M.A./M.Sc. Geography: 2-Years Semester Course Outline, 2004-05-06

### I SEMESTER

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Type (Core/Major/Minor)</th>
<th>Course Title</th>
<th>Credit</th>
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<tbody>
<tr>
<td>GMC 101</td>
<td>Theory (core) 1</td>
<td>Emerging Geographical Thought</td>
<td>4</td>
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<tr>
<td>GMC 102</td>
<td>Theory (core) 2</td>
<td>Physical Landscape and Hydrology</td>
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<tr>
<td>GMC 103</td>
<td>Theory (core) 3</td>
<td>Advanced Geography of India</td>
<td>4</td>
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<tr>
<td>GMP 104</td>
<td>Practical (core) 1</td>
<td>1. Physical Diagrams, Hydrology, &amp; Map Projections</td>
<td>3</td>
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<tr>
<td>GMP 105</td>
<td>Practical (core) 2</td>
<td>2. Spatial Analysis: Locational and Network</td>
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<tr>
<td>GMM 501</td>
<td>Elective (Minor) 1</td>
<td>1. Remote Sensing Basics</td>
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<tr>
<td>GMS 601</td>
<td>Seminar (Minor)</td>
<td>Assignment Based Seminar 1</td>
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### II SEMESTER

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<td>GMC 106</td>
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<td>Advanced Geomorphology</td>
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<tr>
<td>GMC 107</td>
<td>Theory (core) 6</td>
<td>Geography of Resources</td>
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<td>GMP 108</td>
<td>Practical (core) 3</td>
<td>3. Statistical Methods &amp; Data Processing</td>
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<td>GME 201</td>
<td>Elective (Major): 1</td>
<td>Special Group Theory Papers, One of the following:</td>
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<tr>
<td>GME 301</td>
<td>Special Group</td>
<td>Gr. I: 1. Population Geography</td>
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<td>GME 401</td>
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<td>Gr. II: 1. Resource Planning</td>
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<td>GMP 202</td>
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<tr>
<td>GMP 302</td>
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<td>Gr. I: 1. Population Geography</td>
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<td>GMP 402</td>
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<td>Gr. II: 1. Resource Planning</td>
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<tr>
<td>GMM 502</td>
<td>Elective (Minor) 2</td>
<td>2. Population and Development</td>
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<tr>
<td>GMC 110</td>
<td>Theory (core) 7</td>
<td>Environmental Studies</td>
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<tr>
<td>GMF 701</td>
<td>Field Training</td>
<td>Field Study &amp; Geographical Excursion (Duration: 2-3 weeks; Area, India: South/ Northwest, North)</td>
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<tr>
<td>GME 203</td>
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<td>GME 303</td>
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<td>GMP 304</td>
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<td>Gr. II: 2. Regional Planning</td>
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<td>GMS 603</td>
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IV SEMESTER

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<tr>
<td>GMC 112</td>
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<td>Interdisciplinary Research Methods and Techniques</td>
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<tr>
<td>GME 205</td>
<td>Elective (Major): 3 Special Group</td>
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<td>GME 305</td>
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<tr>
<td>GME 405</td>
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<tr>
<td>GME 305</td>
<td>Special Group Theory Papers, One of the following:</td>
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<tr>
<td>GME 405</td>
<td>Gr. I: 3. Urban Geography</td>
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<td>Gr. II: 3. Rural &amp; Urban Planning</td>
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<tr>
<td>GMP 206</td>
<td>Practical: 3 Elective (Major)</td>
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<tr>
<td>GMP 306</td>
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<tr>
<td>GMP 406</td>
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<tr>
<td>GMS 604</td>
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<td>Assignment Based Seminar</td>
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<tr>
<td>GMF 702</td>
<td>Field Survey</td>
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<td></td>
<td>Instrumental, and Socio-Economic</td>
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<tr>
<td>GMD 703</td>
<td>Dissertation</td>
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<td>Field Work: 2 + Dissertation: 4 + Viva Voce: 2</td>
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**TOTAL IV SEMESTER** 23

I to IV Semesters.

(1) Departmental CORE Courses (52 credits):
--Theory: 8 (each 4 credits), i.e. 32; Practical: 4 (each 3 credits), i.e. 12 = 44 credits.
--Assignment based Seminar (Major): 2 (each 2 credits) = 4 credits.
--Field Study: Field Training and Field Excursion: 1 = 2 credits.
--Field Survey: Instrumental and Socio-economic: 1 = 2 credits.

(2) Major Elective (Specialisation; 29 credits):
--Elective (Major) Special Group, Theory: 3 (each 4 credits) = 12 credits.
--Elective (Major) Special Group, Practical: 3 (each 3 credits) = 9 credits.

(3) Minor Elective (from other departments within the faculty, OR within the same department; 09 credits):
--Elective (Minor): 2 (each 3 credits) = 6 credits.
--Assignment based Seminar (Minor): 2 (each 1½ credits) = 3 credits.

SPECIAL GROUPS:
I. Population and Settlement Geography.
II. Applied Geography and Planning.
III. Cartography and Remote Sensing.
Emerging Geographical Thought

1. **Basic Frame and Concepts.** Man-Environment interaction: New Environmentalism; Concepts: Space, place, environment, time, and spatial organisation; Region, and regional typology; Culture and Cultural landscape.

2. **Modern Approaches.** Quantitative revolution and challenges; Philosophy and Geography: contributions of — Vidal de la Blache, and Carl Sauer; Humanistic & Phenomenological Geography — contributions of Yi-Fu Tuan; Literary geography: landscape as text.

3. **Contemporary Trends.** Qualitative paradigm; Behavioural revolution — Perception and cognition, mental maps; Marxism/ Radicalism and Welfare Approach; Modernism vs. Postmodernism; Poststructuralism and Postcolonialism.

4. **Indian Geography: Base & Trends.** Impact of postcolonialism and Gandhism on Indian geography; Gaia theory and links to Indian literature; Ancient Indian geography and scientific outlook (e.g. cultural astronomy); Future of Indian geography: problems, perspective and prospects.

**Books Recommended**


( 16 )
Physical Landscape and Hydrology:

1. **Bases of Physical Landscape.** Concept and types of Physical Landscape; Significance of Geomorphic processes, including plate tectonics in landforms development; Geological structure and climatic factors in the development of landforms.

2. **Landforms Development.** Interruption in the evolution of landforms: tectonic, climate, and base-level changes; Landforms development in various areas: Humid, Coastal, Karsts, and Peri-Glacial; River terraces: concept and types; Regional Geomorphology: Indo-Ganga plain, and Rajmahal Hills.

3. **Bases of Hydrology.** System application in hydrology; Hydrological cycle; Man’s influence on the hydrological cycle; Precipitation types, characteristics and measurements; Evaporation: factors affecting evaporation from free water surface and from soil; Evapotranspiration: estimation and its control.

4. **Water & its Disposition.** Soil moisture and its zones; Infiltration; Groundwater: occurrence, storage, recharge and discharge; Runoff: its sources and components, factors affecting runoff; River regimes; Hydrograph: components and separation.

Books Recommended


GMC-103. Theory (Core) Paper : 3

**Advanced Geography of India**

1. **Introduction.** Making of India through geological times, structure and relief; Drainage Systems and Water sheds; Physiographic divisions; Climate Characteristics: mechanism of the Indian Monsoon; Forests: types, distribution and utilisation.

2. **Population Characteristics.** Population growth: trends and pattern; Population: distribution and density; Sex and Literacy differentials; Ethnic composition; Trends of urbanisation; Population Policy.

3. **Agricultural Scene.** Agricultural characteristics and trends; Land holdings, land tenure, land consolidation and land reforms; Infrastructure: Irrigation, Power, Fertiliser, HYV Seeds and Farm technology; Green Revolution and its impact: White, Blue and Yellow revolutions;

4. **Industrial Resource Base.** Regional distribution and development potentials of mineral and power resources; New industrial policy: Globalisation and liberalisation; Industrial complexes and Industrial regions; Transport development: Rail and road; Geographical regions; Detailed study of the Middle Ganga Plain, and Karnataka Plateau regions.

**Books Recommended.**


**GMP 104. Practical (Core), Paper: 1**

**Physical Diagrams, Hydrology, and Map Projections**

1. **Physical Diagrams & Hydrology.** Advanced exercises on Geological Maps: folded and faulted structures, unconformable rock series; Hypsographic and Clinographic curves; Drainage basin analysis; Drawing of climatological water balance graph and determination of the components; Calculation of climatic indices: rainfall-runoff relationship; Hydro-graphs: Components and separation; Unit hydrograph.

2. **Map Projections.** Determination of Azimuth, Retro-azimuth and Great Circle distances on the earth: Construction of comparative scales for graticules on Mercator’s and Gall’s Projections; Determination of percentage of error in scale and area on selected projections.

**GMP 105. Practical (Core), Paper: 2**

**Spatial Analysis**

1. **Locational Analysis.** Absolute and relative location: spacing, indices of randomness, deviation and nature of dispersion; Nodes-Population clusters: the size continuum, size and shape; Hierarchies: Functional hierarchy of settlements and ordering; Interaction–movement and distance models; Service area and territory – serial polygons, interactions zones; Case of industrial and agricultural regions.

2. **Network Analysis.** Topologic structures: Branching, circuit and barrier networks; Geometric structures: Networks shape and density, pattern and order; Flow and network efficiency; Location of network routes and boundaries; Pattern of spatial and evolution and network transformation.
GMM 501. Elective (Minor) Theory, Paper: 1

Remote Sensing Basics

1. **Fundamentals.** Remote sensing: definition and scope; Electro-magnetic radiation: characteristics, interaction with matter and spectral regions; Types of remote sensing; Remote sensing regions and bands.

2. **Aerial photographs.** Aerial photos: types, scale, resolution; Stereoscopy; Geometric properties of aerial photos; Stereoscopic parallax; Relief displacement.

3. **Satellite Imagery.** Orbital characteristics of remote sensing satellites; General characteristics of remote sensing sensors, and remote sensing data.

4. **Interpretation and Application.** Elements of image and patterns interpretation; Elements of visual image processing (VIP); Digital Image Processing (DIP): pre-processing operations, enhancement and image classification; Remote sensing in resource mapping and environmental monitoring.

Books Recommended


( 20 )
SEMINAR – II
GMC-106. Theory (Core), Paper: 4

Advanced Geomorphology

1. Concepts. Recent observations on some fundamental concepts of geomorphology; Concept of time: cyclic, graded and steady state; Concept of morphogenetic regions; Concept of dynamic equilibrium; Recent trends in Geomorphology.

2. Drainage Basin & related aspects. Drainage-basin as geomorphic unit: morphometric laws; Denudation and morphochronology and dating of landscapes; Soil erosion and its measurement.

3. Theories & Techniques. Theories of hill-slope evolution; Erosion surfaces; Geomorphic Mapping techniques; Systems in geomorphology; Models in geomorphology.

4. Application in various fields. Geomorphic hazards and mitigation measures; Geomorphology and economic deposits; Geomorphology in engineering construction; Geomorphology in ground water studies; Soils and geomorphology.

Books Recommended


( 21 )
GMC-107. Theory (Core) Paper: 5

Geography of Resources

1. **Introduction and bases.** Concept and scope of Resource Geography; Resource: Concept and types; World resources: distribution and pattern; Land, water, mineral and power resources; Non-conventional sources of energy; Human resources; Resource base and its dynamism as related to stages of cultural, technological and economic development.

2. **Resource and uses.** The Limits to Growth; Resource Scarcity Hypothesis; World energy crisis; Resource conservation and management; Approaches to ecological, behavioural and integrated watershed management; Sustainable development; Resources, development and international politics.

3. **Theories of Resource uses.** Theories of agricultural location; Theories of industrial location – Weber, Hoover, and Lösch; Trade blocs.

4. **Regional Perspectives.** Resource regionalisation; World economic development; Concept of Developed and Developing nations; Concepts of North-South and First, Second, Third and Fourth Worlds.

Books Recommended

GMP 108. Practical (Core), Paper: 3.

Statistical Methods and Data Processing

1. **Statistical Methods.** The normal frequency distribution curve and its characteristics; Curve fitting; Sampling: sampling procedures, Random, Stratified random, Systematic and Cluster; Sampling distribution and the standard error; Estimates from sample measurements; Test of significance: Chi-square test, Student’s t-test, F-test, Analysis of variance; Analysis of time series.

2. **Data Processing.** Collection of data: methods, sources and types; Classification and tabulation of data; Data processing devices; Characteristics and component of a computer system; Binary arithmetic; Computer languages; Flow charting; Analysis and processing of data.

GMM 502. Elective (Minor), Theory Paper : 2

Population and Development

1. **Conceptual Frame.** Population as resource; Population and Development: a debate; Population and Ecosystem; Demographic transition.

2. **Historical background and Characteristics.** History of Human population; Relationship between population and food, energy; Debate on The Limits to Growth; Population characteristics: Developed and Developing countries (case study of India).

3. **Problems and Policies.** Optimum population; Family welfare and planning; Population policies in Developed and Developing countries (case of India).


Books Recommended :


**GMS 602. Seminar (Minor): 2**

Assignment Based seminar

**SEMESTER–III**

**GMC-109. Theory (Core), Paper: 6**

**GIS and its Application**

1. **Introduction and Bases.** Evolution of GIS; Definition and scope of GIS; Components of GIS; Approaches to GIS.

2. **Digital Representation of Geographical Data.** Geographical database: types and characteristics; Database management system; Spatial data formats and models: raster, vector, and geographic data representation and Digital Elevation Model (DEM).

3. **Data Quality and Data Standard.** Concept and definition of data quality; Components of geographic data quality; Map compilation and base maps; Generation of information product; Projection transformation.

4. **GIS Issues and Prospects.** Remote sensing and GIS Integration, GIS project planning and application; Issue of implementing GIS; Project evaluation (case studies); Trend of GIS development.

**Books Recommended**


GMC-110. Theory (Core), Paper: 7

Environmental Studies

1. **Bases.** Meaning and Scope of Environmental Geography; Approaches to Study of Environment; Types of Environment, Environment and Society, Environment and Development, Environmental perception and cognitive maps.

2. **Bio-Geography & Ecosystem.** Definition, Scope and Significance of Biogeography; Basic Ecological Principles; Geo-Biochemical Cycles- Carbon, Nitrogen, Oxygen and Phosphorus Cycles; Biome and Biomass; World Distribution of Plants and Animals; Biodiversity: Depletion and Conservation.

3. **Hazards & Changes.** Environmental hazards; Natural hazards: Landslides, Soil erosion, Droughts and Floods, Earthquakes; Man made hazards: Technological hazards, Global Climatic Changes, Global Warming, Green House effects, Ozone Depletion, Sedimentation in Rivers and Reservoirs.

4. **Pollution & Management.** Environmental Pollution: Pollutants’ sources and Types of pollution; Water, Soil, Air, and Noise pollution; Solid Waste Disposal; Environmental Pollution and Health; Environmental Education; Environmental Impact Analysis; Environmental Monitoring and Standards; Environmental Policy and Legislation; Environmental Management.

Books Recommended


GMP-111. Practical (Core), Paper: 4.

Remote Sensing, GIS, Air, Soil, and Water Analysis

Stereoscopic test; Interpretation of Stereograms and Stereopairs; Mapping for Land Use/ Land Cover; Determination of Photoscale; Border information on Landsat/ IRS Imagery; Visual interpretation of satellite imageries (Landsat/ IRS); Scanning; Digitisation; Editing; Base Map preparation.

Soil analysis: texture and structure; Water analysis: physical and chemical characteristics; Air analysis: estimation of SPM.
GMF 701. Field Training.

Field study & Geographical Excursion


Assignment Based seminar

SEMESTER–IV
GMC-112. Theory (Core), Paper: 8

Interdisciplinary Research Methods and Techniques

1. Framework of Research. Concept and significance of research in geography; Research approaches and choices: Empiricism, Positivism, Behaviourism; Inductive and Deductive approaches.

2. Planning the research and Data generation. Primary data and Secondary data; Data collection and arrangement; Research design; Participatory research; Planning and framing pilot/ research project; Survey-questionnaire: making of form and design.

3. Theories and Techniques. Model making; Application of System theory; Self-Organised Criticality (SOC) theory; Use of GPS; Application and relevance of statistical and cartographic techniques; Application of Computer and GIS.

4. Analysis, Writing and Dissemination. Production and arrangement of data and maps; Quantitative and Qualitative interpretations; Use of Writing Manuals (arranging themes, maintaining coherence, cross-comparison, concluding, referencing, noting); Proof marks and Marked proof; Report writing: a case study of heritage planning of Varanasi.

Books Recommended


**GMS 604. Seminar (Major): 4**

Assignment Based Seminar

**GMF-702. Field Survey: Instrumental, and Socio-Economic**

A. **Instrumental.** Surveying with the help of Theodolite and levelling by Dumpy Level; Solution of advanced survey problems; Use of GPS and Total Stations.

B. **Socio-Economic.** Making questionnaire format; Village and household survey and reporting.

**GMD-703. Dissertation (thematic as per the Special Group)**

**SPECIAL GROUPS**

Elective (Major), Group I:

Population and Settlement Geography

**SEMESTER-II**

**GME-201. Elective (Major, Group I) Theory: 1**

Population Geography

1. **Bases.** Population Geography: Concepts and Scope; Components of population growth: fertility, mortality and migration; Demographic transition; Migration: types, causes, consequences, ethnic movement, and theories; Age and sex structure; Concept of ageing: young, stationary and stable population.

2. **Characteristics.** Composition and characteristics of rural and urban population; Literacy: gender analysis and differentials; Working population: occupational structure; Socio-economic implications of population; Population characteristics of developed and developing countries.
3. **Theories.** Theories of population growth: Malthus, Neo-Malthusian, Marxian, Optimum population; Problems of population pressure and population explosion; Problems of declining and zero population growth; Interrelationship between population growth, environment, resources and development; Population Resource Region.

4. **Case of India.** India’s population: characteristics and regional variation; Population resource regions of India; Population Policy and Development planning: integration and prospects.

**Books Recommended**

GMP 202. Elective (Major, Group I), Practical: 1

Population Geography

1. Spatial systems and Global scenario. Population distribution maps: spheres, cubes, circles, realistically distribution dots, evenly distributed dots, smooth statistical surface, stepped statistical surface; Density maps by isopleths and isometric methods; Population survey: Census techniques and sampling techniques, Linear programming technique; Determination of centre of gravity of population distribution and Centrographic analysis of trend.

2. Studies from India. Construction of compound and superimposed pyramids showing age-sex structure, occupational pattern, rural-urban structure; Construction of population graphs and diagram (absolute and growth rate etc. using arithmetic, semi-log and log-graphs, Frequency graphs, Scatter diagrams, Log Linear diagrams, Deviational graphs, and Cumulative graph); Population potential maps and Population resource maps; Interpretation of population maps of the National Atlas of India, Population projection.

SEMESTER-III

GME-203. Elective (Major, Group I), Theory: 2

Geography of Rural Settlements


2. Spatiality and Histogenesis. Evolution and growth of rural settlements and their causes: Old and New worlds; Siting and location of rural settlements; Distribution, spacing, and nature of dispersion; Types and patterns; Morphology and Socio-spatial segregation; Rural-service centres: nature, hierarchy, service area, and interaction.

3. Rural Dwellings. Rural house types – origin, evolution and characteristics; Typology based on building materials, plans, uses and architectural style; House types and their characteristics in different geographical environments: Monsoon Asia and Arid zone.

4. Indian Village. Evolution and multiplicity; Regional morphological characteristics; Morphological interaction models: Religio-ritual, Secular-economic, and Sacred-economic interlocking system; Transformation and Planning of Indian village: models and plans.

Books Recommended


GMP 204. Elective (Major, Group I), Practical: 2

Geography of Rural Settlements

1. **Spatial Systems.** Size classification of rural settlements by scatter diagrams; Rural settlement distribution and types in India; Density function and pattern analysis of distribution of settlements: Randomness and spacing indices, testing Christaller Theory; Theoretical models of rural settlements and testing of different hypothesis;

2. **Studies from India.** Typological classification of rural settlements from maps; Rural Service Centres: indices, hierarchy, classification and ordering; Mapping the morphology of Indian villages; Planning of Indian Villages: models, plans and case studies.
Urban Geography

1. **Bases.** Meaning and scope of urban geography; Recent trends in urban geography; Urban population: characteristics, processes and trends of urbanisation; Methodology in urban studies; Origin and evolution of urban settlements; Distribution of urban centres.

2. **Characteristics.** Characteristics of cities in different historical periods (both industrial and pre-industrial); Urban transportation; Urban systems: Metropolitan areas, Conurbation and Megalopolises; Functions and functional classification of towns; Contributions of Banaras School and others.

3. **Spatiality and Models.** Size and spacing of cities: Rank-size rule; Law of the primate city; Urban hierarchies; Central Place Theory (Christaller, Lösch, Isard, and others); Urban land use and functional morphology: functional areas and peri-urban areas; Theories of Urban structure (Burgess, Hoyt, Harris & Ulmann, others, and cases from India).

4. **Issues and Planning.** Urban problems: environmental, urban poverty, slums, transportation, housing, crime; Million cities of India: Delhi; Planned cities: Chandigarh and Jaipur; Urban land use planning: study of urban development and Master Plans of Varanasi.

**Books Recommended**


( 34 )
Urban Geography

1. **Global Perspective.** Theoretical models of urban growth, infrastructure, community zone based on study of maps; Functional interpretation of urban morphology and town plan through the ages; Functional classification of towns based on population data on occupational structure; Town size and functional relations (scatter-diagram).

2. **Studies from India.** Structural and growth analysis of Indian cities and conurbations; Determination of urban hierarchy in an Indian region; Determination of population density gradient in urban areas; Application of rank-size rule in a selected area of India; Urban survey and mapping of functional areas of cities; Field mapping of urban structure and functions.

**Elective (Major), Group II**

**APPLIED GEOGRAPHY AND PLANNING**

Semester-II

**GME-301: Elective (Major, Group II), Theory: 1**

**Resource Planning**

1. **Basic framework.** Concept, purpose and scope of resource planning; Methods and techniques of resource appraisal; Sustainable development: theory and practice; Human resource development; Resource planning and policy models.

2. **Conservation.** Principles of resource conservation; Resource management; Conservation and planning of resources: land, soil, water, forest, and minerals (with special reference to India).

3. **Indian Perspective.** Resource utilisation and development; Impact of resource utilisation on environment; Environmental Planning and Policy in India; Resource potentials and Resource regions; Agriculture region; Population resource region.

4. **Case Study of India.** Resource planning units and development strategies: Damodar Valley, National Capital Region.

**Books Recommended**

Resource Planning

Population Resource region – a case study; Demographic transition model: a case study; Agricultural efficiency and Agricultural regions: Uttar Pradesh; National Capital Region: A Resource Appraisal Planning Unit; Scatter diagram and Regression: Energy, Human resources and Economic development.
Regional Planning

1. **Fundamentals.** Concept, nature and scope of regional planning; Methods of regional planning; Different approaches to regional planning; Planning regions: concept and types; Methods of delimitation; Planning regions of India; Regional policies in India.

2. **Conceptual Outlook.** Regional planning and National Development; Economic development and Regional Development; Regional disparity and regional diversity; Production Processes and cycles; Regional economic complexes; Inter-regional and Intra-regional functional interactions; Regional disparities in India.

3. **Approaches.** Approaches to Integrated Regional Planning at different levels: local, regional and national; Multi-level planning in India: State, District and Block level planning; Planning for Tribal, Agricultural, Industrial and Urban (Metropolitan) regions.

4. **Development Perspective.** Service and market centres planning; Growth Centre and Regional development with reference to India and France; Decentralised planning: themes and issues; Regional planning: Development strategies in the 21st century, Developed nations and Developing nations.

**Books Recommended**


(38)
GMP 304. Elective (Major, Group II), Practical: 2

Regional Planning
Regional planning of a given area: District planning; Service centre planning: Micro Level Planning; Central place hierarchy and Growth centre in regional development; Delineation of City region/Umland: a case study; Identification and demarcation of axial growth: a case study.

Semester-IV
GME-305. Elective (Major, Group II), Theory: 3

Rural and Urban Planning

(A) Rural Planning
1. Meaning, concept and scope of rural development and planning; Approaches to rural development; Policies and paradigms of rural development programmes; Basic infrastructures for rural development; People’s participation in rural planning and rural industrialisation.
2. Rural Land use: concepts, principles and classification; Rural land use changes and systems in India; Carrying capacity of land; Agricultural efficiency;

(B) Urban Planning
3. Meaning, concept and scope of urban planning; Urban planning: methods and techniques; Urban land use: models and planning; Urban renewal and re-development of towns; Urban transportation planning.

Books Recommended

( 39 )


GMP 306. Elective (Major, Group II), Practical: 3

Rural and Urban Planning

1. **Rural Planning.** Rural land use maps (India, and UK); International colour scheme and its applicability in Indian context; Intensive rural land use survey and application of locational theories; Land capability: Its determination and mapping; Sample Field mapping and planning of land use in given rural areas.

2. **Urban Planning.** Preparation of urban land use maps from topo-sheets; Diagrammatic representation of internal structure of urban centres based on traditional theories; Examination of Master Plans of Towns from different areas; Planning a New Town (considering urban land use), neighbourhood and community centre plan; Preparation of redevelopment and development sketch plan.
Elective (Major), Group III
Cartography and Remote Sensing

SEMESTER-II
GME-401. Elective (Major, Group III), Theory: 1

Advanced Cartography

1. **Measuring the Earth.** Properties of sphere; The Earth: its shape and size; Coordinate reference system on the sphere; Celestial coordinates: Equatorial system, Horizon system; Geographical Coordinates and Grid system; UTM grids.

2. **Survey.** Curvature of the Earth and its effect on survey and levelling; Geographical Positioning System (GPS); Trigonometrical surveying; Calculation of height by Levelling.

3. **Map Projections.** Choice and Classification of map projections; Derivations of formulae for construction of: Conical equal area with one and two standard parallels (Lambert's and Alber’s); International Map projection.

4. **Science of Cartography.** History and development of Cartography; Science of cartography and Communication theory; Sources of cartographic data; Cartographic techniques and methods in preparation of diagrams and maps; Thematic mapping; Soil and Vegetation maps, Environmental maps and Population maps (rural & urban); Atlas Mapping; Pre and Post Census mapping; Automation and Computer cartography.

Books Recommended


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**GMP-402. Elective (Major, Group III), Practical: 1**

**Advanced Cartography**

1. **Survey & Map Projections.** Calculation of height by levels and Theodolite; Contour planning; Construction of map projections (mathematical method): Conical Equal Area with one and two standard parallels (Lambert’s and Alber’s), International and Gnomonic Equatorial.
2. **Cartographic Methods.** Enlargement and reduction methods; Designing and preparation of a map on various scales; Representation of statistical data by various cartographic methods; Preparation of one general purpose map and one special purpose map.

**SEMESTER-III**

**GME-403. Elective (Major, Group III), Theory: 2**

**Remote Sensing: Aerial Photographs**

1. Flight planning; Parallax equation; Principles of stereo-photogrammetry (inner and exterior orientation); Digital Photogrammetry; Digital orthophotos.
2. Nature of qualitative information in aerial photographs; Philosophy and sequence in air photo interpretation; Elements of air photo pattern – landforms, drainage, erosion details, graytones; Elements of image interpretation.
3. Interpretation keys and their types; Aerial mosaics; Air-based multispectral and Thermal sensing data: Characteristics, interpretation, application, and advantages.
4. Aerial photo interpretation in general resource evaluation; Environmental monitoring and mapping; Land use/Land cover mapping; Ground water investigations; Geomorphological studies and mapping.

**Books Recommended**


**GMP-404. Elective (Major, Group III), Practical: 2**

**Remote Sensing: Aerial Photographs**
- Interpretation of Vertical Aerial Photograph; Determination of height of objects from single photographs and stereopairs; Thematic mapping from Aerial photographs for Geomorphology: Lithology and structure, Land use/ Land cover, Ground water potential zones, Forest types, Soil and Soil erosion.

**SEMESTER-IV**

**GME-405 Elective (Major, Group III), Theory: 3**

**Remote Sensing: Satellite Imagery**
1. Spectral characteristics of common natural objects; Atmospheric effects on remote sensing data; Spectral signatures and Spectral response patterns; Resolutions of Remote Sensing data
2. Characteristics of Remote sensing platforms and sensors; Indian Remote Sensing Satellites and sensors; Microwave Remote sensing data: characteristics, interpretation and application.
3. Image processing (IP) techniques: Visual (VIP) and Digital (DIP); Image rectification/ pre-processing; Image enhancement; Image classification: supervised and unsupervised.
4. Satellite Image interpretation in terrain and resource evaluation; Environmental monitoring; Land Use/ Land Cover mapping; water and forest; Lithology and Structure; Remote Sensing and GIS.

**Books Recommended:**

**GMP-406. Elective (Major, Group III), Practical: 3**

**Remote Sensing: Satellite Imagery**

Preparation of Keys from satellite imageries; Thematic mapping through satellite imageries for geomorphology, Land Use/ Land Cover, Ground water potential zones, Lithology and Structure, Soil and Forest types.

Digital image processing (DIP) techniques: Image enhancement; Image classification: Supervised and Unsupervised.