SAVITRIBAI PHULE PUNE UNIVERSITY, PUNE

(Formerly University of Pune)

Two Year Post Graduate Programme in Geography

(Faculty of Science and Technology)

Choice Based Credit System (CBCS)

Syllabi for

M. A. / M. Sc. Geography (Second Year)

(Semester III & IV)

(For Affiliated Colleges to Savitribai Phule Pune University)

Syllabus as per the guidelines of National Education Policy 2020

Second-year syllabi to be implemented from Academic Year 2024-2025

SAVITRIBAI PHULE PUNE UNIVERSITY, PUNE

Syllabi as per NEP 2020 for

M.A. / M.Sc. (Geography) Part–I (CBCS)

(For Affiliated Colleges to Savitribai Phule Pune University)

Two Year - IV Semester award PG Degree on completion of 88 credits

or

One Year - PG Degree (44 credits) after Four Year UG Degree (UG Honors)

M. A./ M. Sc. Geography

Semester I

Level	Semester	Group	Course Code	Course Name	Credits		Total Credits
					T	P	
6.0	First Semester	**Major Core**	GEO 501 MJ	Principles of Geomorphology	02	--	02
			GEO 502 MJ	Principles of Climatology	02	--	02
			GEO 503 MJ	Principles of Economic Geography	02	--	02
			GEO 504 MJ	Principles of Population and Settlement Geography	02	--	02
			GEO 505 MJ	Introduction to Statistical Methods in Geography	02	--	02
			GEO 506 MJP	Practicals in Physical Geography	--	02	02
			GEO 507 MJP	Practicals in Human Geography	--	02	02
				Total credits related to Major Core	**10**	**04**	**14**
		Major Elective (Select any one group)		**Group A**			
			GEO 510 MJ	Introduction to Geographic Information System	02	--	02
			GEO 511 MJP	Practicals in Geographic Information Systems	--	02	02
				Group B			
			GEO 512 MJ	Tourism Management	02	--	02
			GEO 513 MJP	Practicals in Tourism Management	--	02	02
				Group C			
			GEO 514 MJ	Geography of Soil	02	--	02
			GEO 515 MJP	Practicals in Soil Analysis	--	02	02
				Total Credits related to Major Electives	**02**	**02**	**04**
		Research Methodology	GEO 531 RM	Research Methodology	**04**	--	**04**
				Semester I- Total Credits	**16**	**06**	**22**

Vertical Group (Semester - I)	Credit for Theory	Credit for Practical	Total Credit
Total Credits related to Major Core	10	04	**14**
Total Credits related to Major Electives	02	02	**04**
Research Methodology	04	--	**04**
Total Credits	**16**	**06**	**22**

Savitribai Phule Pune University, Pune

M.A. / M. Sc. Syllabus in Geography (as per NEP 2020)

Syllabus (from June, 2023)

M. A./M. Sc. Geography

Semester II

Level	Semester	Group	Course Code	Course Name	Credits		Total Credits
					T	P	
6.0	Second Semester	**Major Core**	GEO 551 MJ	**Core Special–1 (Theory)** **(Select any one as per specialization from following)** A. Fluvial Geomorphology B. Synoptic Climatology C. Agricultural Geography D. Population Geography	04	--	04
			GEO 552 MJP	**Core Special– 1 (Practical)** **(Select any one as per specialization from following)** A. Practicals in Fluvial Geomorphology B. Practicals in Synoptic Climatology C. Practicals in Agricultural Geography D. Practicals in Population Geography	--	02	02
			GEO 553 MJ	Geographical Thought	02	--	02
			GEO 554 MJ	**Core Special – 2 (Theory)** **(Select any one as per specialization from following)** A. Coastal Geomorphology B. Agro-Meteorology C. Geography of Development D. Geography of Rural Settlement	04	--	04
			GEO 555 MJP	**Core Special - 2 (Practical)** **(Select any one as per specialization from following)** A. Practicals in Coastal Geomorphology B. Practicals in Agro-Meteorology C. Practicals in Geography of Development D. Practicals in Geography of Rural Settlement	---	02	02
				Total credits related to Major Core	**10**	**04**	**14**

		Major Elective (Select any one group)	**Group A**				
			GEO 560 MJ	Introduction to Remote Sensing	02	--	02
			GEO 561 MJP	Practicals in Remote Sensing	--	02	02
			Group B				
			GEO 562 MJ	Geography of India	02	--	02
			GEO 563 MJP	Practicals in Surveying	--	02	02
			Group C				
			GEO 564 MJ	Political Geography	02	--	02
			GEO 565 MJP	Practicals in Digital Cartography	--	02	02
			Total Credits Related to Major Electives		**02**	**02**	**04**
		On Job Training / Field Project	GEO 581 OJT	**On Job Training** (Student should complete on job training not less than 60 clock hours) **OR**			**04**
			GEO 582 FP	**Field Project**			**04**
			Sem. II Total Credits=Major Core + Major Elective + OJT/FP		**12**	**06**	**22**

Vertical Group (Semester - II)	**Credit for Theory**	**Credit for Practical**	**Total Credit**
Total Credits related to Major Core	10	04	**14**
Total Credits Related to Major Electives	02	02	**04**
On-Job Training / Field Project	--	--	**04**
Total Credits	**12**	**06 + 04**	**22**

SAVITRIBAI PHULE PUNE UNIVERSITY, PUNE

Syllabi as per NEP 2020 for

M.A. / M.Sc. (Geography) Second Year

Choice Based Credit System (CBCS)

(For Affiliated Colleges to Savitribai Phule Pune University)

Two Year, IV Semester award PG Degree on completion of 88 credits

or

One Year -PG Degree (44 credits) after Four Year UG Degree (UG Honors)

M. A./ M. Sc. Geography (Semester III)

Level	Semester	Group	Course Code	Course Name	Credits		Total Credits
					T	P	
6.5	Third Semester	**Major Core**	GEO 601 MJ	**Core Special–3 (Theory)** **(Select anyone as per specialization from the following)** A. Tropical Geomorphology B. Monsoon Climatology C. Geography of Development II D. Urban Geography	04	--	04
			GEO 602 MJP	**Core Special– 3 (Practical)** **(Select anyone as per specialization from the following)** A. Practicals in Tropical Geomorphology B. Practicals in Monsoon Climatology C. Practicals in Geography of Development- II D. Practicals in Urban Geography	--	02	02
			GEO 603 MJ	Watershed Management	02	--	02
			GEO 604 MJ	**Core Special – 4 (Theory)** **(Select anyone as per specialization from the following)** A. Applied Geomorphology B. Applied Climatology C. Advances in Economic Geography D. Geography of Migration	04	--	04
			GEO 605 MJP	**Special Paper - 4 (Practical)** **(Select anyone as per specialization from the following)** A. Practicals in Applied Geomorphology B. Practicals in Applied Climatology C. Practicals in Advances in Economic Geography D. Practicals in Geography of Migration	--	02	02

			Total Credits related to Major Core		**10**	**04**	**14**
		Major Elective (Select any one group)	**Group A**				
			GEO 610 MJ	Advances in Geoinformatics	02	--	02
			GEO 611 MJP	Practicals in Geoinformatics	--	02	02
			Group B				
			GEO 612 MJ	Geography of Resource Management	02	--	02
			GEO 613 MJP	Practicals in Resource Management	--	02	02
			Group C				
			GEO 614 MJ	Regional Planning and Development	02	--	02
			GEO 615 MJP	Quantitative Techniques in Geography	--	02	02
			Total Credits related to Major Electives		**02**	**02**	**04**
		Research Project	GEO 631 RP	Research Project – I (RP)		**04**	**04**
			Sem. III- Total Credits=Major Core+ Major Elective + RP		**12**	**10**	**22**

Vertical Group (Semester - III)	**Credit for Theory**	**Credit for Practical**	**Total Credit**
Total Credits related to Major Core	10	04	**14**
Total Credits related to Major Electives	02	02	**04**
Research Project		**04**	**04**
Total Credits	**12**	**10**	**22**

SAVITRIBAI PHULE PUNE UNIVERSITY, PUNE

Syllabi as per NEP 2020 for

M.A. / M.Sc. (Geography) Second Year, Sem. IV

M. A. /M. Sc. Geography Semester IV

Level	Semester	Group	Course Code	Course Name	Credits		Total Credits
					T	P	
6.5	Fourth Semester	**Major Core**	GEO 651 MJ	Social and Cultural Geography	04	--	04
			GEO 652 MJ	Geography of Disaster Management	04	--	04
			GEO 653 MJP	Practical in Watershed Management	--	02	02
			GEO 654 MJP	Interpretation of Topographical Maps	--	02	02
			Total credit related to Major Core		**08**	**04**	**12**
		Major Elective (Select any one group)	**Group A**				
			GEO 660 MJ	Advance Surveying	02	--	02
			GEO 661 MJP	Practicals in Advance Surveying	--	02	02
			Group B				
			GEO 662 MJ	Geography of Maharashtra	02	--	02
			GEO 663 MJP	Practicals in Gender Analysis	--	02	02
			Group C				
			GEO 664 MJ	Environmental Laws	02	--	02
			GEO 665 MJP	Practicals in Water Quality Analysis	--	02	02
			Total Credits related to Major Electives		**02**	**02**	**04**
		Research Project	GEO 681 RP	Research Project - II			**06**
			Sem. IV Total Credits =Major Core + Major Elective + RP		**10**	**06**	**22**

Vertical Group (Semester - IV)	Credit for Theory	Credit for Practical	Total Credit
Total Credits related to Major Core	08	04	**12**
Total Credits related to Major Electives	02	02	**04**
Research Project		06	**06**
Total Credits	**10**	**06+06**	**22**

M. A. / M. Sc. Geography-II (Semester -III)

GEO 601 MJ (A): Tropical Geomorphology

Core Special – 3 (Theory)

Year	Semester	Group Vertical (V)	Course Type	Course and Course Code	Course Title	Total Credits	No. of Periods (01 Clock hrs. lecture)	Total lectures per week
II	III	Major Core	Theory	GEO 601 MJ (A)	Tropical Geomorphology	04	60	04

Objectives of the Course:

i. To understand unique processes and landforms found in tropical regions.

ii. To explore the interactions between geological, climatological, hydrological, and biological factors that influence landscape evolution in tropical environments.

iii. To examine the significance of tropical geomorphology in addressing contemporary issues like natural hazard management, environmental conservation, and sustainable development in tropical regions.

iv. To integrate interdisciplinary perspectives from geology, geography, ecology, climatology, and anthropology to comprehend the complexities of tropical landscapes and their evolution over time.

v. To investigate the role of tectonics, weathering, erosion, and sedimentation in shaping tropical landforms and landscapes.

Topic No.	Topic Name	Sub Topic	No. of Periods
1.	Introduction to Tropics	i. Introduction to tropical environment ii. Peculiarities of tropical climate iii. Classification of Tropics iv. Morphogenetic regions - Temperature, rainfall, humidity, vegetation	06
2.	Tropical Weathering	i. Factors influencing the weathering - climatic, geomorphic, biotic, geologic, chronological, and site factors ii. Solubility and mobility of minerals in tropics iii. Weathering profile: Deep weathering profiles - nature, development and distribution iv. Tropical soils: Process of soil formation in tropics, clay minerals	12
3.	Duricrusts and Laterites	i. Introduction to Duricrusts and Laterites ii. Indurated laterites - Properties and world distribution iii. Classification by site, morphology and chronology iv. A complete account of various division of lateritic profile	10

		v. Landform development on laterites vi. Distribution of laterites in India vii. Theories of origin of iron in laterites	
4.	Denudation in Tropics	i. Mass movement: Types and processes ii. Slope wash iii. Process of chemical denudation iv. Tropical rivers - process of erosion and deposition	08
5.	Tropical Landscape	i. Tropical terrain – Relief characteristics ii. Slope and valley forms iii. Domed and boulder inselbergs iv. Hillslopes and pediments v. Tropical coasts	08
6.	Tropical Planation	i. Formation and types of planation surfaces ii. Morphology of planation surfaces iii. Peneplains, Pediplains, Etchplains iv. Double surface of planation	08
7.	Landform Development in the Tropics	i. Role of tectonics and climatic change ii. Nature of changes during Quaternary in climate and vegetation	08
		Total	**60**

Course Outcomes:

By the end of the course, students will be able to -

COs 1: Understand the unique Geomorphological processes and landforms found in tropical regions.

COs 2: Develop the ability to analyze and interpret tropical landscapes, recognizing the interplay between various Geomorphological processes and their effects on landforms.

COs 3: Identify and analyze Geomorphological challenges specific to tropical regions.

COs 4: Explain the various concepts of tropical environment and landform. development in tropical regions with its processes.

COs 5: Explain the interdisciplinary nature of tropical Geomorphology.

Reference:

1. Andrew Goudie, (1985): Duricrusts in tropical and subtropical landscapes, Allen Unwin, London.
2. Andrew Goudie, (1987): Environmental change.
3. Budel J. (1982) Climatic geomorphology, Princeton University Press.
4. Douglas j. & Spencer, (1985): Environmental change & Tropical geomorphology, George Allen & Unwin.
5. Feniran A. 7 Jeje L.K. (1983): Humid tropical geomorphology
6. Gupta, A. (2011). Tropical Geomorphology. London: Cambridge University Press.
7. Joshi, V. (2022). An Introduction to Tropical Geomorphology, Mangalam Publications, Delhi.
8. Thomas, M. F. (1994): Geomorphology in the Tropics, John Wiley and Sons, Chichester
9. Thomas M.F. (1974): Tropical geomorphology, McMillan, London.
10. Tricart J. (1972): Landforms of the humid tropics, forests and Savanna, Longman, London.

M. A. / M. Sc. Geography-II (Semester -III)

GEO 601 MJ (B): Monsoon Climatology

Core Special – 3 (Theory)

Year	Semester	Group Vertical (V)	Course Type	Course and Course Code	Course Title	Total Credits	No. of Periods (01 Clock hrs. lecture)	Total lectures per week
II	III	Major Core	Theory	GEO 601 MJ (B)	Monsoon Climatology	04	60	04

Objectives of the Course:

1. To understand the basic concepts of monsoon rainfall and monsoon climatology of India.
2. To realize ubiquitous importance of monsoon rainfall in India
3. To recognize the origin and variability of monsoon.
4. To study the inter-seasonal and inter-annual variations of Indian monsoon.
5. To acquire knowledge of important monsoon forecasting systems.

Topic No.	Topic Name	Sub Topic	No. of Periods
1.	Significance of Monsoon	i. Introduction and scope ofmonsoon climatology ii. History of Monsoon Climatology iii. Economic importance of monsoon rainfall in India	08
2.	Origin of Monsoon	i. Different concepts of origin of Monsoon –Thermal concept, Flohn's concept, Aerological concept ii. The Asian Monsoon: East and South AsianMonsoon iii. Classical Theory of Indian Monsoon iv. Tibetan Plateau and Monsoon	12
3.	Monsoon Models	i. Driving mechanism of Monsoon ii. Monsoon on non-rotating and rotating Earth iii. Realistic Monsoon Model	08
4.	Monsoon Climatology	i. Normal temperature, wind and pressure ii. Dates of onset and withdrawal of monsoon rainfall in India iii. Semi-permanent systems- heat low, monsoon trough iv. Easterly Jet, Tibetan High	12
5.	Variation of Monsoon	**Intra-seasonalvariation:** i. Active and break period, depressions,trough of low Pressure ii. Mid-tropospheric disturbances, offshore andonshore vortices iii. Effect of topography	12

		Interannual variation: i. Meteorological Teleconnections: El NiñoSouthern Oscillation (ENSO) ii. Indian Ocean Dipole (IOD) iii. North Atlantic Oscillation (NAO) iv. Walker Circulation	
6.	Forecasting of Monsoon	i. Different time scales ii. Factors for forecasting iii. Power regression and parametric model iv. Current monsoon forecasting system of IndiaMeteorological Department v. MONEX and IIOE	08
		Total	**60**

Course Outcomes:

By the completion of the course, students will be able to;

COs 1: Understand the basic concepts of monsoon and monsoon climatology of India.

COs 2: Discuss the widespread importance of monsoon in India.

COs 3: Explain the origin and variability of monsoon.

COs 4: Understand inter-seasonal and inter-annual variations of Indian monsoon.

COs 5: Applying the knowledge of forecasting systems.

Reference Books:

1. Das, P.K. (1991): Monsoons, National Book Trust, New Delhi.
2. Fein, J.S. and Stephens, P.L. (1987): Monsoons, John Wiley
3. and Sons, New York.
4. Keshavmurty, K. N. (1992): The Physics of Monsoons, Allied Publishers Limited, New Delhi.
5. Pant, G.B. and Rupa Kumar, K. (1997): Climates of South Asia, John Wiley and sons, ltd, Chichester.
6. Rao, Y.P. (1976): Meteorological Monograph, Meteorology No. 1/1976, Southwest Monsoon,India Meteorological Department.
7. Tyagi Ajit, Asnani G. C., De U.S., Hatwar H.R., Mazumdar A.B. (2012): Monsoon Monograph Vol-1, India Meteorological Department.
8. Tyagi Ajit, Asnani G. C., De U.S., Hatwar H.R., Mazumdar A.B. (2012): Monsoon Monograph Vol-2, India Meteorological Department.
9. Katiyar Vidya Sagar (1990): The Indian monsoon and its frontiers: Inter-India Publications, 1990, The University of California
10. Kelkar, R. R. (2009): Monsoon Prediction, B S Publications Hyderabad.
11. Clift, Peter D and Plumb, Alan (2008): The Asian Monsoon: Causes history and effects. Cambridge University Press.

M. A. / M. Sc. Geography-II (Semester -III)

GEO 601 MJ (C): Geography of Development II

Core Special – 3 (Theory)

Year	Semester	Group Vertical (V)	Course Type	Course and Course Code	Course Title	Total Credits	No. of Periods (01 Clock hrs. lecture)	Total lectures per week
II	III	Major Core	Theory	GEO 601 MJ (C)	Geography of Development II	04	60	04

Objectives of the Course:

1. To familiarize the students with the concepts of various aspects of development sectors.
2. To analyze the causes of unequal development across regions, considering historical, political, geographical, and socio-economic factors.
3. To explore the concept of sustainable development and the role of international organizations in promoting it.
4. To evaluate Indian government policies for development across various sectors.
5. To understand the challenges in global economic development.

Topic No.	Topic Name	Sub Topic	No. of Periods
1.	Geographies of Inequities and Uneven Development	i. The World Bank classification of countries based on level of development (per capita income) ii. Causes of unequal development- Historical, Political, Geographical and Socio-economic iii. The Third World: Role of biophysical factors in creating disparities between the first and third worlds	12
2.	Development and Globalization	i. Impact of Industrialisation ii. Investment in Transportation and Communication iii. Impact of Globalization on Employment and resources, iv. Relationships and Trade v. Types of employment (sector-wise) vi. Trade for economies	12
3.	Sustainable Development	i. Role of United Nations in the development of worldwide nations ii. Sustainable Development Goals formed by UNO iii. Innovations in the energy sector for Sustainable Development iv. Investment in Renewable Energy Resources Development	12

4.	Resources Management Trends for development	i. Self-reliance policy of development with special reference to India ii. Need of renewable energy resources development iii. Development trends in human resource management iv. Strategies for Managing Resources	12
5.	Indian Government Policies for Development	i. Government policies in Agriculture development ii. Government policies in Industrial development iii. Government policies in Service Sector development iv. Trade development policies v. Challenges in the Global Economic Development	12

Course Outcome:

By the completion of the course, students will be able to:

COs 1: Identify and assess the impact of globalization on various aspects of development including employment, resources, trade, and types of employment sectors.

COs 2: Understand the principles and goals of sustainable development as outlined by the United Nations and evaluate innovations in energy sectors for achieving sustainability.

COs 3: Grasp the importance of resource management in development.

COs 4: Identify the need for sustainable development in every field of humanities.

COs 5: Recognize and appreciate the significance of government bodies' decisions in national development initiatives.

Reference Books:

1. Chander, Y. S. (2010): Developmental Geography and Economic Theory, Swastik Publications India
2. Chenery, H. B., Behrman, J., & Srinivasan, T. N. (Eds.). (1988). Handbook of development economics. Elsevier.
3. Gillis, M., Perkins, D. H., Roemer, M., & Snodgrass, D. R. (1992). Economics of Development (3rd Edtion), W.W. Norton, New York
4. Magdoff, F., & Tokar, B. (2010). Agriculture and food in crisis: Conflict, resistance, and renewal. NYU Press.
5. Mishra, R. S. (1975): Economics of Growth and Development, Somaiya Publication Pvt. Ltd.
6. Morris, A. (2005). Geography and development. Routledge.
7. Porter, P. W., & Faust, D. R. (2009). A world of difference: Encountering and contesting development. Guilford Press.
8. Potter, R. B., Binns, T., & Elliott, J. A. (2008). Geographies of development: An introduction to development studies. Pearson Education.
9. Sachs, J. D. (2012). From millennium development goals to sustainable development goals. The lancet, 379(9832), 2206-2211.

M. A. / M. Sc. Geography-II (Semester -III)

GEO 601 MJ (D): Urban Geography

Core Special – 3 (Theory)

Year	Semester	Group Vertical (V)	Course Type	Course and Course Code	Course Title	Total Credits	No. of Periods (01 Clock hrs. lecture)	Total lectures per week
II	III	Major Core	Theory	GEO 601 MJ (D)	Urban Geography	04	60	04

Objectives of the Course:

i. To familiarize students with the nature and scope of urban geography

ii. To learn about Urbanization in India

iii. To provide knowledge about urban classification and characteristics of urban population.

iv. To understand the morphology and hierarchy in the urban system.

v. To know about contemporary urban issues and policy.

Topic No.	Topic Name	Sub Topic	No. of Periods
1	Introduction to Urban Geography	i) Concepts, Nature and Scope of Urban Geography ii) Approaches of Urban Geography iii)Development of urban geography	06
2	Urbanization	i) Definition of urbanization ii) Factors affecting on urbanization iii) Brief review of spatial-temporal variations in urbanization in the world iv)Patterns and trends of urbanization in India	08
3	Urban classification and characteristics of Urban Population	i) Criteria used for classification ii) Functional classification of towns and cities iii) Growth of the urban population iv) Density of population in cities v) Age, Sex and occupational structure	10
4	Urban Morphology	Models of Urban Structure i) Concentric zone model by Park and Burgess ii) Sector model by Homer Hoyt	08
5	Central Place	i) Christaller's Central Place Theory ii) Hierarchy of Urban Settlements	08

6	Contemporary Urban Issues	i) Price of land and vertical and horizontal growth of cities ii) Scarcity of housing and growth of slums iii) Problems of civic amenities iv) Urban transport problem v) Urban Environmental pollution vi) Solid waste management	08
7	Urban Planning	i) History and origins of urban planning ii) Pioneers of urban planning iii) Types of urban plans iv) Concepts: New towns, neighborhood, garden city, green belts; healthy urban planning, WHO concept of healthy city, livable city, sustainable city.	06
8	Urban Policy	i) Urban policy since independence (five-year plans) ii) Importance of urban plans iii) Concepts: Smart Cities Mission; HRIDAY, AMRUT, PURA, RURBAN mission	06

Course Outcome:

By the completion of the course, students will be able to;

COs 1: Understand the concept of urbanization, classification and characteristics of the Urban Population

COs 2: Acquire knowledge of urban morphology and central place

COs 3: Map out the problems in urban settlements

COs 4: project or draw structure to learn urban planning and development

Reference Books:

1. Bhattacharya: Urban Development in India, Shree publication
2. Brian, R.K. (1996): Landscape of Settlement Prehistory to present, Routledge, London
3. Careter (1972): Fourth edition: The study of Urban Geography, Arnold, London
4. Gadakh B.L. & Jaybhaye R. G. (2017): Urban Sprawl Analysis of Nashik City, Scholar press
5. Hall P. (1992): Urban and Regional Planning, Routedge, London
6. K. Siddharth and S. Mukherji: Cities, Urbanization and Urban Systems
7. Kundu, A. (1992): Urban Development and Urban Research in India, Khanna Publication
8. Mayer and Kohan: Readings in Geography
9. Northam: Urban Geography
10. Roy Turner: Indian's Urban Future
11. R.B Mandal-V.G A Textbook (Concept publishing Company
12. Shah Manzooor Alam: Urbanization in Developing Countries

13. Singh. K. and Steinberg. F. (eds)(1998): Urban India in Crisis. New Age Interns

14. Urban Geography: Tim Hall

15. Verma: Urban Geography, Rawat, Jaipur

16. Chand, M and V.K. Puri, (1983), Regional Planning in India, New Delhi, Allied.

17. Hall, P, (1992), Urban and Regional Planning, Third Editions, London, Routledge.

18. Nyerges, Timothy L. and, Jankowski Piotr (2010): Regional and Urban GIS: A Decision Support Approach, Rawat Publication, Jaipur.

M. A. / M. Sc. Geography-II (Semester -III)

GEO 602 MJP (A): Practicals in Tropical Geomorphology

Core Special – 3 (Practical)

Year	Semester	Group Vertical (V)	Course Type	Course and Course Code	Course Title	Total Credits	No. of Practicals *(each Practicals of 02 clock hours)*	Total Practicals per week (04 clock hours)
II	III	Major Core	Practical	GEO 602 MJP (A)	Practicals in Tropical Geomorphology	02	30	02

Objectives of the Course:

1. To understand tropical weathering through Bowen's & Golditch's Weathering Reaction Series.
2. To provide an overview of clay mineralogy, including important clay minerals and their properties
3. To explain the Universal Soil Loss Equation (USLE) and Miall's Lithocode.
4. To gain a comprehensive understanding of landscapes, weathering profiles, laterite profiles, and lithosections through field studies.
5. To collect the soil samples along slopes to analyze soil characteristics and understand slope dynamics.

Topic No.	Topic Name	Sub Topic	No. of Practicals
1	Weathering in Tropics	i. Bowen's and Golditch's Weathering Reaction Series ii. Calculation and Interpretations of Chemical Weathering Indices	06
2	Minerals	i. Listing of Important Clay Minerals and their Properties	06
3	Soil/Sediment	i. Sediment in Sections (Miall's Lithocode)	06
4	Field Survey	i. Field Study of Landscapes, Weathering Profiles, Laterite Profiles and Lithosections ii. Collection of soil samples along the slope	06
5	Laboratory work	Textural Analysis of the Sediments Collected During the Field Trip (Soil/Sediment analysis) i. Analysis of 1 Sandy and 1 Clayey sample ii. Plotting of data on probability graph paper and iii. Estimation of grain size parameters iv. Interpretation of results	06

Course Outcome:

By the completion of the course, students will be able to;

COs 1: Students will understand the unique weathering processes prevalent in tropical environments.

COs 2: Students will understand clay mineralogy, including the identification and characterization of important clay minerals and their properties.

COs 3: Students will be utilizing the Universal Soil Loss Equation (USLE) to predict soil erosion rates and apply Miall's Lithocode to interpret sedimentary sequences.

COs 4: Students will be acquiring practical skills in conducting field studies to observe landscapes, weathering profiles, laterite profiles, and lithosections.

COs 5: Students will be analyzing Soil/Sediment samples and plot the data with interpretation.

Reference Books:

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

M. A. / M. Sc. Geography-II (Semester -III)

GEO 602 MJP (B): Practicals in Monsoon Climatology

Core Special – 3 (Practical)

Year	Semester	Group Vertical (V)	Course Type	Course and Course Code	Course Title	Total Credits	No. of Practicals *(each Practicals of 02 clock hours)*	Total Practicals per week (04 clock hours)
II	III	Major Core	Practical	GEO 602 MJP (B)	Practicals in Monsoon Climatology	02	30	02

Objectives of the Course:

1. To familiarize students with IMD weather maps.
2. To develop capacity to interpret weather map.
3. To develop skills of weather map preparation.
4. To train students for weather data collection and report writing.

Topic No.	Topic Name	Sub Topic	No. of Practicals
1	Weather Map and Weather Map Reading	i. Introduction to IMD weather map ii. Introduction and drawing of weather map signs and symbols iii. Preparation of report about the monsoon activity during a particular week with respect to Temperature, Rainfall and Wind (Min. two reports)	08
2	Preparation of Weather Parameter	i. Preparation of temperature distribution map ii. Preparation of atmospheric pressure distribution map iii. Preparation of rainfall distribution map	06
3	Analysis of Upper Air Data	Tephigram: Computation of total precipitable water and various meteorological parameters	08
4	Field Work and Report Writing	Visit a nearby weather station and report writing	08

Course Outcome:

By the completion of the course, students will be able to:

COs 1: Understand the components of IMD weather maps.

COs 2: Critically analyze and interpret the weather maps.

COs 3: Expertise in weather map preparation.

COs 4: Acquire the skills of weather data collection and report writing.

Reference Books:

1. Daily and weekly weather reports of India Meteorological Department.
2. Kelkar, R. R. (2015), Monsoon prediction – B. S. Publication, Hyderabad.
3. Das, P. K. (1995), The Monsoon, National Book Trust, New Delhi.
4. Fein, J. S. and Stephens, P. N. (1987), Monsoons, Wiley Inter Science,
5. India Meteorological Department (1968): Climatological Tables of observatories in India, Government of India.
6. Tyagi Ajit, Asnani G. C., De U.S., Hatwar H.R., Mazumdar A.B. (2012): Monsoon Monograph Vol-1, India Meteorological Department.
7. Tyagi Ajit, Asnani G. C., De U.S., Hatwar H.R., Mazumdar A.B. (2012): Monsoon Monograph Vol-2, India Meteorological Department.

M. A. / M. Sc. Geography-II (Semester -III)

GEO 602 MJP (C): Practicals in Geography of Development II

Core Special – 3 (Practical)

Year	Semester	Group Vertical (V)	Course Type	Course and Course Code	Course Title	Total Credits	No. of Practicals *(each Practicals of 02 clock hours)*	Total Practicals per week (04 clock hours)
II	III	Major Core	Practical	GEO 602 MJP (C)	Practicals in Geography of Development II	02	30	02

Objectives of the Course:

1. To equip students with practical skills in interpreting various quantitative indices commonly used in development geography.
2. To analyze and compare various indices of human development to understand the multidimensional nature of development and its implications for societal well-being.
3. To enable students to analyze regional development disparities and income inequality using relevant indices and understand their implications for socio-economic development.
4. To acquaint students with the various measures of transport network.

Topic No.	Topic Name	Sub Topic	No. of Practicals
1	Mapping and Interpretation of Social Perspective	i) Index of Dissimilarity ii) Index of Development by Kendall's Method iii) Population potential using Gravity Model.	5
2	Indices of Human Development	i) Gender Inequality Index (GII) ii) Multidimensional Poverty Index (MPI) iii) Education Index, Health Index, iv) Gender Development Index (GDI) v) Environmental Sustainability Index (ESI)	10
3	Indices for Regional Development	i) Regional Development Disparities Index ii) Gini Coefficient for Income Inequality iii) Environmental Quality Index iv) Trade Volume Index (TVI) v) Logistics Performance Index (LPI)	10
4	Social Development Index	i) Detour Index ii) Network Density iii) Pi Index iv) Eta Index v) Theta Index	5

Course Outcome:

By the completion of the course, students will be able to:

COs 1: Understand the interpretation of social perspectives.

COs 2: Understand the key indices such as HDI, GDI, and MPI

COs 3: Applying regional development indices for analysis of development.

COs 4: Assess the performance of transport networks using measures of regional connectivity and development.

Reference Books:

1. Alkire, S., Roche, J. M., Ballon, P., Foster, J., Santos, M. E., & Seth, S.(2015). Multidimensional poverty measurement and analysis. Oxford University Press, USA.
2. Arlinghaus, S. L., Arlinghaus, W. C., & Harary, F. (2002). Graph theory and geography: An interactive view (eBook). John Wiley and Sons, Wiley-Interscience Series in Discrete Mathematics and Optimization, http://www. wiley. com/.
3. Kansky, K. J. (1963). Structure of transportation networks: relationships between network geometry and regional characteristics. The University of Chicago.
4. Lindsay, J. (2006). Techniques in human geography. Routledge.
5. Stimson, R. J., Stough, R. R., & Roberts, B. H. (2006). Regional economic development: analysis and planning strategy. Springer Science & Business Media.

M. A. / M. Sc. Geography-II (Semester -III)

GEO 602 MJP (D): Practicals in Urban Geography

Core Special – 3 (Practical)

Year	Semester	Group Vertical (V)	Course Type	Course and Course Code	Course Title	Total Credits	No. of Practicals *(each Practicals of 02 clock hours)*	Total Practicals per week (04 clock hours)
II	III	Major Core	Practical	GEO 602 MJP (D)	Practicals in Urban Geography	02	30	02

Objectives of the Course:

1. To provide students with basic knowledge of urban studies.
2. To apply knowledge to a creative participation in the development of urban centres.
3. To acquaint students with the local problems and their solutions.
4. To develop skills in the construction of quality reports

Topic No.	Topic Name	Sub Topic	No. of Practicals
1	Measures of Urbanization and Primacy	i) Concepts: Urban Growth, Urbanization, Urban Sprawl, Rural- Urban Fringe ii) Application and construction of Urbanization Curve iii) Rank Size distribution of towns and city iv) Primate City	08
2	Models in Urban Geography	i) Functional classification of towns and cities a. (C D Harris method) ii) Service classification of cities a. (H J Nelson Method) iii) Application of any one Model of Urban Structure to a nearby town or city	10
3	Urban Assessment	i) Assessment of civic amenities using Lorenz Curve ii) Characteristics of CBD iii) Demarcation of CBD area	06
4	Application of Urban Study	Visit to Town planning department to assess the Development Plan (DP) reports and prepare of survey report of your town or city **Or** Visit to Maharashtra Pollution Control Board Office (MPCB) and preparation of Report on Air or Water quality	06

Course Outcome:

By the completion of the course, students will be able to;

COs 1: Acquire the knowledge about the urban studies.

COs 2: Analysis of Urbanization trend in world.

COs 3: Apply the models to the local urban centres.

COs 4: Assess local issues with global perception.

COs 5: Construct an analytical report of the assessed area.

Reference Books:

1. Ashish Bose (1974) Studies in India's Urbanization-1901-71 Tata McGraw-Hill, Delhi
2. David Clark (1982), Urban Geography, Croom Helm, London.
3. Davis Kingsley (1962) urbanization in India – Past and Future, in Turner, R. (ed.) India's Urban Future, University of California Press, Berkley
4. H. Carter (1976), the study of urban Geography, Arnold – Heinemann Publication (India), New Delhi, 110016.
5. H. Mayer and C. F. Khon, (1967), Reading in Urban Geography, Central book depot, Allahabad. Pp 127-160
6. J. K. Dikshit (2011) edited book, the urban fringe of Indian cities, Professor JaymalaDiddee felicitation volume, Rawat publication, Jaipur, 302 004.
7. J. P. Gibbs (1966), Urban Research Methods, Affiliated east west press Pvt. Ltd. New Delhi 3. Pp 176-187
8. K.V. Sundaram (1977) Urban and Regional Planning in India, Vikas publishing house, Delhi-110032
9. M. T. Cadwallader (1985), Analytical urban geography, spatial patterns and theories Prentice Hall, Englewood Cliffs, New Jersey, USA.
10. P.T. Malshe (1974) Kolhapur: a Study in Urban Geography, University of Pune press.
11. R. B. Mandal (2000), urban geography, Concept publication, New Delhi
12. R. L. Singh (1973), Urban Geography in developing countries, edited book, The National Geographical Society of India, Varanasi-221 005.
13. Rajkishor Meher (1993), Basic Amenities and Quality of Life in an Urban Industrial Complex: A case study of Rourkela, Concept publishing company, New Delhi. pp. 214.
14. S.B. Sawant (1978) The City of Poona: A Study in Urban Geography, University of Pune press.

M. A. / M. Sc. Geography-II (Semester -III)

GEO 603 MJ: Watershed Management

Year	Semester	Group Vertical (V)	Course Type	Course and Course Code	Course Title	Total Credits	No. of Periods (01 Clock hrs. lecture)	Total lectures per week
II	III	Major Core	Theory	GEO 603 MJ	Watershed Management	02	30	02

Objectives of the Course:

1. To understand watershed systems and their management principles.
2. To analyze physical processes shaping watershed dynamics.
3. To understand the basin morphometric analysis.
4. To explore watershed planning.
5. To develop abilities in watershed monitoring and application of management techniques.
6. To implement watershed management practices.

Topic No.	Topic Name	Sub Topic	No. of Periods
1	Introduction to Watershed Management	i. Nature and Scope of Watershed ii. Concept of Hydrology and Watersheds iii. The Importance of Watersheds for Water Resources Management iv. Hydrological Cycle and its components	6
2	Basin Morphometric Analysis	i. Definition of Watershed Boundary ii. Morphometric Analysis a. Linear Aspect: one-dimensional b. Areal Aspect: two-dimensional c. Relief Aspects: three-dimensional	8
3	Significance of Watershed development	i. Water Supply Management ii. Flood Control and Disaster Management iii. Water Quality Protection iv.Watershed Development and Livelihoods	8
4	Impact of Watershed Development	i. Impact on Ecosystem ii. Impact on Agriculture iii. Case Study/ Field Visit: Ralegan Siddhi / Hiware Bajar – Effective Watershed Management	8

Course Outcome:

By the completion of the course, students will be able to;

COs 1: Understanding the concept of watershed and its importance in sustainable development.

COs 2: Familiarization with the techniques and methods of watershed management

COs 3: Ability to analyze and assess the impact of human activities on watersheds

COs 4: Familiarization with the developments in watershed management research and practice.

COs 5: Ability to evaluate the effectiveness of watershed management interventions.

Reference Books:

1. Brosius, J. P., Lovelace, G., & Martini, F. (2005). Disciplines and interdisciplinary practices: The case of watershed management. Society & Natural Resources, 18(3), 199-212.
2. Heathcote, I. W. (2009). Integrated watershed management: principles and practice. John Wiley & Sons.
3. Katyal, J.C., R.P. Singh, Shriniwas Sharma, S.K. Das, M.V. Padmanabhan and P.K. Mishra. 1995. Field Manual on Watershed Management. CRIDA, Hyderabad.
4. Lyon, J. G. (2002). GIS for water resources and watershed management. In GIS for Water Resource and Watershed Management (pp. 1-6). CRC Press.
5. Mahnot, S.C. 2014. Soil and Water Conservation and Watershed Management. International Books and Periodicals Supply Service. New Delhi.
6. McCool, D. K., & Lee, R. G. (Eds.). (2017). Watershed management: Balancing sustainability and environmental change. CRC Press.
7. Naiman, R. J. (Ed.). (2012). Watershed management: balancing sustainability and environmental change. Springer Science & Business Media.
8. Novotny, V., Ahern, J., & Brown, P. (2010). Water centric sustainable communities: planning, retrofitting, and building the next urban environment. John Wiley & Sons.
9. Sabatier, P. A., Focht, W., Lubell, M., Trachtenberg, Z., Vedlitz, A., & Matlock, M. (2005). Collaborative approaches to watershed management.
10. Sharda, V.N., A.K. Sikka and G.P. Juyal. 2006. Participatory Integrated Watershed Management: A Field Manual. Central Soil and Water Conservation Research and Training Institute, Dehradun.
11. Singh, G.D. and T.C. Poonia. 2003. Fundamentals of Watershed Management Technology. Yash Publishing House, Bikaner.

M. A. / M. Sc. Geography-II (Semester -III)

GEO 604 MJ (A): Applied Geomorphology

Core Special – 4 (Theory)

Year	Semester	Group Vertical (V)	Course Type	Course and Course Code	Course Title	Total Credits	No. of Periods (01 Clock hrs. lecture)	Total lectures per week
II	III	Major Core	Theory	GEO 604 MJ (A)	Applied Geomorphology	04	60	04

12.

Objectives of the Course:

1. To understand man's effect on landforms and processes.
2. To recognize effect of geomorphology on man.
3. To know the extent to which geomorphology can contribute towards solution of practical problems, towards general need of the society.
4. To aware students about environmental hazards, environmental management, evaluation of resources and relevant techniques.

Topic No.	Topic Name	Sub Topic	No. of Periods
1	Introduction to Applied Geomorphology	i. Introduction to Applied Geomorphology ii. Need for applied studies iii. Role for the applied Geomorphologists iv. Relevant contemporary developments	08
	Environmental Hazards - I	i. Introduction ii. Soil erosion by water & Wind iii. River floods iv. Slope instability v. Ground-surface subsidence	11
	Environmental Hazards - II	i. Coasts ii. Periglacial environments iii. Avalanches iv. Volcanoes	10
	Environmental Management - I	i. Introduction ii. Control and Prevention of soil erosion iii. Rivers and river channels iv. Responses to river floods v. Managing landslides	11
	Environmental Management - II	i. Coasts ii. Periglacial environments iii. The destruction of natural materials by weathering iv. Urban management v. Road building	10
	Resource Evaluation	i. Introduction ii. Material resources iii. Techniques of scenic evaluation iv. Land-systems approach v. Geomorphological approach	10

Course Outcome:

By the completion of the course, students will be able to;

COs 1: Understand man's effect on landforms and processes.

COs 2: Recognize the effect of geomorphology on man.

COs 3: Know the extent to which geomorphology can contribute towards the solution of Practical problems, towards the general need of the society.

COs 4: Aware students about environmental hazards, environmental management, evaluation of resources and relevant techniques.

Reference Books:

1. Allison, R.J. (2005): Applied Geomorphology: Theory and Practice, Wiley, New York.
2. Bloom, A.L. (2012): Geomorphology- A Systematic Analysis of Late Cenozoic Landforms, Prentice-Hall of India, New Delhi.
3. Chorley, R.J., Schumm, S. A. and Sugden, D. E. (1984): Geomorphology, Methuen, London.
4. Christiansen E.H. and Hamblin, W.K. (2008): The Earth's dynamic systems Macmillan, New York and Collier Macmillan London.
5. Coates, D.R. (ed.) (1971) Environmental Geomorphology, Binghamton: State University of New York.
6. Cooke, R.U. and Doornkamp, J.C. (1974) Geomorphology in Environmental Management, Oxford: Oxford University Press.
7. Gregory, K.J. and Goudie, A.S. (2014): The SAGE Handbook of Geomorphology, SAGE, London.
8. Hails, J.R. (ed.) (1977) Applied Geomorphology; A Perspective of the Contribution of Geomorphology to Interdisciplinary Studies and Environmental Management, Amsterdam: Elsevier Science Publishers.
9. Hart, M. G. (1986): Geomorphology, Pune and Applied George Allen and Unwin, London.
10. Holmes, (1944): Principles of Physical Geology, Thomas Nelson and Sons Ltd, London.
11. Huggett, R.J. (2008): Fundamentals of Geomorphology, Routledge, London and New York.
12. Kale, V. S. and Gupta, A. (2010): Introduction to Geomorphology, Universities Press, Hyderabad
13. Kale, V.S. (2014): Landscapes and Landforms of India, Springer, London/New York.
14. Thorne, C.R., Hey, R.D. and Newson, M. (eds) (1997) Applied Fluvial Geomorphology for River Engineering and Management, Chichester: Wiley.
15. Viles, H.A. and Spencer, T. (1995) Coastal Problems, London: Arnold.

M. A. / M. Sc. Geography-II (Semester -III)

GEO 604 MJ (B): Applied Climatology

Core Special – 4 (Theory)

Year	Semester	Group Vertical (V)	Course Type	Course and Course Code	Course Title	Total Credits	No. of Periods (01 Clock hrs. lecture)	Total lectures per week
II	III	Major Core	Theory	GEO 604 MJ (B)	Applied Climatology	04	60	04

1.

Objectives of the Course:

1. To understand the fundamental concepts and importance of applied climatology.
2. To know the correlation of diverse fields of economy and climate.
3. To correlate and analyze aspects of climate with industry, commerce engineering and human activities.
4. To recognize the applications of remote sensing in agro climatology.

Topic No.	Topic Name	Sub Topic	No. of Periods
1	Introduction	i. Nature and scope ii. Development of applied climatology iii. Atmospheric concern and awareness iv. Climate impact assessment	10
2	Climate and Economic Activity	i. Significant climate variables ii. Agriculture and Climate iii. Climate and Industry iv. Tourism and Climate v. Energy and Climate	12
3	Climate and Human	i. Human bio-meteorology ii. Climate, clothing and human control iii. Climate and health	10
4	Urban Climate	i. Nature of urban climates ii. Urban air Pollution iii. Climate and Urbanization	10
5	Climate and Transportation	i. Climate & land transport ii. Climate & water transport iii. Climate & air transport – clear air turbulence	08
6	Applications in Applied Climatology	i. Agriculture ii. Drought iii. Cyclones	10

Course Outcome:

By the completion of the course, students will be able to;

1. Understand the fundamental concepts and importance of applied climatology.
2. Recognize the correlation of diverse fields of economy and climate.
3. Correlate and analyze different aspects of climate with industry, commerce engineering and human activities.
4. Identify the applications of various natural conditions.

Reference Books:

1. Geiger, Rudolf (1966): The Climate near the Ground, Hardward University Press.
2. Hobbs, John E. (1980): Applied Climatology, Dawson West View Press.
3. Lal, M. (ed.) (1993): Global Warming, Tata McGraw Hill, New York.
4. Mather, J.R. (1974): Climatology: Fundamentals and Applications, McGraw Hill, New York.
5. Oliver, John E. (1981): Climatology, Selected Applications, V.H. Winston and Sons, London.
6. Thompson, R. D. and Allen, P. (1997): Applied Climatology: Principles and Practice, Routledge, London
7. Oliver, J. E. (1973): Climate and Man's Environment: An introduction to Applied Climatology, John Wiley and Sons, New York
8. Mather, J. R. (1974): Climatology: Fundamentals and Applications, McGraw Hill, NewYork
9. Kelkar, R. R. (2010): Climate Change: A Holistic View, BS Publication, Hyderabad
10. Kelkar, R. R. (2008): Monsoon Prediction, BS Publication, Hyderabad

M. A. / M. Sc. Geography-II (Semester -III)

GEO 604 MJ (C): Advances in Economic Geography

Core Special – 4 (Theory)

Year	Semester	Group Vertical (V)	Course Type	Course and Course Code	Course Title	Total Credits	No. of Periods (01 Clock hrs. lecture)	Total lectures per week
II	III	Major Core	Theory	GEO 604 MJ (C)	Advances in Economic Geography	04	60	04

1.

Objectives of the Course:

1. To realize the basic concepts of Economic Geography in the view of modernization of the economy.
2. To understand theoretical models along with technological advancement and make their application for economic development
3. To assess the association between trade and transportation and its impact on economic development.
4. To understand emergent concepts in the field of advance in Economic Geography

Topic No.	Topic Name	Sub Topic	No. of Periods
1	Introduction	i. Concept and operation of economy ii. Concept of resources, its classification and importance in the economy	08
2	Theories of Location	i. Classical location theory -August Losch's ii. New Economic Geography of Krugman and Fujita iii. Firm location decisions in the modern context	10
3	Policies in Economic	i. Economic landscape and economic activities ii. Export Policies iii. Logistics Policies	10
4	Globalization and Economic Geography	i. Trade and transportation network ii. Global production network iii. Investment and multinational corporations iv. Implications of globalization for regional economics	10
5	Environment and Economic Geography	i. Environmental implications of economic activities ii. Sustainable economic development	06
6	Regionalization and Economic Development - I	i. Regional disparities ii. Factors affecting in regional disparities iii. Regional development policies and strategies	08
7	Regionalization and Economic Development - II	i. Regional development in India ii. Regional development in Maharashtra iii. Import and Export- documentation & process	08

Course Outcome:

By the completion of the course, students will be able to:

COs 1: Distinguish different types of economic activities and their utilities.

COs 2: Examine the significance and relevance of theories about the location of different economic activities.

COs 3: Analyze the association between trade, transport and production network and its impact on economic development.

COs 4: Assess the relationship among the various developmental factors for regionalization

COs 5: Understand the relationship between environment and economic geography

Reference Books:

1. Chatterjee K. (2015): Basics of Economic Geography, Concept publishing Company Pvt. Ltd., New Delhi
2. Fujita M, Krugman P. and Venables J. (1999): "The Spatial Economy: Cities, Regions and International Trade," Cambridge, Mass MIT Press.
3. Hanink, D.M. (1997): "Principles and Applications of Economic Geography, Economy, Policy, Environment", John Wiley and Sons, New York.
4. Hussain M., (2008): Models in Geography, Rawat Publications, New Delhi
5. Hussain M., (2018): Economic Geography, Rawat Publications, New Delhi.
6. Knox P. and Agnew J. (1998): The Geography of the World Economy, Arnold, London.
7. Krugman P. (1991): Geography and Trade. Leuven, Leuven University Press
8. Krugman P. (1995): Development, Geography and Economic Theory, Cambridge, MIT Press,
9. Leong G. C. and Moran G. C. (2009): Human and Economic Geography, Oxford University Press, Honk Kong
10. Martin, R, and Sunley, P (2021): Economic Geography: A Critical Introduction, John Wiley & Sons.
11. Roy, P. K. (2014): Economic geography A Study of Resources, New Central Book Agency Ltd. Kolkata.
12. Saxena, H. M. (2013): Economic Geography, Rawat publication, Jaipur
13. Siddhartha K., (2009): Economic Geography: Theories, Process and Patterns, Kisalaya Publications Pvt. Ltd., Delhi
14. Truman A Hartshorn, John W. Alexander (2010): "Economic Geography" PHL Learning Private Limited, New Delhi.

M. A. / M. Sc. Geography-II (Semester -III)

GEO 604 MJ (D): Geography of Migration

Core Special – 4 (Theory)

Year	Semester	Group Vertical (V)	Course Type	Course and Course Code	Course Title	Total Credits	No. of Periods (01 Clock hrs. lecture)	Total lectures per week
II	III	Major Core	Theory	GEO 604 MJ (D)	Geography of Migration	04	60	04

1.

Objectives of the Course:

1. To provide in-depth understanding of migration concept, nature and scope of migration geography.
2. To understand determinants and types of migration.
3. To provide better insights of causes and consequences of migration.
4. To provide knowledge about internal and international migration.
5. To know about Migration theories, models and Migration Policy.

Topic No.	Topic Name	Sub Topic	No. of Periods
1	Introduction	i. Concepts, Nature and Scope ii. Significance of Geography of Migration	04
2	Determinants and Types of Migration	i. Economic ii. Social and iii. Demographic determinants iv. Types of migration	10
3	Causes and Consequences of Migration	i. Causes of Migration: Push and Pull ii. Consequences of migration: demographic, economic, social and political consequences at the individual, household and community level.	08
4	Internal Migration	i. Types of Internal Migration, ii. Problems and Prospects iii. Issues at origin and destination iv. Environmental Issues and Migration	10
5	International Migration	i. Historical and recent trends ii. Problems and Prospects iii. International Laws and Conventions, iv. Issues: permanent immigrants, labour migration, brain drain, refugee migration and Illegal migration	10
6	Migration theories and models	i. Ravenstein's Laws of Migration ii. Everett Lee's Theory of Migration	10

7	Migration Policy	i. International Migration Policy ii. National Migration Policy /(Migration in India)	08

Course Outcome:

By the completion of the course, students will be able to;

COs 1: Acquire the knowledge about migration determinants, consequences and types

COs 2: Understand the patterns of internal and international migration

COs 3: Apprehend with various regional and global issues of migration. i.e. Refugee, IDPs etc.

COs 4: Critically examine the policy and programmes related to migration.

Reference Books:

1. Brown, A.A. ed. (l977). Internal Migration: A Comparative Perspective, New York: Academic Press.
2. Cohen, Robin (1996). Theories of Migration, Cheltenham: Edward Elga.
3. Demko, G. et. al (1977). Population Geog: A Reader. New York: McGraw Hill.
4. Harvey, David (1973). Social Justice and City. Baltimore: Edward Arnold and The Johns Hopkins University Press.
5. Jackson. J. A. (1969). Migration. Cambridge: University Press.
6. Jones,E.ed. (1975). Readings in Social Geography. Oxford: Oxford University Press.
7. Khadaria, B. (2010). India Migration Report 2009: Past, Present and Future Outlook. New Delhi: Cambridge University Press.
8. Kosinki, L.A. et.al.eds (1975). People on The Mov., London: Methuen.
9. Oberai, A.S., & Singh, H.K.M. (1983). Causes and Consequences of Internal Migration: A Study in the Indian Punjab. Delhi: Oxford University Press.
10. O'Neill, B. C. O. (2001). Population and Climate Change. Cambridge: Cambridge University Press.
11. Cohen, Robin, (1996): Theories of Migration, The International Library of Studies on Migration, Edward Elgar, Cheltenham.
12. United Nations, (1998): World Population Monitoring 1997, International Migration and Development, New York.
13. United Nations, (1974): Methods of Measuring Internal Migration, Manual VI, UN, New York.

M. A. / M. Sc. Geography-II (Semester -III)

GEO 605 MJP (A): Practicals in Applied Geomorphology

Core Special – 4 (Practical)

Year	Semester	Group Vertical (V)	Course Type	Course and Course Code	Course Title	Total Credits	No. of Practicals *(each Practicals of 02 clock hours)*	Total Practicals per week (04 clock hours)
II	III	Major Core	Practical	GEO 605 MJP (A)	Practicals in Applied Geomorphology	02	30	02

Objectives of the Course:

1. To acquaint students about geomorphological mapping technique and train students for geomorphological mapping.
2. To undertake field surveys and sample collection and give exposure to students.
3. To conduct of laboratory exercises and train students for interpretation.

Topic No.	Topic Name	Sub Topic	No. of Practicals
1	Geomorphological mapping	i. Application of geomorphological mapping in planning and economic development. ii. Chart showing symbols (Hart, 1986). iii. Preparation of a geomorphic map of a small area/basin from toposheet or field survey data. iv. Interpretation of a map in terms of geomorphic feature, forms, processes, resources evaluation.	10
2	Field Survey and Sample Collection	i. Channel cross sections/Beach/Hill slope profiles in the field ii. GPS survey of River channel/Beach/Hill slope iii. Fluvial Sediment Analysis along with River Morphology	10
3	Laboratory work	i. Preparation of channel cross sections/Beach/Hill slope profiles and its interpretation ii. Soil/Sediment analysis a) Analysis of sample b) Plotting of data c) Estimation of grain size parameters d) Interpretation of results	10

(Note : Field Work / Field Visit for a minimum duration of 5 days should be undertaken for the selected course)

Course Outcome:

By the completion of the course, students will be able to;

COs 1: Prepare geomorphological maps of given areas.

COs 2: Undertake field surveys and learn sample collection techniques.

COs 3: Complete laboratory exercises and interpret results.

Reference Books:

1. Aackombe, R. V. and Gardiner, V. (1983): Geomorphological Field Manual.
2. Allison, R.J. (2005): Applied Geomorphology: Theory and Practice, Wiley, New York.
3. Bloom, A.L. (2012): Geomorphology- A Systematic Analysis of Late Cenozoic Landforms, Prentice-Hall of India, New Delhi.
4. Chorley, R. J., Schumm, S. A. and Sugden, D.E. (1984) : Geomorphology, Methuen, London
5. Christiansen E.H. and Hamblin, W.K. (2008): The Earths dynamic systems Macmillan, New York and Collier Macmillan London.
6. Coates, D.R. (ed.) (1971) Environmental Geomorphology, Binghamton: State University of New York.
7. Cooke, R.U. and Doornkamp, J.C. (1974) Geomorphology in Environmental Management, Oxford: Oxford University Press.
8. Goudie, A. (1990): Geomorphological Techniques, Unwin Hyman, London
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10. Hails, J.R. (ed.) (1977) Applied Geomorphology; A Perspective of the Contribution of Geomorphology to Interdisciplinary Studies and Environmental Management, Amsterdam: Elsevier Science Publishers.
11. Hart, M. G. (1986) : Geomorphology, Pune and Applied George Allen and Unwin, London.
12. Huggett, R.J. (2008): Fundamentals of Geomorphology, Routledge, London and New York.
13. Kale, V. S. and Gupta, A. (2001): Introduction to Geomorphology, Orient Longman, Culcutta
14. Kale, V. S. and Gupta, A. (2010): Introduction to Geomorphology, Universities Press, Hyderabad
15. Kale, V.S. (2014): Landscapes and Landforms of India, Springer, London/New York.
16. King, C.A.M. (1966): Techniques in Geomorphology, Edward Arnold, London
17. Thorne, C.R., Hey, R.D. and Newson, M. (eds) (1997) Applied Fluvial Geomorphology for River Engineering and Management, Chichester: Wiley.
18. Viles, H.A. and Spencer, T. (1995) Coastal Problems, London: Arnold.

M. A. / M. Sc. Geography-II (Semester -III)

GEO 605 MJP (B): Practicals in Applied Climatology

Core Special – 4 (Practical)

Year	Semester	Group Vertical (V)	Course Type	Course and Course Code	Course Title	Total Credits	No. of Practicals *(each Practicals of 02 clock hours)*	Total Practicals per week (04 clock hours)
II	III	Major Core	Practical	GEO 605 MJP (B)	Practicals in Applied Climatology	02	30	02

Objectives of the Course:

1. To expertize students with the knowledge and skills of climate data analysis.
2. To implement climate knowledge for human comfort and architectural design.
3. To aware students with various statistical techniques for analyzing climate data.
4. To familiarize methods for retrieving land surface temperature from satellite imagery.

Topic No.	Topic Name	Sub Topic	No. of Practicals
1	Climate Analysis	**Climate and Architectural Analysis** (Mahoney table) i. Air temperature ii. Humidity, Rain, Wind iii. Humid Indicator iv. Arid Indicator	04
2	Comfort Indices and Climatic Waves	**Comfort Indices** i. Effective Temperature ii. Heat Index iii. Temperature – Humidity Index **Climatic Waves** i. Heat Waves ii. Cold Waves	04
3	Statistics for Climatology	i. Climatological Series ii. Frequency distribution iii. Cumulative distribution iv. Trend analysis (Linear Regression)	04
4	Application of Satellite Imageries	i. Retrieval of land surface temperature ii. Relationship between NDVI and LST to study vegetation and thermal characteristics.	03

Course Outcome:

By the completion of the course, students will be able to;

COs 1: Understand the statistical analysis of climate data.

COs 2: Implement climate knowledge for human comfort and architectural design.

COs3: Apply various statistical techniques for analyzing climate data and its applications.

COs 4: Acquaint methods for retrieving land surface temperature from satellite imagery.

Reference Books:

1. Keith, S. (1975): Principles of Applied Climatology Willey the University of Michigan.
2. Griffiths, F. (1966): Applied Climatology: An Introduction, Oxford University Press, London.
3. Hobbs, J. E. (1980) : Applied Climatology : A study of Atmospheric Resources W Davison University of California, California.
4. Fitzmy, R. (2012): The weather book, A manual of Practical Meteorology, Green Longman, Cambridge.
5. Subrahmanyam, V.P. (ed.) (1983): Contribution to Indian Geography, Heritage Publishers, New Delhi, Vol IV- Applied Climatology.
6. Tyagi Ajit, Asnani G. C., De U.S., Hatwar H.R., Mazumdar A.B. (2012): Monsoon Monograph Vol-1, India Meteorological Department.
7. Tyagi Ajit, Asnani G. C., De U.S., Hatwar H.R., Mazumdar A.B. (2012): Monsoon Monograph Vol-2, India Meteorological Department.

M. A. / M. Sc. Geography-II (Semester -III)

GEO 605 MJP (C): Practicals in Advances in Economic Geography

Core Special – 4 (Practical)

Year	Semester	Group Vertical (V)	Course Type	Course and Course Code	Course Title	Total Credits	No. of Practicals *(each Practicals of 02 clock hours)*	Total Practicals per week (04 clock hours)
II	III	Major Core	Practical	GEO 605 MJP (C)	Practicals in Advances in Economic Geography	02	30	02

Objectives of the Course:

1. To equip students with practical skills in conducting fieldwork and preparing questionnaires.
2. To understand industry agglomeration and the degree of spatial concentration within a region
3. To apply GIS and statistical techniques to investigate spatial patterns of economic phenomena.

Topic No.	Topic Name	Sub Topic	No. of Practicals
1	Data Collection and Sources	i. Primary and Secondary Data Sources ii. Survey Design and preparation of questionnaires iii. Field Work	10
2	Industry Structure	i. Analytical methods for calculating industrial concentration: Cluster analysis ii. Shift-share analysis: Change in national growth, industrial mix and regional shift	10
3	Site Suitability Analysis	i. Applications of GIS in spatial analysis of economic data ii. Spatial interpolation techniques iii. Evaluation of policy impacts using GIS and statistical analysis	10

Course Outcome:

By the completion of the course, students will be able to:

COs 1: Understand the distinction between primary and secondary data sources.

COs 2: Learn techniques for designing and preparing questionnaires for economic surveys.

COs 3: Develop proficiency in conducting shift-share analysis to assess changes in national growth, industrial mix, and regional shift.

COs 4: Applying of Geographic Information Systems (GIS) in spatial analysis of economic data.

Reference Books:

1. Bendavid-Val, A. (1991). Regional and local economic analysis for practitioners, Praeger Publishers Inc
2. Coe, N. M., Kelly, P. F., & Yeung, H. W. (2019). Economic geography: a contemporary introduction. John Wiley & Sons.
3. Creswell, J. W., & Creswell, J. D. (2017). Research design: Qualitative, quantitative, and mixed methods approaches. Sage publications.
4. LeSage, J. P. (1999). The theory and practice of spatial econometrics. University of Toledo. Toledo, Ohio, 28(11), 1-39.
5. Lune, H., & Berg, B. L. (2017). Qualitative research methods for the social sciences. Pearson.
6. Paul, L., Michael, F. G., David, J. M., & David, W. R. (2005). Geographic information systems and science. UK 2nd edition, Wiley & Sons Ltd.

M. A. / M. Sc. Geography-II (Semester -III)

GEO 605 MJP (D): Practicals in Geography of Migration

Core Special – 4 (Practical)

Year	Semester	Group Vertical (V)	Course Type	Course and Course Code	Course Title	Total Credits	No. of Practicals *(each Practicals of 02 clock hours)*	Total Practicals per week (04 clock hours)
II	III	Major Core	Practical	GEO 605 MJP (D)	Practicals in Geography of Migration	02	30	02

Objectives of the Course:

i. To study relevant aspects of migration, with various estimation methods.

ii. To Acquire knowledge of analysis of different migration patterns and trends effectively.

iii. To develop problem-solving skills through conducting a detailed examination of migration within a specific geographical area.

Topic No.	Topic Name	Sub Topic	No. of Practicals
1	Estimation of Migration	i. Estimation of Migration. **ii. Direct estimates of Migration:** a. Place of Birth, b. Duration of Residence c. Place of Last Residence d. Place of Residence at a specific date. **iii. Indirect estimates of Migration:** a. National growth rate method b. Vital Statistics method. c. Survival Ratio method. (Life Table Survival Ratio method and Census Survival Ratio Method) **(Note- Solve examples of indirect estimates of migration method only)**	14
2	Inter-Censal methods of net migration	i. Inter-Censal Net Migration by Residual Method. ii. Inter-Censal Cohort Component Method, iii. Inter-Censal Component Method for Foreign-Born Population, iv. Estimates of Net Immigration of Alien Population, v. Estimates of National Abroad.	10

3	Case Study	i. Collection of Data on a given Geographical region. ii. Estimation of Net Migration using any one of the mentioned methods iii. Report Writing.	06

Course Outcome:

By the completion of the course, students will be able to;

COs 1: Acquire advanced knowledge about the geography of Migration.

COs 2: Improved ability to analyze and interpret migration data using various estimation methods.

COs 3: Calculate the geographical problems as well as research problems

COs 4: Capability to prepare comprehensive reports integrating findings from migration Studies as well as research problems in geography.

Reference Books:

1. United Nations. Economic Commission for Africa. Methods of measuring internal migration. Stat Inf Bull Afr. 1983;(15):44-56. PMID: 12280601.
2. Jacob S. Siegel and David a. Swanson (2004): The Methods and Materials of Demography, Second edition, Elsevier Science, USA.
3. John Weeks (2005): Population – An Introduction to Concepts and Issues, Wordsworth learning. Singapore. 9th edition.
4. Mitra R. G. (2002): Understanding Patterns of Migration from Census 2001 data, Population Stabilization and Development, Council of Cultural growth and Cultural relations, Cuttack.
5. Shryock, Henry S. Jacob S. Siegel and Associate, (1980): The Methods and Materials of Demography. Vol. 1. US Bureau of Census, Washington D. C.
6. Todaro, Michael P. (1976): Internal Migration in Developing countries, International Labour office, Geneva.
7. United Nations (1974): Methods of Measuring Internal Migration, Manual VI, UN, New York.
8. United Nations (1979): Trends and Characteristics of Internal Migration since 1950, Demographic studies No. 64, UN, New York.
9. United Nations (1983): Determinants and Consequences of Population Trends, Volume 1, UN, New York, Chapter VI.
10. Bogue D.J. (1969): Principals of Demography, New York, Wiley.
11. Handbook on Measuring International Migration through Population Censuses' United Nations, New York, 2022.

M. A. / M. Sc. Geography-II (Semester -III)

GEO 610 MJ: Advances in Geoinformatics

Major Elective - Group A (Theory)

Year	Semester	Group Vertical (V)	Course Type	Course and Course Code	Course Title	Total Credits	No. of Periods (01 Clock hrs. lecture)	Total lectures per week
II	III	Major Elective	Theory (Group A)	GEO 610 MJ	Advances in Geoinformatics	02	30	02

Objectives of the Course:

1. To familiarize the students with the advance concepts of Geoinformatics.
2. To introduced students with image georeferencing and its characteristics.
3. To ascertain the students with the image enhancement techniques.
4. To create skill amongst students about the GNSS.

Topic No.	Topic Name	Sub Topic	Number of Periods
1	Introduction to Geoinformatics	i. Introduction and Definition ii. Definition, meaning and Introduction of GIS, Remote Sensing, Photogrammetry, GNSS	02
2	Spatial Analysis	i. Single – Layer Operations ii. Multiple – Layer Operations iii. Spatial Modelling iv. Topological overlays v. Point Pattern analysis vi. Network analysis vii. Surface analysis viii. Grid analysis	11
3	Image Georeferencing and Enhancement	i. Types of errors: Systematic & Nonsystematic ii. GCP Tools, Mapping Function, Resampling iii. Contrast Enhancement: iv. Contrast Stretch-Linear Contrast Stretch, Non-Linear Contrast Stretch v. Spatial Enhancement: Spatial Filtering, Edge Enhancement	11
4	GNSS and GPS	i. Introduction of GNSS and GPS ii. Segments of GPS- Control segment, Space segment, User Segment iii. GNSS System-IRNSS, GPS iv. Applications of GPS	06

Course Outcome:

By the completion of the course, students will be able to;

COs 1: Describe the concepts of Geoinformatics

COs 2: Understand the advance in GIS and remote sensing

COs 3: Recognize and apply the skill of spatial analysis

COs 4: Analyze and evaluate image georeferencing and its characteristics

COs 5: Develop the skill of applications of GPS.

References:

1. American society for Photogrammetry and Remote Sensing, (1999), Remote Sensing for the Earth Sciences, Manual of Remote Sensing,3rd ,vol. 3, Wiley, New York
2. Bethesda (2005) Photogrammetry and Remote Sensing, Mary Land, USA. 2005.
3. Burrough, P. A. and McDonnell, R. A. (2000): Principles of Geographical Information Systems, *Oxford University Press, New York.*
4. Campbell, J. B. (2002), Introduction to Remote Sensing. London: Taylor and Francis.
5. Cha, B., Dattaa, D., Majumdar (2001): Digital Image Processing Analysis, *Prentice-Hall of India, New Delhi*
6. Chang, K. T. (2008): Introduction to Geographic Information Systems, Avenue of the Americas, *McGraw-Hill, New York.*
7. Debashis, C. and Sahoo, R. N. (2015): Fundamentals of Geographic Information System,
   Viva Books Private Limited.
8. DeMers, M. N. (2008): Fundamentals of Geographic Information Systems, *John Wiley and Sons, New Delhi.*
9. Heywood, I., Cornelius, S. and Carver, S. (2011): An Introduction to Geographical Information Systems, *Pearson Education, New Delhi.*
10. Jensen, J. R. (2005): Introductory Digital Image Processing, *Prentice Hall ,New Jersey*
11. Jensen, J.R. (2000), Remote Sensing of the Environment: An Earth resource Perspective. Prentice Hall.
12. Joseph, G. (2003). Fundamentals of Remote Sensing, Hyderabad: University Press.
13. Korte, G. B. (2001): The GIS Book, *Onward Press, Bangalore.*
14. Lillesand, T. M., Kiefer, R. W.Chipman, J. W. (2008): Remote Sensing and Image Interpretation, *John Wiley & Sons, New Delhi*
15. Lo Albert, C. P., Yeung and Albert K. W. (2002): Concepts and Techniques of Geographical Information Systems, *Prentice Hall of India, New Delhi.*

16. Longley, P. A., Goodchild, M. F., Maguire, D. J. and Rhind, D. W. (2002): Geographical Information Systems and Science, *John Wiley & Sons, Chichester.*
17. Mather, P.M. (1999). Computer processing of remotely sensed images: an introduction, Wiley, Chichester.
18. Nag, P. Kudrat, M. (1998): Digital Remote Sensing, *Concept Publishing Company, New Delhi*
19. Ollier Lillesand, T. M., & Ralph, K. W. (2008). Remote Sensing and Image Interpretation. Singapore: John Wiley and Sons.
20. Pandey, J. and Pathak D. (2015): Geographic Information System, *TERI Press, The Energy and Resources Institute, New Delhi.*
21. Paul A. L., Michel, F. G., Maguire, D. J. and Rhind, D.W. (2002): Introduction to Geographic Information Systems and Science, *John Wiley and Sons Ltd.*
22. Paul R.Wolf, (2001) Elements of Photogrammetry, McGraw-Hill Science, 2001.
23. Richards, J. A, Jia,X.(1999): Remote Sensing and Digital Image Processing, *Springer, Verlag Berlin*
24. Sabins, F. F. (1996): Remote Sensing: Principles an Interpretation, *W. H. Freeman Company, New York*
25. Shrikant Karlekar (2014) Remote Sensing, Diamond Publication, Pune
26. Tempfi, K., Kerle, N., Huurneman, G., & Janssen, L. F. (Eds) (2009). Principles of Remote Sensing - An Introductory Text Book. Netherlands: The International Institute for Geoinformation Science

M. A. / M. Sc. Geography-II (Semester -III)

GEO 611 MJP: Practicals in Geoinformatics

Major Elective - Group A (Practical)

Year	Semester	Group Vertical (V)	Course Type	Course and Course Code	Course Title	Total Credits	No. of Practicals *(each Practicals of 02 clock hours)*	Total Practicals per week (04 clock hours)
II	III	Major Elective	Practical (Group A)	GEO 611 MJP	Practicals in Geoinformatics	02	30	02

Objectives of the Course:

1. To familiarize the students with the advance concepts of Geoinformatics.
2. To introduced students with image georeferencing and its characteristics.
3. To ascertain the students with the image enhancement techniques.
4. To create skill amongst students about the GNSS, use of GIS software's

Topic No.	Topic Name	Sub Topic	No. of Practicals
1	Spatial Data Editing	i. Errors in Digitization, Editing, ii. Topology Building – Contiguity, Connectivity and Containment	02
2	Spatial Data Analysis	Practical exercises of analysis and mapping of following using GIS software (Open source/ Professional) i. Spatial Modelling ii. Topological overlays iii. Network analysis iv. Surface analysis v. Grid analysis	10
3	Image Georeferencing	i. Georeferencing of at least two satellite images using GIS software's ii. Mosaic raster data iii. Image Subset	03
4	Image Enhancement	Apply image enhancement techniques on satellite image using open source software's i. Contrast Enhancement: Contrast Stretch, Linear Contrast Stretch, Non-Linear Contrast Stretch ii. Spatial Enhancement: Spatial filtering, edge enhancement	10
5	GPS	i. GPS survey ii. GPS data plotting using GIS software/ Excel programme iii. Overlay of GPS data on Google Earth	05

Course Outcome:

By the completion of the course, students will be able to;

COs 1: Edit the spatial vector data and remove the errors.

COs 2: Evaluate and examine the spatial data through GIS software

COs 3: Analyze and create image georeferencing and its characteristics

COs 4: Acquire the skill of advance concepts of image enhancement

COs 5: Acquaint the talent of applications of GPS.

References:

1. Ahmed, E. L. Rabbany(2002): Introduction to Global Positioning Systems, Artech House, Boston
2. Anji Reddy, M. (2008): Textbook of Remote Sensing and Geographic Information System, B.S. Publication, Hyderabad
3. Bao, J., Tsui, Y. (2005): Fundamentals of Global Positioning System Receivers, John Wiley Sons, Inc., Hoboken
4. Bernhardsen, Tor (1999): Geographic Information Systems: An Introduction, John Wiley and Sons
5. Burrough, P. A. and McDonnell, R.A. (2000): Principles of Geographical Information Systems, Oxford University Press, New York
6. Campbell, J. (2002): Introduction to Remote Sensing, Taylor & Francis, London
7. Chand, B., Majumdar, D. D. (2001): Digital Image Processing Analysis Prentice- Hall of India, New Delhi
8. Chang, K. T. (2008): Introduction to Geographic Information Systems, Avenue of the Americas, McGraw-Hill, New York
9. Clarke, Keith C. (1999): Getting Started with Geographic Information Systems, Prentice Hall
10. Debas his, C. and Sahoo, R. N. (2015): Fundamentals of Geographic Information System, Viva Books Private Limited.
11. DeMers, M. N. (2008): Fundamentals of Geographic Information Systems, John Wiley and Sons, New Delhi.
12. Demers, M. N.(2000):Fundamentals of Geographic Information Systems, John Wiley and Sons, New Delhi
13. Drury, S. A. (2001): Image Interpretation in Geology, Blackwell, Oxford
14. Heywood, I., Cornelisus, S., Carver, S. (2011):An Introduction to Geographical Information Systems, Pearson Education, New Delhi
15. Heywood, I., Cornelius, S. and Carver, S. (2011): An Introduction to Geographical

Information Systems, Pearson Education, New Delhi.

16. Jensen, J. R. (2005): Introductory Digital Image Processing, Prentice Hall, New Jersey
17. Joseph, G. (2004): Fundamentals of Remote Sensing, Universities Press, Hyderabad, India
18. Korte, G. B.(2001):The GIS Book, Onward Press, Bangalore
19. Kresse, W. and Danko, D. (2002): Springer Handbook of Geographic Information, Springer Drecht, London
20. Lillesand, T. M., Kiefer, R. W. and Chipman, J. W.(2008): Remote Sensing and Image Interpretation, John Wiley & Sons, New Delhi
21. Lo, C. P.,Yeung, A. W.(2002): Concepts Techniques of Geographical Information Systems, Prentice Hall of India, New Delhi
22. Longley, P. A., Goodchild, M. F., Maguire, D. J.,Rhind, D. W. (2002):Geographical Information Systems and Science, John Wiley & Sons, Chichester
23. Makrewski, J. (1999):GIS Multi-criteria Analysis, John Wiley and Sons, New York
24. Pandey, J. and Pathak D. (2015): Geographic Information System, TERI Press, The Energy and Resources Institute, New Delhi.
25. Paul, A. L., Michel, F. G., Maguire, D. J. and Rhind, D.W. (2002): Introduction to Geographic Information Systems and Science, John Wiley and Sons Ltd.
26. Sabins, F. F. (1996): Remote Sensing: Principles and Interpretation, W.H. Freeman and Company, San Francisco
27. Shrikant Karlekar (2014) Remote Sensing, Diamond Publication, Pune
28. Tomlin, C. D. (1990): Geographic Information Systems and Cartographic Modeling, Prentice Hall, Englewood Cliffs
29. Williams, J. (1995): Geographic Information from Space: Processing Applications of Geocoded Satellite Images, John &Wiley Sons, New Delhi

M. A. / M. Sc. Geography-II (Semester -III)

GEO 612 MJ: Geography of Resource Management

Major Elective - Group B (Theory)

Year	Semester	Group Vertical (V)	Course Type	Course and Course Code	Course Title	Total Credits	No. of Periods (01 Clock hrs. lecture)	Total lectures per week
II	III	Major Elective	Theory (Group B)	GEO 612 MJ	Geography of Resource Management	02	30	02

Objectives of the Course:

1. To understand the concept & approaches of resource management.
2. To differentiate characteristics of renewable & non-renewable resources.
3. To study the need for conservation & management of resources.
4. To understand the policies on renewable energy in India.

Topic No.	Topic Name	Sub Topic	No. of Periods
1	Introduction	i. Definition, Nature and Scope of resource management ii. Approaches to resource management	05
2	Classification of Resources	i. Non-renewable: Coal, Oil, Natural gas, Nuclear power ii. Renewable: Soil Resource, Water Resource, Forest Resource, Wind energy and Solar energy.	10
3	Conservation & Management	i. Meaning of conservation & management ii. Methods of conservation of resources iii. Need for Resource Management iv. Management of resources: Reduce, Recycle & Reuse	08
4	Resource Appraisal & Policy Making	i. Population as a resource ii. Applications of Remote Sensing & GIS in resource management iii. Policies on Renewable Energy in India: iv. Rooftop Solar Programme, Small Wind Energy and Hybrid Systems Programme	07

Course Outcome:

By the completion of the course, students will be able to;

COs 1: Understand the scope of resource geography and approaches for its management.

COs 2: Learn the classification of resources on basic of tier availability.

COs 3: Know the need & methods of conservation of resources.

COs 4: Use of remote sensing & GIS for management of resources.

COs 5: Study the policy making in India for resources.

Reference Books:

1. Adams, W.M (1990): Green Development: Environment and Sustainability in the Third World, Rutledge & Chapman Hall, New York.
2. Granfelt. T.R (1999) Managing the Globalized Environmental J&L Composition Ltd., New York.
3. Holechek, J.L. etal (2000): Natural Resources: Eulogy Economics & Policy, Prentice Hall, New Jersey.
4. Hooja. R & Joshi R. (1994): Desert, Drought and Development, Studies in Resource Management and Sustainability; Rawat Publication Jaipur
5. Howard. M.C. (ed), (1993): Asia's Environmental Crisis, Westview Press, Prouldar,
6. Kates R.W. & Burton I.(eds)(1986): Geography, Resources and Environment, Vol. I & II University of Chicago Press, Chicago
7. Mc Laren, D.J. and Skinnet, B.J. (eds)(1986): Resources and World Development, John Wiley & Sons, New York
8. Newson, M.D. (1991) : Land, water and Development River Basin systems and Management Routledge Lodon.
9. Owen, S. and Owens, P.L. (1991): Environment Resources and Conservation Cambridge University Press, New York.
10. Peckford, John et. At (ed) : (1994) Water, Sanitation, Environment and Development, IT Publication, London
11. Rees, J. (1988): Natural Resources: Allocation, Economics and Policy, Methuen, London
12. Redielift, M (1987): Sustainable Development: Exploring the Contradiction: Methuen, London.
13. Simmons I.G. (1991): Earth, Aoir and Water Resources and Environment in Kate 20th Century Edward Arnold, New York.
14. Thoman Alan et.at (2001): Environmental Policies and NGO Influence, Routledge London.

M. A. / M. Sc. Geography-II (Semester -III)

GEO 613 MJP: Practicals in Resource Management

Major Elective - Group B (Practical)

Year	Semester	Group Vertical (V)	Course Type	Course and Course Code	Course Title	Total Credits	No. of Practicals *(each Practicals of 02 clock hours)*	Total Practicals per week (04 clock hours)
II	III	Major Elective	Practical (Group B)	GEO 613 MJP	Practicals in Resource Management	02	30	02

Objectives of the Course:

1. To Understand the issues related to local resources
2. To understand the methods of self-study and data collection in the field
3. To acquire the Knowledge of about resource management.

Topic No.	Topic Name	Sub Topic	No. of Practicals
1	i. Waste Management ii. Water Conservation iii. Sustainable Agriculture iv. Green Building Techniques v. Energy Conservation vi. Soil Quality measures vii. Forest and Wildlife **(Select any one topic for practical as per the local issues)**	Guidelines for Practicals of any one selected topic from the provided topic name, you could consider the following steps: 1. Identify the types and sources selected topic in the area where the practical is being conducted. 2. Analyze the characteristics of the selected topic. 3. Evaluate the existing practices for selected topics in the area and identify areas for improvement. 4. Work of Local Govt. Authority / NGO for a selected topic 5. Develop a plan that includes reduction, reuse, recycling, and nature-friendly measures. 6. Implement the plan for the topic issue and promote awareness among the community. 7. Monitor and evaluate the effectiveness of the selected topics and practices implemented. 8. Document and photograph the entire process and prepare a report highlighting the outcomes and lessons learned.	30

NOTE:- During the practical, the subject teacher could involve the participants in all the above steps, if required giving them hands-on experience in selected practices. This will help them to understand the challenges and opportunities in resource management and develop a practical solution that can be implemented in the real world.

Course Outcome:

By the completion of the course, students will be able to;

COs 1: Understand the local issues.
COs 2: Know the methods of self-study mode with the help of local issues.
COs 3: Aware of the importance of resources and their reuse.
COs 4: Acquire the skills of data collection and report writing.

Reference Books:

1. William A. Worrell, P. Aarne Vesilind, and Christian Ludwig, by book on “Solid Waste Engineering”.
2. D. V. Reddy book “Introduction to Waste Management”.
3. Behzad Nematollahi book “Waste Management and Sustainable Consumption”.
4. N. K. Bansal and S. K. Kataria book “Solid Waste Management: Principles and Practice”.
5. Richard L. Haney and Thallapuranam Krishnaswamy Sreekrishnan “Waste Management and Sustainable Resource Recovery”
6. Albert J. Parker book “Water Conservation Techniques and Strategies”
7. Parviz Koohafkan, Miguel A. Altieri, and Eric W. H. Seeley “Sustainable Agriculture: Principles, Practices, and Benefits”
8. R S Means book “Green Building: Project Planning and Cost Estimating”
9. James A. Allen and Robert C. Wilging book on “Principles of Forest and Wildlife Resource Management”.

M. A. / M. Sc. Geography-II (Semester -III)

GEO 614 MJ: Regional Planning and Development

Major Elective - Group C (Theory)

Year	Semester	Group Vertical (V)	Course Type	Course and Course Code	Course Title	Total Credits	No. of Periods (01 Clock hrs. lecture)	Total lectures per week
II	III	Major Elective	Theory (Group C)	GEO 614 MJ	Regional Planning and Development	02	30	02

Objectives of the Course:

1. To understand the concept of regional planning and geographical perspective.
2. To discuss and debate various issues and challenges of regional development.
3. To understand the issues of development in India.
4. To understand the town planning in India.

Topic No.	Topic Name	Sub Topic	No. of Periods
1	Introduction	i. Region: Definition and Types ii. Planning: Definition and Types iii. Role of Geography in regional development	04
2	Regional Development	i. Indicators of Development: Economic, Social and Environmental. ii. Model of regional development:- Growth Pole Model of Perroux. iii. Challenges of regional development in India. iv. Regional disparities in India	10
3	Regional Planning	i. Meaning of Planning, need of planning ii. Rationales and primary functions of planning iii. Development Programme in India:(Command area, Drought prone, Metropolitan, River Valley, Tribal and Hill area project)	08
4	Town Planning	i. Concepts, Need and Functions. ii. Urban Planning Classical Theories iii. Metropolitan planning in India.	08

Course Outcome:

By the completion of the course, students will be able to;

COs 1: Understand the concepts of region and planning.
COs 2: Know the indicators and models of development.
COs 3: Understand the regional development programme in India.
COs 4: Study the town planning in India.

Reference Books:

1. Bhat, L.S. (1973): Regional Planning in India, Statistical Publishing Society, Kolkata.
2. Chandana, R. C. (2000) Regional Planning – A Comprehensive Text
3. Dube K.N. (ed) (1990): Planning and Development in India, Asia Publishing House, New Delhi
4. Jyotirmoy Sen (2003) Introduction to regional planning and development, Rawat Publication
5. Sen, L.K. (1972): Readings in Micro-level Planning and Rural Growth Centers, National Institute of community development Hydrabad
6. Lekhi , R.K.: "The Economics of Development and Planning", Kalyani Publishers, New Delhi
7. Mishra R.P. (Ed.) (1992): Regional Planning, Concepts, Techniques, Policies and Case Studies, Concept Pub. New Delhi.
8. Mahesh Chand, V. K. Puri (2020) Regional Planning in India , Allied Publishers, Mumbai
9. Nath V. (2010) Rural Development and Planning in India, Concept Publishing Company Pvt. Ltd.
10. Moonis Raza. 1978. "Levels of Regional Development in India". Paper presented at Indo-Soviet Symposium of Regional Development and National Planning. USSR.
11. V. Nath. 1970. Regional Development in Indian Planning. Economic and Political Weekly. Annual Number. Jan., 1970. PP.242-260.
12. Misra R. P., Sundaram K. V. and Prakasa Rao V. L. S., 1974: Regional Development Planning in India A New Strategy, Vikas Publishing, Delhi.
13. Yugandhar, B. N. and Mukherjee, Amitava (eds.) 1991: Readings in De-centralised Planning (with special reference to District Planning), 2 vols. Concept Publs. Co., New Delhi
14. Misra, R. P. & Misra, K. eds. 1998: Million Cities of India, Sustainable Development Foundation, New Delhi.

M. A. / M. Sc. Geography-II (Semester -III)

GEO 615 MJP: Quantitative Techniques in Geography

Major Elective - Group C (Practical)

Year	Semester	Group Vertical (V)	Course Type	Course and Course Code	Course Title	Total Credits	No. of Practicals *(each Practicals of 02 clock hours)*	Total Practicals per week (04 clock hours)
II	III	Major Elective	Practical (Group C)	GEO 615 MJP	Quantitative Techniques in Geography	02	30	02

Objectives of the Course:

1. To acquainted students with applications of statistics in geographical context
2. To familiarize students through determination of probability
3. To develop skill amongst students with applications of time series method
4. To enhance ability of students by testing of hypothesis and application of statistical tests

Topic No.	Topic Name	Sub Topic	No. of Practicals
1.	Determination of Probability	i. Methods of Determination, Normal Probability distribution, central limit theory, confidence interval for mean ii. Determination of probability of a continuous random event using normal distribution iii. Determination of probability of a discrete random event using binominal distributions	7
2.	Time Series Analysis	i. Properties of time series, trends and periodicity ii. Calculation and plotting of running means (3 and 5) iii. Curve fitting method of least squares	5
3.	Application of Bivariate Analysis	i. Calculation of Pearson product moment correlation coefficient ii. Calculation, plotting and interpretation of linear regression equation	5
4.	Application of Statistical Tests	i. Testing of hypothesis-Meaning and definition, null and alternative hypothesis, level of significance, degree of freedom ii. Non Parametric test – 'Chi squared' test, (minimum two sample) using relative frequency table iii. Parametric Test- ANOVA (Analysis of Variance)	13

Course Outcome:

By the completion of the course, students will be able to:

COs 1: Understand the quantitative techniques in Geography
COs 2: Apply appropriate quantitative techniques to analyze geographical data
COs 3: Analyze probability and time series methods with geographical data
COs 4: Evaluate bivariate statistical methods in geographical research
COs 5: Develop the ability of use and application of various statistical tests

References:

1. Ebdon, D. (1977): Statistics in Geography, Basil Blackwell, Oxford
2. Rogerson, P.A.(2010): Statistical Methods for Geography, Sage Publications, London
3. Frank, H. and Althoen, S.C. (1994): Statistics: Concepts Applications, Cambridge University Press, Cambridge
4. Gregory, S. (1978): Statistical Methods for Geographers, Longman, London
5. Hammond, R., & McCullagh, P. S. (1985). Quantitative techniques in geography: an introduction. Clarendon Press, Oxford University Press.
6. Harris, R., Jarvis, C. (2011). Statistics for Geography and Environmental Science, Prentice Hall.
7. Jog. S. R. and Saptarshi, P. G., 1980. Sankhikhi Bhugol, Narendra Publication, Pune.
8. Johnston, R. J. (1978). Multivariate Statistics in Geography. Longman, London
9. Karlekar Shrikant (2007) Statistical Methods in Geography, Diamond Publication, Pune
10. Karlekar Shrikant and Kale Mohan (2006): Statistical analysis of geographical data, Diamond Publication, Pune
11. Mann, P. S. (2020). Introductory statistics. John Wiley & Sons.
12. Mc Grew Jr., J. C., Lembo Jr., A. J., Monroe, C. B. (2014). An Introduction to Statistical Problem Solving in Geography, 3rd ed, Waveland Press.
13. O'Brien, L. (2005). Introducing quantitative geography: measurement, methods, and generalized linear models. Taylor & Francis.
14. Pal. S. K., 1998. Statistical Methods for Geoscientists: Techniques and Applications, Concept Pub.co.
15. Rogerson, P. A. (2019). Statistical methods for geography: a student's guide. Sage Publications, London.

M. A. / M. Sc. Geography-II (Semester -III)

GEO 631 RP: Research Project- I

Research Project

Year	Semester	Group Vertical (V)	Course Type	Course and Course Code	Course Title	Total Credits	No. of Periods	Total lectures per week
II	III	Research Project	* Research project	GEO 631 RP	Research Project- I	04	120	08

***Course type**- research project in based on following guidelines for the semester III & IV.

Objectives of the Course:

1. To understand the research problem and research gap.
2. To understand the depth of the research problem and topic.
3. To plan the research project.
4. To prepare the required tools and techniques for a research project.

Guidelines:

1) The team and guide will be declared and the commencement of semester III.
2) A group of a maximum of two students will be the team of one project.
3) A PG Teacher will be the research guide.
4) The guide of the selected team will be continued in the next semester IV.
5) Students will prepare a research notebook to maintain their progress.
6) At the end of the semester the team of students will submit a research proposal with selected and prepared tools for the research.

Topic No.	Topic Name	Sub Topic
1	Title Framing	i. Problem finding ii. Selection of topic iii. Framing Research questions iv. Identifying Research Gap
2	Literature Review	i. Selection of research papers and Reports for review ii. Minimum ten research papers/reports from the core area iii. Prepare literature matrix for review papers / Reports

3	Preparation of Research Proposal	i. Title ii. Keywords iii. Introductions iv. Study area v. Objectives vi. Hypothesis vii. Research Methodology: Data, Methods and Techniques viii. Chapter Scheme ix. Limitations of study x. Time Framing
4	Preparation	Finding and tools: i. Selection of samples, ii. Preparation of research notebook, Checklist

Course Outcome:

By the end of the course, students will be able to-

COs 1: Find research gap and problems.

COs 2: Select the appropriate research topic and frame the title.

COs 3: Prepare research proposal

COs 4: Select and prepare appropriate research tools and techniques for research project

Reference Books:

1. Gomez, B., & Jones III, J. P. (Eds.). (2010). *Research methods in geography: A critical introduction* (Vol. 6). John Wiley & Sons.
2. Gomez, B., & Jones, J. P. III (2010). Research Methods in Geography: A Critical Introduction. John Wiley and Sons.
3. Goudie, A. (Ed) (2004): Encyclopaedia of Geomorphology, Routledge, London.
4. Gregory, D., Johnston, R., Pratt, G., Watts, M. & Whatmore, S. (2009). The Dictionary of Human Geography. Singapore: Wiley-Blackwell.
5. Hay, I. (2000). Qualitative research methods in Human Geography.
6. Montello, D. and Sutton, P. (2013). An Introduction to Scientific Research Methods in Geography and Environmental Studies. SAGE Publications.
7. Warf, B. (Ed)(2006). Encyclopaedia of Human Geography. London: SAGE Publications.

SAVITRIBAI PHULE PUNE UNIVERSITY, PUNE

(Formerly University of Pune)

Two Year Post Graduate Programme in Geography

(Faculty of Science and Technology)

Choice Based Credit System (CBCS)

Syllabi for

M. A. / M. Sc. Geography (Second Year)

(Semester IV)

(For Affiliated Colleges to Savitribai Phule Pune University)

Syllabus as per the guidelines of National Education Policy 2020

Second year syllabi to be implemented from Academic Year 2024-2025

SAVITRIBAI PHULE PUNE UNIVERSITY, PUNE

Syllabi as per NEP 2020 for

M.A. / M.Sc. (Geography) Second Year, Sem. IV (from June, 2024)

M. A. /M. Sc. Geography Semester IV

Level	Semest	Group	Course Code	Course Name	Credits T	Credits P	Total Credits
6.5	Fourth Semester	**Major Core**	GEO 651 MJ	Social and Cultural Geography	04	--	04
			GEO 652 MJ	Geography of Disaster Management	04	--	04
			GEO 653 MJP	Practical in Watershed Management	--	02	02
			GEO 654 MJP	Interpretation of Topographical Maps	--	02	02
				Total credit related to Major Core	**08**	**04**	**12**
		Major Elective (Select any one group)		**Group A**			
			GEO 660 MJ	Advance Surveying	02	--	02
			GEO 661 MJP	Practicals in Advance Surveying	--	02	02
				Group B			
			GEO 662 MJ	Geography of Maharashtra	02	--	02
			GEO 663 MJP	Practicals in Gender Analysis	--	02	02
				Group C			
			GEO 664 MJ	Environmental Laws	02	--	02
			GEO 665 MJP	Practicals in Water Quality Analysis	--	02	02
				Total Credits Related to Major Electives	**02**	**02**	**04**
		Research Project	GEO 681 RP	Research Project -II			**06**
			Sem. IV Total Credits =Major Core + Major Elective + RP		**10**	**06**	**22**

Vertical Group (Semester - IV)	Credit for Theory	Credit for Practical	Total Credit
Total Credits related to Major Core	08	04	**12**
Total Credits Related to Major Electives	02	02	**04**
Research Project		06	**06**
Total Credits	**10**	**06+06**	**22**

M. A. / M. Sc. Geography-II (Semester -IV)

GEO 651 MJ : Social and Cultural Geography

Major Core (Theory)

Year	Semester	Group Vertical (V)	Course Type	Course and Course Code	Course Title	Total Credits	No. of Periods (01 Clock hrs	Total lectures per week
II	IV	Major Core	Theory	GEO 651 MJ	Social and Cultural Geography	04	60	04

Objectives of the Course:

1. To learn basic concepts of social and cultural geography.
2. To introduce the students to the scope and importance of the Social Geography
3. To understand the spatial distribution of social groups in world as well as India.
4. To learn about Social Problems in India.
5. To understand the concepts related to social well-being.
6. To learn basic concepts of Cultural Geography

Topic No.	Topic Name	Sub Topic	No. of Periods
		Section I – Social Geography	
1.	Introduction to Social Geography	i. Definition, Nature and Scope of Social Geography ii. Trends and Developments in Social Geography iii. Relationship with social sciences	08
2.	Spatial distribution of Social Geography	i. Religion, Casts, Language and Races-Origin, Types and Spatial distribution ii. Tribes- definition, nomenclature, spatial distribution iii. Basis of racial classification and their physical characteristics	08
3.	Social Issues in India	i. Housing, Space and Society; Crime, Space and Inequality ii. Environment and Human Health iii. Gender and Space, Sex Ratio, Education, Poverty	08
4.	Social Well-being	i. Cultural Geography: Definition, Nature, Scope, ii. Elements and components, Significance, iii. Development of Cultural Geography	08

Section II – Cultural Geography			
5.	Introduction to Cultural Geography	i. Cultural Geography: Definition, Nature, Scope, ii. Elements and components, Significance, iii. Development of Cultural Geography	06
6.	Cultural: Concept and theories	i. Concept of Cultural, Cultural Region ii. Cultural landscape, Cultural Theory	06
7.	Cultural Regions of the World	i. Cultural Regions of the World ii. Cultural Change: Cultural Adaptation, Cultural Assimilation, Integration, iii. Globalization of Culture	08
8.	Cultural Identity and Processes	i. Impacts of technology and mobility on cultural heritage ii. Processes of Diffusion and Acculturation iii. Popular cultures, folk culture and its revival iv. India and its multicultural identity	08
		Total	**60**

Course Outcomes:

By the end of the course, students will be able to –

COs 1: Describe the basic concepts of Social and Cultural Geography

COs 2: Understand the spatial distribution of social groups and cultural regions in India and the world.

COs 3: Classify different social groups, languages, tribes, races, cultures and related issues.

COs 4: Analyze the social problems in India.

COs 5: Examine the impacts on cultural heritage.

Reference:

1. Ahmad, A. (2012): Social Geography of India, Concept Publishing Company, New Delhi
2. Ahmad, Aijazuddin (1999): Social Geography, Rawat Publications, Jaipur.
3. Jones, E. and Eyles, J. (1977). Introduction to Social Geography. Oxford University Press.
4. Casino V. J. D., Jr., 2009) Social Geography: A Critical Introduction, Wiley Blackwell.
5. Smith D. M., 1994: Geography and Social Justice, Blackwell, Oxford.
6. Jordon, G. (1995). Cultural Politics, Oxford: Blackwell.
7. Mike, C. (1998). Cultural Geography, London: Routledge.
8. Anderson, K., Domosh, M. Pile, S. and Thrift, N. (2003): Handbook of Cultural Geography, SAGE Publications, London
9. David Atkinson, Peter Jackson, David sibley and Neil washbourne (2007) Cultural Geography, Rawat Publication Jaipur.

M. A. / M. Sc. Geography-II (Semester -IV)

GEO 652 MJ : Geography of Disaster Management

Major Core (Theory)

Year	Semester	Group Vertical (V)	Course Type	Course and Course Code	Course Title	Total Credits	No. of Periods (01 Clock hrs	Total lectures per week
II	IV	Major Core	Theory	GEO 652 MJ	Geography of Disaster	04	60	04

Objectives of the Course:

1. To introduce basic concepts, types, causes and effects of Disaster.
2. To understand relief management and various methods of in disaster management.
3. To inculcate critical thinking and problem-solving abilities on disaster management.
4. To make the students aware of the need and techniques of protection in disaster.
5. To introduce the concept of disaster & its relation with Geography

Topic No.	Topic Name	Sub Topic	No. of Periods
1.	Introduction and Classification of Disaster	i. Concepts, Definitions of Hazards and Disasters, ii. Risk and Vulnerability in Disasters, iii. Natural and Man-made disasters iv. Classification of disasters	08
2.	Types of Disasters	**A.-Natural Disasters** i. Wind-related- Cyclone, Storm, Storm surge, Tidal waves, Heat and cold Waves ii. Climatic Change, Global warming, Sea Level rise, Ozone Depletion **B-. Man–made Disasters** i. CBRN – Chemical disasters, Biological disasters, Radiological disasters, Nuclear disasters ii. Fire – Building fire, Coal fire, Forest fire	08
3.	Causes and Effect of Disaster	**Causes and effects: Natural** i. Earthquake, Volcano, Landslide, Tsunami, ii. Cyclone, Flood, Drought. iii. Major Natural disaster examples in India **Causes and effects: Man-made** i. Fire, Terrorism, Food poisoning ii. Strike and lockouts, accidents, stampedes iii. Major man-made disaster examples in India	08

4.	Relief Management	i. Relief Management-Essential Components ii. Minimum Standards of Relief iii. Disaster Relief Funding iv. Role of Central, State, District and Local Administration in Disaster Response v. Role of NDRF, SDRF and Civil Defense in Disaster Response vi. Role of Geographers in disaster management	10
5.	Phases of Disaster Management	i. Mitigation, ii. Preparedness, iii. Response, iv. Recovery, v. Rehabilitation	06
6.	Disaster Management techniques	i. Basic principles of disaster management, ii. Disaster Management cycle, iii. Disaster management policy, iv. National and State Bodies for Disaster Management, v. Early Warming Systems, vi. Building design and construction in highly seismic zones, Retrofitting of buildings.	10
7.	Impacts of Disasters	i. Social, ii. Economic, iii. Political, iv. Environmental, v. Health, vi. Psychological impacts	10

Course Outcome:

By the completion of the course, students will be able to;

COs 1: Understand the Classification and Types of Disaster.

COs 2: Assess Risk and Vulnerability of a geographical area.

COs 3: Understand causes and effects of disaster

COs 4: Comprehension of relief management with phases of disaster.

COs 5: Acquaint methods for Disaster Management

Reference Books:

1. Disaster Management Guidelines, GOI-UND Disaster Risk Program (2009-2012)
2. Singh Savindra (2000) : Environmental Geography, Parag Pustak Bhavan, Allahabad
3. Smith, K. (2001) : Environmental Hazards : Assessing Risk and Reducing Disaster, Routledge
4. Arjun Musmade, Jyotiram More (2014) Geography of Disaster Management, Diamond

Publication, Pune. (Marathi)

5. P. P. Marathe (2010), Disaster Management Concepts & Practices Diamond Publication, Pune. (Marathi)
6. Dr. Mrinalini Pandey (2017) Disaster Management, Wiley India Pvt. Ltd.
7. Gupta A.K., Niar S.S and Chatterjee S. (2013) Disaster management and Risk Reduction, Role of Environmental Knowledge, Narosa Publishing House, Delhi.
8. Tushar Bhattacharya (2018) Disaster Science and Management, McGraw Hill Education (India) Pvt. Ltd.
9. Lutgens, F.K. and Tarbuck, E.J., 2007. The Atmosphere. Prentice Hall, Englewood Cliffs, New Jersey, USA.
10. Huggett, D.A., 2004. Fundamentals of Biogeography, Routledge

M. A. / M. Sc. Geography-II (Semester -IV)

GEO 653 MJP: Practicals in Watershed Management

Major Core (Practical)

Year	Semester	Group Vertical (V)	Course Type	Course and Course Code	Course Title	Total Credits	No. of Practicals *(each Practicals of 02 clock*	Total Practicals per week (04 clock hours)
II	IV	Major Core	Practical	GEO 653 MJP	Practicals in Watershed Management	02	30	02

Objectives of the Course:

1. To understand the measurement and calculation of stream length.
2. To analyze the areal aspects of the drainage basin
3. To determine the relief aspects.
4. To examine on-ground aspects of the watershed through field visits.

Topic No.	Topic Name	Sub Topic	No. of Practicals
1	Linear Aspects	i. Measurement of stream length ii. Calculation of Mean Stream Length	04
2	Areal Aspects	i. Measurement of basin area ii. Measurement of basin perimeter iii. Calculation of drainage density iv. Stream frequency v. Texture ratio vi. Compactness constant vii. Constant of channel maintance	08
3	Relief	i. Calculation of relief ratio ii. Relative relief iii. Ruggedness number	08
4	Field Visit	i. Minimum one day or two days field visit to study relief, climate, soil, natural vegetation etc. in any watershed in India. ii. Preparation of field visit report	10

Course Outcome:

By the completion of the course, students will be able to;

COs 1: Understanding the various aspects of watershed analysis.

. **COs 2:**. Analyze the Linear, Areal and Relief aspect of watershed.

COs 3: Expertise in Calculating examples of watershed.

COs 4: Acquire the skills of Watershed data collection and report writing

Reference Books:

1. B. K. Kakde, (2004) Watershed Manual – A Guide for Watershed Development Practitionersand Trainers, BAIF Development Research Foundation, Pune.
2. Heathcote, I. W. (2009). Integrated watershed management: principles and practice. John Wiley & Sons.
3. Heathcote, I. W. (2009). Integrated watershed management: principles and practice. John Wiley & Sons. Westervelt, J. (2001). Simulation modeling for watershed management. Springer Science & Business Media.
4. Hein, C. (2020). Adaptive strategies for water heritage: Past, present and future (p. 435). Springer Nature. House, Bikaner, India.
5. Jain, S. K., & Singh, V. P. (2023). Water resources systems planning and management. Elsevier.
6. Lyon, J. G. (2002). GIS for water resources and watershed management. In GIS for Water Resource and Watershed Management (pp. 1-6). CRC Press.
7. Naiman, R. J. (Ed.). (2012). Watershed management: balancing sustainability and environmental change. Springer Science & Business Media.
8. R. Suresh (2006) Soil and Watershed Conversation Engineering, 2nd Edition, – StandardPublication Distributors, Delhi.
9. Rajvir Singh, (2008): Watershed Planning and Management, 2nd Edition, Yash Publishing
10. Sabatier, P. A., Focht, W., Lubell, M., Trachtenberg, Z., Vedlitz, A., & Matlock, M. (2005). Collaborative approaches to watershed management.
11. Savindra Singh (2002): Geomorphology, Prayag Pustak Bhawan, Allahabad
12. Wilson, J., Gallant, J., (2000): Terrain Analysis: Principles and Applications. New York: JohnWiley and Sons.

M. A. / M. Sc. Geography-II (Semester -IV)

GEO 654 MJP: Interpretation of Topographical Maps

Major Core (Practical)

Year	Semester	Group Vertical (V)	Course Type	Course and Course Code	Course Title	Total Credits	No. of Practicals *(each Practicals of 02 clock*	Total Practicals per week (04 clock hours)
II	IV	Major Core	Practical	GEO 654 MJP	Interpretation of Topographical Maps	02	30	02

Objectives of the Course:

1. To familiarize the students with the techniques of different types of map interpretation.
2. To identification of physical and cultural features using conventional signs and symbols.
3. To explain the elementary and essential principles of the field of practical work.

Topic No.	Topic Name	Sub Topic	No. of Practicals
1	Topographical Information	i. International Series, ii. Asia Series, iii. Indexing, Classification iv. Color scheme used in topographical maps, v. Grid references: 4-figure grid, 6-figure grid and international grid reference vi. Locational and Relief aspects of the area vii. Importance of topographical maps, viii. Introduction to Foreign topographical maps	08
2	Interpretation of S.O.I toposheets.	i. Relief: Distribution of Spot heights, bench marks, Trigonometrical Points, etc., Types of Slopes (convex, concave, uniform, etc.), and Major landforms from contour patterns ii. Drainage network: Types-trellis, dendritic, radial, etc., Streams with water, without water, and Influence of relief on drainage iii. Natural Vegetation: Types of vegetation, Association of relief and drainage, Reserved Forest and Protected Forest iv. Land Use: Agriculture, mining, etc., areal distribution and impact of Physical landscape	14

		v. Settlements: Types of settlements, amenities, etc., Distribution, relative size, relative distance (dispersed, nucleated, etc.) vi. Transport and Communication: Types of roads, railway lines, and facilities of communication (3 sheets of S.O.I. toposheets)	
3	Fieldwork and field report/study Tour	Select any area near the institution and collect toposheets of the same area (1:50,000 scale). Visit the area identify the landform, settlements, and land use features and compare the same with the topo-sheets, draw sketches and map of the selected area; conduct fieldwork with the help of survey instruments, and prepare a report.	08

Course Outcome:

By the completion of the course, students will be able to;

COs 1: Understand the SOI toposheet with index system, Sings & symbols and grid references.

COs 2: Prepare interpretation of SOI toposheet with physical & Cultural features.

COs 3: Apply practical knowledge for analysis of fieldwork.

COs 4: Acquire the skill of report writing on the base of field work

References:

1. Archer J. E and Dalton T. H. (1968), Fieldwork in Geography B.T. Batsford Limited London
2. Dury G.H. (1960): Map Interpretation. Sir Isaac Pitman and Sons Limited, Pitman House, Bath.
3. Gupta, K. K. and Tyagi, V. C. (1992): Working with maps, Survey of India Publication, Dehradun.
4. Jones P. A. (1968): Field work in Geography. Longmans, Green and Company Limited.
5. Meux A. H. (1960): Reading Topographical Maps. University of London Press Limited.
6. Petrie N. (1992): Analysis and Interpretation of Topographical Maps. Orient Longman Limited Calcutta.
7. Ramamurthy, K. (1982): Map interpretation, Madras.
8. Tamaskar B.G. and Deshmukh V.M. (1974): Geographical Interpretation of Indian Topographical Maps. Orient Longman Limited, Bombay.
9. Vaidyanadhan. R. (1968): Index to 60 topographical maps, CSIR, New Delhi.
10. Wheeler K.S. Ed (1970): Geography in the field. Blond Educational, London.
11. Misra. R.P and A, Ramesh – Fundamentals of Cartography, Concept Publishing Company, New Delhi, 2000.

M. A. / M. Sc. Geography-II (Semester -IV)

GEO 660 MJ: Advance Surveying

Major Elective - Group A (Theory)

Year	Semester	Group Vertical (V)	Course Type	Course and Course Code	Course Title	Total Credits	No. of Periods (01 Clock hrs. lecture)	Total lectures per week
II	IV	Major Elective	Theory (Group A)	GEO 660 MJ	Advance Surveying	02	30	02

Objectives of the Course:

1. To understand advanced surveying concepts.
2. To utilize modern surveying instruments.
3. To plan and execute field survey.
4. To analyze and process survey data.
5. To apply surveying in various domains

Topic No.	Topic Name	Sub Topic	No. of Periods
1	Auto Level	i. Introduction to Auto level, ii. Principle, functions iii. Uses of auto level.	06
2	GPS & DGPS	i. Introduction to DGPS, Principle and Function. ii. Duel and Single Frequency DGPS, iii. Real Time Kinematic (RTK), iv. Static Surveys in DGPS, v. Use of DGPS in Topographical Survey.	08
3	Total Station	i. Introduction to Total Station, ii. Principle and Function of total station. iii. Remote Elevation Measurement (REM), iv. Remote Distance Measurement (RDM), v. Use of Total station for data processing and analysis.	08

4	Drone Survey	i. Introduction to UAV, ii. Principles and Functions. iii. Types of Unmanned Aerial Vehicle (UAV), iv. Directorate General of Civil Aviation (DGCA) directions and rules.	08

Course Outcome:

By the completion of the course, students will be able to;

COs 1: Handle advanced survey instruments such as Total Station, DGPS, and UAVs.

COs 2: Learn the surveys and collect the required data.

COs 3: Analyze the data and produce the results with advanced survey instruments.

COs 4: Correlate and compare the data from various sources.

Reference Books:

1. Jeff, H. (1995). *Differential GPS Explained*, Trimble Navigation

2. Lawrence, L., & Alex, L. (2008). *GPS Made Easy: Using Global Positioning Systems in the Outdoors.* Calgary: Rocky Mountain Books.

3. Mohinder, S. G., Lawrence, R. W., & Angus, P. A. (2001). *Global Positioning Systems, Inertial Navigation and Integration*, New York: John Wiley and Sons Inc.

4. Satheesh, G., Sathikumar, R., & Madhu, N. (2007). *Advanced Surveying: Total Station, GIS and Remote Sensing*, Delhi: Pearson Education.

M. A. / M. Sc. Geography-II (Semester -IV)

GEO 661 MJP: Practicals in Advance Surveying

Major Elective - Group A (Practical)

Year	Semester	Group Vertical (V)	Course Type	Course and Course Code	Course Title	Total Credits	No. of Practicals *(each Practicals of 02 clock*	Total Practicals per week (04 clock hours)
II	IV	Major Elective	Practical (Group A)	GEO 661 MJP	Practicals in Advance Surveying	02	30	02

Objectives of the Course:

1. To understand advanced surveying concepts.
2. To utilize modern surveying instruments.
3. To plan and execute field survey.
4. To analyze and process survey data.
5. To apply surveying in various domains.

Topic No.	Topic Name	Sub Topic	No. of Practicals
1	Auto Level	i. Demonstration of Auto-Level	06
2	GPS	i. Data Collection, ii. DEM Generation, iii. Land measurement using GPS	08
3	Total Station	i. Remote Elevation Measurement (REM), ii. Remote Distance Measurement (RDM), iii. Land measurement using Total Station	08
4	Drone Survey	i. Data Collection using drone ii. Land measurement using Drone	08

Course Outcome:

By the completion of the course, students will be able to;

COs 1: Handle advanced survey instruments such as Total Station, DGPS, and UAVs.

COs 2: Learn the surveys and collect the required data.

COs 3: Analyze the data and produce the results with advanced survey instruments.

COs 4: Correlate and compare the data from various sources.

Reference Books:

1. Jeff, H. (1995). *Differential GPS Explained*, Trimble Navigation
2. Lawrence, L., & Alex, L. (2008). *GPS Made Easy: Using Global Positioning Systems in the Outdoors.* Calgary: Rocky Mountain Books.
3. Mohinder, S. G., Lawrence, R. W., & Angus, P. A. (2001). *Global Positioning Systems, Inertial Navigation and Integration*, New York: John Wiley and Sons Inc.
4. Satheesh, G., Sathikumar, R., & Madhu, N. (2007). *Advanced Surveying: Total Station, GIS and Remote Sensing*, Delhi: Pearson Education.

M. A. / M. Sc. Geography-II (Semester -IV)

GEO 662 MJ: Geography of Maharashtra

Major Elective - Group B (Theory)

Year	Semester	Group Vertical (V)	Course Type	Course and Course Code	Course Title	Total Credits	No. of Periods (01 Clock hrs. lecture)	Total lectures per week
II	IV	Major Elective	Theory (Group B)	GEO 662 MJ	Geography of Maharashtra	02	30	02

Objectives of the Course:

1. To acquaint students with the Geography of our State.
2. To make students aware of various types of climate, Drainage systems and soils with their importance in human development.
3. To apply geographical knowledge to everyday living and the development of agriculture and industries.
4. To help students understand the interrelationship between the subject and society.

Topic No.	Topic Name	Sub Topic	No. of Periods
1	Physiography and Administrative setup	i. Geographical location ii. Administrative Divisions iii. Physiographic Divisions iv. Historical and Political Background	06
2	Climate, Drainage System and Soil	i. Climatic Regions of Maharashtra ii. Drainage system in Maharashtra iii. Major soil types and their distribution	07
3	Population	i. Population Distribution ii. Population Composition Sex, Literacy and Socio-Economic Composition iii. Migration: - Definition, Causes and Effects.	08

4	Agriculture	i. Distribution & Production of Major Crops in Maharashtra a. Wheat, b. Rice, c. Sugarcane, d. Cotton ii. Factors affecting agriculture in Maharashtra iii. Export-Import of Agricultural Products iv. Problems and Prospects of Agriculture	09

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

Course Outcome:

By the completion of the course, students will be able to;

COs 1: Understand the Physiography and Drainage system with their importance.

COs 2: Explain the various types of Climate, Drainage and soils with their importance in human development.

COs 3: Applying knowledge of geography to solve problems related to agricultural and industrial development in Maharashtra.

Reference Books:

1. Anonymous (1974): Climate of Maharashtra state, I.M.D., Pune
2. Bhamre S M (2011): Geography of Maharashtra, Prashant publication, Jalgaon.
3. Dastane Santosh (2009): Maharashtra- 2009,Dasane Ramchandra and co. , Pune
4. Deshpande C. D. (1971): Geography of Maharashtra, NBT, New Delhi
5. Didde Jaymala and other (2002): Geography of Maharashtra, Rawat Publication, Jaipur.
6. Dikshit K R (1986): Maharashtra in Maps, Maharashtra State Board for Literature and Culture Mantralya, Mumbai
7. Dikshit K R. (1971): Maharashtra Region in India- A Regional Geography Edt. By Dr. R L Sing, NAGI, Varanashi.
8. Joshi C B (1962): Maharashtra- A regional geography, A R Sheth and Company, Mumbai.
9. Sahu Arun(2007): Maharashtra, NBT , New Dalhi
10. Savdi A,B., 2002, Geography of Maharashtra, Nirali Publication, Pune.
11. Savdi A,B., 2005, The Mega State Maharashtra, Nirali Publication, Pune.
12. Sagar K., 2004, Maharashtratil Jilhe, K. Sagar Publication.
13. Dipak Bawiskar, Dilip Patil, 2018, Maharashtracha Bhugol, Dipstambha Publication.
14. Dr. Jyotiram C. More, Dr. Atul M. Jethe, Prof. Ram S. Kolapkar, 2020, Geography of Maharashtra
15. Maharashtra State Agricultural Atlas
16. More J. C., 2014, Geography & Agriculture for MPSC Examination, Atharv Publication, Pune (Marathi)
17. Prof. Sambhaji B. Patil, 2012, Geography of Maharashtra, Prashant Publication.
18. Karve I., Maharashtra its Land and people.

M. A. / M. Sc. Geography-II (Semester -IV)

GEO 663 MJP: Practicals in Gender Analysis

Major Elective - Group B (Practical)

Year	Semester	Group Vertical (V)	Course Type	Course and Course Code	Course Title	Total Credits	No. of Practicals *(each Practicals of 02 clock hours)*	Total Practicals per week (04 clock hours)
II	IV	Major Elective	Practical (Group B)	GEO 663 MJP	Practicals in Gender Analysis	02	30	02

Objectives of the Course:

1. To apply theoretical concepts from gender studies to practical research and analysis.
2. To develop skills in data collection methods relevant to gender analysis, such as surveys, interviews, and content analysis.
3. To critically evaluate and interpret empirical data related to gender dynamics.
4. To communicate research findings effectively through written reports and presentations.
5. To engage with ethical considerations in gender research and analysis

Topic No.	Topic Name	Sub Topic	No. of Practicals
1	Introduction to Gender Analysis	i. Definition, Gender and Gender Analysis ii. Need for Gender Analysis iii. Data and data collection for Gender Analysis	08
2	Gender Analysis Tools	i. Quantitative analysis: descriptive statistics and inferential tests ii. Qualitative analysis: thematic coding and content analysis iii. Gender Analysis Matrix (GAM)	10
3	Case Studies and Report writing	Case studies (Any One) i. Educational Organization ii. Industry	12

Course Outcome:

By the completion of the course, students will be able to;

COs 1: Apply Gender Analysis Frameworks of gender studies to understand real-world gender issues and dynamics.

COs 2: Analyze the differential impacts of policies, programs, and interventions on different genders.

COs 3: Acquire the skill of report writing on the base of fieldwork.

Reference Books:

1. DFID, (2002), Gender Manual. A practical Guide for Development Policy and Practitioners, UK, DFID, Social Development Division.
2. EC, UNIFEM, ITC, (2009). Training Module: Introduction to Gender Analysis and Gender Sensitive Indicators. Gender Campus, Torino, Italy.
3. GIZ (2011), Gender Analysis. A Manual for the Gender differentiated design of technical cooperation projects and Programmes, Bonn, Germany.
4. GIZ (2013), Gender Analysis- Frequently Asked Questions, Bonn, GIZ.
5. UN, Executive Board of the United Nations Development Programme, the United Nations Population Fund and the United Nations Office for Project Services (2015); Management response to the thematic evaluation of the UNDP contribution to gender equality and women's empowerment (2008-2013), DP/2015/30. New York, United Nations.
6. UN Develop Group & UN System Staff College (2014). Frameworks for Gender Analysis. Power Point. New York, USA.
7. UNDP (3rd edition, 2007), Gender Mainstreaming in Practice: A Toolkit. Part II & I. Regional Bureau for Europe and the Commonwealth of Independent States (RBEC), Bratislava.
8. UNDP (2013-2014), Gender Mainstreaming Made Easy, Volume I&II. Resource Handbook for all Staff. Country Office for UNDP Somalia.
9. UNDP (2014a) Gender Equality Strategy 2014-2017, The future we want: rights and empowerment. New York, UNDP.
10. UNDP (2014b), Making Joint Gender Programmes Work. Guide for design, implementation, monitoring and evaluation. New York, UNDP.
11. UNDP (2015a). Social Environmental Screening Procedure. New York, UNDP.
12. UNDP (2015b). Gender Mainstreaming in Environment & Sustainable Development Project. A perspective from Asia-Pacific Region. Guidelines for UNDP Staff.

M. A. / M. Sc. Geography-II (Semester -IV)

GEO 664 MJ: Environmental Laws

Major Elective - Group C (Theory)

Year	Semester	Group Vertical (V)	Course Type	Course and Course Code	Course Title	Total Credits	No. of Periods (01 Clock hrs. lecture)	Total lectures per week
II	IV	Major Elective	Theory (Group C)	GEO 664 MJ	Environmental Laws	02	30	02

Objectives of the Course:

1. To understand the foundational concepts and principles related to environmental laws.
2. To familiarize students with constitutional provisions for environmental laws.
3. To comprehensive understanding of pollution prevention and control laws.
4. To analyze and evaluate the effectiveness of pollution prevention and control measures.
5. To understand the natural resource conservation and management laws.

Topic No.	Topic Name	Sub Topic	No. of Periods
1	Introduction to Environmental Laws	i. Definition and meaning ii. History of environmental laws iii. Constitutional provision of environmental laws iv. SDG's associated with the environment v. Concept of environment, biosphere, ecosystem, pollution, ozone depletion, global warming and climate change vi. Environment Protection Act,1986	10
2	Pollution Prevention and Control Laws	i. The Water (Prevention and Control of Pollution) Act, 1974 ii. The Air (Prevention and Control of Pollution) Act, 1981 iii. Plastic Waste Management Rules, 2016	10
3	Natural Resource Conservation and Management Laws	i. The Wildlife Protection Act, 1972 ii. The Forest Conservation Act, 1980 iii. Coastal Regulation Zone Notification, 2019	10

Course Outcome:

By the completion of the course, students will be able to;

COs 1: Articulate and critically evaluate the meanings of key environmental terms, including environment, biosphere, ecosystem etc.

COs 2: Demonstrate a deep understanding of the Environment Protection Act, 1986, its objectives, provisions, and enforcement mechanisms.

COs 3: Explain a thorough understanding of pollution prevention and control laws, including their objectives, legal frameworks etc.

COs 4: Explain a thorough understanding of natural resource conservation and management laws.

Reference Books:

1. P. Leelakrishnan (2010). Environmental Law in India. LexisNexis.

2. Shyam Diwan and Armin Rosencranz (2002). Environmental Law & Policy in India. Oxford University Press

3. Singh S. (2007). Environmental Geography. Prayag Pustak Bhavan, Allahabad.

4. S.K.Nanda (2019). Environmental Law. Central Law Publications.

5. V.R. Krishna Iyer (1984). Environment Pollution and Law. Vedpal Law House.

6. The Environment Protection Act, 1986

7. The water (Prevention and Control of Pollution) Act, 1974

8. The Air (Prevention and Control of Pollution) Act, 1981

9. Plastic Waste Management Rules, 2016

10. The Wildlife Protection Act, 1972

11. The Forest Conservation Act, 1980

12. Coastal Regulation Zone Notification, 2019

13. http://moef.gov.in/division/forest-divisions

14. http://moef.gov.in/

15. http://mahaforest.gov.in/

M. A. / M. Sc. Geography-II (Semester -IV)

GEO 665 MJP: Practicals in Water Quality Analysis

Major Elective - Group C (Practical)

Year	Semester	Group Vertical (V)	Course Type	Course and Course Code	Course Title	Total Credits	No. of Practicals *(each Practicals of 02 clock hours)*	Total Practicals per week (04 clock hours)
II	IV	Major Elective	Practical (Group C)	GEO 665 MJP	Practicals in Water Quality Analysis	02	30	02

Objectives of the Course:

1. To identify and explain key water quality parameters.
2. To learn various quality indices useful for drinking and irrigation water analysis.
3. To train the students for the interpretation of water quality data with the comparison of regulatory standards.

Topic No.	Topic Name	Sub Topic	No. of Practicals
1	Introduction to water quality	i. Definition ii. Water quality parameters: Physical, Chemical iii. Standards of water quality assessment: BIS (Bureau of Indian Standards) and WHO (World Health Organization) iv. Classification of water qualities	07
2	Water quality analysis for drinking water	i. Calculation of WQI using weighted parameters ii. Gibbs Analysis	08
3	Water quality analysis for irrigation	i. Calculate, and compare WHO standards and interpret two examples of each following indices a. Sodium Adsorption Ratio (SAR) (Richards 1954), b. Residual Sodium Carbonate (RSC) (Eaton 1950), c. Sodium Percentage (SP) (Wilcox 1955), d. Kelly's ratio (Kelly 1963), e. Magnesium Hazard Ratio (MHR) (Raghunath 1987)	15

Course Outcome:

By the completion of the course, students will be able to;

COs 1: Comprehensive understanding of various quality indices useful for assessment of water resources.

COs 2: select and calculate appropriate water quality indices based on specific objectives and available data.

COs 3: interpret the overall water qualities with a comparison of BIS and WHO standards.

Reference Books:

1. Standard Methods for the Examination of Water and Wastewater - American Public Health Association, American Water Works Association, Water Environment Federation.
2. Water Quality Assessments: A Guide to the Use of Biota, Sediments and Water in Environmental Monitoring - Deborah V. Chapman (Editor).
3. Water Quality: Guidelines, Standards and Health - Lorna Fewtrell and Jamie Bartram.
4. Environmental Engineering: Water, Wastewater, Soil and Groundwater Treatment and Remediation - Nelson L. Nemerow and Franklin J. Agardy.
5. BIS 10500:2012 - Drinking Water Specification
6. BIS 2296:1982 - Specifications for Packaged Natural Mineral Water
7. BIS 3025:1983 - Methods of Sampling and Test (Physical and Chemical) for Water and Waste Water
8. BIS 3589:2001 - Methods of Sampling and Test (Physical and Chemical) for Water and Waste Water (Revision of IS 3025)
9. BIS 1622:2008 - Drinking Water - Specification
10. BIS 3025:1964 - Methods of Sampling and Test (Physical and Chemical) for Water and Waste Water

M. A. / M. Sc. Geography-II (Semester -IV)

GEO 681 RP: Research Project- II

Research Project

Year	Semester	Group Vertical (V)	Course Type	Course and Course Code	Course Title	Total Credits	No. of Periods	Total lectures per week
II	III	Research Project	* Research	GEO 681 RP	Research Project- II	06	180	12

*course type- research project in based on the following guidelines for semester III & IV.

Objectives of the Course:

1. To learn the team work for research activities.
2. To explore a particular phenomenon, issue, or problem in depth, aiming to gain a comprehensive understanding of it.
3. To examine data, literature, or existing theories to identify patterns, relationships, or insights that contribute to the research question or problem statement.
4. To acquire skills in report writing and presentation of the research projects.

Guidelines:

Section A: Team and Guide

1) The team and guide will continue which declared in the semester III.
2) Group of maximum two students will be the team of one project.
3) PG Teacher will be research guide.

Section B: Execution of research project:

1) Data / sample collection
2) Data analysis
3) Literature review
4) Preparation of charts, graphs maps and images.
5) Preparation of results

Section C: Report writing

1) Report of research project will be prepared according to chapter scheme given in the proposal.
2) Reports should have a list of references and required appendices.
3) The team of students should prepare spiral bound copy for checking and finalization from the guide before final binding of the report.
4) Reports should be hard bound.

Section D: Submission and presentation

1) The final hard bound report of the research project should be submitted before 5 days of commencement of the practical examination of IV semester.
2) The team of the students should submit their research note book to the department through their guide along with the report.
3) The team of the students should prepare PowerPoint presentation and submit through their guide to the department along with the report.
4) The team of the students should present their report of research project with the help of Power Point presentation at the time of final examination.

Workload:

1. Assigned One to Two students for research projects under one research guide – its workload of 2 credits.
2. Assigned Three to more students for research projects under one research guide – its workload of 4 credits.

Course Outcome:

By the end of the course, students will be able to

COs 1: Work in a team for the execution of the research project.

COs 2: Understand a particular phenomenon, issue, or problem in-depth.

COs 3: Examine the data, literature, or existing theories to identify patterns, relationships, or insights that contribute to the research question.

COs 4: Prepare reports and presentation of results of conducted research projects.

Reference Books:

1. Gomez, B., & Jones III, J. P. (Eds.). (2010). *Research methods in geography: A critical introduction* (Vol. 6). John Wiley & Sons.
2. Gomez, B., & Jones, J. P. III (2010). Research Methods in Geography: A Critical Introduction. John Wiley and Sons.
3. Goudie, A. (Ed) (2004): Encyclopaedia of Geomorphology, Routledge, London.
4. Gregory, D., Johnston, R., Pratt, G., Watts, M. & Whatmore, S. (2009). The Dictionary of Human Geography. Singapore: Wiley-Blackwell.
5. Hay, I. (2000). Qualitative research methods in Human Geography.
6. Montello, D. and Sutton, P. (2013). An Introduction to Scientific Research Methods in Geography and Environmental Studies. SAGE Publications.
7. Warf, B. (Ed)(2006). Encyclopaedia of Human Geography. London: SAGE Publications.