4. Kitchin, R. and Tate, N. J. (2000): *Conducting Research in Human Geography: Theory, Methodology and Practice*, Pearson, Harlow
5. Montello, D. R. and Sutton, P. C. (2013): *An Introduction to Scientific Research Methods in Geography and Environmental Studies*, SAGE, London
6. Parsons, A. J. and Knight, P. G. (2005): *How to Do Your Dissertation in Geography and Related Disciplines*, Routledge, Abingdon