**Annexure-I**

**Kurukshetra University, Kurukshetra**
**(Established by the State Legislature Act XII of 1956)**
**('A+' Grade, NAAC Accredited)**

।। योगस्थः कुरु कर्माणि।।
समबुद्धि व योग युक्त होकर कर्म करो

(Perform Actions while Stead fasting in the State of Yoga)

**DEPARTMENT OF GEOGRAPHY**

CBCS CURRICULUM (2020-21)
Program Name: M.Sc. (Geography)
(For the Batches Admitted From 2020-2021)

# OUTCOME BASED EDUCATION SYSTEM

**CBCS CURRICULUM (2020-21)**
**Program Name: M.Sc. (Geography)**
**(For the Batches Admitted From 2020-2021)**

## VISION

Be globally acknowledged as a distinguished centre of academic excellence.

## MISSION

To prepare a class of proficient scholars and professionals with ingrained human values and commitment to expand the frontiers
of knowledge for the advancement of society.

## DEPARTMENT VISION AND MISSION

### VISION

- To become a model department as a Centre of quality education, research with innovation and recognition at National and International level for serving the society.

### MISSION

- **M1:** To provide quality education to aspiring young minds for improving their skills, inculcating values, creating leadership qualities and enhance research with innovative methods.
- **M2:** To produce young geographers who would contribute in the areas of higher education, regional and national planning, development, environment, ethics and sustainable environment development.
- **M3:** To develop Teaching-Learning methods which can produce socially committed professionals who contribute effectively in nation building.

### *Mapping of University Vision and Mission to Department Vision and Mission*

Acclaimed as modal Centre of Learning and Research by

| **University Vision and Mission** | **Department Vision and Mission** |
|---|---|
| High quality knowledge delivery through state of art infrastructure and ethical values to the students | **Yes** |
| Students excellence will make them professionals and innovators emerging as national and global leaders | **Yes** |
| Research and development will help in furtherance of faculty knowledge | **Yes** |

**Program Outcomes (PO) with Post Graduate Attributes**

Programme outcomes are attributes of the post graduates from the programme that are indicative of the post graduates' ability and competence to work after being a qualified professional geographer upon post-graduation. Program outcomes are statements that describe what students are expected to know or do by the time of post-graduation, they must relate to knowledge and skills that the students acquire from the programme. The achievement of all outcomes indicates that the student is well prepared to achieve the program educational objectives down the road. The department of geography has the following eleven PO's. The course syllabi and the overall curriculum have been designed to achieve these outcomes:

## Program Outcomes (PO) for Post Graduate Programmes (CBCS) in the Faculty of Sciences, Kurukshetra University, Kurukshetra

| | | |
|---|---|---|
| **PO1** | Knowledge | Capable of demonstrating comprehensive disciplinary knowledge gained during course of study |
| **PO2** | Research Aptitude | Capability to ask relevant/appropriate questions for identifying, formulating and analyzing the research problems and to draw conclusion from the analysis |
| **PO3** | Communication | Ability to communicate effectively on general and scientific topics with the scientific community and with society at large |
| **PO4** | Problem Solving | Capability of applying knowledge to solve scientific and other problems |
| **PO5** | Individual and Team Work | Capable to learn and work effectively as an individual, and as a member or leader in diverse teams, in multidisciplinary settings. |
| **PO6** | Investigation of Problems | Ability of critical thinking, analytical reasoning and research-based knowledge including design of experiments, analysis and interpretation of data to provide conclusions |
| **PO7** | Modern Tool usage | Ability to use and learn techniques, skills and modern tools for scientific practices |
| **PO8** | Science and Society | Ability to apply reasoning to assess the different issues related to society and the consequent responsibilities relevant to the professional scientific practices |
| **PO9** | Life-Long Learning | Aptitude to apply knowledge and skills that are necessary for participating in learning activities throughout life |
| **PO10** | Ethics | Capability to identify and apply ethical issues related to one's work, avoid unethical behaviour such as fabrication of data, committing plagiarism and unbiased truthful actions in all aspects of work |
| **PO11** | Project Management | Ability to demonstrate knowledge and understanding of the scientific principles and apply these to manage projects |

## Program Specific Outcomes (PSO's):

- **PSO1:** Understanding the human and physical environmental phenomena using specialized knowledge pertaining to various sub-fields of geography.

- **PSO2:** Ability to use the state of art geospatial knowledge for resolving the social, economic, cultural and physical problems of the society.

- **PSO3:** Learning the techniques of data acquisition, data processing and interpretation of locational and spatial data.

- **PSO4:** Ability to demonstrate and communicate the geographical knowledge and inculcate analytical ability, research aptitude and relevant skills.

**Kurukshetra University Kurukshetra**
**Scheme of Examination and Syllabus for M. Sc.**
**under Choice Based Credit System w.e.f. 2020-21 in phased manner**
**Subject: Geography**

| Course Code and Type | Nomenclature of the Paper | Credits | Hours/Week | External Assessment Marks | Internal Assessment Marks | Total Marks | Duration of Exam. |
|---|---|---|---|---|---|---|---|
| **Semester-I** | | | | | | | |
| M-GEO-101 (core) | Climatology | 4 | 4 | 70 | 30 | 100 | 3 Hours |
| M-GEO-102 (core) | Geography of India | 4 | 4 | 70 | 30 | 100 | 3 Hours |
| M-GEO-103 (core) | Economic Geography | 4 | 4 | 70 | 30 | 100 | 3 Hours |
| M-GEO-104 (core) | Statistical Methods in Geography | 4 | 4 | 70 | 30 | 100 | 3 Hours |
| M-GEO-105 (core) | Cartographic Methods in Geography (Theory) | 2 | 2 | 35 | 15 | 50 | $2\frac{1}{2}$ Hours |
| M-GEO-106 (core) | Cartographic Methods in Geography (Practical) | 4 | 8 | 70 | 30 | 100 | 3 Hours |
| **Semester-II** | | | | | | | |
| M-GEO-201 (core) | Geomorphology | 4 | 4 | 70 | 30 | 100 | 3 Hours |
| M-GEO-202 (core) | Population Geography | 4 | 4 | 70 | 30 | 100 | 3 Hours |
| M-GEO-203 (core) | Regional Development and Planning with Special Reference to India | 4 | 4 | 70 | 30 | 100 | 3 Hours |
| M-GEO-204 (core) | Agricultural Geography with Special Reference to India | 4 | 4 | 70 | 30 | 100 | 3 Hours |
| M-GEO-205 (core) | Morphometric Analysis (Theory) | 2 | 2 | 35 | 15 | 50 | $2\frac{1}{2}$ Hours |
| M-GEO-206 (core) | Morphometric Analysis (Practical) | 4 | 8 | 70 | 30 | 100 | 3 Hours |
| M-GEO-OE-204 | General Geography of India | 2 | 2 | 35 | 15 | 50 | $2\frac{1}{2}$ Hours |
| **Semester III** | | | | | | | |
| M-GEO-301 (core) | Geography and Ecosystems | 4 | 4 | 70 | 30 | 100 | 3 Hours |
| M-GEO-302 (core) | Field Methods in Geography (Socio-economic) (Theory) | 2 | 2 | 35 | 15 | 50 | $2\frac{1}{2}$ Hours |
| M-GEO-303(i) (elective) | Urban Geography | 4 | 4 | 70 | 30 | 100 | 3 Hours |
| M-GEO-303(ii) (elective) | Geography of Wellbeing with Special Reference to India | 4 | 4 | 70 | 30 | 100 | 3 Hours |
| M-GEO-303(iii) (elective) | Fluvial Geomorphology | 4 | 4 | 70 | 30 | 100 | 3 Hours |
| M-GEO-303(iv) (elective) | Climate Change and Earth Systems | 4 | 4 | 70 | 30 | 100 | 3 Hours |
| M-GEO-303 (v) (elective) | Resource Geography | 4 | 4 | 70 | 30 | 100 | 3 Hours |
| M-GEO-304 (i) (elective) | Political Geography | 4 | 4 | 70 | 30 | 100 | 3 Hours |
| M-GEO-304 (ii) (elective) | Geography of Rural Settlements | 4 | 4 | 70 | 30 | 100 | 3 Hours |
| M-GEO-304 (iii) (elective) | Soil Geography | 4 | 4 | 70 | 30 | 100 | 3 Hours |
| M-GEO-304 (iv) (elective) | Geography and Disaster Management | 4 | 4 | 70 | 30 | 100 | 3 Hours |
| M-GEO-304 (v) (elective) | Biogeography | 4 | 4 | 70 | 30 | 100 | 3 Hours |
| M-GEO-305 (core) | Introduction to Remote Sensing (Theory) | 2 | 2 | 35 | 15 | 50 | $2\frac{1}{2}$ Hours |
| M-GEO-306 (core) | Introduction to Remote Sensing (Practical) | 4 | 8 | 70 | 30 | 100 | 3 Hours |
| M-GEO-307 (core) | Project Report Based on Field Survey | 4 | 4 | 70 | 30 | 100 | 3 Hours |
| M-GEO-OE-304 | General Geography of World | 2 | 2 | 35 | 15 | 50 | $2\frac{1}{2}$ Hours |
| **Semester IV** | | | | | | | |
| M-GEO-401 (core) | Geographical Thought | 4 | 4 | 70 | 30 | 100 | 3 Hours |
| M-GEO-402 (core) | Hydrology and Oceanography | 4 | 4 | 70 | 30 | 100 | 3 Hours |
| M-GEO-403(i) (elective) | Regional Geography of India with Special Reference to Haryana | 4 | 4 | 70 | 30 | 100 | 3 Hours |
| M-GEO-403 (ii) (elective) | Health Geography with Special Reference to India | 4 | 4 | 70 | 30 | 100 | 3 Hours |
| M-GEO-403 (iii) (elective) | Social Geography with Special Reference to India | 4 | 4 | 70 | 30 | 100 | 3 Hours |
| M-GEO-403(iv) (elective) | Coastal Geomorphology | 4 | 4 | 70 | 30 | 100 | 3 Hours |
| M-GEO-403 (v) (elective) | Tropical Climatology | 4 | 4 | 70 | 30 | 100 | 3 Hours |
| M-GEO-404 (i) (elective) | Gender Geography | 4 | 4 | 70 | 30 | 100 | 3 Hours |
| M-GEO-404 (ii) (elective) | Geography of Tourism with Special Reference to India | 4 | 4 | 70 | 30 | 100 | 3 Hours |
| M-GEO-404 (iii) (elective) | Cultural Geography | 4 | 4 | 70 | 30 | 100 | 3 Hours |
| M-GEO-404 (iv) (elective) | Geography of Water Resources | 4 | 4 | 70 | 30 | 100 | 3 Hours |
| M-GEO-404 (v) (elective) | Urbanization in India | 4 | 4 | 70 | 30 | 100 | 3 Hours |
| M-GEO-405 (core) | Fundamentals of Geographical Information Systems (Theory) | 2 | 2 | 35 | 15 | 50 | $2\frac{1}{2}$ Hours |
| M-GEO-406 (core) | Fundamentals of Geographical Information Systems (Practical) | 4 | 8 | 70 | 30 | 100 | 3 Hours |

**Semester-I**
**Core Course Code: M-GEO-101**
**Core Course Name: Climatology**

**Time: 3 Hours** | **Total Marks : 100**
**Credits: 4** | **External Assessment Marks : 70**
**Internal Assessment Marks : 30**

**Course Outcomes (COs):**

**M-GEO-101.1**: Enhancement of knowledge about atmospheric constituents and structure.
**M-GEO-101.2:** Development of scientific understanding about climatic elements and their characteristics.
**M-GEO-101.3:** Sharpens the understanding about atmospheric moisture, stability, instability and weather systems.
**M-GEO-101.4:** Enrichment of knowledge about climatic classification, climate change and global warming.

**Note for Paper Setters:** Question 1 is compulsory comprising of seven sub parts (two marks for each sub part), to be answered in 25-30 words. There will be eight long questions, two from each unit. The candidate has to answer four long questions, at least one question from each unit. All questions carry equal marks.

**UNIT-I**

1. Definition of weather and climate; Climatology and Meteorology.
2. Origin, composition and structure of atmosphere.
3. Solar radiation, greenhouse effect, heat budget and temperature distribution.

**UNIT-II**

4. Atmospheric pressure and its distribution pattern.
5. Theories of general circulation and planetary winds.
6. Walker circulation- ENSO and La Nina, origin of monsoons and jet streams.

**UNIT-III**

7. Atmospheric Moisture: humidity, evaporation, condensation; precipitation formation theories and types of precipitation, acid rain.
8. Stability and instability of atmosphere, air masses and fronts.
9. Weather systems: Origin and characteristics of extra tropical and tropical cyclones.

**UNIT-IV**

10. Climatic classification: Bases of climatic classification by Koeppen, Trewartha and Thornthwaite.
11. Climatic change: pattern, evidences and theories of climate change.
12. Global warming and its impacts on earth systems.

**Suggested Readings:**


1. Athrens, C. D. Meteorology Today: An Introduction to Weather, Climate and Environment, West Publishing Co., 1994
2. Barry, R. G. and Chorley, R. J. Atmosphere, Weather and Climate, Marth Ren, 2010.
3. Critchfield, H. J. General Climatology, Prentice Hall of India, New Delhi, 1987.
4. Collins, J.M. Climatology, Oxford, 2014.
5. Das, P.K. The Monsoons, National Book Trust, New Delhi, 1984.
6. Lal, D.S. Climatology, Chaitanya Publishing House, Allahabad, 1966.
7. Lutgens, F.K. and Tarbuck, E.J. The Atmosphere: An Introduction to Meteorology, Prentice Hall of India, New Delhi, 2010.
8. Miller, A.A. Climatology, Methuen and Co., London, 1979.
9. Oliver, J.E. and Hidore, J.J. Climatology: An Atmospheric Science, Pearson Education Inc. New Delhi, 2003.
10. Ram Sastry, AA, Weather and Weather Forecasting, Publication Division, New Delhi.
11. Trewartha G. T., An Introduction to Climate, McGraw Hill Company, New York, 1980.


**Mapping of Course Outcomes to Program Outcomes (Climatology)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-101.1 | 3.0 | 3.0 | 2.0 | 3.0 | 2.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 |
| M-GEO-101.2 | 3.0 | 3.0 | 2.0 | 3.0 | 2.0 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 2.0 |
| M-GEO-101.3 | 3.0 | 3.0 | 2.0 | 2.0 | 2.0 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 2.0 |
| M-GEO-101.4 | 3.0 | 3.0 | 3.0 | 2.0 | 2.0 | 2.0 | 2.0 | 3.0 | 3.0 | 2.0 | 1.0 |
| Average | 3.0 | 3.0 | 2.3 | 2.5 | 2.0 | 2.8 | 2.8 | 3.0 | 3.0 | 2.3 | 1.8 |

**Mapping of Course Outcomes to Program Specific Outcomes (Climatology)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-101.1 | 3.0 | 3.0 | 2.0 | 3.0 |
| M-GEO-101.2 | 3.0 | 3.0 | 3.0 | 3.0 |
| M-GEO-101.3 | 3.0 | 3.0 | 3.0 | 3.0 |
| M-GEO-101.4 | 3.0 | 2.0 | 3.0 | 3.0 |
| Average | 3.0 | 2.8 | 2.8 | 3.0 |

**Semester-I**
**Core Course Code: M-GEO-102**
**Core Course Name: Geography of India**

**Time: 3 Hours** | **Total Marks : 100**
**Credits: 4** | **External Assessment Marks : 70**
**Internal Assessment Marks : 30**

**Course Outcomes (COs):**

**M-GEO-102.1**: Provides understanding about the physical structure of India.
**M-GEO-102.2:** Enrichment of understanding about spatial organization of agriculture and irrigation systems.
**M-GEO-102.3:** Acquaintance with geographical distribution and production of major resources.
**M-GEO-102.4:** Enhancement of knowledge about spatial distribution of industries and international trade of India.

**Note for Paper Setters:** Question 1 is compulsory comprising of seven sub parts (two marks for each sub part), to be answered in 25-30 words. There will be eight long questions, two from each unit. The candidate has to answer four long questions, at least one question from each unit. All questions carry equal marks.

**UNIT-I**

1. Physiography: relief characteristics and physiographical divisions
2. Drainage systems and their functional significance.
3. Climate: characteristics, seasons and climatic regions of India.
4. Soil and vegetation types: their distribution, characteristics and conservation.

**UNIT-II**

5. Agriculture: major characteristics, agricultural development.
6. Problems of Indian agriculture.
7. Irrigation: types, major projects with reference to Bhakra Nangal, Narmada and Damodar Valley Projects.

**UNIT-III**

8. Production, distribution, status of use and conservation of metallic minerals: iron ore and bauxite.
9. Production, distribution, status of use and conservation of non-metallic minerals: mica and manganese.
10. Production, distribution, status of use and conservation of following power resources: coal, petroleum and hydropower

**UNIT-IV**

11. Production and distribution of (a) iron and steel (b) cotton textile (c) sugar and (d) automobile industry.
12. Major industrial regions and their characteristics.
13. International trade: major exports and imports.

**Suggested Readings:**


1. Dubey, R. N.,1974: Economic Geography of India, Kitab Mahal, Allahabad
2. Hussain Majid (2015): Geography of India, Mc Graw Hill Education.
3. Joshi, H. L.,1990: Industrial Geography of India, Rawat Publications, Jaipur
4. Nag, P. and Sengupta, S., 1992: Geography of India, Concept publications. Co., New Delhi.
5. Singh, R. L.: India: A Regional Geography, N.G.S.I., Varanasi, 1971
6. Sharma, T. C. and Coutinho, O. 1988: Economic and Commercial Geography of India. Vikas Publishing House Pvt. Ltd, New Delhi.
7. Singh, S. and Saroha, J. 2019. Geography of India, Mc Graw Hill Education.
8. Tiwari, R. C.: Geography of India, Prayag Pustak Bhawan, Allahabad.


**Mapping of Course Outcomes to Program Outcomes (Geography of India)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-102.1 | 3.0 | 1.0 | 2.0 | 1.0 | 2.0 | 1.0 | 1.0 | 1.0 | 3.0 | 1.0 | 1.0 |
| M-GEO-102.2 | 3.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-102.3 | 3.0 | 1.0 | 2.0 | 2.0 | 2.0 | 1.0 | 1.0 | 1.0 | 3.0 | 1.0 | 1.0 |
| M-GEO-102.4 | 3.0 | 1.0 | 2.0 | 2.0 | 2.0 | 1.0 | 1.0 | 2.0 | 3.0 | 1.0 | 1.0 |
| Average | 3.0 | 1.3 | 2.0 | 1.8 | 2.0 | 1.3 | 1.3 | 1.5 | 3.0 | 1.0 | 1.3 |

**Mapping of Course Outcomes to Program Specific Outcomes (Geography of India)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-102.1 | 3.0 | 1.0 | 1.0 | 1.0 |
| M-GEO-102.2 | 3.0 | 1.0 | 2.0 | 2.0 |
| M-GEO-102.3 | 3.0 | 1.0 | 2.0 | 2.0 |
| M-GEO-102.4 | 3.0 | 1.0 | 2.0 | 2.0 |
| Average | 3.0 | 1.0 | 1.8 | 1.8 |

**Semester-I**
**Core Course Code: M-GEO-103**
**Core Course Name: Economic Geography**

**Time: 3 Hours** | **Total Marks : 100**
**Credits: 4** | **External Assessment Marks : 70**
**Internal Assessment Marks : 30**

**Course Outcomes (COs):**

**M-GEO-103.1**: Provides understanding about the location and distribution of economic activities.
**M-GEO-103.2:** Familiarization with location theories of economic activities.
**M-GEO-103.3:** Acquaintance with the spatial organization of world economies.
**M-GEO-103.4:** Knowledge about trade blocs, trends in trade and various processes of globalization.

**Note for Paper Setters:** Question 1 is compulsory comprising of seven sub parts (two marks for each sub part), to be answered in 25-30 words. There will be eight long questions, two from each unit. The candidate has to answer four long questions, at least one question from each unit. All questions carry equal marks.

**UNIT-I**

1. Definition, nature, scope, importance, recent trends and approaches in economic geography.
2. Relationship of economic geography with economics.
3. Economic activities and their classification.

**UNIT-II**

4. Network structure and economic activities, impact of transport on economic activities, spatial variation in production and transport cost.
5. Location theories of Weber, Losch, Christaller, Ullman and Krugman.

**UNIT-III**

6. World Economies: bases of classification, patterns and characteristics of developed and developing economies of the world.
7. Economic development: meaning, evolution, goals, measures, patterns, problems and theories.

**UNIT-IV**

8. Globalization and recent trends in pattern of international trade.
9. Emergence of a new global economy-transnational integration and its spatial outcomes.
10. Major regional trade blocks of the world, free trade initiatives (GATT, UNCTAD, WTO).

**Suggested Readings:**


1. Gautam, A. 2010. Advanced Economic Geography. Sharda Pustak Bhawan, Allhabad.
2. Hartshorne, T. A. and Alexander, J. W. 2001. Economic Geography. Prentice Hall of India. New Delhi.
3. Hudson, R. 2005. Economic Geography. Sage Publication, New Delhi.
4. Jones, C. F. and Darkenwarld, G. G. Economic Geography. The Macmillan and Company. New York.
5. Knox, P. 2003. The Geography of World Economy. Arnold, London.
6. Saxena, H.M. 2013. Economic Geography. Rawat Publications, Jaipur.
7. Wheeler, J.O. and Muller, P.O. 1985. Economic Geography. John Wiley and Sons. New York.


**Mapping of Course Outcomes to Program Outcomes (Economic Geography)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-103.1 | 3.0 | 3.0 | 3.0 | 1.0 | 3.0 | 2.0 | 1.0 | 3.0 | 3.0 | 2.0 | 3.0 |
| M-GEO-103.2 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 3.0 | 1.0 | 3.0 |
| M-GEO-103.3 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 1.0 | 3.0 | 3.0 | 1.0 | 3.0 |
| M-GEO-103.4 | 3.0 | 2.0 | 3.0 | 2.0 | 3.0 | 3.0 | 1.0 | 3.0 | 3.0 | 2.0 | 3.0 |
| Average | 3.0 | 2.8 | 3.0 | 2.3 | 3.0 | 2.5 | 1.3 | 3.0 | 3.0 | 1.5 | 3.0 |

**Mapping of Course Outcomes to Program Specific Outcomes (Economic Geography)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-103.1 | 3.0 | 3.0 | 2.0 | 3.0 |
| M-GEO-103.2 | 3.0 | 3.0 | 2.0 | 3.0 |
| M-GEO-103.3 | 3.0 | 3.0 | 3.0 | 3.0 |
| M-GEO-103.4 | 3.0 | 3.0 | 2.0 | 3.0 |
| Average | 3.0 | 3.0 | 2.3 | 3.0 |

**Semester-I**
**Core Course Code: M-GEO-104**
**Core Course Name: Statistical Methods in Geography**

| | |
|---|---|
| **Time: 3 Hours** | **Total Marks : 100** |
| **Credits: 4** | **External Assessment Marks : 70** |
| | **Internal Assessment Marks : 30** |

**Course Outcomes (COs):**

**M-GEO-104.1**: Introduction to tools of quantitative information and data.
**M-GEO-104.2:** Enhancement of knowledge about statistical analysis of spatial pattern from geographical data.
**M-GEO-104.3:** Enrichment of knowledge about inferential data analysis and errors associated with it.
**M-GEO-104.4:** Acquaintance with bivariate and multivariate analytical techniques.

**Note for Paper Setters:** Question 1 is compulsory comprising of seven sub parts (two marks for each sub part), to be answered in 25-30 words. There will be eight long questions, two from each unit. The candidate has to answer four long questions, at least one question from each unit. All questions carry equal marks.

**UNIT-I**

1. Descriptive statistics: histogram and frequency curve, measures of central tendency: mean, median, mode, Partitioned values: quartiles and deciles, comparison of mean, median and mode
2. Measures of dispersion: absolute measures: range, quartile deviation, mean deviation, standard deviation, relative measure of dispersion: coefficient of variation

**UNIT-II**

3. Normal curve as a probability distribution: characteristics and area under curve
4. Measure of inequality: location quotient and Lorenz curve.
5. Sampling: theory, methods, distribution and chance errors.

**UNIT-III**

6. Bivariate analysis: scatter diagram, correlation analysis, Spearman's rank correlation and Karl Pearson's correlation coefficient, test of significance.
7. Simple linear regression model: properties of least square estimate, coefficient of determination

**UNIT-IV**

8. Residuals and their mapping
9. Basics of multivariate analysis: correlation matrix, partial and multiple correlation

**Suggested Readings:**


1. Gregory, S. Statistical Methods and the Geographers, Longman, London, 1964.
2. Gupta, C. B. An Introduction to Statistical Methods, Vikas Publishing House, Delhi, 1974.
3. Johnston, R.J. Multivariate Statistical Analysis in Geography, Longman Scientific and Technical, John Wiley & Sons, 1989.
4. Mahmood, A. Statistical Methods in Geographical Studies, Rajesh Publications, New Delhi, 1993.
5. Paul, S.K. Statistics for Geoscientists: Techniques and Applications, Concept Publishing Company, New Delhi, 1998.
6. Houshmand, A.R. Statistical Methods for Environmental and Agricultural Sciences, CRC Press, New York, 1998.
7. Levin, J and Fox, J.A. Elementary Statistics in Social Research, Pearson Education, New Delhi, 2006.
8. Rogerson. P.A. Statistical Methods for Geography, Sage Publication, New Delhi, 2010.
9. Sarkar, A. Quantitative Geography: Techniques and Presentations. 2013.


**Mapping of Course Outcomes to Program Outcomes (Statistical Methods in Geography)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-104.1 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 3.0 | 3.0 | 2.0 | 2.0 | 3.0 |
| M-GEO-104.2 | 3.0 | 3.0 | 2.0 | 3.0 | 2.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 |
| M-GEO-104.3 | 3.0 | 3.0 | 2.0 | 3.0 | 1.0 | 3.0 | 3.0 | 3.0 | 2.0 | 2.0 | 1.0 |
| M-GEO-104.4 | 3.0 | 3.0 | 3.0 | 3.0 | 1.0 | 3.0 | 3.0 | 3.0 | 2.0 | 2.0 | 2.0 |
| Average | 3.0 | 3.0 | 2.5 | 3.0 | 1.5 | 3.0 | 3.0 | 3.0 | 2.3 | 2.3 | 2.0 |

**Mapping of Course Outcomes to Program Specific Outcomes (Statistical Methods in Geography)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-104.1 | 2.0 | 3.0 | 3.0 | 3.0 |
| M-GEO-104.2 | 3.0 | 3.0 | 3.0 | 3.0 |
| M-GEO-104.3 | 2.0 | 3.0 | 3.0 | 3.0 |
| M-GEO-104.4 | 2.0 | 3.0 | 3.0 | 3.0 |
| Average | 2.3 | 3.0 | 3.0 | 3.0 |

**Semester-I**
**Core Course Code: M-GEO-105**
**Core Course Name: Cartographic Methods in Geography (Theory)**

**Time: $2\frac{1}{2}$ Hours** | **Total Marks : 50**
**Credits: 2** | **External Assessment Marks : 35**
**Internal Assessment Marks : 15**

**Course Outcomes (COs):**

**M-GEO-105.1**: Provides understanding about the basic concepts of cartography.
**M-GEO-105.2:** Enhancement of skills to prepare thematic maps and diagrams.
**M-GEO-105.3:** Acquaintance with representation of statistical data in the form of diagrams.
**M-GEO-105.4:** Ability to represent and interpret climatic data using diagrams.

**Note for Paper Setters:** Question 1 is compulsory comprising of four sub parts (two marks for each sub part), to be answered in 25-30 words. There will be six long questions, three from each unit. The candidate has to answer three long questions, at least one question from each unit. Question 1 carries eight marks. Long questions carry nine marks each.

**UNIT-I**

1. Nature and scope of Cartography.
2. Recent advancements in cartography.
3. Types and characteristics of distribution maps: (i) Chorochromatic (ii) Choroschematic (iii) Isopleths (iv) Choropleth (v) Dot and (vi) Diagrammatic.

**UNIT-II**

4. Types and characteristics of statistical diagrams: (i) One dimensional (bar, line), (ii) Two dimensional (circular, rectangular, square), (iii) Three dimensional (block, sphere, cube) and (iv) Other diagrams (Snail, pyramid, flow diagram/cartogram).
5. Characteristics of graph/diagrams/maps representing climatic data: (i) Rainfall deviation, (ii) Climograph (Taylor and Foster), (iii) Hythergraph, (iv) Star/Wind rose diagram (v) Isopleths (vi) Line and bar (vii) polygraph.

**Suggested Readings:**


1. Misra, R.P. and Ramesh, A. 1999. Fundamentals of Cartography, Concept Publishing Company, New Delhi
2. Monkhouse, F.J. and Wilkinson, H.R. 1980. Maps and Diagrams. B. I. Publications, New Delhi.
3. Singh, R. L. 1986. Elements of Practical Geography. Kalyani Publishers, New Delhi.


**Mapping of Course Outcomes to Program Outcomes (Cartographic Methods in Geography-Theory)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-105.1 | 3.0 | 2.0 | 2.0 | 3.0 | 2.0 | 2.0 | 2.0 | 2.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-105.2 | 3.0 | 2.0 | 2.0 | 3.0 | 1.0 | 2.0 | 2.0 | 2.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-105.3 | 3.0 | 2.0 | 2.0 | 3.0 | 2.0 | 2.0 | 2.0 | 2.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-105.4 | 3.0 | 2.0 | 2.0 | 3.0 | 2.0 | 2.0 | 2.0 | 2.0 | 3.0 | 1.0 | 2.0 |
| Average | 3.0 | 2.0 | 2.0 | 3.0 | 1.8 | 2.0 | 2.0 | 2.0 | 3.0 | 1.0 | 2.0 |

**Mapping of Course Outcomes to Program Specific Outcomes (Cartographic Methods in Geography-Theory)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-105.1 | 3.0 | 1.0 | 3.0 | 3.0 |
| M-GEO-105.2 | 3.0 | 1.0 | 3.0 | 3.0 |
| M-GEO-105.3 | 3.0 | 1.0 | 3.0 | 3.0 |
| M-GEO-105.4 | 3.0 | 1.0 | 3.0 | 3.0 |
| Average | 3.0 | 1.0 | 3.0 | 3.0 |

**Semester-I**
**Core Course Code: M-GEO-106**
**Core Course Name: Cartographic Methods in Geography (Practical)**

| | |
|---|---|
| **Time: 3 Hours** | **Total Marks : 100** |
| **Credits: 4** | **External Assessment Marks : 70** |
| | **Internal Assessment Marks : 30** |

**Course Outcomes (COs):**

**M-GEO-106.1**: Awareness about various types of cartographic diagrams.
**M-GEO-106.2:** Enrichment of skills to prepare the thematic maps and diagrams.
**M-GEO-106.3:** Acquisition of skills to represent the statistical data.
**M-GEO-106.4:** Capability to understand and interpret the graphs/diagrams/maps.

**Note for Paper Setters:** The examiner shall set four questions, two from each unit. The candidate shall attempt three questions in all, selecting at least one question from each unit.

**Distribution of Marks for Evaluation**

**Exercise = 45** **File Record = 10** **Viva-voce = 15**

**UNIT-I**

| | |
|---|---|
| **1. Simple Diagrams:** | |
| a) Line and bar graph | 1 exercise |
| b) Poly graph | 1 exercise |
| c) Rainfall deviation diagram | 1 exercise |
| **2. One dimensional diagrams:** | |
| a) Simple | 1 exercise |
| b) Comparative bar | 1 exercise |
| c) Compound bar | 1 exercise |
| d) Trend graph | 1 exercise |
| **3. Two dimensional diagrams:** | |
| a) Pie diagram | 1 exercise |
| b) Proportional circle | 1 exercise |
| **4. Three dimensional diagrams:** | |
| a) Sphere | 1 exercise |
| **5. Weather Diagrams:** | |
| a) Climograph (Taylor and Foster) | 2 exercise |
| b) Hythergraph | 1 exercise |
| c) Ergograph | 1 exercise |
| d) Wind rose diagram | 1 exercise |
| e) Isopleth | 1 exercise |

**UNIT-II**

| | |
|---|---|
| **6. Distribution maps:** | |
| a) Dot method | 1 exercise |
| b) Choropleth- Monovariate | 4 exercise |
| c) Choropleth- Bivariate | 2 exercise |
| **7. Diagrams:** | |
| a) Age and Sex pyramid | 1 exercise |
| b) Snail Diagram | 1 exercise |
| c) Cartogram (rectangular, traffic flow) | 2 exercise |

**Suggested Readings:**


1. Misra, R.P. and Ramesh, A. 1999. Fundamentals of Cartography, Concept Publishing Company, New Delhi
2. Monkhouse, F.J. and Wilkinson, H.R. 1980. Maps and Diagrams. B. I. Publications, New Delhi.
3. Singh, R. L. 1986. Elements of Practical Geography. Kalyani Publishers, New Delhi.

**Mapping of Course Outcomes to Program Outcomes (Cartographic Methods in Geography-Practical)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-106.1 | 3.0 | 2.0 | 3.0 | 3.0 | 2.0 | 2.0 | 2.0 | 2.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-106.2 | 3.0 | 2.0 | 3.0 | 3.0 | 2.0 | 2.0 | 2.0 | 2.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-106.3 | 3.0 | 2.0 | 3.0 | 3.0 | 2.0 | 2.0 | 2.0 | 2.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-106.4 | 3.0 | 2.0 | 3.0 | 3.0 | 2.0 | 2.0 | 2.0 | 2.0 | 3.0 | 1.0 | 2.0 |
| Average | 3.0 | 2.0 | 3.0 | 3.0 | 2.0 | 2.0 | 2.0 | 2.0 | 3.0 | 1.0 | 2.0 |

**Mapping of Course Outcomes to Program Specific Outcomes (Cartographic Methods in Geography-Practical)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-106.1 | 3.0 | 1.0 | 3.0 | 3.0 |
| M-GEO-106.2 | 3.0 | 1.0 | 3.0 | 3.0 |
| M-GEO-106.3 | 3.0 | 1.0 | 3.0 | 3.0 |
| M-GEO-106.4 | 3.0 | 1.0 | 3.0 | 3.0 |
| Average | 3.0 | 1.0 | 3.0 | 3.0 |

**Semester-II**
**Core Course Code: M-GEO-201**
**Core Course Name: Geomorphology**

**Time: 3 Hours** | **Total Marks : 100**
**Credits: 4** | **External Assessment Marks : 70**
**Internal Assessment Marks : 30**

**Course Outcomes (COs):**

**M-GEO-201.1**: Development of understanding about the fundamental concepts of geomorphology.
**M-GEO-201.2:** Enrichment of knowledge about tectonic activities and hill slope relationship.
**M-GEO-201.3:** Familiarization with the processes and patterns shaping the landforms.
**M-GEO-201.4:** Understanding of environmental management using principles of applied geomorphology.

**Note for Paper Setters:** Question 1 is compulsory comprising of seven sub parts (two marks for each sub part), to be answered in 25-30 words. There will be eight long questions, two from each unit. The candidate has to answer four long questions, at least one question from each unit. All questions carry equal marks.

**UNIT-I**

1. Introduction to geomorphology as a science: definition, nature, scope and recent developments.
2. Fundamental concepts: geological structure and landforms, uniformitarianism, multi-cycle and polygenetic evolution of landscape, frequency concept of geomorphic processes, climatogenetic geomorphology and peneplain and pediplain.

**UNIT-II**

3. Continental drift theory and its basic considerations; Plate tectonics-meaning and concept, margins and boundaries, plate motion and cycle; Tectonic activities along boundaries and distribution of plates.
4. Hill slope-definition and forms of slope, geomorphic processes and slope forms, theories of slope evolution by Davis, Penck, Strahler, Young, Wood and King.

**UNIT-III**

5. Weathering: Causes; types of weathering: physical, chemical and biological.
6. Mass movement, causes, classifications and types of mass movements- slow and rapid mass movements.

**UNIT-IV**

7. Geomorphic processes and resulting land forms: Fluvial, Glacial, Periglacial, Aeolian and Karst
8. Applied geomorphology: meaning and concept, role of geomorphology in environmental management of the following: (i) accelerated erosion and sedimentation, (ii) construction of large dams (iii) urban floods.

**Suggested Readings:**


1. Bloom AL. 2002. Geomorphology: A systematic Analysis of late Cenozoic landforms. Prentice-Hall Private Limited, New Delhi.
2. Embleton, C and Thormne. J. 1979. Process in Geomorphology. London, Edward Arnold.
3. Kale VS and Gupta A. 2001. Introduction to Geomorphology. Orient Longman, Hyderabad.
4. Ritter DF., Kochel RC. and Miller JR. 1995. Process Geomorphology. Dubuque, Win C. Brown Publishers.
5. Sharma HS and Kale VS 2009. Geomorphology in India, Prayag Pustak Bhawan, Allahabad.
6. Sharma, VK. 2010. Introduction to Process Geomorphology. Tayler and Francis's, London.
7. Sharma, VK. 1992. Earth's Surface Processes and Forms. Tata McGraw Hill Publications, New Delhi.
8. Singh S. 2002. Geomorphology, Prayag Pustak Bhawan, Allahabad.
9. Strahler AH. 2013. Introducing Physical Geography, Wiley and Sons, New York.
10. Thornbury, WD. 2004. Principles of Geomorphology, John Wiley Sons, New York.


**Mapping of Course Outcomes to Program Outcomes (Geomorphology)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-201.1 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 2.0 | 2.0 | 3.0 | 2.0 | 2.0 |
| M-GEO-201.2 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 2.0 | 3.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-201.3 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 |
| M-GEO-201.4 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 3.0 | 3.0 | 3.0 | 1.0 | 3.0 |
| Average | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 2.5 | 2.8 | 3.0 | 1.5 | 2.5 |

**Mapping of Course Outcomes to Program Specific Outcomes (Geomorphology)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-201.1 | 3.0 | 2.0 | 1.0 | 3.0 |
| M-GEO-201.2 | 3.0 | 2.0 | 1.0 | 3.0 |
| M-GEO-201.3 | 3.0 | 2.0 | 3.0 | 3.0 |
| M-GEO-201.4 | 3.0 | 3.0 | 2.0 | 3.0 |
| Average | 3.0 | 2.3 | 1.8 | 3.0 |

**Semester-II**
**Core Course Code: M-GEO-202**
**Core Course Name: Population Geography**

| | | |
|---|---|---|
| **Time: 3 Hours** | **Total Marks** | **: 100** |
| **Credits: 4** | **External Assessment Marks** | **: 70** |
| | **Internal Assessment Marks** | **: 30** |

**Course Outcomes (COs):**

**M-GEO-202.1**: Knowledge about population data base, methodological issues and mapping.
**M-GEO-202.2:** Familiarization with the dynamics of population and demographic dividends.
**M-GEO-202.3:** Enrichment of knowledge about population theories and models.
**M-GEO-202.4:** Awareness about population policies of different countries and relation between population and environment.

**Note for Paper Setters:** Question 1 is compulsory comprising of seven sub parts (two marks for each sub part), to be answered in 25-30 words. There will be eight long questions, two from each unit. The candidate has to answer four long questions, at least one question from each unit. All questions carry equal marks.

**UNIT-I**

1. Nature and scope of population geography.
2. Methodological problems in population geography.
3. Sources of population data, quality and reliability of data.
4. Problems of mapping population data.

**UNIT-II**

5. Concepts, determinants and world patterns of the following attributes of population:
   (i) Dynamics of population: fertility, mortality, migration (including policies) and growth.
   (ii) Composition of population: age and sex composition, ageing of population, occupational structure and workforce.
6. Demographic dividend: linkages between population and economic development.

**UNIT-III**

7. Concepts of over population, under population and optimum population.
8. Demographic transition model.
9. Population resource regions.
10. Theories of population: Malthus, Ricardo and Marx.
11. Limits to growth: concept and application.

**UNIT-IV**

12. Comparative study of population problems and policies of developed and less developed countries.
    (i) Developed world: U.S.A., Japan, Canada.
    (ii) Less developed world: India, China and Brazil.
13. Population problems and environmental implications.

**Suggested Readings:**


1. Bhende, A. A. and Kanitkar, T. (2011): Principles of Population Studies, Himalaya Publishing House, Mumbai.
2. Cassen, Robert & Bates, Lisa M. (1994): Population Policy: A New Consensus Overseas Development Council, Washington, D.C.
3. Chandna, R. C. (2016): Population Geography: Concepts, Determinants and Patterns, Kalyani Publishers, New Delhi.
4. Demko, G. J. and others (Eds.) (1971): Population Geography, Reader, McGraw- Hill Books Co., New York
5. Graff, M., and Bremner, J. (2014): A Practical Guide to Population and Development, Washington DC: Population Reference Bureau.
6. Hassan, I. (2020) Population Geography: A Systematic Exposition, Routledge, London.
7. May, J.F. (2012) World population policies: their origin, evolution, and impact, Washington DC: Springer.
8. Mahajan, N (2014) Population Geography, R.K. publishers, Delhi.
9. Murray C. J. L., J. A. Salomon, C. D. Mathers and A. D. Lopez (), Summary Measures of Population Health: Concepts, Ethics, Measurement and Applications. WHO, Geneva.
10. Newbold, K Bruce (2016) Population geography: Tools and Issues.
11. Qazi, S.A(2010). Population Geography, APH publishers.

12. Trewartha, G. T. (1972): The Less Developed Realm-A Geography of its Population, John Wiley & Sons, Inc., New York.
13. Trewartha, G. T. (1978): The More Developed Realm-A Geography of its Population Pergamon Press, New York.
14. Woods, R. (1979): Population Analysis in Geography, Longman, London.
15. United Nations (1997): Health and Mortality Issues of Global Concern, Proceeding of the Symposium on Health and Mortality, Brussels, 19-22 November 1997.

**Mapping of Course Outcomes to Program Outcomes (Population Geography)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-202.1 | 3.0 | 2.0 | 3.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-202.2 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 3.0 | 3.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-202.3 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 2.0 | 3.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-202.4 | 3.0 | 2.0 | 3.0 | 3.0 | 2.0 | 2.0 | 1.0 | 2.0 | 3.0 | 1.0 | 2.0 |
| Average | 3.0 | 2.5 | 3.0 | 2.8 | 2.0 | 2.5 | 2.0 | 2.5 | 3.0 | 1.0 | 2.0 |

**Mapping of Course Outcomes to Program Specific Outcomes (Population Geography)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-202.1 | 3.0 | 1.0 | 3.0 | 3.0 |
| M-GEO-202.2 | 3.0 | 1.0 | 3.0 | 1.0 |
| M-GEO-202.3 | 3.0 | 1.0 | 2.0 | 1.0 |
| M-GEO-202.4 | 3.0 | 1.0 | 3.0 | 3.0 |
| Average | 3.0 | 1.0 | 2.8 | 2.0 |

**Semester-II**
**Core Course Code: M-GEO-203**
**Core Course Name: Regional Development and Planning with Special Reference to India**

| | | |
|---|---|---|
| **Time: 3 Hours** | **Total Marks** | **: 100** |
| **Credits: 4** | **External Assessment Marks** | **: 70** |
| | **Internal Assessment Marks** | **: 30** |

**Course Outcomes (COs):**

**M-GEO-203.1**: Understanding of basic concepts of regional planning and development.
**M-GEO-203.2:** Acquaintance with models of regional development.
**M-GEO-203.3:** Enrichment of knowledge about regional disparities and challenges in India.
**M-GEO-203.4:** Awareness about developmental plans and strategies in India.

**Note for Paper Setters:** Question 1 is compulsory comprising of seven sub parts (two marks for each sub part), to be answered in 25-30 words. There will be eight long questions, two from each unit. The candidate has to answer four long questions, at least one question from each unit. All questions carry equal marks.

**UNIT-I**

**1.** Concept of regional development, regional disparities, balanced regional development
**2.** Region and its typology
**3.** Basis of regionalization in India and their characteristics.

**UNIT-II**

**4.** Theories of regional development:
(i) Trickle Down Theory
(ii) Growth Pole Theory
(iii) Cumulative causation Model
(iv) Core-Periphery Theory
**5.** Concept of sustainable development, inclusive growth and eco-feminism

**UNIT-III**

**6.** Development and regional disparities in India since Independence:
(i) Disparities in Agricultural Development
(ii) Disparities in Industrial Development.
7. Disparities in human resource development in terms of poverty, education and health

**UNIT-IV**

**8.** India through Planned Era with special reference to:
(i) **T**ribal area development plan
(ii) Hill Area development plan
(iii) Desert, drought prone and backward area development plan
9. Niti Ayog: aims and objectives
**10.** Urban planning in India with special reference to National Capital Region

**Suggested Readings:**


1. Chandna, R.C. (2000): Regional Planning: A Comprehensive Text. Kalyani Publishers, New Delhi.
2. Chaudhuri, J.R. (2001): An Introduction to Development and Regional Planning with special reference to India. Orient Longman, Hyderabad.
3. Friedmann, J. and Alonso, W. (1973): Regional Development and Planning. The MIT Press, Mass.
4. Hettne, B., Inotai, A. and Sunkel, O. (2000): Studies in the New Regionalism. Vol. I-V. Macmillan Press, London.
5. Kuklinski, A.R. (1972): Growth Poles and Growth Centres in Regional Planning. Mouton and Co., Paris.
6. Leys, C. (1996): The Rise and Fall of Development Theory. Indian University Press, Bloomington.
7. Mahapatra, A.C. and Pathak, C.R. (2003): Economic Liberalization and Regional Disparities in India. Star Publishing House, Shillong.
8. Chand, M and Puri, V.K. (1983): Regional Planning in India, Allied Publishers, New Delhi.
9. Misra, R.P. (1992): Regional Planning: Concepts, Techniques, Policies and Case Studies. Concept Publishing Company, New Delhi.
10. Misra, R.P. and Natraj, V.K. (1978): Regional Planning and National Development. Vikas Publication, New Delhi.
11. Sundaram K V (1986): Urban and Regional Planning in India, Vikas Publishing House, New Delhi
12. Raza Moonis (1988): Regional Development Vol. 10, Contribution to Indian Geography Heritage Publishers, New Delhi.

13. Kundu and Moonis Raza (1988): Indian Economy: The Regional Dimension, CSRD/SSS, JNU. New Delhi.
14. Patnaik, C. S. (1981): Economics of Regional Development and Planning in Third World Countries, Associate Publishing House, New Delhi.

**Mapping of Course Outcomes to Program Outcomes**
**(Regional Development and Planning with Special Reference to India)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-203.1 | 3.0 | 3.0 | 2.0 | 3.0 | 2.0 | 2.0 | 2.0 | 3.0 | 3.0 | 3.0 | 2.0 |
| M-GEO-203.2 | 3.0 | 3.0 | 2.0 | 3.0 | 2.0 | 3.0 | 2.0 | 3.0 | 3.0 | 2.0 | 1.0 |
| M-GEO-203.3 | 3.0 | 3.0 | 2.0 | 3.0 | 2.0 | 3.0 | 2.0 | 3.0 | 3.0 | 3.0 | 1.0 |
| M-GEO-203.4 | 3.0 | 3.0 | 2.0 | 2.0 | 2.0 | 3.0 | 2.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Average | 3.0 | 3.0 | 2.0 | 2.8 | 2.0 | 2.8 | 2.0 | 3.0 | 3.0 | 2.8 | 2.0 |

**Mapping of Course Outcomes to Program Specific Outcomes**
**(Regional Development and Planning with special reference to India)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-203.1 | 3.0 | 2.0 | 3.0 | 3.0 |
| M-GEO-203.2 | 3.0 | 3.0 | 3.0 | 3.0 |
| M-GEO-203.3 | 3.0 | 2.0 | 3.0 | 3.0 |
| M-GEO-203.4 | 2.0 | 2.0 | 3.0 | 3.0 |
| Average | 2.8 | 2.3 | 3.0 | 3.0 |

**Semester-II**
**Core Course Code: M-GEO-204**
**Core Course Name: Agricultural Geography with Special Reference to India**

| | | |
|---|---|---|
| **Time: 3 Hours** | **Total Marks** | **: 100** |
| **Credits: 4** | **External Assessment Marks** | **: 70** |
| | **Internal Assessment Marks** | **: 30** |

**Course Outcomes (COs):**

**M-GEO-204.1**: Enrichment of knowledge about origin, location and distribution of agricultural activities.
**M-GEO-204.2:** Enhancement of knowledge about changing land use and cropping pattern.
**M-GEO-204.3:** Acquaintance with agricultural systems, efficiency and productivity.
**M-GEO-204.4:** Awareness about impacts of climate change and economic liberalization on agriculture.

**Note for Paper Setters:** Question 1 is compulsory comprising of seven sub parts (two marks for each sub part), to be answered in 25-30 words. There will be eight long questions, two from each unit. The candidate has to answer four long questions, at least one question from each unit. All questions carry equal marks.

**UNIT-I**

1. Nature, scope and significance of agricultural geography.
2. Origin and dispersal of agriculture in the World.
3. Determinants of agricultural patterns: physical, technological and cultural factors

**UNIT-II**

4. Concepts of land capability survey, land use and cropping pattern.
5. Agricultural Concepts: intensity of cropping, Degree of commercialization, Cropping diversification and concentration, Crop combination, Contract framing and agri-business.
6. Approaches in agricultural regionalization: Von Thunen Model of agricultural land use, Agro-climatic zonation: Concept and Indian experience.

**UNIT-III**

7. Bases of identification of agricultural systems by Whitllesey and agricultural typology by Kostrowiki.
8. Measurements of agricultural efficiency and productivity.
9. Green revolution: Its impacts and consequences in India.

**UNIT-IV**

10. Food production and security in India.
11. Neo-liberalization and Indian agriculture.
12. Agriculture and climate change: impacts and adaptation.

**Suggested Readings:**


1. Bowler TR (1992) The Geography of Agriculture in Developed Market Economics. Longman.
2. Geoffrey, H.F. (1970) Geography of Agriculture: Themes in Research. Practice Hall, N.J.
3. Grigg D (1995) Introduction to Agricultural Geography. Routledge, London.
4. Husain, Majid (1996) Systematic Agricultural Geography. Rawat Publications, Jaipur.
5. Morgon, W.B. and Munton, R.J.C. (1971) Agricultural Geography. Methuen, London.
6. Singh Jasbir and Dhillon S.S. (1994) Agricultural Geography. Tata Mc Graw Hill, New Delhi.
7. Safi, Mohammad (2007) Agricultural Geography. Prentice-Hall of India.
8. Singh Jasbir (1989) Agricultural Geography.
9. Symons, Leslic (1967): Agricultural Geography, G. Bell and Sons, London.
10. Tarrant, J.R. (1974) Agricultural Geography, Willey, New York.


**Mapping of Course Outcomes to Program Outcomes**
**(Agricultural Geography with Special Reference to India)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-204.1 | 3.0 | 2.0 | 2.0 | 3.0 | 2.0 | 3.0 | 2.0 | 3.0 | 3.0 | 2.0 | 1.0 |
| M-GEO-204.2 | 3.0 | 3.0 | 2.0 | 3.0 | 1.0 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 2.0 |
| M-GEO-204.3 | 3.0 | 3.0 | 1.0 | 3.0 | 1.0 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 2.0 |
| M-GEO-204.4 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 2.0 | 3.0 | 3.0 | 3.0 | 2.0 |
| Average | 3.0 | 2.8 | 2.0 | 3.0 | 1.5 | 3.0 | 2.5 | 3.0 | 3.0 | 2.3 | 1.8 |

**Mapping of Course Outcomes to Program Specific Outcomes**
**(Agricultural Geography with Special Reference to India)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-204.1 | 3.0 | 2.0 | 2.0 | 3.0 |
| M-GEO-204.2 | 3.0 | 3.0 | 3.0 | 3.0 |
| M-GEO-204.3 | 3.0 | 2.0 | 3.0 | 2.0 |
| M-GEO-204.4 | 3.0 | 3.0 | 3.0 | 3.0 |
| Average | 3.0 | 2.5 | 2.8 | 2.8 |

**Semester-II**
**Core Course Code: M-GEO-205**
**Core Course Name: Morphometric Analysis (Theory)**

**Time: $2\frac{1}{2}$ Hours** | **Total Marks : 50**
**Credits: 2** | **External Assessment Marks : 35**
**Internal Assessment Marks : 15**

**Course Outcomes (COs):**

**M-GEO-205.1**: Familiarization with arrangement, identification and interpretation of topographical sheets.
**M-GEO-205.2:** Acquaintance with the concept of drainage basin and its linear and areal properties.
**M-GEO-205.3:** Provides understanding about relief aspects of drainage basin.
**M-GEO-205.4:** Development of understanding about slope and various methods of its analysis.

**Note for Paper Setters:** Question 1 is compulsory comprising of four sub parts (two marks for each sub part), to be answered in 25-30 words. There will be six long questions, three from each unit. The candidate has to answer three long questions, at least one question from each unit. Question 1 carries eight marks. Long questions carry nine marks each.

**UNIT-I**

1. Arrangement, identification and interpretation of topographical sheets of India.
2. Delineation of drainage basin and its geographical significance.
3. Profile: Transverse and longitudinal.
4. Drainage network analysis: Linear and areal properties.
5. Relationship between stream order, number and length.

**UNIT-II**

6. Relief aspect of drainage basin:
   (i) Area-height curve,
   (ii) Altimetric frequency curve,
   (iii) Hypsographic curve,
   (iv) Hypsometric integral curve
   (v) Clinographic curve.
7. Development of slope and various methods of its analysis (Wentworth and Smith's method).

**Suggested Readings:**


1. Dury, G.H. 1966. Essays in Geomorphology. Heinmann, London.
2. Misra, R.P. and Ramesh, A. 1999. Fundamentals of Cartography, Concept Publishing Company, New Delhi.
3. Miller, A. 1964. The Skin of the Earth. Methuen, London
4. Monkhouse, F. J. and Wilkinson, H.R. 1980. Maps and Diagrams. B.I. Publications, New Delhi.
5. Singh, R. L. 1986. Elements of Practical Geography, Kalyani Publications, New Delhi.


**Mapping of Course Outcomes to Program Outcomes (Morphometric Analysis-Theory)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-205.1 | 3.0 | 2.0 | 2.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 3.0 | 1.0 | 3.0 |
| M-GEO-205.2 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 2.0 | 3.0 | 3.0 | 2.0 | 3.0 |
| M-GEO-205.3 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 2.0 | 3.0 | 3.0 | 1.0 | 3.0 |
| M-GEO-205.4 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 2.0 | 3.0 | 3.0 | 2.0 | 3.0 |
| Average | 3.0 | 2.8 | 2.8 | 2.5 | 1.8 | 2.5 | 1.8 | 2.5 | 3.0 | 1.5 | 3.0 |

**Mapping of Course Outcomes to Program Specific Outcomes (Morphometric Analysis-Theory)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-205.1 | 3.0 | 1.0 | 1.0 | 2.0 |
| M-GEO-205.2 | 3.0 | 3.0 | 3.0 | 3.0 |
| M-GEO-205.3 | 3.0 | 3.0 | 3.0 | 3.0 |
| M-GEO-205.4 | 3.0 | 3.0 | 3.0 | 3.0 |
| Average | 3.0 | 2.5 | 2.5 | 2.8 |

**Semester-II**
**Core Course Code: M-GEO-206**
**Core Course Name: Morphometric Analysis (Practical)**

| | | |
|---|---|---|
| **Time: 3 Hours** | **Total Marks** | **: 100** |
| **Credits: 4** | **External Assessment Marks** | **: 70** |
| | **Internal Assessment Marks** | **: 30** |

**Course Outcomes (COs):**

**M-GEO-206.1**: Acquisition of skills to extract physical and cultural information from topographical maps.
**M-GEO-206.2:** Knowledge of drawing of transverse and longitudinal profiles.
**M-GEO-206.3:** Ability to represent the linear, areal and relief aspects of drainage basin.
**M-GEO-206.4:** Capability to prepare the slope and relative relief maps of drainage basin.

**Note for Paper Setters:** The examiner shall set four questions, two from each unit. The candidate shall attempt three questions in all, selecting at least one question from each unit.

**Distribution of Marks for Evaluation**

**Exercise = 45** **File Record = 10** **Viva-voce = 15**

**UNIT-I**

| | | |
|---|---|---|
| 1. | Representation of physical features | 1 exercise |
| 2. | Representation of cultural features | 1 exercise |
| 3. | Delineation of watershed (All exercises shall be based on it) | 1 exercise |
| 4. | Profile analysis: transverse and longitudinal | |
| | a) Serial profiles | 1 exercise |
| | b) Superimposed profiles | 1 exercise |
| | c) Composite profiles | 1 exercise |
| | d) Projected profiles | 1 exercise |
| | e) Longitudinal or valley Thalweg profile | 1 exercise |
| 5. | Linear Aspects: | |
| | a) Relationship between stream order and stream Number | 1 exercise |
| | b) Relationship between stream order and average stream length | 1 exercise |
| | c) Bifurcation ration | 1 exercise |
| 6. | Areal Aspects: | |
| | a) Drainage frequency | 1 exercise |
| | b) Drainage Density | 1 exercise |

**UNIT-II**

| | | |
|---|---|---|
| 6. | Relief Aspect: | |
| | a) Area height Curve | 1 exercise |
| | b) Altimetric frequency curve | 1 exercise |
| | c) Hypsographic curve | 1 exercise |
| | d) Hypsometric integral curve | 1 exercise |
| | e) Clinographic curve | 1 exercise |
| 7. | Slope Analysis: | |
| | a) Wentworth's method of average slope | 1 exercise |
| | b) G. H. Smith's method of relative relief | 1 exercise |

**Suggested Readings**


1. Dury, G.H. 1966. Essays in Geomorphology. Heinmann, London.
2. Misra, R.P. and Ramesh, A. 1999. Fundamentals of Cartography, Concept Publishing Company, New Delhi.
3. Miller, A. 1964. The Skin of the Earth. Methuen, London
4. Monkhouse, F. J. and Wilkinson, H.R. 1980. Maps and Diagrams. B.I. Publications, New Delhi.
5. Singh, R. L. 1986. Elements of Practical Geography, Kalyani Publications, New Delhi.

**Mapping of Course Outcomes to Program Outcomes (Morphometric Analysis-Practical)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-206.1 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 2.0 | 3.0 | 3.0 | 2.0 | 3.0 |
| M-GEO-206.2 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 2.0 | 2.0 | 3.0 | 2.0 | 3.0 |
| M-GEO-206.3 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 3.0 | 2.0 | 3.0 | 1.0 | 3.0 |
| M-GEO-206.4 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 3.0 | 2.0 | 3.0 | 1.0 | 3.0 |
| Average | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 2.5 | 2.3 | 3.0 | 1.8 | 3.0 |

**Mapping of Course Outcomes to Program Specific Outcomes (Morphometric Analysis-Practical)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-206.1 | 3.0 | 1.0 | 3.0 | 2.0 |
| M-GEO-206.2 | 3.0 | 2.0 | 3.0 | 2.0 |
| M-GEO-206.3 | 3.0 | 3.0 | 3.0 | 3.0 |
| M-GEO-206.4 | 3.0 | 3.0 | 3.0 | 3.0 |
| Average | 3.0 | 2.3 | 3.0 | 2.5 |

**Semester-II**
**Open Elective Course Code: M-GEO-OE-204**
**Open Elective Course Name: General Geography of India**

**Time: $2\frac{1}{2}$ Hours** | **Total Marks : 50**
**Credits: 2** | **External Assessment Marks : 35**
**Internal Assessment Marks : 15**

**Course Outcomes (COs):**

**M-GEO-OE-204.1**: Understanding of location and geographical expansion of India.
**M-GEO-OE-204.2:** Acquaintance with the geophysical structure of India.
**M-GEO-OE-204.3:** Enrichment of knowledge about peopling and distribution of population.
**M-GEO-OE-204.4:** Capability to understand the regional diversity and unity in India.

**Note for Paper Setters:** Question 1 is compulsory comprising of four sub parts (two marks for each sub part), to be answered in 25-30 words. There will be six long questions, three from each unit. The candidate has to answer three long questions, at least one question from each unit. Question 1 carries eight marks. Long questions carry nine marks each.

**UNIT-I**

1. India: locational setting and geographical expansion
2. Relief and drainage systems.
3. Climate, soil and natural vegetation.
4. Physiographic regions of India

**UNIT-II**

5. The Peopling of India
6. Population: distribution, density and growth
7. Population composition: ethnic and socio-cultural attributes (caste and tribes)
8. Unity in diversity in India

**Suggested Readings**:


1. Ahmed, A, India: A General Geography, NCERT, New Delhi.
2. Hussain, Majid Geography of India, McGraw Hill Education Series
3. Qureshi, M. H. India: People and Economy, NCERT, New Delhi.
4. Qureshi, M.H. India: Physical Environment, NCERT, New Delhi.
5. Singh, S. and Saroha, J. 2019. Geography of India, Mc Graw Hill Education.
6. Tiwari, RC, Geography of India, Prayag Pustak Bhawan, Allahabad.


**Mapping of Course Outcomes to Program Outcomes (General Geography of India)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-OE-204.1 | 3.0 | 1.0 | 2.0 | 1.0 | 2.0 | 2.0 | 1.0 | 2.0 | 3.0 | 2.0 | 2.0 |
| M-GEO-OE-204.2 | 3.0 | 2.0 | 1.0 | 1.0 | 1.0 | 2.0 | 1.0 | 3.0 | 3.0 | 2.0 | 2.0 |
| M-GEO-OE-204.3 | 3.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.0 | 3.0 | 3.0 | 2.0 | 2.0 | 2.0 |
| M-GEO-OE-204.4 | 3.0 | 2.0 | 2.0 | 2.0 | 3.0 | 2.0 | 1.0 | 3.0 | 3.0 | 2.0 | 2.0 |
| Average | 3.0 | 1.8 | 1.8 | 1.5 | 2.0 | 1.8 | 1.5 | 2.8 | 2.8 | 2.0 | 2.0 |

**Mapping of Course Outcomes to Program Specific Outcomes (General Geography of India)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-OE-204.1 | 3.0 | 1.0 | 1.0 | 1.0 |
| M-GEO-OE-204.2 | 3.0 | 1.0 | 2.0 | 3.0 |
| M-GEO-OE-204.3 | 3.0 | 1.0 | 2.0 | 2.0 |
| M-GEO-OE-204.4 | 3.0 | 1.0 | 2.0 | 2.0 |
| Average | 3.0 | 1.0 | 1.8 | 2.0 |

**Semester-III**
**Core Course Code: M-GEO-301**
**Core Course Name: Geography and Ecosystems**

| | | |
|---|---|---|
| **Time: 3 Hours** | **Total Marks** | **: 100** |
| **Credits: 4** | **External Assessment Marks** | **: 70** |
| | **Internal Assessment Marks** | **: 30** |

**Course Outcomes (COs):**

**M-GEO-301.1**: Familiarization with the concept and elements of ecosystem.
**M-GEO-301.2:** Enrichment of knowledge about the characteristics of different biomes.
**M-GEO-301.3:** Awareness about the inter-linkages between human artifacts and natural environment.
**M-GEO-301.4:** Acquaintance about world environmental problems and policy framework.

**Note for Paper Setters:** Question 1 is compulsory comprising of seven sub parts (two marks for each sub part), to be answered in 25-30 words. There will be eight long questions, two from each unit. The candidate has to answer four long questions, at least one question from each unit. All questions carry equal marks.

**UNIT-I**

1. Geography and ecosystem: fundamental concepts.
2. Concept of ecosystem: bases, types, components and function of ecosystem.
3. Energy flow in ecosystem: food chain, food web, trophic levels, ecological production and ecological pyramids.
4. Biogeochemical cycles: hydrological, carbon, oxygen and nitrogen cycles.

**UNIT-II**

5. Biome: scheme of classification: factors affecting the distribution of biomes.
6. Salient features of the following biomes:
    a. Tropical evergreen rain forest biome
    b. Savanna biome
    c. Monsoon biome
    d. Temperate biome
    e. Marine biome
    f. Mountain biome
    g. Desert biome
7. Ecosystem approach and its relevance in geography.

**UNIT-III**

8. Man-environment relationship: classification of resources; use and ecological imbalance with reference to soils, forests and energy resources.
9. Concept of air, water, and noise pollution: level of problem, causes and measurement tools.
10. Biodiversity and conservation: preservation and conservation of ecosystem through resource management.

**UNIT- IV**

11. Environmental issues: climate change, ozone depletion, global warming and global cooling
12. International efforts for environment management and conservation: The Stockholm Conference, the Earth Summit, Kyoto Protocol, Paris declaration and after.
13. Environment Governance: environment policies and environmental legislation in India: prevention & protection Act of wild life, water, air, forest, environment protection and National Environment Tribunal Act.

**Suggested Readings:**


1. Agarwal, A. and Sen, S. The Citizens Fifth Report. Centre for Science and Environment New Delhi 1999.
2. Bertalanffy, L. General Systems Theory, George Bragiller, New York, 1958.
3. Bodkin, E. Environmental Studies, Charles E. Merril Pub Co., Columbus, Ohio, 1982.
4. Chandna, R.C.: Environmental Awareness, Kalyani Publishers, New Delhi, 1998.
5. Chorley, R.J., Geomorphology and General Systems Theory, U.S.G.S. Professional Paper, 500B, 1962.
6. Eyre, S.R. and Jones, G.R.J. Geography as Human Ecology, Edward Arnold, London, 1966.
7. Kormondy, E.J. Concepts of Ecology, Prentice Hall, 1989.
8. Mishra, S.P. and Pandey, S.N. (2016) Essential Environmental studies, Ane publications New Delhi.
9. Nobel and Wright: Environmental Science, Prentice Hall, New York 1996.
10. Odum, E.P. Fundamentals of Ecology, W.B. Saunders, Philadelphia, 1971.
11. Russwurm, L.H. and Sommerville, E. Man's Natural Environment-A systems Approach, Duxbury, Massachusets, 1985.
12. Sharma, H.S. Ranthambhore Sanctuary-Dilemma of Eco-development, Concept, New Delhi, 2000.

13. Simmons, I.G. Ecology of Natural Resources, Edward Arnold, London, 1981.
14. Singh, S. Environmental Geography, Prayag Publications, Allahabad, 1991.
15. Smith, R.L. Man and his Environment: An Ecosystem Approach, Harper & Row, London, 1992.
16. World Watch Institute: State of the World, Latest Report, Washington, D.C.

**Mapping of Course Outcomes to Program Outcomes (Geography and Ecosystems)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-301.1 | 3.0 | 1.0 | 3.0 | 2.0 | 2.0 | 2.0 | 1.0 | 2.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-301.2 | 3.0 | 2.0 | 3.0 | 3.0 | 2.0 | 2.0 | 1.0 | 2.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-301.3 | 3.0 | 2.0 | 3.0 | 3.0 | 2.0 | 2.0 | 2.0 | 2.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-301.4 | 3.0 | 2.0 | 3.0 | 3.0 | 2.0 | 2.0 | 2.0 | 2.0 | 3.0 | 1.0 | 2.0 |
| Average | 3.0 | 1.0 | 3.0 | 2.8 | 2.0 | 2.0 | 1.5 | 2.0 | 3.0 | 1.0 | 2.0 |

**Mapping of Course Outcomes to Program Specific Outcomes (Geography and Ecosystems)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-301.1 | 3.0 | 1.0 | 1.0 | 3.0 |
| M-GEO-301.2 | 3.0 | 1.0 | 2.0 | 3.0 |
| M-GEO-301.3 | 3.0 | 1.0 | 2.0 | 3.0 |
| M-GEO-301.4 | 3.0 | 1.0 | 2.0 | 3.0 |
| Average | 3.0 | 1.0 | 1.8 | 3.0 |

**Semester-III**
**Core Course Code: M-GEO-302**
**Core Course Name: Field Methods in Geography (Socio-economic) (Theory)**

**Time: $2\frac{1}{2}$ Hours** | **Total Marks : 50**
**Credits: 2** | **External Assessment Marks : 35**
**Internal Assessment Marks : 15**

**Course Outcomes (COs):**

**M-GEO-302.1**: Realization of importance of fieldwork in learning geography.
**M-GEO-302.2:** Ability to identify research problem and formulation of research design.
**M-GEO-302.3:** Learning the techniques of socio-economic data collection through surveys.
**M-GEO-302.4:** Enhancement of skills about retrieval, analysis of data and preparation of field report.

**Note for Paper Setters:** Question 1 is compulsory comprising of four sub parts (two marks for each sub part), to be answered in 25-30 words. There will be six long questions, three from each unit. The candidate has to answer three long questions, at least one question from each unit. Question 1 carries eight marks. Long questions carry nine marks each.

**UNIT-I**

1. Significance of field work in Geography.
2. Identification of research problem and formulation of research design in geography.
3. Types and sources of data: characteristics of primary and secondary data.
4. Types of questionnaires and their formulation.

**UNIT-II**

5. Sample design for collection of socio-economic data.
6. Collection of demographic and socio-economic data from the field.
7. Retrieval and analysis of data collected from field.
8. Format of field project report writing.

**Suggested Readings:**


1. Black James A and D.J. Champion (1976): Methods and Issues in Social Research, New York, John Wiley and Sons, Inc.
2. Goode and Hatt, Research Methodology in Social Sciences, Oxford University Press, New Delhi.
3. Gomez B and John Paul Jones. 2010. Research Methods in Geography-A Critical Introduction. Wiley Blackwell Publications, Singapore.
4. Har Prasad (1992) Research Methods and Techniques in Geography, Rawat Publishers, Jaipur.
5. Kundu A. Measurement of Urban Processes: A Study of Regionalization, Popular Prakashan, Mumbai.
6. Mishra, H.N. and Singh V.P. (1998) Research Methodology: Social, Spatial and Policy Dimensions, Rawat Publishers, Jaipur.


**Mapping of Course Outcomes to Program Outcomes**
**(Field Methods in Geography (Socio-economic)-Theory)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-302.1 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 1.0 | 2.0 | 3.0 | 3.0 | 2.0 |
| M-GEO-302.2 | 3.0 | 3.0 | 2.0 | 3.0 | 2.0 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 2.0 |
| M-GEO-302.3 | 3.0 | 3.0 | 2.0 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 3.0 | 2.0 |
| M-GEO-302.4 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 3.0 | 3.0 |
| Average | 3.0 | 3.0 | 2.5 | 3.0 | 2.8 | 3.0 | 2.5 | 2.3 | 3.0 | 2.8 | 2.3 |

**Mapping of Course Outcomes to Program Specific Outcomes**

**(Field Methods in Geography (Socio-economic)-Theory)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-302.1 | 2.0 | 2.0 | 2.0 | 3.0 |
| M-GEO-302.2 | 2.0 | 3.0 | 3.0 | 3.0 |
| M-GEO-302.3 | 3.0 | 3.0 | 3.0 | 3.0 |
| M-GEO-302.4 | 2.0 | 3.0 | 3.0 | 3.0 |
| Average | 2.3 | 2.8 | 2.8 | 3.0 |

**Semester-III**
**Elective Course Code: M-GEO-303 (i)**
**Elective Course Name: Urban Geography**

| | | |
|---|---|---|
| **Time: 3 Hours** | **Total Marks** | **: 100** |
| **Credits: 4** | **External Assessment Marks** | **: 70** |
| | **Internal Assessment Marks** | **: 30** |

**Course Outcomes (COs):**

**M-GEO-303 (i).1**: Provides understanding about evolution of towns and pattern of urbanization.
**M-GEO-303 (i).2:** Enrichment of knowledge about economic and functional characteristics of cities.
**M-GEO-303 (i).3:** Acquaintance with urban morphology and land use models.
**M-GEO-303 (i).4:** Familiarization with theories of urban development.

**Note for Paper Setters:** Question 1 is compulsory comprising of seven sub parts (two marks for each sub part), to be answered in 25-30 words. There will be eight long questions, two from each unit. The candidate has to answer four long questions, at least one question from each unit. All questions carry equal marks.

**UNIT-I**

1. Urban geography: concepts, nature and scope.
2. Approaches to study urbanization and urban systems
3. Origin and evolution of towns and factors of urban growth; theories of urban origins
4. The global context of urbanization: trends and pattern; cycle of urbanization.

**UNIT-II**

5. Economic base of cities: concept and employment ratio.
6. Functional classification of cities: concepts and scheme of classification.
7. Rural Urban Fringe: structural characteristics and its development.
8. City and region: concepts of influence and dominance, methods of delimitation of area of influence and dominance.
9. SEZ: concept, policies and consequences.

**UNIT-III**

10. Urban morphology and land use structure: city core, commercial, industrial and residential areas.
11. Classical models of city structure: concentric zone model by E.W. Burgess, sector model by Homer Hoyt, multiple nuclei model by Harris and Ullman,
12. Modifications of the classical models: Kearsley' modifications of Burgess model, Mann's model of midsize British city, White's model of the 21st century city and Vance's urban realms model.
13. Internal structure of third world cities: Bazar model and colonial model of South Asian cities, model of South East Asian cities and model of African cities.

**UNIT-IV**

14. Social Area Analysis; Bases of residential segregation.
15. Diffusion theories by Bylund, Morril, Hudson and Vance.
16. Rank size rule.
17. Law of primate city.

**Suggested Readings:**


1. Mayer, H.M. and Kohn, C.F. (1968) Readings in Urban Geography. The University of Chicago Press, Chicago.
2. Berry, J.E. (1970) Geography Perspective on Urban System, Prentice Hall, New Jersey.
3. Cater, Herald (1972) The study of Urban Geography, Edward Arnold, London.
4. Datta, A. and Shaban, A. (2017) Mega-Urbanization in Global South: Fast Cities and New Urban Utopias of the Post-colonial State, Routledge: London and New York.
5. Johnson, J. (1974) Suburban Growth, John Wiley and Sons, London.
6. Kaplan, Wheeler and Holloway (2007) Urban Geography, John Wiley, USA.
7. Clark, D. (1982), Urban Geography, Croom Halm, London and Cambridge.
8. Northern, R.M. (1979) Urban Geography, John Wiley, Toronto.
9. Michael P. (2004) Urban Geography: A Global Perspective, Routledge, USA.
10. Parnell, S. and Oldfield, S. (2014) The Routledge Handbook on Global Cities, Routledge, London.
11. Ramachandra, R (1992) Urbanization and Urban System in India, Oxford, London.
12. Raymond and Murphy (1960) The American Cities: An Urban Geography, McGraw Hills, New York.
13. Scott, A.J. (2002) Global City-Regions: Trends, Theory, Policy, Oxford Press, London.
14. Southhall, A. (1998) The City in Time and space, Cambridge University Press, Cambridge.

15. Sinha, S.P. (1984) Processes and Pattern of Urban Development in India: A Study of Haryana, The associated Publishers, Ambala Cantt.

**Mapping of Course Outcomes to Program Outcomes (Urban Geography)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-303 (i).1 | 3.0 | 1.0 | 3.0 | 2.0 | 2.0 | 2.0 | 1.0 | 2.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-303 (i).2 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 3.0 | 2.0 | 3.0 | 1.0 | 3.0 |
| M-GEO-303 (i).3 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 2.0 | 2.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-303 (i).4 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 3.0 | 2.0 | 3.0 | 1.0 | 2.0 |
| Average | 3.0 | 2.5 | 3.0 | 2.8 | 2.0 | 2.8 | 2.3 | 2.0 | 3.0 | 1.0 | 2.3 |

**Mapping of Course Outcomes to Program Specific Outcomes (Urban Geography)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-303 (i).1 | 3.0 | 1.0 | 2.0 | 3.0 |
| M-GEO-303 (i).2 | 3.0 | 1.0 | 3.0 | 3.0 |
| M-GEO-303 (i).3 | 3.0 | 1.0 | 2.0 | 3.0 |
| M-GEO-303 (i).4 | 3.0 | 1.0 | 2.0 | 3.0 |
| Average | 3.0 | 1.0 | 2.3 | 3.0 |

**Semester-III**
**Elective Course Code: M-GEO-303 (ii)**
**Elective Course Name: Geography of Wellbeing with Special Reference to India**

**Time: 3 Hours** | **Total Marks : 100**
**Credits: 4** | **External Assessment Marks : 70**
**Internal Assessment Marks : 30**

**Course Outcomes (COs):**

**M-GEO-303 (ii).1**: Understanding the concept of social wellbeing in spatial context.
**M-GEO-303 (ii).2:** Enhancement of knowledge about human welfare issues and their identification.
**M-GEO-303 (ii).3:** Acquaintance with educational infrastructure and policies in India.
**M-GEO-303 (ii).4:** Enrichment of knowledge about spatial pattern of hunger, health and nutritional security.

**Note for Paper Setters:** Question 1 is compulsory comprising of seven sub parts (two marks for each sub part), to be answered in 25-30 words. There will be eight long questions, two from each unit. The candidate has to answer four long questions, at least one question from each unit. All questions carry equal marks.

**UNIT-I**

1. Welfare geography: concept of social well-being, development and approaches to study human welfare.
2. Human beings: needs and wants, quality of life, level of living and state of well-being in India, identification of social indicators, their data sources and problem.

**UNIT-II**

3. Human Development Index, poverty and its measures, poverty and inequality in India
4. Gender issues in the process of development and gender development index.

**UNIT-III**

5. Structure of education in independent India, regional patterns of educational development; enrolment and dropouts with reference to school education.
6. Financing education and education policy in India.

**UNIT-IV**

7. Geography of health: concept of disease, ecology and epidemiology.
8. Health programmes and National Health Policy in independent India.
9. Nutritional security in India.

**Suggested Readings:**


1. Ahmad, A. (1999) Social Geography, Rawat Publication, New Delhi.
2. Coates, B.E., Johnston R.J. and Knox P.L. (1977) Geography and Inequality, Oxford University Press, London.
3. Jean, D. and Sen, A. (1996) Economic Development and Social Opportunity, Oxford University Press, New Delhi.
4. Jean, D and Sen, A (2002), India: Development and Participation, OUP, New Delhi.
5. Kapila, U (2007) India's Economic Development Since 1947. Academic Foundation, New Delhi.
6. National Nutrition Monitoring Bureau (2000) Dynamic Database on Diet and Nutrition, National Institute of Nutrition, Hyderabad.
7. Sen, A. and Jean D. (1996) Indian Development: Selected Regional Perspectives, Oxford University Press.
8. Smith, D.M. (1977) Human Geography: A Welfare Approach, Arnold Heinemann.
9. Smith, D.M. (1973) The Geography of Social Well-being in the United States. McGraw Hill, New York.
10. Smith, D.M. (1977) Where the Grass is Greener: Geographical Perspectives on Inequality, Penguin.


**Mapping of Course Outcomes to Program Outcomes**
**(Geography of Wellbeing with Special Reference to India)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-303 (ii).1 | 3.0 | 2.0 | 2.0 | 3.0 | 2.0 | 2.0 | 1.0 | 3.0 | 3.0 | 2.0 | 1.0 |
| M-GEO-303 (ii).2 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 1.0 | 3.0 | 3.0 | 2.0 | 1.0 |
| M-GEO-303 (ii).3 | 3.0 | 3.0 | 2.0 | 3.0 | 1.0 | 2.0 | 2.0 | 3.0 | 3.0 | 2.0 | 1.0 |
| M-GEO-303 (ii).4 | 3.0 | 3.0 | 2.0 | 3.0 | 2.0 | 3.0 | 2.0 | 2.0 | 3.0 | 2.0 | 2.0 |
| Average | 3.0 | 2.8 | 2.3 | 3.0 | 1.8 | 2.5 | 1.5 | 2.8 | 3.0 | 2.0 | 1.3 |

**Mapping of Course Outcomes to Program Specific Outcomes**
**(Geography of Wellbeing with Special Reference to India)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-303 (ii).1 | 3.0 | 2.0 | 2.0 | 1.0 |
| M-GEO-303 (ii).2 | 3.0 | 2.0 | 3.0 | 2.0 |
| M-GEO-303 (ii).3 | 3.0 | 3.0 | 2.0 | 2.0 |
| M-GEO-303 (ii).4 | 3.0 | 3.0 | 3.0 | 3.0 |
| Average | 3.0 | 2.5 | 2.5 | 2.0 |

**Semester-III**
**Elective Course Code: M-GEO-303 (iii)**
**Elective Course Name: Fluvial Geomorphology**

**Time: 3 Hours** | **Total Marks : 100**
**Credits: 4** | **External Assessment Marks : 70**
**Internal Assessment Marks : 30**

**Course Outcomes (COs):**

**M-GEO-303 (iii).1**: Acquaintance with the basic concepts of fluvial system.
**M-GEO-303 (iii).2:** Familiarization with sediment transfer processes and major types of channels.
**M-GEO-303 (iii).3:** Cognizance of flood forecasting and management techniques.
**M-GEO-303 (iii).4:** Awareness about flood plain management using geospatial technology.

**Note for Paper Setters:** Question 1 is compulsory comprising of seven sub parts (two marks for each sub part), to be answered in 25-30 words. There will be eight long questions, two from each unit. The candidate has to answer four long questions, at least one question from each unit. All questions carry equal marks.

**UNIT-I**

1. Fluvial System: types, variables, feedbacks, thresholds, responses and scales in fluvial geomorphology.
2. Water erosion: types of water erosion and erosive processes, monitoring of water erosion (field measurements and models) management problems associated with erosion.

**UNIT-II**

3. Sediment transfer: sources, modes, storage, movement and measurement of sediment load and yield, controls as sediment yield, human activity and sediment yield.
4. Channel forms and processes: channel types, geometry, size, shape, channel pattern, bedrock channels and associated land forms.

**UNIT-III**

5. Floods: Flood frequency, magnitude, forecasting and structural and non-structural adjustment to floods, catastrophic and paleo floods.
6. Impact of construction activities on fluvial systems.
7. Human adjustment in floodplains.

**UNIT-IV**

8. Managing river channels: channelization and flow regulation; impacts of water management on the physical, chemical and ecological condition of channels and floodplains, river restoration.
9. Remote sensing and GIS applications in mapping, monitoring and management of fluvial environments.

**Suggested Readings:**


1. Charlton, R. 2008. Fundamentals of Fluvial Geomorphology, Routledge, London
2. Chorley R.J. 1973. Introduction of Fluvial Processes. Methuen and Company, London.
3. Fryirs, K.A. and Brierley G.J. 2013. Geomorphologic Analysis of River Systems, Wiley Blackwell, Chichester.
4. Gregory K.J. 1977. River Channel Changes. John Wiley and Sons, New York.
5. Gregory K.J. and Walling, D.E. 1985. Drainage Basin: Forms and Process-A Geomorphological Approach. John Wiley and Sons, New York.
6. Kingston D. 1984. Fluvial Forms and Processes. Edward Arnold, London.
7. Kondelf, G.M. and Piegay, H. 2003. Tools in Fluvial Geomorphology. Wiley, Chichester.
8. Leopold C.B. 1964. Fluvial Processes in Geomorphology. Freeman, London.
9. Morisawa. 1981. Fluvial Geomorphology. George Allen and Unwin, London.
10. Robert, A. 2003. River Processes-An Introduction to Fluvial Dynamics, Hodder Education.


**Mapping of Course Outcomes to Program Outcomes (Fluvial Geomorphology)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-303 (iii).1 | 3.0 | 3.0 | 2.0 | 2.0 | 1.0 | 3.0 | 1.0 | 3.0 | 3.0 | 2.0 | 1.0 |
| M-GEO-303 (iii).2 | 3.0 | 3.0 | 2.0 | 3.0 | 2.0 | 3.0 | 2.0 | 3.0 | 3.0 | 2.0 | 2.0 |
| M-GEO-303 (iii).3 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 1.0 | 3.0 |
| M-GEO-303 (iii).4 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 |
| Average | 3.0 | 3.0 | 2.5 | 2.8 | 2.3 | 3.0 | 2.3 | 3.0 | 3.0 | 1.8 | 2.3 |

**Mapping of Course Outcomes to Program Specific Outcomes (Fluvial Geomorphology)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-303 (iii).1 | 3.0 | 2.0 | 1.0 | 3.0 |
| M-GEO-303 (iii).2 | 3.0 | 3.0 | 2.0 | 3.0 |
| M-GEO-303 (iii).3 | 3.0 | 3.0 | 3.0 | 3.0 |
| M-GEO-303 (iii).4 | 3.0 | 3.0 | 3.0 | 3.0 |
| Average | 3.0 | 2.8 | 2.3 | 3.0 |

**Semester-III**
**Elective Course Code: M-GEO-303 (iv)**
**Elective Course Name: Climate Change and Earth Systems**

**Time: 3 Hours** | **Total Marks : 100**
**Credits: 4** | **External Assessment Marks : 70**
**Internal Assessment Marks : 30**

**Course Outcomes (COs):**

**M-GEO-303 (iv).1**: Understanding about dynamics, trend and pattern of past climates.
**M-GEO-303 (iv).2:** Enrichment of knowledge about role of GHGs in global warming.
**M-GEO-303 (iv).3:** Acquaintance with future trends of climate change and policy framework.
**M-GEO-303 (iv).4:** Awareness about impacts of global warming on earth systems and environment.

**Note for Paper Setters:** Question 1 is compulsory comprising of seven sub parts (two marks for each sub part), to be answered in 25-30 words. There will be eight long questions, two from each unit. The candidate has to answer four long questions, at least one question from each unit. All questions carry equal marks.

**UNIT-I**

1. Climatic variations, fluctuations and change.
2. Past climates and evidences of climate change.
3. Terrestrial and extra-terrestrial hypotheses of Climate Change

**UNIT-II**

4. Earth's radiation balance, Greenhouse effect and global warming.
5. Greenhouse gases: emission, concentration and effects.
6. Biochemical cycle of carbon and other Greenhouse gases.

**UNIT-III**

7. IPCC and its reports: trend and pattern of global warming.
8. Future climate change and predictions.
9. World climate policy framework: Rio Summit, Kyoto Protocol and Paris Agreement.

**UNIT-IV**

10. Climate change impacts on sea level and oceanic environment.
11. Climate change, water resources and agriculture.
12. Global warming, disaster vulnerability and environment.

**Suggested Readings:**


1. Andrew Dessler, 2011. Introduction to Modern Climate Change, Cambridge University Press.
2. Andrew Dessler, 2012. The Science and Politics of Global Climate Change, Cambridge University Press.
3. Anthony Giddens, 2013. The Politics of Climate Change, Wiley.
4. David Wallace-Wells, 2019. The Uninhabitable Earth, Penguin Books.
5. John Houghton, 2009. Global Warming: The Complete Briefing, Cambridge University Press.
6. Jefferey Bennet, 2016. Global Warming Premier, https://www.globalwarmingprimer.com/.
7. Intergovernmental Panel on Climate Change, UNEP and WMO. IPCC Assessment Reports 1-5.
8. Trewartha G. T., 1980. An Introduction to Climate, McGraw Hill Company, New York.
9. Will Steffen, Regina Angelina Sanderson, Peter D. Tyson, Jill Jagger, Pamela A. Matson, Berrien Moore III, Frank Oldfield, Katherine Richardson, Hans-Joachim Schellenberg, Billie L. Turner and Robert J. Wasson, 2005. Global Climate Change and the Earth System: A Planet under Pressure. Springer Verlag Berlin Heidelberg, Germany.


**Mapping of Course Outcomes to Program Outcomes (Climate Change and Earth Systems)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-303 (iv).1 | 3.0 | 3.0 | 2.0 | 1.0 | 1.0 | 2.0 | 2.0 | 3.0 | 3.0 | 3.0 | 1.0 |
| M-GEO-303 (iv).2 | 3.0 | 3.0 | 2.0 | 2.0 | 2.0 | 2.0 | 3.0 | 3.0 | 3.0 | 2.0 | 2.0 |
| M-GEO-303 (iv).3 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 2.0 | 3.0 | 3.0 | 3.0 | 2.0 | 2.0 |
| M-GEO-303 (iv).4 | 3.0 | 2.0 | 2.0 | 3.0 | 2.0 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 2.0 |
| Average | 3.0 | 2.8 | 2.3 | 2.3 | 1.8 | 2.3 | 2.8 | 3.0 | 3.0 | 2.3 | 1.8 |

**Mapping of Course Outcomes to Program Specific Outcomes (Climate Change and Earth Systems)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-303 (iv).1 | 3.0 | 2.0 | 3.0 | 2.0 |
| M-GEO-303 (iv).2 | 3.0 | 2.0 | 3.0 | 3.0 |
| M-GEO-303 (iv).3 | 3.0 | 3.0 | 3.0 | 2.0 |
| M-GEO-303 (iv).4 | 3.0 | 2.0 | 3.0 | 2.0 |
| Average | 3.0 | 2.3 | 3.0 | 2.3 |

**Semester-III**
**Elective Course Code: M-GEO-303 (v)**
**Elective Course Name: Resource Geography**

**Time: 3 Hours** | **Total Marks : 100**
**Credits: 4** | **External Assessment Marks : 70**
**Internal Assessment Marks : 30**

**Course Outcomes (COs):**

**M-GEO-403 (ii).1**: Basic understanding about concept of resource, environment and development.
**M-GEO-403 (ii).2:** Enrichment of knowledge about resource availability, accessibility and distribution.
**M-GEO-403 (ii).3:** Acquaintance with concepts of resource use, core-periphery relations and imbalanced development.
**M-GEO-403(ii).4:** Awareness about management techniques of resources for sustainable development.

**Note for Paper Setters:** Question 1 is compulsory comprising of seven sub parts (two marks for each sub part), to be answered in 25-30 words. There will be eight long questions, two from each unit. The candidate has to answer four long questions, at least one question from each unit. All questions carry equal marks.

**UNIT-I**

Concept and Scope of Resource Geography; Resource and ecosystem services: concept and types in relation to related concepts- environment, ecosystem, nature as nurture; World resources: classification of resources- changing profile and concerns; understanding relationship between natural resources and development process, and livelihoods with special reference to poor in the developing world. Sustainable development and some concerns from the past- from dooms day, zero growth to Rio and subsequent Earth summits.

**UNIT-II**

Natural resource-based development processes in history: the agricultural transition, the era of Malthusian stagnation, Emergence of world economy, rise of the Western Europe with special reference to golden era of resource-based development (1870-1913), colonial origins and resource exploitation, center-periphery trade-resource dependency and unequal development.

**UNIT-III**

Models of Natural Resources Process**:** Zimmermann's Primitive and Advance Models of natural resource process-population, resources and carrying capacity, Kirk's Decision Model, Brookfield System Model; The resource curse hypothesis; open access exploitation hypothesis; factor endowment hypothesis; resources and common property/ entitlement-opportunity hypothesis; Resource exploitation and internal colonization, accumulation by dispossession; poverty and resource degradation.

**UNIT-IV**

Management of Natural Resources: Meaning and Concept of conservation of Natural Resources, Resources and governance- State, civil society and state- resource tenure and property rights-access and ownership; decentralization, participation and Justice- fundamentals of community based natural resources management (C-BNRM); political economy and C-BNRM; reconciling biodiversity with development. Conservation and Management Methods of Natural resources: Soil Resource, Water Resource, Forest Resource and Mineral Resources, Problems of Natural Resource Management in India. Policies for sustainable resource-based development.

**Suggested Readings:**


1. Barbier, Edward B (2005) Natural Resources and Economic Development, Cambridge University Press.
2. Borton, I and R W Kates (1984) Readings in Resource Management and Conservation, University of Chicago Press, Chicago.
3. Bruce, Mitchell (1989) Geography and Resource Analysis, John Wiley and Son, New York.
4. Eliot Hurst, M E (1972) A Geography of Economic Behavior: An Introduction, Duxbury Press, California.
5. Fabricius, C and Eddie Koch (2004) Rights, Resources and Rural Development: Community based Natural Resource Management in Southern Africa, Earthscan, London.
6. Guha, J L and P R Chattroj (1994) Economic Geography-A Study of Resources, The World Press Pvt. Ltd. Calcutta.
7. Martino, R L (1969) Resource Management. McGraw Hill Book Co., London.
8. Negi, B S (2000) Geography of Resources, Kedar Nath and Ram Nath, Meerut.
9. Owen, Oliver (1971) Natural Resource Conservation: An Ecological Approach, McMillion, New Delhi.
10. Raja, M (1989) Renewable Resources, Development, Concept Publication, New Delhi.
11. UNDP & World Resource Institute (2005) The Wealth of the Poor-Managing Ecosystems to Fight Poverty, World Resources Institute, Washington, DC.
12. Zimmermann, E. W. (1951) World Resources and Industries, Harper and Brothers, New Delhi.

**Mapping of Course Outcomes to Program Outcomes (Resource Geography)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-403 (ii).1 | 3.0 | 1.0 | 3.0 | 2.0 | 2.0 | 1.0 | 1.0 | 2.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-403 (ii).2 | 3.0 | 2.0 | 3.0 | 3.0 | 2.0 | 2.0 | 2.0 | 2.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-403 (ii).3 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 3.0 | 3.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-403 (ii).4 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 3.0 | 3.0 | 3.0 | 1.0 | 2.0 |
| Average | 3.0 | 2.3 | 3.0 | 2.8 | 2.0 | 2.3 | 2.3 | 2.5 | 3.0 | 1.0 | 2.0 |

**Mapping of Course Outcomes to Program Specific Outcomes (Resource Geography)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-403 (ii).1 | 3.0 | 1.0 | 1.0 | 2.0 |
| M-GEO-403 (ii).2 | 3.0 | 1.0 | 2.0 | 3.0 |
| M-GEO-403 (ii).3 | 3.0 | 1.0 | 3.0 | 3.0 |
| M-GEO-403 (ii).4 | 3.0 | 1.0 | 3.0 | 3.0 |
| Average | 3.0 | 1.0 | 2.3 | 2.8 |

**Semester-III**
**Elective Course Code: M-GEO-304 (i)**
**Elective Course Name: Political Geography**

| | | |
|---|---|---|
| **Time: 3 Hours** | **Total Marks** | **: 100** |
| **Credits: 4** | **External Assessment Marks** | **: 70** |
| | **Internal Assessment Marks** | **: 30** |

**Course Outcomes (COs):**

**M-GEO-304 (i).1**: Familiarization with the conceptual framework of geo-political issues.
**M-GEO-304 (i).2:** Augmentation of knowledge about state and nation in geographic perspective.
**M-GEO-304 (i).3:** Enhancement of knowledge about global strategic views and geo-politics in post-cold war era.
**M-GEO-304 (i).4:** Awareness about contemporary geo-political situation and issues in India.

**Note for Paper Setters:** Question 1 is compulsory comprising of seven sub parts (two marks for each sub part), to be answered in 25-30 words. There will be eight long questions, two from each unit. The candidate has to answer four long questions, at least one question from each unit. All questions carry equal marks.

**UNIT-I**

1. Nature and scope of political geography, its approaches and recent trends.
2. School of thoughts: political economy, world system, globalization.

**UNIT-II**

3. Concept of nation, state and nation-state, nationalism and nation building, emergence and growth of territorial state, globalization and the crisis of the territorial state forms of governance: unitary and federal.
4. Distinction between frontiers and boundaries, demarcation of boundaries, classification and functions of boundaries.
5. Landlocked state: advantages and disadvantages.

**UNIT-III**

6. Global strategic views: Mahan and Sea power; Mackinder and Heartland; Spykman and Rimland Servasky and Air power.
7. Geo-politics in the post-cold war world- S.B. Cohen's model of geo-politics.

**UNIT-IV**

8. Emergence of India as regional power: geo-political significance of Indian and Pacific Ocean.
9. Geo-political issues in India with special reference to water disputes and riparian claims.
10. Gerrymandering and electoral abuse in India.
11. Kashmir problem and Indo-Pak relations.

**Suggested Readings:**


1. Alexander, L.M. World Political Patterns Ran Mc Nally, Chicago, 1963.
2. De Blij, H.J. and Glassner, Martin. Systematic Political Geography, John Wiley, New York, 1968.
3. Deshpande C.D: India-A Regional Interpretation Northern Book Centre, New Delhi, 1992.
4. Dikshit, R. D. Political Geography: A Contemporary perspective, Tata McGraw Hill, New Delhi, 1996.
5. Dikshit, R.D. Political geography: A Century of Progress, Sage, New Delhi, 1999.
6. Fisher Charles A. Essays in Political Geography, Methuen, London, 1968.
7. John R. Short. An Introduction to Political Geography, Routledge, London, 1982.
8. Moddie, A.E. Geography Behind Political Hutchinson, London, Latest edition.
9. Pounds N.J.G. Political Geography. McGraw Hill, New York, 1972.
10. Prescott. J.R.V. The Geography of Frontiers and Boundaries Aldine, Chicago.
11. Sukhwal, B.L. Modern Political Geography of India Sterling Publishers, New Delhi. 1968.
12. Taylor, P. Political Geography, Longman, London. 1985.

**Mapping of Course Outcomes to Program Outcomes (Political Geography)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-304 (i).1 | 3.0 | 3.0 | 3.0 | 2.0 | 2.0 | 2.0 | 2.0 | 3.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-304 (i).2 | 3.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-304 (i).3 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 2.0 | 2.0 | 2.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-304 (i).4 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 2.0 | 2.0 | 3.0 | 1.0 | 2.0 |
| Average | 3.0 | 2.8 | 2.8 | 2.5 | 2.0 | 2.3 | 2.0 | 2.3 | 3.0 | 1.0 | 2.0 |

**Mapping of Course Outcomes to Program Specific Outcomes (Political Geography)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-304 (i).1 | 3.0 | 1.0 | 1.0 | 2.0 |
| M-GEO-304 (i).2 | 3.0 | 1.0 | 2.0 | 2.0 |
| M-GEO-304 (i).3 | 3.0 | 1.0 | 2.0 | 3.0 |
| M-GEO-304 (i).4 | 3.0 | 1.0 | 2.0 | 3.0 |
| Average | 3.0 | 1.0 | 1.8 | 2.5 |

**Semester-III**
**Elective Course Code: M-GEO-304 (ii)**
**Elective Course Name: Geography of Rural Settlements**

| | | |
|---|---|---|
| **Time: 3 Hours** | **Total Marks** | **: 100** |
| **Credits: 4** | **External Assessment Marks** | **: 70** |
| | **Internal Assessment Marks** | **: 30** |

**Course Outcomes (COs):**

**M-GEO-304 (ii).1**: Understanding about the fundamental concepts of settlement geography.
**M-GEO-304 (ii).2:** Enhancement of knowledge about types and patterns of rural settlements
**M-GEO-304 (ii).3:** Acquaintance with various social issues in rural settlements.
**M-GEO-304 (ii).4:** Knowledge about environmental issues and rural development planning in India.

**Note for Paper Setters:** Question 1 is compulsory comprising of seven sub parts (two marks for each sub part), to be answered in 25-30 words. There will be eight long questions, two from each unit. The candidate has to answer four long questions, at least one question from each unit. All questions carry equal marks.

**UNIT-I**

1. Nature, scope, significance and development of settlement geography. Approaches in rural settlement geography.
2. Histogenesis of rural settlements: historical development, definition and characteristics of rural settlement, distribution of rural settlements, size and spacing of rural settlements in India.

**UNIT-II**

3. Rural Settlement: types, forms and patterns.
4. Regionalization of rural settlements with special reference to India.

**UNIT-III**

5. Social issues in rural settlements: Poverty, housing, health care and inequality in India.
6. Cultural landscape elements in rural settlements: House type and field pattern.

**UNIT-IV**

7. Environmental issues in rural settlements.
8. Rural development planning in India.

**Suggested Readings:**


1. Alam, S.M. Settlement System of India, Oxford and IBH Publication Co, New Delhi, 1982.
2. Brock, J.O.M and Welb, J.W. Geography of Mankind. McGraw Hill, London, 1978.
3. Chisholm, M. Rural settlements and Land Use, John Wiley, New York, 1967.
4. Clout, H.D. Rural Geography, Pergamon, Oxford, 1977.
5. Daniel, P. and Hopkinson, M. The Geography of Settlement. Oliver & Byod, Edinburgh, 1986.
6. Grover, N. Rural Settlements – A Cultural Geographical analysis, Inter-India Publication, Delhi, 1985.
7. Hudson, R.S. A Geography of Settlements, MacDonald & Evans., New York, 1976.
8. Mitra, A. Report on House Types and Village settlement Patterns in India. Publication Development, Govt. Of India, New Delhi, 1960.
9. Mayer, I and R.J. Haqqet. Settlements: Theory and Practice. Harper & Row, London, 1979.
10. Ramachandran, H. Village Clusters and Rural Development, Concept Publication, New Delhi, 1985.
11. Rao, E.N. Strategy for Integrated Rural Development, B.R. Publication Cor., Delhi, 1986.
12. Rappaport, A. House form and Culture, Prentice Hall, New Jersey, 1969.
13. Sen, L.K. Readings in Micro-level Planning and Rural Growth Centres. National Institute of Community Development, Hyderabad, 1972.
14. Singh, R.L. Transformation of Rural Habitat in Indian Perspectives: A Geographic Dimension, NGSI Research Publication, No. 19, Varanasi, 1978.
15. Srinivas, M.N. Village India, Asia Publication House, Bombay, 1968.
16. Wan Mali, S.: Service Centres in Rural India, B.R. Publication, New Delhi, 1983.

**Mapping of Course Outcomes to Program Outcomes (Geography of Rural Settlements)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-304 (ii).1 | 3.0 | 1.0 | 3.0 | 3.0 | 2.0 | 2.0 | 1.0 | 2.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-304 (ii).2 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 2.0 | 3.0 | 2.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-304 (ii).3 | 3.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-304 (ii).4 | 3.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 3.0 | 1.0 | 2.0 |
| Average | 3.0 | 2.0 | 2.5 | 2.5 | 2.0 | 2.0 | 2.0 | 2.0 | 3.0 | 1.0 | 2.0 |

**Mapping of Course Outcomes to Program Specific Outcomes (Geography of Rural Settlements)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-304 (ii).1 | 3.0 | 1.0 | 1.0 | 2.0 |
| M-GEO-304 (ii).2 | 3.0 | 1.0 | 3.0 | 3.0 |
| M-GEO-304 (ii).3 | 3.0 | 1.0 | 2.0 | 2.0 |
| M-GEO-304 (ii).4 | 3.0 | 1.0 | 2.0 | 2.0 |
| Average | 3.0 | 1.0 | 2.0 | 2.3 |

**Semester-III**
**Elective Course Code: M-GEO-304 (iii)**
**Elective Course Name: Soil Geography**

**Time: 3 Hours** **Total Marks : 100**
**Credits: 4** **External Assessment Marks : 70**
**Internal Assessment Marks : 30**

**Course Outcomes (COs):**

**M-GEO-304 (iii).1**: Acquaintance with soil profile and soil forming processes.
**M-GEO-304 (iii).2:** Enrichment of knowledge about physical, chemical and biological properties of soils.
**M-GEO-304 (iii).3:** Awareness about soil erosion and degradation processes.
**M-GEO-304 (iii).4:** Augmentation of knowledge about soil conservation and soil survey methods.

**Note for Paper Setters:** Question 1 is compulsory comprising of seven sub parts (two marks for each sub part), to be answered in 25-30 words. There will be eight long questions, two from each unit. The candidate has to answer four long questions, at least one question from each unit. All questions carry equal marks.

**UNIT-I**

1. Nature and scope of soil geography.
2. Soil formation factors (parent material, flora and fauna, climatic and topographic) and processes of soil formation and soil development (physical, biotic and chemical).
3. Soil profile and its characteristics (zonal, azonal and intra zonal soils).

**UNIT-II**

4. Physical properties of soils: morphology, (texture, structure, colour, porosity and permeability), water, air and temperature.
5. Chemical properties of soils: soils reaction and controlling factors, soil clays, organic matter and humus.
6. Biological properties of soils (soil organisms).

**UNIT-III**

7. Soil classification: genetic, taxonomic and 7$^{th}$ Approximation, their characteristics and world patterns.
8. Soil erosion and degradation processes

**UNIT-IV**

9. Conservation methods to improve the physical qualities of soils.
10. Methods and mechanism of soil survey.
11. Soil reclamation and management, integrated soil and management.

**Suggested Readings:**


1. Birkland P.W. 1999. Soil and Geomorphology, oxford university press, Inc., New York.
2. Brady NC and Weil Raymond C. 2012. The nature and Properties of soils, Pearson publishing, New Delhi.
3. Brickland, PW. 1984. Soils and Geomorphology. Oxford University Press, London.
4. Buckman, H.O and Brady, N.C. 1960. The Nature and Properties of Soils. MacMillan, New York.
5. Bunting, B.T. 1973. The Geography of Soils, Hutchinson, London.
6. Clark, GR. 1957. Study of Soil in the Field, Oxford University Press, Oxford.
7. Daji, JA.1970. A Text Book of Soil Science. Asia Publishing House, New Delhi.
8. Foth H.D. and Turk LM. 1972. Fundamentals of Soil Science. John Wiley, New York.
9. Mc. Bride, M.B. 1999. Environmental Chemistry of Soils, Oxford University Press, New York.
10. Pitty, A.F. 1978. Geography and Soil Properties. University Press, London.
11. Ray Choudhuri, S.P. 1958. Soils of India, ICAR, New Delhi.
12. Sehgal, J. 2000. Pedology-concepts and Applications. Kalyani Publications, New Delhi.


**Mapping of Course Outcomes to Program Outcomes (Soil Geography)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-304 (iii).1 | 3.0 | 2.0 | 2.0 | 2.0 | 2.0 | 3.0 | 1.0 | 2.0 | 3.0 | 2.0 | 3.0 |
| M-GEO-304 (iii).2 | 3.0 | 3.0 | 2.0 | 3.0 | 2.0 | 3.0 | 2.0 | 3.0 | 3.0 | 1.0 | 3.0 |
| M-GEO-304 (iii).3 | 3.0 | 3.0 | 2.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 3.0 | 1.0 | 3.0 |
| M-GEO-304 (iii).4 | 3.0 | 3.0 | 2.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 |
| Average | 3.0 | 2.8 | 2.0 | 2.8 | 2.5 | 3.0 | 2.0 | 2.8 | 3.0 | 1.5 | 3.0 |

**Mapping of Course Outcomes to Program Specific Outcomes (Soil Geography)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-304 (iii).1 | 3.0 | 2.0 | 3.0 | 3.0 |
| M-GEO-304 (iii).2 | 3.0 | 2.0 | 3.0 | 3.0 |
| M-GEO-304 (iii).3 | 3.0 | 3.0 | 3.0 | 3.0 |
| M-GEO-304 (iii).4 | 3.0 | 3.0 | 3.0 | 3.0 |
| Average | 3.0 | 2.5 | 3.0 | 3.0 |

**Semester-III**
**Elective Course Code: M-GEO-304 (iv)**
**Elective Course Name: Geography and Disaster Management**

**Time: 3 Hours** | **Total Marks : 100**
**Credits: 4** | **External Assessment Marks : 70**
**Internal Assessment Marks : 30**

**Course Outcomes (COs):**

**M-GEO-304 (iv).1**: Understanding about the spatial dimensions and distribution of disasters
**M-GEO-304 (iv).2:** Enrichment of knowledge about natural and human induced disasters.
**M-GEO-304 (iv).3:** Acquaintance with the concepts of disaster management, vulnerability and mitigation
**M-GEO-304 (iv).4:** Awareness about the role of geospatial technology in disaster management.

**Note for Paper Setters:** Question 1 is compulsory comprising of seven sub parts (two marks for each sub part), to be answered in 25-30 words. There will be eight long questions, two from each unit. The candidate has to answer four long questions, at least one question from each unit. All questions carry equal marks.

**UNIT-I**

1. Disasters and hazards: definition, nature and classification.
2. Geography and disasters: major disasters of world, disaster profile of India.
3. Tectonic disasters: volcanoes, earthquakes, tsunamis, landslides.

**UNIT-II**

4. Hydrological disasters: floods and droughts.
5. Climatic disasters: cyclones and heavy precipitation events.
6. Human induced disasters: epidemics, industrial and transport disasters; wars and terrorism induced disasters.

**UNIT-III**

7. Disaster management in India: policy and organizational structure setup.
8. Disaster vulnerability and affecting factors.
9. Planning for disaster mitigation measures and preparedness.

**UNIT-IV**

10. Post disaster recovery and rehabilitation.
11. Impacts of disaster on society and economy.
12. Geospatial technology applications in disaster prevention and monitoring.

**Suggested Readings:**


1. Nlaikie, P (1994) At Risk: Natural Hazards, People's Vulnerability and Disasters, Routledge, London.
2. Carter, NW (1991) Disaster Management: A Disaster Manager's Handbook, ADB, Manila.
3. Cuny, FC (1983) Disasters and Development, Oxford University Press.
4. Hewitt, K (1977) Regions of Risk: A Geographical Introduction to Disasters, Longman, Harlow.
5. National Policy on Disaster Management (2009) Ministry of Home Affairs, Govt. of India, New Delhi.
6. Smith, K (1996) Environmental Hazards: Assessing Risks and Reducing Disasters, Routledge, London.
7. Varley, A. Disaster, Development and Environment, John Wiley and Sons, Chichester.


**Mapping of Course Outcomes to Program Outcomes (Geography and Disaster Management)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-304 (iv).1 | 3.0 | 2.0 | 3.0 | 2.0 | 1.0 | 2.0 | 1.0 | 2.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-304 (iv).2 | 3.0 | 2.0 | 3.0 | 2.0 | 1.0 | 3.0 | 1.0 | 2.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-304 (iv).3 | 3.0 | 3.0 | 3.0 | 3.0 | 1.0 | 3.0 | 1.0 | 3.0 | 3.0 | 2.0 | 3.0 |
| M-GEO-304 (iv).4 | 3.0 | 3.0 | 3.0 | 3.0 | 1.0 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 |
| Average | 3.0 | 2.5 | 3.0 | 2.5 | 1.0 | 2.8 | 1.5 | 2.5 | 3.0 | 1.5 | 2.5 |

**Mapping of Course Outcomes to Program Specific Outcomes (Geography and Disaster Management)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-304 (iv).1 | 3.0 | 2.0 | 1.0 | 3.0 |
| M-GEO-304 (iv).2 | 3.0 | 3.0 | 2.0 | 3.0 |
| M-GEO-304 (iv).3 | 3.0 | 3.0 | 2.0 | 3.0 |
| M-GEO-304 (iv).4 | 3.0 | 3.0 | 2.0 | 3.0 |
| Average | 3.0 | 2.8 | 1.8 | 3.0 |

**Semester-III**
**Elective Course Code: M-GEO-304 (v)**
**Elective Course Name: Biogeography**

**Time: 3 Hours** | **Total Marks : 100**
**Credits: 4** | **External Assessment Marks : 70**
**Internal Assessment Marks : 30**

**Course Outcomes (COs):**

**M-GEO-304 (v).1**: Understanding about basic ecological principles.
**M-GEO-304 (v).2:** Enrichment of understanding about distribution of plants and animals' life on the earth.
**M-GEO-304 (v).3:** Awareness about conservation of biotic resources and effects of industrial effluents on ecosystems.
**M-GEO-304 (v).4:** Acquaintance with environmental hazards and enactment of forest and wild life policy in India.

**Note for Paper Setters:** Question 1 is compulsory comprising of seven sub parts (two marks for each sub part), to be answered in 25-30 words. There will be eight long questions, two from each unit. The candidate has to answer four long questions, at least one question from each unit. All questions carry equal marks.

**UNIT-I**

1. Nature, scope and significance of biogeography.
2. Basic ecological principles: Bio-energy cycle in territorial ecosystem; energy budget of the earth; trophic levels and food web.
3. Origin of fauna and flora: major gene centers; domestication of plants and animals and their disposal agents and roots.

**UNIT-II**

4. Distribution of plant life on the earth and its relation to soil, climate and human activities.
5. Geographical distribution of animal life on the earth and its relation to vegetation types, climate and human activities.

**UNIT-III**

6. Communities: nature of communities and ecosystems: bio-diversities; human induced communities change; habitat decay and conservation of biotic resources.
7. Industrial effluent and its effect on fresh water and marine biology.

**UNIT-IV**

8. Environmental hazards: Ecological consequences, human perception and adjustment with respect to flood, drought and earthquake.
9. Bio-Reserves in India.
10. National forest and wild life policy of India.

**Suggested Readings:**


1. Cox, C.D. and Moore, P.D.: Biogeography: An Ecological and Evolutionary Approach, Blackwell, 1993.
2. Huggett, R.J.: Fundamentals of Biogeography. Routledge, U.S.A. 1998.
3. Lllies, J.: Introduction of Zoogeography, McMillan. London. 1974.
4. Khushoo, T.N. and Sharma, M.: Indian Geosphere-Biosphere Har-Anand Publication, Delhi 1991.
5. Mathur, H.S.: Essentials of Biogeography, Anuj Printers, Jaipur, 1998.
6. Pears, N.: Basic Biogeography, Longman, London, 1985.
7. Simmon, I.G.: Biogeography, Natural and Cultural, Longman, London 1974.
8. Tivy, J.: Biogeography: A study of Plants in Ecosphere, Oliver and Boyd, U.S.A., 1992.


**Mapping of Course Outcomes to Program Outcomes (Biogeography)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-304 (v).1 | 3.0 | 1.0 | 2.0 | 2.0 | 2.0 | 1.0 | 1.0 | 2.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-304 (v).2 | 3.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.0 | 2.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-304 (v).3 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 3.0 | 3.0 | 3.0 | 1.0 | 3.0 |
| M-GEO-304 (v).4 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 3.0 | 3.0 | 3.0 | 1.0 | 3.0 |
| Average | 3.0 | 2.3 | 2.5 | 2.5 | 2.0 | 2.3 | 2.0 | 2.5 | 3.0 | 1.0 | 2.5 |

**Mapping of Course Outcomes to Program Specific Outcomes (Biogeography)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-304 (v).1 | 3.0 | 1.0 | 1.0 | 2.0 |
| M-GEO-304 (v).2 | 3.0 | 1.0 | 1.0 | 2.0 |
| M-GEO-304 (v).3 | 3.0 | 1.0 | 2.0 | 3.0 |
| M-GEO-304 (v).4 | 3.0 | 1.0 | 1.0 | 3.0 |
| Average | 3.0 | 1.0 | 1.3 | 2.5 |

**Semester-III**
**Core Course Code: M-GEO-305**
**Core Course Name: Introduction to Remote Sensing (Theory)**

**Time: $2\frac{1}{2}$ Hours** | **Total Marks : 50**
**Credits: 2** | **External Assessment Marks : 35**
**Internal Assessment Marks : 15**

**Course Outcomes (COs):**

**M-GEO-305.1**: Acquaintance with fundamentals of remote sensing.
**M-GEO-305.2:** Development of capability to interpret the aerial photographs.
**M-GEO-305.3:** Enrichment of skills to extract information from resource satellite imageries.
**M-GEO-305.4:** Awareness about digital image processing and its applications in resource monitoring and mapping.

**Note for Paper Setters:** Question 1 is compulsory comprising of four sub parts (two marks for each sub part), to be answered in 25-30 words. There will be six long questions, three from each unit. The candidate has to answer three long questions, at least one question from each unit. Question 1 carries eight marks. Long questions carry nine marks each.

**UNIT-I**

1. Aerial Photographs: History, definition and advantages and limitations. Types of aerial photographs and resolution. Mirror Stereoscope, stereoscopic parallax, relief displacement. Elements of aerial photo interpretation.
2. Remote Sensing, definition and scope, EMR and spectrum. Blackbody Radiation and Kirchhoff's Law. Interaction of EMR with atmosphere and earth surface features. Atmospheric window. Remote Sensing Platforms and Sensors. Orbits, Resolution and types of remote sensing.

**UNIT-II**

3. Concept of Multispectral, Thermal and Hyper spectral remote sensing. Major earth resource Satellites: LANDSAT, SPOT and IKONOS. Indian Space Program and characteristics of Indian remote sensing satellite and data.
4. Digital Image processing and application: image restoration and correction. Image classification: supervised and unsupervised. Applications in resource mapping and monitoring.

**Suggested Readings:**


1. Avery T.E., and G.L. Berlin (1992): Fundamentals of Remote Sensing and Air Photo Interpretation, Macmillan, New York, USA.
2. Aggarwal C.S. and P.K. Garg (2000). Remote Sensing, A.H. Wheeler & Co. Ltd, New Delhi.
3. Campbell, J.B. (2002) Introduction to Remote Sensing, Taylor & Francis, New York, USA.
4. Jensen, J.R. (2000), Remote Sensing of the Environment: An Earth Resource Perspectives, Pearson Education.
5. Lillesand, TM. and Keffer R. (1994) Remote Sensing and Image Interpretation, John Willy & Sons, New York.
6. Meenakshi Kumar (2000), Text book on Remote Sensing; NCERT, New Delhi.
7. Nag and Kudrat (2002), Remote Sensing and Image Interpretation, Concept Publishers, Delhi.
8. Reddy, A. (2000) Remote Sensing and Geographical Information System (An Introduction), Hyderabad.


**Mapping of Course Outcomes to Program Outcomes (Introduction to Remote Sensing-Theory)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-305.1 | 3.0 | 2.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 2.0 |
| M-GEO-305.2 | 3.0 | 3.0 | 2.0 | 3.0 | 2.0 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 1.0 |
| M-GEO-305.3 | 3.0 | 2.0 | 2.0 | 2.0 | 2.0 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 2.0 |
| M-GEO-305.4 | 3.0 | 3.0 | 3.0 | 2.0 | 2.0 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 1.0 |
| Average | 3.0 | 2.5 | 2.5 | 2.5 | 2.3 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 1.8 |

**Mapping of Course Outcomes to Program Specific Outcomes (Introduction to Remote Sensing-Theory)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-305.1 | 2.0 | 3.0 | 3.0 | 3.0 |
| M-GEO-305.2 | 2.0 | 3.0 | 3.0 | 3.0 |
| M-GEO-305.3 | 3.0 | 3.0 | 3.0 | 3.0 |
| M-GEO-305.4 | 3.0 | 3.0 | 3.0 | 3.0 |
| Average | 2.5 | 3.0 | 3.0 | 3.0 |

**Semester-III**
**Core Course Code: M-GEO-306**
**Core Course Name: Introduction to Remote Sensing (Practical)**

**Time: 3 Hours** | **Total Marks : 100**
**Credits: 4** | **External Assessment Marks : 70**
**Internal Assessment Marks : 30**

**Course Outcomes (COs):**

**M-GEO-306.1:** Acquisition of skills of measurements on aerial photographs.
**M-GEO-306.2:** Capability of reading and interpreting physical and socio-economic features on photographs.
**M-GEO-306.3:** Acquaintance with different digital data products and software for the processing of satellite data.
**M-GEO-306.4:** Enhancement of skills about processing and extracting features from satellite imageries.

**Note for Paper Setters:** The examiner shall set four questions, two from each unit. The candidate shall attempt three questions in all, selecting at least one question from each unit.

**Distribution of Marks for Evaluation**

**Exercise = 45** **File Record = 10** **Viva-voce = 15**

**UNIT-I**

| | | |
|---|---|---|
| 1. | Basic information on aerial photographs (annotation and markings). | |
| 2. | Identification of Fiducial marks, Principal point, Conjugate Principal points and Flight line. | 1 exercise |
| 3. | Calculation of scale of aerial photographs. | 2 exercise |
| 4. | Determination of height of objects on single vertical aerial photographs. | 1 exercise |
| 5. | Stereoscope vision and identification of objects on ZEISS card. | 1exercise |
| 6. | Interpretation and preparation of land use/land cover from aerial photographs | 2 exercise |
| 7. | Preparation of interpretation key of satellite imageries | 1 exercise. |
| 8. | Visual interpretation and preparation of land use/land cover from satellite imageries | 1 exercise |

**UNIT-II**

| | | |
|---|---|---|
| 9. | Georeferencing of Satellite Data by georeferenced toposheet or GCP's | 1exercise |
| 10. | Pre-processing of imageries (i) image enhancement (ii) sub set and (iii) resolution merge/sharpening of image | 3 exercise |
| 11. | Preparation of FCC and comparison of features on true colour, panchromatic and FCC | 3 exercise |
| 12. | Digital classification of satellite data (supervised and unsupervised) | 2 exercise |

**Suggested Readings:**


1. Bhatta Basudeb (2014). Remote Sensing and GIS. Oxford University Press, Oxford.
2. Guha Pardeep (2013). Remote Sensing for the Beginner. East West Press, New Delhi.
3. Kumar Meenakshi 2001. Remote Sensing, NCERT, New Delhi.
4. Lillesand and R.W. Kiefer,2005. Remote Sensing and Image Interpretation, John Wiley and Sons.
5. Pritvish Nag, and M. Kudrat 1998. Digital Remote Sensing, Concept Publishing Company, New Delhi.


**Mapping of Course Outcomes to Program Outcomes (Introduction to Remote Sensing-Practical)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-306.1 | 3.0 | 3.0 | 2.0 | 3.0 | 1.0 | 2.0 | 3.0 | 3.0 | 3.0 | 2.0 | 1.0 |
| M-GEO-306.2 | 3.0 | 3.0 | 3.0 | 3.0 | 1.0 | 2.0 | 3.0 | 3.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-306.3 | 3.0 | 3.0 | 2.0 | 2.0 | 2.0 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 2.0 |
| M-GEO-306.4 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 2.0 | 3.0 | 3.0 | 3.0 | 2.0 | 2.0 |
| Average | 3.0 | 3.0 | 2.5 | 2.8 | 1.5 | 2.3 | 3.0 | 3.0 | 3.0 | 1.8 | 1.8 |

**Mapping of Course Outcomes to Program Specific Outcomes (Introduction to Remote Sensing-Practical)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-306.1 | 2.0 | 3.0 | 3.0 | 2.0 |
| M-GEO-306.2 | 3.0 | 3.0 | 3.0 | 2.0 |
| M-GEO-306.3 | 2.0 | 3.0 | 3.0 | 3.0 |
| M-GEO-306.4 | 2.0 | 3.0 | 3.0 | 3.0 |
| Average | 2.3 | 3.0 | 3.0 | 2.5 |

**Semester-III**
**Core Course Code: M-GEO-307**
**Core Course Name: Project Report Based on Field Survey**

**Time: 3 Hours** | **Total Marks : 100**
**Credits: 4** | **External Assessment Marks : 70**
**Internal Assessment Marks : 30**

**Course Outcomes (COs):**

**M-GEO-307.1**: Ability to work as a team and handle the field situations.
**M-GEO-307.2:** Gives opportunity to identify socio-economic problem and formulation of research design.
**M-GEO-307.3:** Awareness about sampling techniques for data collection in the field.
**M-GEO-307.4:** Training of retrieval, analysis and interpretation of socio-economic field data.

**Note for Paper Setters:** Examiner will have to evaluate the candidate on the basis of field report prepared by the student.

**Distribution of Marks for Evaluation of Project Report**

**Field Report: 40 marks** **Viva-voce on report: 30 marks**

**Suggested Readings:**


1. Black James A and D.J. Champion (1976): Methods and Issues in Social Research, New York, John Wiley and Sons, Inc.
2. Goode and Hat, Research Methodology in Social Sciences, Oxford University Press, New Delhi.
3. Gomez B and John Paul Jones. 2010. Research Methods in Geography-A Critical Introduction. Wiley Blackwell Publications, Singapore.
4. Har Prasad (1992) Research Methods and Techniques in Geography, Rawat Publishers, Jaipur.
5. Kundu A. Measurement of Urban Processes: A Study of Regionalization, Popular Prakashan, Mumbai.
6. Mishra, H.N. and Singh V.P. (1998) Research Methodology: Social, Spatial and Policy Dimensions, Rawat Publishers, Jaipur.


**Mapping of Course Outcomes to Program Outcomes (Project Report Based on Field Survey)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-307.1 | 1.0 | 2.0 | 2.0 | 2.0 | 2.0 | 3.0 | 2.0 | 3.0 | 3.0 | 2.0 | 3.0 |
| M-GEO-307.2 | 3.0 | 3.0 | 2.0 | 3.0 | 3.0 | 2.0 | 2.0 | 3.0 | 3.0 | 3.0 | 2.0 |
| M-GEO-307.3 | 3.0 | 3.0 | 1.0 | 2.0 | 2.0 | 2.0 | 2.0 | 3.0 | 3.0 | 2.0 | 2.0 |
| M-GEO-307.4 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 2.0 | 3.0 | 3.0 | 2.0 | 3.0 |
| Average | 2.5 | 2.8 | 2.0 | 2.5 | 2.3 | 2.5 | 2.0 | 3.0 | 3.0 | 2.3 | 2.5 |

**Mapping of Course Outcomes to Program Specific Outcomes (Project Report Based on Field Survey)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-307.1 | 1.0 | 2.0 | 3.0 | 3.0 |
| M-GEO-307.2 | 2.0 | 2.0 | 3.0 | 3.0 |
| M-GEO-307.3 | 2.0 | 3.0 | 3.0 | 3.0 |
| M-GEO-307.4 | 3.0 | 3.0 | 3.0 | 3.0 |
| Average | 2.0 | 2.5 | 3.0 | 3.0 |

**Semester-III**
**Open Elective Course Code: M-GEO-OE-304**
**Open Elective Course Name: General Geography of World**

**Time: $2\frac{1}{2}$ Hours** | **Total Marks : 50**
**Credits: 2** | **External Assessment Marks : 35**
**Internal Assessment Marks : 15**

**Course Outcomes (COs):**

**M-GEO-OE-304.1**: Understanding about the geographical expansion of continents and oceans.
**M-GEO-OE-304.2:** Acquaintance with the geophysical structure of world.
**M-GEO-OE-304.3:** Enrichment of knowledge about ethnic and religious composition of population.
**M-GEO-OE-304.4:** Capability to understand the population characteristics and economies of the world.

**Note for Paper Setters:** Question 1 is compulsory comprising of four sub parts (two marks for each sub part), to be answered in 25-30 words. There will be six long questions, three from each unit. The candidate has to answer three long questions, at least one question from each unit. Question 1 carries eight marks. Long questions carry nine marks each.

**UNIT-I**

1. Continents and oceans: their location, expansion and geographical characteristics.
2. World major physiographic units: mountain, plains and plateaus.
3. World climates and major climatic regions.
4. Major soil types and natural vegetation.

**UNIT-II**

5. Human biological diversity, ethnicity and distribution of races.
6. Major religions of world and their distribution.
7. Population: distribution, density and growth.
8. World economy: characteristics of developed and developing economies.

**Suggested Readings:**


1. Hussain, Majid (2006) World Geography, Rawat Publishers, New Delhi.
2. Mcdougal, Holt (2010) World Geography, HMH Publishing Co.
3. Pounds and Taylor (1974) World Geography, South Western Publishing Co., Ohio.


**Mapping of Course Outcomes to Program Outcomes (General Geography of World)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-OE-304.1 | 3.0 | 1.0 | 1.0 | 2.0 | 1.0 | 2.0 | 1.0 | 2.0 | 3.0 | 3.0 | 1.0 |
| M-GEO-OE-304.2 | 3.0 | 2.0 | 1.0 | 1.0 | 2.0 | 1.0 | 1.0 | 3.0 | 3.0 | 2.0 | 1.0 |
| M-GEO-OE-304.3 | 3.0 | 2.0 | 1.0 | 1.0 | 1.0 | 2.0 | 1.0 | 2.0 | 2.0 | 2.0 | 1.0 |
| M-GEO-OE-304.4 | 3.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.0 | 1.0 | 2.0 | 3.0 | 2.0 | 1.0 |
| Average | 3.0 | 1.8 | 1.3 | 1.5 | 1.5 | 1.5 | 1.0 | 2.3 | 2.8 | 2.3 | 1.0 |

**Mapping of Course Outcomes to Program Specific Outcomes (General Geography of World)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-OE-304.1 | 3.0 | 2.0 | 1.0 | 2.0 |
| M-GEO-OE-304.2 | 3.0 | 2.0 | 2.0 | 2.0 |
| M-GEO-OE-304.3 | 3.0 | 1.0 | 2.0 | 2.0 |
| M-GEO-OE-304.4 | 3.0 | 2.0 | 2.0 | 2.0 |
| Average | 3.0 | 1.8 | 1.8 | 2.0 |

**Semester-IV**
**Core Course Code: M-GEO-401**
**Core Course Name: Geographical Thought**

**Time: 3 Hours** | **Total Marks : 100**
**Credits: 4** | **External Assessment Marks : 70**
**Internal Assessment Marks : 30**

**Course Outcomes (COs):**

**M-GEO-401.1**: Cognizance of nature and philosophy of geography.
**M-GEO-401.2:** Contextualization of development of geographic knowledge in ancient and medieval period.
**M-GEO-401.3:** Awareness about philosophy and concepts of modern geography.
**M-GEO-401.4:** Acquaintance with positivist and alternative explanations in geography.

**Note for Paper Setters:** Question 1 is compulsory comprising of seven sub parts (two marks for each sub part), to be answered in 25-30 words. There will be eight long questions, two from each unit. The candidate has to answer four long questions, at least one question from each unit. All questions carry equal marks.

**UNIT-I**

1. Classification of knowledge, nature of geography and its place among sciences.
2. Nature of geographic knowledge during ancient (Greek and Roman) and medieval (Arab) periods
3. Foundation of modern geography-contributions of Varenius, Kant, Humboldt and Ritter.

**UNIT-II**

4. Emergence of geography as a study of (i) physical features (ii) chorology (iii) landscapes.
5. Concepts in geography: environmental determinism and possibilism, areal differentiation.
6. Dichotomy and dualism in Geography: Physical vs Human Geography and Systematic vs Regional Geography.

**UNIT-III**

7. Quantitative revolution-emergence of geography as spatial science.
8. Positivist explanations in geography- laws, theories, models.
9. Inductive and deductive logic in geographic explanations.

**UNIT-IV**

10. Behavioral and humanistic perspectives in geography.
11. Social relevance in geography-Welfare, Radical and Feminist Perspectives.
12. Postmodernism and Geography.

**Suggested Readings:**


1. Creswell Tim (2013), Geographic Thought: A critical introduction, Wiley- Blackwell.
2. Dickinson, R E (1969), The Makers of Modern Geography, London.
3. Dikshit, RD (1997), Geographical Thought-A Contextual History of Ideas, Prentice Hall of India, New Delhi.
4. Gaile GL and Willmott CJ (2003), Geography in America at the Dawn of 21st Century, Oxford.
5. Hartshorne, R (1959), Perspectives on the Nature of Geography, Rand MacNelly, Chicago.
6. Harvey David (1989), Explanation in Geography, Edward Arnold, London.
7. Holt-Jonson (2011), Geography, History and Concepts: A Study's Guide, Sage Publications.
8. James PE and Martin J Geoffrey (1972), All possible Worlds, John Wiley and Sons, New York.
9. Johnston, RJ (1983), Geography and Geographers, Edward Heinemann, London.
10. Peet, Richard (1998), Modern Geographical Thought, Oxford, Blackwell Publishers.


**Mapping of Course Outcomes to Program Outcomes (Geographical Thought)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-401.1 | 3.0 | 3.0 | 2.0 | 2.0 | 1.0 | 2.0 | 1.0 | 3.0 | 3.0 | 3.0 | 1.0 |
| M-GEO-401.2 | 3.0 | 3.0 | 2.0 | 2.0 | 2.0 | 3.0 | 2.0 | 3.0 | 3.0 | 3.0 | 2.0 |
| M-GEO-401.3 | 3.0 | 3.0 | 2.0 | 1.0 | 2.0 | 2.0 | 1.0 | 3.0 | 3.0 | 3.0 | 1.0 |
| M-GEO-401.4 | 3.0 | 3.0 | 2.0 | 1.0 | 2.0 | 2.0 | 1.0 | 3.0 | 3.0 | 3.0 | 1.0 |
| Average | 3.0 | 3.0 | 2.0 | 1.5 | 1.8 | 2.3 | 1.3 | 3.0 | 3.0 | 3.0 | 1.3 |

**Mapping of Course Outcomes to Program Specific Outcomes (Geographical Thought)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-401.1 | 3.0 | 1.0 | 2.0 | 3.0 |
| M-GEO-401.2 | 3.0 | 1.0 | 2.0 | 3.0 |
| M-GEO-401.3 | 3.0 | 1.0 | 1.0 | 3.0 |
| M-GEO-401.4 | 3.0 | 3.0 | 3.0 | 3.0 |
| Average | 3.0 | 1.5 | 2.0 | 3.0 |

**Semester-IV**
**Core Course Code: M-GEO-402**
**Core Course Name: Hydrology and Oceanography**

**Time: 3 Hours** | **Total Marks : 100**
**Credits: 4** | **External Assessment Marks : 70**
**Internal Assessment Marks : 30**

**Course Outcomes (COs):**

**M-GEO-402.1**: Awareness about the basic concepts and applications of hydrology.
**M-GEO-402.2:** Acquaintance with techniques of rainfall estimation and runoff processes.
**M-GEO-402.3:** Enrichment of knowledge about topographic features of oceanic floor and deposits.
**M-GEO-402.4:** Augmentation of knowledge about movement and circulation in oceanic water.

**Note for Paper Setters:** Question 1 is compulsory comprising of seven sub parts (two marks for each sub part), to be answered in 25-30 words. There will be eight long questions, two from each unit. The candidate has to answer four long questions, at least one question from each unit. All questions carry equal marks.

**UNIT-I**

1. Definition, nature, scope, importance and historical development of hydrology.
2. Relationship of hydrology with other physical sciences.
3. Hydrological cycle, estimation of global water budget, human impact on hydrological cycle.

**UNIT-II**

4. Rainfall: frequency, intensity and measurement accuracy, determination of average rainfall (arithmetic mean, Theiesson polygon, isohyetal methods); types of variations in rainfall.
5. Hydrograph: components, analysis, separation methods, affecting factors; variations in runoff, rainfall-runoff relationship.

**UNIT-III**

6. Major topographic features of ocean basins, bottom relief of Atlantic, Pacific and Indian oceans.
7. Sources, classification and distribution of ocean deposits, corals-origin, types and conditions for development; theories of the origin of coral reefs (Subsidence and Standstill).

**UNIT-IV**

8. Origin, causes, types and effects of the ocean currents; currents of the Atlantic, Pacific and Indian oceans.
9. Oceanic temperature: distribution and causes of variation.
10. Composition of oceanic water and distribution of salinity.

**Suggested Readings:**


1. Digman, L.S. 2002. Physical Hydrology. Prentice Hall, New Jersey.
2. Lal, D.S. 2007. Oceanography. Sharda Pustak Bhawan, Allahabad.
3. Patra K.C. 2010. Hydrology and Water Resource Engineering, Norsa Publishing House, New Delhi.
4. Reddy, P.J. 1992. A Text Book of Hydrology, Laxmi Publications, New Delhi.
5. Siddhartha, K.1999. Oceanography-A Brief Introduction, Kisalaya Publications, New Delhi.
6. Singh. S. 2008. Oceanography. Prayag Pustak Bhawan, Allahabad
7. Sharma RC and Vatal M. 1993. Oceanography for Geographers, Chaitanya Publishing House, Allahabad.
8. Subramanya, K. 1994. Engineering Hydrology, Tata McGraw-Hill Publishing Company Limited, New Delhi.
9. Ward, W.C. 1967. Principles of Hydrology, McGraw Hill, New York.


**Mapping of Course Outcomes to Program Outcomes (Hydrology and Oceanography)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-402.1 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 |
| M-GEO-402.2 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 3.0 | 3.0 | 3.0 | 1.0 | 3.0 |
| M-GEO-402.3 | 3.0 | 3.0 | 3.0 | 1.0 | 1.0 | 2.0 | 1.0 | 2.0 | 3.0 | 1.0 | 1.0 |
| M-GEO-402.4 | 3.0 | 3.0 | 3.0 | 1.0 | 1.0 | 3.0 | 1.0 | 3.0 | 3.0 | 1.0 | 1.0 |
| Average | 3.0 | 3.0 | 3.0 | 2.0 | 1.5 | 2.8 | 2.0 | 2.8 | 3.0 | 1.3 | 2.0 |

**Mapping of Course Outcomes to Program Specific Outcomes (Hydrology and Oceanography)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-402.1 | 3.0 | 3.0 | 3.0 | 3.0 |
| M-GEO-402.2 | 3.0 | 3.0 | 3.0 | 3.0 |
| M-GEO-402.3 | 3.0 | 2.0 | 2.0 | 2.0 |
| M-GEO-402.4 | 3.0 | 2.0 | 2.0 | 2.0 |
| Average | 3.0 | 2.5 | 2.5 | 2.5 |

**Semester-IV**
**Elective Course Code: M-GEO-403 (i)**
**Elective Course Name: Regional Geography of India with Special Reference to Haryana**

**Time: 3 Hours** | **Total Marks : 100**
**Credits: 4** | **External Assessment Marks : 70**
**Internal Assessment Marks : 30**

**Course Outcomes (COs):**

**M-GEO-403 (i).1**: Familiarization with the concept of region and regionalization.
**M-GEO-403 (i).2:** Awareness about macro and meso regions of India.
**M-GEO-403 (i).3:** Understanding about the physical and economic diversities in Haryana.
**M-GEO-403 (i).4:** Acquaintance with demographic characteristics and socio-economic development in Haryana.

**Note for Paper Setters:** Question 1 is compulsory comprising of seven sub parts (two marks for each sub part), to be answered in 25-30 words. There will be eight long questions, two from each unit. The candidate has to answer four long questions, at least one question from each unit. All questions carry equal marks.

**UNIT-I**

1. Concept and types of regions and regionalization.
2. Regional diversities in India.
3. Critical review of schemes of regionalization of India: Baker and Stamp, Pithawala, Spate and R.L. Singh.

**UNIT-II**

4. Macro regions of India: Himalayas, Indo-Ganga Plains, Indian Peninsula (physical and socio-economic characteristics).
5. Bases and demarcation of meso regions of India.
6. Schemes of socio-economic regionalization: Asok Mitra, P. Sengupta and Galina Sadasyuk.

**UNIT-III**

7. Physical and economic diversities in Haryana
   - (i) Relief, Climate, Drainage, Soils and Natural Vegetation
   - (ii) Agriculture and its spatial organization
   - (iii) Industry, Transport and Communication
8. Regionalization of Haryana (R.L Singh).

**UNIT-IV**

9. Demographic characteristics and diversities in Haryana.
10. Social diversity in terms of education in Haryana.
11. Socio-economic development in Haryana.

**Suggested Readings:**


1. Census of India (1981) Regional Division in Haryana.
2. Census of India (2001), Administrative Atlas of Haryana.
3. Deshpande CD (1992), India: A Regional Interpretation, ICSSR and Northern Book Centre.
4. FICCI (2007), State of Infrastructure in Haryana.
5. Singh, Jasbir (1976) Agricultural Geography of Haryana, Vishal Publishers, Kurukshetra.
6. Singh, RL (1971): India-A Regional Geography, National Geographical Society, Varanasi
7. Spate OHK and ATA Learmonth (1971)-India and Pakistan, Methuen, London.
8. Tirtha R and Gopal Krishna (1996), Emerging India, Rawat Publications, Jaipur.


**Mapping of Course Outcomes to Program Outcomes**
**(Regional Geography of India with special reference to Haryana)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-403 (i).1 | 3.0 | 1.0 | 3.0 | 1.0 | 2.0 | 1.0 | 1.0 | 1.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-403 (i).2 | 3.0 | 1.0 | 3.0 | 1.0 | 2.0 | 1.0 | 1.0 | 1.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-403 (i).3 | 3.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.0 | 2.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-403 (i).4 | 3.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.0 | 2.0 | 3.0 | 1.0 | 2.0 |
| Average | 3.0 | 1.5 | 2.5 | 1.5 | 2.0 | 1.5 | 1.0 | 1.5 | 3.0 | 1.0 | 2.0 |

**Mapping of Course Outcomes to Program Specific Outcomes**
**(Regional Geography of India with special reference to Haryana)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-403 (i).1 | 3.0 | 1.0 | 1.0 | 2.0 |
| M-GEO-403 (i).2 | 3.0 | 1.0 | 1.0 | 2.0 |
| M-GEO-403 (i).3 | 3.0 | 1.0 | 2.0 | 3.0 |
| M-GEO-403 (i).4 | 3.0 | 1.0 | 2.0 | 3.0 |
| Average | 3.0 | 1.0 | 1.5 | 2.5 |

**Semester-IV**
**Elective Course Code: M-GEO-403 (ii)**
**Elective Course Name: Health Geography with Special Reference to India**

**Time: 3 Hours** **Total Marks : 100**
**Credits: 4** **External Assessment Marks : 70**
**Internal Assessment Marks : 30**

**Course Outcomes (COs):**

**M-GEO-303 (v).1**: Understanding about the concept of health and parameters of health care.
**M-GEO-303 (v).2:** Enhancement of knowledge about health indicators and measurement.
**M-GEO-303 (v).3:** Augmentation of knowledge about health infrastructure and policies in India.
**M-GEO-303 (v).4:** Awareness about spatial pattern of communicable and life style diseases.

**Note for Paper Setters:** Question 1 is compulsory comprising of seven sub parts (two marks for each sub part), to be answered in 25-30 words. There will be eight long questions, two from each unit. The candidate has to answer four long questions, at least one question from each unit. All questions carry equal marks.

**UNIT-I**

1. History and development of Medical/Healthcare Geography.
2. Concept of health, its measurement and data source.
3. Environmental, ecological and social approaches in study of human health.

**UNIT-II**

4. Demographic change and diseases: epidemiological and demographic transition.
5. Epidemiology of communicable and non-communicable diseases.
6. Climate change and human health.

**UNIT-III**

7. Healthcare infrastructure: spatial organization and pattern in India.
8. National health policies in India since independence.
9. Health financing in India.

**UNIT-IV**

10. Food security, nutrition and hunger index.
11. Anthropometric health outcome and its pattern in India: malnutrition.
12. Demographic health outcomes in India: mortality and life expectancy.

**Suggested Readings:**


1. Dreze Jean, Amartya Sen (1996) Economic Development and Social opportunity, Oxford University Press, New Delhi.
2. Dreze Jean and Amartaya Sen (2002) India: Development and Participation, OUP, New Delhi.
3. D. M. Smith (1973) The Geography of Social Well-being in the United States. McGraw Hill, New York.
4. G H Mooney (1986) Economics, Medicine and Health Care, Harvester Press.
5. Meade and Erickson (2006) Medical Geography, Rawat Publications, Jaipur.
6. N D McGlashan (1972) Medical Geography: Techniques and Field Studies, London.
7. National Nutrition Monitoring Bureau (2000) Dynamic Database on Diet and Nutrition, National Institute & Nutrition, Hyderabad.
8. P Anthamatten and H Hazen (2016) An Introduction to Geography of Health, Routledge publication.
9. Roger Jeffery (1989) Politics of Health in India, Cambridge University Press.
10. Sen, Amartya & Dreze Jean, Indian Development (1998): Selected Regional Perspectives, Oxford University Press, Delhi.


**Mapping of Course Outcomes to Program Outcomes (Health Geography with Special Reference to India)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-303 (v).1 | 3.0 | 3.0 | 2.0 | 3.0 | 2.0 | 3.0 | 1.0 | 3.0 | 3.0 | 3.0 | 1.0 |
| M-GEO-303 (v).2 | 3.0 | 3.0 | 2.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 3.0 | 2.0 | 1.0 |
| M-GEO-303 (v).3 | 3.0 | 3.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 3.0 | 3.0 | 3.0 | 1.0 |
| M-GEO-303 (v).4 | 3.0 | 3.0 | 2.0 | 3.0 | 2.0 | 3.0 | 2.0 | 3.0 | 3.0 | 2.0 | 2.0 |
| Average | 3.0 | 3.0 | 2.0 | 2.8 | 2.3 | 2.8 | 1.8 | 3.0 | 3.0 | 2.5 | 1.3 |

**Mapping of Course Outcomes to Program Specific Outcomes (Health Geography with Special Reference to India)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-303 (v).1 | 3.0 | 2.0 | 3.0 | 3.0 |
| M-GEO-303 (v).2 | 3.0 | 3.0 | 3.0 | 3.0 |
| M-GEO-303 (v).3 | 3.0 | 2.0 | 2.0 | 3.0 |
| M-GEO-303 (v).4 | 3.0 | 2.0 | 3.0 | 2.0 |
| Average | 3.0 | 2.3 | 2.8 | 2.8 |

**Semester-IV**
**Elective Course Code: M-GEO-403 (iii)**
**Elective Course Name: Social Geography with Special Reference to India**

**Time: 3 Hours** **Total Marks : 100**
**Credits: 4** **External Assessment Marks : 70**
**Internal Assessment Marks : 30**

**Course Outcomes (COs):**

**M-GEO-403 (iii).1**: Enrichment of understanding about spatial dimensions of Indian society.
**M-GEO-403 (iii).2:** Cognizance of caste and clan territories in India.
**M-GEO-403 (iii).3:** Acquaintance with linguistic and religious profile of India.
**M-GEO-403 (iii).4:** Awareness about social change and transformation in spatial context.

**Note for Paper Setters:** Question 1 is compulsory comprising of seven sub parts (two marks for each sub part), to be answered in 25-30 words. There will be eight long questions, two from each unit. The candidate has to answer four long questions, at least one question from each unit. All questions carry equal marks.

**UNIT-I**

1. Nature and scope of social geography, its development and place among social sciences.
2. Sources and problems of data for study in social geography of India.
3. Social differentiation and region formation, social evolution, social space, social and spatial justice.

**UNIT-II**

4. Tribes: social formations, rural-urban and spatial distribution and impacts of development.
5. Castes: origin, caste and morphology of settlements, caste and clan territories and distribution of scheduled castes.

**UNIT-III**

6. Languages: classification, historical processes of diffusion and geographical distribution, linguistic regions
7. Religions: origin, historical background and spatial distribution of religious groups, minority and segregation in space, communalism.

**UNIT-IV**

8. Social change and transformation in India, Modernization and Sanskritization
9. Rural-urban interaction and social change.
10. Social wellbeing: overview of the concept.

**Suggested Readings:**


1. Ahmad, A. Social Geography, Rawat Publication, New Delhi, 1999.
2. Jean, D. and Sen, A. Economic Development and Social opportunity, Oxford University Press, New Delhi, 1996.
3. Dubey, S.C. Indian Society, National Book Trust, New Delhi, 1991.
4. Schwartzberg J. An Historical Atlas of South Asia, University of Chicago Press, Chicago, 1978.
5. Sen, A and Jean, D. Indian Development: Selected Regional Perspectives, Oxford University Press, 1996.
6. Smith, D. Geography: A Welfare Approach, Edward Arnold, London, 1977.
7. Sopher, D. An Exploration of India, Cornell University Press, 1980.
8. Rao, S. Personality of India, M.S. University Baroda, Vadodara, 1958.


**Mapping of Course Outcomes to Program Outcomes (Social Geography with special reference to India)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-403 (iii).1 | 3.0 | 2.0 | 1.0 | 1.0 | 2.0 | 2.0 | 1.0 | 3.0 | 3.0 | 3.0 | 1.0 |
| M-GEO-403 (iii).2 | 3.0 | 2.0 | 2.0 | 2.0 | 2.0 | 3.0 | 2.0 | 3.0 | 3.0 | 3.0 | 1.0 |
| M-GEO-403 (iii).3 | 3.0 | 2.0 | 2.0 | 1.0 | 1.0 | 2.0 | 2.0 | 3.0 | 3.0 | 2.0 | 2.0 |
| M-GEO-403 (iii).4 | 3.0 | 3.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.0 | 3.0 | 3.0 | 3.0 | 1.0 |
| Average | 3.0 | 2.3 | 1.8 | 1.5 | 1.8 | 2.3 | 1.5 | 3.0 | 3.0 | 2.8 | 1.3 |

**Mapping of Course Outcomes to Program Specific Outcomes (Social Geography with special reference to India)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-403 (iii).1 | 3.0 | 2.0 | 2.0 | 3.0 |
| M-GEO-403 (iii).2 | 3.0 | 2.0 | 2.0 | 2.0 |
| M-GEO-403 (iii).3 | 3.0 | 2.0 | 3.0 | 3.0 |
| M-GEO-403 (iii).4 | 3.0 | 2.0 | 2.0 | 3.0 |
| Average | 3.0 | 2.0 | 2.3 | 2.8 |

**Semester-IV**
**Elective Course Code: M-GEO-403 (iv)**
**Elective Course Name: Coastal Geomorphology**

**Time: 3 Hours** | **Total Marks : 100**
**Credits: 4** | **External Assessment Marks : 70**
**Internal Assessment Marks : 30**

**Course Outcomes (COs):**

**M-GEO-403 (iv).1**: Understanding about fundamental concepts of coastal geomorphology.
**M-GEO-403 (iv).2:** Knowledge about forms of movement in oceanic water.
**M-GEO-403 (iv).3:** Acquaintance with processes and mechanism of marine erosion and deposition.
**M-GEO-403 (iv).4:** Awareness about shoreline change and coastal zone management techniques.

**Note for Paper Setters:** Question 1 is compulsory comprising of seven sub parts (two marks for each sub part), to be answered in 25-30 words. There will be eight long questions, two from each unit. The candidate has to answer four long questions, at least one question from each unit. All questions carry equal marks.

**UNIT-I**

1. Nature and scope of coastal geomorphology and its Significance, Time as a factor in coastal geomorphology
2. Classification of coasts and shore: submerged and emerged coasts, classification of coasts by Johnson and Shepard.

**UNIT-II**

3. Waves generation and modification, waves in shallow and deep water, wave energy, waves induced currents, Tsunamis and Seiches.
4. Origin and Types of tides. Theories of origin of Tides (Equilibrium theory, Progressive wave theory and Stationary wave theory).

**UNIT-III**

5. Processes and mechanism of marine erosion and resultant landforms.
6. Depositional landforms: Origin, classification and distribution. (Sandy and muddy shores- beaches and beach ridge, barriers spit and bar; mudflats and marshes (salt and tidal), formation of estuaries and mangrove swamps, coastal sand dunes and deltas.

**UNIT-IV**

7. Shoreline change: mechanism, rates and causes.
8. Structural control of shore zone morphology.
9. Coastal zone management: mapping and monitoring of coastal changes, legal and institutional coastal regulation, effective coastal zone policies.

**Suggested Readings:**


1. Ahmad, E.: Coastal Geomorphology of India. Orient Longmans, Bombay, 1973.
2. Bose, A.et. al: Coastal Zone Management of West Bengal, Pub. Sea Explorers Institute, Calcutta, 1985.
3. Bird, E.C.: Coasts- An Introduction to Coastal Geomorphology, Basil- Blackwell, Oxford, 1984.
4. Davis J.L: Geographical Variation in Coastal Development. Hafner Pub. Co., New York, 1973.
5. French, P.W.: Coastal and Estuarine Management, Routledge, London, 1997.
6. John, P.: An Introduction to Coastal Geomorphology. Arnold Heinemann, London, 1984.
7. Kind. C.A.M: Beaches & Coasts, Edward Arnold, London, 1972.
8. Pethick, J.: An Introduction to coastal Geomorphology. Oxford University Press, New York, 1983.
9. Shepard, F.P. and Wanless, N.R.: Our changing Coastlines. Oxford University Press, 1971.


**Mapping of Course Outcomes to Program Outcomes (Coastal Geomorphology)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-403 (iv).1 | 3.0 | 2.0 | 2.0 | 1.0 | 1.0 | 2.0 | 1.0 | 1.0 | 3.0 | 1.0 | 1.0 |
| M-GEO-403 (iv).2 | 3.0 | 2.0 | 3.0 | 1.0 | 1.0 | 3.0 | 1.0 | 2.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-403 (iv).3 | 3.0 | 2.0 | 3.0 | 2.0 | 2.0 | 3.0 | 1.0 | 3.0 | 3.0 | 1.0 | 3.0 |
| M-GEO-403 (iv).4 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 |
| Average | 3.0 | 2.3 | 2.8 | 1.8 | 1.8 | 2.8 | 1.5 | 2.3 | 3.0 | 1.3 | 2.3 |

**Mapping of Course Outcomes to Program Specific Outcomes (Coastal Geomorphology)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-403 (iv).1 | 3.0 | 1.0 | 1.0 | 3.0 |
| M-GEO-403 (iv).2 | 3.0 | 2.0 | 1.0 | 3.0 |
| M-GEO-403 (iv).3 | 3.0 | 3.0 | 2.0 | 3.0 |
| M-GEO-403 (iv).4 | 3.0 | 3.0 | 2.0 | 3.0 |
| Average | 3.0 | 2.3 | 1.5 | 3.0 |

**Semester-IV**
**Elective Course Code: M-GEO-403 (v)**
**Elective Course Name: Tropical Climatology**

**Time: 3 Hours** | **Total Marks : 100**
**Credits: 4** | **External Assessment Marks : 70**
**Internal Assessment Marks : 30**

**Course Outcomes (COs):**

**M-GEO-403 (v).1**: Cognizance of tropical heat balance and its global consequences.
**M-GEO-403 (v).2:** Enrichment of knowledge about circulation pattern and dynamics of Monsoon climates.
**M-GEO-403 (v).3:** Acquaintance with dynamics and distribution of rainfall in tropics.
**M-GEO-403 (v).4:** Awareness about impact of global warming on tropical climates and their relation with agriculture.

**Note for Paper Setters:** Question 1 is compulsory comprising of seven sub parts (two marks for each sub part), to be answered in 25-30 words. There will be eight long questions, two from each unit. The candidate has to answer four long questions, at least one question from each unit. All questions carry equal marks.

**UNIT-I**

1. Nature and scope and significance of Tropical Climatology.
2. Energy balance in tropical areas
3. Temperature distribution in tropical areas.

**UNIT-II**

4. Atmospheric Pressure and circulation in tropical areas-Hadley Cell
5. Walker Circulation, ENSO.
6. Monsoons-Theories of origin and characteristics and areas of influence

**UNIT-III**

7. Tropical Cyclones-Origin and characteristics.
8. Tropical Rainfall-Dynamics and distribution.
9. Heavy Precipitation events in tropical areas

**UNIT-IV**

10. Tropical Climates-Classification and characteristics.
11. Tropical Climates and agriculture: Human Adaptation to Tropical Climates.
12. Impact of Global Warming on Tropical Climates and Biomass.

**Suggested Readings:**


1. Barry, RF and RJ Chorley (1998) Atmosphere, Weather and Climate, Routledge, London.
2. Critchfield, HJ, General Climatology. Prentice-Hall of India, New Delhi.
3. Das PK (1987) The Monsoons, NBT Publications, New Delhi.
4. Fein JS and PM Stephens (1987) Monsoons, Wiley Inter Sciences.
5. McGregor, GR and Simon Nierswold (1998) Tropical Climatology: An introduction to the Climates of the Low Latitudes, Wiley Interscience.
6. Parenti, C (2011) Tropic of Chaos: Climate Change and New Geography of Violence, Nation Books, New York
7. Robinson PJ and S Henderson (1999) Contemporary Climatology, Henow.
8. Thompson, RD and A Perry (1997) Applied Climatology, Principles and Practices, Routledge, London.
9. Trewartha, GT (1980) An Introduction to Climate. McGraw Hill Company, New York.


**Mapping of Course Outcomes to Program Outcomes (Tropical Climatology)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-403 (v).1 | 3.0 | 3.0 | 2.0 | 2.0 | 2.0 | 3.0 | 2.0 | 3.0 | 3.0 | 2.0 | 1.0 |
| M-GEO-403 (v).2 | 3.0 | 3.0 | 2.0 | 3.0 | 2.0 | 3.0 | 2.0 | 3.0 | 3.0 | 2.0 | 2.0 |
| M-GEO-403 (v).3 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 2.0 | 2.0 | 3.0 | 3.0 | 3.0 | 2.0 |
| M-GEO-403 (v).4 | 3.0 | 3.0 | 2.0 | 3.0 | 2.0 | 2.0 | 2.0 | 3.0 | 3.0 | 2.0 | 1.0 |
| Average | 3.0 | 3.0 | 2.3 | 2.8 | 2.0 | 2.5 | 2.0 | 3.0 | 3.0 | 2.3 | 1.8 |

**Mapping of Course Outcomes to Program Specific Outcomes (Tropical Climatology)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-403 (v).1 | 3.0 | 2.0 | 3.0 | 3.0 |
| M-GEO-403 (v).2 | 3.0 | 2.0 | 3.0 | 2.0 |
| M-GEO-403 (v).3 | 3.0 | 2.0 | 3.0 | 3.0 |
| M-GEO-403 (v).4 | 3.0 | 2.0 | 2.0 | 2.0 |
| Average | 3.0 | 2.0 | 2.8 | 2.5 |

**Semester-IV**
**Elective Course Code: M-GEO-404 (i)**
**Elective Course Name: Gender Geography**

| | | |
|---|---|---|
| **Time: 3 Hours** | **Total Marks** | **: 100** |
| **Credits: 4** | **External Assessment Marks** | **: 70** |
| | **Internal Assessment Marks** | **: 30** |

**Course Outcomes (COs):**

**M-GEO-404 (i).1**: Understanding about growth and evolution of gender geography.
**M-GEO-404 (i).2:** Awareness about feminism and gender issues.
**M-GEO-404 (i).3:** Acquaintance with gender gaps and empowerment of women in spatial context.
**M-GEO-404 (i).4:** Enhancement of knowledge about gender sensitive issues and policies in India.

**Note for Paper Setters:** Question 1 is compulsory comprising of seven sub parts (two marks for each sub part), to be answered in 25-30 words. There will be eight long questions, two from each unit. The candidate has to answer four long questions, at least one question from each unit. All questions carry equal marks.

**UNIT-I**

1. Growth and evolution of the discipline; its connotation; traditional concept of interdependence between men and women; emergence of patriarchy and capitalism and post-modern feminist movement.
2. Gender based demographic structure; gender gaps in infant mortality rates; maternal mortality rate; female infanticide; gender and longevity gap- their spatial variations.

**UNIT-II**

3. Male-Female involvement in Economic and Social Activities; multiple roles of women in land, water and forest resource management.
4. Involvement of women in household activities, agriculture, mining, construction, industry, service and informal sectors.

**UNIT-III**

5. Gender gaps in social and public life: education, wage differentials in economic activities, health care and nutrition.
6. Scope for bridging gender gap: empowerment of women and education, economic opportunities, access to reproductive health services, involvement in decision making processes in development and environmental management.

**UNIT-IV**

7. Gender and Neo-liberalization Policies in India.
8. Making of Gender geography in India.

**Suggested Readings:**


1. Boserup, E (1989) Women's Role in Economic Development. Earthscan, London.
2. Dankelman, I and Davidson, J (1989) Women and Environment in the Third World. Earthscan, London.
3. Deblig, H.J (1991) Human Geography-Culture, Society and Space, John Wiley, New York.
4. Haraway, D (1991) Simians, Cyberages and Women-The Reinvention of Nature. Routledge, New York.
5. Johnston, R.J (1996), The Dictionary of Human Geography, Blackwell, Oxford,
6. Koblinsky, M (1993) The Health of Women-A Global Respective. Westview Press, Boulder.
7. Lee, D (1988) Women in Geography-A Comprehensive Bibliography. Boca Raton, Florida.
8. Lewis, R. R (1995) Feminity and Representation. Routledge, New York.
9. Momsen, JH. and Townsend, J (1987) Geography of Gender in the Third World, Albany, New York.
10. Montagu, A (1964) Man's Most Dangerous Myth-the fallacy of Race. Cleveland.
11. Reagent, A.C. and Monk J.J (1982) Women and Spatial Change. Kendell & Hund, Dubuque, Lowe.
12. Rhodda, A (1991) Women and Environment. Zed, London,
13. Seager, J. and Olson, A. Women in the world – An International Atlas.
14. Sivant, R.L (1985) Women-A World Survey, World Priorities Washington, D.C.
15. Skjelsback, I and Smith, D (2001) Gender, Peace and Conflict. Sage, London.
16. Sowell, T (1994) Race and culture-A world View. Basic Books, New York.
17. UNICEF (1990) The Lesser Child-the Girl in India. United Nations, Geneva.
18. United Nations (1991) The World's Women, 1970-1990. United Nations, New York.

**Mapping of Course Outcomes to Program Outcomes (Gender Geography)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-404 (i).1 | 3.0 | 2.0 | 2.0 | 1.0 | 1.0 | 2.0 | 2.0 | 3.0 | 3.0 | 3.0 | 1.0 |
| M-GEO-404 (i).2 | 3.0 | 2.0 | 1.0 | 2.0 | 2.0 | 2.0 | 1.0 | 3.0 | 3.0 | 3.0 | 2.0 |
| M-GEO-404 (i).3 | 3.0 | 2.0 | 1.0 | 2.0 | 2.0 | 2.0 | 1.0 | 3.0 | 3.0 | 3.0 | 2.0 |
| M-GEO-404 (i).4 | 3.0 | 2.0 | 1.0 | 2.0 | 2.0 | 2.0 | 1.0 | 3.0 | 3.0 | 3.0 | 2.0 |
| Average | 3.0 | 2.0 | 1.3 | 1.5 | 1.5 | 2.0 | 1.3 | 3.0 | 3.0 | 3.0 | 1.8 |

**Mapping of Course Outcomes to Program Specific Outcomes (Gender Geography)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-404 (i).1 | 3.0 | 1.0 | 2.0 | 3.0 |
| M-GEO-404 (i).2 | 3.0 | 1.0 | 3.0 | 3.0 |
| M-GEO-404 (i).3 | 3.0 | 2.0 | 3.0 | 2.0 |
| M-GEO-404 (i).4 | 3.0 | 2.0 | 3.0 | 3.0 |
| Average | 3.0 | 1.8 | 2.8 | 2.8 |

**Semester-IV**
**Elective Course Code: M-GEO-404 (ii)**
**Elective Course Name: Geography of Tourism with Special Reference to India**

**Time: 3 Hours** **Total Marks : 100**
**Credits: 4** **External Assessment Marks : 70**
**Internal Assessment Marks : 30**

**Course Outcomes (COs):**

**M-GEO-404 (ii).1**: Familiarization with the fundamentals of tourism geography.
**M-GEO-404 (ii).2:** Awareness about motivating factors of tourism.
**M-GEO-404 (ii).3:** Acquaintance with eco-tourism potentials and socio-economic impacts of tourism.
**M-GEO-404 (ii).4:** Knowledge about impact of globalization and foreign capital on tourism development.

**Note for Paper Setters:** Question 1 is compulsory comprising of seven sub parts (two marks for each sub part), to be answered in 25-30 words. There will be eight long questions, two from each unit. The candidate has to answer four long questions, at least one question from each unit. All questions carry equal marks.

**UNIT-I**

1. Definition, nature, scope and significance of tourism geography.
2. Factors influencing tourism: historical, physical, socio-cultural and economic.

**UNIT-II**

3. Motivating factors of tourism: leisure, recreation, spiritual, attraction of site and situation.
4. Infrastructure and support system of tourism accommodation and supplementary accommodation.

**UNIT-III**

5. Eco-Tourism potentials in India with reference to northern mountains and plains, peninsula, coastal regions and islands.
6. Impact of tourism: physical, economic and social.

**UNIT-IV**

7. Environmental laws and tourism.
8. Impact of globalization and foreign capital on tourism development.
9. Government policies for tourism development.

**Suggested Readings:**


1. Bhatia A.K. Tourism Development; Principles and Practices. Sterling Publishers, New Delhi, 1996.
2. Bhatia, A.K. International Tourism-Fundamentals and Practices, Sterling, New Delhi, 1991.
3. Chandra R.H. Hill Tourism: Planning and Development, Kanishka Publishers, New Delhi, 1998.
4. Hunter C and Green H. Tourism and the Environment: A Sustainable Relationship, Routledge, London, 1995.
5. Kaul R.K. Dynamics of Tourism & Recreation. Inter-India, New Delhi, 1985.
6. Kaur J. Himalayan Pilgrimages & New Tourism Himalayan Books, New Delhi, 1985.
7. Lea J. Tourism and Development in the Third World, Routledge, London, 1988.
8. Molton D. Geography of World Tourism Prentice. Hall, New York, 1993.
9. Pearce D.G. Tourism To-day: A Geographical Analysis, Harlow, Longman, 1987.
10. Robinson, H. A Geography of Tourism. Macdonald and Evans, London, 1996.
11. Sharma J.K. Tourism Planning and Development – A New Perspective Kanishka Publishers, New Delhi, 2000.
12. Shaw G. and Williams A.M. Critical Issues in Tourism-A Geographical Perspective, Oxford: Blackwell, 1994.
13. Sinha P.C. Global Tourism: The Next Decade, Oxford, Butterworth, Heinemann, Oxford, 1994.
14. Voase R. Tourism: The Human Perspective Hodder & Stoughton, London, 1995.
15. Williams A.M. and Shaw G. Tourism and Economic Development- Western European Experiences, London.


**Mapping of Course Outcomes to Program Outcomes (Geography of Tourism with Special Reference to India)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-404 (ii).1 | 3.0 | 3.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.0 | 2.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-404 (ii).2 | 3.0 | 2.0 | 3.0 | 2.0 | 2.0 | 2.0 | 1.0 | 2.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-404 (ii).3 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 2.0 | 3.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-404 (ii).4 | 3.0 | 2.0 | 3.0 | 3.0 | 2.0 | 3.0 | 2.0 | 3.0 | 3.0 | 1.0 | 2.0 |
| Average | 3.0 | 2.5 | 2.8 | 2.5 | 2.0 | 2.5 | 1.5 | 2.5 | 3.0 | 1.0 | 2.0 |

**Mapping of Course Outcomes to Program Specific Outcomes (Geography of Tourism with Special Reference to India)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-404 (ii).1 | 3.0 | 1.0 | 1.0 | 2.0 |
| M-GEO-404 (ii).2 | 3.0 | 1.0 | 1.0 | 2.0 |
| M-GEO-404 (ii).3 | 3.0 | 1.0 | 2.0 | 3.0 |
| M-GEO-404 (ii).4 | 3.0 | 1.0 | 2.0 | 3.0 |
| Average | 3.0 | 1.0 | 1.5 | 2.8 |

**Semester-IV**
**Elective Course Code: M-GEO-404 (iii)**
**Elective Course Name: Cultural Geography**

**Time: 3 Hours** | **Total Marks : 100**
**Credits: 4** | **External Assessment Marks : 70**
**Internal Assessment Marks : 30**

**Course Outcomes (COs):**

**M-GEO-404 (iii).1**: Enrichment of knowledge about main civilizations of world.
**M-GEO-404 (iii).2:** Enhancement of knowledge about factors and processes of cultural diversity.
**M-GEO-404 (iii).3:** Acquaintance with racial classification and distribution in the world.
**M-GEO-404 (iii).4:** Awareness about changing characteristics of Indian society in regional context.

**Note for Paper Setters:** Question 1 is compulsory comprising of seven sub parts (two marks for each sub part), to be answered in 25-30 words. There will be eight long questions, two from each unit. The candidate has to answer four long questions, at least one question from each unit. All questions carry equal marks.

**UNIT-I**

1. Definition, nature and scope of Cultural Geography; cultural elements and components of culture.
2. The evolution of Human Civilizations with special reference to: Mesopotamia, the Nile Valley, the Indus Valley and the Hwang Ho Valley.

**UNIT-II**

3. Bases of cultural diversity and cultural transformation-race, religion and language.
4. Cultural landscape and cultural ecology.
5. The speed and efficiency of operation of cultural processes.

**UNIT-III**

6. Race, evolution of race, criteria of racial classification, theories of the classification of Races-Zones and Strata or Migration Zone Theory of race evolution.
7. Classification of Races: Major races of the world: Nordics, Mongoloids, Negroids and Caucasoids.
8. Racial Classification in India-Sri Risley, A.C. Haddon, B.S. Guha.

**UNIT-IV**

9. Tribes of India with main emphasis on Naga, Khasis, Todas, Bhils and Santhals.
10. Patterns of livelihood: Various economic activities, cultural adaptations; agriculture, industrialization and modernization, technological changes and their geographical implications.

**Suggested Readings:**


1. Craig, Mike (1998) Cultural Geography, Routledge Publications, London.
2. De Blij, Harm J. (1977) Human Geography, Cultural Society and Space, John Wiley and Sons, New York.
3. Dickens, S.N. (1970) Introduction to Cultural Geography, Xerox College Publishing House, Waltham, Massachusetts.
4. Magunder, D.N. (1973) Races and Culture of India, Asia Publishing House, New Delhi.
5. Mukerjee, A.B. and Aijazuddin A. (1985) India: Culture, Society and Economy, Inter-India Publications, New Delhi.
6. Spencer, J.E. and Thomas, W.L. (1973) Introducing Cultural Geography, John Wiley and Sons, New York.
7. Taylor G. (1971) The Geography in the Twentieth Century, Asia Publishing House, New Delhi.
8. Wagner, P.L. and Mikesell, M. (1962) Readings in Cultural Geography, The University of Chicago Press, Chicago.


**Mapping of Course Outcomes to Program Outcomes (Cultural Geography)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-404 (iii).1 | 3.0 | 2.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 3.0 | 3.0 | 3.0 | 1.0 |
| M-GEO-404 (iii).2 | 3.0 | 3.0 | 1.0 | 1.0 | 2.0 | 2.0 | 1.0 | 3.0 | 3.0 | 3.0 | 2.0 |
| M-GEO-404 (iii).3 | 3.0 | 2.0 | 2.0 | 1.0 | 2.0 | 2.0 | 1.0 | 3.0 | 3.0 | 3.0 | 2.0 |
| M-GEO-404 (iii).4 | 3.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.0 | 3.0 | 3.0 | 3.0 | 1.0 |
| Average | 3.0 | 2.3 | 1.5 | 1.3 | 1.8 | 1.8 | 1.0 | 3.0 | 3.0 | 3.0 | 2.0 |

**Mapping of Course Outcomes to Program Specific Outcomes (Cultural Geography)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-404 (iii).1 | 3.0 | 2.0 | 1.0 | 2.0 |
| M-GEO-404 (iii).2 | 3.0 | 2.0 | 2.0 | 2.0 |
| M-GEO-404 (iii).3 | 3.0 | 2.0 | 3.0 | 3.0 |
| M-GEO-404 (iii).4 | 3.0 | 3.0 | 2.0 | 3.0 |
| Average | 3.0 | 2.3 | 2.0 | 2.5 |

**Semester-IV**
**Elective Course Code: M-GEO-404 (iv)**
**Elective Course Name: Geography of Water Resources**

**Time: 3 Hours** **Total Marks : 100**
**Credits: 4** **External Assessment Marks : 70**
**Internal Assessment Marks : 30**

**Course Outcomes (COs):**

**M-GEO-404 (iv).1**: Awareness about the availability of earth's water resources.
**M-GEO-404 (iv).2:** Familiarization with development and dynamics of water resources.
**M-GEO-404 (iv).3:** Ability to understand the issues and problems of water resources.
**M-GEO-404 (iv).4:** Augmentation of knowledge about conservation and management of water resources.

**Note for Paper Setters:** Question 1 is compulsory comprising of seven sub parts (two marks for each sub part), to be answered in 25-30 words. There will be eight long questions, two from each unit. The candidate has to answer four long questions, at least one question from each unit. All questions carry equal marks.

**UNIT-I**

1. Definition, nature, scope and importance of Water Resources Geography.
2. Distribution and changing trends in use of water in the world.
3. Status of water resources in India.

**UNIT-II**

4. Factors affecting demand of water, kor water demand, delta and duty of water.
5. Estimation of water demand and use in agricultural sector.
6. Groundwater assessment, development and management.
7. Water pricing and its marketing, virtual and footprints of water.

**UNIT-III**

8. Irrigation induced waterlogging and salinity with reference to Indira Gandhi Canal project.
9. Sources, monitoring and management of water pollution.
10. Interstate water disputes-history, constitutional provisions, treaties and financial constraints.
11. Water disputes and treaties with reference to India.

**UNIT-IV**

12. Water harvesting techniques.
13. Watershed management.
14. Issues and challenges of inter basin transfer of water.
15. Environmental flows.
16. Resettlement issues pertaining to water resource projects.

**Suggested Readings:**


1. Gurjar R.K. and Jat B.C. 2008. Geography of Water Resources, Rawat Publications, Jaipur.
2. Jones, J.A. 1997. Global Hydrology-Processes, Resources and Environmental Management. Longman.
3. Michael. A.M. 1978. Irrigation: Theory and Practices. Vikas Publishing House Pvt. Ltd., New Delhi.
4. Mather, J.R. 1984. Water Resources Distribution, Use and Management. John Wiley, Maryland.
5. Newson, M. 1992. Land, Water and Development River Basin Systems and their Sustainable Management, Routledge, London.
6. Rao, K.L. 1979. India's Water Wealth. Orient Longman, New Delhi.
7. Tideman, E.M. 1996. Watershed Management; Guidelines for Indian Conditions, Omega, New Delhi.


**Mapping of Course Outcomes to Program Outcomes (Geography of Water Resources)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-404 (iv).1 | 3.0 | 2.0 | 3.0 | 2.0 | 1.0 | 3.0 | 1.0 | 3.0 | 3.0 | 1.0 | 1.0 |
| M-GEO-404 (iv).2 | 3.0 | 2.0 | 3.0 | 3.0 | 2.0 | 3.0 | 2.0 | 3.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-404 (iv).3 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 3.0 | 2.0 | 3.0 |
| M-GEO-404 (iv).4 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 |
| Average | 3.0 | 2.5 | 3.0 | 2.8 | 2.3 | 3.0 | 2.0 | 3.0 | 3.0 | 1.5 | 2.3 |

**Mapping of Course Outcomes to Program Specific Outcomes (Geography of Water Resources)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-404 (iv).1 | 3.0 | 3.0 | 1.0 | 3.0 |
| M-GEO-404 (iv).2 | 3.0 | 2.0 | 2.0 | 3.0 |
| M-GEO-404 (iv).3 | 3.0 | 3.0 | 2.0 | 3.0 |
| M-GEO-404 (iv).4 | 3.0 | 3.0 | 3.0 | 3.0 |
| Average | 3.0 | 2.8 | 2.0 | 3.0 |

**Semester-IV**
**Elective Course Code: M-GEO-404 (v)**
**Elective Course Name: Urbanization in India**

| | | |
|---|---|---|
| **Time: 3 Hours** | **Total Marks** | **: 100** |
| **Credits: 4** | **External Assessment Marks** | **: 70** |
| | **Internal Assessment Marks** | **: 30** |

**Course Outcomes (COs):** On completion of the course the students will have ability to:

**M-GEO-404 (v).1**: Understanding about pattern and processes of urbanization.
**M-GEO-404 (v).2:** Acquaintance with contemporary urban infrastructure issues.
**M-GEO-404 (v).3:** Augmentation of knowledge about urban social issues.
**M-GEO-404 (v).4:** Awareness about urban governance issues.

**Note for Paper Setters:** Question 1 is compulsory comprising of seven sub parts (two marks for each sub part), to be answered in 25-30 words. There will be eight long questions, two from each unit. The candidate has to answer four long questions, at least one question from each unit. All questions carry equal marks.

**UNIT-I**

1. History of urbanization in India: Ancient, Medieval, Colonial and post-independence phases of urbanization.
2. Processes of urbanization: Socio-cultural, political, economic and geographical processes.
3. Patterns of urbanization: settlement structure, level of urbanization, criteria of measurement and spatial patterns of urbanization in India.
4. Recent trends of urbanization in India.

**UNIT-II**

5. Urban housing.
6. Urban transport.
7. Water crisis and water management.
8. Urban sanitation.
9. Solid waste management.

**UNIT-III**

10. Urban poverty: measures of poverty, status, causes and policies.
11. Slums: current status, causes and policies.
12. Urban crime and delinquency.
13. Marginalization of poor in urban space.
14. Squeezing of urban social space.

**UNIT-IV**

15. Role of urbanization in economic and social change.
16. Urban land management: land acquisition problems and policies.
17. National urbanization policy.
18. Urban regions of India: case studies of metropolitan regions of Delhi, Mumbai, Kolkata, Chennai. Bangalore and Hyderabad.

**Suggested Readings:**


1. Ahluwalia, I.J., Kanbur, R. and Mohanty, P.K. (2014) Urbanization in India: Challenges, Opportunities and the Way Forward, SAGE India, New Delhi.
2. Alam, SM and Khan, W. (1972) Metropolitan Hyderabad and its Region: A Strategy for Development, Asia Publishing House, Bombay.
3. Amarjit, S. and Komol, S. (2020) Understanding Urbanization in Northeast India, Routledge.
4. Bhattacharya, B. (2006) Urban Development in India since Pre-Historic Times, Concept Publishing Company, New Delhi.
5. Denis, E. (2019) Subaltern Urbanization in India: An Introduction to the Dynamics of Ordinary Towns, Springer.
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8. Kundu, A. (1992) Urban Development and Urban Research in India, Khanna Publication.
9. Mishra, R.P. (2019) Million Cities of India: Growth Dynamics, Internal Structure, Quality of Life and Planning Perspectives, IBP.
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11. Nangia, S. (1976) Delhi Metropolitan Region: A study in Settlement Geography, Rajesh Publication.
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13. Rao V.L.S.P. Urbanization in India: Spatial Dimensions. Concept Publishing Co. New Delhi.
14. Rao V.L.S.P. (1979) The Structure of an Indian Metropolis: A study of Bangalore, Allied Publishers Bangalore.
15. Sharma, A.K. and Mishra, B.D. (2018) Urbanization in India: Issues and Challenges, Ane Publication, New Delhi.
16. Siva Ramakrishnan, K.C., Kundu, A. and Singh, B.N. (2005) A Handbook of Urbanization in India, Oxford University Press.

**Mapping of Course Outcomes to Program Outcomes (Urbanization in India)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-404 (v).1 | 3.0 | 2.0 | 3.0 | 2.0 | 2.0 | 3.0 | 2.0 | 2.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-404 (v).2 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 2.0 | 3.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-404 (v).3 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 2.0 | 3.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-404 (v).4 | 3.0 | 2.0 | 3.0 | 3.0 | 2.0 | 3.0 | 2.0 | 2.0 | 3.0 | 1.0 | 2.0 |
| Average | 3.0 | 2.5 | 3.0 | 2.8 | 2.0 | 3.0 | 2.0 | 2.5 | 3.0 | 1.0 | 2.0 |

**Mapping of Course Outcomes to Program Specific Outcomes (Urbanization in India)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-404 (v).1 | 3.0 | 1.0 | 3.0 | 3.0 |
| M-GEO-404 (v).2 | 3.0 | 1.0 | 2.0 | 3.0 |
| M-GEO-404 (v).3 | 3.0 | 1.0 | 2.0 | 3.0 |
| M-GEO-404 (v).4 | 3.0 | 1.0 | 2.0 | 3.0 |
| Average | 3.0 | 1.0 | 2.3 | 3.0 |

**Semester-IV**
**Core Course Code: M-GEO-405**
**Core Course Name: Fundamentals of Geographical Information Systems (Theory)**

**Time: $2\frac{1}{2}$ Hours** | **Total Marks : 50**
**Credits: 2** | **External Assessment Marks : 35**
**Internal Assessment Marks : 15**

**Course Outcomes (COs):**

**M-GEO-405.1**: Acquaintance with the fundamentals of Geographical Information Systems.
**M-GEO-405.2:** Capability to differentiate the data types in geographical information systems.
**M-GEO-405.3:** Understanding about the applications of geographical information systems in resource mapping.
**M-GEO-405.4:** Knowledge about types and functioning of global positioning system

**Note for Paper Setters:** Question 1 is compulsory comprising of four sub parts (two marks for each sub part), to be answered in 25-30 words. There will be six long questions, three from each unit. The candidate has to answer three long questions, at least one question from each unit. Question 1 carries eight marks. Long questions carry nine marks each.

**UNIT-I**

1. GIS: definition and scope; components and elements of GIS, concept of geoid and spheroid. Coordinate projection system: implications of spherical and planar coordinate systems and their transformations in GIS.
2. Geographic data: spatial and non-spatial; spatial data structure: raster and vector; data base management system.

**UNIT-II**

3. Spatial analysis: overlay, neighborhood and proximity; integration of raster and vector data; applications of GIS in resource mapping and management.
4. Fundamentals of Global Positioning System (GPS): concept and principles; GPS devices; GPS system: NAVSTAR, GALILIO and GAGAN; applications of GPS.

**Suggested Readings:**


1. Burrough, P.A. and McDonnell, R. (1998). Principles of Geographic Information Systems. Oxford University Press, Oxford.
2. Bhatta Basudeb (2014). Remote Sensing and GIS. Oxford University Press, Oxford.
3. Chang, K.T. (2003). Introduction to Geographic Information Systems. Tata McGraw Hill Publications Company, New Delhi.
4. Demers, M. N. (2000). Fundamentals of Geographic Information Systems. John Wiley and Sons, Singapore
5. Heywood I, Cornelius S and Carver S. (2000). An Introduction to Geographical Information Systems, Longman, New York.


**Mapping of Course Outcomes to Program Outcomes**
**(Fundamentals of Geographical Information Systems -Theory)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-405.1 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 1.0 | 3.0 |
| M-GEO-405.2 | 3.0 | 3.0 | 2.0 | 2.0 | 2.0 | 3.0 | 3.0 | 3.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-405.3 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 3.0 | 3.0 | 3.0 | 1.0 | 3.0 |
| M-GEO-405.4 | 3.0 | 2.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 1.0 | 3.0 |
| Average | 3.0 | 2.8 | 2.8 | 2.8 | 2.5 | 3.0 | 3.0 | 3.0 | 3.0 | 1.0 | 2.8 |

**Mapping of Course Outcomes to Program Specific Outcomes**
**(Fundamentals of Geographical Information Systems -Theory)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-405.1 | 2.0 | 3.0 | 3.0 | 3.0 |
| M-GEO-405.2 | 3.0 | 3.0 | 3.0 | 2.0 |
| M-GEO-405.3 | 2.0 | 3.0 | 3.0 | 3.0 |
| M-GEO-405.4 | 2.0 | 3.0 | 3.0 | 3.0 |
| Average | 2.3 | 3.0 | 3.0 | 2.8 |

**Semester-IV**
**Core Course Code: M-GEO-406**
**Core Course Name: Fundamentals of Geographical Information Systems (Practical)**

**Time: 3 Hours** | **Total Marks : 100**
**Credits: 4** | **External Assessment Marks : 70**
**Internal Assessment Marks : 30**

**Course Outcomes (COs):**

**M-GEO-406.1**: Acquisition of skills to handle geographical information systems software.
**M-GEO-406.2:** Enhancement of skills in processing of digital imageries using techniques of GIS.
**M-GEO-406.3:** Awareness about GPS functioning and processes of data acquisition.
**M-GEO-406.4:** Acquaintance with the techniques of integrating GPS data in GIS and mobile mapping.

**Note for Paper Setters:** The examiner shall set four questions, two from each unit. The candidate shall attempt three questions in all, selecting at least one question from each unit.

**Distribution of Marks for Evaluation**

**Exercise = 45** **Project File Record = 10** **Viva-voce = 15**

**UNIT-I**

1. Generation of geographic framework: Georeferencing of Topographic maps with Projection, (Spheroids local & spheroids)
2. Generation of geodatabase/ spatial data base: vectorization (point, line and polygon), editing and building topology, joining non-spatial data
3. Analysis: overlay, query, proximity
4. Symbolization: chorochromatic, choropleth and point proportional.

**UNIT-II**

5. GPS: introduction to the GPS and different pages in GPS device.
6. Collection of GCP and mobile mapping.

**Suggested Readings:**


1. Burrough, P.A. and McDonnell, R. (1998). Principles of Geographic Information Systems. Oxford University Press, Oxford.
2. Bhatta Basudeb (2014). Remote Sensing and GIS. Oxford University Press, Oxford.
3. Chang, K.T. (2003). Introduction to Geographic Information Systems. Tata McGraw Hill Publications Company, New Delhi.
4. Demers, M. N. (2000). Fundamentals of Geographic Information Systems. John Wiley and Sons, Singapore
5. Heywood I, Cornelius S and Carver S. (2000). An Introduction to Geographical Information Systems, Longman, New York.


**Mapping of Course Outcomes to Program Outcomes**
**(Fundamentals of Geographical Information Systems -Practical)**

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-406.1 | 3.0 | 2.0 | 3.0 | 2.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-406.2 | 3.0 | 3.0 | 2.0 | 3.0 | 2.0 | 3.0 | 3.0 | 3.0 | 3.0 | 1.0 | 2.0 |
| M-GEO-406.3 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 3.0 | 3.0 | 3.0 | 1.0 | 3.0 |
| M-GEO-406.4 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 1.0 | 3.0 |
| Average | 3.0 | 2.8 | 2.8 | 2.8 | 2.5 | 3.0 | 3.0 | 3.0 | 3.0 | 1.0 | 2.5 |

**Mapping of Course Outcomes to Program Specific Outcomes**
**(Fundamentals of Geographical Information Systems -Practical)**

| COs/PSOs | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|
| M-GEO-406.1 | 2.0 | 3.0 | 3.0 | 3.0 |
| M-GEO-406.2 | 3.0 | 3.0 | 3.0 | 3.0 |
| M-GEO-406.3 | 3.0 | 3.0 | 3.0 | 3.0 |
| M-GEO-406.4 | 3.0 | 3.0 | 3.0 | 3.0 |
| Average | 2.8 | 3.0 | 3.0 | 3.0 |

**Mapping of Course Outcomes, Program Outcomes and Program Specific Outcomes (M.Sc. Geography)**

| Course Code | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-101 | 3.0 | 3.0 | 2.3 | 2.5 | 2.0 | 2.8 | 2.8 | 3.0 | 3.0 | 2.3 | 1.8 | 3.0 | 2.8 | 2.8 | 3.0 |
| M-GEO-102 | 3.0 | 1.3 | 2.0 | 1.8 | 2.0 | 1.3 | 1.3 | 1.5 | 3.0 | 1.0 | 1.3 | 3.0 | 1.0 | 1.8 | 1.8 |
| M-GEO-103 | 3.0 | 2.8 | 3.0 | 2.3 | 3.0 | 2.5 | 1.3 | 3.0 | 3.0 | 1.5 | 3.0 | 3.0 | 3.0 | 2.3 | 3.0 |
| M-GEO-104 | 3.0 | 3.0 | 2.5 | 3.0 | 1.5 | 3.0 | 3.0 | 3.0 | 2.3 | 2.3 | 2.0 | 2.3 | 3.0 | 3.0 | 3.0 |
| M-GEO-105 | 3.0 | 2.0 | 2.0 | 3.0 | 1.8 | 2.0 | 2.0 | 2.0 | 3.0 | 1.0 | 2.0 | 3.0 | 1.0 | 3.0 | 3.0 |
| M-GEO-106 | 3.0 | 2.0 | 3.0 | 3.0 | 2.0 | 2.0 | 2.0 | 2.0 | 3.0 | 1.0 | 2.0 | 3.0 | 1.0 | 3.0 | 3.0 |
| M-GEO-201 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 2.5 | 2.8 | 3.0 | 1.5 | 2.5 | 3.0 | 2.3 | 1.8 | 3.0 |
| M-GEO-202 | 3.0 | 2.5 | 3.0 | 2.8 | 2.0 | 2.5 | 2.0 | 2.5 | 3.0 | 1.0 | 2.0 | 3.0 | 1.0 | 2.8 | 2.0 |
| M-GEO-203 | 3.0 | 3.0 | 2.0 | 2.8 | 2.0 | 2.8 | 2.0 | 3.0 | 3.0 | 2.8 | 2.0 | 2.8 | 2.3 | 3.0 | 3.0 |
| M-GEO-204 | 3.0 | 2.8 | 2.0 | 3.0 | 1.5 | 3.0 | 2.5 | 3.0 | 3.0 | 2.3 | 1.8 | 3.0 | 2.5 | 2.8 | 2.8 |
| M-GEO-205 | 3.0 | 2.8 | 2.8 | 2.5 | 1.8 | 2.5 | 1.8 | 2.5 | 3.0 | 1.5 | 3.0 | 3.0 | 2.5 | 2.5 | 2.8 |
| M-GEO-206 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 2.0 | 3.0 | 3.0 | 2.0 | 3.0 | 3.0 | 2.3 | 3.0 | 2.5 |
| M-GEO-OE-204 | 3.0 | 1.8 | 1.8 | 1.5 | 2.0 | 1.8 | 1.5 | 2.8 | 2.8 | 2.0 | 2.0 | 3.0 | 1.0 | 1.8 | 2.0 |
| M-GEO-301 | 3.0 | 1.0 | 3.0 | 2.8 | 2.0 | 2.0 | 1.5 | 2.0 | 3.0 | 1.0 | 2.0 | 3.0 | 1.0 | 1.8 | 3.0 |
| M-GEO-302 | 3.0 | 3.0 | 2.5 | 3.0 | 2.8 | 3.0 | 2.5 | 2.3 | 3.0 | 2.8 | 2.3 | 2.3 | 2.8 | 2.8 | 3.0 |
| M-GEO-303(i) | 3.0 | 2.5 | 3.0 | 2.8 | 2.0 | 2.8 | 2.3 | 2.0 | 3.0 | 1.0 | 2.3 | 3.0 | 1.0 | 2.3 | 3.0 |
| M-GEO-303(ii) | 3.0 | 2.8 | 2.3 | 3.0 | 1.8 | 2.5 | 1.5 | 2.8 | 3.0 | 2.0 | 1.3 | 3.0 | 2.5 | 2.5 | 2.0 |
| M-GEO-303(iii) | 3.0 | 3.0 | 2.5 | 2.8 | 2.3 | 3.0 | 2.3 | 3.0 | 3.0 | 1.8 | 2.3 | 3.0 | 2.8 | 2.3 | 3.0 |
| M-GEO-303(iv) | 3.0 | 2.8 | 2.3 | 2.3 | 1.8 | 2.3 | 2.8 | 3.0 | 3.0 | 2.3 | 1.8 | 3.0 | 2.3 | 3.0 | 2.3 |
| M-GEO-303 (v) | 3.0 | 2.3 | 3.0 | 2.8 | 2.0 | 2.3 | 2.3 | 2.5 | 3.0 | 1.0 | 2.0 | 3.0 | 1.0 | 2.3 | 2.8 |
| M-GEO-304 (i) | 3.0 | 2.8 | 2.8 | 2.5 | 2.0 | 2.3 | 2.0 | 2.3 | 3.0 | 1.0 | 2.0 | 3.0 | 1.0 | 1.8 | 2.5 |
| M-GEO-304 (ii) | 3.0 | 2.0 | 2.5 | 2.5 | 2.0 | 2.0 | 2.0 | 2.0 | 3.0 | 1.0 | 2.0 | 3.0 | 1.0 | 2.0 | 2.3 |
| M-GEO-304 (iii) | 3.0 | 2.8 | 2.0 | 2.8 | 2.5 | 3.0 | 2.0 | 2.8 | 3.0 | 1.5 | 3.0 | 3.0 | 2.5 | 3.0 | 3.0 |
| M-GEO-304 (iv) | 3.0 | 2.5 | 3.0 | 2.5 | 1.0 | 2.8 | 1.5 | 2.5 | 3.0 | 1.5 | 2.5 | 3.0 | 2.8 | 1.8 | 3.0 |
| M-GEO-304 (v) | 3.0 | 2.3 | 2.5 | 2.5 | 2.0 | 2.3 | 2.0 | 2.5 | 3.0 | 1.0 | 2.5 | 3.0 | 1.0 | 1.3 | 2.5 |
| M-GEO-305 | 3.0 | 2.5 | 2.5 | 2.5 | 2.3 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 1.8 | 2.5 | 3.0 | 3.0 | 3.0 |
| M-GEO-306 | 3.0 | 3.0 | 2.5 | 2.8 | 1.5 | 2.3 | 3.0 | 3.0 | 3.0 | 1.8 | 1.8 | 2.3 | 3.0 | 3.0 | 2.5 |
| M-GEO-307 | 2.5 | 2.8 | 2.0 | 2.5 | 2.3 | 2.5 | 2.0 | 3.0 | 3.0 | 2.3 | 2.5 | 2.0 | 2.5 | 3.0 | 3.0 |
| M-GEO-OE-304 | 3.0 | 1.8 | 1.3 | 1.5 | 1.5 | 1.5 | 1.0 | 2.3 | 2.8 | 2.3 | 1.0 | 3.0 | 1.8 | 1.8 | 2.0 |
| M-GEO-401 | 3.0 | 3.0 | 2.0 | 1.5 | 1.8 | 2.3 | 1.3 | 3.0 | 3.0 | 3.0 | 1.3 | 3.0 | 1.5 | 2.0 | 3.0 |
| M-GEO-402 | 3.0 | 3.0 | 3.0 | 2.0 | 1.5 | 2.8 | 2.0 | 2.8 | 3.0 | 1.3 | 2.0 | 3.0 | 2.5 | 2.5 | 2.5 |
| M-GEO-403(i) | 3.0 | 1.5 | 2.5 | 1.5 | 2.0 | 1.5 | 1.0 | 1.5 | 3.0 | 1.0 | 2.0 | 3.0 | 1.0 | 1.5 | 2.5 |
| M-GEO-403 (ii) | 3.0 | 3.0 | 2.0 | 2.8 | 2.3 | 2.8 | 1.8 | 3.0 | 3.0 | 2.5 | 1.3 | 3.0 | 2.3 | 2.8 | 2.8 |
| M-GEO-403 (iii) | 3.0 | 2.3 | 1.8 | 1.5 | 1.8 | 2.3 | 1.5 | 3.0 | 3.0 | 2.8 | 1.3 | 3.0 | 2.0 | 2.3 | 2.8 |
| M-GEO-403(iv) | 3.0 | 2.3 | 2.8 | 1.8 | 1.8 | 2.8 | 1.5 | 2.3 | 3.0 | 1.3 | 2.3 | 3.0 | 2.3 | 1.5 | 3.0 |
| M-GEO-403 (v) | 3.0 | 3.0 | 2.3 | 2.8 | 2.0 | 2.5 | 2.0 | 3.0 | 3.0 | 2.3 | 1.8 | 3.0 | 2.0 | 2.8 | 2.5 |
| M-GEO-404 (i) | 3.0 | 2.0 | 1.3 | 1.5 | 1.5 | 2.0 | 1.3 | 3.0 | 3.0 | 3.0 | 1.8 | 3.0 | 1.8 | 2.8 | 2.8 |
| M-GEO-404 (ii) | 3.0 | 2.5 | 2.8 | 2.5 | 2.0 | 2.5 | 1.5 | 2.5 | 3.0 | 1.0 | 2.0 | 3.0 | 1.0 | 1.5 | 2.8 |
| M-GEO-404 (iii) | 3.0 | 2.3 | 1.5 | 1.3 | 1.8 | 1.8 | 1.0 | 3.0 | 3.0 | 3.0 | 2.0 | 3.0 | 2.3 | 2.0 | 2.5 |
| M-GEO-404 (iv) | 3.0 | 2.5 | 3.0 | 2.8 | 2.3 | 3.0 | 2.0 | 3.0 | 3.0 | 1.5 | 2.3 | 3.0 | 2.8 | 2.0 | 3.0 |
| M-GEO-404 (v) | 3.0 | 2.5 | 3.0 | 2.8 | 2.0 | 3.0 | 2.0 | 2.5 | 3.0 | 1.0 | 2.0 | 3.0 | 1.0 | 2.3 | 3.0 |
| M-GEO-405 | 3.0 | 2.8 | 2.8 | 2.8 | 2.5 | 3.0 | 3.0 | 3.0 | 3.0 | 1.0 | 2.8 | 2.3 | 3.0 | 3.0 | 2.8 |
| M-GEO-406 | 3.0 | 2.8 | 2.8 | 2.8 | 2.5 | 3.0 | 3.0 | 3.0 | 3.0 | 1.0 | 2.5 | 2.8 | 3.0 | 3.0 | 3.0 |

**Attainment of COs:**

The attainment of COs can be measured on the basis of the results of internal assessment and semester examination. The attainment is measured on scale of 3 after setting the target for COs attainment. **Following table** shows the CO attainment levels assuming the set target of 60% marks:

**CO Attainment Levels for internal assessment**

| Attainment Level | |
|---|---|
| 1<br>(low level of attainment) | 60% of students score more than 60% of marks in class tests of a course. |
| 2<br>(Medium level of attainment) | 70% of students score more than 60% of marks in class tests of a course. |
| 3<br>(High level of attainment) | 80% of students score more than 60% of marks in class tests of a course. |

*Note: In the above table, the set target is assumed as 60%. It may vary in different departments/institutes. The staff councils of the departments/institutes may finalize the set target.*

A proper mapping of course outcomes with assessment methods should be defined before measuring the attainment level. The questions in tests for internal assessment are based on COs. Here it is assumed that class test-I is based on first two COs **(i.e. M-GEO-101.1 and M-GEO-101.2)** of a course with equal weightage given to both COs. Similarly, class test-II is based on next two COs (i.e. **M-GEO-101.3 and M-GEO-101.4**) of a course with equal weightage given to these two COs. For each internal assessment test, the percentage of students attaining the target level of CO is estimated and average percentage will decide the attainment level of COs. Following steps may be followed for determining the attainment level in internal assessment of a course.

(i) Estimate the %age of students scoring set target (say 60%) or more in the question(s) of test -I based on first CO i.e. **M-GEO-101.1.**
(ii) Estimate the %age of students scoring set target (60%) or more in the question(s) of test-I based on second CO i.e. **M-GEO-101.2.**
(iii) Estimate the %age of students scoring set target (60%) or more in the question(s) of test-II based on third CO i.e. **M-GEO-101.3.**
(iv) Estimate the %age of students scoring set target (60%) or more in the question(s) of test-II based on the fourth CO i.e. **M-GEO-101.4.**
(v) Take average of the percentages obtained above.
(vi) Determine the attainment level i.e. 3, 2 or 1 as per scale defined in **the above table**.

***Note:*** *In the above steps, it is assumed that internal assessment is based on two tests only. However, if internal assessment is based on more than two tests and/or on assignments then same may by incorporated to determine the COs attainment level. There may be more than four COs for a course. The set target may also be different for different COs. These issues may be resolved by the staff councils of the departments/institutes.*

For determining the attainment levels for end semester examination, it is assumed that questions in the end term examination are based on all COs of the course. Attainment levels for end semester examination of a course can be determined after the declaration of the results. The CO attainment levels for end semester examination are given **in the following Table.**

**CO Attainment Levels for End Semester Examination (ESE)**

| Attainment Level | |
|---|---|
| 1<br>(Low level of attainment) | 60% of students obtained letter grade of A or above (for CBCS programs) or score more than 60% of marks (for non-CBCS programs) in ESE of a course. |
| 2<br>(Medium level of attainment) | 70% of students obtained letter grade of A or above (for CBCS programs) or score more than 60% of marks (for non-CBCS programs) in ESE of a course. |
| 3<br>(High level of attainment) | 80% of students obtained letter grade of A or above (for CBCS programs) or score more than 60% of marks (for non-CBCS programs) in ESE of a course. |

***Note:*** *In the above table, the set target is assumed as grade A for CBCS courses and 60% for non-CBCS courses. It may vary in different departments/institutes. The staff councils of the departments/institutes may finalize the set target.*

**Overall CO Attainment level of a Course:**

The overall CO attainment level of a course can be obtained as:

Overall CO attainment level = 50% of CO attainment level in internal assessment + 50% of CO attainment level in end semester examination.

The overall COs attainment level can be obtained for all the courses of the program in a similar manner.

**Attainment of POs:**

The overall attainment level of POs is based on the values obtained using direct and indirect methods in the ratio of 80:20. The direct attainment of POs is obtained through the attainment of COs. The overall CO attainment value as estimated above and CO-PO mapping value as shown in **Table 3** are used to compute the attainment of POs. PO attainment values obtained using direct method can be written as shown **in the following Table.**

**PO Attainment Values using Direct Method**

| Course Code | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M-GEO-101 | | | | | | | | | | | |
| M-GEO-102 | | | | | | | | | | | |
| M-GEO-103 | | | | | | | | | | | |
| M-GEO-104 | | | | | | | | | | | |
| M-GEO-105 | | | | | | | | | | | |
| M-GEO-106 | | | | | | | | | | | |
| M-GEO-201 | | | | | | | | | | | |
| M-GEO-202 | | | | | | | | | | | |
| M-GEO-203 | | | | | | | | | | | |
| M-GEO-204 | | | | | | | | | | | |
| M-GEO-205 | | | | | | | | | | | |
| M-GEO-206 | | | | | | | | | | | |
| M-GEO-OE-204 | | | | | | | | | | | |
| M-GEO-301 | | | | | | | | | | | |
| M-GEO-302 | | | | | | | | | | | |
| M-GEO-303(i) | | | | | | | | | | | |
| M-GEO-303(ii) | | | | | | | | | | | |
| M-GEO-303(iii) | | | | | | | | | | | |
| M-GEO-303(iv) | | | | | | | | | | | |
| M-GEO-303 (v) | | | | | | | | | | | |
| M-GEO-304 (i) | | | | | | | | | | | |
| M-GEO-304 (ii) | | | | | | | | | | | |
| M-GEO-304 (iii) | | | | | | | | | | | |
| M-GEO-304 (iv) | | | | | | | | | | | |
| M-GEO-304 (v) | | | | | | | | | | | |
| M-GEO-305 | | | | | | | | | | | |
| M-GEO-306 | | | | | | | | | | | |
| M-GEO-307 | | | | | | | | | | | |
| M-GEO-OE-304 | | | | | | | | | | | |
| M-GEO-401 | | | | | | | | | | | |
| M-GEO-402 | | | | | | | | | | | |
| M-GEO-403(i) | | | | | | | | | | | |
| M-GEO-403 (ii) | | | | | | | | | | | |
| M-GEO-403 (iii) | | | | | | | | | | | |
| M-GEO-403(iv) | | | | | | | | | | | |
| M-GEO-403 (v) | | | | | | | | | | | |
| M-GEO-404 (i) | | | | | | | | | | | |
| M-GEO-404 (ii) | | | | | | | | | | | |
| M-GEO-404 (iii) | | | | | | | | | | | |
| M-GEO-404 (iv) | | | | | | | | | | | |
| M-GEO-404 (v) | | | | | | | | | | | |
| M-GEO-405 | | | | | | | | | | | |
| M-GEO-406 | | | | | | | | | | | |
| Direct PO attainment | Average of above values | Average of above values | Average of above values | -- | -- | -- | -- | -- | -- | -- | Average of above values |

The PO attainment values to be filled in above table can be obtained as follows:

**For B-GEO-101-PO1 Cell:**

PO1 attainment value = (Mapping factor of **M-GEO-101**-PO1 from **Table 3** × Overall CO attainment value for the course **M-GEO-101**)/3

**For M-GEO-201-PO1 Cell:**

PO1 attainment value = (Mapping factor of **M-GEO-201**-PO1 from **Table 3** × Overall CO attainment value for the course **M-GEO-201**)/3

Similarly, values for each cell **of the above table** can be obtained. The direct attainment of POs is average of individual PO attainment values.

In order to obtain the PO attainment using indirect method, a student exit survey based on the questionnaire of POs may be conducted at end of last semester of the program. The format for the same is given **in the following table**. Average of the responses from the outgoing students for each PO is estimated.

The overall PO attainment values are obtained by adding attainment values estimated using direct and indirect methods in the proportion of 80:20 as follows:

Overall attainment value for PO1 = 0.8 × average attainment value for PO1 using direct method **(from above table)** + 0.2 × average response of outgoing students for PO1. Similarly, overall attainment value can be obtained for each PO.

**Questionnaire for indirect measurement of PO attainment (For outgoing students)**

At the end of my degree program I am able to do:

| | Please tick any one | | |
|---|---|---|---|
| Statement of PO1 | 3 | 2 | 1 |
| Statement of PO2 | 3 | 2 | 1 |
| Statement of PO3 | 3 | 2 | 1 |
| Statement of PO4 | 3 | 2 | 1 |
| Statement of PO5 | 3 | 2 | 1 |
| Statement of PO6 | 3 | 2 | 1 |
| Statement of PO7 | 3 | 2 | 1 |
| Statement of PO8 | 3 | 2 | 1 |
| Statement of PO9 | 3 | 2 | 1 |
| Statement of PO10 | 3 | 2 | 1 |
| Statement of PO11 | 3 | 2 | 1 |
| 3: Strongly Agree; 2: Agree; 1: Average | | | |

Overall PO attainment values can be written as shown **in the following Table.**

**Overall PO attainment Values**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Direct PO attainment | | | | | | | | | | | |
| Indirect PO attainment | | | | | | | | | | | |
| Overall PO attainment | | | | | | | | | | | |
| Target | 2 | 2 | 2 | 2 | 2 | 1.5 | 2 | 2 | 2 | 2 | 1.5 |

The overall PO attainment values obtained above are compared with set target. The set target for each PO may be different and can be finalized by the staff councils of the departments/institutes. If overall PO attainment value is less than the set target value then an action plan may be prepared for improvement in the subsequent academic session.

The overall PSO attainment level based on CO-PSO mapping values and overall CO attainment values can be obtained in a similar manner.